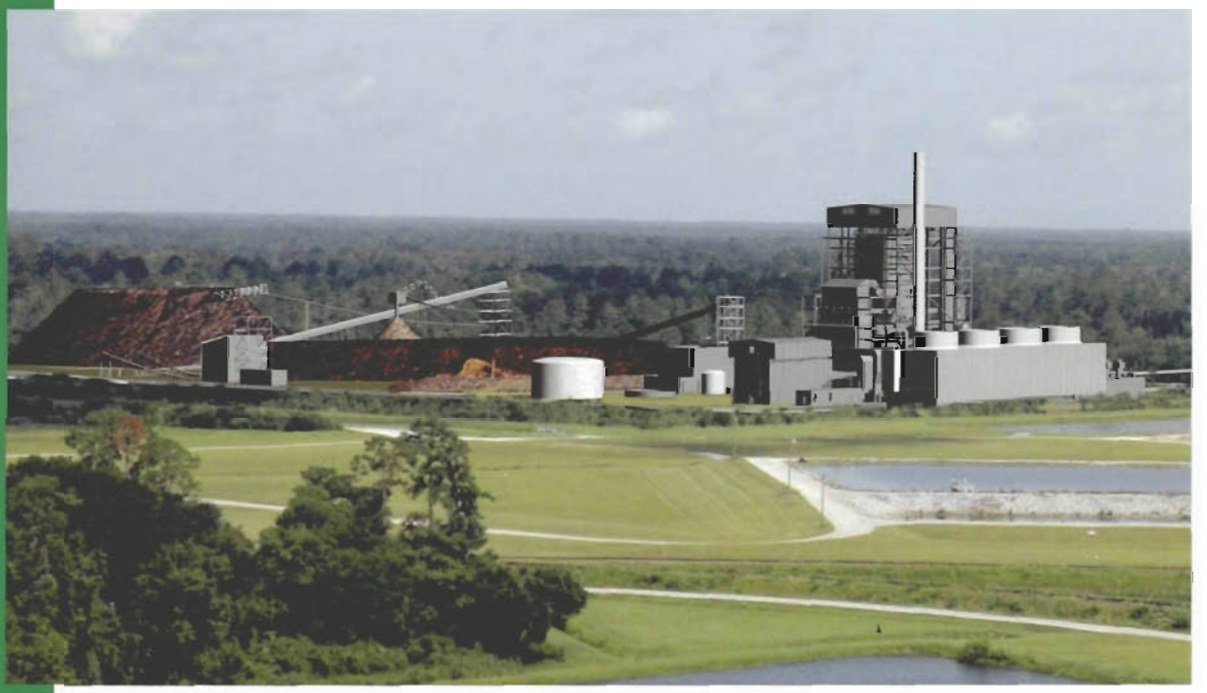
Gainesville Renewable Energy Center Completeness Responses and Amendment to the Site Certification Application



Gainesville Renewable Energy Center
An American Renewables Company

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Prepared by:

ECT

Environmental Consulting & Technology, Inc.
3701 Northwest 98th Street
Gainesville, Florida 32606
ECT No. 090408-0800

February 2010

Gainesville Renewable Energy Center
An American Renewables Company

Renewable, Reliable, Economical Power for Florida

February 8, 2010

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BUREAU OF AIR REGULATION

Mr. Mike Halpin, Administrator
Siting Coordination Office
Florida Department of Environmental Protection
Mail Station 48
3900 Commonwealth Boulevard
Tallahassee, Florida 32399

Re: Gainesville Renewable Energy Center
Site Certification Application (PPSA No. PA09-55)
Completeness Responses and Amendment to the Site Certification Application

Dear Mr. Halpin:

Gainesville Renewable Energy Center, LLC (GREC LLC), is pleased to file these completeness responses and amendment to the Site Certification Application (SCA) for the proposed Gainesville Renewable Energy Center (GREC) in the City of Gainesville, Alachua County, Florida. GREC LLC is concurrently distributing copies of this information to the statutory agencies and other entities that received copies of the SCA. A copy of the distribution list is attached.

The completeness responses are provided in response to the Florida Department of Environmental Protection (FDEP) Determination that Application is Incomplete dated January 11, 2010. The responses provide additional information and clarifications to the requests from the reviewing agencies, which were included with FDEP's determination of incompleteness. For certain agency requests, GREC LLC clearly indicates the reasons why the requested information is not provided. Also, as indicated in several of the responses, GREC LLC has concluded that certain completeness items may be more suitably addressed through postcertification submittals and has recommended conditions of certification for several of these requests.

Further, as indicated in the enclosed information, GREC LLC continued to refine the engineering/design plans for the GREC facilities after the SCA was filed. These efforts identified several improvements in the locations or layout of facilities within the Site that will enhance the overall operations. These improvements to the site layout are considered to be minor, because the facilities are merely being relocated or slightly shifted within the original plant and fuel storage areas.

These improvements in the facility layout are precertification amendments to the SCA, as defined in FDEP Rule 62-17.200(10), Florida Administrative Code (F.A.C.). The information concerning these amendments is being provided to all agencies and entities that received the SCA for review. GREC LLC and its consultants have discussed these amendments in the facility layout with the FDEP Siting Coordination Office and several of the reviewing agencies and, to date, no concerns with the amendments have been identified.

GREC LLC looks forward to continuing to work with you and FDEP during this certification proceeding. If you have any questions regarding GREC, please contact GREC LLC's project manager, Mr. Josh Levine, at 617/482-6150, Ext. 117.

Sincerely,

Jim Gordon

James S. Gordon
Chief Executive Officer

Enclosures

Distribution List for GREC SCA

Gainesville Renewable Energy Center
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U.S. Army Corps of Engineers
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EnviroFocus Technologies

December 23, 2009

RECEIVED
DEC 2 3 2009
BUREAU OF AIR REGULATION

Mr. Al Linero
Program Administrator
Special Projects Section
Florida Department of Environmental Protection
2600 Blairstone Road
Tallahassee, Florida 32399-2400

RE: Request for Extension; Ambient Air Monitoring Stations
Project Number: Permit No. 0570057-020-AC/PSD-FL-404
File No: 0570057-023-AC/PSD-FL-404A

Dear Mr. Linero:

The purpose of this correspondence is to request an extension of the 120 day suspense date listed in Section 3. F. Facility Grounds and Roadways- AMBIENT MONITORING AND MODELING REQUIRED. Title V Permit No.0570057-020-AC was dated September 22, 2009. Accordingly, two (2) ambient monitoring stations for Lead-Total Suspended Particles (Pb-TSP) are to be installed and operated at offsite locations to be determined by the Department within 120 days of final issuance of the permit.

EFT has been working closely with the Environmental Protection Commission Hillsborough County (EPC) to implement the installation of the ambient monitoring stations. During a meeting between EPC and EFT on December 9, 2009, EPC utilized discretionary enforcement to interpret the terms of the permit and assumed the responsibility of installing, maintaining, developing the associated standard operating procedures, and operating the monitors. The coordination of these efforts continues. The monitors were purchased by EFT and were delivered to EPC (Tom Tamanini) on December 22, 2009. However, the following essential items have not been confirmed: Approval to install the offsite monitors in the nearby trailer park and local elementary school; the installation of power to the monitor locations once established; and the development of a logistics contract between EFT and EPC for the monitor, sample collection, normal data base management, lab services, and maintenance. In view of the multitude of time consuming efforts anticipated to achieve these objectives, EFT requests a **90 day extension or an extension until installed.**

EFT and EPC have been having weekly meetings coordinating these efforts and EPC is in agreement with this request. Please feel free to call me at 813-744-5004 with any questions or comments you may have regarding this request.

Sincerely,
EnviroFocus Technologies, LLC

Larry G. Eagan
Plant Manager

Cc: Sterlin Woodard, PE, Hillsborough County EPC
John Tapper, EnviroFocus Technologies, LLC

EnviroFocus Technologies LLC
Voice 813-620-3260 Fax 813-620-3505 www.efttampa.com 1901 N. 66th Street • Tampa, Florida 33619

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
ACI	Archaeological Consultants, Inc.
CD	compact disc
CO_2	carbon dioxide
COD	commercial operation date
CSX	CSX Transportation, Inc.
DGS	Deerhaven Generation Station
DOH	Division of Historical Resources
EPA	U.S. Environmental Protection Agency
ERP	environmental resource permit
F.A.C.	Florida Administrative Code
F.S.	Florida Statutes
FAS	Floridan aquifer system
FDEP	Florida Department of Environmental Protection
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FNAI	Florida Natural Areas Inventory
ft	foot
FWC	Florida Fish and Wildlife Conservation Commission
GHG	greenhouse gas
GIS	geographic information system
gpd	gallon per day
GREC	Gainesville Renewable Energy Center
GREC LLC	Gainesville Renewable Energy Center, LLC
GRU	Gainesville Regional Utilities
GWP	global warming potential
LUWS	limited use water system
MFLs	minimum flows and levels
MGD	million gallons per day
NAVD88	North American vertical datum of 1988
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NTNCWS	nontransient, noncommunity water system
PPA	power purchase agreement
PPSA	Florida Electrical Power Plant Siting Act
PUC	Public Utilities Commission
PVC	polyvinyl chloride
SCA	site certification application
SHPO	State Historic Preservation Office
SRWMD	Suwannee River Water Management District
U.S. 441	U.S. Highway 441
UMAM	Uniform Mitigation Assessment Methodology
USFWS	U.S. Fish and Wildlife Service
ZLD	zero liquid discharge

1.0 INTRODUCTION

On November 30, 2009, Gainesville Renewable Energy Center, LLC (GREC LLC) filed a site certification application (SCA) with the Florida Department of Environmental Protection (FDEP) for the construction and operation of the Gainesville Renewable Energy Center (GREC), a new biomass-fueled electrical power plant and associated facilities located within the City of Gainesville, Alachua County, Florida. GREC LLC is seeking certification of the proposed GREC electrical power plant and associated facilities in accordance with the Florida Electrical Power Plant Siting Act (PPSA), Sections 403.501 through 403.518, Florida Statutes (F.S.). The SCA was also provided to all affected agencies and local governments for review and comment in accordance with the PPSA requirements.

1.1 COMPLETENESS RESPONSES

Pursuant to Section 403.5066, F.S., on January 11, 2010, the FDEP Siting Coordination Office, after consulting with affected agencies, determined that the SCA for GREC is incomplete (i.e., the SCA does not contain sufficient information to support a recommendation concerning certification). Attachment A of this document provides a copy of FDEP's incompleteness determination. The determination includes all requests for additional or clarifying information from the reviewing agencies.

GREC LLC has agreed to provide the additional information necessary to make the SCA complete, pursuant to Section 403.5066(2)(b), F.S. Section 2.0 of this document provides GREC LLC's responses to the completeness comments and requests from the reviewing agencies. As indicated in several of the responses to these comments/requests, GREC LLC has concluded that certain completeness items may be more suitably addressed through postcertification submittals. The following responses also contain the conditions of certification that GREC LLC recommends for several of these items.

1.2 AMENDMENT TO THE SCA

After the SCA for GREC was filed, GREC LLC continued to refine the engineering/design plans for the GREC facilities. Based on these efforts, several improvements in

the location or layout of facilities within the Site have been identified that will enhance the overall operations. These improvements primarily involve the relocation of the scale and scale house used to weigh the incoming biomass fuel delivery trucks and the relocation of the biomass fuel truck unloading shed, receiving hoppers, fuel screening/hogging enclosure, and conveyor system from the unloading area to the biomass fuel storage piles. The biomass fuel storage piles will remain the same size, but their location will shift slightly (i.e., approximately 50 feet [ft]) to the east. These improvements to the site layout are considered to be minor because the facilities are merely being relocated to different sections of the plant roadway loop or shifted slightly within the roadway loop area. No additional land areas on the Site will be impacted by these improvements. Section 3.0 of this document provides more detailed descriptions of these improvements to the site plan, including revised figures that depict the refinements to the site plan and facility layout. The revised figures supersede the site layout figures contained in the SCA.

These improvements in the facility layout are precertification amendments to the SCA, as defined in FDEP Rule 62-17.200(10), Florida Administrative Code (F.A.C.). The information concerning these amendments is being provided to all agencies and entities that received the SCA for review. GREC LLC and its consultants have discussed these amendments in the facility layout with the FDEP Siting Coordination Office and several of the reviewing agencies and, to date, no concerns with the amendments have been identified.

2.0

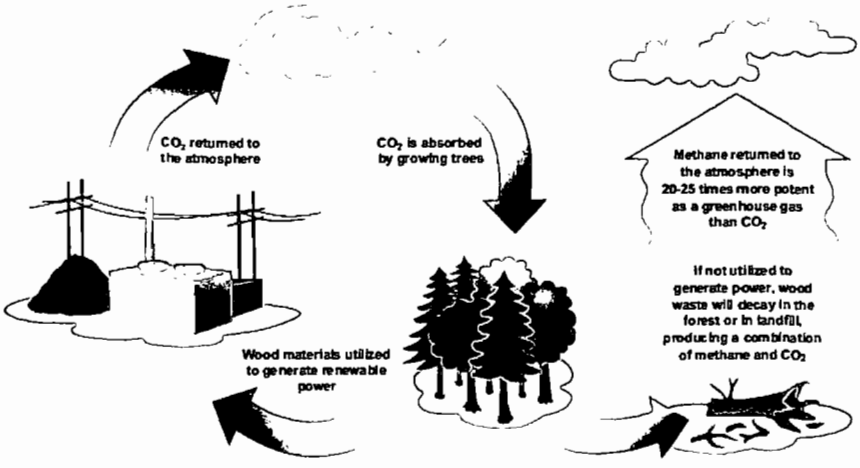
COMPLETENESS RESPONSES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) SITING COORDINATION OFFICE (FDEPSCO)

FDEPSCO-1 1) According to the application, GREC's use of woody biomass fuel will not result in a net increase of carbon dioxide (CO2) emissions. Although the growth and decomposition of trees represents a natural atmospheric carbon cycle, woody biomass is generally only considered a carbon neutral source of energy if the level of potential sequestration of trees balances that of tree harvesting. Please justify the assertion that GREC's biomass fuel source is considered carbon neutral and provide supporting references or documentation. Be advised that the Department may require the applicant to comply with a carbon neutral requirement.

Response:

Woody biomass is considered a *carbon neutral* source of energy because carbon dioxide (CO_2) released by the combustion of renewable woody biomass is already part of the current atmospheric/biospheric carbon cycle and no *new* carbon is being added to the environment. In fact, biomass energy has the potential to achieve a net reduction in greenhouse gas (GHG) emissions, because disposing of woody biomass materials in landfills and/or allowing these materials to decompose naturally will release not only CO_2, but also significant amounts of methane, a GHG that has a global warming potential (GWP) from 20 to 25 times greater than CO_2. Furthermore, biomass energy reduces the need to burn fossil fuels, which release geologically stored carbon that is not part of the current atmospheric carbon cycle. The carbon cycle for renewable woody biomass energy generation is illustrated in the following diagram:



As shown, trees absorb CO_2 from the atmosphere through the process of photosynthesis. During photosynthesis, CO_2 is converted into carbon-based organic matter (e.g., the woody tissue of the tree), and oxygen is released to the atmosphere. Forest residue (e.g., wood waste) is chipped/ground and transported to the biomass-fired power plant where the woody biomass is combusted to generate electricity. During combustion, the carbon in the woody biomass is oxidized and creates CO_2, which is released to the atmosphere. Completing the carbon cycle, the CO_2 released then becomes available for photosynthesis and new tree growth. Forest residue that is not used for power generation and is allowed to decompose naturally will release methane as well as CO_2.

As discussed previously, using woody biomass fuel to generate electricity does not increase the amount of CO_2 in the atmosphere (i.e., there is an equilibrium between the amount of CO_2 released into the atmosphere and the amount of CO_2 removed from the atmosphere). In this regard, using woody biomass as fuel is fundamentally different than using fossil fuels. The combustion of fossil fuels releases *old* carbon that was removed from the atmosphere millions of years ago by plant and animal life and was stored in permanent geologic formations. Thus, the combustion of fossil fuels increases the amount of carbon in the atmosphere.

The generation of electricity using woody biomass requires the combustion of some fossil fuels, which primarily are used to transport the woody biomass to the power plant. Fossil fuels are also used to harvest and process the woody biomass material. The use of these fossil fuels will increase the total CO_2 emissions associated with the operation of the biomass power plant. However, the CO_2 emissions from fossil fuels are offset by the following factors:

- A substantial portion of the woody biomass fuel for GREC will consist of forest residues (wood waste from traditional silviculture practices currently occurring in north-central Florida) that typically are open-burned in the forest or left to naturally decompose.
- The biomass fuel for GREC also will include urban wood wastes that routinely are left to decompose in a landfill or mulch.

- By using these woody biomass materials to generate electricity, GREC will reduce the amount of woody material allowed to be open-burned with no emission control technologies or to decompose.
- As stated previously, decomposition of woody biomass results in the release of methane, as well as CO_2. Methane is a GHG with 20 to 25 times the GWP of CO_2. Thus, reducing the amount of decomposing woody biomass can significantly reduce GHG emissions.

The U.S. Department of Energy, National Renewable Energy Laboratory (NREL), prepared a January 2004 technical report entitled *Biomass Power and Conventional Fossil Systems with and without CO_2 Sequestration – Comparing the Energy Balance, Greenhouse Gas Emissions and Economics*. In its report, NREL evaluated the overall GHG emissions from a biomass-fired electrical power project that was similar to GREC. As part of its evaluation, NREL considered the GHG emissions associated with upstream activities, such as forest silvicultural activities, biomass fuel preparation, and transportation of the fuel to the power plant. NREL also considered the GHG emissions that would be avoided when the woody biomass is used as fuel, instead of decomposing in a landfill or mulch. After analyzing these factors, NREL concluded that the proposed biomass-fired electrical power plant would cause an overall net reduction in GHG emissions. The California Public Utilities Commission (PUC) also supported this conclusion with its Decision 07-01-039 (January 2007), where they stated that "the record shows that electric generation using biomass that would otherwise be disposed of under a variety of conventional methods (such as open burning, forest accumulation, landfills, composting) results in a substantial net reduction in GHG emissions."

As noted by FDEP, the woody biomass used by GREC must be a renewable energy source to be considered carbon neutral. GREC will use clean, chipped/ground, woody biomass as its primary fuel. This fuel will typically be procured from areas within a 75-mile radius of the GREC Site. As described in Subsection 4.3.2 of the GREC SCA, the power purchase agreement (PPA) between GREC LLC and Gainesville Regional Utilities (GRU) includes a set of stringent standards for ensuring the sustainability of the forest-derived biomass fuels used by GREC. The PPA also includes a forest stewardship

incentive plan to reward growers that provide a higher level of forest biological protection than is required by the minimum sustainability standards within the PPA. The stringent and comprehensive forest management practices that are required within the PPA will ensure that the forest residue used by GREC is a renewable energy source (i.e., the forest residue will only be obtained from forests that are harvested in a sustainable manner).

GREC will promote improved forest management practices by purchasing woody biomass materials that are harvested in compliance with the PPA. In this fashion, GREC will encourage periodic forest thinning, in addition to encouraging other positive silviculture practices. Timely and appropriate thinning of the forest promotes the growth of larger trees, which results in the increased sequestration of CO_2, as well as reduces the potential for severe forest fires.

In light of the information set forth previously, it is reasonable to conclude that GREC will be carbon neutral. Indeed, the NREL report and California PUC order indicate that GREC has the potential to reduce overall GHG emissions. GREC's actual impact on GHG emissions will depend upon a number of variables (e.g., the exact locations of GREC's fuel suppliers; the exact quantity of wood waste that will be used for fuel, instead of being allowed to decompose; and the fuel efficiency of the equipment used to process and transport the biomass fuel).

It is unnecessary and inappropriate for FDEP to impose a condition of certification requiring GREC to be carbon neutral for the following reasons:

- GREC will be required to comply with any future GHG rules pursuant to Section 403.511(5), F.S., which requires all power plants certified under the PPSA to comply with any newly adopted rules that establish more stringent applicable requirements.
- Actual GHG emissions from GREC will depend on several variables that are not reasonably within the control of GREC LLC. GREC LLC should not be required to comply with a condition of certification that GREC LLC may not be able to meet, notwithstanding its best efforts.

- GREC will be subject to the applicable provisions of U.S. Environmental Protection Agency's (EPA's) recently promulgated Mandatory Reporting of Greenhouse Gases Rule. This reporting rule, which requires GHG monitoring beginning January 1, 2010, will provide FDEP with accurate and comprehensive data of actual GHG emissions for GREC as well as other Florida GHG emission sources.
- GREC will be operated in compliance with the requirements in the GREC LLC/GRU PPA. The PPA requirements were carefully designed to ensure that GREC is operated in a manner that is responsible, sustainable, and environmentally protective. It is not obvious that FDEP's proposed condition would provide any meaningful environmental benefits that are not provided by the PPA.
- If FDEP imposes a condition under the PPSA that requires GREC to be carbon neutral, GREC LLC will suffer a competitive disadvantage when compared with any power plant that is not subject to the same requirement. To the best of our knowledge, there is no such requirement imposed on the biomass-fired plant proposed by ADAGE in Hamilton County, and there is no such requirement imposed on any fossil fuel-fired power plant in Florida.
- FDEP's proposed carbon neutral requirement will impose additional regulatory burdens on GREC, and, thus, it will be contrary to the state and federal policies promoting the development of new electrical power plants that use renewable sources of energy.
- It appears that FDEP does not have the statutory or regulatory authority to impose a carbon neutral requirement on GREC. FDEP has not adopted any rules that are applicable here and would require GREC to comply with a carbon neutral requirement. The Florida Legislature has not given statutory authority to FDEP to impose a carbon neutral requirement in this case. Without any rules or statutory authorization, there is no legal basis for imposing the proposed carbon neutral requirement.

FDEPSCO-2 2) Please provide more details regarding the off-site fuel processing (i.e. sorting/chipping) locations discussed in Section 4.3 of the application. It is unclear as to whether these are independently owned and pre-existing facilities; it is also unclear whether the off-site fuel processing facilities would be constructed primarily for the purpose of supporting GREC.

Response:

The primary biomass fuel that GREC will use in its operations will be forest residues (i.e., woody biomass material left over from traditional silviculture operations that are presently occurring in north-central Florida) collected from a 75-mile radius around GREC. These forest residues mainly consist of the tops and limbs that are currently left on the forest floor or are piled and open burned in the forest. Rather than allowing the forest residues to decompose or be open burned, these materials can be fed through a mobile grinder or chipper in the forest and made into a fuel chip that can be used at GREC. A small mobile crane will be used to feed the forest residue into a mobile grinder/chipper. The grinder/chipper will blow the fuel chips directly into the back of a chip van (i.e., a covered or enclosed truck), which will deliver the biomass material to GREC. The offsite processing locations discussed in Section 4.3 will use this process to prepare the fuel for GREC.

The offsite processing of the forest residue will occur in temporary locations in the forest where the traditional timber harvesting occurs. This biomass processing activity will take place in many different locations throughout the 75-mile radius around GREC. The exact location of a processing site and the exact time when a site is used will depend on the timing and location of the timber harvests. It is anticipated that the grinding/chipping process at a particular location typically will last from a few days to 2 weeks, depending on the size of the timber harvest. When the process is completed at one location, the mobile processing equipment will be moved to a new site. The processing of forest residue is not expected to involve any permanent, fixed equipment.

The companies/individuals conducting this process are independently owned and will be contracted by GREC to deliver the material to the biomass energy facility. Currently, there are a number of independent suppliers with grinding/chipping operations in north-

central Florida. The demand for biomass material for GREC may encourage new entrants into this market. GREC does not intend to build, own, or operate any offsite fuel processing equipment or facilities.

Biomass material from urban wood wastes (i.e., woody waste material from right-of-way clearings, land clearing activities, as well as storm or diseased debris) will also be used as fuel at GREC. This material will be collected within 75 miles of GREC. The urban wood wastes may be processed with mobile equipment at temporary locations, where the wood waste is generated, in the same way that the forest residue is processed. In some cases, the urban wood waste may be taken to an existing landfill and stockpiled until the wood waste is processed with mobile or permanent equipment. The urban wood wastes also may be taken to an existing processing facility to be ground or chipped before being sent to GREC. There are a number of independent processing facilities currently operating in the region, including one that is less than 5 miles from the GREC Site.

FDEPSCO-3 3) Please provide more details regarding transportation of the fuel sources to the GREC site. Does GREC plan to contract out these services, maintain their own fleet, or a combination thereof?

Response:

The biomass material used to fuel GREC will be delivered to the Site in processed form only (i.e. ground or chipped) and will be delivered in chip vans, which are typical eighteen-wheel tractor trailers that are covered or enclosed. These chip vans will be independently owned and will be contracted by GREC to deliver the biomass material to the facility. GREC does not intend to own its own fleet of chip vans.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT OFFICE
GROUNDWATER SECTION
(FDEPNEDGW)

B. Northeast District Office – Ground Water Section:

FDEPNEDGW-1 ***1) Although a zero liquid discharge (ZLD) is proposed for all wastewater, a ground water monitoring plan for Water Facilities Program related activities is requested as an indicator system. In order to provide both pre- and postoperational monitoring, please submit a proposed ground water monitoring plan with a response to this correspondence. This plan should include background and compliance well monitoring.***

Response:

Based on further consultation with the FDEP, Northeast District Office, Groundwater Section, FDEP has determined that groundwater monitoring will not be required at GREC because GREC will not have any discharges to groundwater. Based on this determination, FDEP has also concluded that no additional information is needed, and no responses are required, for the Groundwater Section's completeness questions in items FDEPNEDGW-1 through FDEPNEDGW-5 and FDEPNEDGW-7 through FDEPNEDGW-11. Therefore, no response to this item is being provided by GREC LLC.

FDEPNEDGW-2 ***2) Since there is a ZLD proposed for all wastewaters, a zone of discharge (ZOD) will not be established at this facility for Water Facilities Program related activities. Although the GRU-Deerhaven Power Plant has an existing ZOD that extends to their current property lines, it does not include any new activities.***

Response:

See response to item FDEPNEDGW-1.

FDEPNEDGW-3	*3) Please clarify if temporary storage areas will be used for the clarifier solids, crystallizer solids\wet salt cake\brine concentrate, chemical metal cleaning wastes, floor drainage, or any other wastewater byproducts, prior to transportation to an off-site landfill. Approximate amounts, storage time frames, and details of storage system should be provided, also.*

Response:

See response to item FDEPNEDGW-1.

FDEPNEDGW-4	*4) On Figure 4.2.0-3, the Detailed Facility Layout does not seem to indicate a boiler blowdown or cooling tower blowdown holding area. Please address this issue and provide details of any applicable holding tanks\basins.*

Response:

See response to item FDEPNEDGW-1.

FDEPNEDGW-5	*5) Please provide flow diagrams of all Industrial and Domestic wastewater streams, including all wastewater and water treatment systems, along with locations and details of all storage areas and chemical treatment systems.*

Response:

See response to item FDEPNEDGW-1.

FDEPNEDGW-6	*6) Section 4.6 of Volume One indicates non-hazardous laboratory waste will be discharged to plant drain and partially used for dust control. Due to the nature of some laboratory waste, it is requested that this waste be routed to the ZLD system, or 100 % used for cooling tower makeup.*

Response:

As requested by FDEP, all nonhazardous laboratory wastes will be collected and routed to the zero liquid discharge (ZLD) system or to the cooling tower basin and used as cooling tower makeup. No laboratory wastes will be discharged to plant drains or partially

used for dust control. This response supersedes the information contained in Section 4.6 of the SCA.

FDEPNEDGW-7	*7)*	***It is indicated that clay liners are proposed under the fuel storage areas. Please provide details on the clay liners (i.e.: final compaction rates, thickness, final permeability rate, source of clay, type of clay, distance to surficial aquifer from bottom of liners, existing grade, proposed grade, elevations, secondary containment system, etc.). In addition, please include preventative and corrective measures if the liners are breached by equipment, fractured, etc.***

Response:

See response to item FDEPNEDGW-1.

FDEPNEDGW-8	*8)*	***Please clarify if runoff swales and ponds are proposed around the fuel storage areas, and provide details on Figure 4.2.0-3, or similar figure, including details of any liners. If no runoff swales or ponds are proposed, then provide details of fuel storage area design that prohibits runoff. Use of a layer of compacted wood chips above the clay liner would not provide a sufficient barrier.***

Response:

See response to item FDEPNEDGW-1.

FDEPNEDGW-9	*9)*	***Due to naturally occurring organic acids that may leach from the wood material in the fuel storage areas, there is concern with the effects of potentially acidic leachate on the clay liners. Please address this issue, and provide data to support the long-term integrity of clay liners.***

Response:

See response to item FDEPNEDGW-1.

FDEPNEDGW-10	*10)*	***Please provide source for results in Table 4.3.4-1, Typical Constituent Analysis of Wood Fuel.***

Response:

See response to item FDEPNEDGW-1.

FDEPNEDGW-11 11) According to the analysis of the wood fuel, nitrate and sulfate may be constituents of concern. Additional constituents may include total dissolved solids, total phosphate, pH, and specific conductivity. A list of parameters and frequency of monitoring should be included with the proposed ground water monitoring plan.

Response:

See response to item FDEPNEDGW-1.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT OFFICE
POTABLE WATER SECTION
(FDEPNEDPW)

As presented in Subsection 4.5.3 and Appendix 10.12 of the SCA, GREC LLC currently anticipates that the potable water needs for GREC will be satisfied by using two potable water supply systems: (1) a nontransient, noncommunity water system (NTNCWS), and (2) a limited use water system (LUWS). The NTNCWS will provide potable water for drinking, restrooms, showers, eyewash, and other uses in the administration building, control room, warehouse/maintenance building, and other operating plant areas. The NTNCWS must be approved by FDEP. The LUWS will provide potable water for drinking, restrooms, eyewash, and similar uses at the scale house and must be approved by the Alachua County Health Department.

However, the plans, designs, and specifications for these potable water systems have not been finalized at this time and may be refined during the detailed engineering/design efforts for the facilities. Consequently, some of the information requested by the FDEP Northeast District Office Potable Water Section is currently unavailable. Therefore, GREC LLC recommends that the potable water system requirements and approvals be addressed through postcertification submittals and related conditions of certification. GREC LLC has prepared proposed conditions of certification to address the potable water system requirements and those proposed conditions are provided in the following responses to the FDEP's informational requests.

FDEPNEDPW-1 1) Will the potable water system comply with requirements as found in Chapters 62-550, 62-555, 62-560, 62-521, and 62-699, Florida Administrative Code (F.A.C.)? These rules can be found at http://www.dep.state.fl.us/water/rulesprog.htm#dw

Response:

Yes, the potable water system will comply with all of the applicable FDEP rules. GREC LLC's proposed condition of certification to meet the specified requirements is as follows:

"The nontransient, noncommunity potable water system for GREC shall be designed and operated in conformance with the applicable provisions of Chapters 62-550, 62-555, 62-560, 62-521, and 62-699, F.A.C. The information required in Chapters 62-550, 62-555, 62-560, and 62-699, F.A.C., shall be submitted to the Department's Northeast District Office, Potable Water Section, and the Siting Coordination Office prior to construction and operation of the potable water system."

FDEPNEDPW-2 2) Will the potable well(s) be constructed according to public well standards found in Chapter 62-532, F.A.C.? Especially be aware of required setbacks for the potable water well. The setback for fuel tanks are at least 50 feet if the tank is above ground and double walled, 100 feet if otherwise.

Response:

Yes, the potable wells will be constructed in compliance with the public well standards in Chapter 62-532, F.A.C. GREC LLC's proposed condition of certification to address this item is as follows:

"All the potable water supply well(s) for GREC shall be constructed according to the applicable public well standards in Chapter 62-532, F.A.C., and shall comply with the required setbacks in Section 62-555.312, F.A.C."

FDEPNEDPW-3 3) A Preliminary Design Report (PDR) or specifications, details, and design drawings are required for approval of a potable water system. The list of requirements for a PDR can be found in subsection 62-555.520(4), F.A.C.

Response:

GREC LLC will comply with this requirement when the final plans and designs for the potable water system are completed. GREC LLC's proposed condition of certification to address this item is as follows:

"A preliminary design report or specifications, details, and design drawings shall be submitted to the Department's Northeast District Office, Potable Water Section, and the Siting Office prior to construction and use of the potable water system for GREC. The Licensee (GREC LLC) shall comply with the list of requirements for a preliminary design report (PDR) in Rule 62-555.520(4), F.A.C."

FDEPNEDPW-4	***4) On Appendix 10.12; Please note that the application form was not filled out properly. The person who signs on page 2; part I; item I, needs to match with page 1; section I; item H, which would be the person that will own the project after it is placed into permanent operation. Please match the signatures.***

Response:

FDEP's Form 62-555.900(1) will be properly completed, signed, and submitted when GREC LLC submits the information needed to satisfy the requirements of the proposed condition of certification for Item FDEPNEDPW-1.

FDEPNEDPW-5	***5) Subsection 62-555.520(2), F.A.C., requires all permit applicants to submit to the Department DEP Form 62-555.900(1) executed in full, containing original signatures. Section II.B needs to be completed with signature and date as well as completing the information required in the corresponding Section II.D which includes signature, seal and date. Also, provide calculations for the new Total Permitted Maximum Day Operating Capacity of Plant.***

Response:

FDEP's Form 62-555.900(1) will be properly completed, signed, and submitted in conjunction with the requirements of the proposed condition of certification in Item FDEP-NEDPW-1.

FDEPNEDPW-6	***6) The limited-use potable water system will need to be permitted through the Alachua County Dept. of Health.***

Response:

GREC LLC's proposed condition of certification to address this item is as follows:

> "The limited use potable water system for GREC shall be constructed and operated in accordance with the applicable requirements of Section 381.0062, F.S., and Chapter 64E-8, F.A.C. Florida Department of Health Form DH 4092B and other required information shall be submitted to the Alachua County Health Department and the Department's Siting Coordination Office for approval prior to construction and operation of the potable water system."

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT OFFICE
STORMWATER SECTION
(FDEPNEDSW)

The revised stormwater management plans presented in Attachments B and C of this document provide the clarifications and additional information requested by the FDEP Northeast District Office, Stormwater Section. These revised plans also include minor amendments to the facility/site layout plans that were contained in the original SCA. These minor amendments do not substantially change the stormwater management system.

FDEPNEDSW-1 1) Contour lines in the Pre- and Post-development Drainage Maps, Sheets 1 and 2 of 2, found in Volume 2, Appendix 10.4.2, are labeled incorrectly. Please revise.

Response:

The labels of the contour lines are correct; however, due to the size of the plans (11 by 17 inches), the labels were not legible. Full size plans (24 by 36 inches) were provided to FDEP, Northeast District Office, Stormwater Section, separately on January 11, 2010.

FDEPNEDSW-2 2) Please indicate in the plans or in the general notes the vertical datum utilized in the design, North American Vertical Datum (NAVD88) or National Geodetic Vertical Datum (NGVD29).

Response:

Referenced datum is North American vertical datum of 1988 (NAVD88) as shown in the notes in the boundary and topographic survey plan, sheet 1 of 5 in Attachment B to this document.

FDEPNEDSW-3 3)	***Paragraph 40B-4.2030(8)(h), FAC, requires detention and retention systems to be designed to provide treatment volumes within 72 hours following the end of the design storm event. For retention systems, only percolation and evapotranspiration may be used to reduce storage and treatment volumes in the system. Please provide a recovery analysis for the swales and the dry retention ponds. Also, specify how runoff is conveyed from the switchyard, and paved/impervious areas into the proposed retention ponds.***

Response:

Recovery analysis for dry retention system and swales are provided in a summary table of the revised stormwater management plans (see drainage calculations, pages 23 and 24) in Attachment B to this document and are included in the attached compact disc (CD) (stormwater management plan).

Conveyance of runoff into the proposed stormwater systems is shown in the grading plans (see sheets C2.20, C2.21, and C2.22 in Attachment B). These drawings are also included in the attached CD (stormwater management plan).

FDEPNEDSW-4 4)	***Paragraph 40B-4.2030(8)(l), FAC, requires swales to be designed to treat, through percolation or evapotranspiration, a volume of stormwater equal to at least 80% of the runoff resulting from the design storm with a 3-yr, 1-hr rainfall depth. Based on design information and weir elevations provided for the proposed swales along the access road, it appears that most of the swales do not have adequate treatment capacity. Also, it is unclear how runoff from Drainage Areas POST-301, 302, and 108 will be conveyed into the swales and through the culverts under the access road. Please provide revised calculations, design details and site plans.***

Response:

Swales have been designed to treat 80 percent of the runoff. Treatment volumes and weir elevations are shown in a summary table of the stormwater management plans (see drainage calculations, page 24) to verify that the swales have adequate capacity.

Runoff of drainage areas 108, 301, and 302 will not discharge into the swales but will instead bypass the swales and discharge into the downstream areas through culverts under

the access roadway as existing conditions (see revised pipe size calculations and plans [sheet C6.04 and C6.05 in Attachment B]).

FDEPNEDSW-5 5)	***It is not clear how runoff from drainage areas POST-100, 101, and 102 will be collected and conveyed to the proposed wet detention ponds for stormwater treatment and attenuation, since storm sewer pipes and inlets are not shown in the plans. In addition, site plans indicate that a swale will be provided along the west side of the access road in drainage area POST-102 for stormwater collection and conveyance, however, design details were not included. Please provide.***

Response:

Proposed grading for areas 100, 101, and 102 and stormpipe calculations are provided in Attachment C to this document, Final Grading Plan by Zachry. Details of the conveyance system (French drain) are included in the final grading plan by Zachry.

FDEPNEDSW-6 6)	***According to Attachment C-Drainage Calculations, Appendix 10.4.2 in Volume 2, the wet detention ponds are provided with a permanent pool volume that is double the required capacity. Please indicate the need and if the ground water table in the area will be impacted along with the proposed two water supply wells located between the wet ponds.***

Response:

Required permanent pool volume for wet detention systems is designed to meet two requirements: (1) provide volume for wet residence time of 21 days and, (2) maintain a mean depth of between 2 to 8 ft. To meet both of these requirements, the provided volume is required to be larger than the minimum required (see drainage calculations, page 25 of Attachment B).

As discussed in Subsection 3.3.2 of the SCA, the groundwater table on the GREC Site generally occurs within 6 ft of land surface and is commonly found at 2 to 4 ft below land surface, depending on the season. The groundwater table tends to fluctuate approximately 5 ft through the annual seasons. The wet detention ponds are not expected to significantly impact the groundwater table, and the water levels in the ponds will generally reflect the

normal levels and fluctuations in the groundwater table. The proposed two water supply wells will be used to withdraw water from the Floridan aquifer system (FAS) at a depth of 200 to 550 ft below land surface. As discussed in Subsection 3.3.2 of the SCA, the groundwater table (i.e., surficial aquifer system) and the wet detention ponds will not be affected by the FAS withdrawals or vice versa due to the presence of a confining unit that effectively separates the groundwater table from the FAS at the GREC Site.

FDEPNEDSW-7 7) Please provide hydraulic calculations for the three proposed culverts at the beginning of the access road located at STA 1+84, 24" RCP; STA 3+49, 18" RCP, and STA 4+09, 18" RCP. These culverts were not included in the Pipe Size Calculations in Appendix 10.4.2. In addition, please indicate how runoff from new paved areas will be handled, specifically from STA 1+00 to 4+40.

Response:

Hydraulic calculations for proposed culverts at the beginning of the roadway are provided in the drainage calculations in Attachment B to this document. The increase of impervious area is minimal; therefore, the additional runoff will be treated by the proposed grassed areas located at the edge of the road (sheet 6.00).

SUWANNEE RIVER WATER MANAGEMENT DISTRICT (SRWMD)

ITEM II: SUWANNEE RIVER WATER MANAGEMENT DISTRICT

SRWMD-1 1) Please provide additional information on the frequency and duration of maximum daily water usage.

Response:

The primary water usage for GREC will be for cooling tower makeup to replace water lost through evaporation. The plant is a ZLD design, so the balance of water usage is recycled. The cooling tower is an evaporative design that provides cooling based on the wet bulb temperature. The evaporative cooling tower works by allowing a small portion of the water being cooled to evaporate into the moving air stream, which will provide cooling to the rest of the water stream. In the case of the GREC cooling tower, the total plant maximum daily water usage will be 1.5 million gallons per day (MGD) with a normal maximum based on 1.447 MGD that includes 1.402 MGD going to evaporation and drift loss. The balance is used for dust control and other losses. Annual average daily usage will be 1.4 MGD. The cooling system will operate 24 hours per day, unless the facility is offline for maintenance or dispatched offline by GRU.

Since water usage is related to wet bulb temperature, usage varies on an hourly basis as a result of changes in the ambient conditions as well as changes in electric loads. The maximum case water usage is based on full load operation and the 1-percent wet bulb case (78 degrees Fahrenheit [°F]). This represents summer conditions. Figure SRWMD-1 provides a curve showing the water usage variation by month. The maximum water usage will be for 60 days or less.

SRWMD-2 2) Please be advised, reduction in groundwater allocation for Deerhaven Generating Station does not quality as an offset of actual groundwater usage and does not generate additional water available for use within the Florida Aquifer.

Response:

This comment is noted.

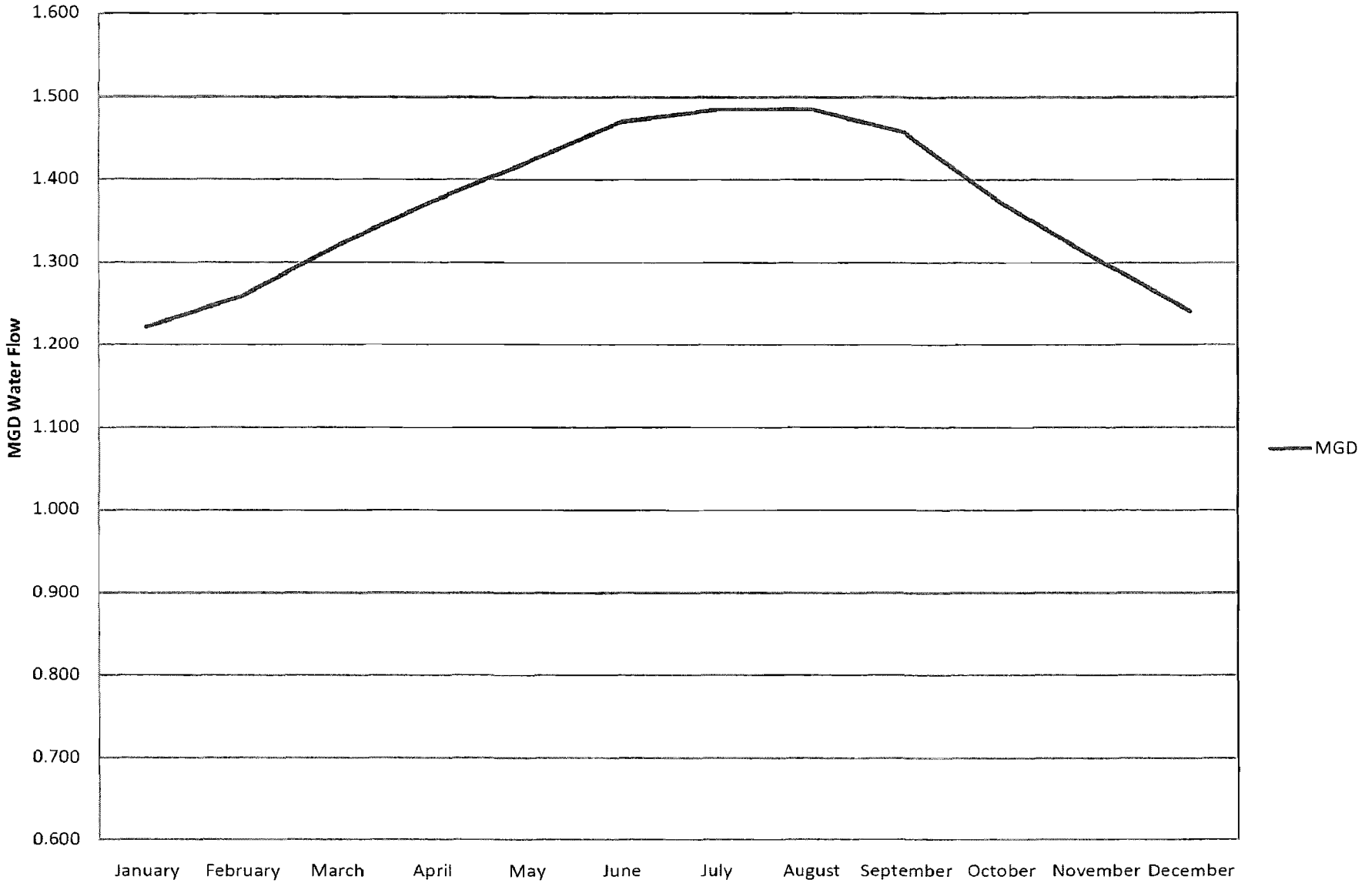


FIGURE SRWMD-1.

AVERAGE MONTHLY WATER USAGE FOR GREC

Sources: Zachry, 1010. GREC LLC, 2010.

Gainesville Renewable Energy Center
An American Renewables Company

SRWMD-3	***3) Please provide justification for cost associated with reuse feasibility studies, particularly the City of Alachua's reclaimed water. Please include a breakdown of cost associated with pipeline, storage and modification of system based on recent cost data specific to this area.***

Response:

As discussed in the Alternative Water Supply Feasibility Assessment report in Attachment 3 of Appendix 10.8 of the SCA, the use of the City of Alachua's reclaimed water would require the design, permitting, and construction of a new pipeline. The new pipeline would be approximately 2.1 miles (i.e., 11,270 ft) in length and would run from the city's existing pipeline to the Turkey Creek Golf Course to the GREC Site.

To the extent possible, the new pipeline route will parallel existing roadways. However, the construction of the new pipeline will involve crossing under U.S. Highway 441 (U.S. 441) and the existing utilities that are located along the highway. The new pipeline also must cross under the CSX Transportation, Inc. (CSX), railroad track and run through some residential areas.

The alternative water supply feasibility assessment did not evaluate the potential issues associated with obtaining easements for the U.S. 441 crossing, the CSX crossing, and the remainder of the pipeline route. Nonetheless, it is anticipated that it will be difficult, time-consuming, and expensive to obtain all of these easements. One or more of these easements may be unobtainable because GREC LLC does not have the power of eminent domain.

As part of the feasibility assessment concerning the use of the City of Alachua's reclaimed water, GREC LLC developed a preliminary cost estimate of approximately $2 million (2009 $) to design and construct the new pipeline. For estimating purposes, the pipeline was assumed to consist of a 10-inch polyvinyl chloride (PVC) pipe, which is similar in size to the existing city pipeline along U.S. 441. The preliminary cost estimate was developed using standard estimating methods and information from cost estimating reference manuals such as RS Means, as well as contacts with local contractors in the

north Florida area. Table SRWMD-1 provides a breakdown of the estimated cost for the design and construction of the new pipeline. As indicated in the table, the estimate does not include costs for obtaining easements or for any needed relocations of existing utilities.

As discussed in the feasibility assessment, the use of the City of Alachua's reclaimed water may also require additional onsite treatment, mixing, and storage facilities. The potential need and specific design (i.e., type of treatment, size of tanks, etc.) of these additional facilities is uncertain at this time because these details are dependent on the future quality of the reclaimed water after the upgrades and expansion of the city's wastewater treatment facilities are completed in 2011. For the feasibility assessment, GREC LLC assumed that these additional facilities may potentially involve approximately $500,000 in capital costs and between $50,000 and $100,000 per year in operation and maintenance costs. These are preliminary estimates because the specific details and requirements for any needed additional facilities are unknown at this time.

SRWMD-4 ***4) Please provide justification as to the feasibility of using ground water as a standby supply to supplement available reclaimed water.***

Response:

This issue is discussed in the alternative water supply feasibility assessment, which is contained in Attachment 3 of Appendix 10.8 of the SCA. As explained in the feasibility assessment, it is not feasible at this time to use reclaimed water from either the City of Alachua or the City of Gainesville as an alternative water supply for GREC. This conclusion is primarily based on (a) the excessive, additional costs associated with constructing a pipeline to deliver reclaimed water to the GREC Site; (b) the uncertainties associated with the quality, quantity, and availability of the reclaimed water; and (c) the potential additional costs for onsite reclaimed water treatment and storage. At the current time, the quantity of reclaimed water available from the City of Alachua would only supply approximately 30 to 40 percent of the GREC water needs, even if all of the reclaimed water were provided to GREC, rather than the Turkey Creek Golf Course. It should be noted that if all reclaimed water was diverted to GREC, the golf course would need to increase its groundwater withdrawals for irrigation purposes.

Table SRWMD-1. Estimated Cost for Reclaimed Water Pipeline from City of Alachua Reclaimed Water System to GREC Facilities

Description	Manhours	Labor	Material	Total Amount
Direct Construction				
1. Excavation/backfill total	3,180	$238,500	$20,000	$258,500
2. Concrete total	0	0	0	0
3. River excavation total	0	0	0	0
4. Jacking beneath railroad total	326	$20,193	$10,181	$30,373
5. Jacking beneath road total	322	$30,636	$8,960	$39,596
6. Road crossing total	142	$7,733	$5,918	$13,650
7. Stream crossing total	0	0	0	0
8. Landscaping total	300	$22,500	$15,000	$37,500
9. Mechanical total 10" pvc	3,050	$228,750	$495,000	$723,750
10. I&C total	160	$8,322	$16,000	$24,322
11. Electric total	0	0	0	0
Total Direct Construction Costs	7,481	556,634	571,058	1,127,692
Indirect Construction Costs				
Construction equipment				w/directs
Small tools and consumables				w/directs
Support labor				N/A
Startup activities				
Other indirects				
Total Indirect Construction Costs				$0
Professional Services Costs				
A/E services				150,000
Startup, testing, and training				Included
Field office (2 personnel)				60,000
Home office				Included
Misc./use/borings/etc.				50,000
Legal				50,000
Permit				50,000
Survey				50,000
Total Professional Services Costs				$410,000
Other Project Costs				
Total Other Project Costs				$0
Estimated Project Cost				$1,537,692
Contingency @ 10%	10.00%			153,769
Subtotal				1,691,461
17.5% Profit/overhead				296,005
Total Project Cost				1,987,466

Basis 11,270 ft 10-inch PVC pipe:

- Current day cost
- Water for test by others
- No rock excavation
- Right of way available including access; costs for right-of-way/easements not included
- No underground utilities -interferences/relocations
- No overhead utilities -interferences/relocations
- Clear and grub allowance

Source: GREC LLC, 2009.

As discussed in the feasibility assessment report in the SCA and discussed with SRWMD staff, GREC LLC will use reclaimed water as an alternative or supplemental water supply for cooling tower makeup in the future if reclaimed water is reasonably available and economically feasible for GREC. Based on further discussions with SRWMD staff, GREC LLC will strengthen its commitment to reduce future groundwater use for GREC and will agree to conditions of certification that require the use of reclaimed water for all or part of GREC's cooling tower makeup needs by a specific date after the start of commercial operations. GREC LLC proposes that SRWMD consider the following conditions of certification regarding the use of reclaimed water for GREC:

1. "The Licensee (GREC LLC) shall provide to the District a written implementation plan and schedule for the use of reclaimed water to meet all or part of the cooling tower makeup needs for GREC no later than 5 years after the commercial operation date (COD) of GREC. The plan shall include the identification of the supply of reclaimed water; the anticipated uncommitted amount of the supply; the plans, facilities, and estimated costs for providing the reclaimed water to the GREC Site; and the schedule to begin the use of the reclaimed water no later than 7 years after the COD of GREC. Based on the District's review and approval of the implementation plan and schedule, the Licensee shall implement the plan for the use of reclaimed water according to the approved schedule and the conditions of certification shall be modified to require the use of reclaimed water, to the extent feasible, to reduce groundwater use for GREC."
2. "In the event that an uncommitted, reasonable reclaimed water supply becomes available or is definitively scheduled to become available at the GREC Site boundary to meet all or part of the cooling tower makeup water needs prior to the required schedule in Condition 1, the Licensee shall provide the District a written implementation plan and schedule for using the reclaimed water. Based on the District's review and approval of the plan and schedule, the Licensee shall implement the plan and the conditions of certification shall be modified to require the use of reclaimed water to the extent feasible, to reduce groundwater use."

3. "If reclaimed water is used to supply all or part of the cooling tower makeup needs, groundwater use shall continue to be allowed for plant process and potable water uses and, to the extent necessary, as supplemental or contingency water supply for cooling tower makeup."

In addition, to reduce potential future groundwater use in the GREC Site vicinity, GREC LLC and GRU have an agreement whereby GRU will reduce its existing approved groundwater use allocation for Deerhaven Generating Station (DGS) by 1.4 MGD after certification is approved for GREC and prior to the start of GREC commercial operation.

SRWMD-5 ***5) Please provide a yearly schedule, including start-up, for proposed water use.***

Response:

The water usage for GREC will start approximately 18 months after the start of construction, which is planned for January 2011. Initial water usage will begin by approximately July 2012, and it will be less than 100,000 gallons per day (gpd). Six months prior to commercial operation (November 2013), water usage will be increased to approximately 1.2 MGD for the testing and commissioning of GREC. During this phase of the project (May through October 2013), some hourly usage will be at the maximum flow rates, but the average daily usage will be less. After November 2013, the plant will be in commercial operation and will be using the average daily and monthly amounts shown in Figure SRWMD-1. After the start of commercial operation, the facility will operate with a 90-percent or better availability. The facility is dispatchable under the GRU power contract and may be operated at a reduced load (70 percent minimum) or shut off. The facility will be shut down for approximately 2 weeks per year for maintenance.

SRWMD-6 ***6) Please provide information on the seasonality of the water use.***

Response:

The curve in Figure SRWMD-1 in the response to SRWMD-1 shows the expected monthly variation, in water use.

SRWMD-7	***7) Please provide assurance that the proposed withdrawal will not cause harm to the Lower Santa Fe River and springs, particularly Hornsby Springs. The District's current draft of the proposed MFL for the Lower Santa Fe River and springs limits the reduction of river and spring flow to no more than a cumulative reduction of 4.7% at all river gaging locations and for each individual spring. The evaluation should be conducted on an individual and cumulative basis.***

Response:

Based on further consultation with SRWMD staff, it is GREC LLC's understanding that SRWMD has recently conducted modeling using its North Florida Model to evaluate the effects of the individual proposed GREC withdrawal and cumulative groundwater withdrawals on the current draft of the *proposed* minimum flows and levels (MFLs) for the Lower Santa Fe River and springs. It is also GREC LLC's understanding that the schedule for SRWMD to adopt final MFLs for the Lower Santa Fe River and springs is relatively uncertain at this time and that SRWMD is currently planning certain revisions and improvements in its North Florida Model, which is used for MFL evaluations. Therefore, the results of the evaluation of the individual GREC and cumulative groundwater withdrawals on the MFLs for the Lower Santa Fe River may be subject to change depending on the final adopted MFLs and/or the revised North Florida Model.

To provide assurance that the proposed groundwater withdrawals for GREC will not potentially cause harm in the future to the Lower Santa Fe River and springs, GREC LLC will agree to conditions of certification requiring the use of reclaimed water within a specified time frame or sooner if a reclaimed water supply becomes available at the Site boundary. This commitment will ensure that the future groundwater withdrawals for GREC will be reduced to the extent feasible. GREC LLC's proposed conditions of certification requiring the use of reclaimed water are provided in the response to item SRWMD-4.

SRWMD-8	***8) Please be aware that since the development of the draft Lower Santa Fe River MFL technical document, additional legal users have received water use permits, thus potentially reducing the available water.***

Response:

The comment is noted.

SRWMD-9	***9) Please provide a description of the actions GREC plans to take to reduce their water demands during a water shortage order issued by the District pursuant to Chapter 40B-21, F.A.C.***

Response:

GREC LLC recognizes that all water users may be required to reduce or cease water use in the event that SRWMD issues a water shortage order pursuant to Chapter 40B-21, F.A.C. Water for cooling tower makeup, boiler makeup, and other plant process water uses is essential for the operation of GREC. The requested groundwater use requirements for GREC of 1.4 MGD on an annual average basis and 1.5 MGD on a maximum daily basis are based on the plant operating at 100-percent load or capacity. GREC will be capable of operating at somewhat reduced capacity, but 70 percent is the minimum load for safe operations. For a power plant such as GREC, the volume of water needed for operations is relatively equivalent to the operating load of the plant. Therefore, in the event of a declared water shortage, GREC would be able to reduce its operating load to 70 percent and, in turn, reduce water use to approximately 70 percent of the full load requirements. Of course, under these operating conditions, the power plant would be generating 30 percent less electricity for the region.

To address SRWMD's comments about water shortages, GREC LLC suggests that SRWMD impose a condition of certification that requires compliance with any ordered water use reductions in accordance with SRWMD's water shortage plan. The condition of certification should not include specific actions to be taken by GREC because any such actions may be highly dependent on the conditions and essential needs at the time of the shortage. This approach and this type of condition of certification are similar to those used by other water management districts for power plants within their jurisdictions. GREC LLC's proposed condition of certification to meet the water shortage requirement is as follows:

> "In the event the District declares a water shortage pursuant to Chapter 40B-21, F.A.C., the Licensee must comply with any water withdrawal reductions ordered by the District to address the water shortage."

FLORIDA FISH & WILDLIFE CONSERVATION COMMISSION (FWC)

FWC-INTRO ITEM III: FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

Based on a Geographical Information System (GIS) analysis of the proposed project site, the following imperiled species and associated habitats were identified:

- ***16 protected species potentially occur onsite or in the vicinity of the proposed site (see table below)***
- ***Historical wading bird rookery***
- ***Florida Natural Areas Inventory-identified rare species habitat for the eastern indigo snake***
- ***FWC-identified potential habitat and priorities wetlands for Florida black bear and wading birds***

Common Name	*Scientific Name*	*Status**
Gopher frog	*Rana capito*	*SSC*
Gopher tortoise	*Gopherus polyphemus*	*ST*
Florida pine snake	*Pituophis melanoleucus mugitus*	*SSC*
Eastern indigo snake	*Drymarchon corais couperi*	*ST; FT*
Tricolored heron	*Egretta tricolor*	*SSC*
Little blue heron	*Egretta caerulea*	*SSC*
Limpkin	*Aramus guarauna*	*SSC*
Snowy egret	*Egretta thula*	*SSC*
White ibis	*Eudocimus albus*	*SSC*
Bald eagle	*Haliaeetus leucocephalus*	*P*
Florida sandhill crane	*Grus canadensis pratensis*	*ST*
Southeastern American kestrel	*Falco sparverius paulus*	*ST*
Wood stork	*Mycteria americana*	*SE; FE*
Sherman's fox squirrel	*Sciurus niger shermani*	*SSC*
Florida black bear	*Ursus americanus floridanus*	*ST*

**SSC = species of special concern.*
ST = state threatened.
SE = state endangered.
FT = federally threatened.
FE = federally endangered.
P = protected under federal law and state management plan.

Response:

Comment noted. All 16 species were identified and discussed in the GREC SCA in Subsection 3.3.6. Tables 3.3.6-1 and 3.3.6-3 list the status of those species onsite.

FWC-1 Issues and Recommendations

1) Issue: The SCA aerial maps provided identify habitats based on the Florida Land Use and [sic]cover Forms [sic]classification [sic]system (FLUCFCS). While this is useful for identifying land uses, this classification system is not appropriate for identification of plant communities that provide habitat for wildlife.

a. We recommend that the plant communities be mapped and classified using the Florida Natural Areas Inventory Natural Communities Guide (2009 Version).

Response:

The FDEP guidelines for completing a SCA require GREC LLC to use the Florida Land Use, Cover and Forms Classification System (FLUCFCS) Level III mapping for the Site's vegetative communities (FDEP Form 62-16.900). The FDEP rules for environmental resource permits (ERP) also require GREC LLC to utilize FLUCFCS for the Uniform Mitigation Assessment Methodology (UMAM) to assess wetland quality and impacts (Section 62-345.400, F.A.C.). The UMAM also takes into consideration wildlife habitat as part of its scoring for wetland quality. The Florida Natural Areas Inventory (FNAI) Natural Communities Guide is currently not a required mapping format for any regulatory process related to power plant licensing and permitting.

GREC LLC is willing to discuss with the Florida Fish and Wildlife Conservation Commission (FWC) any specific habitat concerns for the proposed project. GREC LLC already has discussed this issue with FWC biologist, Stephanie Rousso, and agreed to send her the project geographic information system (GIS) *shape* files, if she wished, to evaluate the Site while using some other vegetation classification system.

FWC-2a	*2)*	***Issue: The SCA acknowledges that imperiled wildlife species were identified onsite, however, the application does not provide information regarding survey methodology including time of year, locations of observations, type of observed activity, etc.***
		a. If it has not already been done, we recommend that a desktop review of potential fish and wildlife issues be performed in advance of appropriate surveys, which should be conducted during the active (i.e., reproductive) season particular to each species.

Response:

This review has been performed. Please refer to Subsection 3.3.6 of the GREC SCA.

FWC-2b	*b.*	***We recommend that the applicant provide a fish and wildlife status report that addresses at least the list of species we have identified in this letter. That report should include the survey methodologies (with source citations) used as well as the timing of the surveys.***

Response:

Please refer to the introductory response (FWC-INTRO). These species were addressed in the GREC SCA in Subsections 3.3.6 and 5.4.1. GREC LLC is also willing to agree to a condition of certification for a preclearing wildlife survey based on FWC-approved methodologies for any listed species that are likely to occur onsite. GREC LLC would propose the following condition of certification:

> "GREC LLC shall coordinate with FWC to determine appropriate survey protocols for all listed species that are expected to occur within the project boundaries and associated linear facilities' corridors.
>
> After certification but prior to land clearing and construction, GREC LLC shall conduct listed species surveys in accordance with survey protocols proposed to and approved by FWC. Surveys will be conducted for listed species likely to be found onsite and conducted in a season to maximize the opportunity to confirm the species' presence. The results of those species surveys shall be provided to FWC. Coordination shall occur with FWC on appropriate impact mitigation methodologies for listed species identified that may be impacted by the proposed construction-related activities."

FWC-3	*3)*	***Issue: The SCA indicates that three isolated wetlands would be impacted. Isolated wetlands can provide significant and often endemic breeding habitat for semi-aquatic wildlife species, as well as important foraging habitat for wading birds.***

Response:

The three isolated wetlands mentioned are marginal wetlands that contained no standing water, even during the wet season. City of Gainesville and FDEP biologists visited the Site and did not disagree with the characterization of the quality of those wetlands. GREC LLC believes these isolated wetlands would not be considered significant breeding habitat for any endemic species, nor would they provide foraging habitat for wading birds. As discussed with Ms. Rousso of FWC, those wetlands also scored low on listed wildlife values during the UMAM scoring.

FWC-3a	*a.*	***We recommend an amphibian breeding season survey be completed; at a minimum, the gopher frog should be a target species for this survey.***

Response:

GREC LLC is willing to agree to a preclearing wildlife survey (see response to FWC-2b) that includes survey methods for the gopher frog. However, based on a lack of gopher tortoises onsite, GREC LLC believes it is unlikely gopher frogs are using the Site's wetlands.

FWC-3b	*b.*	***Please note that the document indicates that this site is dominated by flatwoods-type soils, which could support the flatwoods salamander (Ambystoma cingulatum, listed by Florida as a Species of Special Concern). Although our GIS analysis did not identify potential habitat for this species, the site falls within its known range and therefore this species should be considered when developing the survey.***

Response:

GREC LLC agrees the Site potentially has flatwoods-type soils. However, the Site has been used for a managed forestry operation for many years, as well as an operating power plant. Vegetation communities onsite have changed, and pine communities are now

logged or converted to planted pine. Further, FNAI records show that no flatwoods salamanders have been found within 5 miles of the Site. For these reasons, GREC LLC does not agree the flatwoods salamander is likely to occur onsite, and GREC LLC has concluded that surveys should not be required on the Site for this species. It is GREC LLC's understanding that Ms. Stephanie Rousso of FWC agrees with these conclusions.

FWC-4	*4)*	***Issue: The SCA indicates that a minimum 50-foot buffer along the perimeter of forested wetlands will be included; however, the wetland delineation and mitigation plan did not identify the conditions under which the buffer system would be maintained.***

Response:

Wetland buffers will be maintained in their current vegetative state.

FWC-4a	*a.*	***Buffers that are intended to meet minimum stormwater management requirements are not always sufficient to protect fish and wildlife needs associated with wetlands. For that reason, we recommend that the applicant develop their buffers based on the results of the fish and wildlife assessment and follow U.S. Fish and Wildlife Service wetland buffer guidelines (enclosed).***

Response:

Buffers will be provided to comply with the applicable FDEP wetlands permitting requirements and the City of Gainesville's wetlands regulations. The proposed buffers meet or exceed those requirements. GREC LLC cannot provide all the buffers recommended by the U.S. Fish and Wildlife Service (USFWS) guidelines, nor is it required do so under any permitting standard applicable to the GREC project. This issue was discussed with Ms. Stephanie Rousso of FWC, and she understood the buffers being proposed complied with current regulatory standards.

DEPARTMENT OF STATE
DIVISION OF HISTORICAL RESOURCES
(FDOSDHR)

FDOSDHR-1 1)	***Because of this, it is the request of this agency that a professional archaeologist perform a cultural resource survey of the property, including subsurface testing, in order to relocate cultural resources identified in the 1977 survey and to assess the probability that additional archaeological sites and/or historical properties might be present.***

Response:

It is GREC LLC's understanding that the only cultural resources assessment for the GREC Site area is the assessment performed in 1977 for the DGS (Miller, 1977). Therefore, as requested by the Florida Department of State, Division of Historical Resources (DOH), GREC LLC has retained a qualified, professional archaeological consultant, Archaeological Consultants, Inc. (ACI), to perform a cultural resource survey of the GREC Site. The purpose of the survey was to locate and identify any archaeological or historic resources within the Site and to assess their significance in terms of eligibility for listing in the National Register of Historic Places (NRHP). The survey efforts included background research and reviews of the Florida Master Site File, the NRHP, and the previous 1977 cultural resource assessment. The survey also consisted of surface reconnaissance, combined with systematic and judgmental subsurface testing. As a result of the survey, no evidence of features observed in the previous survey by Miller (1977) was found. This result was not unexpected due to long-term, extensive agricultural and silvicultural activities on the Site.

Based on the results of the survey, ACI concluded that no archaeological sites or historic structures that are listed, determined eligible, or considered potentially eligible for listing in the NRHP were identified within the proposed GREC Site. As a result, ACI concluded that no significant properties will be affected by the development of GREC, and no further work is recommended.

Attachment D to this document provides a copy of the Cultural Resource Assessment Survey, Gainesville Renewable Energy Center, Alachua County, Florida, January 2010,

prepared by ACI. A copy of the report has also been provided separately to the State Historic Preservation Office (SHPO) for review with a request for a concurrence letter.

FDOSDHR-2 2) If the application is referencing a more recent cultural resources assessment, a new survey may not be necessary. Regardless, detailed references to specific cultural resource assessment(s) and associated finding should be incorporated into your application.

Response:

As discussed in the response to FDOSDHR-1, a recent cultural resource assessment survey was performed on the GREC Site by ACI in January 2010. Attachment D to this document contains a copy of the survey report.

3.0 AMENDMENT TO THE SITE CERTIFICATION APPLICATION

As discussed in Section 1.0 of this document, after the SCA for GREC was filed, GREC LLC continued to refine the engineering/design plans for the GREC facilities. Based on these efforts, several improvements in the location or layout of facilities within the Site have been identified that will enhance the overall operations. These improvements primarily involve the relocation of the scale and scale house used to weigh the incoming biomass fuel delivery trucks and the relocation of the biomass fuel truck unloading shed, and conveyor system from the unloading area to the biomass fuel storage piles. The biomass fuel storage piles will remain the same size, but their location will shift slightly. These improvements to the site layout are considered to be minor because the facilities are merely being relocated to different sections of the plant roadway loop or shifted slightly within the roadway loop area. No additional land areas on the Site will be impacted by these improvements. The following figures from the SCA have been revised to show the improvements to the site plan and facility layout:

- Figure 4.1.2-1 (Revised 01/28/10). Locations of Proposed GREC Associated Linear Facilities.
- Figure 4.2.0-1 (Revised 01/28/10). Overall Layout of Proposed GREC Facilities within DGS Site.
- Figure 4.2.0-2 (Revised 01/28/10). Layout of Proposed Facilities within GREC Site.
- Figure 4.2.0-3 (Revised 01/28/10). Detailed Facility Layout for GREC.
- Figure 5.1.1-1 (Revised 01/28/10). Land Disturbed by Construction on GREC Site and DGS Site.

These revised figures supersede the site layout figures contained in the SCA.

As shown in the revised figures, the following key improvements have been made to the site layout:

- The biomass fuel truck unloading shed and associated facilities will be relocated. With reference to Figure 4.2.0-3, Detailed Facility Layout for GREC, on page 4-11 of the GREC SCA compared to the revised Figure 4.2.0-3, the

biomass fuel truck receiving equipment (Legend No. 60) was situated on the southern section of the plant roadway loop directly south of the western biomass fuel storage pile (Legend No. 50). In the revised layout, the biomass fuel truck receiving equipment, including the truck dumpers, pit bridges, and pit hoppers, will be relocated to the western section of the plant roadway loop and will be situated to the southwest of the western biomass fuel storage pile. Other layout changes associated with the relocation of the biomass fuel truck unloading shed include the relocation of several conveyors, and the fuel screening/hogging enclosure (Legend No. 72), which will be shifted approximately 250 ft to the west on the north side of the southern section of the plant roadway loop.

- The large western biomass fuel storage pile (Legend No. 50) will remain the same size and will shift approximately 35 ft to the east.
- The biomass fuel stock storage pile (Legend No. 44) and the large eastern biomass fuel storage pile (Legend No. 64) will shift approximately 50 ft to the east. Both piles will remain the same size. There will also be a shift to the east of approximately 50 ft of the equipment located between the biomass fuel storage piles and the power block area. However, the locations of the main power block area equipment (i.e., the bubbling fluidized bed [BFB] boiler and its emission control systems, the BFB boiler stack, the mechanical draft cooling tower, etc.) will not change.
- The scale house (Legend No. 31) and the incoming fuel delivery truck scale were relocated. These facilities will be relocated to the southern section of the plant roadway loop south of the large eastern biomass fuel storage pile.

Again, these improvements to the site layout are considered minor because the facilities are merely being shifted within the original footprint area within the plant roadway loop. No additional land areas or environmental resources (e.g., wetlands or wetland buffers) will be affected by these facility relocations compared to the effects described in the original SCA. Specifically, the improvements to the site layout do not require any changes to the text of the SCA in Chapter 5.0 and 6.0, which discuss the effects of plant operation and construction. These facility relocations have required some minor revisions in the

design details of the stormwater management plan. These minor revisions have been incorporated into the revised stormwater management plan and related information provided in Attachments B and C to this document. As described in Section 2.0 of this document, the revised stormwater management plan also includes the revisions and/or clarifications needed to address the completeness requests from the FDEP Northeast District Office, Stormwater Section.

These improvements in the facility layout are precertification amendments to the SCA, as defined in FDEP Rule 62-17.200(10), F.A.C. The information concerning these amendments is being provided to all agencies and entitles that received the SCA for review. GREC LLC and its consultants have discussed these amendments in the facility layout with the FDEP Siting Coordination Office and several of the reviewing agencies and, to date, no concerns with the amendments have been identified.

M:\acad\0904OR\0110 Site\Associated linears 012810.dwg

Jan 29, 2010 - 9:43am by jroberts

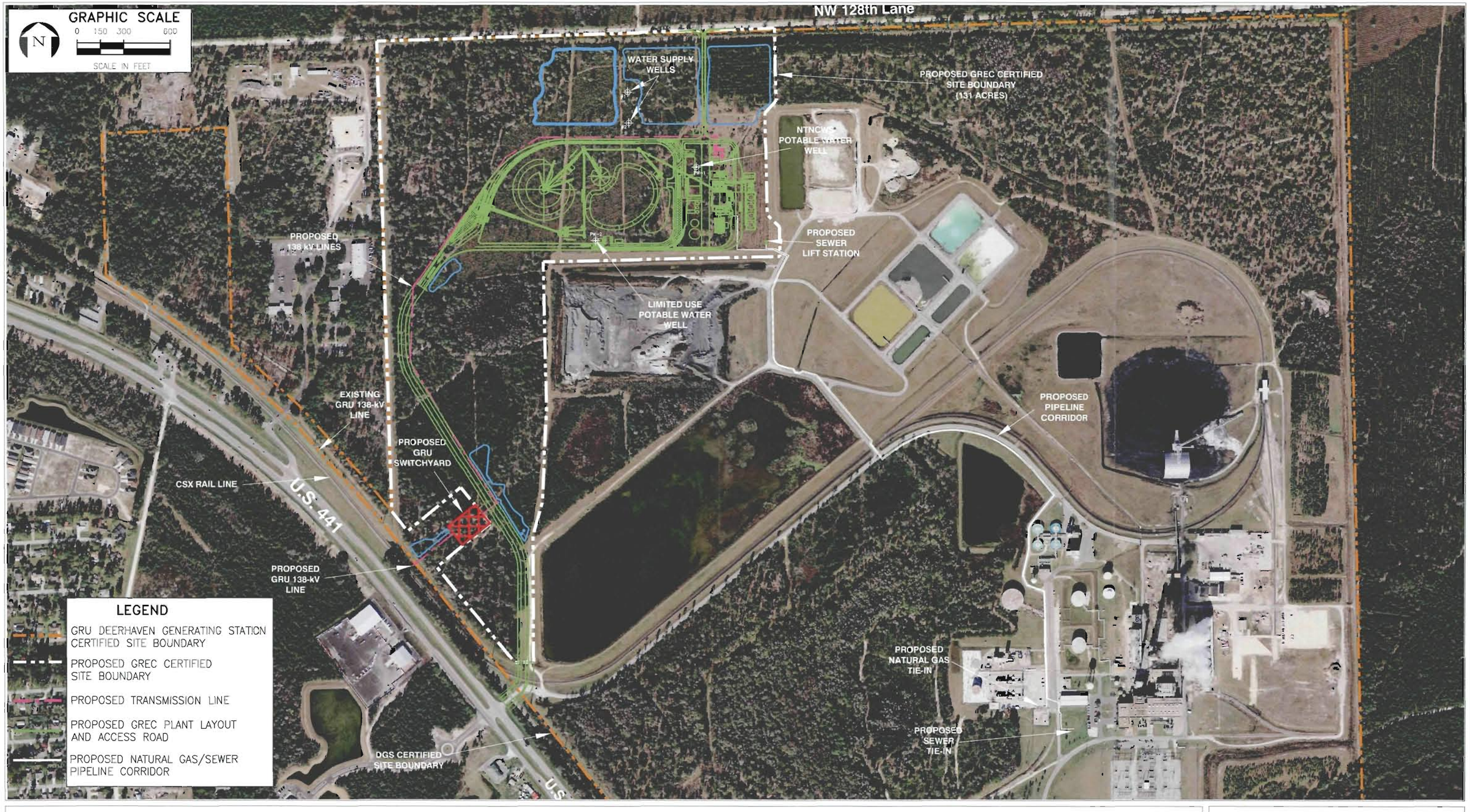


FIGURE 4.1.2-1. (REVISED 01/28/10)

LOCATIONS OF PROPOSED GREC ASSOCIATED LINEAR FACILITIES

Source: FDOT, 2008; Zachary, 2010; EDA, 2010, Genesis, 2009; ECT, 2010.

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M:\acad\090406\0110 Site\Overall Layout 012810.dwg

Jan 28, 2010 - 9:45am by jobbins

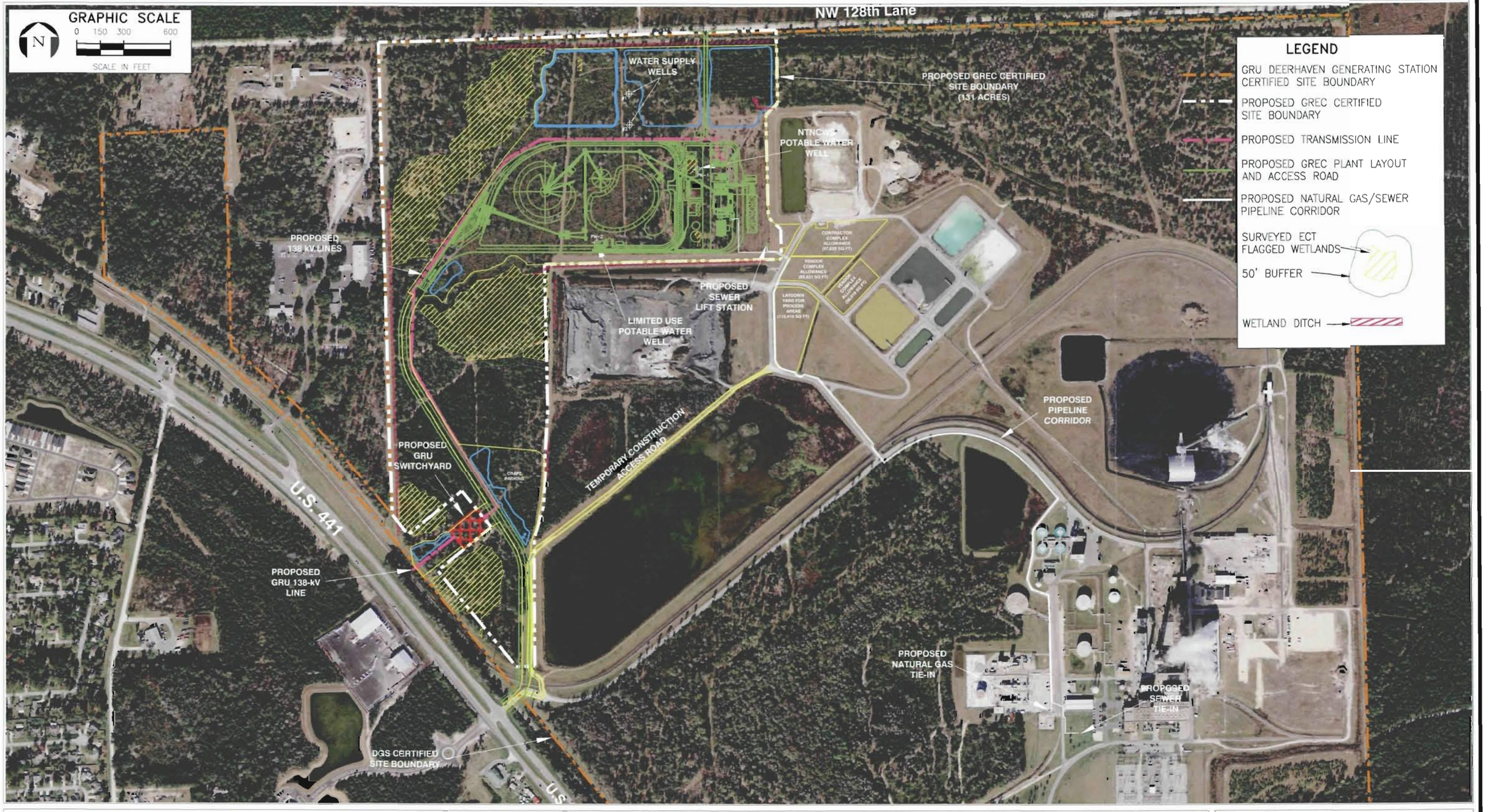

FIGURE 4.2.0-1. (REVISED 01/28/10)

OVERALL LAYOUT OF PROPOSED GREC FACILITIES WITHIN DGS SITE

Source: FDOT, 2008; Zachary, 2010; EDA, 2010, Genesis, 2009; ECT, 2010.

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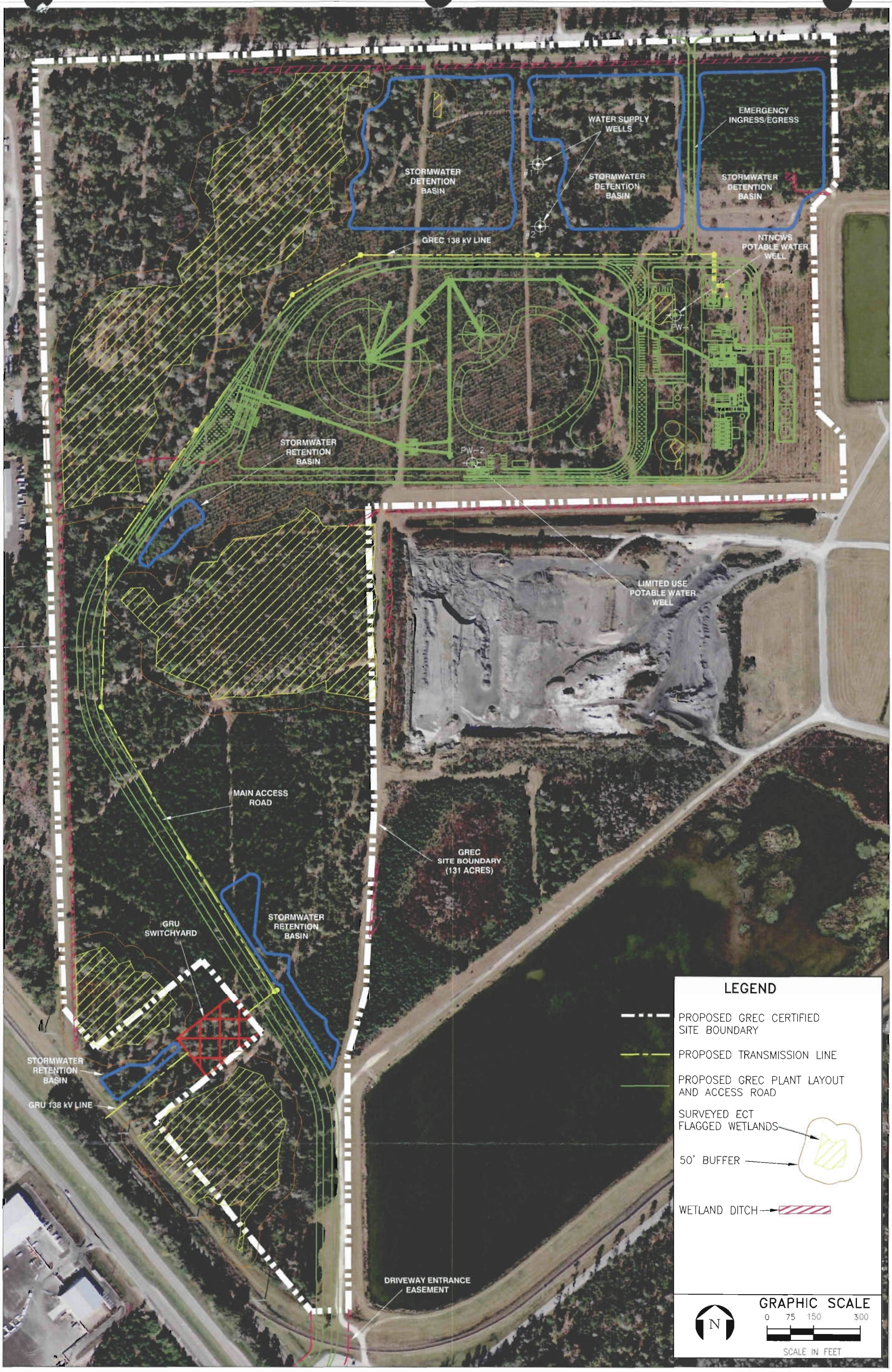

FIGURE 4.2.0-2. (REVISED 01/28/10)

LAYOUT OF PROPOSED FACILITIES WITHIN GREC SITE

Source: FDOT, 2008; EDA, 2010; Zachary, 2010; Genesis, 2009; ECT, 2010.

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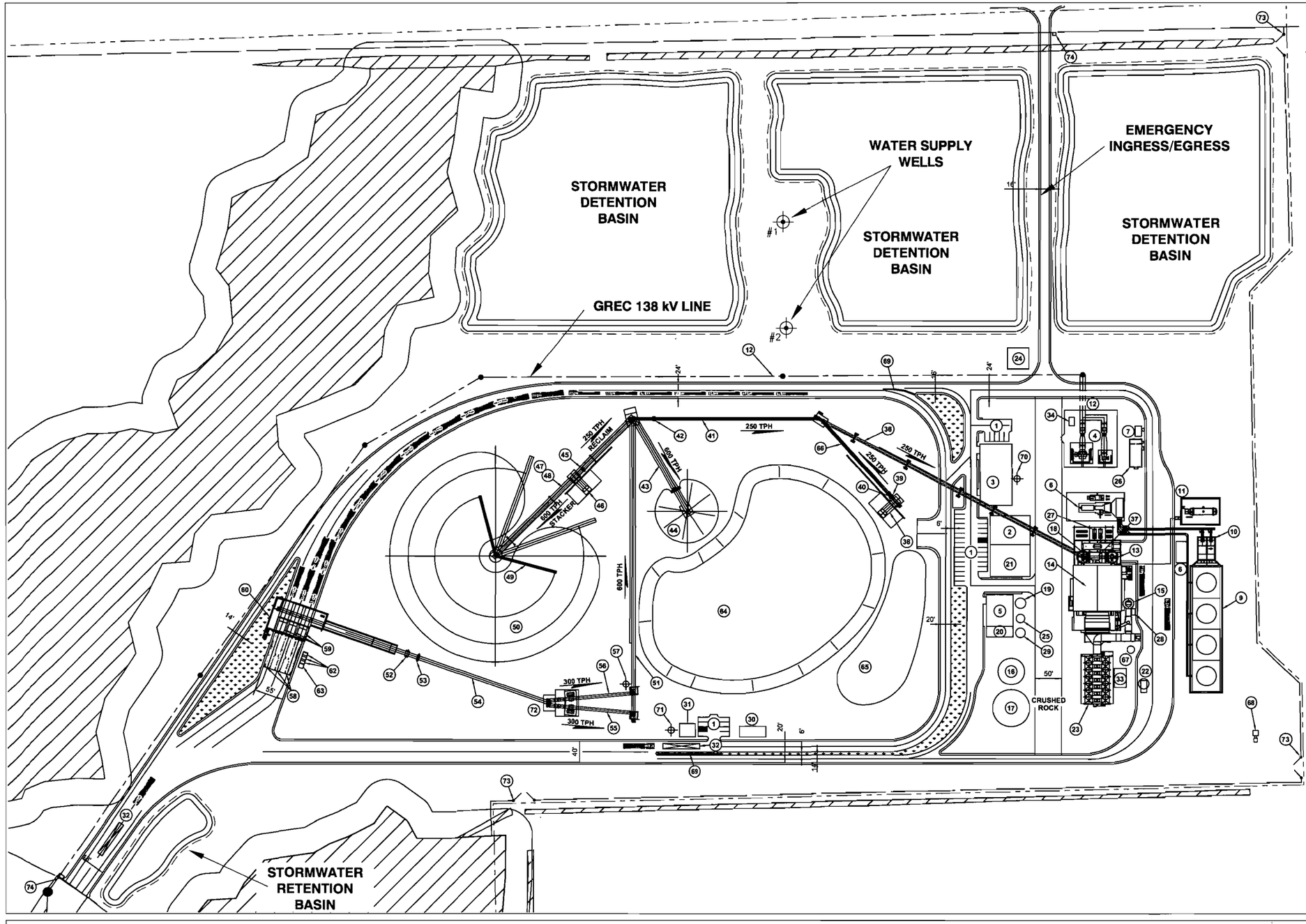

LEGEND

1. PARKING
2. ADMINISTRATION
3. WAREHOUSE / MAINTENANCE
4. SWITCHYARD
5. WATER TREATMENT
6. COOLING TOWER CHEMICAL TREATMENT
7. DIESEL GENERATOR
8. STEAM TURBINE
9. COOLING TOWER
10. CIRCULATING WATER PUMPS
11. AQUEOUS AMMONIA UNLOADING AND STORAGE
12. ELECTRICAL TRANSMISSION LINES
13. FUEL DAY BINS
14. BOILER
15. STACK
16. INFLUENT SOFTENER/CLARIFIER
17. RAW WATER / FIREWATER TANK
18. SAND SILO
19. DEMINERALIZED WATER TANK
20. FIRE PUMPS
21. CONTROL ROOM/OFFICE
22. FLY ASH SILO
23. BAGHOUSE
24. CONSTRUCTION TRANSFORMER
25. PROCESS WASTE WATER TANK
26. POWER DISTRIBUTION CENTER (PDC)
27. BOILER FEED PUMPS
28. CEMS
29. SIDESTREAM CLARIFIER
30. WOOD YARD POWER DISTRIBUTION CENTER (WPDC)
31. SCALE HOUSE
32. TRUCK SCALE
33. BAGHOUSE PDC
34. SUBSTATION ELECTRICAL ROOM
35. NOT USED
36. CONVEYOR #9
37. CONVEYOR #10
38. UNDERPILE RECLAIMER #2
39. MAGNET #3
40. BELT SCALE #2
41. CONVEYOR #8
42. BELT SCALE #1
43. CONVEYOR #6
44. STOCKPILE
45. MAGNET #2
46. UNDERPILE RECLAIMER #1
47. CONVEYOR #5 (ABOVE)
48. CONVEYOR #7 (BELOW)
49. STACKER RECLAIMER
50. FUEL STORAGE (125,000 CU YDS)
51. CONVEYOR #4
52. MAGNET #1
53. METAL DETECTOR
54. CONVEYOR #1
55. CONVEYOR #2
56. CONVEYOR #3
57. DUST COLLECTOR
58. TRUCK DUMPERS
59. PIT BRIDGES
60. TRUCK RECEIVING
61. NOT USED
62. HYDRAULIC POWER UNITS
63. HYDRAULIC EQUIPMENT
64. FUEL STORAGE (125,000 CU YDS)
65. SAWDUST UNLOADING AND STORAGE AREA
66. CONVEYOR #11
67. SORBENT STORAGE AND HANDLING
68. SANITARY LIFT STATION
69. JERSEY BARRIER
70. POTABLE WATER WELL #1
71. POTABLE WATER WELL #2
72. SCREEN/HOG ENCLOSURE
73. SWING GATE
74. AUTOMATED GATE

GRAPHIC SCALE
0 50 100 200
SCALE IN FEET

FIGURE 4.2.0-3. (REVISED 1/28/10)

DETAILED FACILITY LAYOUT FOR GREC

Source: FDOT, 2008; Genesis, 2009; Zachary, 2010; EDA, 2010; ECT, 2010.

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File: M:\acad\090408\0110 Site\Disturbedland_012810.mxd

FIGURE 5.1.1-1. (REVISED 01/28/10)

LAND DISTURBED BY CONSTRUCTION ON GREC SITE
AND DGS SITE

Source: FDOT, 2008; Zachry, 2009; Genesis, 2009; ECT, 2009.

Gainesville
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ATTACHMENT A

FDEP DETERMINATION OF INCOMPLETENESS

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

IN RE: GAINESVILLE RENEWABLE ENERGY CENTER, LLC,
Applicant.

DOAH Case No. 09-6641EPP
DEP OGC Case No. 09-4002
PPSA No. PA09-55

_____ /

DEPARTMENT OF ENVIRONMENTAL PROTECTION'S DETERMINATION THAT APPLICATION IS INCOMPLETE

Pursuant to section 403.5066, Florida Statutes (F.S.), the Florida Department of Environmental Protection (Department) hereby finds the application incomplete. A description of all completeness issues is attached and incorporated by reference herein. Pursuant to section 403.5066, F.S., as a result of the Department's declaration that the application is incomplete, the Applicant, within 15 days after the filing of this statement by the Department, is required to file with the Division of Administrative Hearings, the Department, and all parties:

(a) A withdrawal of the application; or,

(b) A statement agreeing to supply the additional information necessary to make the application complete. The additional information shall be provided within 30 days after the issuance of the Department's statement on completeness of the application. The time schedules under this act shall not be tolled if the Applicant makes the application complete within 30 days after the issuance of the Department's statement on completeness of the application. A subsequent finding by the Department that the application remains incomplete, based upon the additional information submitted by the Applicant or upon the failure of the Applicant to timely submit the additional information, tolls the time schedules under this act until the application is determined complete;

(c) A statement contesting the Department's determination of incompleteness; or

(d) A statement agreeing with the Department and requesting additional time beyond 30 days to provide the information necessary to make the application complete. If the Applicant exercises this option, the time schedules under this act are tolled until the application is determined complete.

I HEREBY CERTIFY that a true and correct copy of the foregoing has been furnished by **electronic mail ONLY**, this ***11th*** day of **January, 2010**, to the parties on the attached Service List.

/s/ Toni L. Sturtevant

Toni L. Sturtevant, Assistant General Counsel
Florida Bar I.D. No. 0661821
STATE OF FLORIDA DEPARTMENT
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GAINESVILLE RENEWABLE ENERGY CENTER, LLC
DOAH Case No. 09-6641
SERVICE LIST

Updated 12-01-09

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Florida Department of Environmental Protection
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Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

January 11, 2010

TO: Toni Sturtevant, OGC

FROM: Mike Halpin, Siting Coordination Office

Pursuant to Section 403.5066, Florida Statutes, the Department of Environmental Protection (DEP), after consulting with affected agencies, has determined that the application submitted by Gainesville Renewable Energy Center, LLC (GREC LLC) for the site certification of Gainesville Renewable Energy Center (GREC) is not complete to support a recommendation concerning certification. The items listed below represent requests for additional or clarifying information from the respective reviewing agencies. The applicant should identify any items which may be more suitably handled through post-certification submittals, as well as propose related conditions of certification. Requests for completeness items related to federal permit applications are processed directly by the federally delegated or approved program and are not shown herein.

ITEM I: DEPARTMENT OF ENVIRONMENTAL PROTECTION

A. Siting Coordination Office:

FDEPSCO-1

1) According to the application, GREC's use of woody biomass fuel will not result in a net increase of carbon dioxide (CO_2) emissions. Although the growth and decomposition of trees represents a natural atmospheric carbon cycle, woody biomass is generally only considered a carbon neutral source of energy if the level of potential sequestration of trees balances that of tree harvesting. Please justify the assertion that GREC's biomass fuel source is considered carbon neutral and provide supporting references or documentation. Be advised that the Department may require the applicant to comply with a carbon neutral requirement.

FDEPSCO-2

2) Please provide more details regarding the off-site fuel processing (i.e. sorting/chipping) locations discussed in Section 4.3 of the application. It is unclear as to whether these are independently owned and pre-existing

facilities; it is also unclear whether the off-site fuel processing facilities would be constructed primarily for the purpose of supporting GREC.

FDEPSCO-3

3) Please provide more details regarding transportation of the fuel sources to the GREC site. Does GREC plan to contract out these services, maintain their own fleet, or a combination thereof?

B. Northeast District Office - Ground Water Section:

FDEPNEDGW-1

1) Although a zero liquid discharge (ZLD) is proposed for all wastewater, a ground water monitoring plan for Water Facilities Program related activities is requested as an indicator system. In order to provide both pre- and post-operational monitoring, please submit a proposed ground water monitoring plan with a response to this correspondence. This plan should include background and compliance well monitoring.

FDEPNEDGW-2

2) Since there is a ZLD proposed for all wastewaters, a zone of discharge (ZOD) will not be established at this facility for Water Facilities Program related activities. Although the GRU-Deerhaven Power Plant has an existing ZOD that extends to their current property lines, it does not include any new activities.

FDEPNEDGW-3

3) Please clarify if temporary storage areas will be used for the clarifier solids, crystallizer solids\wet salt cake\brine concentrate, chemical metal cleaning wastes, floor drainage, or any other wastewater byproducts, prior to transportation to an offsite landfill. Approximate amounts, storage time frames, and details of storage system should be provided, also.

FDEPNEDGW-4

4) On Figure 4.2.0-3, the Detailed Facility Layout does not seem to indicate a boiler blowdown or cooling tower blowdown holding area. Please address this issue and provide details of any applicable holding tanks\basins.

FDEPNEDGW-5

5) Please provide flow diagrams of all Industrial and Domestic wastewater streams, including all wastewater and water treatment systems, along with locations and details of all storage areas and chemical treatment systems.

FDEPNEDGW-6

6) Section 4.6 of Volume One indicates non-hazardous laboratory waste will be discharged to plant drain and partially used for dust control. Due to the nature of some laboratory waste, it is requested that this waste be routed to the ZLD system, or 100 % used for cooling tower makeup.

FDEPNEDGW-7

7) It is indicated that clay liners are proposed under the fuel storage areas. Please provide details on the clay liners (i.e.: final compaction rates, thickness, final permeability rate, source of clay, type of clay, distance to surficial aquifer from bottom of liners, existing grade, proposed grade, elevations,

secondary containment system, etc.). In addition, please include preventative and corrective measures if the liners are breached by equipment, fractured, etc.

FDEPNEDGW-8

8) Please clarify if runoff swales and ponds are proposed around the fuel storage areas, and provide details on Figure 4.2.0-3, or similar figure, including details of any liners. If no runoff swales or ponds are proposed, then provide details of fuel storage area design that prohibits runoff. Use of a layer of compacted wood chips above the clay liner would not provide a sufficient barrier.

FDEPNEDGW-9

9) Due to naturally occurring organic acids that may leach from the wood material in the fuel storage areas, there is concern with the effects of potentially acidic leachate on the clay liners. Please address this issue, and provide data to support the long-term integrity of clay liners.

FDEPNEDGW-10

10) Please provide source for results in Table 4.3.4-1, Typical Constituent Analysis of Wood Fuel.

FDEPNEDGW-11

11) According to the analysis of the wood fuel, nitrate and sulfate may be constituents of concern. Additional constituents may include total dissolved solids, total phosphate, pH, and specific conductivity. A list of parameters and frequency of monitoring should be included with the proposed ground water monitoring plan.

C. Northeast District Office - Potable Water Section:

FDEPNEDPW-1

1) Will the potable water system comply with requirements as found in Chapters 62-550, 62-555, 62-560, 62-521, and 62-699, Florida Administrative Code (F.A.C.)? These rules can be found at http://www.dep.state.fl.us/water/rulesprog.htm#dw

FDEPNEDPW-2

2) Will the potable well(s) be constructed according to public well standards found in Chapter 62-532, F.A.C.? Especially be aware of required setbacks for the potable water well. The setback for fuel tanks are at least 50 feet if the tank is above ground and double walled, 100 feet if otherwise.

FDEPNEDPW-3

3) A Preliminary Design Report (PDR) or specifications, details, and design drawings are required for approval of a potable water system. The list of requirements for a PDR can be found in subsection 62-555.520(4), F.A.C.

FDEPNEDPW-4

4) On Appendix 10.12; Please note that the application form was not filled out properly. The person who signs on page 2; part I; item I, needs to match with

page 1; section I; item H, which would be the person that will own the project after it is placed into permanent operation. Please match the signatures.

FDEPNEDPW-5

5) Subsection 62-555.520(2), F.A.C., requires all permit applicants to submit to the Department DEP Form 62-555.900(1) executed in full, containing original signatures. Section II.B needs to be completed with signature and date as well as completing the information required in the corresponding Section II.D which includes signature, seal and date. Also, provide calculations for the new Total Permitted Maximum Day Operating Capacity of Plant.

FDEPNEDPW-6

6) The limited-use potable water system will need to be permitted through the Alachua County Dept. of Health.

*Note: Questions number 1 and 3 really cover everything that will be needed for approval of the potable water system. Specification and details of all the components, treatment processes, size of tanks, pumps, etc. are necessary to determine if the water system will meet the requirements.

D. Northeast District Office - Storm Water Section:

FDEPNEDSW-1

1) Contour lines in the Pre- and Post-development Drainage Maps, Sheets 1 and 2 of 2, found in Volume 2, Appendix 10.4.2, are labeled incorrectly. Please revise.

FDEPNEDSW-2

2) Please indicate in the plans or in the general notes the vertical datum utilized in the design, North American Vertical Datum (NAVD88) or National Geodetic Vertical Datum (NGVD29).

FDEPNEDSW-3

3) Paragraph 40B-4.2030(8)(h), FAC, requires detention and retention systems to be designed to provide treatment volumes within 72 hours following the end of the design storm event. For retention systems, only percolation and evapotranspiration may be used to reduce storage and treatment volumes in the system. Please provide a recovery analysis for the swales and the dry retention ponds. Also, specify how runoff is conveyed from the switchyard, and paved/impervious areas into the proposed retention ponds.

FDEPNEDSW-4

4) Paragraph 40B-4.2030(8)(l), FAC, requires swales to be designed to treat, through percolation or evapotranspiration, a volume of stormwater equal to at least 80% of the runoff resulting from the design storm with a 3-yr, 1-hr rainfall depth. Based on design information and weir elevations provided for the proposed swales along the access road, it appears that most of the swales do not have adequate treatment capacity. Also, it is unclear how runoff from

Drainage Areas POST-301, 302, and 108 will be conveyed into the swales and through the culverts under the access road. Please provide revised calculations, design details and site plans.

FDEPNEDSW-5

5) It is not clear how runoff from drainage areas POST-100, 101, and 102 will be collected and conveyed to the proposed wet detention ponds for stormwater treatment and attenuation, since storm sewer pipes and inlets are not shown in the plans. In addition, site plans indicate that a swale will be provided along the west side of the access road in drainage area POST-102 for stormwater collection and conveyance, however, design details were not included. Please provide.

FDEPNEDSW-6

6) According to Attachment C-Drainage Calculations, Appendix 10.4.2 in Volume 2, the wet detention ponds are provided with a permanent pool volume that is double the required capacity. Please indicate the need and if the ground water table in the area will be impacted along with the proposed two water supply wells located between the wet ponds.

FDEPNEDSW-7

7) Please provide hydraulic calculations for the three proposed culverts at the beginning of the access road located at STA 1+84, 24" RCP; STA 3+49, 18" RCP, and STA 4+09, 18" RCP. These culverts were not included in the Pipe Size Calculations in Appendix 10.4.2. In addition, please indicate how runoff from new paved areas will be handled, specifically from STA 1+00 to 4+40.

ITEM II: SUWANNEE RIVER WATER MANAGEMENT DISTRICT

SRWMD-1

1) Please provide additional information on the frequency and duration of maximum daily water usage.

SRWMD-2

2) Please be advised, reduction in groundwater allocation for Deerhaven Generating Station does not quality as an offset of actual groundwater usage and does not generate additional water available for use within the Florida Aquifer.

SRWMD-3

3) Please provide justification for cost associated with reuse feasibility studies, particularly the City of Alachua's reclaimed water. Please include a breakdown of cost associated with pipeline, storage and modification of system based on recent cost data specific to this area.

SRWMD-4

4) Please provide justification as to the feasibility of using ground water as a standby supply to supplement available reclaimed water.

SRWMD-5

5) Please provide a yearly schedule, including start-up, for proposed water use.

SRWMD-6

6) Please provide information on the seasonality of the water use.

SRWMD-7

7) Please provide assurance that the proposed withdrawal will not cause harm to the Lower Santa Fe River and springs, particularly Hornsby Springs. The District's current draft of the proposed MFL for the Lower Santa Fe River and springs limits the reduction of river and spring flow to no more than a cumulative reduction of 4.7% at all river gaging locations and for each individual spring. The evaluation should be conducted on an individual and cumulative basis.

SRWMD-8

8) Please be aware that since the development of the draft Lower Santa Fe River MFL technical document, additional legal users have received water use permits, thus potentially reducing the available water.

SRWMD-9

9) Please provide a description of the actions GREC plans to take to reduce their water demands during a water shortage order issued by the District pursuant to Chapter 40B-21, F.A.C.

FWC-INTRO

ITEM III: FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

Based on a Geographical Information System (GIS) analysis of the proposed project site, the following imperiled species and associated habitats were identified:

- 16 protected species potentially occur onsite or in the vicinity of the proposed site (see table below)
- Historical wading bird rookery
- Florida Natural Areas Inventory-identified rare species habitat for the eastern indigo snake
- FWC-identified potential habitat and priorities wetlands for Florida black bear and wading birds

Common Name	*Scientific Name*	Status*
Gopher frog	*Rana capito*	SSC
Gopher tortoise	*Gopherus polyphemus*	ST
Florida pine snake	*Pituophis melanoleucus mugitus*	SSC
Eastern indigo snake	*Drymarchon corais couperi*	ST; FT
Tricolored heron	*Egretta tricolor*	SSC

Little blue heron	*Egretta caerulea*	SSC
Limpkin	*Aramus guarauna*	SSC
Snowy egret	*Egretta thula*	SSC
White ibis	*Eudocimus albus*	SSC
Bald eagle	*Haliaeetus leucocephalus*	P
Florida sandhill crane	*Grus canadensis pratensis*	ST
Southeastern American kestrel	*Falco sparverius paulus*	ST
Wood stork	*Mycteria americana*	SE; FE
Sherman's fox squirrel	*Sciurus niger shermani*	SSC
Florida black bear	*Ursus americanus floridanus*	ST

* SSC - Species of Special Concern; ST - State Threatened; SE - State Endangered; FT - Federally Threatened; FE - Federally Endangered; P - Protected under federal law and state management plan

Issues and Recommendations

FWC-1

1) Issue: The SCA aerial maps provided identify habitats based on the Florida Land Use and cover Forms classification system (FLCUFCS). While this is useful for identifying land uses, this classification system is not appropriate for identification of plant communities that provide habitat for wildlife.
    a. We recommend that the plant communities be mapped and classified using the Florida Natural Areas Inventory Natural Communities Guide (2009 Version).

FWC-2a

2) Issue: The SCA acknowledges that imperiled wildlife species were identified onsite, however, the application does not provide information regarding survey methodology including time of year, locations of observations, type of observed activity, etc.
    a. If it has not already been done, we recommend that a desktop review of potential fish and wildlife issues be performed in advance of appropriate surveys, which should be conducted during the active (i.e., reproductive) season particular to each species.

FWC-2b

    b. We recommend that the applicant provide a fish and wildlife status report that addresses at least the list of species we have identified in this letter. That report should include the survey methodologies (with source citations) used as well as the timing of the surveys.

FWC-3

3) Issue: The SCA indicates that three isolated wetlands would be impacted. Isolated wetlands can provide significant and often endemic breeding habitat

for semi-aquatic wildlife species, as well as important foraging habitat for wading birds.

FWC-3a

a. We recommend an amphibian breeding season survey be completed; at a minimum, the gopher frog should be a target species for this survey.

FWC-3b

b. Please note that the document indicates that this site is dominated by flatwoods-type soils, which could support the flatwoods salamander (*Ambystoma cingulatum*, listed by Florida as a Species of Special Concern). Although our GIS analysis did not identify potential habitat for this species, the site falls within its known range and therefore this species should be considered when developing the survey.

FWC-4

4) Issue: The SCA indicates that a minimum 50-foot buffer along the perimeter of forested wetlands will be included; however, the wetland delineation and mitigation plan did not identify the conditions under which the buffer system would be maintained.

FWC-4a

a. Buffers that are intended to meet minimum stormwater management requirements are not always sufficient to protect fish and wildlife needs associated with wetlands. For that reason, we recommend that the applicant develop their buffers based on the results of the fish and wildlife assessment and follow U.S. Fish and Wildlife Service wetland buffer guidelines (enclosed).

Summary

Guidance related to our recommendations can be found in the FWC's website at http://myfwc.com/conservation/fwcg.htm. At this time, we find the information included in the SCA to be insufficient for our determination of potential impacts to wildlife resources or to recommend specific site certification conditions for this proposal. We therefore have determined that this application is incomplete. If you or your staff would like to coordinate further on the issues and recommendations contained in this report, please contact me at 850-410-5272 or via email at maryann.poole@myfwc.com. If you or your staffs have any specific questions regarding our comments, I encourage them to contact Ms. Stephanie Rousso at 904-731-3196 or via email at Stephanie.rousso@myfwc.com.

ITEM IV: FLORIDA DEPARTMENT OF STATE

The Department of State, Division of Historical Resources notes that while Section 5.9 of GREC's site certification application references a prior cultural resources assessment, it does not address the specifics of that assessment. A search of our records indicates that

what was then called the Deerhaven Generating Plant Expansion was subjected to a cultural resources assessment in 1977. Several cultural resources were identified but for various reasons were not recorded in the Florida Master Site File (FMSF). Consequently, any recent searches of the FMSF would not reveal the presence of resources that may in fact still be located within the project area. Furthermore, the significance of historical resources on the property may have increased in the 32 years since the survey was conducted.

FDOSDHR-1

1) Because of this, it is the request of this agency that a professional archaeologist perform a cultural resource survey of the property, including subsurface testing, in order to relocate cultural resources identified in the 1977 survey and to assess the probability that additional archaeological sites and/or historical properties might be present.

FDOSDHR-2

2) If the application is referencing a more recent cultural resources assessment, a new survey may not be necessary. Regardless, detailed references to specific cultural resource assessment(s) and associated finding should be incorporated into your application.

Enclosures: Copies of submitted letters/comments from the Suwannee River Water Management District, Florida Fish and Wildlife Conservation Commission, and Florida Department of State.

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

December 30, 2009

Mr. Mike Halpin, Administrator
Siting Coordination Office
Florida Department of Environmental Protection
3900 Commonwealth Blvd., Mail Station 48
Tallahassee, FL 32399

Subject: WUP09-0040, Request for Comments, Gainesville Renewable Energy Center, Alachua County

Dear Mr. Halpin:

As directed by Section 403.941, Florida Statutes, and your office, the Suwannee River Water Management District (District) offers the following comments:

1. Please provide additional information on frequency and duration of maximum daily water usage.
2. Please be advised, reduction in groundwater allocation for Deerhaven Generating Station (DGS) does not qualify as an offset of actual groundwater usage and does not generate additional water available for use within the Floridan Aquifer.
3. Please provide justification for cost associated with reuse feasibility studies, particularly City of Alachua's reclaimed water. Please include a breakdown of cost associated with pipeline, storage and modification of system based on recent cost data specific to this area.
4. Please provide justification as to feasibility of using ground water as a standby supply to supplement available reclaimed water.
5. Please provide a yearly schedule, including start-up, for proposed water use.
6. Please provide information on the seasonality of the water use.
7. Please provide assurance that the proposed withdrawal will not cause harm to the Lower Santa Fe River and springs, particularly Hornsby Springs. The District's current draft of the proposed MFL for the Lower Santa Fe River and springs limits the reduction of river and spring flow to no more than a cumulative reduction of 4.7% at all river gaging locations and for each individual spring. The evaluation should be conducted on an individual and cumulative basis.

DON QUINCEY, JR.
Chairman
Chiefland, Florida

N. DAVID FLAGG
Vice Chairman
Gainesville, Florida

GEORGIA JONES
Secretary/Treasurer
Lake City, Florida

C. LINDEN DAVIDSON
Lamont, Florida

HEATH DAVIS
Cedar Key, Florida

JAMES L. FRALEIGH
Madison, Florida

OLIVER J. LAKE
Lake City, Florida

CARL E. MEECE
O'Brien, Florida

DAVID STILL
Executive Director
Lake City, Florida

9225 CR 49 • LIVE OAK, FLORIDA 32060 • TELEPHONE 386/362-1001 • 800/226-1066 (FL) • FAX 386/362-1056
mysuwanneeriver.com

RECYCLED PAPER

8. Please be aware that since the development of the draft Lower Santa Fe River MFL technical document, additional existing legal users have received water use permits, potentially reducing the available water.
9. Please provide a description of the actions Gainesville Renewable Energy Center plans to take to reduce their water demands during a District-issued water shortage order, pursuant to 40B-21, Florida Administrative Code.

The District appreciates the opportunity to comment. If you have questions, please contact me at 386.362.1001, or toll free at 800.226.1066. Prior to the applicant attempting to resolve these issues, it is strongly suggested that the applicant schedule a meeting with District staff to discuss these issues in depth.

Sincerely,

Kevin Wright

Kevin Wright
Resource Management Staff

KW/lgw

Florida Fish and Wildlife Conservation Commission

Commissioners
Rodney Barreto
Chair
Miami

Kathy Barco
Vice Chair
Jacksonville

Ronald M. Bergeron
Fort Lauderdale

Richard A. Corbett
Tampa

Dwight Stephenson
Delray Beach

Kenneth W. Wright
Winter Park

Brian S. Yablonski
Tallahassee

Executive Staff
Nick Wiley
Executive Director

Greg Holder
Assistant Executive Director

Karen Ventimiglia
Deputy Chief of Staff

Office of Planning and Policy Coordination
Nancy Linehan
Director
(850) 487-3794
(850) 410-5265
FAX
(850) 410-5272

Managing fish and wildlife resources for their long-term well-being and the benefit of people.

620 South Meridian Street
[redacted]
32399-1600
Voice: (850) 488-4676

Hearing/speech impaired:
(800) 955-8771 (T)
(800) 955-8770 (V)

MyFWC.com

January 3, 2010

Mr. Mike Halpin, Administrator
Siting Coordination Office, Mail Station 48
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, Florida 32399

Re: Gainesville Renewable Energy Center; Site Certification Application Review
Alachua County

Dear Mr. Halpin:

The Division of Habitat and Species Conservation, Habitat Conservation Scientific Services Section, of the Florida Fish and Wildlife Conservation Commission (FWC) has coordinated our agency's review of the referenced project in accordance with the Florida Electrical Power Plant Siting Act, Section 403.5252, Florida Statutes.

Project Description

The Gainesville Renewable Energy Center, LLC, has submitted a Site Certification Application (SCA) for the proposed construction and operation of an electrical power plant and associated facilities within the City of Gainesville, Alachua County, Florida. The proposed facility would use woody biomass material as fuel to generate electrical energy. The 131-acre development footprint is located within the existing Deerhaven Generating Station.

Potentially Occurring Fish and Wildlife Resources

Based on a Geographical Information System (GIS) analysis of the proposed project site, the following imperiled species and associated habitats were identified:

- 16 protected species potentially occur onsite or in the vicinity of the proposed site (see table below)
- Historical wading bird rookery
- Florida Natural Areas Inventory-identified rare species habitat for the eastern indigo snake
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Snowy egret	*Egretta thula*	SSC
White ibis	*Eudocimus albus*	SSC
Bald eagle	*Haliaeetus leucocephalus*	P
Florida sandhill crane	*Grus canadensis pratensis*	ST
Southeastern American kestrel	*Falco sparverius paulus*	ST
Wood stork	*Mycteria americana*	SE; FE
Sherman's fox squirrel	*Sciurus niger shermani*	SSC
Florida black bear	*Ursus americanus floridanus*	ST

* SSC - Species of Special Concern; ST - State Threatened; SE - State Endangered; FT - Federally Threatened; FE - Federally Endangered; P - Protected under federal law and state management plan

Issues and Recommendations

1. Issue: The SCA aerial maps provided identify habitats based on the Florida Land Use and cover Forms classification system (FLCUFCS). While this is useful for identifying land uses, this classification system is not appropriate for identification of plant communities that provide habitat for wildlife.
    a. We recommend that the plant communities be mapped and classified using the Florida Natural Areas Inventory Natural Communities Guide (2009 Version)

2. Issue: The SCA acknowledges that imperiled wildlife species were identified onsite, however, the application does not provide information regarding survey methodology including time of year, locations of observations, type of observed activity, etc.
    a. If it has not already been done, we recommend that a desktop review of potential fish and wildlife issues be performed in advance of appropriate surveys, which should be conducted during the active (i.e., reproductive) season particular to each species.
    b. We recommend that the applicant provide a fish and wildlife status report that addresses at least the list of species we have identified in this letter. That report should include the survey methodologies (with source citations) used as well as the timing of the surveys

3. Issue: The SCA indicates that three isolated wetlands would be impacted. Isolated wetlands can provide significant and often endemic breeding habitat for semi-aquatic wildlife species, as well as important foraging habitat for wading birds.
    a. We recommend an amphibian breeding season survey be completed; at a minimum, the gopher frog should be a target species for this survey.
    b. Please note that the document indicates that this site is dominated by flatwoods-type soils, which could support the flatwoods salamander (*Ambystoma cingulatum*, listed by Florida as a Species of Special Concern). Although our GIS analysis did not identify potential habitat for

this species, the site falls within its known range and therefore this species should be considered when developing the survey.

4. Issue: The SCA indicates that a minimum 50-foot buffer along the perimeter of forested wetlands will be included; however, the wetland delineation and mitigation plan did not identify the conditions under which the buffer system would be maintained.
    a. Buffers that are intended to meet minimum stormwater management requirements are not always sufficient to protect fish and wildlife needs associated with wetlands. For that reason, we recommend that the applicant develop their buffers based on the results of the fish and wildlife assessment and follow U.S. Fish and Wildlife Service wetland buffer guidelines (enclosed).

Summary

Guidance related to our recommendations can be found in the FWC's at http://myfwc.com/conservation/fwcg.htm. At this time, we find the information included in the SCA to be insufficient for our determination of potential impacts to wildlife resources or to recommend specific site certification conditions for this proposal. We therefore have determined that this application is incomplete. If you or your staff would like to coordinate further on the issues and recommendations contained in this report, please contact me at 850-410-5272 or via email at maryann.poole@myfwc.com. If you or your staffs have any specific questions regarding our comments, I encourage them to contact Ms. Stephanie Rousso at 904-731-3196 or via email at Stephanie.rousso@myfwc.com.

Sincerely,

Mary Ann Poole

Mary Ann Poole
Commenting Program Administrator

map/jw
Gainesville Renewable Energy Center_2532_1-3-10
ENV 2-11-2/3
Enclosure

cc: Josh Levine, Director- Project Development (jlevine@amrenewables.com)
Jack Doolittle, ECT Consulting (jdoolittle@ectinc.com)
Tom Davis, ECT Consulting (tdavis@ectinc.com)
Jessica Dalton, FDEP, Tallahassee

Buffers: An Efficient Tool for Watershed Protection

What Are Buffers?

A **buffer** is a strip of naturally vegetated land along a lake, stream, or wetland that provides numerous benefits. Preserving a buffer zone protects water resources from neighboring land uses. Nutrient inputs are of great concern because of their abundant sources (fertilizer, septic tank drain fields, leaking sewage lines, animal waste). Excess nutrients in lakes and estuaries cause toxic algal blooms and depleted oxygen. Natural chemical and biological processes within buffers alter or uptake nutrients and pollutants *before* they enter a water body, thus providing a cost-effective treatment system. Buffers preserve native habitat for wildlife and enhance aquatic habitat. The range of benefits provided by buffers includes:

- Water quality protection
- Erosion control
- Storage of floodwaters and flood damage reduction
- Aquatic habitat enhancement
- Habitat for terrestrial riparian wildlife
- Maintenance of base flow in streams
- Improved aesthetic appearance of stream corridors
- Recreational and educational opportunities

Riparian refers to the land adjoining a body of water, usually a river or stream.

Buffer Width: Bigger is Better

Choosing a buffer width depends on your planning goals. As buffer width increases, the buffer provides greater benefits. As seen in the table below, a 30-foot buffer provides minimal service. At 50 feet, the buffer meets minimum water quality protection recommendations and gives some aquatic habitat benefits. For effective water quality and aquatic habitat protection, a buffer width of 100 feet is needed. Buffers to enhance riparian wildlife should be 300 feet or greater. Special buffer zones may be required to protect vulnerable species. Width should be increased where slope, impervious surface, and soil type reduce buffer effectiveness. The consequences of an inadequate buffer may be an increased need for stormwater ponds, increased flooding, decreased abundance of sportfish, and/or loss of certain species such as some salamanders or crayfish.

Benefit Provided:	**Buffer Width:** 30 ft	50 ft	100 ft	300 ft	1,000 ft	1,500 ft
Sediment Removal - Minimum	●	●	●	●	●	●
Maintain Stream Temperature	●	●	●	●	●	●
Nitrogen Removal - Minimum		●	●	●	●	●
Contaminant Removal		●	●	●	●	●
Large Woody Debris for Stream Habitat		●	●	●	●	●
Effective Sediment Removal			●	●	●	●
Short-Term Phosphorus Control			●	●	●	●
Effective Nitrogen Removal			●	●	●	●
Maintain Diverse Stream Invertebrates			●	●	●	●
Bird Corridors				●	●	●
Reptile and Amphibian Habitat					●	●
Habitat for Interior Forest Species					●	●
Flatwoods Salamander Habitat – Protected Species						●

Sources

Burke, V.J. and J.W. Gibbons, 1995, Terrestrial Buffer Zones and Wetland Conservation: A Case Study of Freshwater Turtles in a Carolina Bay, *Conservation Biology* 9 (6), pp. 1365-1369.

Desbonnet, A., V. Lee, P. Pogue, D. Reis, J. Boyd, J. Willis, and M. Imperial, 1995, Development of Coastal Vegetated Buffer Programs, *Coastal Management* 23, pp. 91-109.

Mitsch, W.J. and J.G. Gosselink, 1993, *Wetlands*, Van Nostrand Reinhold, New York, New York.

Semlitsch, R.D., 1998, Biological Delineation of Terrestrial Buffer Zones for Pond-Breeding Salamanders, *Conservation Biology* 12 (5), pp. 1113-1119.

U.S. Fish and Wildlife Service, April 1, 1999, Endangered and Threatened Wildlife and Plants: Final Rule to List the Flatwoods Salamander as a Threatened Species, *Federal Register* 62(241): 15691-15704.

Wenger, S., 1999, *A Review of the Scientific Literature on Riparian Buffer Width, Extent and Vegetation*, Office of Public Service and Outreach, Institute of Ecology, University of Georgia, Athens, Georgia.

Wenger, S. and L. Fowler, 2000, *Protecting Stream and River Corridors: Creating Effective Local Riparian Buffer Ordinances*, Carl Vinson Institute of Government, University of Georgia, Athens, Georgia.

For Further Information Contact:

U.S. Fish and Wildlife Service
Panama City Field Office
1601 Balboa Avenue
Panama City, Florida 32405
Tel: (850) 769-0552
Fax: (850) 763-2177
E-mail: FW4_ES_FR_Panama_City@fws.gov

DEPARTMENT OF
ENVIRONMENTAL PROTECTION

DEC 28 2009

SITING COORDINATION

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. James S. Gordon
Gainesville Renewable Energy Center
75 Arlington Street, 5th Floor
Boston, Massachusetts 20009

December 22, 2009

Re: DHR Project File No.: 2009-6973 / Received by DHR: December 1, 2009
Gainesville Renewable Energy Center
Site Certification Application
Alachua County

Dear Mr. Gordon:

Our office has reviewed the referenced project in accordance with Chapters 267 and 403, *Florida Statutes*, regarding possible impact to historic properties listed, or eligible for listing, in the National Register of Historic Places, or otherwise of historical, architectural or archaeological value.

We note that while Section 5.9 of this application references a prior cultural resources assessment, it does not address the specifics of that assessment. A search of our records indicates that what was then called the Deerhaven Generating Plant Expansion was subjected to a cultural resources assessment in 1977. Several cultural resources were identified but for various reasons were not recorded in the Florida Master Site File (FMSF). Consequently, any recent searches of the FMSF would not reveal the presence of resources that may in fact still be located within the project area. Furthermore, the significance of historic resources on the property may have increased in the 32 years since the survey was conducted. Because of this, it is the request of this agency that a professional archaeologist perform a cultural resource survey of the property, including subsurface testing, in order to relocate cultural resources identified in the 1977 survey and to assess the probability that additional archaeological sites and/or historic properties might be present.

If this application is referencing a more recent cultural resources assessment, a new survey may not be necessary. Regardless, detailed references to specific cultural resource assessment(s) and associated findings should be incorporated into your application.

Because this letter and its contents are a matter of public record, cultural resource consultants who have knowledge of our survey request may contact an applicant or the project agent. This should in no way be interpreted as an endorsement by this agency. The Division of Historical Resources does not maintain a list of professional consultants who are qualified to work in the State of Florida and/or who meet *The Secretary of the Interior's Historic Preservation Professional Standards* [Volume 62, Number 119, page 33707 (June 20, 1997)], ("Professional Qualifications"), or as amended in the future. However, the American Cultural Resources Association (ACRA) maintains a listing of

professional consultants (www.acra-crm.org/southeast.html). In addition, the Register of Professional Archaeologists (RPA) maintains a membership directory for locating professional archaeologists as well as other professional preservation consultants (www.rpanet.org/about.htm). Many qualified historic preservation professionals are not members of these organizations, and omission from the directories does not imply that someone does not meet the Secretary's Standards or that the resultant work would not be acceptable. Conversely, inclusion on the lists is no guarantee that a product will automatically be acceptable.

If you have any questions concerning our comments, please contact Samantha Earnest, Historic Preservationist, by electronic mail at *swearnest@dos.state.fl.us*, or by telephone at 850-245-6333 or 800-847-7278.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Historic Preservationist Supervisor
Compliance Review Section
Bureau of Historic Preservation

PC: Mr. Mike Halpin, DEP 3700

ATTACHMENT B

STORMWATER MANAGEMENT PLAN (EDA)

ENG, DENMAN & ASSOCIATES, INC.
ENGINEERS • SURVEYORS • PLANNERS

Gainesville Renewable Energy Center
An American Renewables Company

GREC BIOMASS GENERATING FACILITY

APPENDIX 10.4.2

STORMWATER MANAGEMENT PLAN

City of Gainesville, Florida

January 28, 2010

Professional Engineer of Record

Claudia S. Vega, P.E. State of Florida

Engineer's Certificate No. 61813

CLAUDIA S. VEGA LICENSE NO. 61813 STATE OF FLORIDA PROFESSIONAL ENGINEER

Area of responsibility excludes Geotechnical Reports, Environmental Wetland Delineation and Analysis, and Topographic Survey.

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Attachment B	Pre- and Post-Development Drainage Plans
Attachment C	Drainage Calculations
Attachment D	CD Routing Data - ICPR 3.1 and Ponds 3.2
Attachment E	Time of Concentration and Pipe Size Calculations
Attachment F	Stormwater Pollution Prevention Plan (SWPPP)
Attachment G	Detailed Construction Plans.

Gainesville Renewable Energy Center
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STORMWATER MANAGEMENT PLAN

1. INTRODUCTION

1.1 General Project Information

The proposed stormwater management plan will provide facilities to serve the proposed Biomass Electric Generating Facility for the City of Gainesville with associated paving, drainage and utility improvements. The master plan will include stormwater systems for areas utilized during construction of the Power Plant.

The proposed project will also include roadway improvements of US441, access roadway to the Power Plant, a switch yard area with associated paving and drainage improvements.

Gainesville Renewable Energy Center (GREC) an "American Renewables Company" will be the entity responsible for the construction, maintenance and operation in perpetuity of the Stormwater Management System.

1.2 Project Location

The proposed project is located on the northwest portion of the existing parcel of the GRU Deerhaven Power Plant (parcel No. 05884-001-000) and lies within the city limits of Gainesville in Alachua County. The project is located in Section 27, Township 8S and Range 19E; Latitude 29°46'7", Longitude 82°23'53". The total area served by the proposed stormwater system is approximately 134 acres with approximately 76 acres being disturbed by construction activities (see Attachment H – Cover Sheet - C0.00).

2. DESIGN CRITERIA

The proposed stormwater systems serving the project site shall meet the requirements from the following agencies: Florida Department of Environmental Protection (FDEP), Suwannee River Water Management District (SRWMD) and City of Gainesville.

2.1 FDEP AND SRWMD

Stormwater systems shall meet the requirement of Rules 62-343 and 40B-4, which require the following design criteria:

- Buildings and structures shall have finished slab elevation one foot above the 100-year flood elevation.
- Detention systems shall de designed to control post-development peak rate for the 100-year critical duration rainfall depth. Critical duration includes 1-hr, 2-hr, 4-hr, 8-hr, 24-hr, 3-d, 7-d and 10-d events.

- Provide treatment volume for the first 2 inches of rainfall for projects within a stream-to-sink watershed.
- Provide treatment volume within the 72 hours following the end of the design storm.
- Systems shall not decrease the storage volume below the 100-yr floodplain elevation.
- Stormwater systems shall provide the total storage volume within 30 days following the end of the design storm event.

2.2 City of Gainesville

Stormwater systems shall meet the requirement of the Land Development Code and their Design Manual, which require containing the 100-yr critical storm event and providing treatment volumes in accordance to the Water Management District

3. SITE SOILS INFORMATION

3.1 Soils Information

According to the NRCS Soil Survey for Alachua County the soils within the site are comprised of Pomona Sand (14) [Hydrologic Soil Group B/D], Wauchula Sand (17) [Hydrologic Soil Group B/D], Monteocha Loamy Sand (19) [Hydrologic Soil Group D] and Chipley Sand (28) [Hydrologic Soil Group D]. The soil type delineations have been superimposed on the site and are approximate (see Attachment H – Soils Map – C2.10). A detailed description of these soils is included in the Soils Report prepared by GSE which is included in Attachment A.

3.2 Subsurface Investigation

GSE Engineering & Consulting, Inc., conducted a subsurface investigation on the site and summarized their findings in the reports dated September 2009. A copy of the report is provided in Attachment A.

4. EXISTING SITE CONDITIONS

4.1 Existing Site Conditions

The project area is approximately 134 acres of undeveloped land with low slopes. The site consists of wooded land and natural vegetation surrounded by four wetlands. These wetlands will remain undisturbed and only portions of the 50-ft buffers will be disturbed and compensated for. According to the FEMA map, a portion of the site is located within the floodplain area and the proposed development will not decrease the storage volumes below the 100-yr floodplain. Since the FEMA maps do not have an established Floodplain elevation, our drainage analysis will establish floodplain elevation for existing conditions and post-development conditions.

The topographic survey was performed by Genesis Group and is based on NAVD88. See Boundary and Topographic Survey.

5. DRAINAGE DESCRIPTION

5.1 Pre-development Conditions

The project site lies within the Turkey Creek watershed basin. The County topographic maps, as shown in Attachment B – Drainage Map, clearly indicate there are not off-site drainage areas coming into the project site. The proposed site consists of three major drainage areas that drain into the on-site wetlands which discharge off-site into the Tributary of Turkey Creek .The drainage areas are described below and are shown in Attachment B – Pre-development Drainage Areas –C2.00 through C2.02.

- North Drainage Area: Although the water management district describes the northern area to be part of the Rocky Creek watershed, the existing topography demonstrates this area discharges into a swale along the north property line that discharges into Wetland A part of the Turkey Creek watershed. North drainage area includes on-site land that drains into Wetland A, which discharges off-site to the west and finally discharging into Turkey Creek. This area consists of sub-drainage areas 10 through 15.
- The center drainage area includes on-site land that drains into a ditch located at the south property line, which discharges into Wetland B. Wetland B will discharge at higher storm events to the west continuing to Turkey Creek. This area consists of sub-drainage areas 20 and 21.
- South drainage area includes on-site land that drains into Wetlands C and D, which discharge off-site to the west and finally discharging into Turkey Creek. This area consists of sub-drainage areas 30 through 32.

The construction of the power plant will utilize an area located to the east of the boundary for temporary lay-down. This area consists of 3 sub-drainage areas that discharge into an existing ditch. The ditch discharges downstream into the Master Stormwater Basin of the Deerhaven Plant.

Calculations of drainage areas, impervious areas, runoff coefficient, curve number and time of concentration are shown in Attachment C.

5.2 Post-development Conditions

At post-development conditions the site will maintain the three major drainage areas. The proposed stormwater systems will not increase flood hazards and will not cause adverse effect to the wetlands and natural resources. The post-development drainage areas are described below and are shown Attachment B – Post-development Drainage Areas – C2.03 through C2.06.

- North Drainage Area will consist of eight sub-drainage areas:
    a.) Sub-drainage areas 100 through 102 consist of the proposed Power Plant, which discharges into three interconnected wet detention systems (Basins 100, 101 and 102). The detention basins will discharge into Wetland A.
    b.) Sub-drainage areas 103 and 104 consist of existing roadside swales that discharge into Wetland A.
    c.) Sub-drainage areas 105 and 106 consist of Wetland A, which discharges off-site to the west through a natural weir.
    d.) Sub-drainage area 109 consists of swales for the proposed access roadway; and undisturbed area which discharges into Wetland A.

- Center drainage area will consist of three sub-drainage areas:
    a.) Sub-drainage area 200 consists of an existing swale on the south property line that discharges into wetland B.

b.) Sub-drainage area 202 consists of a dry retention system that collects runoff from the scale house and then discharges into Wetland B.
c.) Sub-drainage area 201 consists of Wetland B, which discharges at higher storm events off-site into Wetland A.

- South drainage area will consist of nine sub-drainage areas:
  a.) Sub-drainage area 300 consists of a dry retention system that collects runoff from the craft parking area and then discharges into Wetland C.
  b.) Sub-drainage areas 304, 306 and 308 consist of roadside swales for the proposed access road which discharges into Wetland C.
  c.) Sub-drainage area 310 consists of a dry retention system that collects runoff from the Switch Yard area and then discharges into Wetland C.
  d.) Sub-drainage area 311 consists of Wetland C, which discharges off-site to the west through a natural weir.
  e.) Sub-drainage area 312, 314 and 318 consists of roadside swales for the proposed access road which discharges into Wetland D.
  f.) Sub-drainage area 309 consists of Wetland D, which discharges off-site to the west through a natural weir.

- The temporary lay-down area will not propose any addition of impervious surface; therefore there will not be increase of runoff from these areas. The 3 sub-drainage areas will continue discharging into an existing ditch and downstream into the Master Stormwater Basin of the Deerhaven Plant. This area will be filled and stabilized to protect ground cover and will be provided with a swale to provide stormwater treatment and prevent any erosion into the existing ditches.

- The area at the beginning of the access roadway will continue draining into the sides as predevelopment conditions. The increase of impervious area will be minimal and grass areas along the roadway will provide the appropriate water quality treatment.

Calculations of drainage areas, impervious areas, runoff coefficient, curve number and time of concentration are shown in Attachment C.

5.3 Storage and Discharge Information

Attachment C includes the storage volumes of the existing and proposed stormwater systems. Information of the discharge structures for the existing and proposed stormwater systems is also included in this Attachment.

5.4 Soil Borings Information

The high season groundwater table (HSGWT) varies from 1 ft to 2 ft below existing ground elevation, as described in the Soils Report (see Attachment A). Attachment C includes a summary of the recommended percolation rates, high season groundwater table and confined layer elevations for each stormwater system.

Wet detention systems are required to operate above tailwater conditions. The proposed wet detention basins discharge into Wetland A, which has a maximum tailwater elevation of 176.00; this elevation is significantly lower than the elevation of the orifice at the wet basins.
Tailwater at the boundary of the drainage areas was estimated based on existing contours and downstream flowing patterns.

5.5 Stormwater Basins

Attachment C includes a summary of the geometry of the proposed stormwater basins. All the proposed stormwater basins will have side slopes ratio of 4:1 (horizontal to vertical) and will be stabilized with vegetation to prevent erosion. The outfall structures of the basins have been designed with skimmers to prevent oils and greases from exiting through any discharge structure and with spreader swales to mimic the release of water into the wetlands. Sequence of construction and erosion control management practices are included in Attachment F.

Storm pipes were designed for conveyance of the 3-yr 10-minute storm event and the results are shown in Attachment E. Construction details of the proposed stormwater systems are shown in Attachment H – Basin Drainage Details – C2.40 through C2.45 and Drainage Details – C3.20.

5.6 Water Quality

The required water quality volumes are calculated in accordance with the rules for the proposed system as follows:

- For stormwater systems that discharge into a stream-to-sink watershed, the minimum stormwater treatment volume shall the runoff from the first 2 inches of rainfall.
- For roadside swales, the criteria requires to percolate 80% of the runoff resulting from the 3-yr, 1-hr storm event.
- For the temporary lay-down area, the proposed swale will provide will provide percolation of the 80% of the runoff resulting from the 3-yr-1hr storm.

Attachment C includes the calculation of the required water quality volumes.

5.7 Wet Detention Basins

Wet detention basins shall be designed in accordance to the Handbook manual of the Water Management District, as follows:

- Size the orifice to provide recovery of one-half of the treatment volume between 24 to 30 hours after the storm event.
- Provide permanent pool volume for the wet season rainfall with a residence time of 21 days.
- Provide permanent pool volume with a mean depth between 2 ft to 8 ft.

Attachment C includes the calculations of the wet detention basins.

6. STORM ROUTING

6.1 Routing

The program Ponds 3.2 was used to analyze each individual drainage area and obtain an infiltration rate that takes into account the soil characteristics (see Attachment D). Infiltration rates were generated for each basin and for each storm to be imported into the program ICPR3.1. Because of the large size of the output data from the program Ponds, the infiltration rates are shown in electronic form as a PDF file.

The program ICPR3.1 was used to model the stormwater basins and swales being interconnected and determine the effects to the floodplain areas. The Input data and storm routing results are included in Attachment D.

6.2 Results

The results of the Pre and Post Comparison are shown in the summary included in Attachment C. Each stormwater system has been designed to meet the design storm requirements of SRWMD, FDEP and City of Gainesville. Recovery of the water quality treatment volume is included in the graphic results of Attachment D.

A summary of the wetlands stage and discharge rates are shown below:

Wetland	Storm Critical	Post-dev Stage	Pre-dev Stage	Post-dev. Flow (cfs)	Pre-dev. Flow (cfs)
A-1	100yr-10d	177.26	177.54		
A-2	100yr-8h	176.51	176.60	40.87	80.46
B	100yr-3d	179.42	179.49		
C	100yr-10d	174.81	174.87	3.86	3.98
D	100yr-8h	174.91	174.96	16.14	22.39

7. CONCLUSION

The drainage analysis demonstrates the floodplain elevations at Wetlands A, B, C and D are not increased by this development. The results show the wetlands hydraulic cycles are not being affected by the proposed development and the proposed stormwater systems control discharge rates for the critical storms. Therefore the proposed development will not increase flood hazards, will not cause excessive drainage or dewatering of the surficial aquifer and will not degrade the receiving water bodies complying with the water management rules from the FDEP, SRWMD and City of Gainesville.

Gainesville Renewable Energy Center
An American Renewables Company

Attachment A

Soil Borings Report

Copy of the Soil Borings Report is provided only in electronic format in the compact disc.

Gainesville Renewable Energy Center
An American Renewables Company

Attachment B

Pre- and Post-development Drainage Plans

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PRE-15

PRE-30

PRE-31

PRE-32

PRE-21

LEASE LINE LIMITS

WETLAND AREA "D"
100 YR. F.P. EL.
= 174.96

WETLAND AREA "C"
100 YR. F.P. EL.
= 174.87

WETLAND AREA "B"
100 YR. F.P. EL.
= 179.49

WETLAND AREA "I"

WETLAND AREA "H"

ZONE A
PER FEMA MAPS

ZONE A
PER FEMA MAPS

LEASE LINE
LIMITS

TIE TO C2.01 (SHEET 2 of 3)

LEGEND

- EXISTING CONTOUR ELEVATION (183)
- PRE-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

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Sheet title:
PRE-DEVELOPMENT DRAINAGE AREAS
SHEET 1 of 3

Project phase:
STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JWR | Date: NOV. 13, 2009 | Project No: 09-194

Professional Engineer of Record:

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Sheet No.:
C2.00

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PRE-11

PRE-13

PRE-12

PRE-10

PRE-14

PRE-20

LEASE LINE LIMITS

ZONE A PER FEMA MAPS

WETLAND AREA "J"

WETLAND AREA "A1"
100 YR. F.P. EL.
= 177.54

WETLAND AREA "E"

LEASE LINE LIMITS

WETLAND AREA "F"

WETLAND AREA "A2"
100 YR. F.P. EL.
= 176.60

WETLAND AREA "G"

WETLAND AREA "B"

WETLAND AREA "H"

LEASE LINE LIMITS

ELECTRIC VAULT

TIE TO C2.02 (SHEET 3 of 3)

TIE TO C2.00 (SHEET 1 of 3)

LEGEND

- EXISTING CONTOUR ELEVATION
- PRE-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

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Sheet title: PRE-DEVELOPMENT DRAINAGE AREAS
SHEET 2 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CaP | Drawn: JVR

Project No: 09-194 | Date: NOV. 13, 2009

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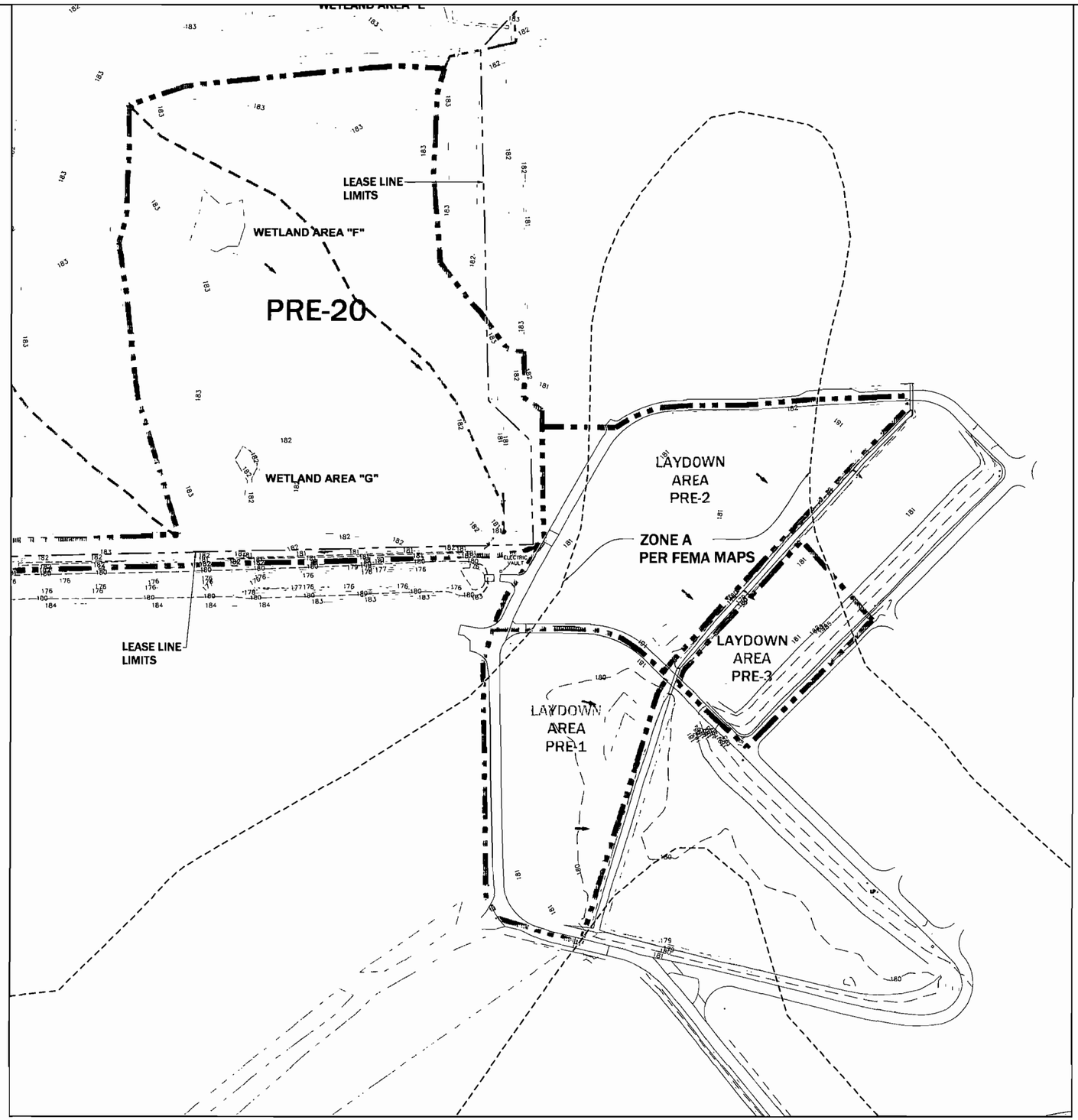
TIE TO C2.01 (SHEET 2 of 3)



LEGEND

- EXISTING CONTOUR ELEVATION (183)
- PRE-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

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SHEET 3 of 3

Project phase: STATE CERTIFICATION

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Sheet No.: C2.02

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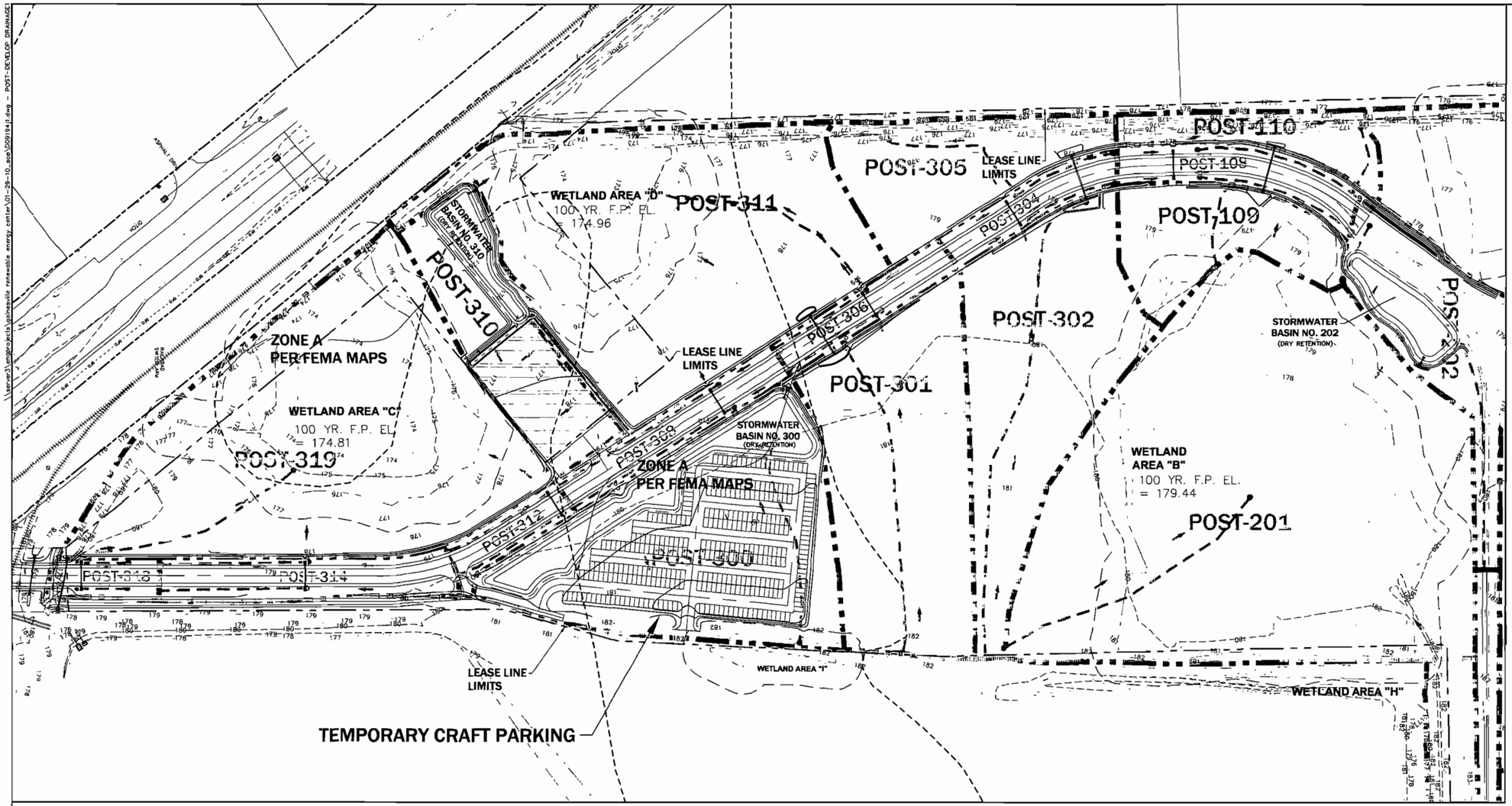

LEGEND

- 183 — EXISTING CONTOUR ELEVATION
- POST-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

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Sheet title: POST-DEVELOPMENT DRAINAGE AREAS
SHEET 1 of 3

Project phase: STATE CERTIFICATION

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Project No: 09-194

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Sheet No.: C2.03

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NW 128TH LANE

POST-104

ZONE A
PER FEMA MAPS

POST-103

LEASE LINE
LIMITS

STORMWATER
BASIN NO. 102
(WET DETENTION)

STORMWATER
BASIN NO. 101
(WET DETENTION)

STORMWATER
BASIN NO. 100
(WET DETENTION)

POST-106

WETLAND AREA "A1"
100 YR. F.P. EL.
= 177.26

POST-105

LEASE LINE
LIMITS

POST-101

POST-100

PROPOSED PLANT
(SEE ZACHRY PLANS FOR DETAILS)

WETLAND AREA "A2"
100 YR. F.P. EL.
= 176.51

POST-102

POST-202

WETLAND AREA "B"

STORMWATER
BASIN NO. 202
(DRY RETENTION)

POST-200

LEASE LINE
LIMITS

TIE TO C2.05 (SHEET 3 of 3)

TIE TO C2.03 (SHEET 1 of 3)

LEGEND

- EXISTING CONTOUR ELEVATION (183)
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100 50 0 100

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Sheet title:
POST-DEVELOPMENT DRAINAGE AREAS
SHEET 2 of 3

Project phase:
STATE CERTIFICATION

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Project No: 06-194 | Date: NOV. 13, 2009

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Sheet No.:
C2.04

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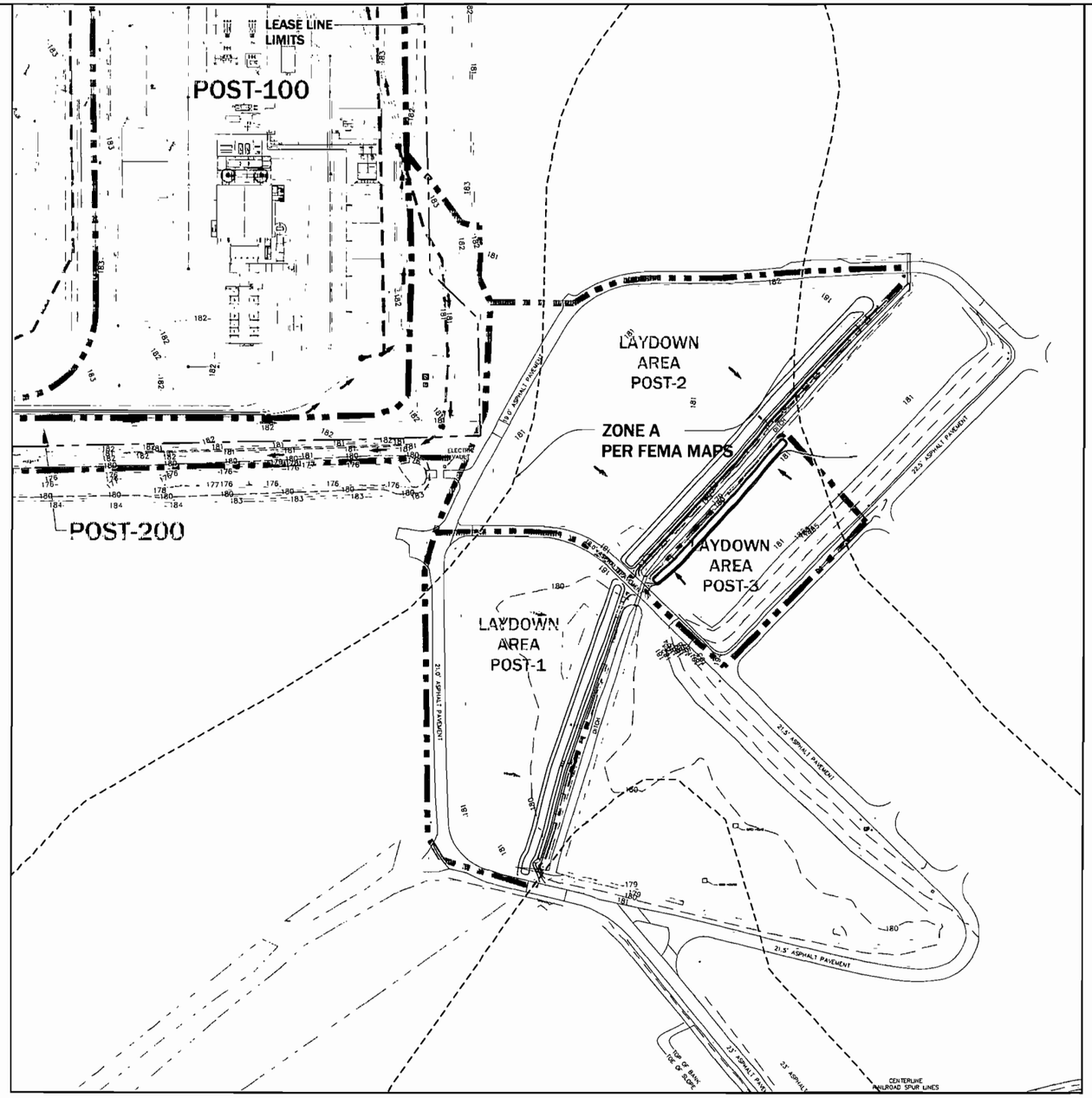

LEGEND

- 183 — EXISTING CONTOUR ELEVATION
- POST-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
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No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

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Sheet title: POST-DEVELOPMENT DRAINAGE AREAS
SHEET 3 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CaP | Drawn: JVR | Project No. 09-194 | Date: NOV. 13, 2009

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Sheet No.: C2.05

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Gainesville
Renewable Energy Center
An American Renewables Company

Attachment C

Drainage Calculations

DRAINAGE CALCULATIONS

Pre-development Drainage Areas

Time of concentration was calculated using TR-55 and the summary is included in Attachment F

Pre-development - Area 10					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	458,959	10.536	0.35	55.0	
Open -Soil 17 (B)	271,807	6.240	0.35	55.0	
Open -Soil 28 (C)	447,035	10.263	0.50	70.0	
Existing Impervious	78,294	1.797	0.90	98.0	
Wetlands	13,347	0.306	1.00	100.0	
Totals	**1,269,442**	**29.142**	**0.44**	**63.4**	**60**

Pre-development - Area 11					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 28 (C)	114,396	2.626	0.50	70.0	
Existing Impervious	16,326	0.375	0.90	98.0	
Wetland	18,924	0.434	1.00	100.0	
Totals	**149,646**	**3.435**	**0.61**	**76.8**	**16**

Pre-development - Area 12					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 28 (C)	409,387	9.398	0.50	70.0	
Existing Impervious	32,800	0.753	0.90	98.0	
Wetland WET-A1	273,364	6.276	1.00	100.0	
Totals	**715,551**	**16.427**	**0.71**	**82.7**	**40**

Pre-development - Area 13					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	69,408	1.593	0.35	55.0	
Ditch	18,347	0.421	1.00	100.0	
Totals	**87,755**	**2.015**	**0.49**	**64.4**	**23**

Pre-development - Area 14

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	257,721	5.916	0.35	55.0	
Open -Soil 28 (C)	399,528	9.172	0.50	70.0	
Existing Impervious	35,709	0.820	0.90	98.0	
Wetland WET-A2	169,627	3.894	1.00	100.0	
Totals	**862,585**	**19.802**	**0.57**	**72.6**	**49**

Pre-development - Area 15

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	138,888	3.188	0.35	55.0	
Ditch	9,165	0.210	1.00	100.0	
Totals	**148,053**	**3.399**	**0.39**	**57.8**	**31**

Pre-development - Area 20

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	396,218	9.096	0.35	55.0	
Open -Soil 17 (B)	210,083	4.823	0.35	55.0	
Ditch	23,949	0.550	1.00	100.0	
Totals	**630,250**	**14.469**	**0.37**	**56.7**	**55**

Pre-development - Area 21

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17 (B)	355,404	8.159	0.35	55.0	
Existing Impervious	7,068	0.162	0.90	98.0	
Wetland-WET-B	134,159	3.080	1.00	100.0	
Totals	**496,631**	**11.401**	**0.53**	**67.8**	**31**

Pre-development - Area 30

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17 (B)	286,197	6.570	0.35	55.0	
Existing Impervious	13,545	0.311	0.90	98.0	
Ditch	17,716	0.407	1.00	100.0	
Totals	**317,458**	**7.288**	**0.41**	**59.3**	**42**

Pre-development - Area 31					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17 (B)	673,735	15.467	0.35	55.0	
Existing Impervious	12,456	0.286	0.90	98.0	
Wetlands - WET-D	67,306	1.545	1.00	100.0	
Totals	**753,497**	**17.298**	**0.42**	**59.7**	**40**

Pre-development - Area 32					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17 (B)	288,497	6.623	0.35	55.0	
Existing Impervious	12,252	0.281	0.90	98.0	
Wetlands - WET-C	99,786	2.291	1.00	100.0	
Totals	**400,535**	**9.195**	**0.53**	**67.5**	**18**

Post-development Drainage Areas

Total Post-development Areas		
Description	Area (sf)	Area (Acres)
Total Impervious	1,559,607	35.804
Open Areas	3,532,742	81.101
Stormwater Systems	823,887	18.914
Totals	**5,916,236**	**135.818**

Time of concentration was calculated using TR-55 and the summary is included in Attachment E

Post-development Area 100					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	121,938	2.799	0.35	55.0	
Proposed Impervious	351,414	8.067	0.90	98.0	
Basin 100	196,436	4.510	1.00	100.0	
Totals	**669,788**	**15.376**	**0.83**	**90.8**	**20**

Post-development - Area 101

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17(B)	48,427	1.112	0.35	55.0	
Open -Soil 28 (C)	65,032	1.493	0.50	70.0	
Proposed Impervious	419,191	9.623	0.90	98.0	
Basin 101	199,853	4.588	1.00	100.0	
Totals	**732,503**	**16.816**	**0.83**	**89.6**	**18**

Post-development - Area 102

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17 (B)	54,062	1.241	0.35	55.0	
Open -Soil 28 (C)	70,268	1.613	0.50	70.0	
Proposed Impervious	414,818	9.523	0.90	98.0	
Basin 102	230,026	5.281	1.00	100.0	
Totals	**769,174**	**17.658**	**0.85**	**93.0**	**18**

Post-development - Area 103

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 28 (C)	33,832	0.777	0.50	70.0	
Open -Soil 14 (B)	20,746	0.476	0.35	55.0	
Impervious (stabilized)	12,684	0.291	0.90	98.0	
Existing Ditch	17,315	0.397	1.00	100.0	
Totals	**84,577**	**1.942**	**0.63**	**76.7**	**23**

Post-development - Area 104

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	69,408	1.593	0.35	55.0	
Existing Ditch	18,347	0.421	1.00	100.0	
Totals	**87,755**	**2.015**	**0.49**	**64.4**	**23**

Post-development - Area 105

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 28 (C)	204,609	4.697	0.50	70.0	
Existing Impervious	32,800	0.753	0.90	98.0	
Wetlands - WET-A1	273,364	6.276	1.00	100.0	
Totals	**510,773**	**11.726**	**0.79**	**87.9**	**36**

Post-development - Area 106

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	128,860	2.958	0.35	55.0	
Open -Soil 28 (C)	252,107	5.788	0.50	70.0	
Existing Impervious	35,709	0.820	0.90	98.0	
Wetlands - WET-A2	169,627	3.894	1.00	100.0	
Totals	**586,303**	**13.460**	**0.64**	**77.1**	**41**

Post-development - Area 109

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	70,152	1.610	0.35	55.0	
By-pass sump	1,170	0.027	1.00	100.0	
Totals	**71,322**	**1.637**	**0.36**	**55.7**	**32**

Post-development - Area 108

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14(B)	7,560	0.174	0.35	55.0	
Proposed Impervious	21,600	0.496	0.90	98.0	
Swale	8,640	0.198	1.00	100.0	
Totals	**37,800**	**0.868**	**0.81**	**89.9**	**10**

Pre-development - Area 110

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	33,375	0.766	0.35	55.0	
Existing Ditch	9,165	0.210	1.00	100.0	
Totals	**42,540**	**0.977**	**0.49**	**64.7**	**28**

Post-development - Area 200

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17(B)	138,283	3.175	0.35	55.0	
Open -Soil 14 (B)	81,116	1.862	0.35	55.0	
Existing Ditch	23,949	0.550	1.00	100.0	
Totals	**243,348**	**5.587**	**0.41**	**59.4**	**10**

Post-development - Area 201

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17(B)	380,412	8.733	0.35	55.0	
Impervious	7,068	0.162	0.90	98.0	
Wetland WET-B	134,159	3.080	1.00	100.0	
Totals	**521,639**	**11.975**	**0.52**	**67.2**	**31**

Post-development - Area 202

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14(B)	35,036	0.804	0.35	55.0	
Impervious	39,045	0.896	0.90	98.0	
Basin 202	17,027	0.391	1.00	100.0	
Totals	**91,108**	**2.092**	**0.71**	**81.8**	**16**

Post-development - Area 300 - Craft Parking

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17 (B)	69,233	1.589	0.35	55.0	
Impervious	95,654	2.196	0.70	85.0	
Basin 300	37,544	0.862	1.00	100.0	
Totals	**202,431**	**4.647**	**0.64**	**77.5**	**38**

Post-development - Area 301

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17(B)	143,429	3.293	0.35	55.0	
By-pass sump	3,226	0.074	1.00	100.0	
Totals	**146,655**	**3.367**	**0.36**	**56.0**	**51**

Post-development - Area 302

Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17(B)	168,437	3.867	0.35	55.0	
By-pass sump	3,125	0.072	1.00	100.0	
Totals	**171,562**	**3.939**	**0.36**	**55.8**	**45**

Post-development - Area 304					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17(B)	3,920	0.090	0.35	55.0	
Impervious	11,200	0.257	0.70	85.0	
Swale	4,480	0.103	1.00	100.0	
Totals	**19,600**	**0.450**	**0.70**	**82.4**	**10**

Post-development - Area 305					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14(B)	75,364	1.730	0.35	55.0	
Existing Impervious	2,400	0.055	0.70	85.0	
Existing Ditch	9,215	0.212	1.00	100.0	
Totals	**86,979**	**1.997**	**0.43**	**60.6**	**29**

Post-development - Area 306					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17(B)	3,920	0.090	0.35	55.0	
Impervious	11,200	0.257	0.70	85.0	
Swale	4,480	0.103	1.00	100.0	
Totals	**19,600**	**0.450**	**0.70**	**82.4**	**10**

Post-development - Area 308					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14(B)	7,280	0.167	0.35	55.0	
Impervious	20,800	0.478	0.70	85.0	
Swale	8,320	0.191	1.00	100.0	
Totals	**36,400**	**0.836**	**0.70**	**82.4**	**10**

Post-development - Area 310 - Switch Yard					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14 (B)	9,646	0.221	0.35	55.0	
Stabilized area	31,500	0.723	0.70	85.0	
Basin 310	16,849	0.387	1.00	100.0	
Totals	**57,995**	**1.331**	**0.73**	**84.4**	**14**

Post-development - Area 311					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17(B)	232,030	5.327	0.35	55.0	
Existing Impervious	12,456	0.286	0.70	85.0	
Wetland D	67,306	1.545	1.00	100.0	
Totals	**311,792**	**7.158**	**0.50**	**65.9**	**40**

Post-development - Area 312					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 17(B)	4,200	0.096	0.35	55.0	
Impervious	12,000	0.275	0.90	98.0	
Swale	4,800	0.110	1.00	100.0	
Totals	**21,000**	**0.482**	**0.81**	**89.9**	**10**

Post-development - Area 314					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14(B)	6,720	0.154	0.35	55.0	
Impervious	19,200	0.441	0.90	98.0	
Swale	7,680	0.176	1.00	100.0	
Totals	**33,600**	**0.771**	**0.81**	**89.9**	**10**

Post-development - Area 318					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14(B)	1,960	0.045	0.35	55.0	
Impervious	5,600	0.129	0.90	98.0	
Swale	2,240	0.051	1.00	100.0	
Totals	**9,800**	**0.225**	**0.81**	**89.9**	**10**

Post-development - Area 319					
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN	Tc (min)
Open -Soil 14(B)	247,138	5.674	0.35	55.0	
Impervious	3,268	0.075	0.90	98.0	
Wetland C	99,786	2.291	1.00	100.0	
Totals	**350,192**	**8.039**	**0.54**	**68.2**	**42**

Post-development - Laydown area 1				
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN
Open -Soil 14(B)	65,271	1.498	0.35	55.0
Open -Soil 16(D)	63,786	1.464	0.50	70.0
Existing roadway	9,000	0.207	1.00	100.0
Totals	**138,057**	**3.169**	**0.46**	**64.9**

Post-development - Laydown area 2				
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN
Open -Soil 14(B)	177,844	4.083	0.35	55.0
Open -Soil 16(D)	24,809	0.570	0.50	70.0
Existing roadway	6,600	0.152	1.00	100.0
Totals	**209,253**	**4.804**	**0.39**	**58.2**

Post-development - Laydown area 3				
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN
Open -Soil 14(B)	4,922	0.113	0.35	55.0
Open -Soil 16(D)	58,538	1.344	0.50	70.0
Existing roadway	4,200	0.096	1.00	100.0
Totals	**67,660**	**1.553**	**0.52**	**70.8**

Drainage Areas at Main Entrance				
Description	Area (sf)	Area (Acres)	Runoff (C)	Curve CN
Existing Impervious	4,922	0.113	0.35	55.0
Proposed Impervious	58,538	1.344	0.50	70.0
Existing roadway	4,200	0.096	1.00	100.0
Totals	**67,660**	**1.553**	**0.52**	**70.8**

Discharge Data

Description	Exist. Pipe & weir 10	Existing weir 13	Existing weir 12	Existing weir 14	Existing Ditch 20
Pipe (in)	15				24
Pipe Elevation (msl)	176.32				179.58
Pipe Downstream El (msl)	176.22				179.07
Pipe length (ft)	35.00				31.00
Weir length (ft)	84.00	324.00	30.00	315.00	29.00
Weir elevation (msl)	178.34	177.52	176.65	176.25	182.00
Weir rise (ft)	0.66	0.50	0.50	0.50	0.28

Description	Existing weir Wet-B	Existing Ditch 30	Existing Weir 31	Existing Weir 32
Pipe (in)		12	12	12
Pipe Upstream El (msl)		174.60	173.12	173.19
Pipe Downstream El (msl)		174.60	173.11	172.75
Pipe length (ft)		29.00	42.00	25.00
Weir length (ft)	115.00	160.00	99.00	93.00
Weir elevation (msl)	179.26	177.41	174.70	175.00
Weir rise (ft)	0.40	0.59	0.30	0.40

Description	Prop. Weir & orifice 100	Prop. Weir & orifice 101	Prop. Weir & orifice 102	Existing weir 104	Existing weir 105
Orifice (in)	3.50	3.50	3.67		
number of orifices	3	3	3		
Orifice Elevation (msl)	180.75	180.25	178.00		
Weir length (ft)	1.17	2.50	3.00	324.00	30.00
Weir elevation (msl)	182.25	181.58	179.58	177.52	176.65
Weir rise (ft)	1.00	1.17	1.17	0.50	0.50

Description	Existing weir 106	Proposed weir 108	Existing weir 200	Existing weir WET-B	Proposed weir 202
Pipe (in)			24		
Pipe Elevation (msl)			179.58		
Pipe Downstream El (msl)			179.07		
Pipe length (ft)			31.00		
Weir length (ft)	315.00	5.00	29.00	115.00	1.50
Weir elevation (msl)	176.25	178.62	182.00	179.23	181.50
Weir rise (ft)	0.50	1.00	0.25	0.40	0.50

Description	Proposed Weir 300	Proposed Weir 306	Proposed Weir 304	Existing Ditch 305	Proposed Weir 308
Pipe (in)				12	
Pipe Upstream El (msl)				174.60	
Pipe Downstream El (msl)				174.60	
Pipe length (ft)				29.00	
Weir length (ft)	2.50	5.00	5.00	149.00	5.00
Weir elevation (msl)	181.95	179.46	179.40	177.41	179.36
Weir rise (ft)	0.75	1.00	1.00	0.59	1.00

Description	Proposed Weir 310	Existing Weir 311	Proposed Weir 312	Proposed Weir 314	Existing Weir 319
Pipe (in)		12			12
Pipe Upstream El (msl)		173.12			173.19
Pipe Downstream El (msl)		173.11			172.75
Pipe length (ft)		42.00			25.00
Weir length (ft)	1.00	99.00	5.00	5.00	93.00
Weir elevation (msl)	177.60	174.70	180.21	179.62	175.00
Weir rise (ft)	0.40	0.30	1.00	1.00	0.40

Description	Proposed Pipe 109	Proposed Pipe 302	Proposed Pipe 301	Proposed Weir 318
Pipe (in)	18	18	18	
Pipe Upstream El (msl)	177.85	178.25	178.53	
Pipe Downstream El (msl)	177.37	177.75	178.00	
Pipe length (ft)	92.00	92.00	92.00	
Weir length (ft)				5.00
Weir elevation (msl)				180.32
Weir rise (ft)				1.00

Description	Laydown Area1	Laydown Area 2	Laydown Area 2
Pipe (in)			
Pipe Upstream El (msl)			
Pipe Downstream El (msl)			
Pipe length (ft)			
Weir length (ft)	5.00	5.00	5.00
Weir elevation (msl)	180.75	181.25	181.35
Weir rise (ft)	0.25	0.25	0.20

Basin Storage Data

Existing Ditch 10			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
176.32	50	0.00	0.00
177.00	150	0.00	0.00
178.00	5,555	0.13	0.07
179.00	30,422	0.70	0.48

Existing Ditch 13			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
177.00	1,517	0.035	-
177.52	9,467	0.217	0.066
178.00	16,809	0.386	0.210

Existing Ditch 15			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
175.00	545	0.013	-
176.00	4,565	0.105	0.059
177.00	9,165	0.210	0.216

Existing Wetland WET-A1 (Area 12)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
175.00	11,441	0.263	-
176.00	53,230	1.222	0.742
176.75	131,215	3.012	2.330
177.00	216,777	4.977	3.329
177.40	277,056	6.360	5.596

Existing Wetland WET-A2 (Area 14)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
175.00	7,383	0.169	-
176.00	101,600	2.332	1.251
176.75	252,765	5.803	4.302

Existing Wetland WET-B			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
178.00	35,955	0.825	-
179.00	134,159	3.080	1.953
179.63	217,196	4.986	4.493

Existing Ditch 20			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
180.00	4,532	0.104	-
181.00	13,450	0.309	0.206
182.00	23,949	0.550	0.636
182.25	25,855	0.594	0.779

Existing Ditch 30			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
175.00	584	0.013	-
176.00	4,632	0.106	0.060
177.00	9,215	0.212	0.219
177.41	11,415	0.262	0.316

Existing Wetland WET-C			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
173.50	32,118	0.737	-
174.00	49,810	1.143	0.470
175.00	99,786	2.291	2.187

Existing Wetland WET-D			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
173.00	5,758	0.132	-
174.00	23,537	0.540	0.336
175.00	67,306	1.545	1.379

Volume V1 is the volume available for the permanent pool and Volume V2 is the storage volume available to route the storm.

Proposed Wet Detention Basin 100				
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft	Vol. V2 Ac-ft
178.60	165,224	3.793	-	
179.00	167,852	3.853	1.529	
179.50	171,137	3.929	3.475	
179.75	172,780	3.966	4.462	
180.00	174,422	4.004	5.458	
180.50	177,707	4.080	7.479	
180.75	179,350	4.117	8.504	0.000
181.00	181,059	4.157	9.538	1.034
181.37	183,555	4.214	11.067	2.563
182.00	187,893	4.313	13.773	5.269
182.50	191,310	4.392	15.949	7.446
183.00	194,727	4.470	18.165	9.661
183.25	196,436	4.510	19.287	10.784

Proposed Wet Detention Basin 101				
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft	Vol. V2 Ac-ft
178.10	167,650	3.849	-	
178.20	168,280	3.863	0.386	
178.50	170,172	3.907	1.551	
179.00	173,324	3.979	3.522	
179.50	176,477	4.051	5.530	
180.00	179,629	4.124	7.574	
180.25	181,205	4.160	8.609	0.000
180.50	183,070	4.203	9.655	1.045
180.91	186,164	4.274	11.413	2.803
181.00	186,799	4.288	11.777	3.168
181.25	188,664	4.331	12.855	4.246
181.50	190,529	4.374	13.943	5.334
182.00	194,259	4.460	16.151	7.542
182.75	199,853	4.588	19.544	10.935

Proposed Wet Detention Basin 102				
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft	Vol. V2 Ac-ft
175.85	182,502	4.190	-	
176.00	184,366	4.232	0.632	
177.00	196,793	4.518	5.007	
177.75	206,113	4.732	8.475	
178.00	209,220	4.803	9.667	0.000
178.61	213,428	4.900	12.610	2.943
179.00	216,155	4.962	14.550	4.883
179.50	219,623	5.042	17.051	7.384
179.75	221,357	5.082	18.316	8.649
180.00	223,091	5.121	19.592	9.924
180.25	224,825	5.161	20.877	11.210
181.00	230,026	5.281	24.793	15.126

Existing Ditch 103			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
176.32	50	0.001	-
177.00	150	0.003	0.002
178.00	5,555	0.128	0.067
179.00	30,422	0.698	0.480

Existing Ditch 104			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
177.00	1,517	0.035	-
177.52	9,467	0.217	0.066
178.00	16,809	0.386	0.210

Existing Wetland WET-A1 (Area 105)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
175.00	11,441	0.263	-
176.00	53,230	1.222	0.742
176.75	131,215	3.012	2.330
177.00	216,777	4.977	3.329
177.40	277,056	6.360	5.596

Existing Wetland WET-A2 (Area 106)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
175.00	7,383	0.169	-
176.00	101,600	2.332	1.251
176.75	252,765	5.803	4.302

Proposed By-pass sump (Area 109)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
177.85	661	0.015	-
177.92	916	0.021	0.001
178.00	1,170	0.027	0.003

Proposed Road Swale 108			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
177.56	1,080	0.025	-
178.00	4,406	0.101	0.028
178.56	8,640	0.198	0.112
179.00	11,966	0.275	0.216
179.56	16,200	0.372	0.397

Existing Ditch 200			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
180.00	4,532	0.104	-
181.00	13,450	0.309	0.206
182.00	23,949	0.550	0.636
182.25	25,855	0.594	0.779

Existing Wetland WET-B (Area 201)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
178.00	35,955	0.825	-
179.00	134,159	3.080	1.953
179.63	217,196	4.986	4.493

Proposed Dry Retention Basin 202			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
180.00	12,351	0.284	-
180.50	13,520	0.310	0.148
181.00	14,689	0.337	0.310
181.50	15,858	0.364	0.486
182.00	17,027	0.391	0.674

Proposed Dry Retention Basin 300 Craft Parking			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
180.50	30,080	0.691	-
181.00	31,946	0.733	0.356
181.50	33,812	0.776	0.733
182.00	35,678	0.819	1.132
182.50	37,544	0.862	1.552

Proposed By-pass sump (Area 301)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
178.53	986	0.023	-
178.77	2,106	0.048	0.009
179.00	3,226	0.074	0.023
179.40	5,345	0.123	0.062

Proposed By-pass sump (Area 302)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
178.25	902	0.021	-
178.63	2,014	0.046	0.013
179.00	3,125	0.072	0.035
179.30	4,389	0.101	0.061

Proposed Road Swale 304			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
178.40	560	0.013	-
179.00	2,912	0.067	0.024
179.40	4,480	0.103	0.058
180.00	6,832	0.157	0.136
180.40	8,400	0.193	0.206

Existing Ditch 305			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
175.00	584	0.013	-
176.00	4,632	0.106	0.060
177.00	9,215	0.212	0.219
177.41	11,415	0.262	0.316

Proposed Road Swale 306			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
178.46	560	0.013	-
179.00	2,677	0.061	0.020
179.46	4,480	0.103	0.058
180.00	6,597	0.151	0.127
180.46	8,400	0.193	0.206

Proposed Road Swale 308			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
178.36	1,040	0.024	-
179.00	5,699	0.131	0.050
179.36	8,320	0.191	0.107
180.00	12,979	0.298	0.264
180.36	15,600	0.358	0.382

Proposed Dry Retention Basin 310- Switch Yard			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
176.50	13,174	0.302	-
176.75	13,787	0.316	0.077
177.00	14,399	0.331	0.158
177.50	15,624	0.359	0.331
178.00	16,849	0.387	0.517

Existing Wetland WET-D (Area 311)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
173.00	5,758	0.132	-
174.00	23,537	0.540	0.336
175.00	67,306	1.545	1.379

Proposed Road Swale 312			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
179.16	600	0.014	-
180.00	4,128	0.095	0.046
180.16	4,800	0.110	0.062
181.00	8,328	0.191	0.189
181.16	9,000	0.207	0.220

Proposed Road Swale 314			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
178.55	960	0.022	-
179.00	3,984	0.091	0.026
179.55	7,680	0.176	0.099
180.00	10,704	0.246	0.194
180.55	14,400	0.331	0.353

Proposed Road Swale 318			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
179.26	280	0.006	-
180.00	1,730	0.040	0.017
180.26	2,240	0.051	0.029
181.00	3,690	0.085	0.079
181.26	4,200	0.096	0.103

Existing Wetland WET-C (Area 319)			
Stage (msl)	Area sf	Area Ac	Vol. V2 Ac-ft
173.50	32,118	0.737	-
174.00	49,810	1.143	0.470
175.00	99,786	2.291	2.187
175.45	120,528	2.767	3.325

Proposed Basin Laydown Area 1			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
179.50	6,132	0.141	-
179.75	7,239	0.166	0.038
180.00	8,346	0.192	0.083
180.50	10,561	0.242	0.192
181.00	12,775	0.293	0.326

Proposed Basin Laydown Area 2			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
180.00	8,960	0.206	-
180.75	11,760	0.270	0.178
181.00	12,693	0.291	0.249
181.25	13,627	0.313	0.324
181.50	14,560	0.334	0.405

Proposed Basin Laydown Area 3			
Stage (msl)	Area sf	Area Ac	Vol. V1 Ac-ft
180.00	4,160	0.096	-
180.75	4,680	0.107	0.076
181.00	4,853	0.111	0.103
181.25	5,027	0.115	0.132
181.50	5,200	0.119	0.161

Soil Borings Information

Description	Basin 100	Basin 101	Basin 102	Basin 202
Soil Borings	38 - 43	34 -37	28 - 33	10,11
Average ground elevation	182.25	181.25	179.00	179.00
High season Water table (ft)	1.5	1	1	1
High season Water elevation	180.75	180.25	178.00	178.00
Depth to confined layer	11	9	10	7
Confined layer Elev.	171.25	172.25	169.00	172.00
Fillable Porosity (%)	25	25	25	25
Vertical Infiltration (ft/d)	15	15	11	11
Horizontal hyd. Con (ft/d)	20	20	15	15
Safety factor	2	2	2	2
Vertical Infiltration (ft/d)	7.5	7.5	5.5	5.5
Horizontal hyd. Con (ft/d)	10	10	7.5	7.5

Description	Basin 300	Basin310	Swale 108	Swale 304
Soil Borings	6, 44, 45	1,2, 3, 4	9,10	8
Average ground elevation	179.75	176.00	178.30	179.00
High season Water table (ft)	1	1	1.5	2
High season Water elevation	178.75	175.00	176.80	177.00
Depth to confined layer	8	2.5	10	9
Confined layer Elev.	171.75	173.50	168.30	170.00
Fillable Porosity (%)	25	25	25	25
Vertical Infiltration (ft/d)	13	11	11	11
Horizontal hyd. Con (ft/d)	17	22	15	15
Safety factor	2	2	2	2
Vertical Infiltration (ft/d)	6.5	5.5	5.5	5.5
Horizontal hyd. Con (ft/d)	8.5	11	7.5	7.5

Description	Swale 306	Swale 308	Swale 312	Swale 314
Soil Borings	7	5,6	4	2,3
Average ground elevation	179.25	179.00	179.50	178.75
High season Water table (ft)	1.5	1	1	1
High season Water elevation	177.75	178.00	178.50	177.75
Depth to confined layer	9	8	10	2.75
Confined layer Elev.	170.25	171.00	169.50	176.00
Fillable Porosity (%)	25	25	25	25
Vertical Infiltration (ft/d)	11	11	11	11
Horizontal hyd. Con (ft/d)	15	15	15	15
Safety factor	2	2	2	2
Vertical Infiltration (ft/d)	5.5	5.5	5.5	5.5
Horizontal hyd. Con (ft/d)	7.5	7.5	7.5	7.5

Description	Swale 318	Lay-down 1	Lay-down 2	Lay-down 3
Soil Borings	1,2			
Average ground elevation	179.50	179.50	180.00	180.00
High season Water table (ft)	1	1	1	1
High season Water elevation	178.50	178.50	179.00	179.00
Depth to confined layer	2.25	8	8	8
Confined layer Elev.	177.25	171.50	172.00	172.00
Fillable Porosity (%)	25	25	25	25
Vertical Infiltration (ft/d)	11	11	11	11
Horizontal hyd. Con (ft/d)	15	15	15	15
Safety factor	2	2	2	2
Vertical Infiltration (ft/d)	5.5	5.5	5.5	5.5
Horizontal hyd. Con (ft/d)	7.5	7.5	7.5	7.5

Basin Geometry

Description	Basin 100	Basin 101	Basin 102	Basin 202
Basin side slope ratio	4:1	4:1	4:1	4:1
Fence Required	no	no	no	no
Max. Unsaturated Area (sf)	N/A	N/A	N/A	14,689
Equivalent pond length (ft)	N/A	N/A	N/A	267
Equivalent pond width (ft)	N/A	N/A	N/A	55
Width of Maint. Path	5	5	5	5

Description	Basin 300	Basin310	Swale 108	Swale 304
Basin side slope ratio	4:1	4:1	4:1	4:1
Fence Required	no	no	no	no
Max. Unsaturated Area (sf)	33,812	15,012	8640	4480
Equivalent pond length (ft)	520	275	540	280
Equivalent pond width (ft)	65	55	16	16
Width of Maint. Path	5	5	N/A	N/A

Description	Swale 306	Swale 308	Swale 312	Swale 314	Swale 318
Basin side slope ratio	4:1	4:1	4:1	4:1	4:1
Fence Required	no	no	no	no	no
Max. Unsaturated Area (sf)	4,480	8,320	4800	7680	2240
Equivalent pond length (ft)	280	520	300	480	140
Equivalent pond width (ft)	16	16	16	16	16
Width of Maint. Path	N/A	N/A	N/A	N/A	N/A

Water Quality

Wet Detention Basins: Volume V1 = 2.00 inches over the total area, or
Volume V2 = 2.50 inches over the impervious area

Basin	V1 (Ac-ft)	V2 (Ac-ft)	Treatm. Vol. (ac-ft)	Stage (ft)	Treatm. Vol. (cf)	Recovery Time (hrs)
Basin 100	2.563	1.681	2.563	181.37	111,631	45.2
Basin 101	2.803	2.005	2.803	180.91	122,084	38.8
Basin 102	2.943	1.984	2.943	178.61	128,196	26.0

Dry Retention Basins: Volume V1 = 2.00 inches over the total area, or
Volume V2 = 2.50 inches over the impervious area

Basin	V1 (Ac-ft)	V2 (Ac-ft)	Treatm. Vol. (ac-ft)	Stage (ft)	Treatm. Vol. (cf)	Recovery Time (hrs)
Basin 202	0.349	0.187	0.349	181.11	15,185	40.0
Basin 300	0.775	0.457	0.775	181.55	33,739	70.0
Basin 310	0.222	0.151	0.222	177.19	9,666	36.0

Swales

Intensity for 3yr- 1 hr storm - I (inches) 2.6

Peak flow for water quality - Qp = Cpost * I * A

Volume of Runoff - Vr = Qp * Duration of storm

Swale	Drainage Area (sf)	Drainage Area (ac)	Peak Flow Qp (cfs)	Volume runoff Vr (cf)	Treatm. Vol. (cf)
Swale 108	37,800	0.868	1.834	6,602	5,282
Swale 304	19,600	0.450	0.817	2,942	2354
Swale 306	19,600	0.450	0.817	2,942	2354
Swale 308	36,400	0.836	1.518	5,464	4371
Swale 312	21,000	0.482	1.019	3,668	2934
Swale 314	33,600	0.771	1.630	5,869	4695
Swale 318	9,800	0.225	0.475	1,712	1369
Laydown 1	138,057	3.169	3.804	13,696	10957
Laydown 2	209,253	4.804	4.850	17,459	13967
Laydown 3	67,660	1.553	2.101	7,562	6049

Swale	Weir Elevation	Treatment Stage	Recovery Time (hrs)
Swale 108	178.62	178.61	12.0
Swale 304	179.40	179.36	7.0
Swale 306	179.46	179.42	7.0
Swale 308	179.36	179.32	45.0
Swale 312	180.21	180.21	12.0
Swale 314	179.62	179.60	30.0
Swale 318	180.32	180.31	35.0
Laydown 1	180.75	180.59	40.0
Laydown 2	181.25	181.24	63.0
Laydown 3	181.35	181.31	61.0

Wet Detention Basins

Orifice Design

Description	Basin1	Basin 2	Basin 3
Orifice Elevation (msl)	180.75	180.25	178.00
Treatment volume (Ac-ft)	2.56	2.80	2.94
Stage of treatment volume (msl)	181.37	180.91	178.61
One-half of treat. volume (Ac-ft)	1.28	1.40	1.47
Stage half of volume (msl)	181.06	180.58	178.30
Number of orifices	3	3	3
Diameter of the orifice (in)	3.50	3.50	3.67
Flow line elevation (msl)	180.90	180.40	178.15
h1 (ft)	0.47	0.52	0.45
h2 (ft)	0.16	0.19	0.15
Average depth (ft)	0.32	0.35	0.30
Area of the orifice (sf)	0.07	0.07	0.07
Orifice Coefficient	0.60	0.60	0.60
Flow rate (cfs)	0.54	0.57	0.58
Recovery time (hours)	28.60	29.58	30.53

Permanent Pool Volume

Description	Basin1	Basin 2	Basin 3
Total drainage area -DA (acres)	15.376	16.816	17.658
Runoff Coefficient - C	0.83	0.83	0.85
Wet season Rainfall depth - R (in)	30.00	30.00	30.00
Residence time - RT (days)	21.00	21.00	21.00
Length of wet season -WS (days)	153.00	153.00	153.00
Volume of permanent pool (Ac-ft)	4.37	4.80	5.18
Proposed volume of pool (ac-ft)	8.50	8.61	9.67
	OK	OK	OK

Mean depth of Basin

Description	Basin1	Basin 2	Basin 3
Volume of permanent pool (Ac-ft)	8.504	8.609	9.667
Pond area at orifice elevation (Ac)	4.117	4.160	4.803
Mean depth of pond (ft)	2.07	2.07	2.01
Mean depth between 2 ft to 8 ft	OK	OK	OK

Routing Results

Discharge Results						
Storm Event	Pre-devel WET-A2 (cfs)	Post-dev WET-A2 (cfs)	Pre-devel WET-C (cfs)	Post-dev WET-C (cfs)	Pre-devel WET-D (cfs)	Post-dev WET-D (cfs)
100yr-1hr	28.56	9.61	3.57	3.46	8.10	3.59
100yr-2hr	42.80	18.25	4.22	3.80	13.20	6.76
100yr-4hr	69.36	34.21	5.10	3.77	21.35	15.05
100yr-8hr	80.46	40.87	5.31	5.06	22.39	16.14
100yr-24hr	61.88	33.76	4.82	4.72	14.27	11.15
100yr-3d	58.41	41.90	4.49	4.36	13.89	13.67
100yr-7d	43.90	35.50	3.37	3.26	10.34	10.30
100yr-10d	57.35	43.84	3.98	3.86	13.45	13.48

Stage Results				
Storm Event	Pre-devel Wet-A1	Post-dev Wet A1	Pre-devel Wet-A2	Post-dev Wet A2
100yr-1hr	177.22	176.95	176.46	176.37
100yr-2hr	177.33	177.04	176.51	176.42
100yr-4hr	177.50	177.15	176.57	176.48
100yr-8hr	177.54	177.18	176.60	176.50
100yr-24hr	177.38	177.18	176.56	176.48
100yr-3d	177.34	177.22	176.55	176.50
100yr-7d	177.25	177.21	176.51	176.48
100yr-10d	177.34	177.26	176.55	176.51

Stage Results						
Storm Event	Existing Ditch 10	Existing Ditch 13	Proposed Ditch 104	Proposed Basin 100	Proposed Basin 101	Proposed Basin 102
100yr-1hr	178.63	177.58	177.58	181.74	181.30	179.08
100yr-2hr	178.65	177.58	177.58	181.94	181.51	179.27
100yr-4hr	178.71	177.59	177.59	182.28	181.86	179.68
100yr-8hr	178.73	177.59	177.59	182.58	182.11	180.03
100yr-24hr	178.56	177.56	177.56	182.87	182.31	180.67
100yr-3d	178.59	177.56	177.56	183.23	182.62	180.81
100yr-7d	178.53	177.56	177.56	183.17	182.56	180.73
100yr-10d	178.58	177.56	177.56	183.10	182.61	180.83

Stage Results					
Storm Event	Existing Ditch 20	Proposed Ditch 200	Basin 202	Existing WET-B	Proposed WET-B
100yr-1hr	180.82	180.51	181.02	179.11	178.92
100yr-2hr	180.93	180.69	181.19	179.31	179.14
100yr-4hr	181.29	180.88	181.58	179.46	179.38
100yr-8hr	181.36	180.97	181.72	179.49	179.42
100yr-24hr	180.77	180.38	181.84	179.49	179.42
100yr-3d	181.00	180.42	181.91	179.49	179.44
100yr-7d	180.79	180.29	181.83	179.46	179.41
100yr-10d	180.99	180.41	181.90	179.49	179.43

Stage Results					
Storm Event	Existing Ditch 30	Proposed Basin 300	Proposed Ditch304	Proposed Ditch 306	Proposed Ditch 305
100yr-1hr	176.45	181.08	179.49	179.55	176.08
100yr-2hr	176.53	181.32	179.47	179.54	176.09
100yr-4hr	177.09	181.80	179.52	179.58	176.44
100yr-8hr	177.21	182.14	179.53	179.57	176.47
100yr-24hr	176.42	182.32	179.45	179.53	176.02
100yr-3d	176.41	182.43	179.46	179.53	176.07
100yr-7d	176.08	182.35	179.45	179.51	175.84
100yr-10d	176.38	182.43	179.46	179.52	176.04

Stage Results				
Storm Event	Proposed Ditch 308	Proposed Basin 310	Existing WET-D	Proposed WET-D
100yr-1hr	179.47	177.15	174.82	174.67
100yr-2hr	179.45	177.19	174.88	174.80
100yr-4hr	179.53	177.53	174.95	174.90
100yr-8hr	179.54	177.68	174.96	174.91
100yr-24hr	179.62	177.90	174.89	174.86
100yr-3d	179.69	177.89	174.89	174.89
100yr-7d	179.64	177.82	174.85	174.85
100yr-10d	179.70	177.89	174.89	174.89

Stage Results				
Storm Event	Proposed Ditch 312	Proposed Ditch 314	Existing WET-C	Proposed WET-C
100yr-1hr	180.36	179.79	174.22	174.19
100yr-2hr	180.34	179.77	174.39	174.28
100yr-4hr	180.34	179.80	174.66	174.55
100yr-8hr	180.36	179.82	174.73	174.64
100yr-24hr	180.30	179.75	174.57	174.53
100yr-3d	180.28	179.72	174.47	174.43
100yr-7d	180.27	179.70	174.58	174.54
100yr-10d	180.28	179.71	174.87	174.81

Entrance Roadway Areas

Entrance Roadway Impervious		
Description	Area (sf)	Area (Acres)
Existing Impervious	11,162	0.256
Proposed Impervious	15,529	0.356
Additional Impervious	**4,367**	**0.100**

Gainesville Renewable Energy Center
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Attachment D

CD – Routing Data

ICPR3.1 and Ponds 3.2

Copies of the ICPR3.1 and Ponds3.2 Model input and output files are provided only in electronic format in the compact disc.

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Attachment E

Time of Concentration and

Pipe Size Calculations

Time of Concentration - Pre-development										
Area	Overland (ft)	Slope (ft/ft)	Shallow Conce (ft)	Slope (ft/ft)	Shallow Conce (ft)	Slope (ft/ft)	Ditch (ft)	Slope (ft/ft)	Tc (hr)	Tc (min)
10	100	0.004	906	0.0022	0		616	0.006	0.994	60
11	15	0.0080	100	0.0100	0		1,670	0.0024	0.267	16
12	100	0.0045	452	0.0012	404	0.0099	0		0.659	40
13	12	0.0250	1,389	0.0043	0		0		0.375	23
14	100	0.0039	459	0.0041	413	0.0097	0		0.814	49
15	100	0.0110	185	0.0054	310	0.0032			0.520	31
20	100	0.0045	676	0.0015	317	0.0060			0.918	55
21	100	0.0080	457	0.0088	0				0.519	31
30	100	0.0080	863	0.0046	174	0.0057			0.694	42
31	100	0.0070	364	0.0025	603	0.0100			0.664	40
32	100	0.0085			207	0.0193	0		0.308	18

Time of Concentration - Post-development										
Area	Overland (ft)	Slope (ft/ft)	Shallow Conce (ft)	Slope (ft/ft)	Shallow Conce (ft)	Slope (ft/ft)	Ditch (ft)	Slope (ft/ft)	Tc (hr)	Tc (min)
100										20
101										18
102										18
103	12	0.0250	1,395	0.0028					0.375	23
104	12	0.0250	1,389	0.0043					0.375	23
105	100	0.0050	122	0.0164	105	0.0190			0.597	36
106	100	0.0080	480	0.0033	390	0.0041			0.684	41
107	100	0.0045	75	0.0073					0.563	34
108	100	0.0060	130	0.0050					0.530	32
109	14	0.0200	380	0.0040					0.160	10
110	100	0.0070	30	0.0050					0.466	28
200	20	0.0200	349	0.0022					0.160	10
201	100	0.0080	457	0.0088					0.519	31
202	20	0.0200	456	0.0050					0.273	16
300	100	0.005	281	0.0018					0.639	38
301	100	0.0028	589	0.0034					0.843	51
302	100	0.0055	748	0.0037					0.751	45
303	14	0.0200	200	0.0036					0.161	10
304	14	0.0200	200	0.0036					0.161	10
305	100	0.0075	185	0.0054					0.490	29
306	12	0.0200	212	0.0040					0.160	10
307	12	0.0200	212	0.0040					0.160	10
308	12	0.0200	358	0.0036					0.160	10
309	12	0.0200	358	0.0036					0.160	10
310	100	0.0040	342	0.0029					0.231	14
311	100	0.0050	195	0.0087	136	0.0147			0.664	40
312	12	0.0200	232	0.0040					0.160	10
313	12	0.0200	232	0.0040					0.160	10
314	12	0.0200	280	0.0040					0.160	10
315	12	0.0200	280	0.0040					0.160	10
316	12	0.0200	200	0.0040					0.160	10
318	12	0.0200	200	0.0040					0.160	10
319	100	0.0029	105	0.0057	214	0.0187			0.704	42

PIPE SIZE CALCULATIONS

RUNOFFF COEFFICIENT

Gainesville Renewable Energy Center

Drainage Inlet	Total Area		C = 0.9 Imperv. Area	C = 0.20 Open Area	C
	S.F.	AC.			
1	18,867	0.433	726	18,141	0.227
2	21,986	0.505	1,976	20,010	0.263
3	14,889	0.342	2,870	12,019	0.335
4	17,447	0.401	2,592	14,855	0.304

PIPE SIZE CALCULATIONS

3 YR, 10 MIN DESIGN EVENT

Gainesville Renewable Energy Center

Location		Drainage Area		Runoff Coefli.	Time of Concen.	Intensity I	Runoff Q des.	n	Required Pipe Size				Proposed Pipe Size			
From	To	No	Acres	C	min.	in/hr.	CFS		Slope %	Pipe (in)	Q CFS	V ft/sec	Slope %	Pipe (in)	Q CFS	V ft/sec
S-1A	S-1						1.47	0.012	0.30	15	3.84	3.13	0.30	15	3.84	3.13
S-2A	S-2						2.93	0.012	0.30	15	3.84	3.13	0.30	15	3.84	3.13
S-3	S-4						4.40	0.012	0.40	15	4.44	3.62	1.14	15	7.49	6.11
S-5A	S-5						3.21	0.012	0.30	15	3.84	3.13	0.30	15	3.84	3.13
S-6A	S-6						6.42	0.012	0.30	30	24.40	4.97	0.30	30	24.40	4.97
S-7	S-8						9.63	0.012	2.00	15	9.92	8.09	2.63	15	11.38	9.27
S-9A	S-9						13.31	0.012	0.30	30	24.40	4.97	0.30	30	24.40	4.97
S-10A	S-10						2.15	0.012	0.30	15	3.84	3.13	0.30	15	3.84	3.13
S-11	S-12						15.46	0.012	2.00	18	16.14	9.13	3.03	18	19.86	11.24
S-15	S-16						0.60	0.012	0.30	15	3.84	3.13	2.27	15	10.57	8.61

PIPE SIZE CALCULATIONS

3 YR, 10 MIN DESIGN EVENT

Gainesville Renewable Energy Center

Location		Drainage Area		Runoff Coeffi.	Time of Concen.	Intensity I	Runoff Q des.	n	Required Pipe Size				Proposed Pipe Size			
From	To	No	Acres	C	min.	in/hr.	CFS		Slope %	Pipe (in)	Q CFS	V ft/sec	Slope %	Pipe (in)	Q CFS	V ft/sec
S-17	S-18						2.68	0.012	0.30	15	3.84	3.13	2.17	15	10.34	8.42
S-19	S-20						1.21	0.012	0.30	15	3.84	3.13	3.12	15	12.39	10.10
S-20A	S-20B	1	0.433	0.227	10.00	6.20	0.61	0.012	0.30	24	13.46	4.28	0.50	24	17.38	5.53
S-21	S-22	2	0.505	0.263	10.00	6.20	0.82	0.012	0.30	24	13.46	4.28	0.50	24	17.38	5.53
S-23	S-24	3	0.342	0.335	10.00	6.20	0.71	0.012	0.30	18	6.25	3.54	0.50	18	8.07	4.57
S-25	S-26	4	0.401	0.304	10.00	6.20	0.76	0.012	0.30	18	6.25	3.54	0.50	18	8.07	4.57
S-27	S-28						6.29	0.012	0.35	18	6.75	3.82	0.50	18	8.07	4.57
S-29	S-30						1.72	0.012	0.30	15	3.84	3.13	0.50	15	4.96	4.04
S-31	S-32						0.92	0.012	0.30	15	3.84	3.13	0.50	15	4.96	4.04
S-33	S-34						3.13	0.012	0.30	15	3.84	3.13	0.50	15	4.96	4.04
S-34A	S-34B						2.64	0.012	0.30	18	6.25	3.54	0.56	18	8.54	4.83
S-35	S-36						3.55	0.012	0.30	18	6.25	3.54	0.50	18	8.07	4.57
S-37	S-38						4.22	0.012	0.30	18	6.25	3.54	0.50	18	8.07	4.57
S-38A	S-38B						2.85	0.012	0.30	18	6.25	3.54	0.50	18	8.07	4.57
S-39	S-40						1.58	0.012	0.30	18	6.25	3.54	0.50	18	8.07	4.57
S-40A	S-40B						1.27	0.012	0.30	18	6.25	3.54	0.50	18	8.07	4.57

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Attachment F

Stormwater Pollution Prevention Plan (SWPPP)

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) MAY BE MODIFIED AND UPDATED DURING CONSTRUCTION AS A RESULT OF WEATHER, UNPREDICTABLE EVENTS AND SITE INSPECTIONS.

THIS DOCUMENT WAS PREPARED IN ORDER TO BE IN COMPLIANCE WITH CHAPTER 62-621.300 (4) OF THE FLORIDA ADMINISTRATIVE CODE, WHICH PERTAINS TO THE GENERIC PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES. THE ADMINISTRATIVE CODE GRANTS THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) THE AUTHORITY TO REGULATE POINT SOURCE DISCHARGES OF STORM-WATER FROM CONSTRUCTION SITES. THIS DOCUMENT ESTABLISHES A STORMWATER POLLUTION PREVENTION PLAN FOR THE SITE AND IS ORGANIZED TO CORRESPOND TO PART V OF DEP DOCUMENT No. 62-621.300 (4) (A) FDEP FORM 62-261.300 (4) (B) IS TO BE SUBMITTED IN CONJUNCTION WITH THIS DOCUMENT.

I. PROJECT INFORMATION:

PROJECT: GAINESVILLE RENEWABLE ENERGY CENTER (GREC)
BIOMASS GENERATING FACILITY
COUNTY: ALACHUA
SECTION/TOWNSHIP/RANGE: S 27 , T 8 SOUTH, R 19 EAST
COUNTY PARCEL NO.: A PORTION OF 05884-001-000
LATITUDE AND LONGITUDE: 29°46'07", 82°23'53"
STREET ADDRESS: 10001 N.W. 13th STREET
PROJECT AREA: 134 Ac.
APPROXIMATE AREA TO BE DISTURBED BY CONSTRUCTION: 76 Ac.

II. SITE DESCRIPTION:

1. THE PROJECT INCLUDES THE CONSTRUCTION OF A BIOMASS ELECTRIC GENERATING FACILITY IN CONJUNCTION WITH GAINESVILLE REGIONAL UTILITIES WITH ASSOCIATED PAVING, DRAINAGE AND UTILITY IMPROVEMENTS.

   THE PROPOSED STORMWATER SYSTEM PROVIDES WATER QUALITY, AND FLOOD CONTROL.

2. THE SOIL CONDITIONS WERE INVESTIGATED AND SUMMARIZED IN THE SOILS REPORT PREPARED BY GSE. THE PROPOSED DRAINAGE PLAN WILL CONSIST OF 3 MAJOR DRAINAGE AREAS.

3. EXISTING AND FUTURE DRAINAGE PATTERNS ARE SHOWN ON THE DRAINAGE PLAN FOR PRE-DEVELOPMENT CONDITIONS AND POST-DEVELOPMENT CONDITIONS. OUTFALLS, AND STORMWATER BASINS ARE SHOWN IN THE DRAINAGE PLAN AND THE DETAIL PLAN.

4. SEQUENCE OF CONSTRUCTION:

   A. PRIOR TO CONSTRUCTION, SILT FENCING AND TREE PROTECTION BARRICADES SHALL BE INSTALLED AND ALL EXISTING DRAINAGE STRUCTURES SHALL BE PROTECTED IN ACCORDANCE WITH FDOT INDEX #102.

B. THE CONSTRUCTION ENTRANCE WILL BE STABILIZED TO MINIMIZE THE CREATION OF DUST AND OFF SITE TRACKING OF SEDIMENTS.

C. THE SITE SHALL BE CLEARED AND GRUBBED OF UNDESIRABLE VEGETATION.

D. THE UNDERGROUND UTILITIES AND STORMWATER PIPING WILL BE INSTALLED AND CONNECTED TO EXISTING STRUCTURES, WHERE APPLICABLE.

E. THE SITE WILL BE ROUGHLY GRADED. IF SUITABLE, THE EXCAVATED MATERIAL MAY BE USED AS FILL FOR ON-SITE GRADING. THE ROADWAYS SHALL BE GRADED.

F. THE STORMWATER BASINS SHALL BE CONSTRUCTED AS FOLLOWS:

1. INITIALLY CONSTRUCT THE WET DETENTION AND DRY RETENTION BASINS TO ROUGH GRADE BY UNDER-EXCAVATING THE BASIN BOTTOM AND SIDES BY APPROXIMATELY 12 INCHES.

2. AFTER THE ROADWAY AND SIDE SWALES HAVE BEEN GRADED, THE INTERIOR SIDE SLOPES AND BASIN BOTTOM SHALL BE EXCAVATED TO FINAL DESIGN SPECIFICATIONS. THE EXCESS SOIL AND UNDESIRABLE MATERIAL MUST BE CAREFULLY EXCAVATED AND REMOVED FROM THE BASINS SO THAT ALL ACCUMULATED SILTS, CLAYS, ORGANICS, AND OTHER FINE SEDIMENT MATERIAL HAS BEEN REMOVED FROM THE BASIN AREA. THE EXCAVATED UNSUITABLE MATERIAL SHALL BE DISPOSED OF AND TAKEN OFF-SITE.
3. ONCE THE BASINS HAVE BEEN EXCAVATED TO FINAL GRADE, THE ENTIRE BASIN BOTTOM MUST BE DEEP RAKED AND LOOSENED FOR OPTIMAL INFILTRATION.

4. THE BASINS SHALL BE SODDED AND STABILIZED ACCORDING TO THE PLANS.

G. ROADWAYS AND PARKING LOTS WILL BE COMPACTED AND A LIMEROCK BASE WILL BE ESTABLISHED FOLLOWED BY AN OVERLAY OF ASPHALTIC CONCRETE. BUILDINGS SHALL BE CONSTRUCTED.

H. UPON SIGNIFICANT COMPLETION OF CONSTRUCTION, THE STORMWATER SYSTEM SHALL BE FLUSHED OUT TO REMOVE ACCUMULATED DEBRIS AND SEDIMENT.

I. STORMWATER BASINS WILL BE SCRAPED CLEAN OF ACCUMULATED SEDIMENT.

J. ALL DISTURBED AREAS WITHIN THE CONSTRUCTION AREA SHALL BE COMPLETELY GRASSED AND/OR LANDSCAPED. EVIDENCE OF GROWTH MUST BE PRESENT PRIOR TO REMOVAL OF SILT FENCING AND OTHER EROSION CONTROL APPLICATIONS.

III. CONTROLS:

THE CONTROLS SHALL BE IMPLEMENTED AND MAINTAINED DURING THE ENTIRE CONSTRUCTION OF THE PROJECT. IF SITE CONDITIONS ARE SUCH THAT ADDITIONAL CONTROL MEASURES ARE REQUIRED THAN WHAT IS SPECIFIED IN THE EROSION AND SEDIMENTATION CONTROL PLAN, THEN THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL BEST MANAGEMENT PRACTICES NECESSARY.

1. THE CONSTRUCTION ACCESS SHALL BE STABILIZED WITH GRAVEL AND TEMPORARY VEGETATION TO PREVENT SILT LEAVING THE SITE.

2. TREE BARRICADES SHALL BE IMPLEMENTED BEFORE CLEARING AND GRUBBING OF ANY OF THE WORK AREAS.

3. BEFORE CLEARING, SILT FENCES SHALL BE INSTALLED AROUND THE PERIMETER OF THE CONSTRUCTION AND AROUND THE WETLAND(S) AND/OR BASIN(S) AS SHOWN IN THE PLANS. ALL EXISTING STORM DRAINAGE SWALES AND INLETS SHALL BE PROTECTED PER FDOT INDEX 102.

4. AFTER CLEARING BUT BEFORE EXCAVATION AND GRADING, TEMPORARY BERMS AND SWALES SHALL BE CONSTRUCTED AS REQUIRED TO DIVERT THE FLOW INTO THE CORRESPONDING STORMWATER BASIN.

5. ALL BASIN AREAS SHALL BE PROTECTED AS INDICATED ON THE PLANS.

6. THE STORMWATER BASINS SHALL BE ROUGH GRADED TO WITHIN 6" OF THE DESIGNED BASIN BOTTOM. THE BASIN SIDE SLOPES SHALL BE STABILIZED AS SHOWN IN THE PLANS BY SEEDING, MULCHING AND/OR SODDING TO PREVENT EXCESSIVE EROSION.

7. DURING CONSTRUCTION OF PAVING AND BUILDINGS, EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED AS REQUIRED.

8. ALL DISTURBED AREAS WITHIN THE CONSTRUCTION SITE SHALL BE COMPLETELY LANDSCAPED AND/OR GRASSED. FINAL STABILIZATION INCLUDING SEEDING, MULCHING, SODDING OR RIPRAP SHALL BE INSTALLED AS REQUIRED. GRASS SEEDING RATES AND MIXTURES SHALL BE PER FDOT INDEX 104. EVIDENCE OF GROWTH MUST BE PRESENT PRIOR TO REMOVAL OF SILT FENCING AND OTHER EROSION CONTROL APPLICATIONS AND PRIOR TO FINAL RELEASE.

IV. EROSION AND SEDIMENTATION CONTROLS:

STABILIZATION PRACTICES.

1. ALL ENTRANCES TO THE SITE SHALL BE STABILIZED BEFORE CONSTRUCTION AND FURTHER DISTURBANCE BEGINS. GRAVEL PAD SHALL PROVIDE STABILIZATION AND MINIMIZE THE AMOUNT OF SEDIMENT LEAVING THE SITE. MAINTENANCE OF THE ENTRANCE SHALL INCLUDE SWEEPING OF THE AREA ADJACENT TO THE ENTRANCE. STONE AND GRAVEL MIGHT NEED TO BE PERIODICALLY ADDED TO MAINTAIN THE EFFECTIVENESS OF THE ENTRANCE(S).

2. TREE BARRICADES SHALL BE INSTALLED AROUND THE TREES AS SHOWN IN THE DETAIL PLAN TO PROTECT THE EXISTING VEGETATION.

3. MULCH SHALL BE PLACED IN THE AREAS REQUIRED TO PREVENT EROSION FROM STORMWATER RUNOFF AND THE AREAS SHOWN ON THE PLANS. MULCH SHALL BE ANCHORED TO RESIST WIND DISPLACEMENT AND SHALL BE INSPECTED AFTER EVERY RAINSTORM TO IDENTIFY AREAS WHERE MULCH HAS BEEN WASHED OUT OR LOOSENED. THESE AREAS SHALL HAVE MULCH COVER REPLACEMENT.

4. SEEDING SHALL BE STARTED AFTER GRADING HAS BEEN FINISHED ON THE AREAS SHOWN IN THE PLANS. SEEDED AREAS SHOULD BE INSPECTED FOR FAILURE TO ESTABLISH, AND NECESSARY REPAIRS AND RESEEDING SHOULD BE MADE AS SOON AS POSSIBLE. ADDITIONAL SEEDING AND MULCH MAY BE REQUIRED AS NECESSARY TO PREVENT EROSION DURING OR AFTER CONSTRUCTION HAS FINISHED.

5. SOD SHALL BE INSTALLED IN THE AREAS SHOWN IN THE PLANS. SOD SHALL BE PEGGED IF INSTALLED ON SLOPES GREATER THAN 3:1. SODDED AREAS SHALL BE MAINTAINED AND INSPECTED TO ENSURE SUCCESSFUL ESTABLISHMENT.

SEDIMENTATION PRACTICES.

1. SILT FENCES SHALL BE INSTALLED IN THE AREAS SHOWN IN THE PLANS AND AS REQUIRED TO PREVENT SEDIMENT FROM LEAVING THE CONSTRUCTION AREA. SILT FENCES SHALL BE INSPECTED AFTER EACH RAINFALL EVENT TO ENSURE THAT THERE ARE NO GAPS OR TEARS. IF GAPS OR TEARS ARE FOUND THE FABRIC SHOULD BE REPAIRED OR REPLACED. SEDIMENT REMOVAL SHALL BE PART OF THE REGULAR MAINTENANCE. SILT FENCES SHALL *REMAIN IN PLACE UNTIL CONSTRUCTION HAS FINISHED AND DISTURBED AREAS ARE* PERMANENTLY STABILIZED.

2. DIVERSION SWALES, IF REQUIRED, SHALL BE CONSTRUCTED BEFORE MAJOR LAND DISTURBANCE OF THE RECEIVING BASIN. DIVERSION SWALES SHALL BE STABILIZED AFTER CONSTRUCTION TO MAINTAIN ITS EFFICIENCY.

3. INLETS SHOULD BE TEMPORARILY PROTECTED TO PREVENT SEDIMENT ENTERING THE INLET. BARRIERS WILL CATCH SOIL, DEBRIS AND SEDIMENT AT THE ENTRANCE OF THE INLET.

4. OUTFALL STRUCTURES SHALL HAVE SILT FENCES TO PREVENT SILT FROM ENTERING THE STORMWATER BASINS AND SHALL BE STABILIZED AS REQUIRED TO PREVENT EROSION FROM WASHOUTS.

V. STORMWATER MANAGEMENT:

1. THE PROPOSED PROJECT OBTAINED AN ENVIRONMENTAL RESOURCE PERMIT FROM SUWANNEE RIVER WATER MANAGEMENT DISTRICT (SRWMD) FOR THE CONSTRUCTION AND OPERATION OF A STORMWATER TREATMENT SYSTEM AND CONTROLS. THE PROPOSED SYSTEM (AS SHOWN ON THE PLANS) INCLUDED THE USE OF THE BEST MANAGEMENT PRACTICES (BMP) CONSISTENT WITH THE APPLICABLE REQUIREMENTS OF RULE 40B-4 OF THE DISTRICT. THE OWNER AND/OR THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF THE STORMWATER TREATMENT SYSTEM AND CONTROLS UNTIL CONSTRUCTION ACTIVITIES ARE COMPLETED AND FINAL STABILIZATION HAS BEEN ACCOMPLISHED. HOWEVER, THE OWNER AND/OR AN ENTITY SIMILAR TO A HOMEOWNERS ASSOCIATION SHALL BE RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF THE STORMWATER SYSTEM IN PERPETUITY, IN ACCORDANCE WITH THE REQUIREMENTS OF THE ENVIRONMENTAL RESOURCE PERMIT.

2. TO TREAT AND CONTROL THE STORMWATER PRODUCED BY THE PROPOSED DEVELOPMENT, THE PROJECT REQUIRES THE INSTALLATION AND CONSTRUCTION OF THE FOLLOWING BMP'S: 3 DRY RETENTION BASINS AND 3 WET DETENTION BASINS WITH ALL GRADING ASSOCIATED WITH THE CONSTRUCTION. THE BASINS HAVE BEEN DESIGNED TO CONTAIN AND ATTENUATE THE STORMS AND DISCHARGE AT PRE-DEVELOPMENT CONDITIONS, WHILE PROVIDING TREATMENT TO THE RUNOFF AS REQUIRED BY THE DISTRICT AND STATE RULES USING THE GUIDELINES CONTAINED IN THE SRWMD HANDBOOK.

VI. CONTROLS FOR OTHER POTENTIAL POLLUTANTS:

1. WASTE DISPOSAL: NO SOLID MATERIALS, INCLUDING CONSTRUCTION MATERIALS, SHALL BE DISCHARGED TO SURFACE WATERS AND ARE NOT AUTHORIZED UNDER THE ISSUED ENVIRONMENTAL RESOURCE PERMIT.

2. THE USE OF GRAVEL AND CONTINUING SWEEPING ACTIVITIES AT THE ENTRANCE OF THE SITE WILL CONTROL THE TRACKING OF SEDIMENT AND DUST LEAVING THE SITE.

3. THE PROPOSED DEVELOPMENT WILL PROVIDE WATER AND SEWER SYSTEM BY CONNECTING INTO THE CENTRAL MUNICIPAL SYSTEM OF GAINESVILLE REGIONAL UTILITIES.

4. ANY APPLICATION OF FERTILIZERS AND PESTICIDES NECESSARY TO ESTABLISH AND MAINTENANCE OF VEGETATION DURING CONSTRUCTION AND THROUGH PERPETUITY MAINTENANCE SHALL FOLLOW THE MANUFACTURERS RECOMMENDATIONS AND THE APPLICABLE RULES OF THE STATE OF FLORIDA.

5. ANY TOXIC MATERIALS REQUIRED DURING CONSTRUCTION SHALL BE PROPERLY STORED, DISPOSED OF AND CONTRACTOR AND/OR OWNER SHALL PROVIDE THE APPROPRIATE PERMITS FROM THE LOCAL OR STATE AGENCIES.

VII. APPROVED STATE OR LOCAL PLANS:

1. ALL THE SEDIMENT AND EROSION CONTROLS THAT ARE LISTED IN THE SITE PLAN AS APPROVED BY THE SRWMD ARE INCLUDED IN THIS STORMWATER POLLUTION PREVENTION PLAN (SEE ITEM III AND IV).

2. THIS STORMWATER POLLUTION PREVENTION PLAN SHALL BE AMENDED IF REQUIRED BY ANY LOCAL OR STATE AGENCY OR AS REQUIRED BY UNFORESEEABLE CONDITIONS AND THE OWNER SHALL SUBMIT A RE-CERTIFICATION TO THE NPDES STATE OFFICE THAT THE PLAN HAS BEEN AMENDED TO ADDRESS THOSE CHANGES.

VIII. MAINTENANCE:

THE CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE, INSPECTION SCHEDULE, AND REPAIRS OUTLINED IN THIS PLAN. MAINTENANCE SHALL CONTINUE THROUGHOUT THE PROJECT UNTIL WORK IS COMPLETE. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER CONSTRUCTION IS COMPLETE.

IN ADDITION TO THE ITEMS MENTIONED IN THE PREVIOUS SECTIONS, THE CONTRACTOR SHALL INITIATE ANY REPAIRS WITHIN 24 HOURS OF BEING REPORTED. IN THE EVENT THAT THE BASINS DO NOT PERFORM PROPERLY OR IF A SINKHOLE DEVELOPS, THE PROJECT ENGINEER SHALL BE NOTIFIED TO ASSIST IN COORDINATING REMEDIAL ACTION.

1. MAINTENANCE WOULD BE DIVIDED IN ROUTINE MAINTENANCE AND REPAIR MAINTENANCE. ALL STORMWATER BMP'S SHOULD BE INSPECTED FOR CONTINUED EFFECTIVENESS AND STRUCTURAL INTEGRITY ON A REGULAR BASIS. THE SYSTEMS SHOULD BE CHECKED AFTER EACH STORM EVENT IN ADDITION TO REGULARLY SCHEDULED INSPECTIONS.

2. ROUTINE MAINTENANCE REQUIREMENTS SHOULD BE INCLUDED IN THE INSPECTOR CHECKLIST TO AID THE INSPECTOR IN DETERMINING WHETHER A BMP'S MAINTENANCE IS ADEQUATE OR NEEDS A REVISION. INSPECTORS SHALL KEEP RECORD OF MAINTENANCE, ROUTINE OR REPAIR, TO PROVIDE EVIDENCE OF AN EFFICIENT INSPECTION AND MAINTENANCE.

3. SIDE ENTRANCES: MAINTENANCE SHALL INCLUDE REPLACEMENT OF GRAVEL AND CLEANING THE SOIL THAT IS TRACKED OFFSITE FOR PROPER DISPOSAL.

4. TREE BARRICADES: MAINTENANCE SHALL INCLUDE INSPECTION OF MESH AND POSTS AND REPAIR OR REPLACEMENT OF DAMAGED VEGETATION.

5. SILT FENCES: MAINTENANCE SHALL INCLUDE SEDIMENT REMOVAL AND INSPECTION TO ENSURE PROPER ANCHORING AND THAT NO TEARING OR GAPS HAVE OCCURRED. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED ONE-THIRD THE HEIGHT OF SILT FENCE.

6. DIVERSION SWALES: MAINTENANCE SHALL INCLUDE INSPECTION AFTER EVERY RAINFALL EVENT AND ONCE EVERY TWO WEEKS BEFORE FINAL STABILIZATION. THEY SHOULD BE CLEARED OF SEDIMENT AND MAINTAIN VEGETATIVE COVER.
7. TEMPORARY BERMS: MAINTENANCE SHALL INCLUDE REMOVAL OF DEBRIS, TRASH SEDIMENT AND LEAVES. SIDES OF THE BERM SHALL BE INSPECTED FOR EROSION AFTER EACH STORM EVENT.

8. MULCHING: ROUTINE MAINTENANCE SHALL INCLUDE REPLACEMENT PERIODICALLY.

9. SEEDING: ROUTINE MAINTENANCE SHALL INCLUDE RESEEDING OF AREAS THAT FAILED TO ESTABLISH.

10. SODDING: ROUTINE MAINTENANCE SHALL INCLUDE WATERING AND MOWING. REPLACEMENT OF GRASS MAY BE NECESSARY IF COVER IS NOT FULLY ESTABLISHED.

11. INLETS: ROUTINE MAINTENANCE SHALL INCLUDE INSPECTION AFTER EVERY STORM EVENT AND MIGHT INCLUDE REMOVAL OF ACCUMULATED SEDIMENT.

12. OUTFALL STRUCTURES: ROUTINE MAINTENANCE SHALL INCLUDE INSPECTION AFTER EVERY STORM EVENT TO ASSURE NO EROSION OR SCOUR HAS OCCURRED.

13. DRY RETENTION BASINS: ROUTINE MAINTENANCE SHALL INCLUDE MONITORING FOR SEDIMENT ACCUMULATION, CLEAN AND REMOVE DEBRIS FROM INLETS AND OUTLETS, MOW SIDE SLOPES AND INSPECT FOR DAMAGE OF BERMS AND REPAIR UNDERCUT OR ERODED AREAS AS NECESSARY.

14. WET DETENTION BASINS: ROUTINE MAINTENANCE SHALL INCLUDE MONITORING FOR SEDIMENT ACCUMULATION, CLEAN AND REMOVE DEBRIS FROM INLETS AND OUTLETS, MOW SIDE SLOPES AND INSPECT FOR DAMAGE OF BERMS AND REPAIR UNDERCUT OR ERODED AREAS AS NECESSARY.

IX. INSPECTIONS:

1. THE OWNER AND /OR CONTRACTOR SHALL PROVIDE QUALIFIED PERSONNEL TO INSPECT ALL POINTS OF POTENTIAL DISCHARGE FROM THE PROJECT SITE FOR DISTURBED AREAS, THE EROSION AND SEDIMENTATION CONTROLS AND BMP'S AS LISTED IN THIS PLAN. THE INSPECTION SHALL BE PERFORMED DURING CONSTRUCTION AND BEFORE FINAL STABILIZATION, ONCE EVERY SEVEN-CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM THAT IS GREATER THAN 0.50 INCHES. AFTER FINAL STABILIZATION AND BEFORE FINISH OF CONSTRUCTION THE INSPECTION SHALL BE CONDUCTED ONCE EVERY MONTH.

2. THE CONTRACTOR SHALL INSTALL A RAIN GAUGE AT THE SITE TO MONITOR AND DOCUMENT RAINFALL EVENTS IN EXCESS OF 0.50 INCHES.

3. ALL DISTURBED AREAS AND AREAS USED FOR MATERIALS STORAGE SHALL BE INSPECTED FOR POLLUTANTS ENTERING THE STORMWATER SYSTEM. THE STORMWATER MANAGEMENT SYSTEM AND EROSION AND SEDIMENT CONTROL MEASURES IDENTIFIED IN THE PLAN SHALL BE INSPECTED TO ENSURE THEY ARE OPERATING CORRECTLY. LOCATIONS WHERE VEHICLES ENTER AND LEAVE THE SITE SHALL BE INSPECTED FOR EVIDENCE OF OFFSITE SEDIMENT TRACKING.

4. REPAIR OR MAINTENANCE NEEDED TO ASSURE PROPER OPERATION OF THE STORMWATER POLLUTION PREVENTION PLAN SHALL BE DONE IN A TIMELY MANNER BUT NO LATER THAN 7 CALENDAR DAYS FOLLOWING THE INSPECTION.

5. A REPORT SHALL BE KEPT OF EACH INSPECTION FOR THREE YEARS AFTER FINAL STABILIZATION AND SHALL INCLUDE THE DATES OF EACH INSPECTION, THE SCOPE OF THE INSPECTION, MAJOR OBSERVATIONS, ANY REPAIR AND/OR MAINTENANCE REQUIRED AND ANY INCIDENT OF NON-COMPLIANCE. IF THE REPORT DOES NOT CONTAIN ANY INCIDENTS OF NON-COMPLIANCE, THE REPORT SHALL CONTAIN A CERTIFICATION THAT THE FACILITY HAS BEEN IN COMPLIANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN AND THE NPDES PERMIT. THE REPORT SHALL INCLUDE THE NAME AND QUALIFICATIONS OF THE INSPECTOR AND SHALL BE SIGNED IN ACCORDANCE TO FDEP RULE 62-621.300, PART VII.C. A COPY OF THE CONSTRUCTION INSPECTION FORM IS INCLUDED ON THIS STORMWATER POLLUTION PREVENTION PLAN SHEET. A COPY SHALL BE RETAINED AT THE CONSTRUCTION SITE FROM THE DATE OF PROJECT INITIATION TO THE DATE OF FINAL STABILIZATION.

X. NON-STORMWATER DISCHARGES:

1. THE FOLLOWING NON-STORMWATER DISCHARGES MIGHT BE COMBINED WITH STORMWATER AND WOULD BE AUTHORIZED AS PART OF THIS PERMIT: FIRE HYDRANT FLUSHING, CONTROL OF DUST, POTABLE WATER FLUSHING AND IRRIGATION DRAINAGE. BECAUSE OF THE NATURE OF THESE DISCHARGES, THE EROSION, STABILIZATION AND TREATMENT SYSTEMS TO BE IMPLEMENTED, AS PART OF THIS PLAN WOULD BE APPROPRIATE TO PREVENT AND TREAT ANY POLLUTION RELATED TO THESE NON-STORMWATER DISCHARGES.

XI. CONTRACTORS:

1. ALL CONTRACTORS AND/OR SUBCONTRACTORS RESPONSIBLE FOR IMPLEMENTING THE PLAN SHALL SIGN THE CERTIFICATION STATEMENT BEFORE STARTING CONSTRUCTION ACTIVITIES OF THE PROJECT. THE CERTIFICATION MUST INCLUDE THE NAME AND TITLE OF THE PERSON PROVIDING THE SIGNATURE, THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE CONTRACTING FIRM, THE ADDRESS OF THE SITE AND THE DATE THE CERTIFICATION IS MADE. THE OWNER SHALL KEEP THESE CERTIFICATIONS AS PART OF THIS POLLUTION PLAN. MULTIPLE COPIES OF THE CERTIFICATION STATEMENT MAY BE NECESSARY DEPENDING UPON THE NUMBER OF SUBCONTRACTORS ASSOCIATED WITH THE PROJECT.

Gainesville Renewable Energy Center
An American Renewables Company

CERTIFICATION STATEMENT

"I CERTIFY UNDER PENALTY OF LAW THAT I UNDERSTAND AND SHALL COMPLY WITH THE TERMS AND CONDITIONS OF THE STATE OF FLORIDA GENERIC PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES AND THIS STORMWATER POLLUTION PREVENTION PLAN PREPARED THEREUNDER."

CONTRACTING FIRM: _____

ADDRESS: _____

CITY, STATE, ZIP CODE: _____

TELEPHONE: _____

FAX: _____

PROJECT NAME: _____

PROJECT ADDRESS: _____

PROJECTADDRESS: _____

CITY, STATE, ZIP CODE: _____

NAME: _____

SIGNATURE: _____

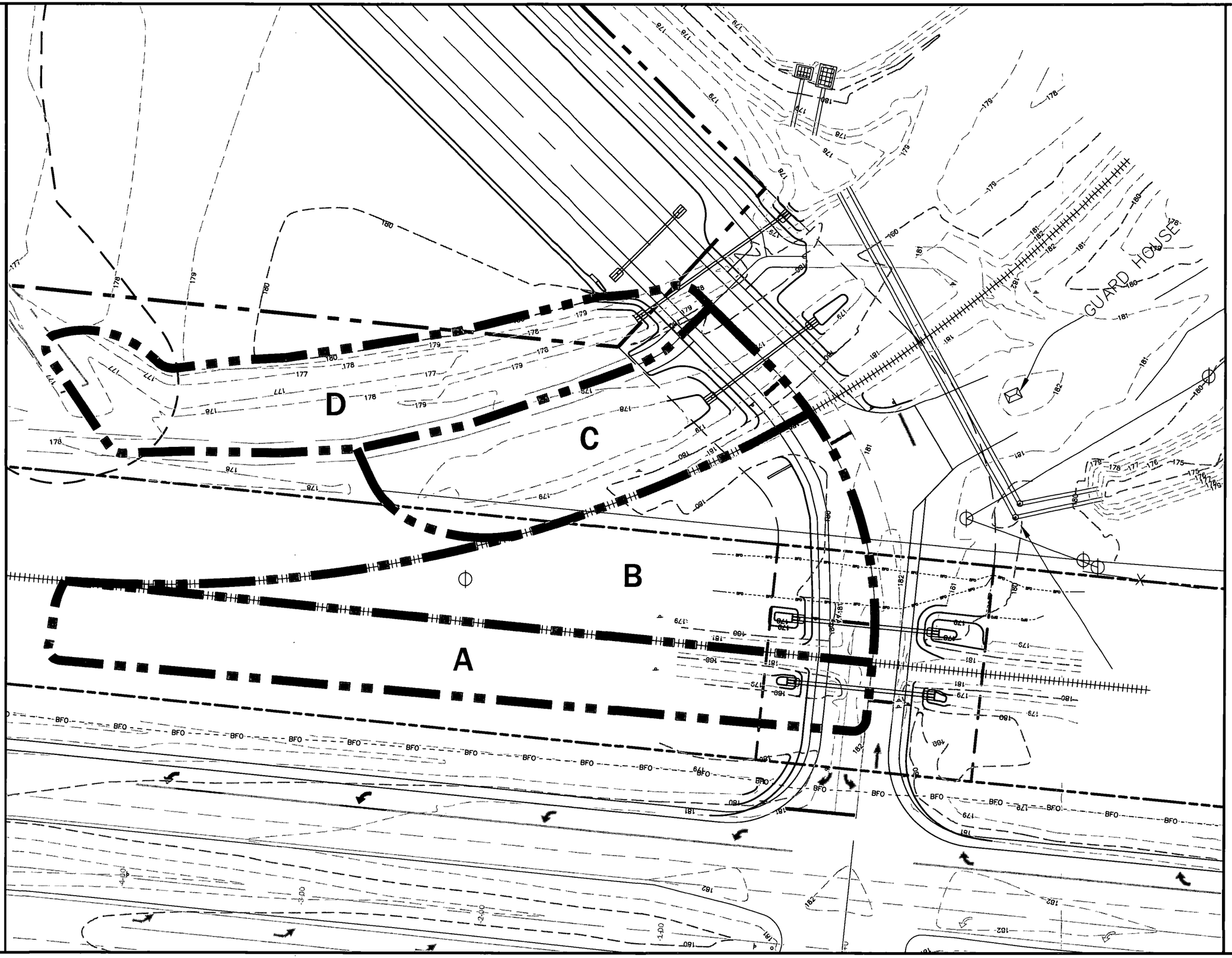
DATE: _____

Gainesville Renewable Energy Center
An American Renewables Company

Attachment G

Detailed Construction Plans

Copies of the Detailed Construction Plans files are provided in electronic format on compact disc as 36" x 24" if higher resolution is desired



ENG, DENMAN & ASSOCIATES, INC.
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TEL. (352) 373-3541 FAX. (352) 373-7249
E-MAIL: eda@atlantic.net

No.	Date	Comment

GAINESVILLE RENEWABLE ENERGY CENTER
GAINESVILLE, FLORIDA

ENTRANCE DRAINAGE AREAS

Project Phase:

Professional Engineer of Record:

Claudia S. Vega P.E. — Engineer
51532 — Florida P.E. no.

Scale: 1" = 50'	Date: JAN. 29, 2010
Designed: CSV	Drawn: JVR
Project No: 09-254	Sheet No. 1 of 1

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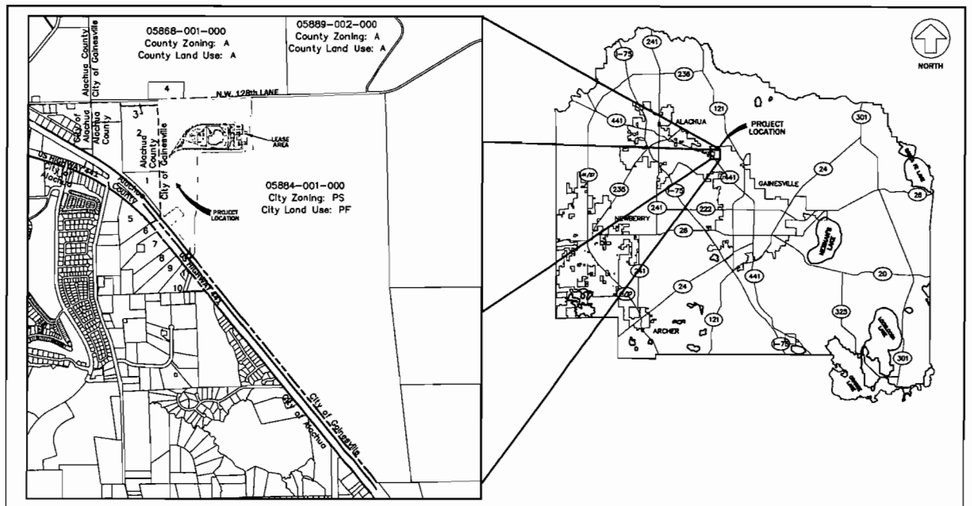
Gainesville Renewable Energy Center

An American Renewables Company

BIOMASS GENERATING FACILITY

CITY OF GAINESVILLE, FLORIDA



VICINITY MAP

ALACHUA COUNTY, FLORIDA

NOT TO SCALE

LEGEND

ZONING:

City of Gainesville

PS = PUBLIC SERVICES

A = AGRICULTURAL (County Zoning)

City of Alachua

CI = COMMERCIAL INTENSIVE

A = AGRICULTURAL

Alachua County

A = AGRICULTURAL

FUTURE LAND USE:

City of Gainesville

PF = PUBLIC FACILITIES

A = AGRICULTURAL (County Land Use)

REC = RURAL EMPLOYMENT CENTER (County Land Use)

City of Alachua

COMM = COMMERCIAL

A = AGRICULTURAL

Alachua County

REC = RURAL EMPLOYMENT CENTER

1) PARCEL: 05884-001-001
COUNTY ZONING: A
COUNTY LAND USE: REC

2) PARCEL: 05890-001-000
COUNTY ZONING: A
COUNTY LAND USE: REC

3) PARCEL: 05890-001-000
COUNTY ZONING: A
COUNTY LAND USE: REC

4) PARCEL: 05868-099-000
COUNTY ZONING: A
COUNTY LAND USE: REC

5) PARCEL: 05885-010-006
CITY OF ALACHUA ZONING: CI
CITY OF ALACHUA LAND USE: COMM

6a) PARCEL: 05885-010-005
CITY OF ALACHUA ZONING: CI
CITY OF ALACHUA LAND USE: COMM

7) PARCEL: 05885-010-004
CITY OF ALACHUA ZONING: CI
CITY OF ALACHUA LAND USE: COMM

8) PARCEL: 05885-010-003
CITY OF ALACHUA ZONING: CI
CITY OF ALACHUA LAND USE: COMM

9) PARCEL: 05885-010-002
CITY OF ALACHUA ZONING: CI
CITY OF ALACHUA LAND USE: COMM

10) PARCEL: 05885-010-010
CITY OF ALACHUA ZONING: CI
CITY OF ALACHUA LAND USE: COMM

11) PARCEL: 05885-010-001
CITY OF ALACHUA ZONING: CI
CITY OF ALACHUA LAND USE: COMM

DEVELOPMENT INFORMATION:

1.	PROPERTY OWNER:	CITY OF GAINESVILLE P.O. BOX 490 MS 58 GAINESVILLE, FL 32602
2.	PROJECT APPLICANT:	GAINESVILLE RENEWABLE ENERGY CENTER, LLC 75 ARLINGTON STREET, 5TH FLOOR BOSTON, MA 02116 (817)482-6150
3.	NAME OF PROJECT:	GAINESVILLE RENEWABLE ENERGY CENTER (GREC) - BIOMASS GENERATING FACILITY
4.	PROJECT DESCRIPTION:	THE PROJECT INCLUDES THE CONSTRUCTION OF A BIOMASS ELECTRIC GENERATING FACILITY IN CONJUNCTION WITH GAINESVILLE REGIONAL UTILITIES.
5.	PROJECT ADDRESS:	10001 N.W. 13th STREET GAINESVILLE, FLORIDA
6.	TAX PARCEL NUMBER:	A PORTION OF 05884-001-00
7.	SECTION/TOWNSHIP/RANGE:	SECTION 27, TOWNSHIP 8 SOUTH, RANGE 19 EAST
8.	ZONING:	PUBLIC SERVICES (PS)
9.	FUTURE LAND DESIGNATION:	PUBLIC FACILITIES (PF)

DRAWING INDEX

SHEET NUMBER	DRAWING TITLE
C0.00	COVER SHEET
C0.50 – C0.52	OVERALL LAYOUT
C0.60 – C0.61	WETLAND BUFFER IMPACTED & COMPENSATED AREAS
C2.00 – C2.02	PRE-DEVELOPMENT DRAINAGE AREAS
C2.03 – C2.05	POST-DEVELOPMENT DRAINAGE AREAS
C2.10	SOILS MAP
C2.20 – 2.22	PAVING, GRADING & DRAINAGE PLANS
C2.40 – C2.45	STORMWATER BASINS, DETAILS AND CROSS SECTIONS
C2.46	LAYDOWN AREA TYPICAL CROSS-SECTIONS
C3.00	STORMWATER POLLUTION PREVENTION PLAN
C3.10 – C3.16	MASTER EROSION AND SEDIMENTATION CONTROL PLAN
C3.20	DRAINAGE DETAILS & NOTES
C5.00	ROADWAY DETAILS, NOTES AND TYPICAL CROSS-SECTION
C6.00 – C6.08	ROADWAYS PLAN & PROFILES

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: AS SHOWN

ENG, DENMAN & ASSOCIATES, INC.
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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: COVER SHEET

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR | Date: NOV. 13, 2009

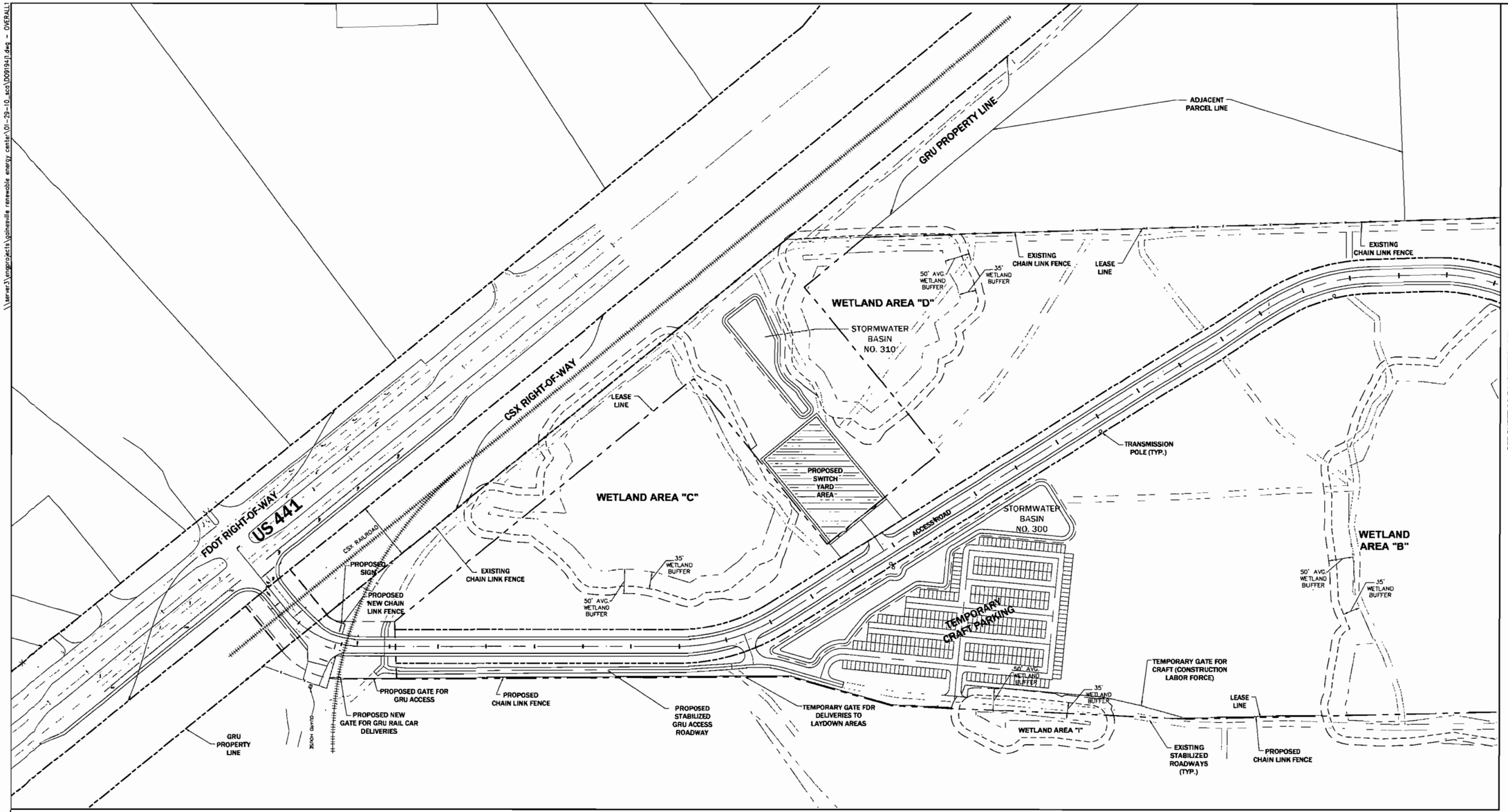
Project No: 09-194

Professional Engineer of Record:

Claudia S. Vega P.E. 51532
Engineer Certificate No.

Sheet No.: C0.00

Plotted: Jan 27, 2010 - 14:57:32 - Jayne Rocks



NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

LEGEND

- PROPOSED ROADWAY
- PROPOSED SWITCH YARD AREA
- PROPOSED PERMANENT 6' CHAINLINK FENCE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

ENG. DENMAN & ASSOCIATES, INC.
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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: OVERALL LAYOUT
SHEET 1 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR | Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega P.E. 51532
Engineer Certificate No.

Sheet No.:

C0.50

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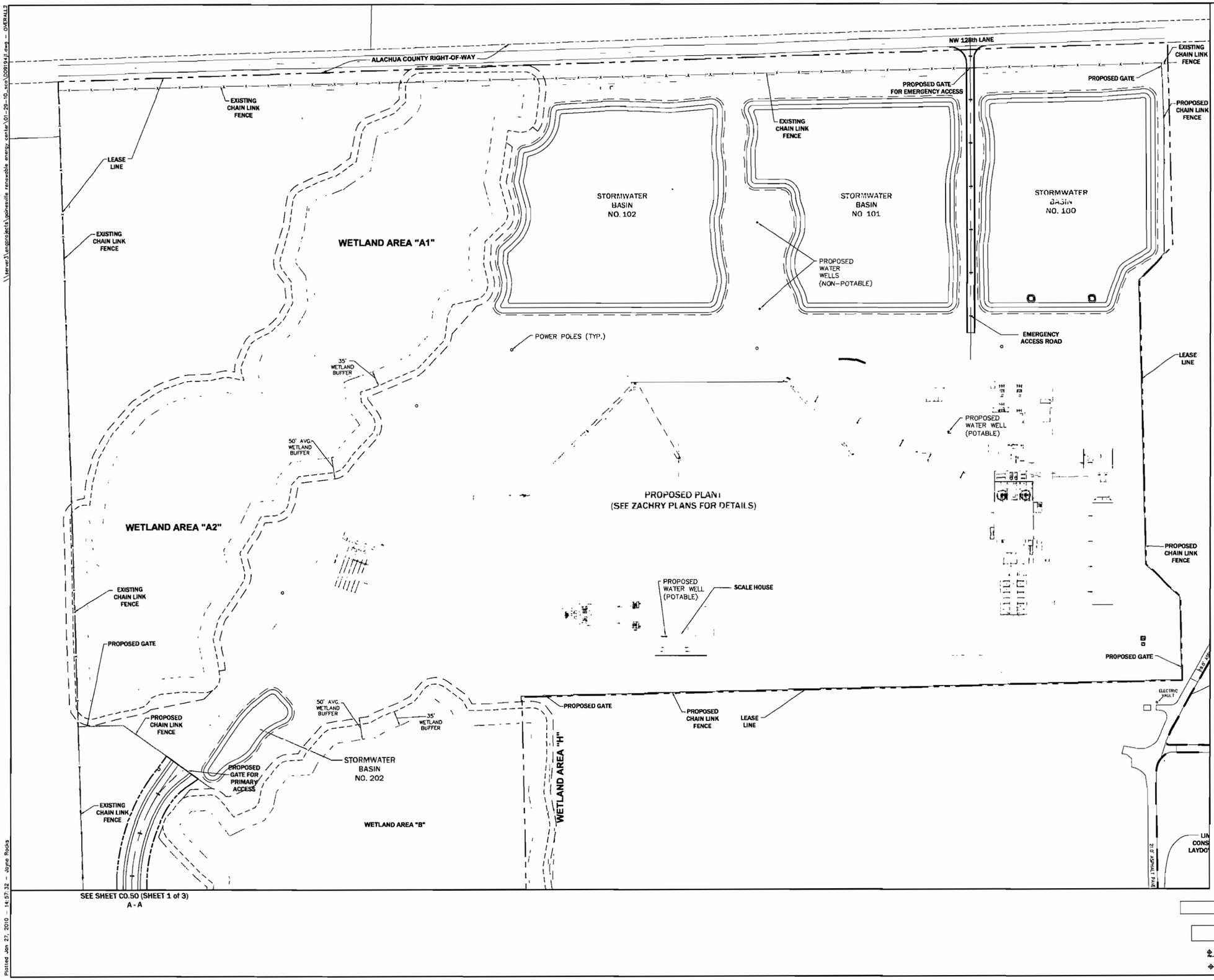

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

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BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: OVERALL LAYOUT
SHEET 2 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR

Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega P.E. 51532
Engineer Certificate No.

Sheet No.: C0.51

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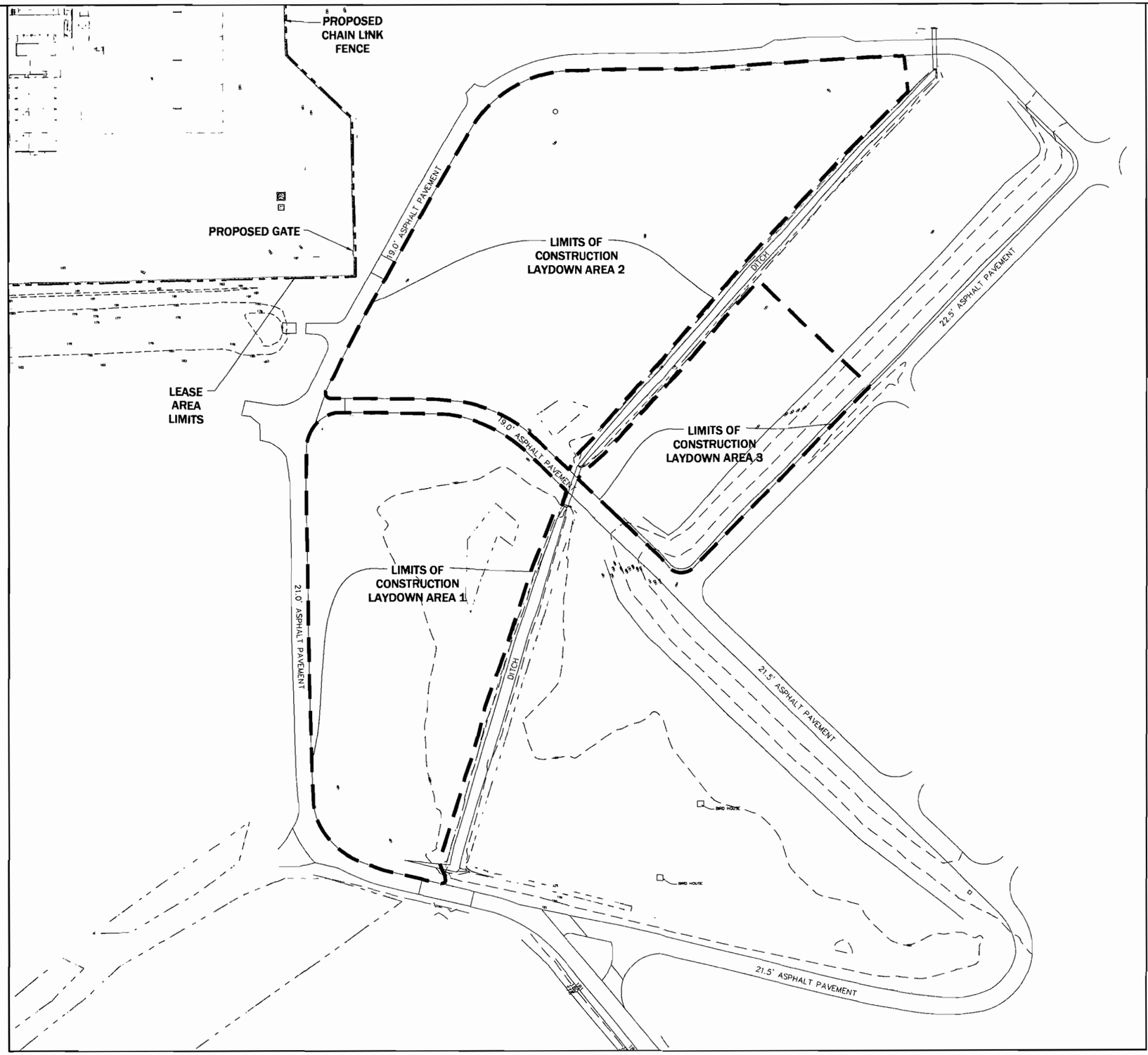
SEE SHEET C0.51 (SHEET 2 of 3)
B - B



No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 60'
60 30 0 60
GRAPHIC SCALE

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BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet Title: OVERALL LAYOUT
SHEET 3 of 3

Project phase: STATE CERTIFICATION
Designed: CSV/CAP Drawn: JVR
Project No: 09-194 Date NOV. 13, 2009
Professional Engineer of Record:
Claudia S. Vega, P.E. Engineer
51332 Certificate No.

Sheet No.
C0.52

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\\server3\wdgprojects\gainesville renewable energy center\01-29-10_acs\D0919431.dwg - WETLANDS1

WETLAND AREA "D"

LEASE LINE LIMITS

LEASE LINE LIMITS

50' BUFFER

35' BUFFER

WETLAND 50' AVG. BUFFER COMPENSATED AREA = 0.03 Ac.

WETLAND 50' AVG. BUFFER IMPACTED AREA = 0.03 Ac.

WETLAND AREA "C"

WETLAND 50' AVG. BUFFER IMPACTED AREA = 0.06 Ac.

WETLAND 50' AVG. BUFFER COMPENSATED AREA = 0.06 Ac.

50' BUFFER

35' BUFFER

WETLAND 50' AVG. BUFFER IMPACTED AREA = 0.001 Ac.

WETLAND 50' AVG. BUFFER IMPACTED AREA = 0.003 Ac.

WETLAND 50' AVG. BUFFER COMPENSATED AREA = 0.04 Ac.

WETLAND AREA "I"

LEASE LINE LIMITS

WETLAND 50' AVG. BUFFER IMPACTED AREA = 0.04 Ac.

35' BUFFER

50' BUFFER

WETLAND 50' AVG. BUFFER COMPENSATED AREA = 0.04 Ac.

WETLAND AREA "B"

WETLAND ARE

TIE TO C0.61 (SHEET 2 of 3)

LEGEND

WETLAND AREAS

PROPOSED 50' BUFFER IMPACTED AREA

PROPOSED 50' BUFFER COMPENSATION AREA

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

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CITY OF GAINESVILLE, FLORIDA

Sheet title: WETLAND BUFFER IMPACTED & COMPENSATED AREAS
SHEET 1 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JAR

Project No. 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega, P.E. — Engineer

51532 — Certificate No.

Sheet No.:

C0.60

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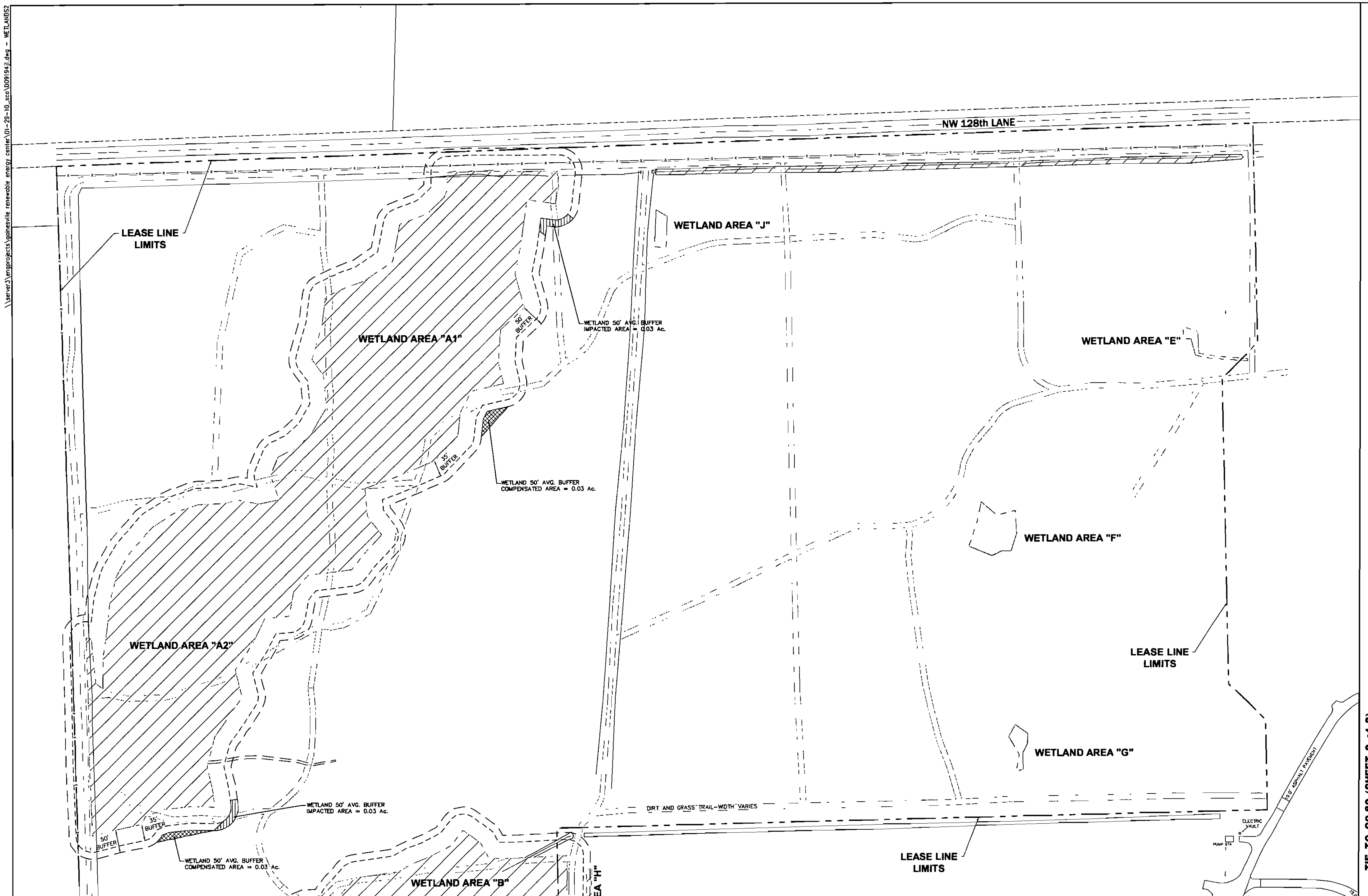

TIE TO C0.60 (SHEET 1 of 3)

LEGEND

Symbol	Description
(hatched)	WETLAND AREAS
(dense hatched)	PROPOSED 50' BUFFER IMPACTED AREA
(crosshatched)	PROPOSED 50' BUFFER COMPENSATION AREA
(blank)	IMPACTED WETLANDS

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

EDA

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Project:
GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title:
WETLAND BUFFER IMPACTED & COMPENSATED AREAS
SHEET 2 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR

Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega P.E. — Engineer
51532 — Certificate No.

Sheet No.: C0.61

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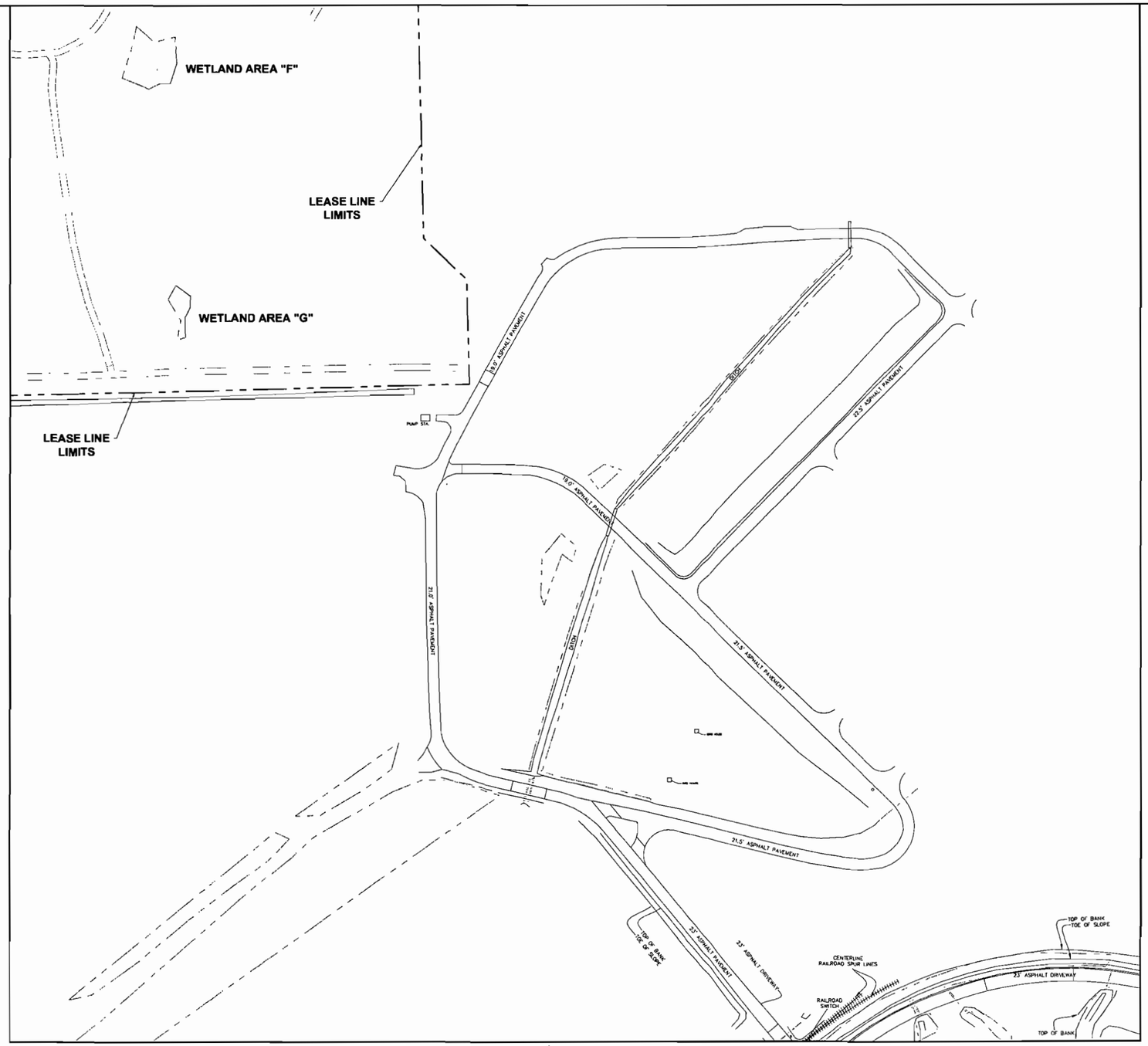
\\server3\engprojects\gainesville renewable energy center\01-29-10_sca\09194jl.dwg – WETLAND52

\\server2\engprojects\gainesville renewable energy center\01-29-10_acc\0091941.dwg - WETLANDS3

TIE TO CO.61 (SHEET 2 of 3)



LEGEND

- WETLAND AREAS
- PROPOSED 50' BUFFER IMPACTED AREA
- PROPOSED 50' BUFFER COMPENSATION AREA
- IMPACTED WETLANDS

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

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CITY OF GAINESVILLE, FLORIDA

Sheet title:
WETLAND BUFFER IMPACTED & COMPENSATED AREAS
SHEET 3 of 3

Project phase:
STATE CERTIFICATION

Designed: CSV/CMP | Drawn: JJR | Date: NOV. 13, 2009 | Project No: 09-194

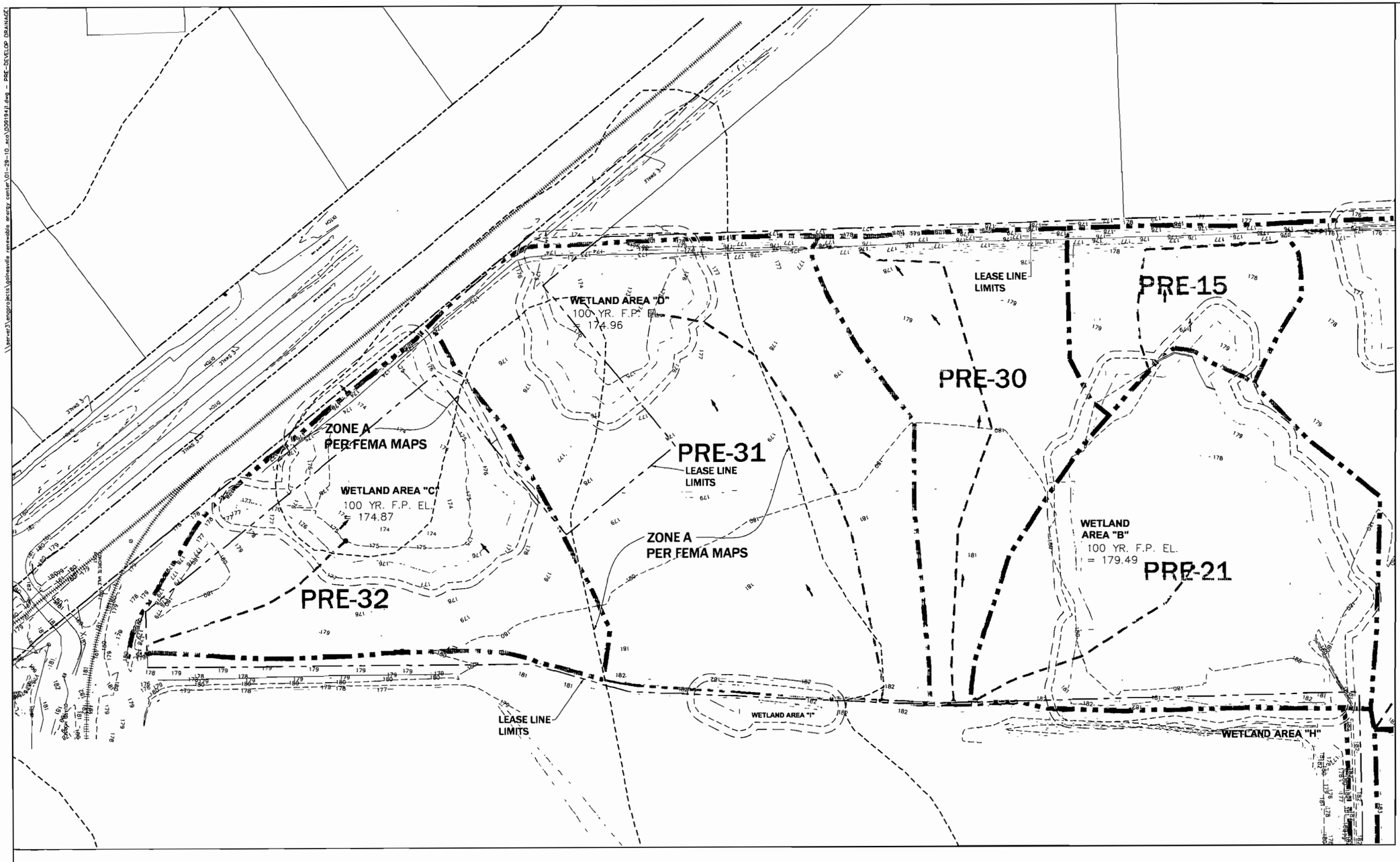
Professional Engineer of Record:

Claudia S. Vega, P.E. — 51532
Engineer — Certificate No.

Sheet No.:
C0.62

Plotted Jan 27, 2010 - 14:57:32 - Joyce Rocks

\\server2\vegaprojects\gainesville renewable energy center\01-29-10 asd\0091841.dwg - PRE-DEVELOP DRAINAGE



LEGEND

- 183 — EXISTING CONTOUR ELEVATION
- PRE-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 100'
100 50 0 100
GRAPHIC SCALE

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Project: GAINESVILLE RENEWABLE ENERGY CENTER
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CITY OF GAINESVILLE, FLORIDA

Sheet title: PRE-DEVELOPMENT DRAINAGE AREAS
SHEET 1 of 3

Project phase: STATE CERTIFICATION
Designed: CSV/CAP Drawn: JVR
Project No: 09-194 Date: NOV. 13, 2009

Professional Engineer of Record:
Claudia S. Vega, P.E. 51532
Engineer Certificate No.

Sheet No.: C2.00

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\\server3\engprojects\gainesville renewable energy center\01-29-10_sca\D0919411.dwg - PRE-DEVELOP DRAINAGE2

PRE-11

PRE-13

PRE-12

PRE-10

PRE-14

PRE-20

LEASE LINE LIMITS

ZONE A PER FEMA MAPS

WETLAND AREA "J"

WETLAND AREA "A1"
100 YR. F.P./ EL.
= 177.54

WETLAND AREA "E"

LEASE LINE LIMITS

WETLAND AREA "F"

WETLAND AREA "A2"
100 YR. F.P. EL.
= 176.60

WETLAND AREA "G"

WETLAND AREA "B"

WETLAND AREA "H"

LEASE LINE LIMITS

ELECTRIC VAULT

TIE TO C2.02 (SHEET 3 of 3)

TIE TO C2.00 (SHEET 1 of 3)

LEGEND

- EXISTING CONTOUR ELEVATION
- PRE-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: PRE-DEVELOPMENT DRAINAGE AREAS
SHEET 2 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR | Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega, P.E. — Engineer — 51532 Certificate No.

Sheet No.: C2.01

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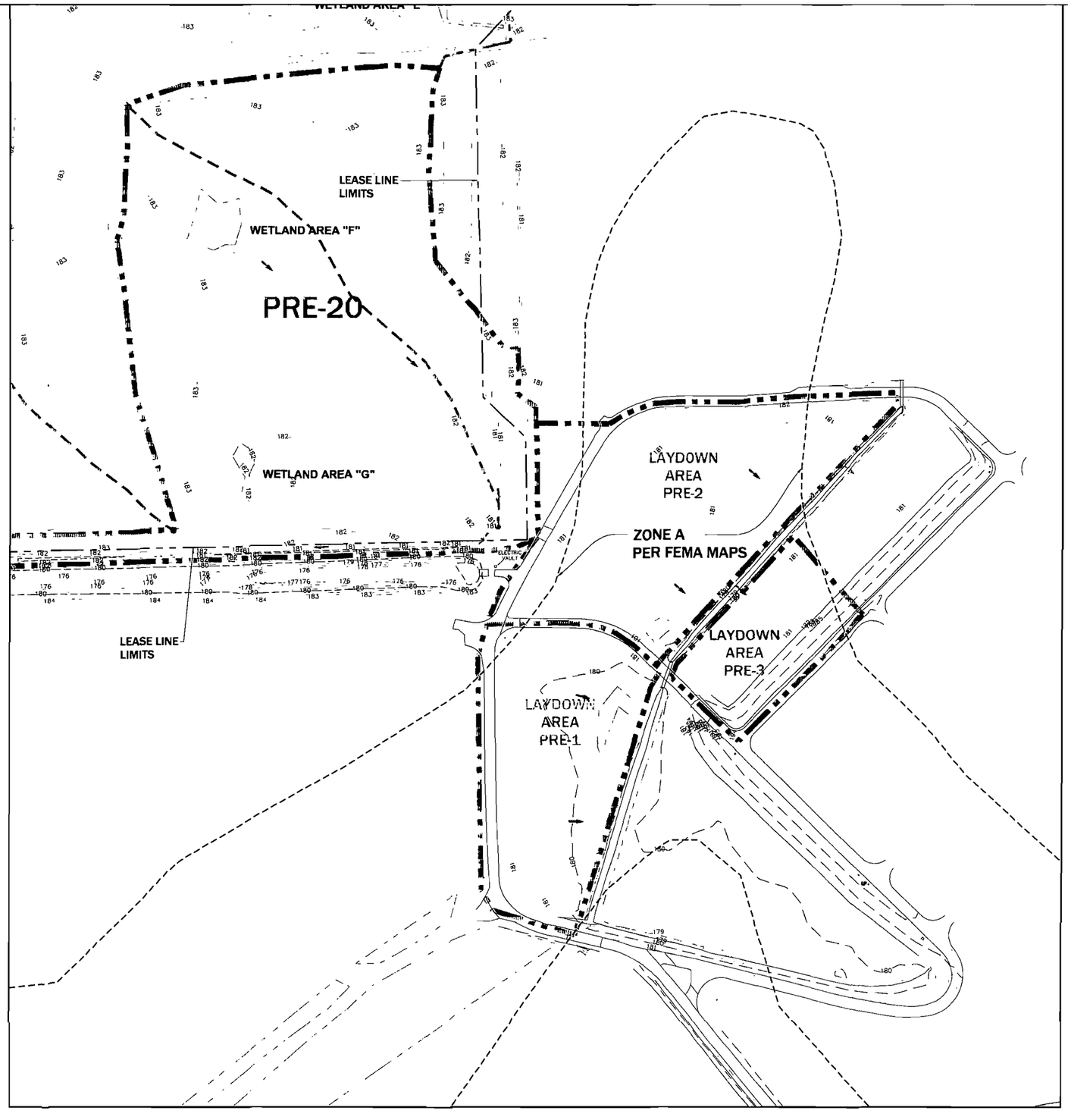
\\server3\projects\gainesville renewable energy center\01-29-10_acs\D0919411.dwg - PRE-DEVELOP DRAINAGE3

TIE TO C2.01 (SHEET 2 of 3)



LEGEND

- 183 — EXISTING CONTOUR ELEVATION
- PRE-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 100'
100 50 0 100
GRAPHIC SCALE

ENG, DENMAN & ASSOCIATES, INC.
ENGINEERS · SURVEYORS · PLANNERS
EB 5268
2404 N.W. 43rd ST. GAINESVILLE, FLORIDA 32606-6603
TEL. (352) 373-3541 · FAX (352) 373-7268
E-MAIL: bob@denman.net

Project phase: STATE CERTIFICATION
Designed: CSV/CAP | Drawn: JVR
Project No: 09-194 | Date: NOV. 13, 2009
Professional Engineer of Record:
Claudia S. Vera P.E. | 51833
Engineer | Certificate No.

Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: PRE-DEVELOPMENT DRAINAGE AREAS
SHEET 3 of 3

Sheet No.: C2.02

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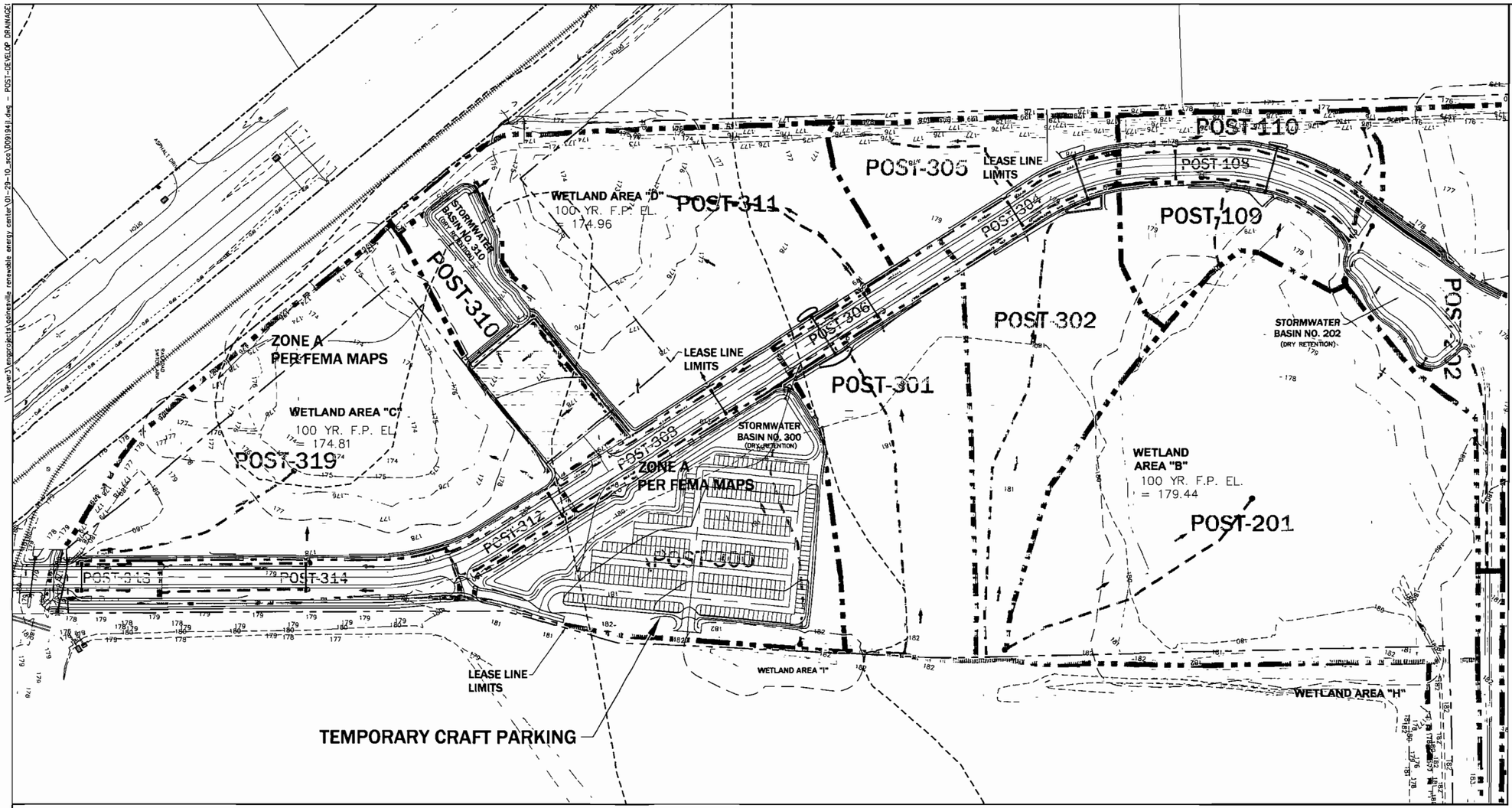

LEGEND

- 183 — EXISTING CONTOUR ELEVATION
- POST-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

ENG, DENMAN & ASSOCIATES, INC.
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TEL. (352) 373-3541 FAX: (352) 373 7549
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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: POST-DEVELOPMENT DRAINAGE AREAS
SHEET 1 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR | Date: NOV. 13, 2009

Project No: 09-194

Professional Engineer of Record:

Claudia S. Vega, P.E. — Engineer

51532 — Certificate No.

Sheet No.: C2.03

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\\server3\engprojects\gainesville renewable energy center\01-29-10_sca\D09194ll.dwg - POST-DEVELOP DRAINAGE

\\server3\engprojects\gainesville renewable energy center\01-29-10_eca\009194\dwg — POST-DEVELOP DRAINAGE2

NW 128TH LANE

POST-104

ZONE A
PER FEMA MAPS

POST-103

LEASE LINE
LIMITS

STORMWATER
BASIN NO. 102
(WET DETENTION)

STORMWATER
BASIN NO. 101
(WET DETENTION)

STORMWATER
BASIN NO. 100
(WET DETENTION)

POST-106

WETLAND AREA "A1"
100 YR. F.P. EL.
= 177.26

POST-105

LEASE LINE
LIMITS

POST-100

POST-101

PROPOSED PLANT
(SEE ZACHRY PLANS FOR DETAILS)

WETLAND AREA "A2"
100 YR. F.P. EL.
= 176.51

POST-102

POST-202

WETLAND AREA "B"

STORMWATER
BASIN NO. 202
(DRY RETENTION)

WETLAND AREA "H"

POST-200

LEASE LINE
LIMITS

TIE TO C2.05 (SHEET 3 of 3)

TIE TO C2.03 (SHEET 1 of 3)

LEGEND

- 183 — EXISTING CONTOUR ELEVATION
- POST-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

ENG. DENHAM & ASSOCIATES, INC.
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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: POST-DEVELOPMENT DRAINAGE AREAS
SHEET 2 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR | Date: NOV. 13, 2009

Project No. 09-194

Professional Engineer of Record:

Claudia S. Vega P.E. 51532
Engineer Certificate No.

Sheet No.:

C2.04

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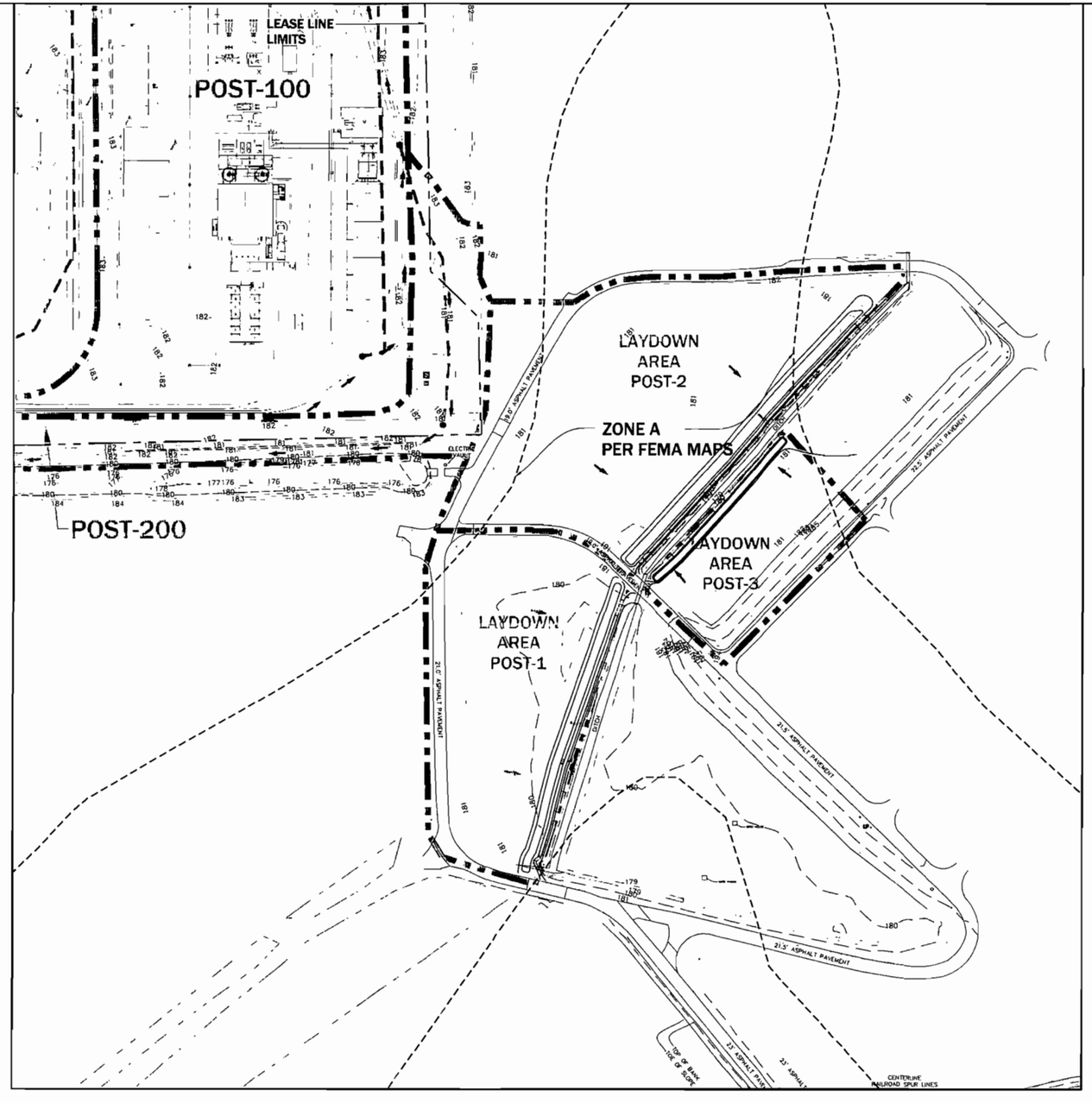
\\server3\engprojects\gainesville renewable energy center\01-29-10_eco\000194jl.dwg - POST-DEVELOP DRAINAGE3

TIE TO C2.04 (SHEET 2 of 3)



LEGEND

- 183 — EXISTING CONTOUR ELEVATION
- POST-DEVELOPMENT DRAINAGE AREAS
- EXISTING ZONE A LIMITS PER FEMA MAPS
- TIME OF CONCENTRATION
- DRAINAGE PATTERN

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 100'

100 50 0 100

GRAPHIC SCALE

ENG, DENMAN & ASSOCIATES, INC.
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3404 N.W. 43rd ST., GAINESVILLE, FLORIDA 32606-6602
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E-MAIL: eda@atlantic.net

Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: POST-DEVELOPMENT DRAINAGE AREAS
SHEET 3 of 3

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR

Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega, P.E. — 51332
Engineer — Certificate No.

Sheet No.: C2.05

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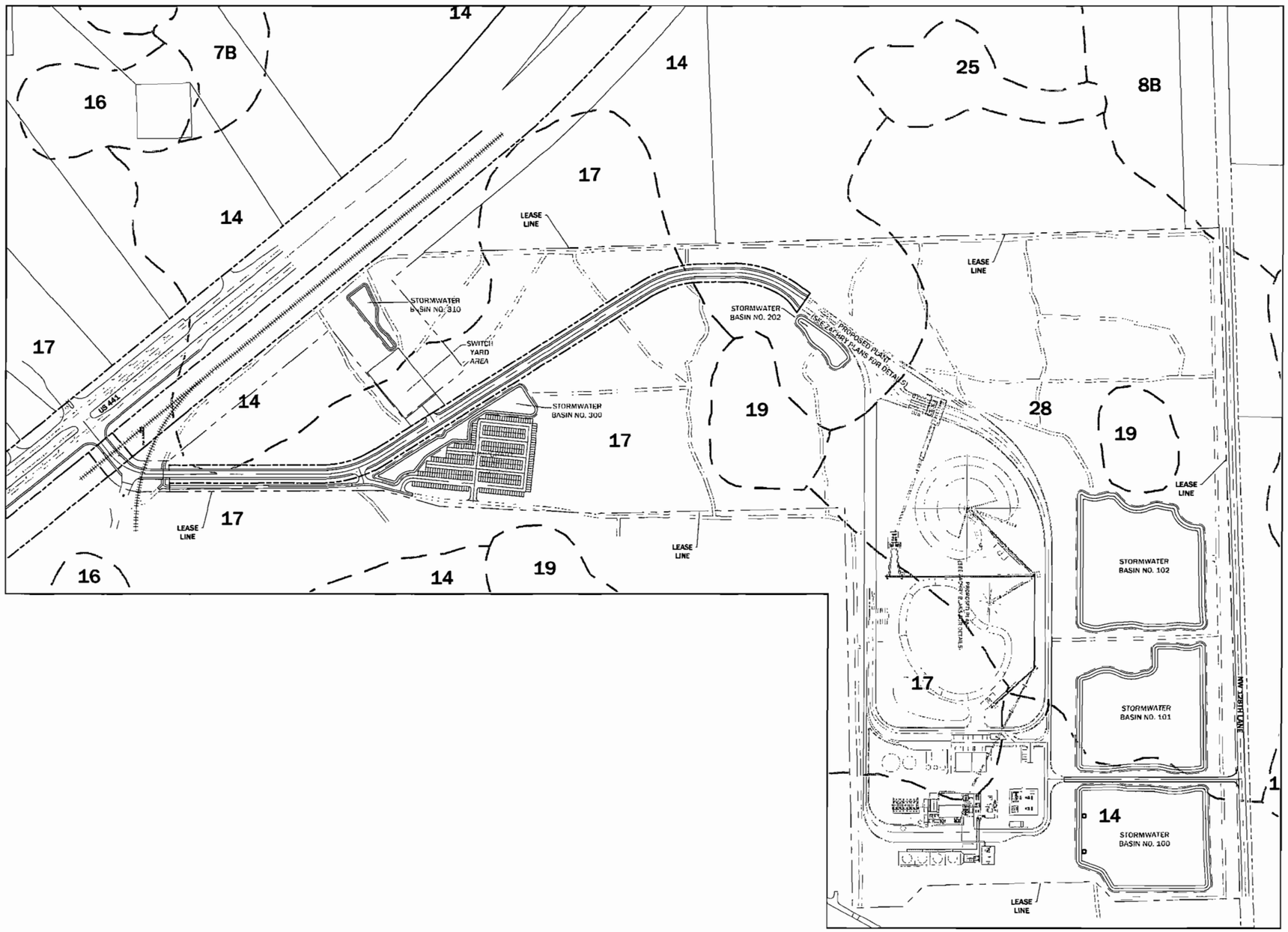

SOILS LEGEND

7B	=	KANAPAHA SAND
8B	=	MILLHOPPER SAND
14	=	POMONA SAND
16	=	SURRENCY SAND
17	=	WAUCHULA SAND
19	=	MONTEOCHA LOAMY SAND
25	=	POMONA SAND, DEPRESSIONAL
28	=	CHIPLEY SAND

LEGEND

EXISTING SOILS BOUNDARIES

NORTH

SCALE: 1" = 200'

200 100 0 200

GRAPHIC SCALE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

ENG, DENMAN & ASSOCIATES, INC.
ENGINEERS · SURVEYORS · PLANNERS
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3404 N.W. 43rd ST. Gainesville, FLORIDA 32606-6602
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Project:
GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title:
SOILS MAP

Project phase:
STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR | Date: NOV. 13, 2009

Project No: 09-194

Professional Engineer of Record:

Claudia S. Vega P.E. — Engineer — Certificate No. 51332

Sheet No.:
C2.10

\\server3\engprojects\gainesville renewable energy center\01-29-10_eco\09194fl.dwg — SOILS MAP
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Plotted Jan 27, 2010 - 14:57:32 - Joyce Rocks

LEGEND

- PROPOSED PERMANENT 6' CHAINLINK FENCE
- PROPOSED DBL. SILT FENCE w/4' TEMP. CHAINLINK FENCE
- PROPOSED SILT FENCE
- LIMITS OF ASPHALT PAVEMENT

WETLAND AREA "C"

STORMWATER BASIN NO. 300

EXISTING STABILIZED ROADWAY

WETLAND AREA "I"

NORTH

SCALE: 1" = 30'

30 15 0 30

GRAPHIC SCALE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

ENG. DENHAM & ASSOCIATES, INC.
ENGINEERS - SURVEYORS - PLANNERS
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TEL (352) 375-3341 FAX (352) 373-7249
E-MAIL: edadenham@aol.com

Project:
GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title:
TEMPORARY CRAFT PARKING
PAVING, GRADING AND DRAINAGE PLAN

Project phase:
STATE CERTIFICATION

Designed: CSV/CAP Drawn: JVR

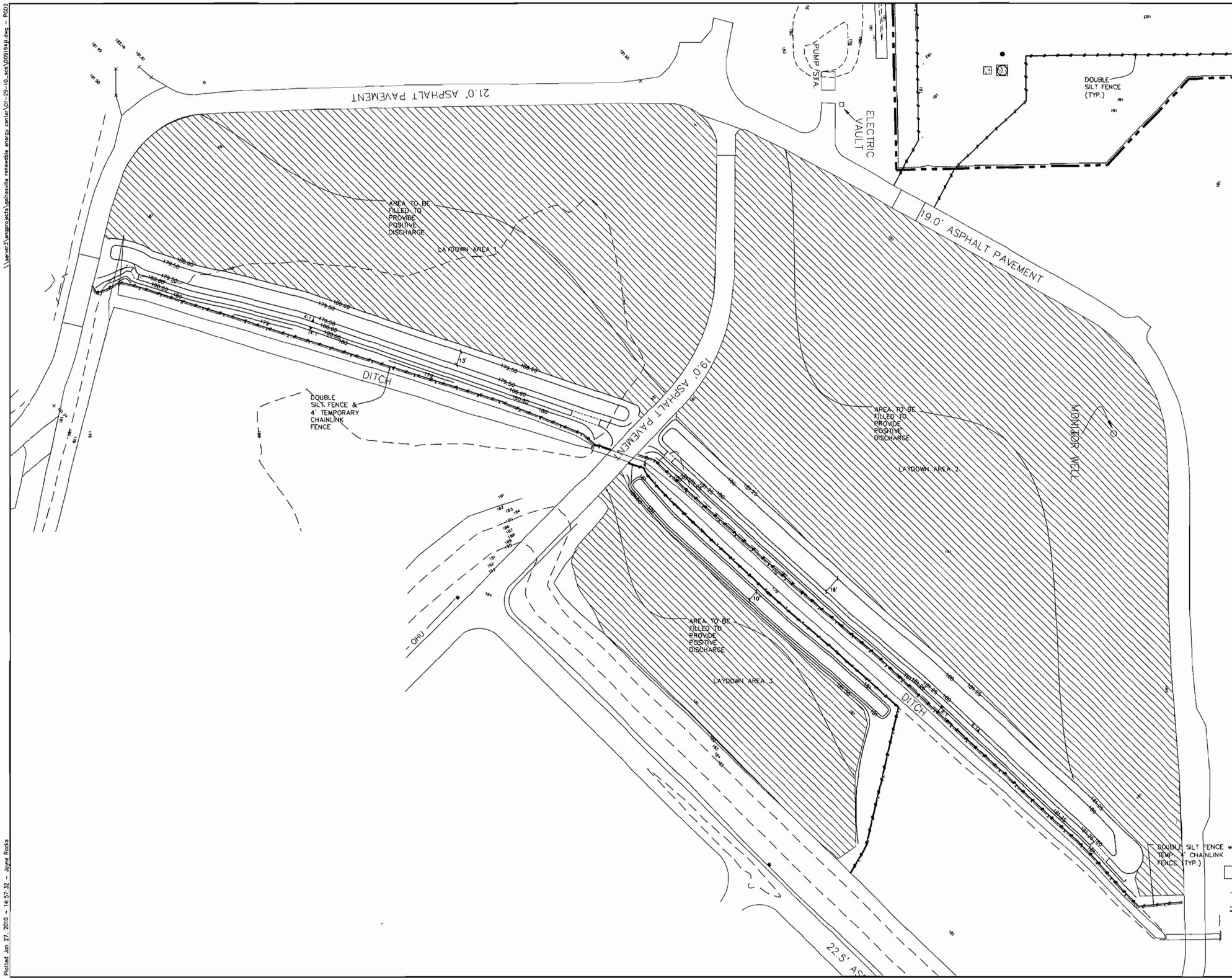
Project No: 09-194 Date: NOV 13, 2009

Professional Engineer of Record:

Claudia S. Vega, P.E. 51532
Engineer Certificate No.

Sheet No.:
C2.20

\\server3\vegaprojects\gainesville renewable energy center\01-29-10_sca\009184jl.dwg - PG02



No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 40'

40 20 0 40

GRAPHIC SCALE

ENG. DENMAN & ASSOCIATES, INC.
ENGINEERS - SURVEYORS - PLANNERS
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2404 N.W. 43rd ST., GAINESVILLE, FLORIDA 32606-6667
TEL: (352) 373-3541 FAX: (352) 373-7547
E-MAIL: eda@denmanfl.net

Project:
GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title:
LAYDOWN AREA
PAVING, GRADING AND DRAINAGE PLAN

Project phase:
STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR
Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:
Claudia S. Vega, P.E.
Engineer
51532
Certificate No.

Sheet No.:
C2.21

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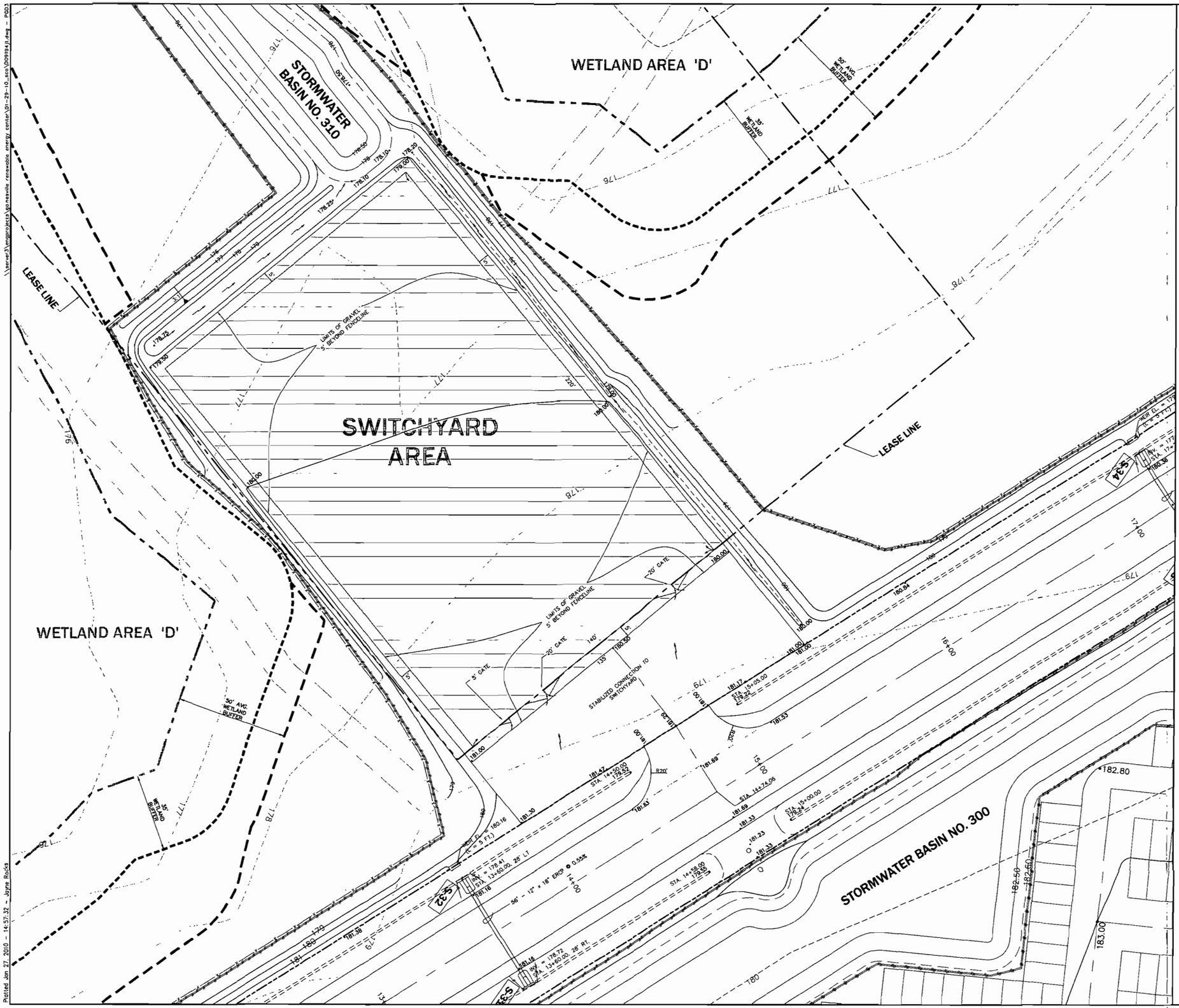
\\server2\vegprojects\vg\e.nesville renewable energy center\01-29-10_scs\D0919491.dwg - PG01



LEGEND

- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- LIMITS OF ASPHALT PAVEMENT
- • pi20 EXISTING TREE TO REMAIN

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 20'

20 10 0 20

GRAPHIC SCALE

ENG. DENMAN & ASSOCIATES, INC.
ENGINEERS - SURVEYORS - PLANNERS
EB 2269
2404 NW 43rd ST, GAINESVILLE, FLORIDA 32606-6402
TEL. (352) 373-2541 FAX. (352) 373-7268
E-MAIL: eda@atlantic.net

Project:
GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title:
SWITCHYARD
PAVING, GRADING AND DRAINAGE PLAN

Project phase:
STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR
Project No. 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

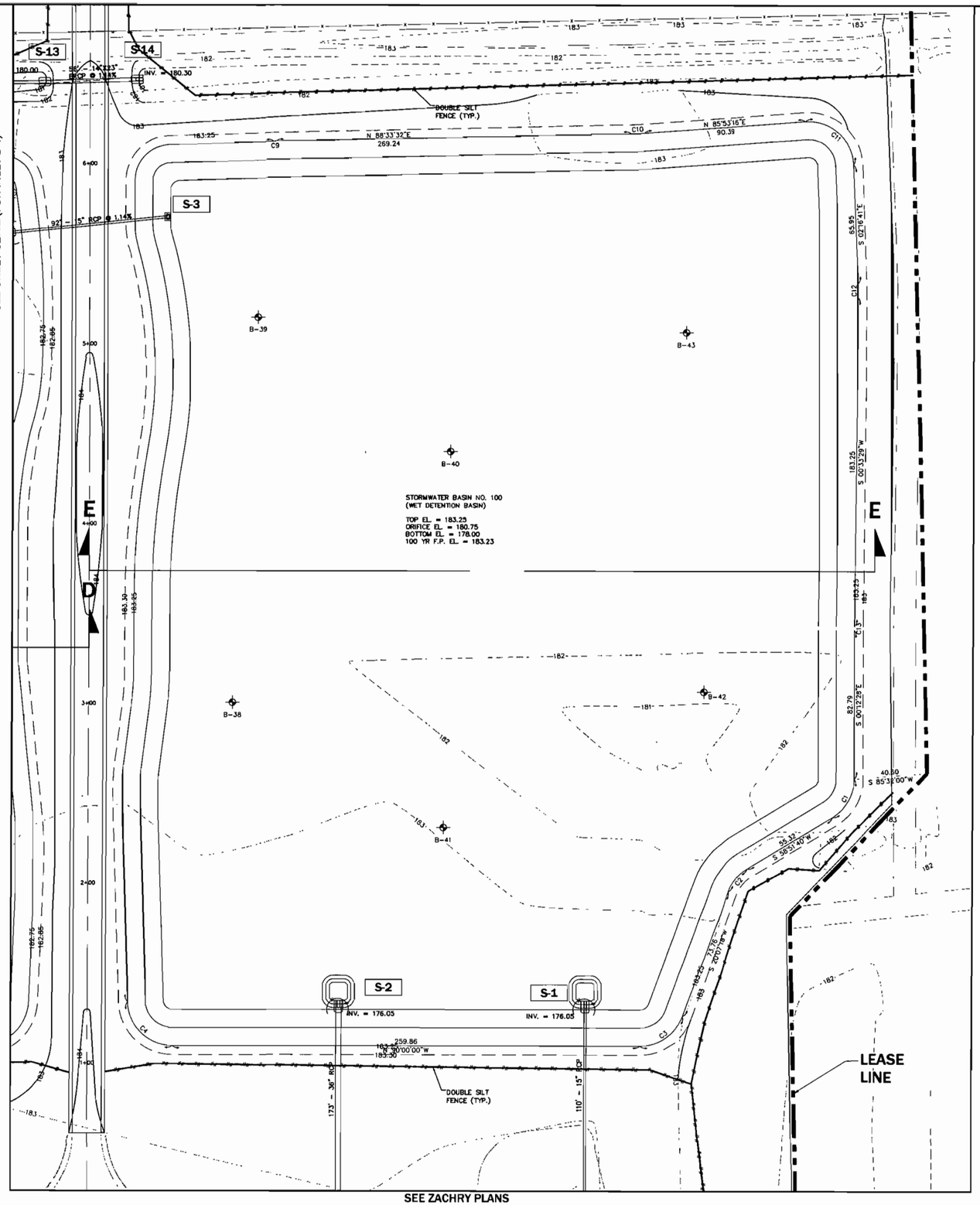
Claudia S. Vega, P.E.
Engineer

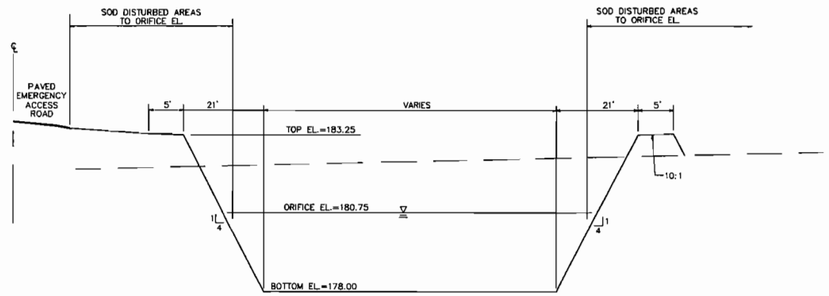
51532
Certificate No.

Sheet No.:
C2.22

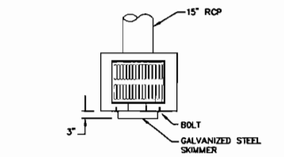
Plotted: Jan 27, 2010 - 14:57:32 - Jayne Rocks

\\server3\engprojects\gainesville renewable energy center\01-29-10_eca\D091941.dwg - BASIN 100

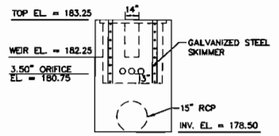




BASIN TYPICAL SECTION E - E
N.T.S.



PLAN VIEW



PROFILE VIEW

BASIN OUTFALL DETAIL (S-3)
N.T.S.

STORMWATER STRUCTURE SCHEDULE

S-1
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

S-2
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 176.05

S-3
TYPE C INLET
FDOT INDEX 232
TOP EL. = 183.25
WEIR EL. = 182.25
3.50" ORIFICE EL. = 180.75
INV. EL. = 178.50

S-4
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.50

S-13
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 180.00

S-14
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 180.20

CURVE	DELTA	RADIUS	ARC	CHORD	TANGENT	CHORD BEARING
C1	59°04'08"	25.00	25.77	24.65	14.16	N 29°19'36"E
C2	38°44'22"	25.00	16.90	16.58	8.79	S 39°29'29"W
C3	69°52'42"	25.00	30.49	28.64	17.47	N 55°03'39"E
C4	88°04'12"	25.00	38.43	34.75	24.17	S 45°57'54"E
C5	07°09'18"	150.00	18.73	18.72	9.38	S 01°38'51"W
C6	12°33'23"	500.00	109.57	109.36	55.01	N 01°03'12"W
C7	05°24'05"	150.00	14.14	14.14	7.08	S 04°37'51"E
C8	90°10'33"	25.00	39.35	35.41	25.08	S 43°09'28"W
C9	00°25'33"	150.00	1.11	1.11	0.56	S 88°27'31"W
C10	02°47'01"	150.00	7.29	7.29	3.64	N 87°16'47"E
C11	91°50'03"	25.00	40.07	35.92	25.61	N 48°11'43"W
C12	02°50'10"	150.00	7.43	7.42	3.71	N 00°51'36"W
C13	00°45'57"	150.00	2.01	2.01	1.00	S 00°10'31"W

LEGEND

- PROPOSED PERMANENT 6' CHAINLINK FENCE
- PROPOSED DBL SILT FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- B-# SOIL TESTING BORING LOCATION

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 30'
30 15 0 30
GRAPHIC SCALE

ENG. DENMAN & ASSOCIATES, INC.
ENGINEERS - SURVEYORS - PLANNERS
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2404 N.W. 43rd ST., Gainesville, FLORIDA 32606-6603
TEL. (352) 373-3541 FAX. (352) 373-7249
Email: edafl@bellsouth.net

Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

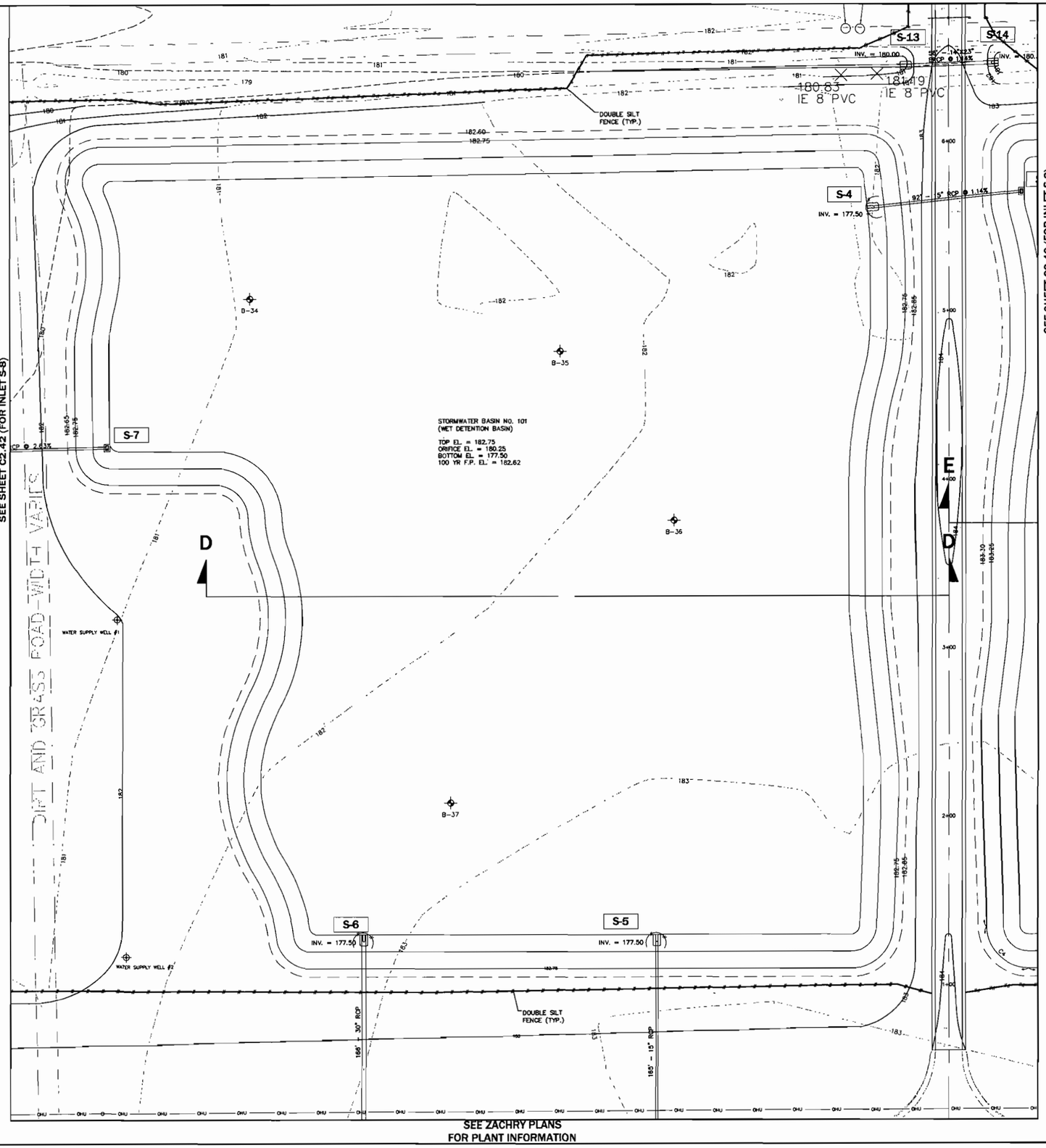
Sheet title: STORMWATER BASINS, DETAILS & CROSS-SECTIONS
BASIN NO. 100

Project phase: STATE CERTIFICATION
Designed: CSV/CAP | Drawn: JVR
Project No. 09-194 | Date: NOV. 13, 2009
Professional Engineer of Record:
Claudia S. Vega P.E. Engineer
51532 Certificate No.

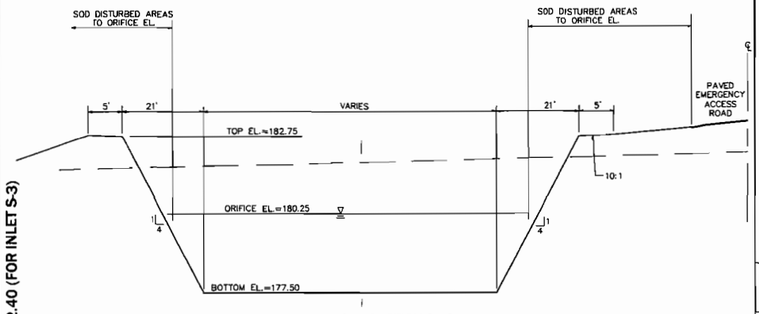
Sheet No.: C2.40

Plotted: Jan 27, 2010 - 14:57:32 - Joyce Rocca

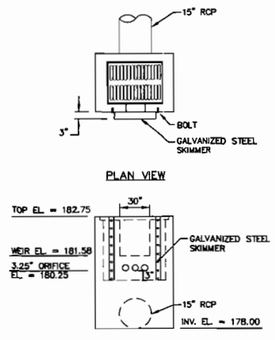
\\server3\engprojects\gainesville renewable energy center\01-29-10_eco\009194\1.dwg — BASIN 101



SEE SHEET C2.40 (FOR INLET S-3)



BASIN TYPICAL SECTION D - D
N.T.S.



BASIN OUTFALL DETAIL (S-7)
N.T.S.

STORMWATER STRUCTURE SCHEDULE

S-3
TYPE C INLET
FDOT INDEX 232
TOP EL. = 183.25
WEIR EL. = 182.25
3.50" ORIFICE EL. = 180.75
INV. EL. = 178.50

S-4
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.50

S-5
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.50

S-6
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.50

S-7
TYPE C INLET
FDOT INDEX 232
TOP EL. = 182.75
WEIR EL. = 181.58
3.25" ORIFICE EL. = 180.25
INV. EL. = 178.00

S-8
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 175.50

S-13
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 180.00

S-14
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 180.20

LEGEND

- PROPOSED DBL SILT FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- B-# SOIL TESTING BORING LOCATION

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 30'
30 15 0 30
GRAPHIC SCALE

ENG. DENHAM & ASSOCIATES, INC.
ENGINEERS · SURVEYORS · PLANNERS
EB 2391
2404 N.W. 43rd ST., GAINESVILLE, FLORIDA 32606-6603
TEL. (352) 377-2440 FAX (352) 378-2481
E-MAIL: eda@atlantic.net

Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: STORMWATER BASINS, DETAILS & CROSS-SECTIONS
BASIN NO. 101

Project phase: STATE CERTIFICATION
Designed: CSV/CAP Drawn: JAR
Project No: 09-194 Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega, P.E. Engineer
51532 Certificate No.

Sheet No.:
C2.41

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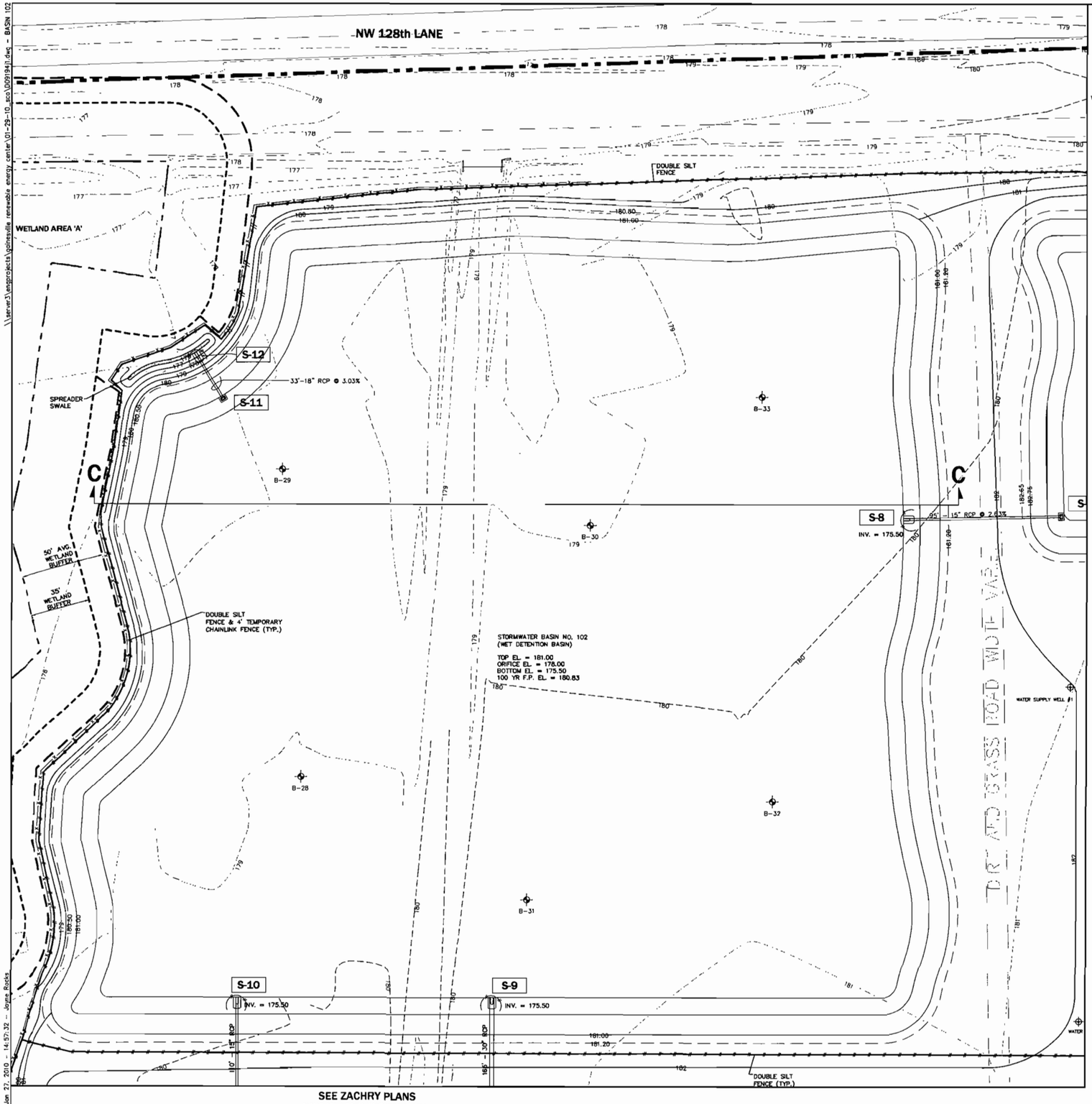
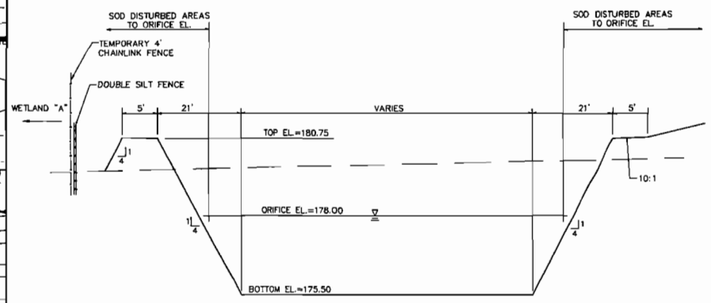
\\server3\engprojects\gainesville renewable energy center\01-29-10_sco\0091941.dwg - BASIN 102

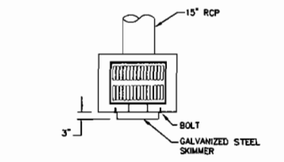


SEE ZACHRY PLANS FOR PLANT INFORMATION

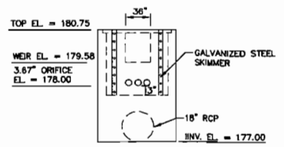
SEE SHEET C2.41 (FOR INLET S-7)



BASIN TYPICAL SECTION C - C
N.T.S.

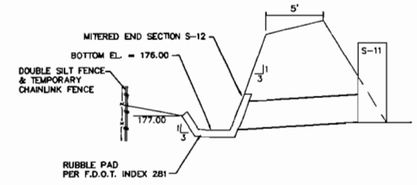


PLAN VIEW



PROFILE VIEW

BASIN OUTFALL DETAIL (S-11)
N.T.S.



SPREADER SWALE CROSS-SECTION
N.T.S.

STORMWATER STRUCTURE SCHEDULE

S-7
TYPE C INLET
FDOT INDEX 232
TOP EL. = 182.75
WEIR EL. = 181.58
3.25" ORIFICE EL. = 180.25
INV. EL. = 178.00

S-8
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 175.50

S-9
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 175.50

S-10
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 175.50

S-11
TYPE C INLET
FDOT INDEX 232
TOP EL. = 180.75
WEIR EL. = 179.58
3.67" ORIFICE EL. = 178.00
INV. EL. = 177.50

S-12
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 176.00

LEGEND

- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- B-# SOIL TESTING BORING LOCATION

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 30'
30 15 0 30
GRAPHIC SCALE

ENG, DENMAN & ASSOCIATES, INC.
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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: STORMWATER BASINS, DETAILS & CROSS-SECTIONS
BASIN NO. 102

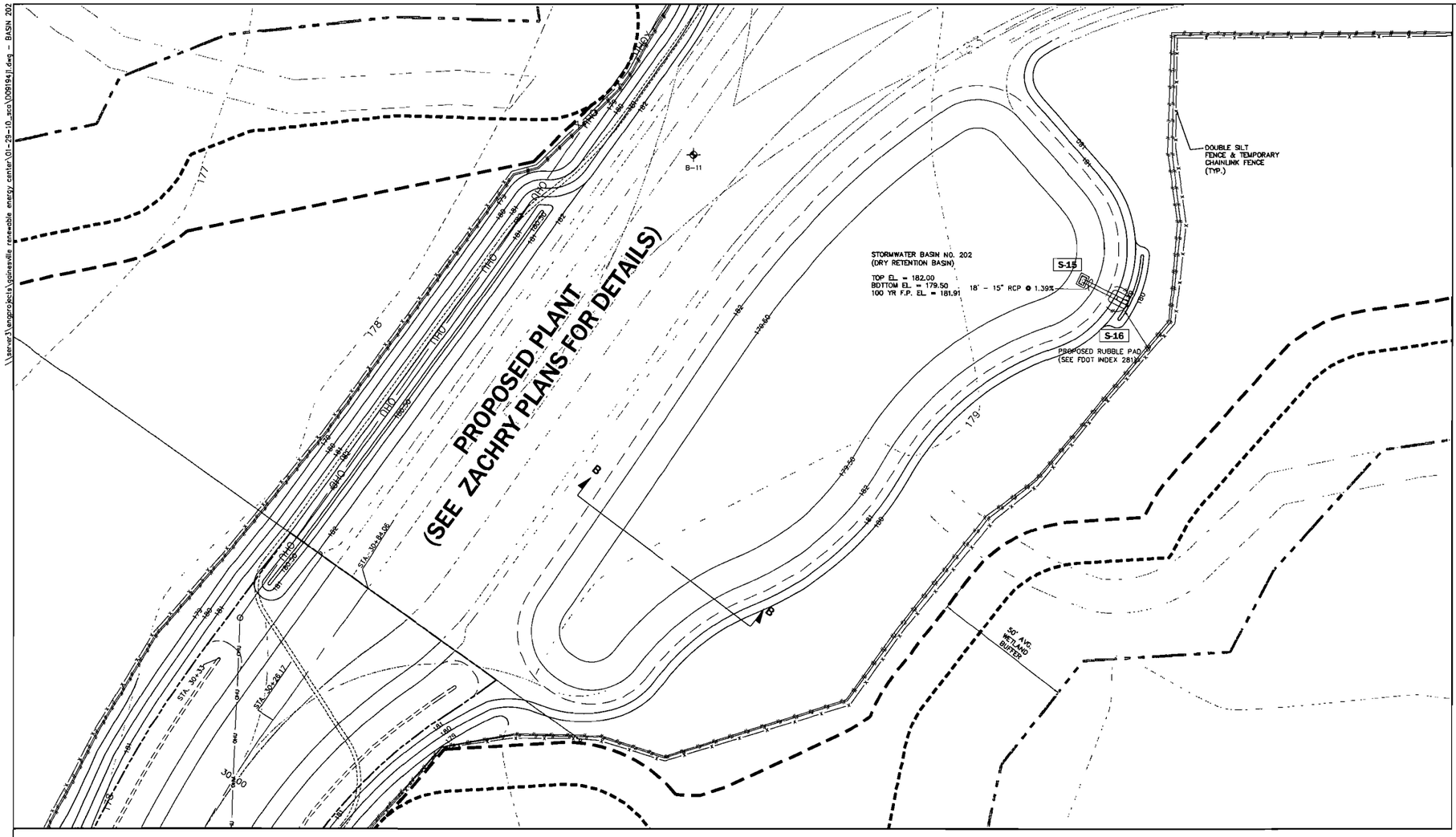
Project phase: STATE CERTIFICATION
Designed: CSV/CAP
Drawn: JVR
Project No: 09-194
Date: NOV. 13, 2009

Professional Engineer of Record:
Claudia S. Vega P.E. 51332
Engineer Certificate No.

Sheet No.: C2.42

Plotted Jan 27, 2010 - 14:57:32 - Joyce Rocks

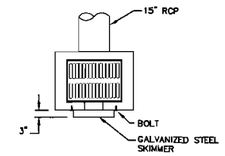
\\server1\engprojects\gainesville renewable energy center\01-23-10_acad\0091941.dwg - BASIN 202



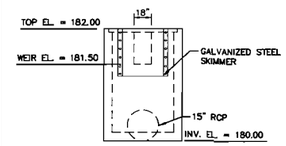
STORMWATER STRUCTURE SCHEDULE

S-15
TYPE C INLET
FDOT INDEX 232
TOP EL. = 182.00
WEIR EL. = 181.50
INV. EL. = 180.00

S-16
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 179.75

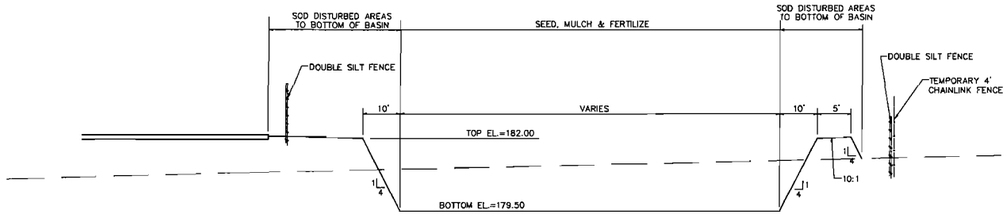


PLAN VIEW

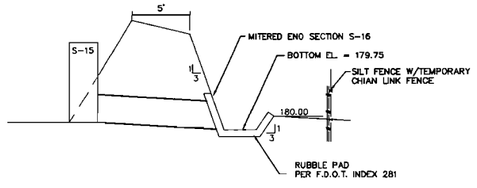


PROFILE VIEW

BASIN OUTFALL DETAIL (S-15)
N.T.S.



BASIN TYPICAL CROSS-SECTION B - B
N.T.S.



SPREADER SWALE CROSS-SECTION
N.T.S.

LEGEND

- PROPOSED PERMANENT 6' CHAINLINK FENCE
- PROPOSED DBL SILT FENCE W/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- B-# SOIL TESTING BORING LOCATION

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 20'
20 10 0 20
GRAPHIC SCALE

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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: STORMWATER BASINS, DETAILS & CROSS-SECTIONS
BASIN NO. 202

Project phase: STATE CERTIFICATION
Designed: CSV/CaP | Drawn: JVR | Date: NOV. 13, 2009
Project No: 09-194
Professional Engineer of Record:
Claudia S. Vega P.E. Engineer
51332 Certificate No.

Sheet No.: C2.43

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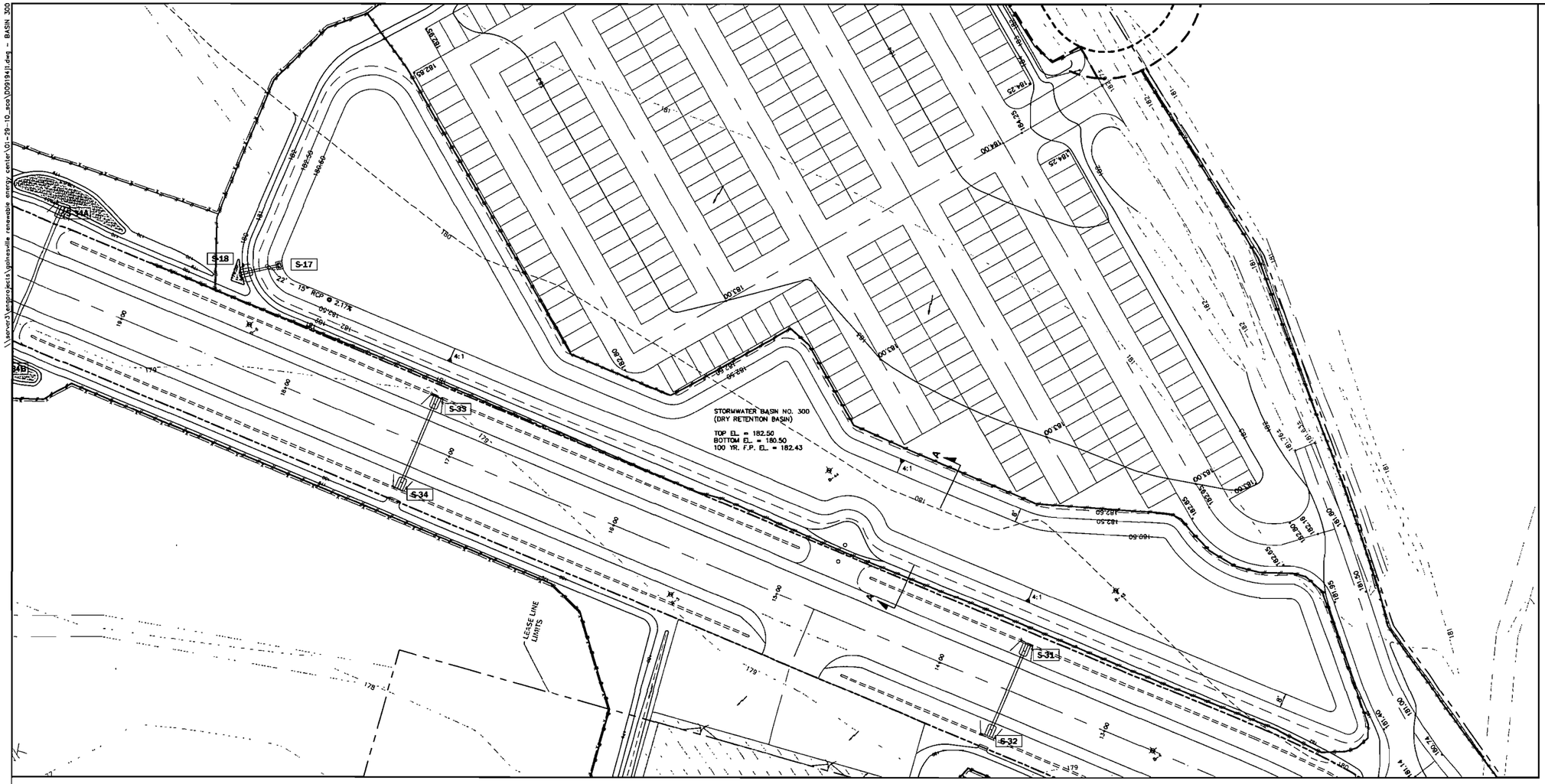
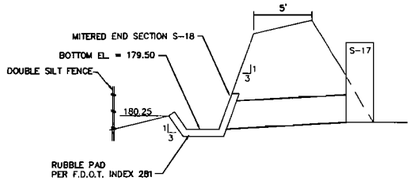


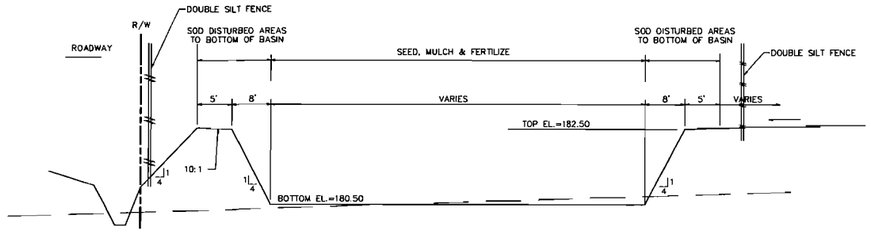
STORMWATER STRUCTURE SCHEDULE

S-17
TYPE C INLET
FDOT INDEX 232
TOP EL. = 182.50
WEIR EL. = 181.95
INV. EL. = 180.00

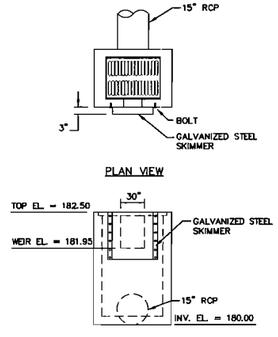
S-18
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 179.50



SPREADER SWALE CROSS-SECTION
N.T.S.



BASIN TYPICAL CROSS-SECTION A - A
N.T.S.



BASIN OUTFALL DETAIL (S-17)
N.T.S.

LEGEND

- PROPOSED PERMANENT 6' CHAINLINK FENCE
- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- B-# SOIL TESTING BORING LOCATION

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 30'
30 15 0 30
GRAPHIC SCALE

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BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

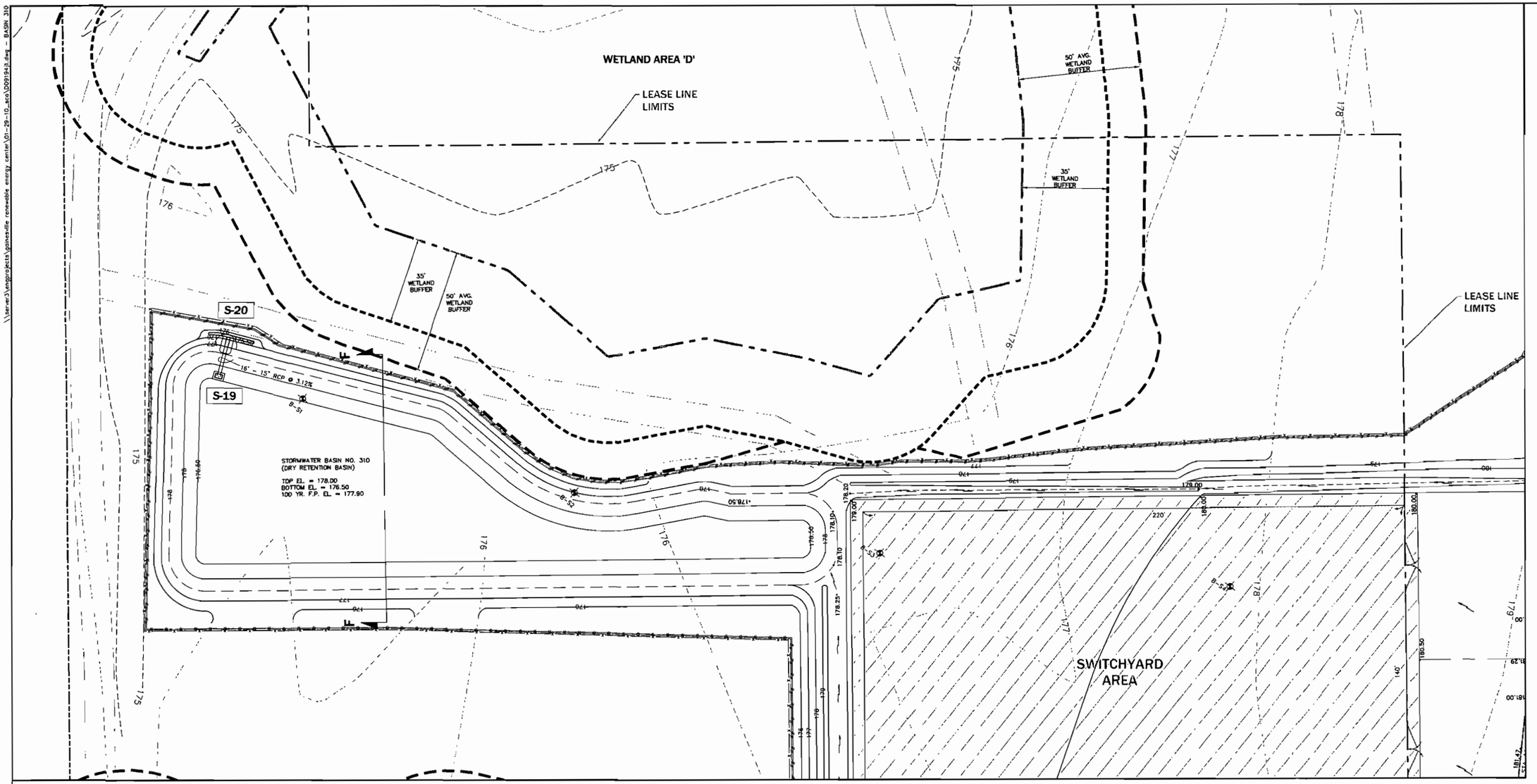
Sheet title: STORMWATER BASINS, DETAILS & CROSS-SECTIONS
BASIN NO. 300

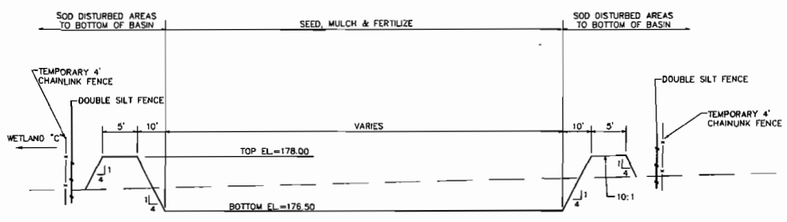
Project phase: STATE CERTIFICATION
Designed: CSV/CAP
Drawn: JVR
Project No: 09-194
Date: NOV. 13, 2009
Professional Engineer of Record:
Claudia S. Vega P.E. 51532
Engineer Certificate No.

Sheet No.:
C2.44

Plotted Jan 27, 2010 - 14:57:32 - Joyce Rocks
\\server2\engproject\gainesville renewable energy center\01-29-10_eca\009194lt.dwg - BASIN 300

\\server3\engprojects\gainesville renewable energy center\01-29-10_sce\0091941f.dwg — BASIN 310





BASIN TYPICAL CROSS-SECTION F - F
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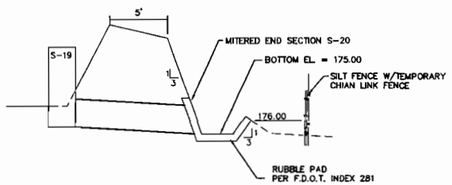
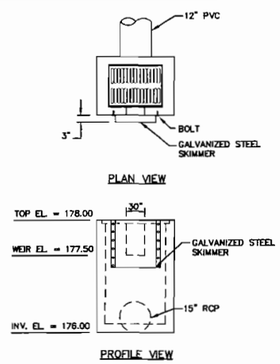


SPREADER SWALE CROSS-SECTION
N.T.S.



BASIN OUTFALL DETAIL (S-19)
N.T.S.

STORMWATER STRUCTURE SCHEDULE

S-19
TYPE C INLET
FDOT INDEX 232
TOP EL. = 178.00
WEIR EL. = 177.50
INV. EL. = 176.00

S-20
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 175.50

LEGEND

- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- B-# SOIL TESTING BORING LOCATION

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 20'
20 10 0 20
GRAPHIC SCALE

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Project:
GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title:
STORMWATER BASINS, DETAILS & CROSS-SECTIONS
BASIN NO. 310

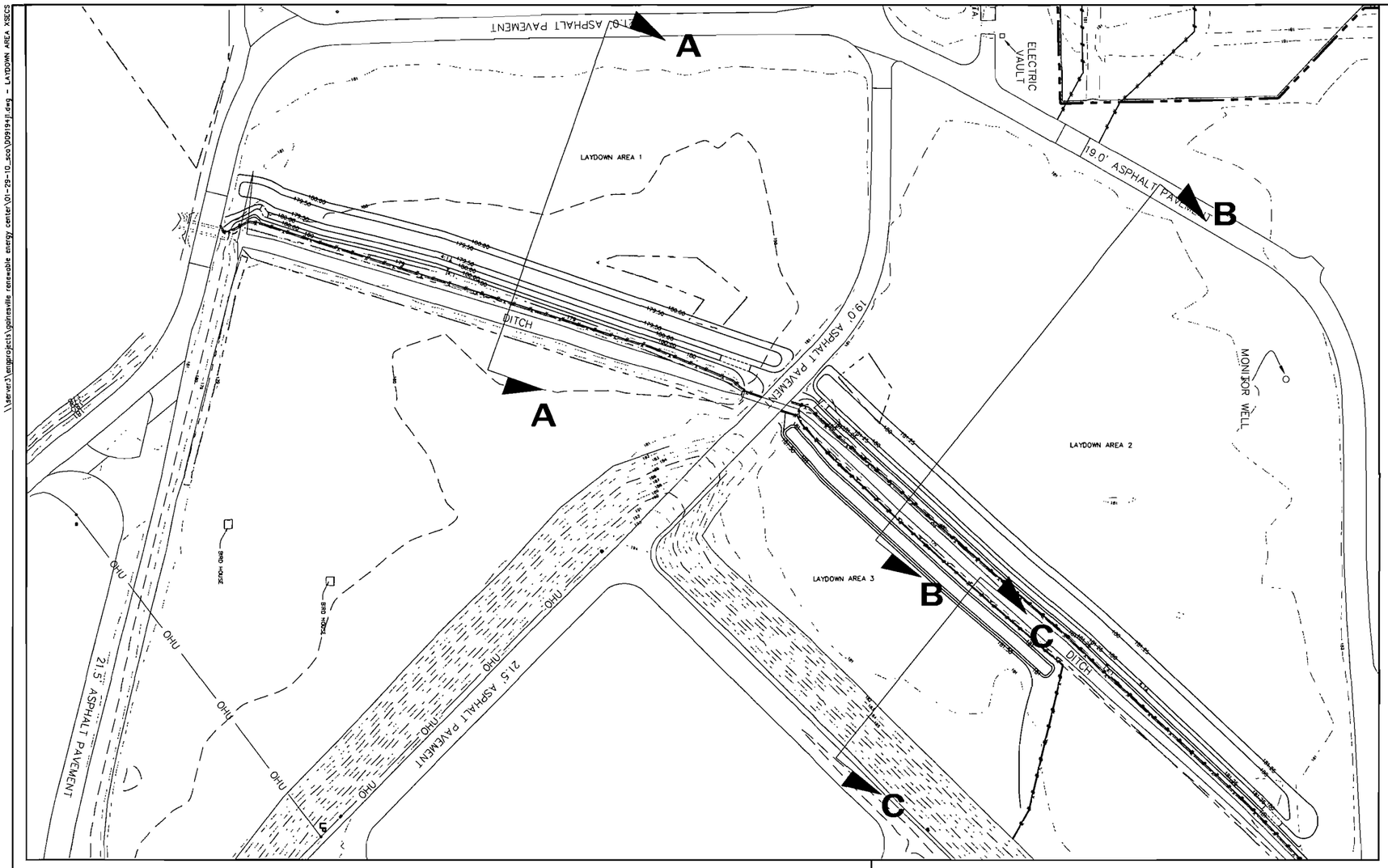
Project phase: STATE CERTIFICATION
Designed: CSV/CAP | Drawn: JVR | Date: NOV. 13, 2009
Project No: 09-194

Professional Engineer of Record:
Claudia S. Vega, P.E. 51332
Engineer | Certificate No.

Sheet No.:
C2.45

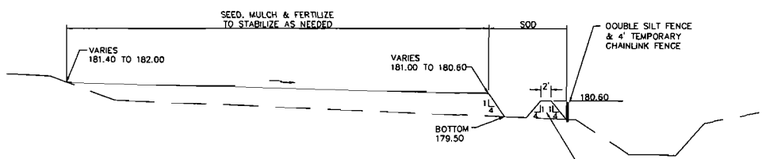
Plotted Jan 27, 2010 — 14:57:32 — Jayne Rocks

\\server3\engprojects\gainesville renewable energy center\01-29-10_sco\100919fl.dwg - LAYDOWN AREA XSECS

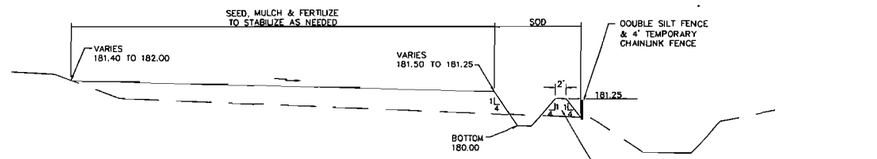


LEGEND

- PROPOSED PERMANENT 6' CHAINLINK FENCE
- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION



TYPICAL CROSS-SECTION A - A
N.T.S.



TYPICAL CROSS-SECTION B - B
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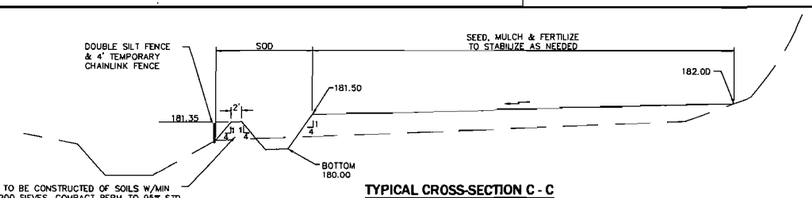

TYPICAL CROSS-SECTION C - C
N.T.S.

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 50'
50 25 0 50
GRAPHIC SCALE

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TEL. (352) 373-3541 FAX (352) 373-7249
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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: LAYDOWN AREA
TYPICAL CROSS-SECTIONS

Project phase: STATE CERTIFICATION
Designed: CSV/CAP
Drawn: JVR
Project No: 09-194
Date: NOV. 13, 2009
Professional Engineer of Record:
Claudia S. Vega, P.E. Engineer
51532 Certificate No.

Sheet No.:
C2.46

Plotted Jan 27, 2010 - 14:57:32 - Joyce Rocks

\\server1\engpro\pcts\gainesville energy center\01-29-10_sco\009194[1].dwg — SPPP

THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) MAY BE MODIFIED AND UPDATED DURING CONSTRUCTION AS A RESULT OF WEATHER, UNPREDICTABLE EVENTS AND SITE INSPECTIONS.

THIS DOCUMENT WAS PREPARED IN ORDER TO BE IN COMPLIANCE WITH CHAPTER 62-621.300 (4) OF THE FLORIDA ADMINISTRATIVE CODE, WHICH PERTAINS TO THE GENERIC PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES. THE ADMINISTRATIVE CODE GRANTS THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) THE AUTHORITY TO REGULATE POINT SOURCE DISCHARGES OF STORM-WATER FROM CONSTRUCTION SITES. THIS DOCUMENT ESTABLISHES A STORMWATER POLLUTION PREVENTION PLAN FOR THE SITE AND IS ORGANIZED TO CORRESPOND TO PART V OF DEP DOCUMENT No. 62-621.300 (4) (A) FDEP FORM 62-281.300 (4) (B) IS TO BE SUBMITTED IN CONJUNCTION WITH THIS DOCUMENT.

I. PROJECT INFORMATION:

PROJECT: GAINESVILLE RENEWABLE ENERGY CENTER (GREC)
BIOMASS GENERATING FACILITY
COUNTY: ALACHUA
SECTION/TOWNSHIP/RANGE: S 27 , T 8 SOUTH, R 19 EAST
COUNTY PARCEL NO.: A PORTION OF 05884-001-000
LATITUDE AND LONGITUDE: 29°46'07", 82°23'53"
STREET ADDRESS: 10001 N.W. 13th STREET
PROJECT AREA: 134 Ac.
APPROXIMATE AREA TO BE DISTURBED BY CONSTRUCTION: 76 Ac.

II. SITE DESCRIPTION:

1. THE PROJECT INCLUDES THE CONSTRUCTION OF A BIOMASS ELECTRIC GENERATING FACILITY IN CONJUNCTION WITH GAINESVILLE REGIONAL UTILITIES WITH ASSOCIATED PAVING, DRAINAGE AND UTILITY IMPROVEMENTS.

   THE PROPOSED STORMWATER SYSTEM PROVIDES WATER QUALITY, AND FLOOD CONTROL.

2. THE SOIL CONDITIONS WERE INVESTIGATED AND SUMMARIZED IN THE SOILS REPORT PREPARED BY GSE. THE PROPOSED DRAINAGE PLAN WILL CONSIST OF 3 MAJOR DRAINAGE AREAS.

3. EXISTING AND FUTURE DRAINAGE PATTERNS ARE SHOWN ON THE DRAINAGE PLAN FOR PRE-DEVELOPMENT CONDITIONS AND POST-DEVELOPMENT CONDITIONS. OUTFALLS, AND STORMWATER BASINS ARE SHOWN IN THE DRAINAGE PLAN AND THE DETAIL PLAN.

4. SEQUENCE OF CONSTRUCTION:

   A. PRIOR TO CONSTRUCTION, SILT FENCING AND TREE PROTECTION BARRICADES SHALL BE INSTALLED AND ALL EXISTING DRAINAGE STRUCTURES SHALL BE PROTECTED IN ACCORDANCE WITH FDOT INDEX #102.

   B. THE CONSTRUCTION ENTRANCE WILL BE STABILIZED TO MINIMIZE THE CREATION OF DUST AND OFF SITE TRACKING OF SEDIMENTS.

   C. THE SITE SHALL BE CLEARED AND GRUBBED OF UNDESIRABLE VEGETATION.

   D. THE UNDERGROUND UTILITIES AND STORMWATER PIPING WILL BE INSTALLED AND CONNECTED TO EXISTING STRUCTURES, WHERE APPLICABLE.

   E. THE SITE WILL BE ROUGHLY GRADED. IF SUITABLE, THE EXCAVATED MATERIAL MAY BE USED AS FILL FOR ON-SITE GRADING. THE ROADWAYS SHALL BE GRADED.

   F. THE STORMWATER BASINS SHALL BE CONSTRUCTED AS FOLLOWS:

      1. INITIALLY CONSTRUCT THE WET DETENTION AND DRY RETENTION BASINS TO ROUGH GRADE BY UNDER-EXCAVATING THE BASIN BOTTOM AND SIDES BY APPROXIMATELY 12 INCHES.

      2. AFTER THE ROADWAY AND SIDE SWALES HAVE BEEN GRADED, THE INTERIOR SIDE SLOPES AND BASIN BOTTOM SHALL BE EXCAVATED TO FINAL DESIGN SPECIFICATIONS. THE EXCESS SOIL AND UNDESIRABLE MATERIAL MUST BE CAREFULLY EXCAVATED AND REMOVED FROM THE BASINS SO THAT ALL ACCUMULATED SILTS, CLAYS, ORGANICS, AND OTHER FINE SEDIMENT MATERIAL HAS BEEN REMOVED FROM THE BASIN AREA. THE EXCAVATED UNSUITABLE MATERIAL SHALL BE DISPOSED OF AND TAKEN OFF-SITE.

      3. ONCE THE BASINS HAVE BEEN EXCAVATED TO FINAL GRADE, THE ENTIRE BASIN BOTTOM MUST BE DEEP RAKED AND LOOSENED FOR OPTIMAL INFILTRATION.

      4. THE BASINS SHALL BE SODDED AND STABILIZED ACCORDING TO THE PLANS.

   G. ROADWAYS AND PARKING LOTS WILL BE COMPACTED AND A LIMEROCK BASE WILL BE ESTABLISHED FOLLOWED BY AN OVERLAY OF ASPHALTIC CONCRETE. BUILDINGS SHALL BE CONSTRUCTED.

   H. UPON SIGNIFICANT COMPLETION OF CONSTRUCTION, THE STORMWATER SYSTEM SHALL BE FLUSHED OUT TO REMOVE ACCUMULATED DEBRIS AND SEDIMENT.

   I. STORMWATER BASINS WILL BE SCRAPED CLEAN OF ACCUMULATED SEDIMENT.

   J. ALL DISTURBED AREAS WITHIN THE CONSTRUCTION AREA SHALL BE COMPLETELY GRASSED AND/OR LANDSCAPED. EVIDENCE OF GROWTH MUST BE PRESENT PRIOR TO REMOVAL OF SILT FENCING AND OTHER EROSION CONTROL APPLICATIONS.

III. CONTROLS:

THE CONTROLS SHALL BE IMPLEMENTED AND MAINTAINED DURING THE ENTIRE CONSTRUCTION OF THE PROJECT. IF SITE CONDITIONS ARE SUCH THAT ADDITIONAL CONTROL MEASURES ARE REQUIRED THAN WHAT IS SPECIFIED IN THE EROSION AND SEDIMENTATION CONTROL PLAN, THEN THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL BEST MANAGEMENT PRACTICES NECESSARY.

1. THE CONSTRUCTION ACCESS SHALL BE STABILIZED WITH GRAVEL AND TEMPORARY VEGETATION TO PREVENT SILT LEAVING THE SITE.
2. TREE BARRICADES SHALL BE IMPLEMENTED BEFORE CLEARING AND GRUBBING OF ANY OF THE WORK AREAS.
3. BEFORE CLEARING, SILT FENCES SHALL BE INSTALLED AROUND THE PERIMETER OF THE CONSTRUCTION AND AROUND THE WETLAND(S) AND/OR BASIN(S) AS SHOWN IN THE PLANS. ALL EXISTING STORM DRAINAGE SWALES AND INLETS SHALL BE PROTECTED PER FDOT INDEX 102.
4. AFTER CLEARING BUT BEFORE EXCAVATION AND GRADING, TEMPORARY BERMS AND SWALES SHALL BE CONSTRUCTED AS REQUIRED TO DIVERT THE FLOW INTO THE CORRESPONDING STORMWATER BASIN.
5. ALL BASIN AREAS SHALL BE PROTECTED AS INDICATED ON THE PLANS.
6. THE STORMWATER BASINS SHALL BE ROUGH GRADED TO WITHIN 6" OF THE DESIGNED BASIN BOTTOM. THE BASIN SIDE SLOPES SHALL BE STABILIZED AS SHOWN IN THE PLANS BY SEEDING, MULCHING AND/OR SODDING TO PREVENT EXCESSIVE EROSION.
7. DURING CONSTRUCTION OF PAVING AND BUILDINGS, EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED AS REQUIRED.
8. ALL DISTURBED AREAS WITHIN THE CONSTRUCTION SITE SHALL BE COMPLETELY LANDSCAPED AND/OR GRASSED. FINAL STABILIZATION INCLUDING SEEDING, MULCHING, SODDING OR RIPRAP SHALL BE INSTALLED AS REQUIRED. GRASS SEEDING RATES AND MIXTURES SHALL BE PER FDOT INDEX 104. EVIDENCE OF GROWTH MUST BE PRESENT PRIOR TO REMOVAL OF SILT FENCING AND OTHER EROSION CONTROL APPLICATIONS AND PRIOR TO FINAL RELEASE.

IV. EROSION AND SEDIMENTATION CONTROLS:

STABILIZATION PRACTICES.

1. ALL ENTRANCES TO THE SITE SHALL BE STABILIZED BEFORE CONSTRUCTION AND FURTHER DISTURBANCE BEGINS. GRAVEL PAD SHALL PROVIDE STABILIZATION AND MINIMIZE THE AMOUNT OF SEDIMENT LEAVING THE SITE. MAINTENANCE OF THE ENTRANCE SHALL INCLUDE SWEEPING OF THE AREA ADJACENT TO THE ENTRANCE. STONE AND GRAVEL MIGHT NEED TO BE PERIODICALLY ADDED TO MAINTAIN THE EFFECTIVENESS OF THE ENTRANCE(S).
2. TREE BARRICADES SHALL BE INSTALLED AROUND THE TREES AS SHOWN IN THE DETAIL PLAN TO PROTECT THE EXISTING VEGETATION.
3. MULCH SHALL BE PLACED IN THE AREAS REQUIRED TO PREVENT EROSION FROM STORMWATER RUNOFF AND THE AREAS SHOWN ON THE PLANS. MULCH SHALL BE ANCHORED TO RESIST WIND DISPLACEMENT AND SHALL BE INSPECTED AFTER EVERY RAINSTORM TO IDENTIFY AREAS WHERE MULCH HAS BEEN WASHED OUT OR LOOSENED. THESE AREAS SHALL HAVE MULCH COVER REPLACEMENT.
4. SEEDING SHALL BE STARTED AFTER GRADING HAS BEEN FINISHED ON THE AREAS SHOWN IN THE PLANS. SEEDED AREAS SHOULD BE INSPECTED FOR FAILURE TO ESTABLISH, AND NECESSARY REPAIRS AND RESEEDING SHOULD BE MADE AS SOON AS POSSIBLE. ADDITIONAL SEEDING AND MULCH MAY BE REQUIRED AS NECESSARY TO PREVENT EROSION DURING OR AFTER CONSTRUCTION HAS FINISHED.
5. SOD SHALL BE INSTALLED IN THE AREAS SHOWN IN THE PLANS. SOD SHALL BE PEGGED IF INSTALLED ON SLOPES GREATER THAN 3:1. SODDED AREAS SHALL BE MAINTAINED AND INSPECTED TO ENSURE SUCCESSFUL ESTABLISHMENT.

SEDIMENTATION PRACTICES.

1. SILT FENCES SHALL BE INSTALLED IN THE AREAS SHOWN IN THE PLANS AND AS REQUIRED TO PREVENT SEDIMENT FROM LEAVING THE CONSTRUCTION AREA. SILT FENCES SHALL BE INSPECTED AFTER EACH RAINFALL EVENT TO ENSURE THAT THERE ARE NO GAPS OR TEARS. IF GAPS OR TEARS ARE FOUND THE FABRIC SHOULD BE REPAIRED OR REPLACED. SEDIMENT REMOVAL SHALL BE PART OF THE REGULAR MAINTENANCE. SILT FENCES SHALL REMAIN IN PLACE UNTIL CONSTRUCTION HAS FINISHED AND DISTURBED AREAS ARE PERMANENTLY STABILIZED.
2. DIVERSION SWALES. IF REQUIRED, SHALL BE CONSTRUCTED BEFORE MAJOR LAND DISTURBANCE OF THE RECEIVING BASIN. DIVERSION SWALES SHALL BE STABILIZED AFTER CONSTRUCTION TO MAINTAIN ITS EFFICIENCY.
3. INLETS SHOULD BE TEMPORARILY PROTECTED TO PREVENT SEDIMENT ENTERING THE INLET. BARRIERS WILL CATCH SOIL, DEBRIS AND SEDIMENT AT THE ENTRANCE OF THE INLET.
4. OUTFALL STRUCTURES SHALL HAVE SILT FENCES TO PREVENT SILT FROM ENTERING THE STORMWATER BASINS AND SHALL BE STABILIZED AS REQUIRED TO PREVENT EROSION FROM WASHOUTS.

V. STORMWATER MANAGEMENT:

1. THE PROPOSED PROJECT OBTAINED AN ENVIRONMENTAL RESOURCE PERMIT FROM SUWANNEE RIVER WATER MANAGEMENT DISTRICT (SRWMD) FOR THE CONSTRUCTION AND OPERATION OF A STORMWATER TREATMENT SYSTEM AND CONTROLS. THE PROPOSED SYSTEM (AS SHOWN ON THE PLANS) INCLUDED THE USE OF THE BEST MANAGEMENT PRACTICES (BMP) CONSISTENT WITH THE APPLICABLE REQUIREMENTS OF RULE 40B-4 OF THE DISTRICT. THE OWNER AND/OR THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF THE STORMWATER TREATMENT SYSTEM AND CONTROLS UNTIL CONSTRUCTION ACTIVITIES ARE COMPLETED AND FINAL STABILIZATION HAS BEEN ACCOMPLISHED. HOWEVER, THE OWNER AND/OR AN ENTITY SIMILAR TO A HOMEOWNERS ASSOCIATION SHALL BE RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF THE STORMWATER SYSTEM IN PERPETUITY, IN ACCORDANCE WITH THE REQUIREMENTS OF THE ENVIRONMENTAL RESOURCE PERMIT.
2. TO TREAT AND CONTROL THE STORMWATER PRODUCED BY THE PROPOSED DEVELOPMENT, THE PROJECT REQUIRES THE INSTALLATION AND CONSTRUCTION OF THE FOLLOWING BMP'S: 3 DRY RETENTION BASINS AND 3 WET DETENTION BASINS WITH ALL GRADING ASSOCIATED WITH THE CONSTRUCTION. THE BASINS HAVE BEEN DESIGNED TO CONTAIN AND ATTENUATE THE STORMS AND DISCHARGE AT PRE-DEVELOPMENT CONDITIONS, WHILE PROVIDING TREATMENT TO THE RUNOFF AS REQUIRED BY THE DISTRICT AND STATE RULES USING THE GUIDELINES CONTAINED IN THE SRWMD HANDBOOK.

VI. CONTROLS FOR OTHER POTENTIAL POLLUTANTS:

1. WASTE DISPOSAL: NO SOLID MATERIALS, INCLUDING CONSTRUCTION MATERIALS, SHALL BE DISCHARGED TO SURFACE WATERS AND ARE NOT AUTHORIZED UNDER THE ISSUED ENVIRONMENTAL RESOURCE PERMIT.
2. THE USE OF GRAVEL AND CONTINUING SWEEPING ACTIVITIES AT THE ENTRANCE OF THE SITE WILL CONTROL THE TRACKING OF SEDIMENT AND DUST LEAVING THE SITE.
3. THE PROPOSED DEVELOPMENT WILL PROVIDE WATER AND SEWER SYSTEM BY CONNECTING INTO THE CENTRAL MUNICIPAL SYSTEM OF GAINESVILLE REGIONAL UTILITIES.
4. ANY APPLICATION OF FERTILIZERS AND PESTICIDES NECESSARY TO ESTABLISH AND MAINTENANCE OF VEGETATION DURING CONSTRUCTION AND THROUGH PERPETUITY MAINTENANCE SHALL FOLLOW THE MANUFACTURERS RECOMMENDATIONS AND THE APPLICABLE RULES OF THE STATE OF FLORIDA.
5. ANY TOXIC MATERIALS REQUIRED DURING CONSTRUCTION SHALL BE PROPERLY STORED, DISPOSED OF AND CONTRACTOR AND/OR OWNER SHALL PROVIDE THE APPROPRIATE PERMITS FROM THE LOCAL OR STATE AGENCIES.

VII. APPROVED STATE OR LOCAL PLANS:

1. ALL THE SEDIMENT AND EROSION CONTROLS THAT ARE LISTED IN THE SITE PLAN AS APPROVED BY THE SRWMD ARE INCLUDED IN THIS STORMWATER POLLUTION PREVENTION PLAN (SEE ITEM III AND IV).
2. THIS STORMWATER POLLUTION PREVENTION PLAN SHALL BE AMENDED IF REQUIRED BY ANY LOCAL OR STATE AGENCY OR AS REQUIRED BY UNFORESEEABLE CONDITIONS AND THE OWNER SHALL SUBMIT A RE-CERTIFICATION TO THE NPDES STATE OFFICE THAT THE PLAN HAS BEEN AMENDED TO ADDRESS THOSE CHANGES.

VIII. MAINTENANCE:

THE CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE, INSPECTION SCHEDULE, AND REPAIRS OUTLINED IN THIS PLAN. MAINTENANCE SHALL CONTINUE THROUGHOUT THE PROJECT UNTIL WORK IS COMPLETE. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER CONSTRUCTION IS COMPLETE.

IN ADDITION TO THE ITEMS MENTIONED IN THE PREVIOUS SECTIONS, THE CONTRACTOR SHALL INITIATE ANY REPAIRS WITHIN 24 HOURS OF BEING REPORTED. IN THE EVENT THAT THE BASINS DO NOT PERFORM PROPERLY OR IF A SINKHOLE DEVELOPS, THE PROJECT ENGINEER SHALL BE NOTIFIED TO ASSIST IN COORDINATING REMEDIAL ACTION.

1. MAINTENANCE WOULD BE DIVIDED IN ROUTINE MAINTENANCE AND REPAIR MAINTENANCE. ALL STORMWATER BMP'S SHOULD BE INSPECTED FOR CONTINUED EFFECTIVENESS AND STRUCTURAL INTEGRITY ON A REGULAR BASIS. THE SYSTEMS SHOULD BE CHECKED AFTER EACH STORM EVENT IN ADDITION TO REGULARLY SCHEDULED INSPECTIONS.
2. ROUTINE MAINTENANCE REQUIREMENTS SHOULD BE INCLUDED IN THE INSPECTOR CHECKLIST TO AID THE INSPECTOR IN DETERMINING WHETHER A BMP'S MAINTENANCE IS ADEQUATE OR NEEDS A REVISION. INSPECTORS SHALL KEEP RECORD OF MAINTENANCE, ROUTINE OR REPAIR, TO PROVIDE EVIDENCE OF AN EFFICIENT INSPECTION AND MAINTENANCE.
3. SIDE ENTRANCES: MAINTENANCE SHALL INCLUDE REPLACEMENT OF GRAVEL AND CLEANING THE SOIL THAT IS TRACKED OFFSITE FOR PROPER DISPOSAL.
4. TREE BARRICADES: MAINTENANCE SHALL INCLUDE INSPECTION OF MESH AND POSTS AND REPAIR OR REPLACEMENT OF DAMAGED VEGETATION.
5. SILT FENCES: MAINTENANCE SHALL INCLUDE SEDIMENT REMOVAL AND INSPECTION TO ENSURE PROPER ANCHORING AND THAT NO TEARING OR GAPS HAVE OCCURRED. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED ONE-THIRD THE HEIGHT OF SILT FENCE.
6. DIVERSION SWALES: MAINTENANCE SHALL INCLUDE INSPECTION AFTER EVERY RAINFALL EVENT AND ONCE EVERY TWO WEEKS BEFORE FINAL STABILIZATION. THEY SHOULD BE CLEARED OF SEDIMENT AND MAINTAIN VEGETATIVE COVER.
7. TEMPORARY BERMS: MAINTENANCE SHALL INCLUDE REMOVAL OF DEBRIS, TRASH SEDIMENT AND LEAVES. SIDES OF THE BERM SHALL BE INSPECTED FOR EROSION AFTER EACH STORM EVENT.
8. MULCHING: ROUTINE MAINTENANCE SHALL INCLUDE REPLACEMENT PERIODICALLY.
9. SEEDING: ROUTINE MAINTENANCE SHALL INCLUDE RESEEDING OF AREAS THAT FAILED TO ESTABLISH.
10. SODDING: ROUTINE MAINTENANCE SHALL INCLUDE WATERING AND MOWING. REPLACEMENT OF GRASS MAY BE NECESSARY IF COVER IS NOT FULLY ESTABLISHED.
11. INLETS: ROUTINE MAINTENANCE SHALL INCLUDE INSPECTION AFTER EVERY STORM EVENT AND MIGHT INCLUDE REMOVAL OF ACCUMULATED SEDIMENT.
12. OUTFALL STRUCTURES: ROUTINE MAINTENANCE SHALL INCLUDE INSPECTION AFTER EVERY STORM EVENT TO ASSURE NO EROSION OR SCOUR HAS OCCURRED.
13. DRY RETENTION BASINS: ROUTINE MAINTENANCE SHALL INCLUDE MONITORING FOR SEDIMENT ACCUMULATION, CLEAN AND REMOVE DEBRIS FROM INLETS AND OUTLETS, MOW SIDE SLOPES AND INSPECT FOR DAMAGE OF BERMS AND REPAIR UNDERCUT OR ERODED AREAS AS NECESSARY.
14. WET DETENTION BASINS: ROUTINE MAINTENANCE SHALL INCLUDE MONITORING FOR SEDIMENT ACCUMULATION, CLEAN AND REMOVE DEBRIS FROM INLETS AND OUTLETS, MOW SIDE SLOPES AND INSPECT FOR DAMAGE OF BERMS AND REPAIR UNDERCUT OR ERODED AREAS AS NECESSARY.

IX. INSPECTIONS:

1. THE OWNER AND /OR CONTRACTOR SHALL PROVIDE QUALIFIED PERSONNEL TO INSPECT ALL POINTS OF POTENTIAL DISCHARGE FROM THE PROJECT SITE FOR DISTURBED AREAS. THE EROSION AND SEDIMENTATION CONTROLS AND BMP'S AS LISTED IN THIS PLAN. THE INSPECTION SHALL BE PERFORMED DURING CONSTRUCTION AND BEFORE FINAL STABILIZATION. ONCE EVERY SEVEN-CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM THAT IS GREATER THAN 0.50 INCHES. AFTER FINAL STABILIZATION AND BEFORE FINISH OF CONSTRUCTION THE INSPECTION SHALL BE CONDUCTED ONCE EVERY MONTH.
2. THE CONTRACTOR SHALL INSTALL A RAIN GAUGE AT THE SITE TO MONITOR AND DOCUMENT RAINFALL EVENTS IN EXCESS OF 0.50 INCHES.
3. ALL DISTURBED AREAS AND AREAS USED FOR MATERIALS STORAGE SHALL BE INSPECTED FOR POLLUTANTS ENTERING THE STORMWATER SYSTEM. THE STORMWATER MANAGEMENT SYSTEM AND EROSION AND SEDIMENT CONTROL MEASURES IDENTIFIED IN THE PLAN SHALL BE INSPECTED TO ENSURE THEY ARE OPERATING CORRECTLY. LOCATIONS WHERE VEHICLES ENTER AND LEAVE THE SITE SHALL BE INSPECTED FOR EVIDENCE OF OFFSITE SEDIMENT TRACKING.
4. REPAIR OR MAINTENANCE NEEDED TO ASSURE PROPER OPERATION OF THE STORMWATER POLLUTION PREVENTION PLAN SHALL BE DONE IN A TIMELY MANNER BUT NO LATER THAN 7 CALENDAR DAYS FOLLOWING THE INSPECTION.
5. A REPORT SHALL BE KEPT OF EACH INSPECTION FOR THREE YEARS AFTER FINAL STABILIZATION AND SHALL INCLUDE THE DATES OF EACH INSPECTION, THE SCOPE OF THE INSPECTION, MAJOR OBSERVATIONS, ANY REPAIR AND/OR MAINTENANCE REQUIRED AND ANY INCIDENT OF NON-COMPLIANCE. IF THE REPORT DOES NOT CONTAIN ANY INCIDENTS OF NON-COMPLIANCE, THE REPORT SHALL CONTAIN A CERTIFICATION THAT THE FACILITY HAS BEEN IN COMPLIANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN AND THE NPDES PERMIT. THE REPORT SHALL INCLUDE THE NAME AND QUALIFICATIONS OF THE INSPECTOR AND SHALL BE SIGNED IN ACCORDANCE TO FDEP RULE 62-621.300, PART VII.C. A COPY OF THE CONSTRUCTION INSPECTION FORM IS INCLUDED ON THIS STORMWATER POLLUTION PREVENTION PLAN SHEET. A COPY SHALL BE RETAINED AT THE CONSTRUCTION SITE FROM THE DATE OF PROJECT INITIATION TO THE DATE OF FINAL STABILIZATION.

X. NON-STORMWATER DISCHARGES:

1. THE FOLLOWING NON-STORMWATER DISCHARGES MIGHT BE COMBINED WITH STORMWATER AND WOULD BE AUTHORIZED AS PART OF THIS PERMIT: FIRE HYDRANT FLUSHING, CONTROL OF DUST, POTABLE WATER FLUSHING AND IRRIGATION DRAINAGE. BECAUSE OF THE NATURE OF THESE DISCHARGES, THE EROSION, STABILIZATION AND TREATMENT SYSTEMS TO BE IMPLEMENTED, AS PART OF THIS PLAN WOULD BE APPROPRIATE TO PREVENT AND TREAT ANY POLLUTION RELATED TO THESE NON-STORMWATER DISCHARGES.

XI. CONTRACTORS:

1. ALL CONTRACTORS AND/OR SUBCONTRACTORS RESPONSIBLE FOR IMPLEMENTING THE PLAN SHALL SIGN THE CERTIFICATION STATEMENT BEFORE STARTING CONSTRUCTION ACTIVITIES OF THE PROJECT. THE CERTIFICATION MUST INCLUDE THE NAME AND TITLE OF THE PERSON PROVIDING THE SIGNATURE, THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE CONTRACTING FIRM, THE ADDRESS OF THE SITE AND THE DATE THE CERTIFICATION IS MADE. THE OWNER SHALL KEEP THESE CERTIFICATIONS AS PART OF THIS POLLUTION PLAN. MULTIPLE COPIES OF THE CERTIFICATION STATEMENT MAY BE NECESSARY DEPENDING UPON THE NUMBER OF SUBCONTRACTORS ASSOCIATED WITH THE PROJECT.

CERTIFICATION STATEMENT

"I CERTIFY UNDER PENALTY OF LAW THAT I UNDERSTAND AND SHALL COMPLY WITH THE TERMS AND CONDITIONS OF THE STATE OF FLORIDA GENERIC PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES AND THIS STORMWATER POLLUTION PREVENTION PLAN PREPARED THEREUNDER."

CONTRACTING FIRM: _____

ADDRESS: _____

CITY, STATE, ZIP CODE: _____

TELEPHONE: _____

FAX: _____

PROJECT NAME: GAINESVILLE RENEWABLE ENERGY CENTER (GREC) BIOMASS GENERATING FACILITY

PROJECT ADDRESS: _____

PROJECT ADDRESS: _____

CITY, STATE, ZIP CODE: _____, FLORIDA

NAME: _____ SIGNATURE: _____

DATE: _____

STORMWATER POLLUTION PREVENTION PLAN INSPECTION REPORT FORM

Inspections must occur at least once a week and within 24 hours of the end of a storm event that is 0.50 inches or greater.

PROJECT NAME: GAINESVILLE RENEWABLE ENERY CENTER (GREC) BIOMASS GENERATING FACILITY FDEP NPDES STORMWATER IDENTIFICATION NO.: FLR10 _____

OWNER: _____ CONTRACTOR: _____

CONSTRUCTION MANAGER: _____

Date of Inspection	Location	Rain data	Type of control (see below)	Date installed / modified	Current Condition (see below)	Observations or Corrective Action / Other Remarks	Inspected By

CONDITION CODE: G = Good; C = Needs to be cleaned; M = Marginal, needs maintenance or replacement soon; P = Poor, needs immediate maintenance or replacement; O = Other

CONTROL TYPE CODES

1. Silt Fence	10. Storm drain inlet protection	19. Reinforced soil retaining system	28. Tree protection
2. Earth dikes	11. Vegetative buffer strip	20. Gabion	29. Detention pond
3. Structural diversion	12. Vegetative preservation area	21. Sediment Basin	30. Retention pond
4. Swale	13. Retention Pond	22. Temporary seed / sod	31. Waste disposal / housekeeping!
5. Sediment Trap	14. Construction entrance stabilization	23. Permanent seed / sod	32. Dam
6. Check dam	15. Perimeter ditch	24. Mulch	33. Sand Bag
7. Subsurface drain	16. Curb and gutter	25. Hay Bales	34. Other
8. Pipe slope drain	17. Paved road surface	26. Geotextile	
9. Level spreaders	18. Rock outlet protection	27. Rip-rap	

INSPECTOR INFORMATION:

_____ _____ _____

Name Qualification Date

The above signature also shall certify that this facility is in compliance with the Stormwater Pollution Prevention Plan and the State of Florida Generic Permit for Stormwater Discharge from Large and Small Construction Activities if there are not any incidents of non compliance identified above.

* * * * *

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

SCALES: AS SHOWN

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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: STORMWATER POLLUTION PREVENTION PLAN

Project phase: STATE CERTIFICATION

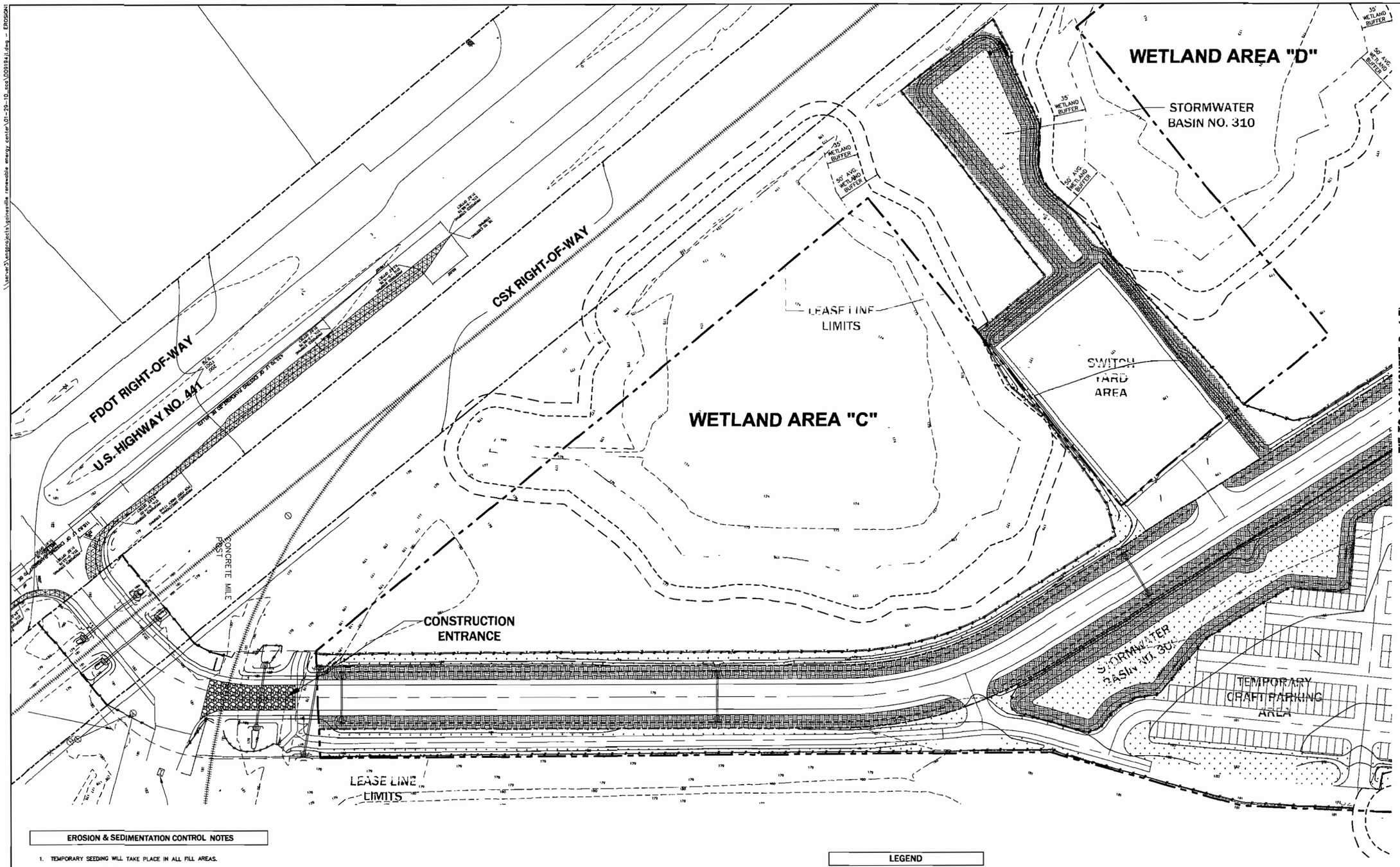
Designed: CSV/CAP Drawn: JVR Date: NOV. 13, 2009

Project No: 09-194

Professional Engineer of Record: Claudia S. Vega P.E. Engineer — 51532 Certificate No.

Sheet No.: C3.00

Plotted Jan 27, 2010 — 14:57:32 — Joyce Rocks



EROSION & SEDIMENTATION CONTROL NOTES

1. TEMPORARY SEEDING WILL TAKE PLACE IN ALL FILL AREAS.
2. INSTALLATION OF EROSION CONTROL SHALL BE IN ACCORDANCE WITH DETAILS AND STORMWATER POLLUTION PREVENTION PLAN (SWPPP).
3. STOCK PILING AND/OR STORAGE OF MATERIAL DURING CONSTRUCTION SHALL NOT IMPEDE STORMWATER FLOW AND SHALL NOT CAUSE EROSION.
4. AREAS USED FOR CONSTRUCTION SHALL BE STABILIZED AFTER REMOVAL AS REQUIRED PER SWPPP.
5. SILT FENCING AND/OR STAKED HAYBALES SHALL BE CONSTRUCTED WHERE SHOWN ON THE DRAWINGS PRIOR TO STARTING CONSTRUCTION.
6. THE STORMPIPE SYSTEM SHALL BE FLUSHED OUT TO REMOVE ALL ACCUMULATED DEBRIS AND SEDIMENT UPON COMPLETION OF CONSTRUCTION.
7. THE DRAINAGE BASIN BOTTOM SHALL BE SCRAPED CLEAN OF ALL ACCUMULATED SEDIMENT UPON COMPLETION OF CONSTRUCTION AFTER THE STORMDRAIN SYSTEM IS COMPLETELY FLUSHED OUT.
8. ALL DISTURBED AREAS IN THE CONSTRUCTION AREA SHALL BE COMPLETELY GRASSED BY COMPLETION OF CONSTRUCTION. EVIDENCE OF GROWTH MUST BE PRESENT PRIOR TO FINAL RELEASE. SEASONAL GRASSES (I.E. WINTER RYE, SUMMER MILLET) SHALL BE USED IS NECESSARY.

LEGEND

- LIMITS OF PROPOSED ROADWAY
- LIMITS OF PROPOSED GRAVEL AREA (SWITCH YARD)
- LIMITS OF PROPOSED STABILIZED AREA
- LIMITS OF PROPOSED TEMPORARY SEED, MULCH & FERTILIZER
- LIMITS OF PROPOSED SOD
- LIMITS OF PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- PROPOSED PERMANENT 6' CHAINLINK FENCE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH
SCALE: 1" = 50'
50 25 0 50
GRAPHIC SCALE

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CITY OF GAINESVILLE, FLORIDA

Sheet title: MASTER EROSION & SEDIMENTATION CONTROL PLAN
SHEET 1 of 7

Project phase: STATE CERTIFICATION
Designed: CSV/CAP | Drawn: JVR
Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:
Claudia S. Vega P.E. 51532
Engineer Certificate No.

Sheet No.:
C3.10

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TIE TO C3.10 (SHEET 1 of 7)

TIE TO C3.12 (SHEET 3 of 7)

LEASE LINE LIMITS

35' WETLAND BUFFER

150' AVG. WETLAND BUFFER

PLANT AREA (SEE ZACHRY PLANS FOR DETAILS)

STORMWATER BASIN NO. 2.0

STORMWATER BASIN NO. 3.0

WETLAND AREA "B"

WETLAND AREA "I"

LEASE LINE LIMITS

LEGEND

- LIMITS OF PROPOSED ROADWAY
- LIMITS OF PROPOSED STABILIZED AREA
- LIMITS OF PROPOSED TEMPORARY SEED, MULCH & FERTILIZER
- LIMITS OF PROPOSED SOD
- PROPOSED OBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- PROPOSED PERMANENT 6' CHAINLINK FENCE

NORTH

SCALE: 1" = 50'

50 25 0 50

GRAPHIC SCALE

No.	Date	Comment
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Sheet title: MASTER EROSION & SEDIMENTATION CONTROL PLAN
SHEET 2 of 7

Project phase: STATE CERTIFICATION

Designed: CSV/CAP Drawn: JVR

Project No. 09-194 Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega P.E. 51332
Engineer Certificate No.

Sheet No.: C3.11

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TIE TO C3.14 (SHEET 5 of 7)

WETLAND AREA "A1"

STORMWATER
BASIN NO. 102

LEASE LINE
LIMITS

WETLAND AREA "A2"

35' WETLAND BUFFER

50' AVG. WETLAND BUFFER

PROPOSED PLANT
(SEE ZACHRY PLANS FOR DETAILS)

LEGEND

- LIMITS OF PROPOSED ROADWAY
- LIMITS OF PROPOSED TEMPORARY SEED, MULCH & FERTILIZER
- LIMITS OF PROPOSED SOD
- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- PROPOSED PERMANENT 6' CHAINLINK FENCE

TIE TO C3.13 (SHEET 4 of 7)

LEASE LINE
LIMITS

WETLAND AREA "B"

TIE TO C3.11 (SHEET 2 of 7)

NORTH
SCALE: 1" = 50'
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GRAPHIC SCALE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

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Sheet title:
MASTER EROSION & SEDIMENTATION CONTROL PLAN
SHEET 3 of 7

Project phase:
STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JAR | Date: NOV. 13, 2009 | Project No. 09-194

Professional Engineer of Record:
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Engineer — Certificate No.

Sheet No.:
C3.12

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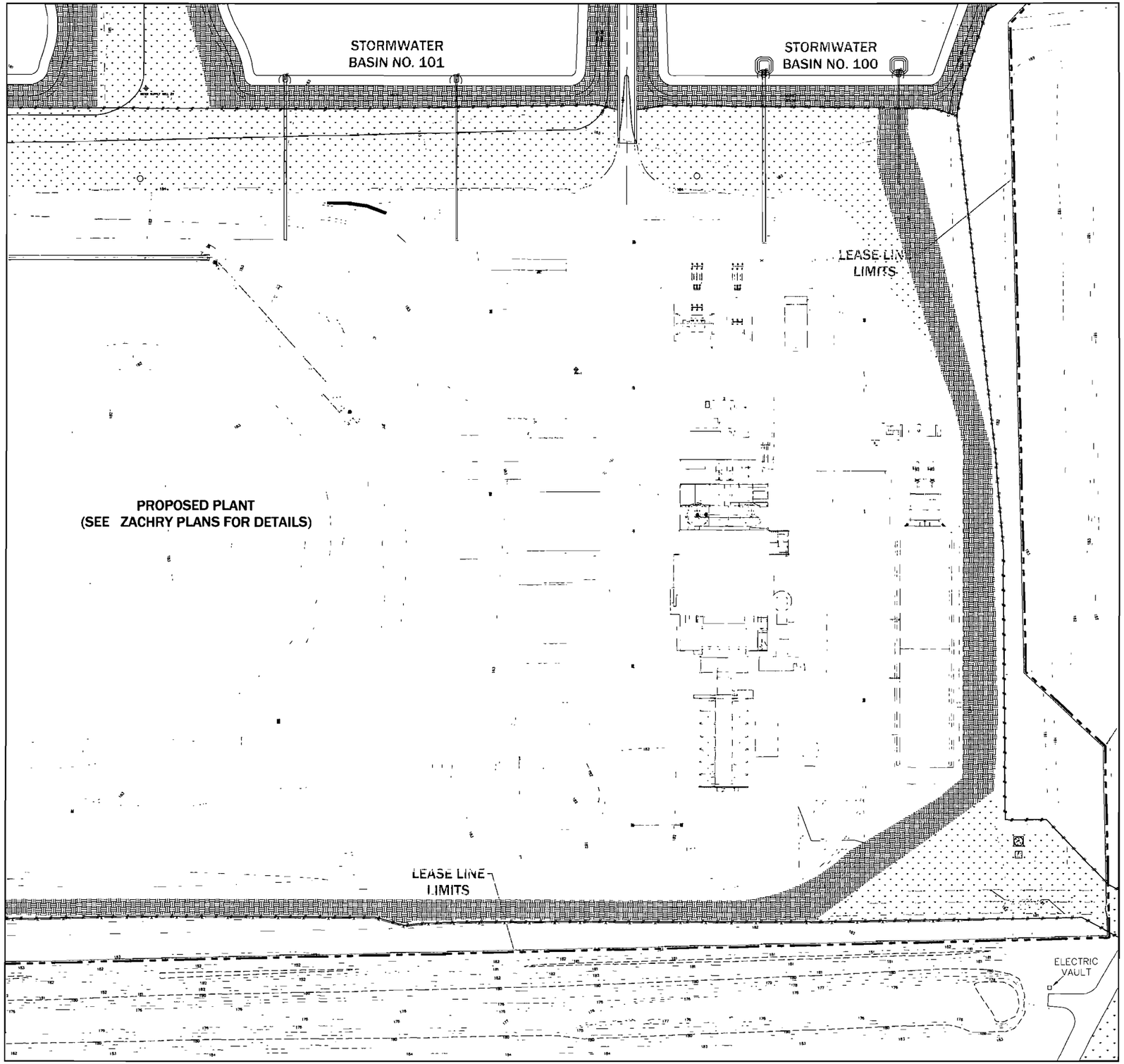
TIE TO C3.15 (SHEET 6 of 7)



TIE TO C3.12 (SHEET 3 of 7)

TIE TO C3.16 (SHEET 7 of 7)

LEGEND

- LIMITS OF PROPOSED ROADWAY
- LIMITS OF PROPOSED TEMPORARY SEED, MULCH & FERTILIZER
- LIMITS OF PROPOSED SOD
- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- PROPOSED PERMANENT 6' CHAINLINK FENCE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 50'

50 25 0 50

GRAPHIC SCALE

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Sheet title: MASTER EROSION & SEDIMENTATION CONTROL PLAN
SHEET 4 of 7

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR

Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vera, P.E. 51532
Engineer Certificate No.

Sheet No.: C3.13

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LEASE LINE LIMITS

WETLAND AREA "A"

50' AVG. WETLAND BUFFER

35' WETLAND BUFFER

STORMWATER BASIN NO. 102

LIMITS

TIE TO C3.16 (SHEET 6 of 7)

TIE TO C3.12 (SHEET 3 of 7)

LEGEND

- LIMITS OF PROPOSED ROADWAY
- LIMITS OF PROPOSED TEMPORARY SEED, MULCH & FERTILIZER
- LIMITS OF PROPOSED SOD
- PROPOSED DBL SILT FENCE */ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 50'

50 25 0 50

GRAPHIC SCALE

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Sheet title: MASTER EROSION & SEDIMENTATION CONTROL PLAN
SHEET 5 of 7

Project phase: STATE CERTIFICATION

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Project No. 09-194

Professional Engineer of Record:

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Engineer Certificate No.

Sheet No.: C3.14

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\\serve-3\engprojects\gainesville renewable energy center\01-29-10_sco\100919sjl.dwg — EROSION6

TIE TO C3.14 (SHEET 5 of 7)

LEASE LINE LIMITS

LEASE LINE LIMITS

STORMWATER BASIN NO. 102

STORMWATER BASIN NO. 101

STORMWATER BASIN NO. 100

TIE TO C3.13 (SHEET 4 of 7)

LEGEND

- LIMITS OF PROPOSED ROADWAY
- LIMITS OF PROPOSED TEMPORARY SEED, MULCH & FERTILIZER
- LIMITS OF PROPOSED SOD
- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- PROPOSED PERMANENT 6' CHAINLINK FENCE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 50'

50 25 0 50

GRAPHIC SCALE

ENG, DENMAN & ASSOCIATES, INC.
ENGINEERS - SURVEYORS - PLANNERS
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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: MASTER EROSION & SEDIMENTATION CONTROL PLAN
SHEET 6 of 7

Project phase: STATE CERTIFICATION

Designed: CSV/CJP | Drawn: JVR

Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega P.E. — Engineer | 51532 — Certificate No.

Sheet No.: C3.15

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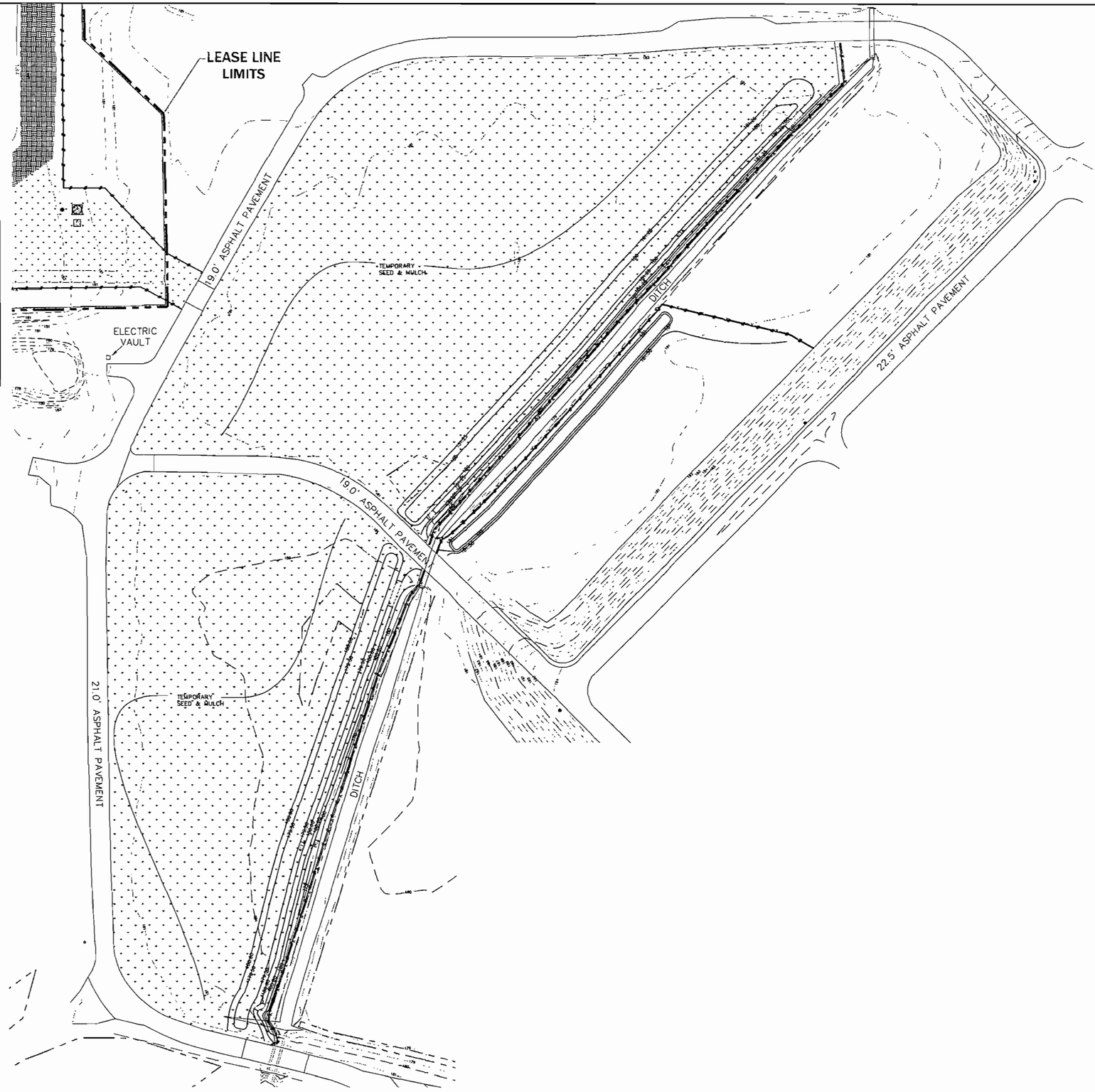

LEGEND

- LIMITS OF PROPOSED TEMPORARY SEED, MULCH & FERTILIZER
- LIMITS OF PROPOSED SOD
- PROPOSED DBL SILT FENCE w/ TEMP. 4' CHAINLINK FENCE
- PROPOSED SILT FENCE
- 183 EXISTING CONTOUR ELEVATION
- 183 PROPOSED CONTOUR ELEVATION
- PROPOSED PERMANENT 6' CHAINLINK FENCE

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALE: 1" = 50'

50 25 0 50

GRAPHIC SCALE

ENG, DENMAN & ASSOCIATES, INC.
ENGINEERS · SURVEYORS · PLANNERS
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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: MASTER EROSION & SEDIMENTATION CONTROL PLAN
SHEET 7 of 17

Project phase: STATE CERTIFICATION

Designed: CSV/CAP | Drawn: JVR | Date: NOV. 13, 20093

Project No: 09-194

Professional Engineer of Record:

Claudia S. Vega P.E. — 51532
Engineer — Certificate No.

Sheet No.: C3.16

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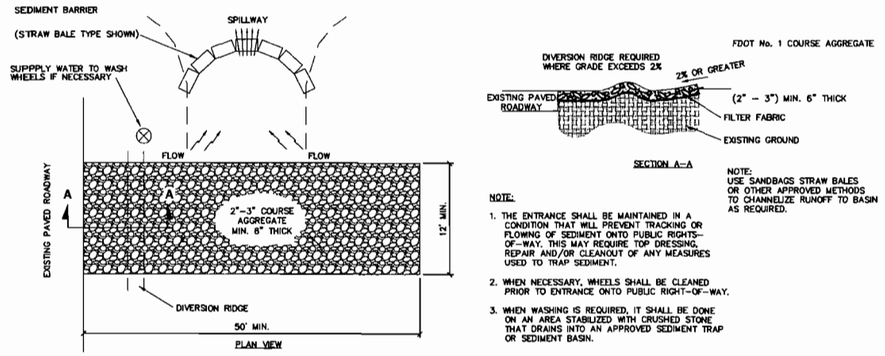
\\server3\vergprojects\gainesville renewable energy center\01-29-10_sca\100914jll.dwg - DETAILS NOTES

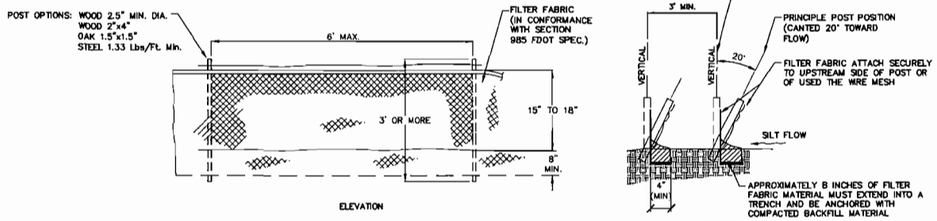


NOTE:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

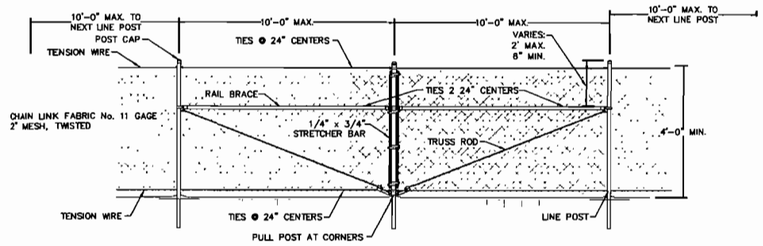
TYPICAL GRAVEL CONSTRUCTION ENTRANCE

N.T.S.



TYPE III SILT FENCE DETAIL

NTS

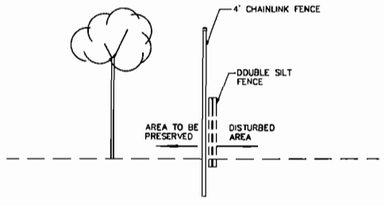


4' TEMPORARY CHAINLINK FENCE DETAIL

N.T.S.

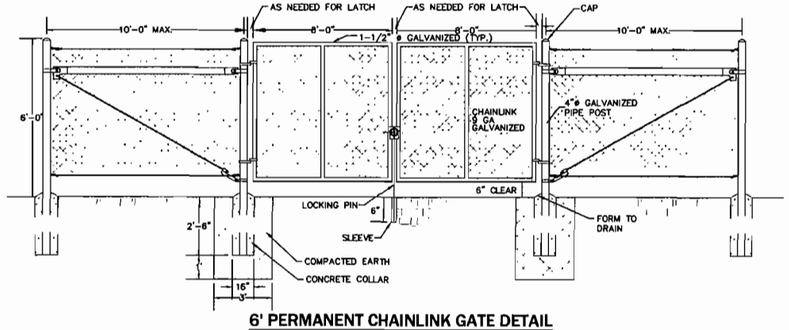
NOTE:

1. 4' CHAIN LINK FENCE IS NOT TO BE USED AS A PERMANENT FENCE



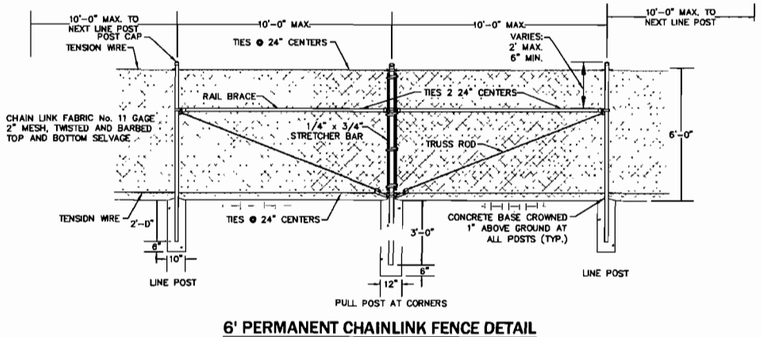
DETAIL OF TEMPORARY CHAINLINK FENCE & TYPE III SILT FENCE

N.T.S.



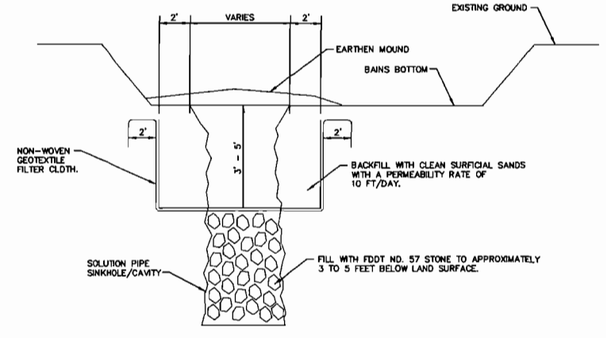
6' PERMANENT CHAINLINK GATE DETAIL

N.T.S.



6' PERMANENT CHAINLINK FENCE DETAIL

N.T.S.



SOLUTION PIPE/CHIMNEY REPAIR DETAIL

N.T.S.

1. IF A SOLUTION PIPE SINKHOLE DOES FORM IN THE STORMWATER BASIN THEN THE SINKHOLE SHALL BE REPAIRED BY BACKFILLING WITH NO. 57 STONE TO APPROXIMATELY 3 TO 5 FEET BELOW LAND SURFACE. AN AREA AT LEAST 6' BEYOND THE EDGES OF THE CHIMNEY SHOULD BE EXCAVATED TO THE TOP OF THE GRAVEL. A NON-WOVEN GEOTEXTILE FILTER CLOTH SHOULD BE PLACED AT THE BOTTOM OF THE EXCAVATION AND THE EXCAVATION SHOULD BE BACKFILLED WITH CLEAN SAND HAVING A VERTICAL COEFFICIENT OF PERMEABILITY OF 10 FEET PER DAY. THE MATERIAL SHALL BE COMPACTED AND THE SINKHOLE REPAIR SHOULD BRING THE SURFACE BACK TO AN ELEVATION WHICH IS SLIGHTLY ABOVE THE ORIGINAL BOTTOM, CREATING A SMALL MOUND.

MAINTENANCE NOTES

1. MAINTENANCE RESPONSIBILITY:

   GAINESVILLE RENEWABLE ENERGY CENTER, LLC, AN AMERICAN RENEWABLES COMPANY WILL BE THE ENTITY RESPONSIBLE FOR THE MAINTENANCE OF THE STORMWATER MANAGEMENT SYSTEM IN PERPETUITY.

2. MAINTENANCE PLAN:

   A. BASINS SHALL BE MOWED REGULARLY TO AVOID EXCESSIVE VEGETATIVE GROWTH. MOWING SCHEDULE SHOULD BE MONTHLY DURING WINTER MONTHS AND MORE FREQUENTLY (BIWEEKLY) DURING SUMMER MONTHS.

   B. BASINS SHALL BE CLEANED OUT ANNUALLY OF ANY ACCUMULATED SEDIMENTATION BUILDUP. IF THE BASINS ARE SHOWING EXCESSIVE SEDIMENTATION ACCUMULATION AT THE AS IN BOTTOM, THE BASIN BOTTOM SHALL BE SCRAPED CLEAN MORE OFTEN AS THE CONDITION DICTATES.

   C. BASINS SIDE SLOPES SHALL BE MAINTAINED WITH A GOOD STAND OF GRASS. SEASONAL GRASSES SHALL BE PLANTED TO AVOID EROSION (WINTER RYE, SUMMER MILLET).

   D. BASINS THAT DO NOT DRAWDOWN PROPERLY AND MAINTAIN STANDING WATER FOR AN EXTENDED PERIOD OF TIME MAY REQUIRE REMEDIAL ACTION. THE ENGINEER SHALL BE NOTIFIED TO HELP COORDINATE REMEDIAL ACTION IN THE EVENT THIS OCCURS.

   E. THE REQUIRED LANDSCAPING SHALL BE MAINTAINED IN A SOUND CONDITION AT ALL TIMES. ANY DEAD LANDSCAPING MATERIALS SHALL BE REPLACED IMMEDIATELY TO ASSURE PUBLIC SAFETY.

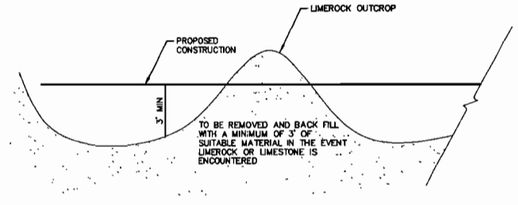
   F. SWALES: MAINTENANCE SHALL INCLUDE INSPECTION AFTER EVERY RAINFALL EVENT AND ONCE EVERY TWO WEEKS BEFORE FINAL STABILIZATION. THEY SHOULD BE CLEARED OF SEDIMENT AND MAINTAIN VEGETATIVE COVER.

   G. INLETS: ROUTINE MAINTENANCE SHALL INCLUDE INSPECTION AFTER EVERY STORM EVENT AND MIGHT INCLUDE REMOVAL OF ACCUMULATED SEDIMENT.

   H. OUTFALL STRUCTURES: ROUTINE MAINTENANCE SHALL INCLUDE INSPECTION AFTER EVERY STORM EVENT TO ASSURE NO EROSION OR SCOUR HAS OCCURRED.

   I. DRY RETENTION BASINS: ROUTINE MAINTENANCE SHALL INCLUDE MONITORING FOR SEDIMENT ACCUMULATION, CLEAN AND REMOVE DEBRIS FROM INLETS AND OUTLETS, MOW SIDE SLOPES AND INSPECT FOR DAMAGE OF BERMS AND REPAIR UNDERCUT OR ERODED AREAS AS NECESSARY.

   J. WET DETENTION BASINS: ROUTINE MAINTENANCE SHALL INCLUDE MONITORING FOR SEDIMENT ACCUMULATION, CLEAN AND REMOVE DEBRIS FROM INLETS AND OUTLETS, MOW SIDE SLOPES AND INSPECT FOR DAMAGE OF BERMS AND REPAIR UNDERCUT OR ERODED AREAS AS NECESSARY.



LIMEROCK OUTCROP REMOVAL DETAIL

N.T.S.

1. IF LIMESTONE OR LIMEROCK OUTCROP IS ENCOUNTERED DURING CONSTRUCTION OF THE BASIN, THE AREA WILL BE OVER-EXCAVATED A MINIMUM OF THREE FEET AND BACKFILLED WITH SUITABLE SOILS TO MEET THE SENSITIVE KARST AREA REQUIREMENTS.
2. IN THE EVENT A SINKHOLE, CAVITIES OR CHIMNEYS DEVELOPS WITHIN THE STORMWATER BASIN, THE FOLLOWING TREATMENT SHALL BE PERFORMED: THE OWNER SHALL NOTIFY SUWANNEE RIVER WATER MANAGEMENT DISTRICT PRIOR TO REMEDIAL ACTION UNLESS POSTPONING THE REPAIR ACTIVITY REPRESENTS AN ENDANGERMENT TO PUBLIC SAFETY. THE SINKHOLE SHALL BE BACKFILLED WITH A SANDY CLAY MIXTURE. THE SANDY CLAY SHALL BE PLACED IN SIX INCH LIFTS WITHIN THE FINAL THREE FEET OF FILL AND ROLLED WITH A HEAVILY LOADED RUBBER TIRE EQUIPMENT. SHOULD SINKHOLE ACTIVITY CONTINUE REPEATEDLY WITHIN A CONFINED AREA, THE OWNER SHALL CONSULT A GEOTECHNICAL ENGINEER TO DETERMINE WHETHER ANY ALTERNATIVE REMEDIAL MEASURES ARE REQUIRED.

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

SCALES:
AS SHOWN

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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: DRAINAGE DETAILS & NOTES

Project phase: STATE CERTIFICATION
Designed: CSV/CAP
Drawn: JVR
Project No: 09-194
Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega P.E. 51532
Engineer Certificate No.

Sheet No.:
C3.20

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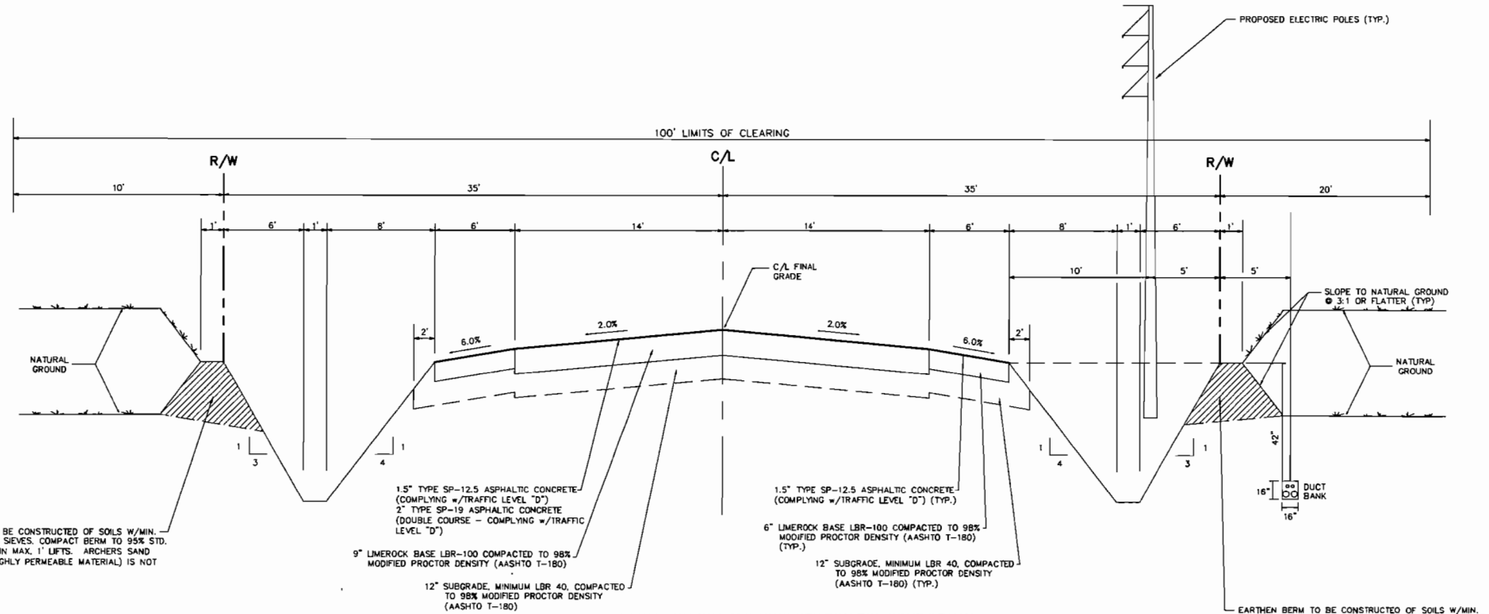
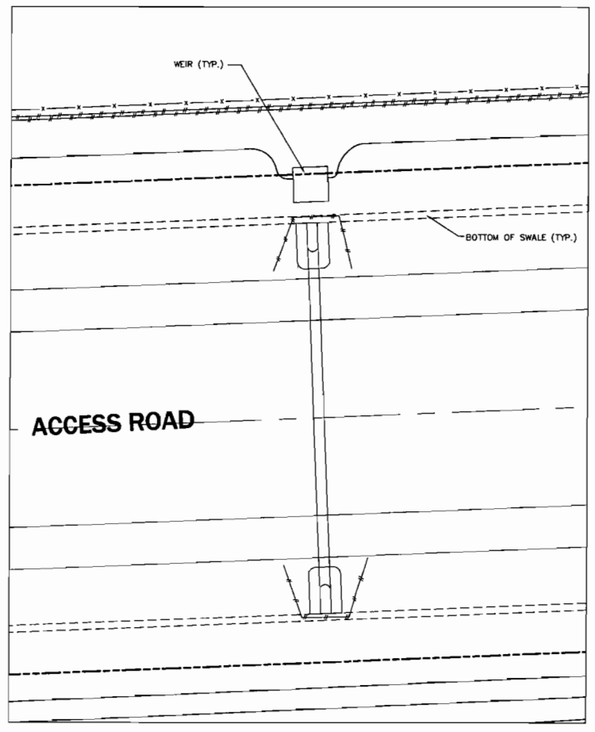
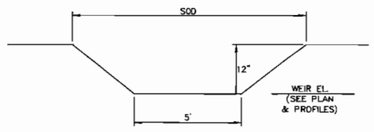
\\server3\vengprojects\gainesville renewable energy center\01-29-10_eca\009194fj.dwg - ROADWAY DETAILS



TYPICAL ROADWAY CROSS-SECTION 70' RIGHT-OF-WAY
DESIGN SPEED - 30 MPH
N.T.S.



PLAN VIEW
SODDED WEIR & STORM CROSSING DETAIL (TYPICAL)
SCALE: 1" = 10'



SODDED WEIR DETAIL (TYPICAL)
N.T.S.

PAVING, GRADING AND DRAINAGE SPECIFICATIONS

1. GENERAL: ALL ROADWAY AND DRAINAGE CONSTRUCTION, INCLUDING MATERIALS, CONSTRUCTION TECHNIQUES, AND TECHNICAL STANDARDS, SHALL BE IN ACCORDANCE WITH THE LATEST F.D.O.T. STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AND THE LATEST F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS.
2. ALL AREAS OF NEW CONSTRUCTION SHALL BE PREPARED AFTER SITE DEMOLITION. TOP SOIL REMAINING ONSITE MAY BE STOCKPILED FOR FINE GRADING IN LANDSCAPED AREAS, IF SUITABLE. THE CONTRACTOR SHALL FURNISH ALL FILL REQUIRED AND DISPOSE OF ALL EXCESS OR UNSUITABLE MATERIAL OFFSITE IN ACCORDANCE WITH ALL REGULATORY REQUIREMENTS.
3. ALL NEW ASPHALT PAVEMENT CONSTRUCTION SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
   A. EARTHWORK: FILL MATERIALS SHALL CONFORM TO AASHTO SOIL GROUPS A-1, A-3, OR A-2-4 AND SHALL BE PLACED IN 6"-12" LOOSE LIFTS AND COMPACTED TO 95% DENSITY USING MODIFIED PROCTOR METHOD (AASHTO T-180).
   B. SUBSOIL EXCAVATION: WHERE SUBSOIL EXCAVATION IS REQUIRED, UNSUITABLE MATERIALS SHALL BE REMOVED TO A DEPTH OF 18" BELOW THE LIMEROCK BASE AND BACKFILLED WITH CLEAN FILL.
   C. STABILIZED SUBGRADE: ALL STABILIZED MATERIAL SHALL BE TYPE 'B' CONFORMING TO SECTION 914-3 AND PLACED ACCORDING TO SECTION 160 IN ONE 12" MINIMUM COMPACTED LIFT. SUBGRADE SHALL BE STABILIZED TO A MINIMUM LBR VALUES AND DENSITIES AS SHOWN IN THE TYPICAL SECTIONS.
   D. BASE COURSE: ALL MATERIAL SHALL BE LIMEROCK CONFORMING TO SECTION 911 AND PLACED ACCORDING TO SECTION 200 IN ONE 6" MINIMUM COMPACTED LIFT OR DOUBLE COMPACTED LIFT. ALL BASE MATERIAL SHALL BE COMPACTED TO 98% DENSITY BY MODIFIED PROCTOR METHOD (AASHTO T-180). THE PRIME COAT SHALL CONFORM TO SECTION 300.
   E. ASPHALTIC CONCRETE: ALL ASPHALTIC CONCRETE MATERIAL SHALL BE PER DESIGN SECTIONS. ALL ASPHALTIC CONCRETE CONSTRUCTION SHALL CONFORM TO SECTION 330.
4. ALL CONCRETE USED FOR CONSTRUCTION OF DRAINAGE STRUCTURES, SIDEWALKS, AND CURBING SHALL BE CLASS I CONFORMING TO SECTION 346.
5. REINFORCED CONCRETE PIPE SHALL CONFORM TO SECTION 941.
6. ALL PAVEMENT MARKINGS REQUIRED IN THE R/W SHALL BE THERMOPLASTIC AND INCLUDE RAISED PAVEMENT MARKERS, WHERE REQUIRED CONFORMING TO SECTION 711.
7. ALL PAVEMENT MARKING, SYMBOLS AND STRIPING WITHIN THE SITE SHALL MEET THE LATEST FLORIDA HANDICAP ACCESSIBILITY CODE. PAVEMENT MARKING SHALL BE 4" BLUE/WHITE (HANDICAP) OR WHITE (REGULAR) AND SHALL CONFORM TO THE LATEST F.D.O.T. AND M.U.T.C.D. STANDARDS.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A GEOTECHNICAL CONSULTANT TO PROVIDE A FIELD INVESTIGATION REPORT DELINEATING RECOMMENDATIONS FOR UNDERCUTTING AND/OR UNDERDRAINS. A COPY OF THIS REPORT SHALL BE FORWARDED TO THE OWNER AND ENGINEER FOR REVIEW AND APPROVAL PRIOR TO UNDERCUTTING OR INSTALLING UNDERDRAIN. UNIT PRICES SHALL BE PROVIDED FOR UNDERDRAIN AND UNDERCUTTING. THE CONTRACTOR SHALL NOT CONSTRUCT BASE COURSE UNTIL THE REPORT IS REVIEWED AND APPROVED BY THE OWNER AND THE ENGINEER.
9. SOIL TESTING RESULTS SHALL BE PROVIDED FOR THE PAVEMENT CONSTRUCTION. TESTING RESULTS SHALL BE SUBMITTED FOR THE SUBGRADE AND BASE COURSE, IN ACCORDANCE WITH THE DESIGN SECTION. A MINIMUM OF 5 TEST LOCATIONS SHALL BE PROVIDED ONSITE. THE TESTING REPORT SHALL DENOTE THE TEST LOCATIONS. THE CONTRACTOR SHALL NOT PROCEED TO THE SUBSEQUENT PAVEMENT SECTION UNTIL TESTING --RESULTS ARE APPROVED FOR PREVIOUS SECTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TESTING COST.
10. LANDSCAPING: FINAL GRADING IN OPEN AREAS AND LANDSCAPE ISLANDS SHALL BE COORDINATED WITH THE LANDSCAPE CONTRACTOR AND THE OWNER. THE CONTRACTOR SHALL ALSO COORDINATE THE PLACEMENT OF ANY IRRIGATION AND ELECTRICAL CONDUIT SLEEVES DURING CONSTRUCTION.

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

SCALES:
AS SHOWN

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Project: GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CITY OF GAINESVILLE, FLORIDA

Sheet title: ROADWAY DETAILS, NOTES & TYPICAL CROSS-SECTION

Project phase: STATE CERTIFICATION
Designed: CSV/CAP | Drawn: JVR | Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:
Claudia S. Vega, P.E. — Engineer
51532 — Certificate No.

Sheet No.:
C5.00

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STORMWATER STRUCTURE SCHEDULE

S-20A
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

S-20B
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

S-21
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

S-22
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

S-23
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

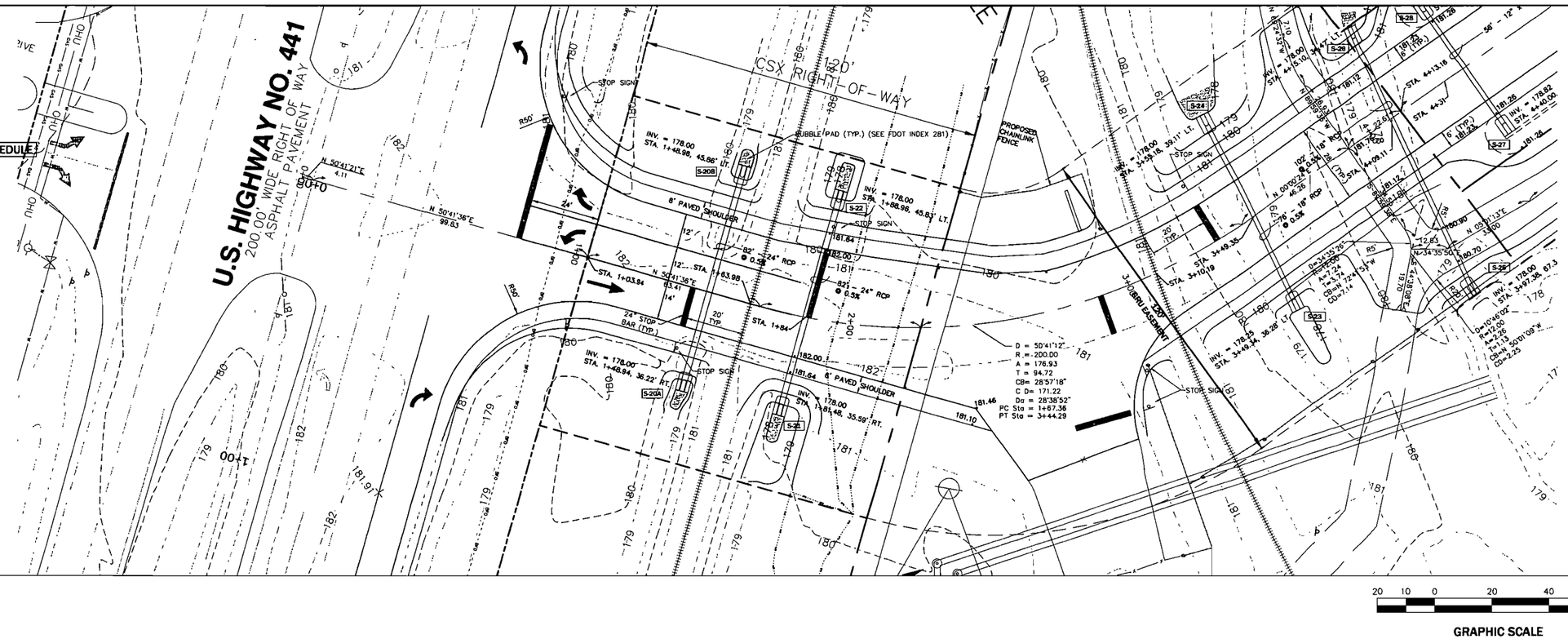
S-24
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

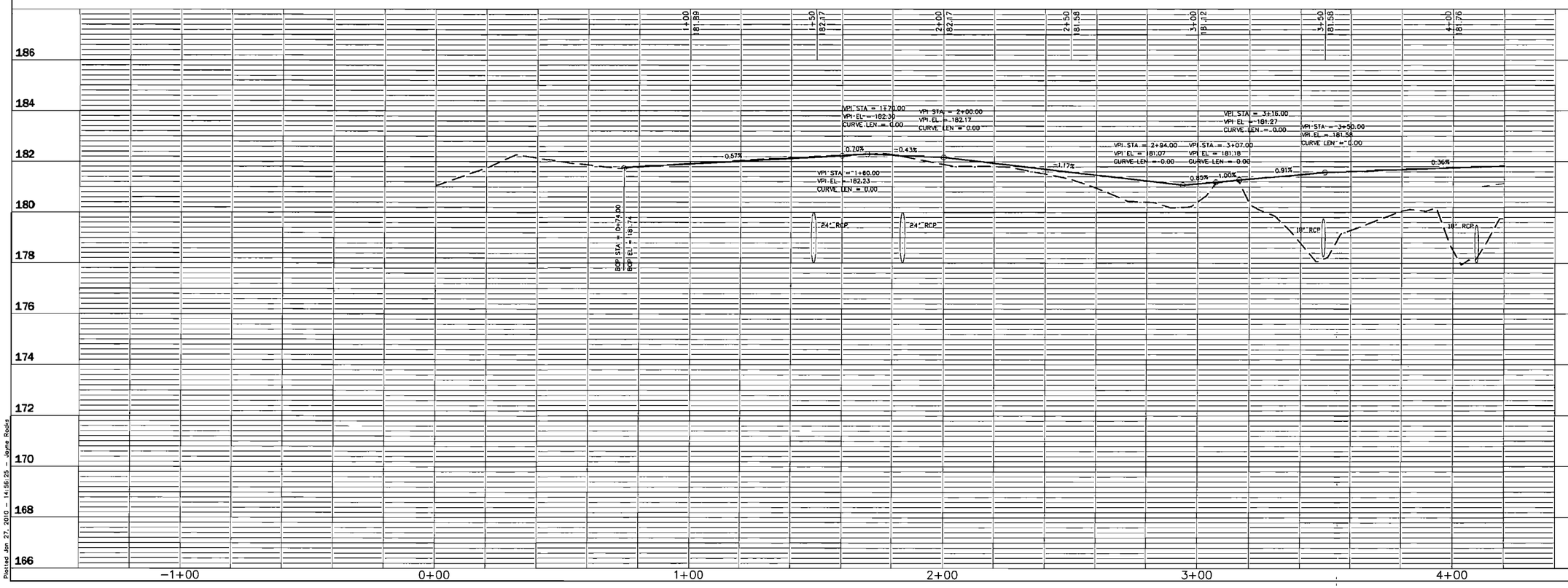
S-25
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

S-26
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

S-27
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 179.26

S-28
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 179.26





No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALES:
HORIZONTAL: 1"=20'
VERTICAL: 1" = 2'

ENG, DENMAN & ASSOCIATES, INC.
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Project: GAINESVILLE RENEWABLE ENERGY CENTER
CITY OF GAINESVILLE, FLORIDA

Sheet title: ROADWAY PLAN & PROFILES
ACCESS ROAD
SHEET 1 of 7

Project phase: STATE CERTIFICATION
Designed: CSV
Drawn: JVR
Project No: 09-194
Date: NOV. 13, 2009

Professional Engineer of Record:
Claudia S. Vega P.E.
Engineer
51532
Certificate No.

Sheet No.:
C6.00

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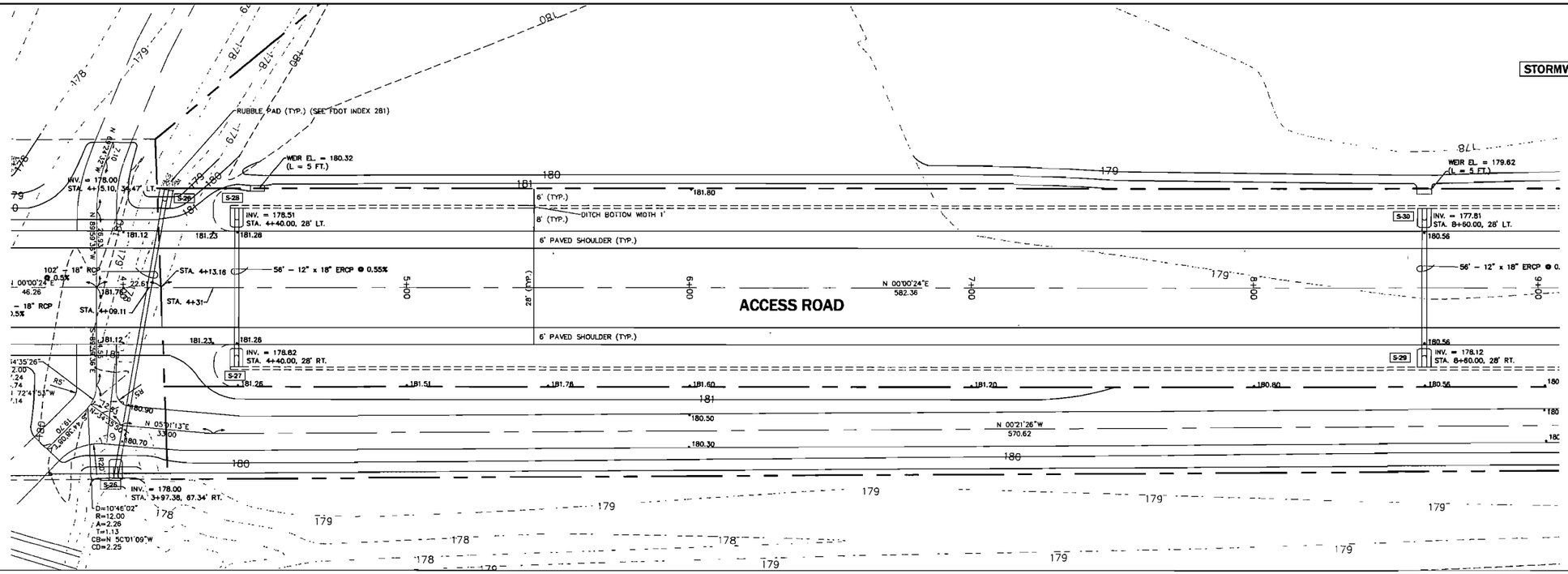

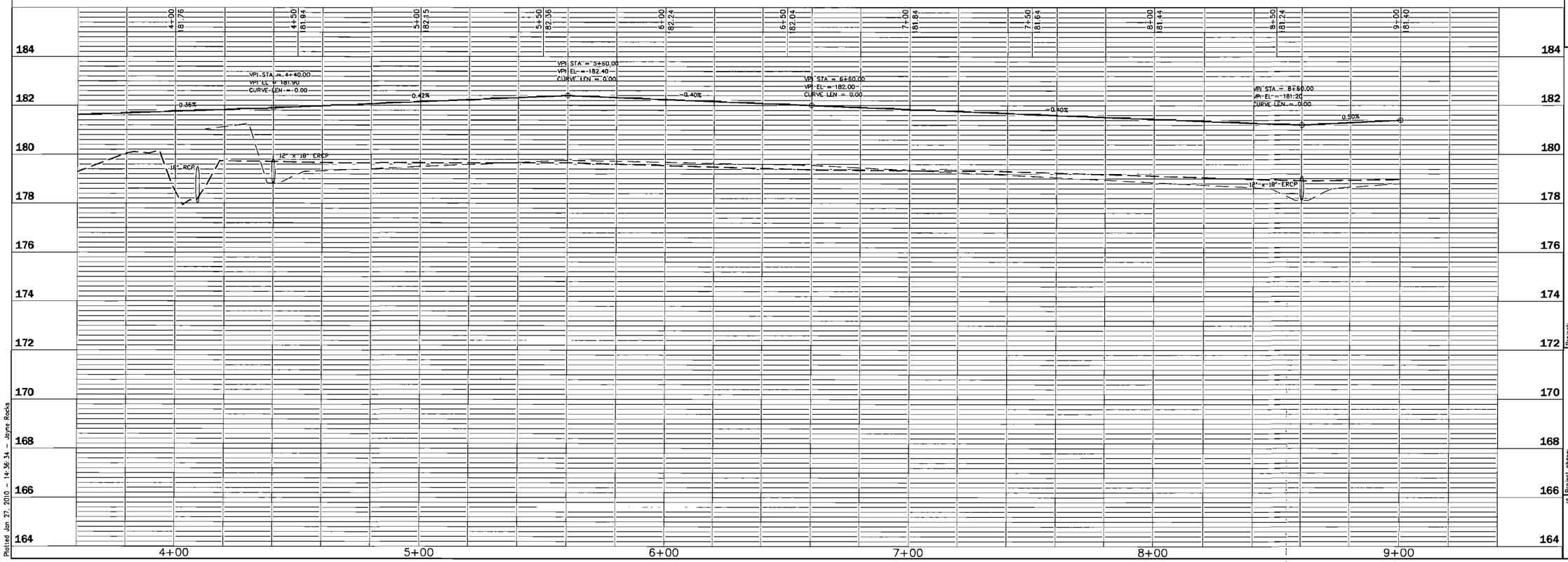

STORMWATER STRUCTURE SCHEDULE

S-27
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.62

S-28
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.51

S-29
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.12

S-30
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.81

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALES:
HORIZONTAL: 1"=20'
VERTICAL: 1" = 2'

ENG, DENMAN & ASSOCIATES, INC.
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Project:
GAINESVILLE RENEWABLE ENERGY CENTER
CITY OF GAINESVILLE, FLORIDA

Sheet title:
ROADWAY PLAN & PROFILES
ACCESS ROAD
SHEET 2 of 7

Project phase:
STATE CERTIFICATION

Designed: CSV | Drawn: JVR | Date: NOV. 13, 2009 | Project No: 09-194

Professional Engineer of Record:

Claudia S. Vega P.E. — Engineer: 51532 — Certificate No.

Sheet No.:
C6.01

Plotted: Jan 27, 2010 - 14:36:14 - Joyce Rocks

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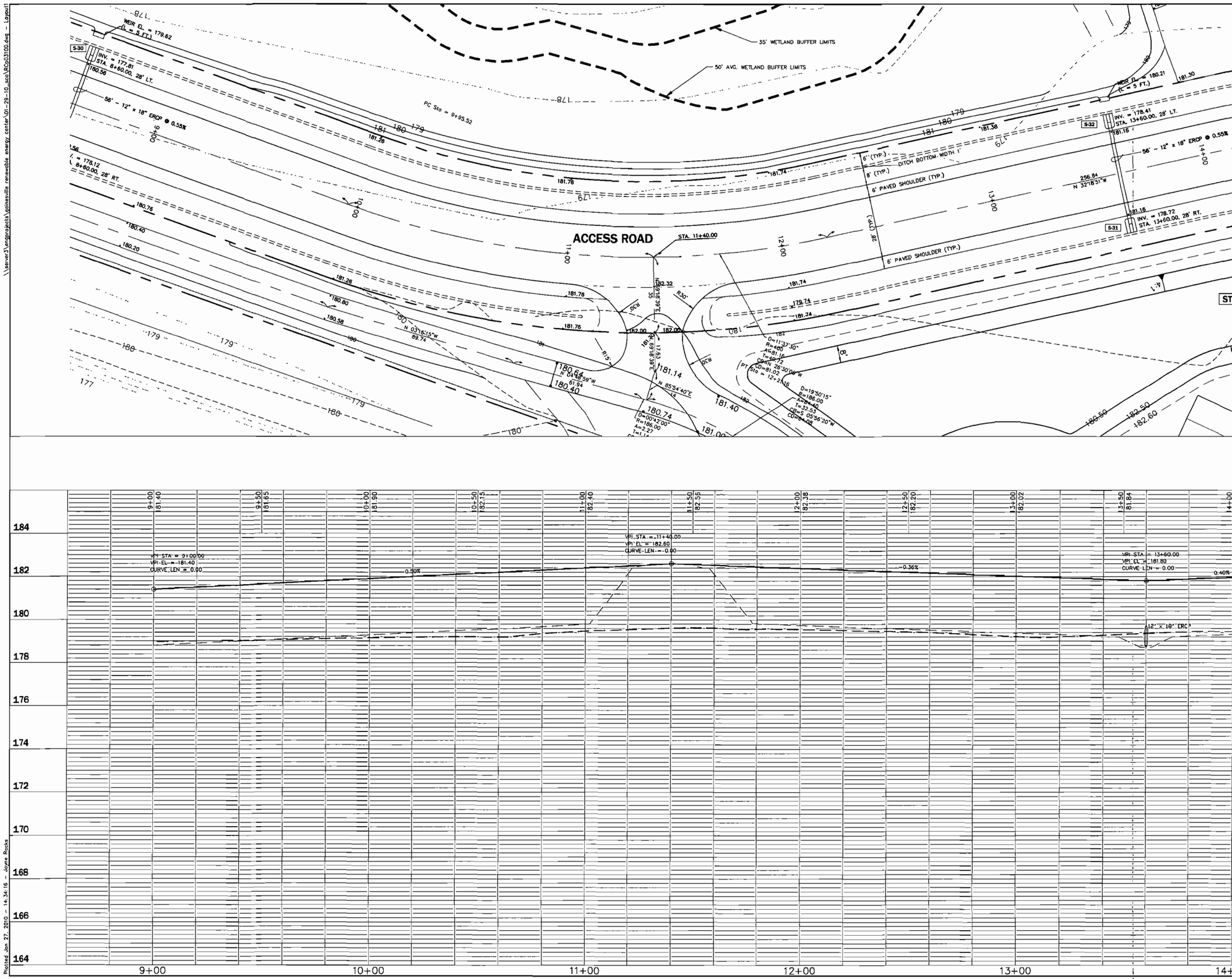


STORMWATER STRUCTURE SCHEDULE

S-31
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.72

S-32
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.41

NORTH

SCALES:
HORIZONTAL: 1"=20'
VERTICAL: 1" = 2'

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

ENG. DENMAN & ASSOCIATES, INC.
ENGINEERS - SURVEYORS - PLANNERS
EB 3269
3104 N.W. 43rd ST. GAINESVILLE, FLORIDA 32606-6672
TEL. (352) 373-3541 FAX. (352) 373-7249
EMAIL: bob@denmanpe.com

Project: GAINESVILLE RENEWABLE ENERGY CENTER
CITY OF GAINESVILLE, FLORIDA

Sheet title: ROADWAY PLAN & PROFILES
ACCESS ROAD
SHEET 3 of 7

Project phase: STATE CERTIFICATION
Designed: CSV
Drawn: JVR
Project No: 09-194
Date: NOV. 13, 2009

Professional Engineer of Record:
Claudia S. Vega P.E.
Engineer
51532
Certificate No.

Sheet No.: C6.02

Plotted: Jan 27, 2010 - 14:34:16 - Joyce Rocks

\\server3\engprojects\gainesville renewable energy center\01-29-10_sco\RCp04100.dwg - Layout1

STORMWATER STRUCTURE SCHEDULE

S-33
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.92

S-34
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.61

S-32
INV. = 178.41
STA. 13+60.00, 28' LT.

S-31
INV. = 178.72
STA. 13+60.00, 28' RT.

S-34
INV. = 177.61
STA. 17+20.00, 28' LT.

S-33
INV. = 177.92
STA. 17+20.00, 28' RT.

WEIR EL. = 180.21
(L = 5 FT.)

WEIR EL. = 179.36
(L = 5 FT.)

56' - 12" x 18" ERCP @ 0.55%

56' - 12" x 18" ERCP @ 0.55%

STA. 14+50.00
179.52

STA. 14+58.00
179.55

STA. 14+74.06

STA. 15+00.00
179.24

STA. 15+05.00
179.22

STA. 18+50.00
180.75

ACCESS ROAD

8' (TYP.)

6' PAVED SHOULDER (TYP.)

6' PAVED SHOULDER (TYP.)

28' (TYP.)

6' (TYP.) DITCH BOTTOM WIDTH

ELECTRIC DUCT BANK

ELECTRIC DUCT BANK

RUBBLE PAD (SEE FDOT INDEX 281)

S 57°19'19" W
45.74

S 32°40'41" E
36.00

182.50

182.80

VPI STA = 14+40.00
VPI EL = 182.12
CURVE LEN = 0.00

0.40%

-0.40%

VPI STA = 17+20.00
VPI EL = 181.00
CURVE LEN = 0.00

0.50%

12"x18" ERCP

14+00 181.96
14+50 182.08
15+00 181.88
15+50 181.68
16+00 181.48
16+50 181.28
17+00 181.08
17+50 181.09
18+00 181.24
18+50 181.39
19+00 181.54

14+00
15+00
16+00
17+00
18+00
19+00

No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALES:
HORIZONTAL: 1"=20'
VERTICAL: 1" = 2'

ENG, DENMAN & ASSOCIATES, INC.
ENGINEERS · SURVEYORS · PLANNERS
LB #3591
3404 N.W. 43rd ST. GAINESVILLE, FLORIDA 32606-6602
TELEPHONE: (352) 373-7541 FAX: (352) 373-7249
E-MAIL: edi@denmanassoc.com

Project: GAINESVILLE RENEWABLE ENERGY CENTER
CITY OF GAINESVILLE, FLORIDA

Sheet title: ROADWAY PLAN & PROFILES
ACCESS ROAD
SHEET 4 of 7

Project phase: STATE CERTIFICATION

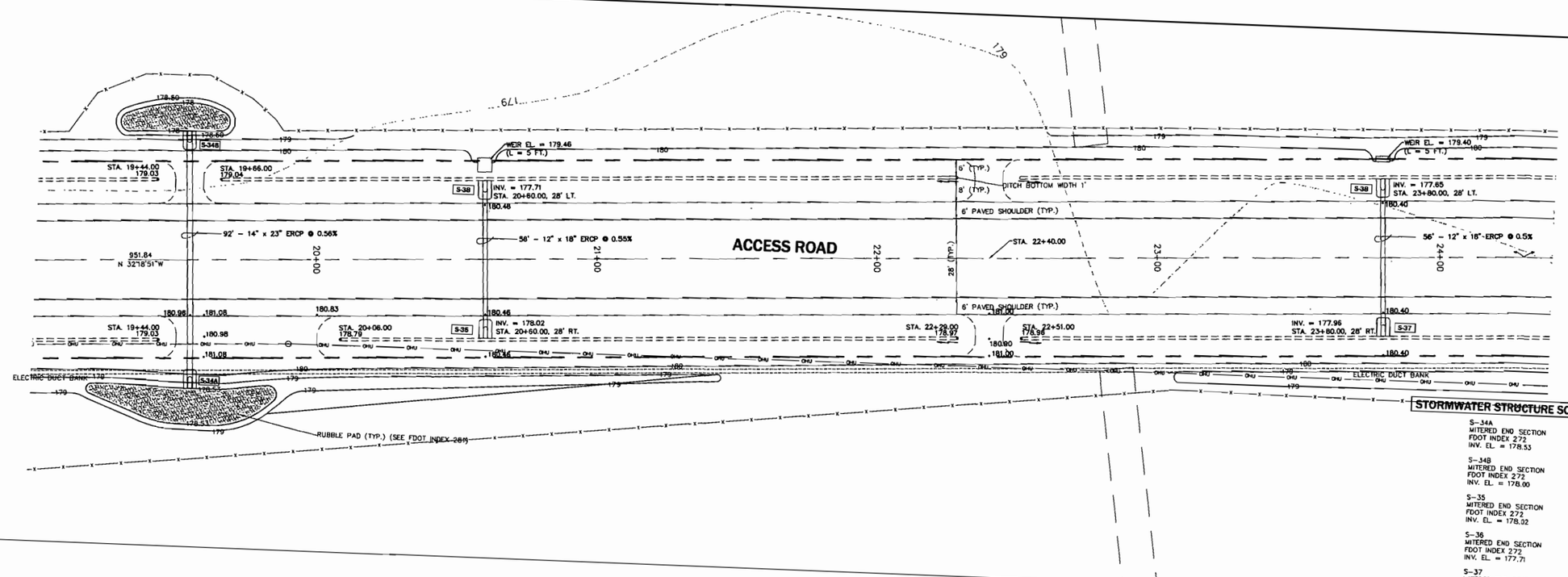
Designed: CSV | Drawn: JVR | Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega P.E. Engineer — 51532 Certificate No.

Sheet No.: C6.03

Plotted: Jan 27, 2010 - 14:32:50 - Joyce Rocks



STORMWATER STRUCTURE SCHEDULE

S-34A
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.53

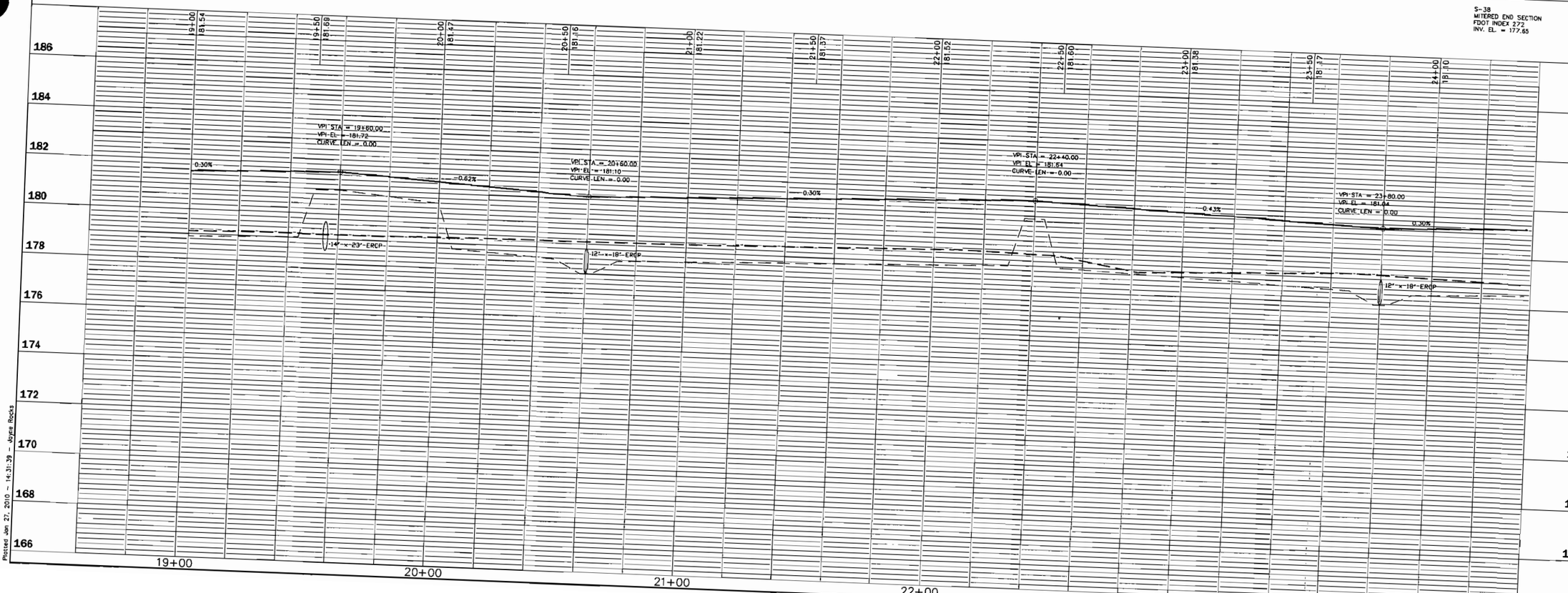
S-34B
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.00

S-35
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 178.02

S-36
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.71

S-37
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.96

S-38
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.65



No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALES:
HORIZONTAL: 1"=20'
VERTICAL: 1" = 2'

EDA
ENG. DENMAN & ASSOCIATES, INC.
ENGINEERS - SURVEYORS - PLANNERS
EB 3266
2404 NW 43rd ST, GAINESVILLE, FLORIDA 32606-6803
TEL: (352) 373-3541 FAX: (352) 378-2249

Project: GAINESVILLE RENEWABLE ENERGY CENTER
CITY OF GAINESVILLE, FLORIDA

Sheet title: ROADWAY PLAN & PROFILES
ACCESS ROAD
SHEET 5 of 7

Project phase: STATE CERTIFICATION

Designed: CSV | Drawn: JAR | Date: NOV. 13, 2009

Project No: 09-194

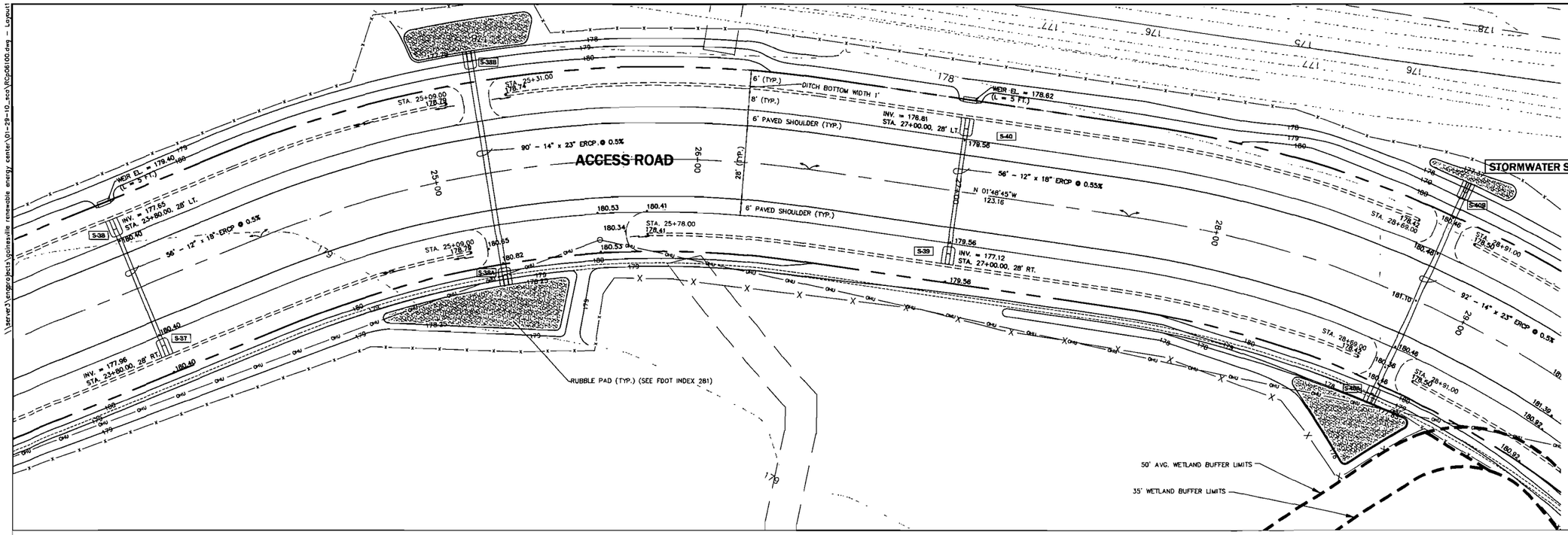
Professional Engineer of Record:

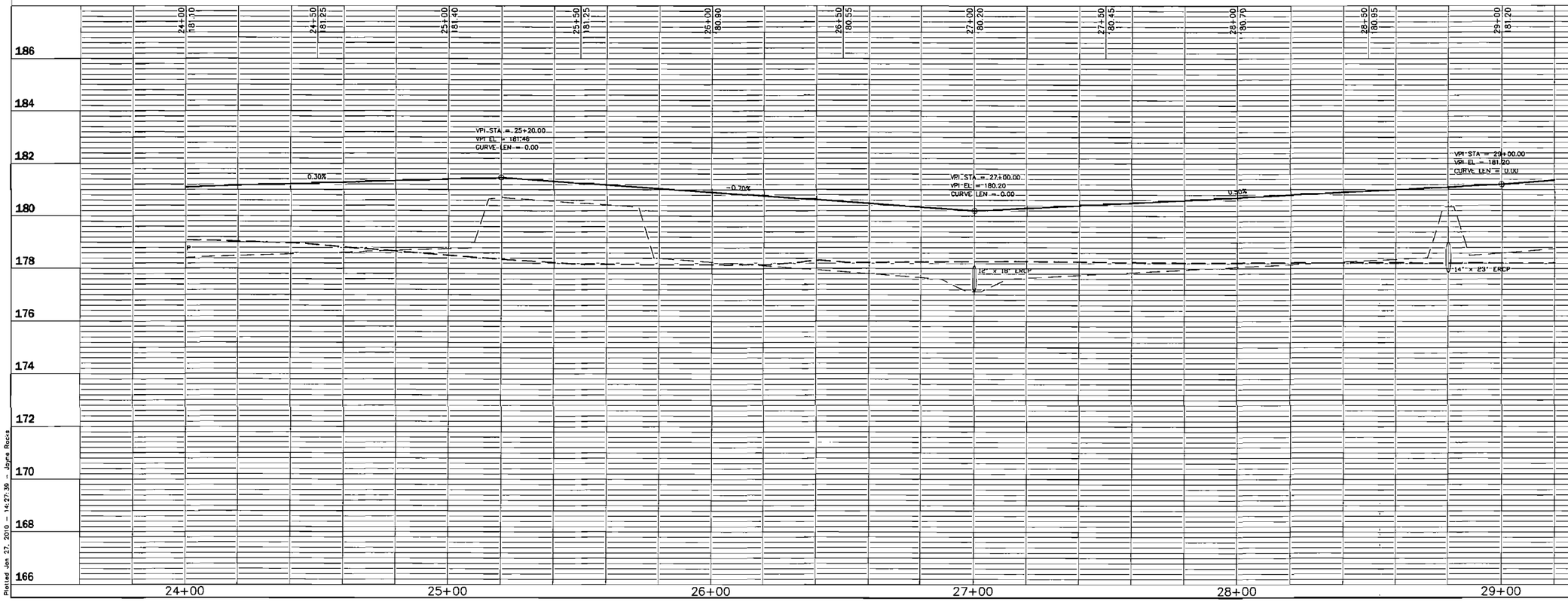
Claudia S. Vega, P.E. — Engineer

51332 — Certificate No.

Sheet No.: C6.04

\\server3\engprojects\gainesville renewable energy center\01-29-10_sca\RDwC6100.dwg - Layout1
Plotted: Jan 27, 2010 - 14:31:39 - dyes Rocks





No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALES:
HORIZONTAL: 1"=20'
VERTICAL: 1" = 2'

ENG, DENMAN & ASSOCIATES, INC.
ENGINEERS · SURVEYORS · PLANNERS
EB 2296
2404 N.W. 43rd ST., GAINESVILLE, FLORIDA 32606-6603
TEL. (352) 373-3541 FAX: (352) 373-7249
E-MAIL: eda@edafl.com

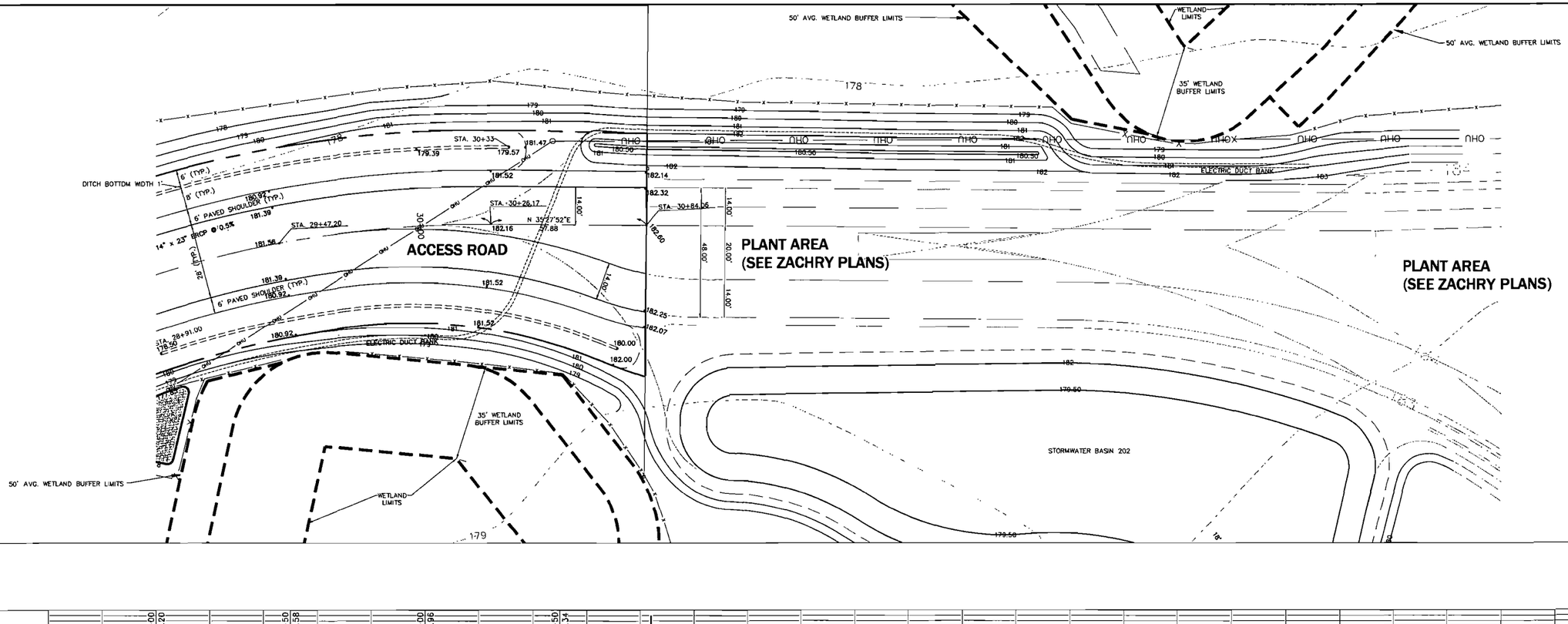
Project: GAINESVILLE RENEWABLE ENERGY CENTER
CITY OF GAINESVILLE, FLORIDA

Sheet title: ROADWAY PLAN & PROFILES
ACCESS ROAD
SHEET 6 of 7

Project phase: STATE CERTIFICATION
Designed: CSV | Drawn: JVR | Date: NOV. 13, 2009
Project No: 09-194
Professional Engineer of Record:
Claudia S. Vega P.E. Engineer
51532 Certificate No.

Sheet No.: C6.05

I:\server3\engprojects\gainesville renewable energy center\01-29-10_sco\R\cp06100.dwg — Layout1
Plotted Jan 27, 2010 — 14:27:39 — Joyce Rocs



No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALES:
HORIZONTAL: 1"=20'
VERTICAL: 1" = 2'

ENG. DENMAN & ASSOCIATES, INC.
ENGINEERS · SURVEYORS · PLANNERS
EB 2289
2464 N.W. 43rd ST. GAINESVILLE, FLORIDA 32606-6602
TEL. (352) 373-3541 FAX. (352) 373-7249
E-MAIL: eda@denmanfl.net

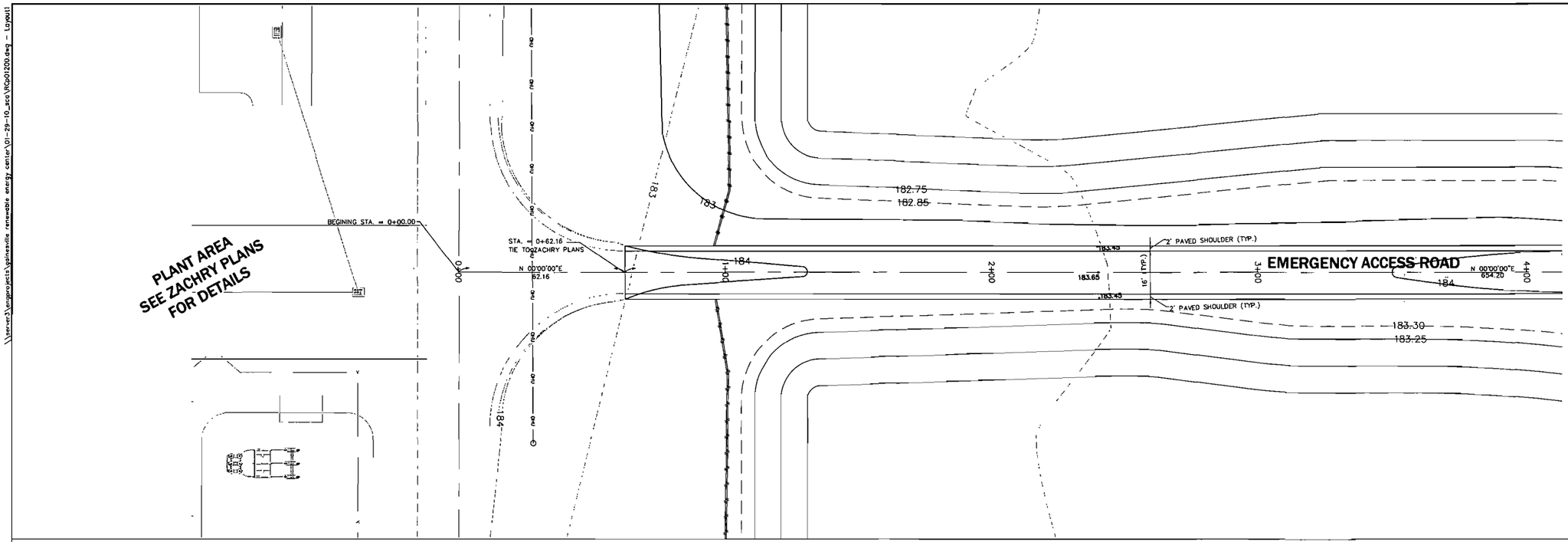
Project: GAINESVILLE RENEWABLE ENERGY CENTER
CITY OF GAINESVILLE, FLORIDA

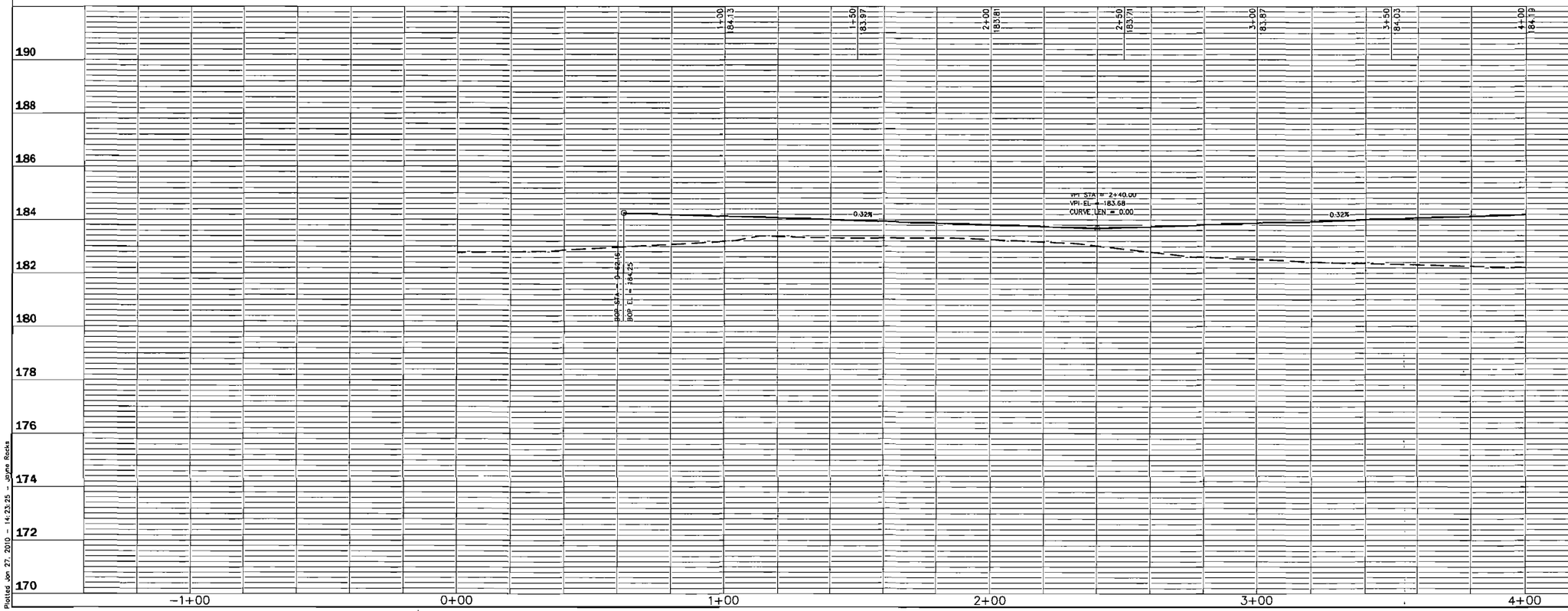
Sheet title: ROADWAY PLAN & PROFILES
ACCESS ROAD
SHEET 7 of 7

Project phase: STATE CERTIFICATION
Designed: GSV | Drawn: JVR | Date: NOV. 13, 2009
Project No: 09-194
Professional Engineer of Record:
Claudia S. Vega P.E. — Engineer
51332 — Certificate No.

Sheet No.: C6.06

\\server3\vongprojects\gainesville renewable energy center\01-29-10_acv\RCp07100.dwg — Layout1
Plotted Jan 27, 2010 — 14:26:22 — Jayna Rocks





No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALES:
HORIZONTAL: 1"=20'
VERTICAL: 1" = 2'

ENG, DENMAN & ASSOCIATES, INC.
ENGINEERS - SURVEYORS - PLANNERS
EB 2389
2464 N.W. 43rd ST., GAINESVILLE, FLORIDA 32606-6600
TEL. (352) 373-3541 FAX. (352) 378-7249
EMAIL: eda@eda-inc.net

Project: GAINESVILLE RENEWABLE ENERGY CENTER
CITY OF GAINESVILLE, FLORIDA

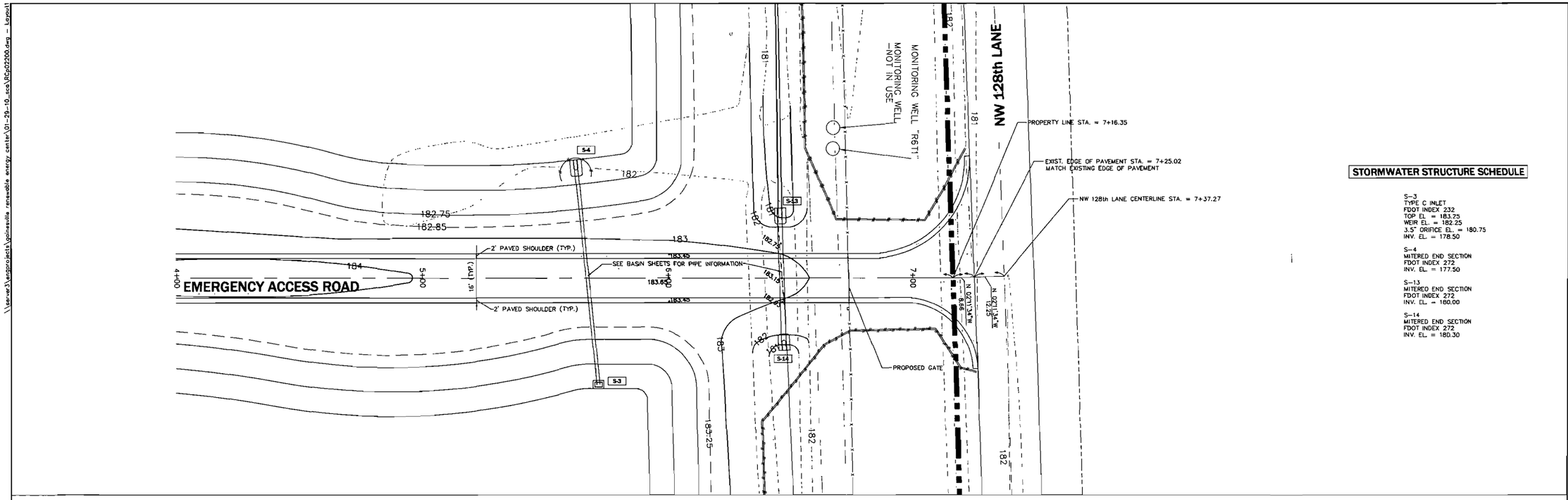
Sheet title: EMERGENCY ACCESS ROAD TO NW 128th LANE
STA. 0+00 to 4+00
SHEET 1 of 2

Project phase: STATE CERTIFICATION
Designed: CSV Drawn: JVR
Project No: 09-194 Date: NOV. 13, 2009
Professional Engineer of Record:
Claudia S. Vega P.E. Engineer
51532 Certificate No.

Sheet No.: C6.07

\\server1\vengproject\gainesville renewable energy center\01-29-10_acq\RCp01200.dwg - Layout1
Plotted Jan 27, 2010 - 14:23:25 - Joyne Rocks

\\server1\engprojects\gainesville renewable energy center\01-29-10_sca\RCp02200.dwg - Layout1



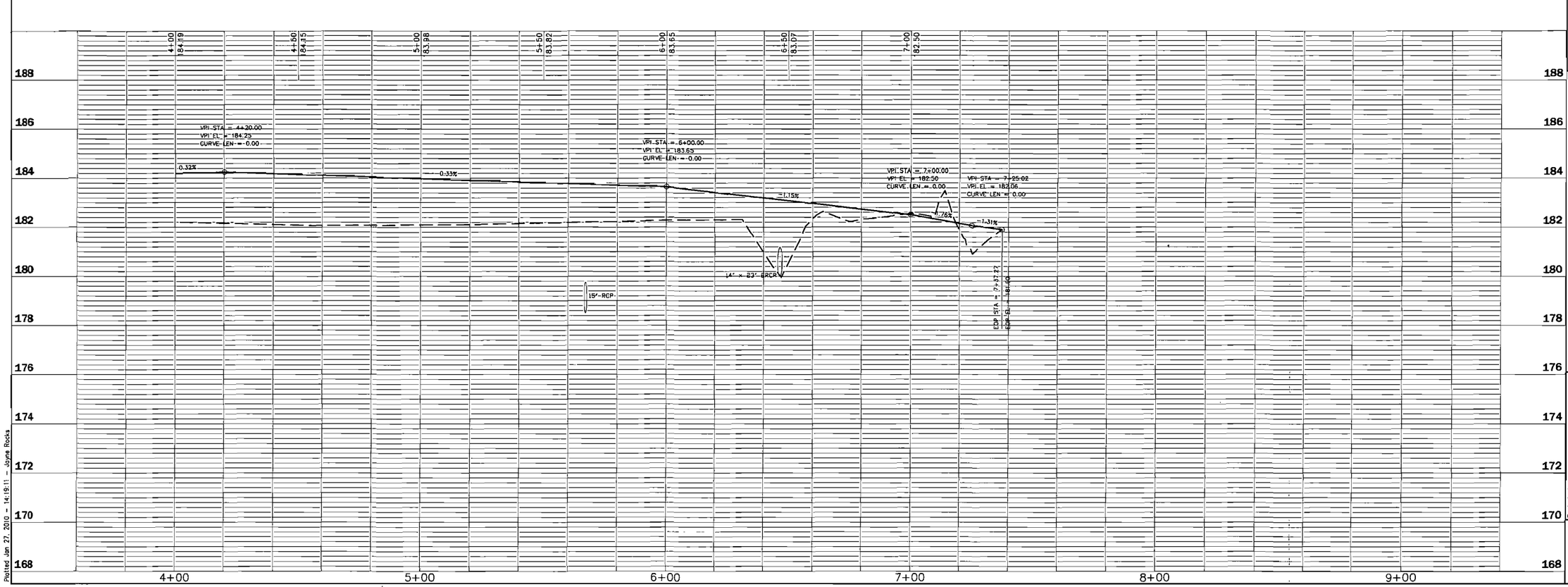
STORMWATER STRUCTURE SCHEDULE

S-3
TYPE C INLET
FDOT INDEX 232
TOP EL = 183.25
WEIR EL. = 182.25
3.5" ORIFICE EL. = 180.75
INV. EL. = 178.50

S-4
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 177.50

S-13
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 180.00

S-14
MITERED END SECTION
FDOT INDEX 272
INV. EL. = 180.30



No.	Date	Comment
1	01/29/10	REVISIONS PER STATE COMMENTS

NORTH

SCALES:
HORIZONTAL: 1"=20'
VERTICAL 1" = 2'

ENG, DENHAM & ASSOCIATES, INC.
ENGINEERS - SURVEYORS - PLANNERS
EB 3289
240 N.W. 43rd St., Suite 151, Gainesville, FL 32607-6402
Tel. (352) 373-3541 Fax: (352) 373-7249
E-mail: eda@eda-inc.net

Project:
GAINESVILLE RENEWABLE ENERGY CENTER
CITY OF GAINESVILLE, FLORIDA

Sheet title:
EMERGENCY ACCESS ROAD TO NW 128th LANE
STA. 4+00 to 7+36.66
SHEET 2 of 2

Project phase:
STATE CERTIFICATION

Designed: CSV | Drawn: JVR
Project No: 09-194 | Date: NOV. 13, 2009

Professional Engineer of Record:

Claudia S. Vega P.E. 51532
Engineer Certificate No.

Sheet No.:
C6.08

Plotted Jan 27, 2010 - 14:19:11 - Joyne Rocks

BOUNDARY AND TOPOGRAPHIC SURVEY
OF
GAINESVILLE RENEWABLE ENERGY CENTER
IN
SECTION 27, TOWNSHIP 8 SOUTH, RANGE 19 EAST
ALACHUA COUNTY, FLORIDA

WETLAND AREA "A"

LINE NO	BEARING	DISTANCE
L1	N14°47'43"E	54.03'
L2	N35°09'29"E	59.36'
L3	N33°04'22"E	43.63'
L4	N13°53'06"W	60.01'
L5	N33°21'27"E	69.40
L6	N25°37'10"E	59.35'
L7	N85°50'25"E	51.93'
L8	N09°57'19"E	53.58'
L9	N41°17'12"E	47.78'
L10	N83°05'33"E	94.64'
L11	N37°54'00"E	42.76'
L12	N42°44'22"E	56.38'
L13	N37°05'05"W	50.85'
L14	N04°47'24"W	59.91'
L15	N70°28'47"E	59.00'
L16	N67°08'49"E	100.37'
L17	N43°39'48"E	73.39'
L18	N06°15'31"E	51.53'
L19	N27°09'50"E	50.93'
L20	N77°13'19"E	70.89'
L21	N13°05'52"W	46.70'
L22	N03°31'03"E	71.10'
L23	N47°32'24"E	69.52'
L24	N15°25'32"W	75.65
L25	N11°38'15"E	58.01'
L26	N07°58'29"E	103.55'
L27	S81°31'10"E	61.60
L28	N06°31'15"E	49.70'
L29	N81°22'46"E	79.68'
L30	S89°41'16"E	98.48
L31	N00°46'32"E	7.59'
L32	N88°55'14"W	93.38'
L33	S89°40'49"W	161.81
L34	N89°53'29"W	109.43'
L35	S87°18'59"W	90.38'
L36	S86°51'19"W	87.01'
L37	S85°01'55"W	95.22'
L38	S86°21'03"E	65.76
L39	N89°12'38"E	95.53
L40	S85°10'16"E	60.39'
L41	S00°05'35"W	15.00'
L42	S29°27'32"W	16.92'
L43	S46°34'08"W	51.56'
L44	S69°12'07"W	61.55
L45	S10°53'25"W	80.83
L46	S55°29'21"W	75.86'
L47	S71°15'12"W	38.80'
L48	S65°03'27"W	49.35
L49	S07°22'14"W	61.87'
L50	S16°31'40"W	76.10'
L51	S36°52'01"E	40.72
L52	S05°32'33"E	71.36'
L53	S30°55'05"W	28.78'
L54	S29°49'00"W	35.67'
L55	S47°14'57"W	47.15'
L56	S63°28'45"W	41.38'
L57	S22°09'43"W	43.19
L58	S19°44'00"E	55.15'
L59	S78°09'32"W	44.60'
L60	N79°16'00"W	44.73'
L61	S77°21'30"W	35.12'
L62	S88°25'52"W	50.50'
L63	S72°15'02"W	50.28
L64	S57°31'17"W	61.98'
L65	S40°45'06"W	78.66
L66	S29°21'58"W	53.04
L67	S14°49'20"W	54.99
L68	S06°10'06"W	61.88'
L69	S07°39'58"W	62.82'
L70	S00°09'56"W	64.99
L71	N53°20'06"W	18.89'
L72	N05°47'58"W	97.04
L73	N80°42'58"W	10.76'
L74	S01°50'16"E	137.20'
L75	S01°03'37"E	130.74
L76	S02°27'26"E	156.64
L77	S01°38'16"E	81.61
L78	S00°22'24"E	133.66'
L79	S02°03'41"E	190.03'
L80	S03°23'27"E	149.[illegible]
L81	S00°18'41"E	113.02'
L82	S03°43'30"E	109.46'
L83	S00°55'07"E	114.41
L84	S04°06'06"E	68.03'
L85	S01°37'15"E	100.90'
L86	S01°42'51"E	83.46
L87	S79°40'46"E	8.29'
L88	N04°58'46"W	26.84
L89	N02°50'13"W	5[illegible].25'
L90	N01°29'14"W	100.55
L91	N00°55'56"W	73.49'
L92	N02°11'41"W	115.42'
L93	N02°15'54"W	105.62'
L94	N01°09'49"W	111.04'
L95	N02°01'01"W	159.94
L96	N01°29'03"W	175.30'
L97	N02°06'21"W	135.[illegible]0'
L98	N08°33'21"E	43.[illegible]5'
L99	N01°18'08"E	49.67
L100	N75°03'37"E	29.[illegible]7'
L101	N78°21'14"E	58.89
L102	N26°14'54"E	18.46
L103	N68°19'03"E	[illegible].03'
L104	N83°52'09"E	59.40
L105	S86°29'[illegible]7"E	52.71
L106	N08°18'20"W	35.85
L107	N12°20'50"W	53.73'
L108	N14°47'43"E	5.05
L109	N87°18'42"E	16.93'
L110	N80°36'37"E	55.75'
L111	N88°04'59"E	58.[illegible]2'
L112	S83°04'26"E	81.45'
L113	S75°54'39"E	18.[illegible]9'
L114	S76°[illegible]'04"E	[illegible].93'
L115	N80°18'34"E	51.07'
L116	S00°05'26"E	2.78'
L117	S78°45'57"W	51.32'
L118	N80°08'47"W	14.36'
L119	N74°41'51"W	[illegible]0.66'
L120	N84°12'01"W	78.89'
L121	S89°18'55"W	36.65'
L122	S80°22'12"W	54.82'
L123	S86°51'2[illegible]"W	21.03'

WETLAND AREA "B"

LINE NO	BEARING	DISTANCE
L124	S87°12'27"W	22.42'
L125	N89°56'12"W	54.38'
L126	N28°11'20"W	38.68'
L127	N54°27'33"W	45.67'
L128	S37°34'28"W	41.58'
L129	S62°46'02"W	53.65'
L130	S68°42'55"W	38.91'
L131	S59°46'13"W	34.05'
L132	S81°49'26"W	93.41'
L133	S41°55'50"W	57.72'
L134	S28°19'27"W	33.26'
L135	S80°34'31"W	52.79'
L136	S37°47'33"W	47.00'
L137	S11°05'22"W	38.35'
L138	S34°49'41"W	32.93'
L139	S66°28'24"W	51.98'
L140	S63°57'46"W	37.48'
L141	N38°45'40"W	76.68'
L142	S80°34'34"W	40.62'
L143	S40°13'23"W	49.07'
L144	S42°55'51"E	43.45'
L145	S44°33'29"E	66.48'
L146	S50°16'01"E	58.74'
L147	S06°58'27"W	46.07'
L148	S01°53'01"W	52.70'
L149	S63°42'20"E	91.62'
L150	S74°47'06"E	45.73'
L151	S66°31'14"E	41.08'
L152	S26°34'52"E	40.91'
L153	N80°55'19"E	52.25'
L154	S89°48'38"E	69.25'
L155	N82°01'14"E	71.96'
L156	N86°43'01"E	77.41'
L157	N67°14'46"E	101.61'
L158	S04°48'04"E	38.18'
L159	S81°48'42"E	33.68'
L160	S79°21'45"E	36.63'
L161	S83°12'57"E	39.01'
L162	S73°10'15"E	21.00'
L163	N74°24'21"E	29.69'
L164	N03°01'19"E	68.25'
L165	N02°04'59"W	59.00'
L166	N07°29'07"W	91.52'
L167	N09°26'52"E	98.38'
L168	N10°30'49"W	77.29'
L169	N04°31'13"E	82.11'
L170	N00°30'30"E	79.91'
L171	S87°12'27"W	71.72'
L172	N64°30'56"E	11.11'
L173	N62°46'50"E	71.78'
L174	N68°11'25"E	11.05'
L175	N05°59'46"E	5.53'
L176	N25°04'40"W	7.92'
L177	S62°50'23"W	8.17'
L178	S60°43'47"W	79.02'
L179	S62°17'22"W	27.91'

WETLAND AREA "C"

LINE NO	BEARING	DISTANCE
L180	N57°12'23"E	30.69'
L181	N27°15'48"E	55.31'
L182	N64°21'44"E	69.73'
L183	N61°51'21"E	83.93'
L184	N64°48'19"E	57.37'
L185	N39°21'[illegible]2"E	60.70'
L186	S70°29'10"E	50.03'
L187	S72°02'33"E	30.44'
L188	S19°48'50"E	36.84
L189	S46°26'23"E	29.82'
L190	S37°32'14"E	44.53'
L191	S04°37'04"E	46.19'
L192	S31°33'45"E	25.29'
L193	S17°04'40"W	29.82'
L194	S17°26'14"W	35.01
L195	S09°05'45"W	47.53'
L196	S01°26'07"W	32.75'
L197	S07°43'21"E	30.79'
L198	S04°22'43"W	28.86'
L199	S53°34'22"W	36.86'
L200	S49°30'35"W	37.01
L201	S37°10'58"W	34.92'
L202	S37°18'37"W	49.45
L203	[illegible]02°2[illegible]'08"W	41.73'
L204	S07°09'21"W	60.32'
L205	N62°56'08"W	17.18'
L206	N11°45'06"E	49.95'
L207	N00°47'57"E	61.61
L208	N02°04'01"E	43.40'
L209	S65°59'34"W	34.85'
L210	N66°19'34"W	43.71'
L211	N54°09'33"W	38.31'
L212	S75°46'29"W	25.66'
L213	S54°11'27"W	22.42'
L214	N56°29'09"W	39.22'
L215	N38°28'58"W	141.92
L216	N37°33'35"W	109.4[illegible]
L217	N72°46'55"E	44.33'
L346	N40°30'46"W	185.41
L347	N31°29'48"E	3.05
L348	S40°33'45"E	148.80'
L349	S40°33'45"E	39.87'

WETLAND AREA "D"

LINE NO	BEARING	DISTANCE
L218	N76°53'55"E	32.57'
L219	S43°17'02"E	34.75'
L220	S37°56'02"E	36.81'
L221	N72°45'54"E	36.89'
L222	S22°51'45"E	37.49'
L223	S83°49'40"E	42.49'
L224	S46°59'59"E	39.49'
L225	S44°41'47"E	35.97'
L226	S37°39'45"E	63.95'
L227	S38°37'12"W	34.16'
L228	S02°55'36"W	41.99'
L229	S66°47'10"W	27.82'
L230	S62°30'20"W	41.50'
L231	S40°32'26"W	40.32'
L232	N87°52'50"W	53.89'
L233	S63°50'57"W	56.81'
L234	N66°15'24"W	91.36'
L235	N01°48'23"W	38.91'
L236	N83°13'30"W	15.19'
L237	S02°29'22"E	69.48'
L238	S71°20'00"W	9.59'
L239	N03°05'32"W	100.57'
L240	N02°12'19"W	106.53'
L241	N00°27'40"W	87.86'
L242	N01°02'22"W	106.11'
L243	N00°39'31"W	171.48'
L244	S72°22'20"E	5.63'
L245	S03°13'34"E	49.09'
L246	S01°08'56"E	80.00'
L247	S02°09'34"E	98.60'
L248	S02°12'43"E	48.55'
L249	NOT USED	
L300	N73°18'31E	31.27'
L301	N60°37'52"E	35.51'

WETLAND AREA "E"

LINE NO.	BEARING	DISTANCE
L250	N88°01'57"W	78.57'
L251	N79°32'18"W	35.54'
L252	N16°34'52"W	36.89'
L253	N86°26'43"W	16.02'
L254	N05°16'22"W	26.06'
L255	S72°50'41"E	35.82'
L256	S03°05'44"E	46.82'
L257	S81°48'10"E	45.74'
L258	S85°37'22"E	60.61'
L259	S02°09'23"W	5.17'

WETLAND AREA "F"

LINE NO	BEARING	DISTANCE
L260	S64°41'42"W	23.55'
L261	N67°59'28"W	53.48'
L262	N18°05'13"E	58.06'
L263	N11°30'01"E	41.73'
L264	S49°39'28"E	44.05'
L265	N76°06'43"E	40.28'
L266	S03°40'42"E	49.94'
L267	S17°40'04"W	38.88'
L268	S89°01'50"W	19.55'

WETLAND AREA "G"

LINE NO	BEARING	DISTANCE
L269	N54°06'11"W	33.77'
L270	S29°21'06"W	29.35'
L271	S30°46'07"E	45.26'
L272	S09°51'10"W	37.25
L273	N73°47'39"E	16.00'
L274	N00°54'02"W	36.56
L275	N26°15'28"E	20.72'
L276	N03°00'56"E	21.96

WETLAND AREA "H"

LINE NO	BEARING	DISTANCE
L277	S71°01'12"E	9.04
L278	N03°01'53"E	82.31
L279	N00°19'26"W	90.18'
L280	N00°15'30"W	124.11
L281	N00°56'59"E	38.20'
L282	S83°57'45"W	11.97'
L283	S02°39'47"E	34.35'
L284	S01°20'42"W	120.81'
L285	S01°07'09"W	96.94
L286	S01°51'57"E	77.90'

WETLAND AREA "I"

LINE NO	BEARING	DISTANCE
L286	S01°51'5[illegible]"E	77.90'
L287	S87°37'50"E	6.72'
L288	N26°05'35"E	69.66
L289	S87°15'05"W	18.76'
L290	N00°14'52"E	105.54
L291	N06°56'37"E	71.51
L292	N83°52'00"W	6.38'
L293	S06°49'49"W	71.[illegible]
L294	S05°38'44"W	102.57
L295	S02°55'4[illegible]"W	65.40'

WETLAND AREA "J"

LINE NO	BEARING	DISTANCE
L296	S57°36'06"E	27.36
L297	S02°02'08"W	[illegible]7.60'
L298	N83°17'00"W	[illegible]4.74
L299	N02°18'02"E	79.63'

WETLAND DITCHES

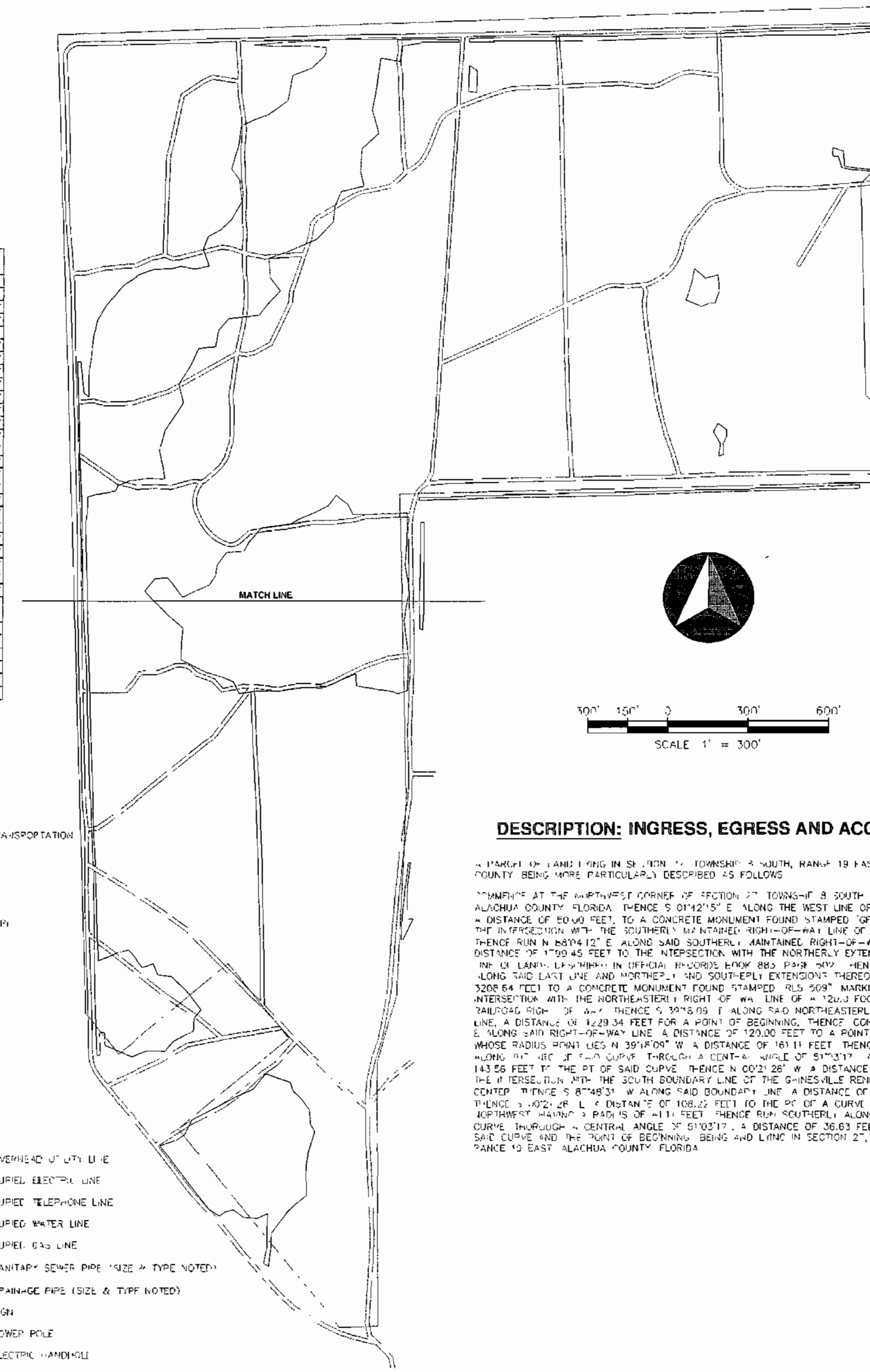
LINE NO	BEARING	DISTANCE
L302	S88°47'17"W	131.90
L303	S87°57'24"W	234.84'
L304	S89°06'55"W	233.83'
L305	S88°20'31"W	145.40
L306	S89°19'04"W	233.52'
L307	S88°28'25"W	151.01'
L308	S03°23'20"E	12.10'
L309	N88°42'08"E	151.88'
L310	N89°38'04"E	233.47'
L311	N88°13'01"E	144.13'
L312	N88°30'01"E	228.24'
L313	N88°24'10"E	240.89'
L314	N89°50'28"E	134.29'
L315	N85°53'16"E	115.88'
L316	N36°12'51"E	9.14'
L317	N49°26'39"E	6.52'
L318	N34°35'51"W	5.57'
L319	N82°45'03"W	11.79'
L320	S88°08'19"W	117.99'
L321	S88°27'32"W	0.07'
L322	N02°36'40"W	10.59'
L323	S87°50'56"W	247.23'
L324	S88°16'23"W	204.28'
L325	S88°45'38"W	265.55'
L326	S88°30'56"W	311.84'
L327	S88°19'37"W	320.87'
L328	S02°16'29"W	8.[illegible]2'
L329	N88°23'53"E	321.69'
L330	N88°46'45"E	310.43
L331	N88°01'36"E	284.07'
L332	N88°30'59"E	206.12'
L333	N88°35'14"E	248.[illegible]9'

ABBREVIATIONS:

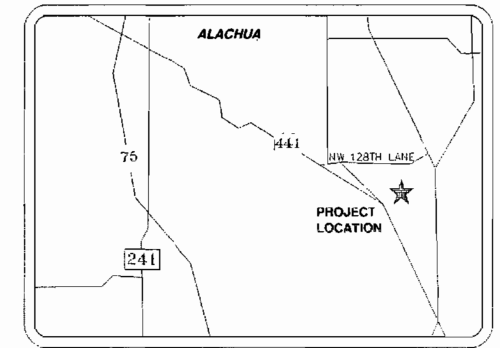
- SIRC SET IRON ROD AND CAP
- FCM FOUND CONCRETE MONUMENT
- WLF – WETLAND FLAG
- LB – LICENSED BUSINESS
- RLS REGISTERED LAND SURVEYOR
- FIRC – FOUND IRON ROD AND CAP
- F.D.O.T. – FLORIDA DEPARTMENT OF TRANSPORTATION
- (F) – FIELD MEASUREMENT
- CCR – CERTIFIED CORNER RECORD
- C/L – CENTER LINE
- RCP – REINFORCED CONCRETE PIPE
- PVC – POLYVINYL CHLORIDE PIPE
- CMP – CORRUGATED METAL PIPE
- TCP – TERRA COTTA PIPE
- HDPE – HIGH DENSITY POLYETHYLENE PIPE
- DIP – DUCTILE IRON PIPE
- W/ – WITH
- F.O.C. FIBER OPTIC CABLE
- TRAV – TRAVERSE
- IRC – IRON ROD AND CAP
- INV INVERT
- NLD NAIL AND DISC
- ELEV ELEVATION
- GFY GEORGE F. YOUNG
- L – LENGTH
- R – RADIUS
- Δ – DELTA ANGLE
- SRL – STATE ROAD
- R/W – RIGHT OF WAY
- FIR – FOUND IRON ROD

LEGEND:

- ---OE---OE--- OVERHEAD UTILITY LINE
- ---BE---BE--- BURIED ELECTRIC LINE
- ---BT---BT--- BURIED TELEPHONE LINE
- ---W---W--- BURIED WATER LINE
- ---GAS---GAS--- BURIED GAS LINE
- ---SS---SS--- SANITARY SEWER PIPE (SIZE & TYPE NOTED)
- DRAINAGE PIPE (SIZE & TYPE NOTED)
- SIGN
- POWER POLE
- EH ELECTRIC HANDHOLE
- ℄ CENTERLINE
- L138 LINE TABLE DIMENSION



KEY MAP



LOCATION MAP
(NOT TO SCALE)

SURVEYOR'S NOTES:

1. THE BEARINGS SHOWN HEREON ARE BASED ON THE NORTH LINE OF SECTION 27, TOWNSHIP 8 SOUTH, RANGE 19 EAST, BEING N 88°59'59" E, ESTABLISHED FROM FIELD TIES TO NATIONAL GEODETIC SURVEY (NGS) CONTROL STATIONS A 143, A 145, AND A 117, NORTH AMERICAN DATUM OF 1983, 2007 ADJUSTMENT (NAD 83, 2007). NGS CONTROL STATIONS DESCRIBED AS FOLLOWS.
   a. A 143: TO REACH THE STATION FROM THE POST OFFICE IN LINKWOOD, GO SOUTHEAST ON U.S. SALEM ROAD FOR 0.85 KM (0.55 MI) TO A SIDE ROAD RIGHT. TURN RIGHT AND GO SOUTH ON RAVENWOOD ROAD FOR 1.90 KM (1.20 MI) TO A SIDE ROAD LEFT. TURN LEFT AND GO EAST ON A DIRT DRIVEWAY FOR 0.42 KM (0.25 MI) TO THE MARK ON THE LEFT. THE MARK IS A CGS TRIANGULATION DISK SET IN THE TOP OF A 0.3 M (1.0 FT) SQUARE CONCRETE POST PROJECTING 0.13 M (0.4 FT) ABOVE THE GROUND. THE STATION IS LOCATED 15.7 M (51.5 FT) SOUTHWEST FROM THE SOUTHWEST EDGE OF A CULTIVATED FIELD 8.1 M (26.6 FT) SOUTH-SOUTHEAST FROM A 0.25 M (0.8 FT) CHERRY TREE, 7.7 M (25.3 FT) NORTHEAST FROM THE NORTHEAST CORNER OF A TWO STORY HOUSE AND 7.0 M (23.0 FT) NORTH FROM THE NORTH CORNER OF A BLOCK BUILDING.
   b. A 145: TO REACH THE STATION FROM THE INTERSECTION OF U.S 441 AND ACR 237 IN HAGUE, GO NORTH FOR 0.2 KM (0.1 MI) ON ACR 237 TO ACR 25A, TURN RIGHT AND GO EAST FOR 0.3 KM (0.2 MI) ON ACR 25A TO NW 31, TURN LEFT AND GO NORTHEAST FOR 0.8 KM (0.5 MI) ON NW 31 TO A PAVED ROAD AT THE ENTRANCE TO THE UNIVERSITY OF FLORIDA DAIRY RESEARCH FARM. CONTINUE STRAIGHT AHEAD AND NORTHEAST FOR 1.1 KM (0.7 MI) ON NW 31 TO THE STATION ON THE LEFT. THE STATION IS WEST 11.3 METERS (37 FT) OF CENTERLINE, EAST 0.9 METERS (3 FT) OF A FENCE, AND EAST 6.4 METERS (21 FT) OF A POWER POLE.
   c. A 117: TO REACH THE STATION FROM THE INTERSECTION OF U.S. 441 AND SR 121, GO NORTH FOR 5 KM (3.1 MI) ON SR 121 TO THE JUNCTION WITH ACR 231, GO NORTH FOR 3.4 KM (2.1 MI) ON ACR 231 TO THE INTERSECTION WITH NW 24 (A GRADED ROAD). GO WEST FOR 1 KM (0.6 MI) ON NW 24 TO THE STATION ON THE SOUTH SIDE OF THE ROAD AND NORTH OF A 1-STORY BRICK RESIDENCE. THE MARK IS WEST 53.6 METERS (176 FT) FROM A 12 IN LIVE OAK ON THE SOUTH OF NW 24, NORTHWEST 37.3 METERS (10.4 FT) FROM WESTERN 5 IN PINE OF A PAIR, EAST 37.3 METERS (122.5 FT) FROM A FENCE CORNER SOUTH OF NW 24, SOUTH 12.8 METERS (42 FT) FROM THE WEST END OF A 12 IN PVC CULVERT PIPE ON THE NORTH R/W OF NW 24.
2. INFORMATION FROM THE FOLLOWING SOURCES WAS USED IN PREPERATION OF THIS SURVEY.
   a. FLORIDA DEPARTMENT OF ENVIORNMENTAL PROTECTION LAND BOUNDARY INFORMATION SYSTEMS (LABINS) WEBSITE
   b. NATIONAL GEODETIC SURVEY
   c. DRAFT OF TITLE INSURANCE COMMITMENT PROVIDED BY OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY, TO BE ISSUED THROUGH ATTORNEY'S TITLE FUND SERVICES, LLC
   d. RECORDED DOCUMENTS OF THE PUBLIC RECORDS OF ALACHUA COUNTY, FLORIDA.
   e. SURVEYS AND MAPS PROVIDED BY GAINESVILLE REGIONAL UTILITIES (GRU)
   f. FLORIDA DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY MAPS FOR STATE ROAD 25, US 441
3. UNLESS OTHERWISE NOTED, ALL DIMENSIONS SHOWN HEREON ARE IN U.S. SURVEY FEET AND ARE BASED ON FIELD (SURVEY) MEASUREMENTS.
4. ELEVATIONS SHOWN HEREON ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), DERIVED FROM THE ORIGIN BENCHMARKS H 51 AND 175 H 1 DESCRIBED AS FOLLOWS:
   a. H 51: 2.2 MILES SOUTHEAST ALONG THE ATLANTIC COAST LINE RAILROAD FROM THE STATION AT HAGUE, 100 YARDS EAST OF A FARMHOUSE, 59.5 FT SOUTHWEST OF MILEPOST RB 737, 42 FT SOUTHWEST OF THE SOUTHWEST RAIL, 19.5 FT NORTHEAST OF THE CENTER LINE OF THE OLD HIGHWAY, 0.5 FT NORTHEAST OF A STEEL WITNESS POST [illegible] IN THE [illegible] OF A CONCRETE POST. ELEVATION 145.[illegible] FEET
   b. 75 H 1: ABOUT 1.3 MILES SOUTHEAST ALONG U.S. ROUTE 441 AND 41 FROM THE INTERSECTION OF STATE ROUTE 237 AND U.S. 441 AND [illegible] AT HAGUE, IN MEDIAN OF U.S. 441 AND 41, 36 FEET WEST OF CENTERLINE OF U.S. 441 AND 41 NORTHBOUND LANE, 44.4 FEET EAST OF U.S. 441 AND 41 SOUTHBOUND LANE AND 10.7 FEET SOUTH OF A METAL POST WITH S 25A RIGHT LANE SIGN. A BRASS DISK SET IN SOUTHEAST CORNER OF CONCRETE HEADWALL FOR [illegible] INLET IN MEDIAN OF U.S. 441 AND IN SECTION 27, T 8 S, R 19 E. ELEVATION 171.67 FEET
5. SITE BENCHMARKS ARE AS SHOWN
6. THE UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON FIELD LOCATIONS OF THE UTILITIES MARKED BY THEIR RESPECTIVE OWNERS.
7. THIS SURVEY IS NOT VALID WITHOUT THE SIGNATURE AND ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER. ADDITIONS AND/OR DELETIONS TO THIS SURVEY BY OTHER THAN THE SIGNING PARTY OR PARTIES IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF THE SIGNING PARTY OR PARTIES.

DESCRIPTION: INGRESS, EGRESS AND ACCESS EASEMENT

A PARCEL OF LAND LYING IN SECTION 27, TOWNSHIP 8 SOUTH, RANGE 19 EAST, ALACHUA COUNTY, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE NORTHWEST CORNER OF SECTION 27, TOWNSHIP 8 SOUTH, RANGE 19 EAST, ALACHUA COUNTY, FLORIDA; THENCE S 01°42'15" E ALONG THE WEST LINE OF SAID SECTION 27 A DISTANCE OF 50.00 FEET, TO A CONCRETE MONUMENT FOUND STAMPED "GFY LB021" MARKING THE INTERSECTION WITH THE SOUTHERLY MAINTAINED RIGHT-OF-WAY LINE OF NW 128TH LANE; THENCE RUN N 88°04'12" E ALONG SAID SOUTHERLY MAINTAINED RIGHT-OF-WAY LINE, A DISTANCE OF 1799.45 FEET TO THE INTERSECTION WITH THE NORTHERLY EXTENSION OF THE EAST LINE OF LANDS DESCRIBED IN OFFICIAL RECORDS BOOK 883, PAGE 502; THENCE S 01°45'52" E ALONG SAID EAST LINE AND NORTHERLY AND SOUTHERLY EXTENSIONS THEREOF, A DISTANCE OF 3208.64 FEET TO A CONCRETE MONUMENT FOUND STAMPED "RLS 509" MARKING THE INTERSECTION WITH THE NORTHEASTERLY RIGHT-OF-WAY LINE OF A 120.0 FOOT WIDE CSX RAILROAD RIGHT-OF-WAY; THENCE S 39°18'09" E ALONG SAID NORTHEASTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 1229.34 FEET FOR A POINT OF BEGINNING; THENCE CONTINUE S 39°18'09" E ALONG SAID RIGHT-OF-WAY LINE, A DISTANCE OF 120.00 FEET TO A POINT ON A CURVE WHOSE RADIUS POINT LIES N 39°18'09" W, A DISTANCE OF 161.11 FEET; THENCE RUN NORTHERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 51°03'17", A DISTANCE OF 143.56 FEET TO THE PT OF SAID CURVE; THENCE N 00°21'26" W, A DISTANCE OF 112.08 FEET TO THE INTERSECTION WITH THE SOUTH BOUNDARY LINE OF THE GAINESVILLE RENEWABLE ENERGY CENTER; THENCE S 87°48'31" W ALONG SAID BOUNDARY LINE, A DISTANCE OF 120.00 FEET; THENCE S 00°21'26" E, A DISTANCE OF 108.22 FEET TO THE PC OF A CURVE CONCAVE TO THE NORTHWEST HAVING A RADIUS OF 41.11 FEET; THENCE RUN SOUTHERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 51°03'17", A DISTANCE OF 36.63 FEET TO THE PT OF SAID CURVE AND THE POINT OF BEGINNING, BEING AND LYING IN SECTION 27, TOWNSHIP 8 SOUTH, RANGE 19 EAST, ALACHUA COUNTY, FLORIDA.

DESCRIPTION: LEASE BOUNDARY OF GAINESVILLE RENEWABLE ENERGY CENTER

A PARCEL OF LAND IN SECTION 27, TOWNSHIP 8 SOUTH, RANGE 19 EAST, ALACHUA COUNTY, FLORIDA, LYING NORTH AND EAST OF THE CSX RAILROAD RIGHT-OF-WAY, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE NORTHWEST CORNER OF SECTION 27, TOWNSHIP 8 SOUTH, RANGE 19 EAST, ALACHUA COUNTY, FLORIDA; THENCE S 01°42'15" E ALONG THE WEST LINE OF SAID SECTION 27 A DISTANCE OF 50.00 FEET TO A CONCRETE MONUMENT FOUND STAMPED "GFY LB02[illegible]" MARKING THE INTERSECTION WITH THE SOUTHERLY MAINTAINED RIGHT-OF-WAY LINE OF NW 128TH LANE; THENCE RUN N 88°04'12" E ALONG SAID SOUTHERLY MAINTAINED RIGHT-OF-WAY LINE, A DISTANCE OF 1799.45 FEET TO THE INTERSECTION WITH THE NORTHERLY EXTENSION OF THE EAST LINE OF THAT CERTAIN PARCEL OF LAND AS DESCRIBED AND RECORDED IN OFFICIAL RECORDS BOOK 883, PAGE 502, PUBLIC RECORDS OF ALACHUA COUNTY, FLORIDA, FOR A POINT OF BEGINNING; THENCE CONTINUE N 88°04'12" E ALONG SAID SOUTHERLY MAINTAINED RIGHT-OF-WAY LINE, A DISTANCE OF [illegible] FEET; THENCE S 01°21'26" E, A DISTANCE OF 169.34 FEET; THENCE S 43°[illegible]'34" W, A DISTANCE OF 109.95 FEET; THENCE S 01°21'26" E, A DISTANCE OF 657.92 FEET; THENCE S 46°21'26" E, A DISTANCE OF 109.95 FEET; THENCE S 01°21'26" E, A DISTANCE OF [illegible] FEET; THENCE [illegible] 88°38'34" W, A DISTANCE OF 1532.22 FEET; THENCE S 01°21'26" E, A DISTANCE OF 946.[illegible] FEET; THENCE S 07°58'54" W, A DISTANCE OF 613.09 FEET; THENCE S 15°[illegible]' [illegible]" W, A DISTANCE OF [illegible].07 FEET; THENCE S 00°21'26" E, A DISTANCE OF 615.82 FEET; THENCE S 87°48'31" W, A DISTANCE OF 120.00 FEET TO A POINT LYING 100.0 FEET NORTHEASTERLY, AS MEASURED PERPENDICULAR FROM THE NORTHEASTERLY RIGHT-OF-WAY LINE OF THE CSX RAILROAD RIGHT-OF-WAY; THENCE N 39°18'09" W, PARALLEL WITH SAID NORTHEASTERLY RAILROAD RIGHT-OF-WAY LINE AND 100.0 FEET NORTHEASTERLY THEREFROM, A DISTANCE OF [illegible] FEET; THENCE N 50°41'51" E, A DISTANCE OF 444.00 FEET; THENCE N 39°18'09" W, A DISTANCE OF 300.00 FEET; THENCE S 50°41'51" W, A DISTANCE OF 444.00 FEET; THENCE N 39°18'09" W, PARALLEL WITH SAID NORTHEASTERLY RAILROAD RIGHT-OF-WAY LINE AND 100.0 FEET NORTHEASTERLY THEREFROM, A DISTANCE OF 163.09 FEET TO THE INTERSECTION WITH THE SOUTHERLY EXTENSION OF AFORESAID EAST LINE OF THAT CERTAIN PARCEL OF LAND AS DESCRIBED AND RECORDED IN OFFICIAL RECORDS BOOK 883, PAGE 502, PUBLIC RECORDS OF ALACHUA COUNTY, FLORIDA; THENCE N 01°45'52" W ALONG SAID EAST BOUNDARY AND THE SOUTHERLY AND NORTHERLY EXTENSIONS THEREOF, A DISTANCE OF 3044.51 FEET TO THE POINT OF BEGINNING, BEING AND LYING IN SECTION 27, TOWNSHIP 8 SOUTH, RANGE 19 EAST, ALACHUA COUNTY, FLORIDA.

CONTAINING 130.78 ACRES, MORE OR LESS.

W. LANIER MATHEWS, II
PROFESSIONAL SURVEYOR AND MAPPER
FLORIDA CERTIFICATE NUMBER 4783
FOR THE FIRM GGI, LLC dba GENESIS GROUP (LB6816)

DATE

NO	DATE	DESCRIPTION — REVISIONS
1	11/03/09	ADDITIONAL TOPOGRAPHIC INFORMATION US441, ALACHUA CO PUBLIC WORKS WEST OF SITE, ADDITIONAL CROSS SECTIONS ON 128TH LANE, CONSTRUCTION LAYDOWN AREA EAST OF SITE, UTILITY CORRIDOR EAST OF SITE, GUARD HOUSE AREA, ADD SITE BENCHMARKS

GENESIS GROUP
FROM VISION TO REALITY
FL LC 26000202, FL LB 0006816, FL CA 00009660
GGI, LLC dba GENESIS GROUP
2507 CALLAWAY ROAD, SUITE 100
TALLAHASSEE, FLORIDA 32303
(850) 224-4400 (850) 681-3600 FAX

SURVEY DATE	
DRAWN BY	J.L.E., S.A.Y.
CHECKED BY	W.L.M.
SCALE	1:300

PREPARED FOR:
AMERICAN RENEWABLES
75 ARLINGTON STREET, SUITE 704
BOSTON, MA 02166

PROJECT NAME:
GAINESVILLE RENEWABLE ENERGY CENTER
GAINESVILLE, FL

SHEET TITLE: BOUNDARY AND TOPOGRAPHIC SURVEY

PROJECT NUMBER	8527-001
DRAWING DATE	09/11/09
SHEET NUMBER	1 OF 8

POINT OF COMMENCEMENT
NORTHWEST CORNER OF SECTION 27-8-19
F.C.M. 4" X 4" X-CUT
CCR #963547 & #003720

POINT OF BEGINNING
LEASE BOUNDARY
S.I.R.C. 5/8" LB #6816

NW 128TH LANE

NORTH LINE OF SECTION 27-8-19

WEST LINE OF SECTION 27-8-19

WETLAND AREA "A"
10.87 ACRES ±

WETLAND AREA "B"
7.81 ACRES ±

WETLAND AREA "E"
0.04 ACRES ±

WETLAND AREA "F"
0.18 ACRES ±

WETLAND AREA "G"
0.05 ACRES ±

WETLAND AREA "J"
0.04 ACRES ±

WETLAND DITCH
0.03 ACRES ±

WETLAND DITCH
0.02 ACRES ±

WETLAND DITCH
0.27 ACRES ±

WETLAND DITCH
0.37 ACRES ±

DIRT AND GRASS TRAIL-WIDTH VARIES

DIRT AND GRASS ROAD-WIDTH VARIES

6' CHAINLINK FENCE

6' CHAINLINK FENCE (ON LINE ±)

MONITOR WELL "R11TS"
MONITOR WELL-OLD

MONITOR WELL "R9TS"

MONITOR WELL "R6TT"
MONITOR WELL-NOT IN USE

MONITOR WELL

POND

PUMP STATION

ELECTRIC VAULT

MATCHLINE
SEE SHEET 3 OF 8

SOUTHWEST CORNER OF SECTION 27-8-19
F.C.M. 4" X 4"
CCR #0640?? & #1042??

SOUTHEAST CORNER OF SECTION 27-8-19
F.C.M. 4" X 4"
CCR #0601445 #0019?2? & #?031493

LINE TABLE

LINE NO	BEARING	DISTANCE
L334	N01°21'28"W	55.01'
L338	N01°55'48"W	50.71'
L339	N01°55'48"W	47.08'
L340	N88°04'12"E	509.80'
L341	S01°01'14"W	10.00'
L342	N01°21'28"W	194.57'
L343	S88°14'08"W	6.90'
L344	N01°15'53"W	1522.72'
L345	S88°14'08"W	11.27'
L346	N01°45'52"W	177.57'
L347	S88°14'08"W	6.14'

SCALE: 1" = 100'

NO.	DATE	DESCRIPTION
		REVISIONS
1	11/03/09	ADDITIONAL TOPOGRAPHIC INFORMATION, US441, ALACHUA CO
		PUBLIC WORKS WEST OF SITE. ADDITIONAL CROSS SECTIONS ON
		128TH LANE, CONSTRUCTION LAYDOWN AREA EAST OF SITE, UTILITY
		CORRIDOR EAST OF SITE, GUARD HOUSE AREA. ADD SITE
		BENCHMARKS.

GENESIS GROUP
FROM VISION TO REALITY
FL LC 26000202, FL LB 0006816, FL CA 00009660

GGI, LLC dba GENESIS GROUP
2507 CALLAWAY ROAD, SUITE 100
TALLAHASSEE, FLORIDA 32303
(850) 224-4400 (850) 681-3600 FAX

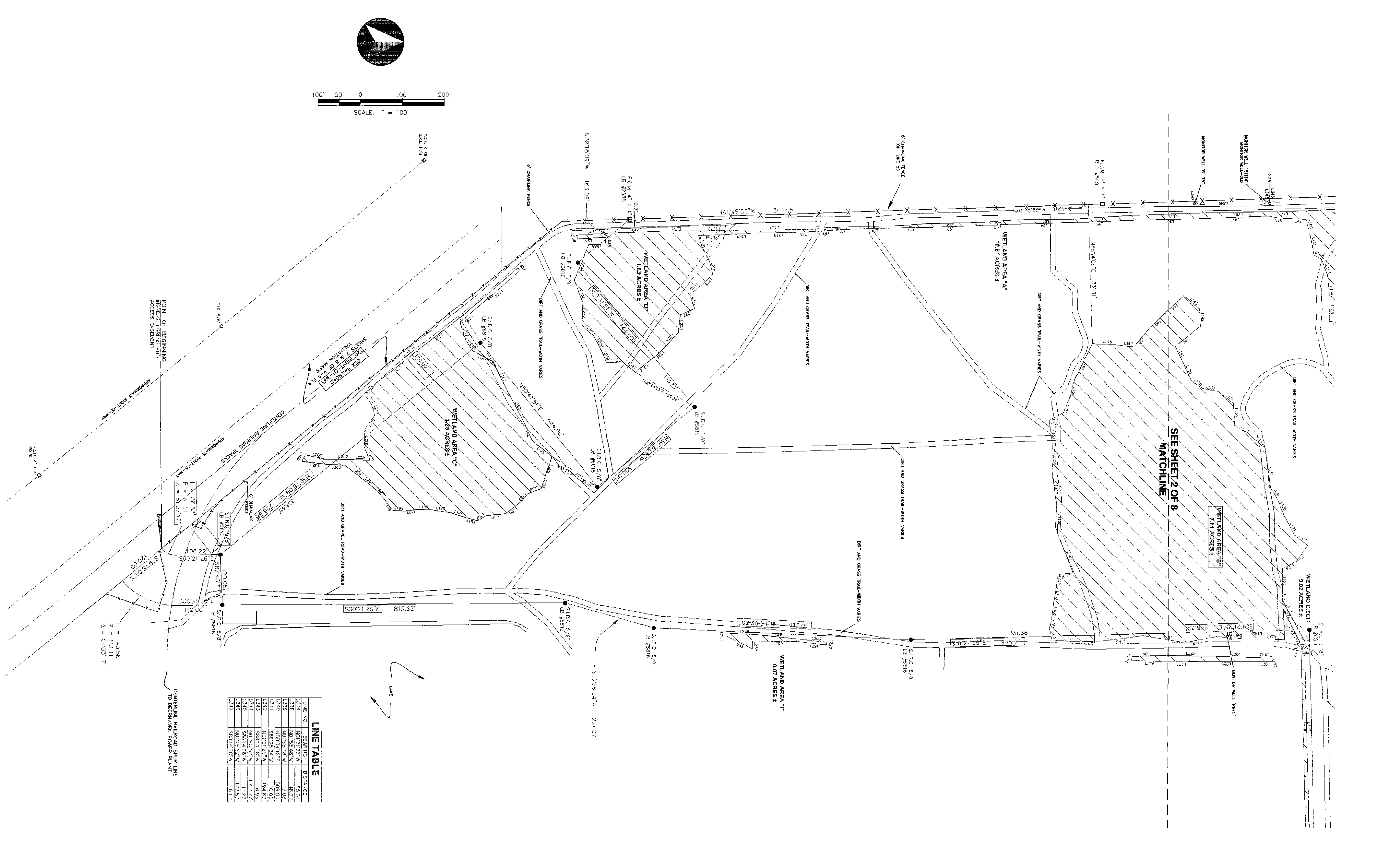
SURVEY DATE:	08/17/09
DRAWN BY:	J.L.E., S.A.Y.
CHECKED BY:	W.L.M.
SCALE:	1"=100'

PREPARED FOR:
AMERICAN RENEWABLES
75 ARLINGTON STREET, SUITE 704
BOSTON, MA 02166

PROJECT NAME:
GAINESVILLE RENEWABLE ENERGY CENTER
GAINESVILLE, FL

SHEET TITLE:
BOUNDARY AND TOPOGRAPHIC SURVEY

PROJECT NUMBER: 8527-001
DRAWING DATE: 09/11/09
SHEET NUMBER: **2 OF 8**



LINE TABLE		
LINE NO.	BEARING	DISTANCE
L334	N01°21'26"W	56.01'
L338	N01°55'48"W	46.71'
L339	N01°55'48"W	47.05
L340	N88°04'12"E	509.60'
L341	S88°38'34"W	10.00'
L342	N01°21'26"W	194.87'
L343	S88°14'08"W	6.95
L344	N01°45'52"W	1522.72'
L345	S88°14'08"W	11.27
L346	N01°45'52"W	177.57
L347	S88°14'08"W	6.14'

NO	DATE	DESCRIPTION — REVISIONS
1	11/03/09	ADDITIONAL TOPOGRAPHIC INFORMATION, US441, ALACHUA CO PUBLIC WORKS WEST OF SITE, ADDITIONAL CROSS SECTIONS ON 128TH LANE, CONSTRUCTION LAYDOWN AREA EAST OF SITE, UTILITY CORRIDOR EAST OF SITE, GUARD HOUSE AREA. ADD SITE BENCHMARKS.

GENESIS GROUP
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(850) 224-4400 (850) 681-3600 FAX

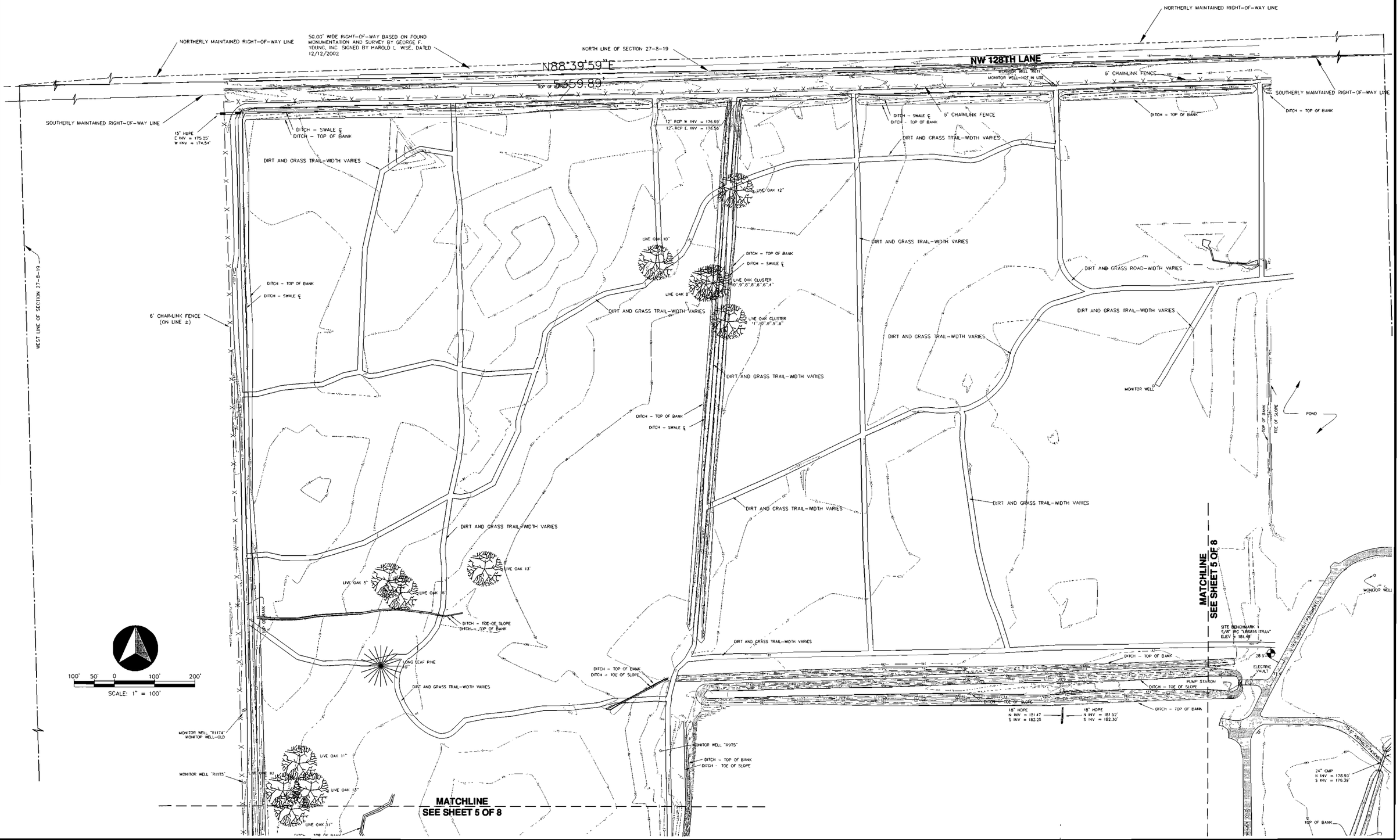
SURVEY DATE: 08/17/09
DRAWN BY: J.L.E., S.A.Y.
CHECKED BY: W.L.M.
SCALE: 1"=100'

PREPARED FOR:
AMERICAN RENEWABLES
75 ARLINGTON STREET, SUITE 704
BOSTON, MA 02166

PROJECT NAME:
GAINESVILLE RENEWABLE ENERGY CENTER
GAINESVILLE, FL

SHEET TITLE: BOUNDARY AND TOPOGRAPHIC SURVEY

PROJECT NUMBER: 8527-001
DRAWING DATE: 09/11/09
SHEET NUMBER: 3 OF 8



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GGI, LLC dba GENESIS GROUP
2507 CALLAWAY ROAD, SUITE 100
TALLAHASSEE, FLORIDA 32303
(850) 224-4400 (850) 681-3600 FAX

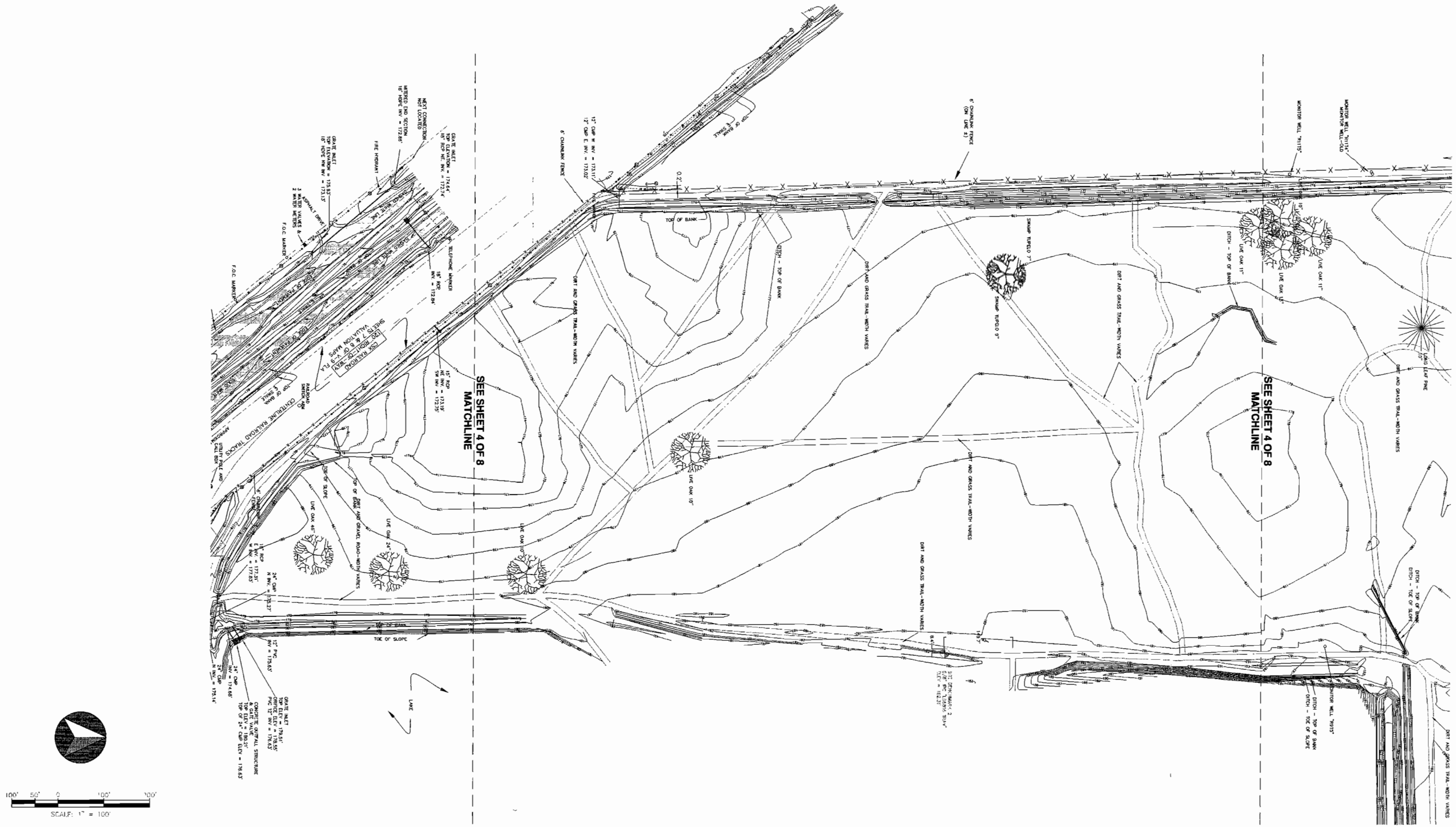
SURVEY DATE:	08/17/09
DRAWN BY:	J.L.E., S.A.Y.
CHECKED BY:	W.L.M.
SCALE:	1"=100'

PREPARED FOR:
AMERICAN RENEWABLES
75 ARLINGTON STREET, SUITE 704
BOSTON, MA 02166

PROJECT NAME:
GAINESVILLE RENEWABLE ENERGY CENTER
GAINESVILLE, FL

SHEET TITLE:
BOUNDARY AND TOPOGRAPHIC SURVEY

PROJECT NUMBER:	8527-001
DRAWING DATE:	09/11/09
SHEET NUMBER:	4 OF 8



NO.	DATE	DESCRIPTION
		REVISIONS
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		PUBLIC WORKS DEPT OF SITE, ADDITIONAL CROSS SECTIONS ON
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2507 CALLAWAY ROAD, SUITE 100
TALLAHASSEE, FLORIDA 32303
(850) 224-4400 (850) 681-3600 FAX

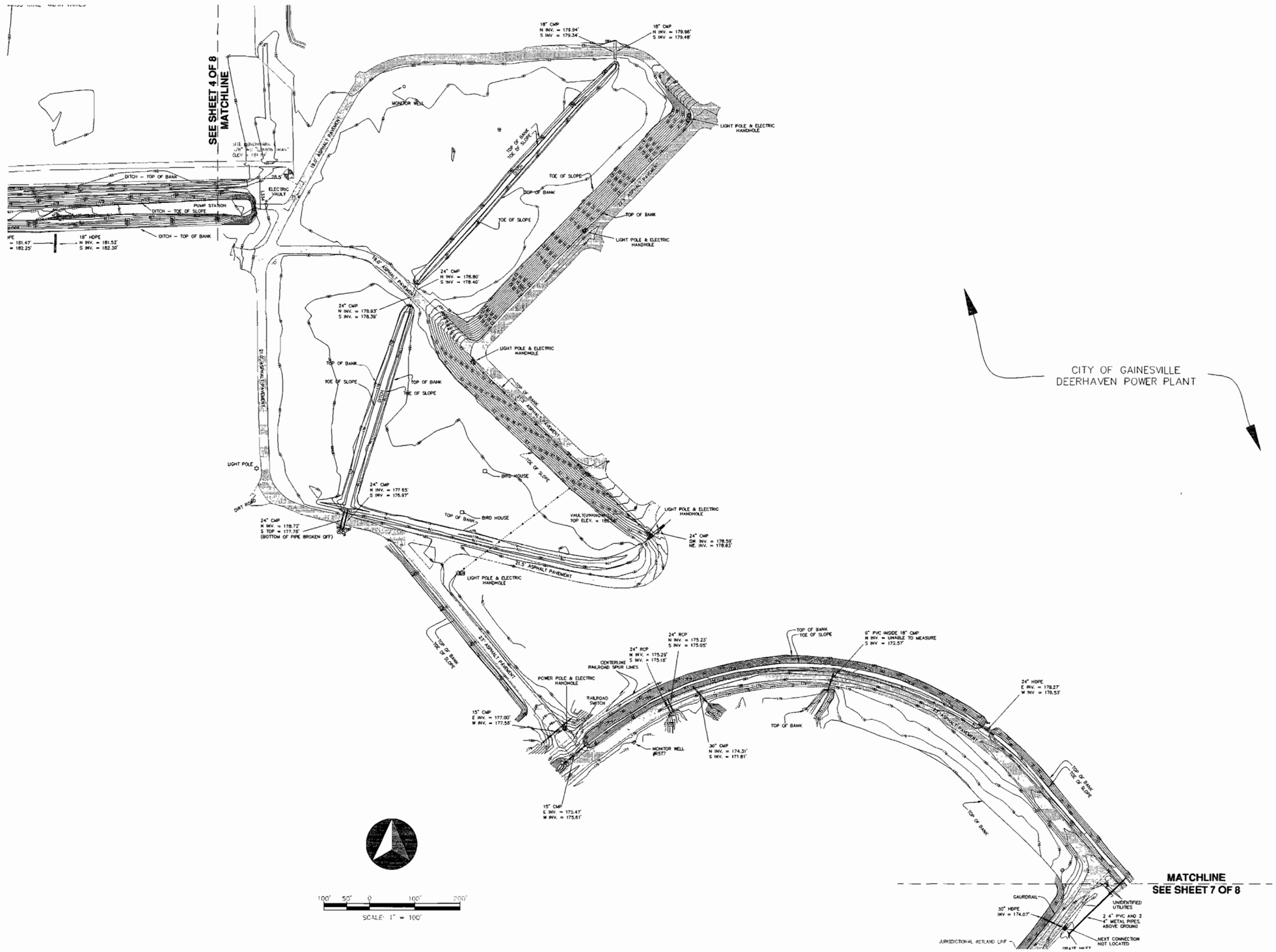
SURVEY DATE: 08/17/09
DRAWN BY: J.L.E., S.A.Y.
CHECKED BY: W.L.M.
SCALE: 1"=100'

PREPARED FOR:
AMERICAN RENEWABLES
75 ARLINGTON STREET, SUITE 704
BOSTON, MA 02166

PROJECT NAME:
GAINESVILLE RENEWABLE ENERGY CENTER
GAINESVILLE, FL

SHEET TITLE:
BOUNDARY AND TOPOGRAPHIC SURVEY

PROJECT NUMBER: 8527-001
DRAWING DATE: 09/11/09
SHEET NUMBER: **5 OF 8**



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		REVISIONS
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2507 CALLAWAY ROAD, SUITE 100
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(850) 224-4400 (850) 681-3600 FAX

SURVEY DATE	08/17/09
DRAWN BY	J.L.E., S.A.Y.
CHECKED BY	W.L.M.
SCALE	1"=100'

PREPARED FOR:

AMERICAN RENEWABLES
75 ARLINGTON STREET, SUITE 704
BOSTON, MA 02166

PROJECT NAME:

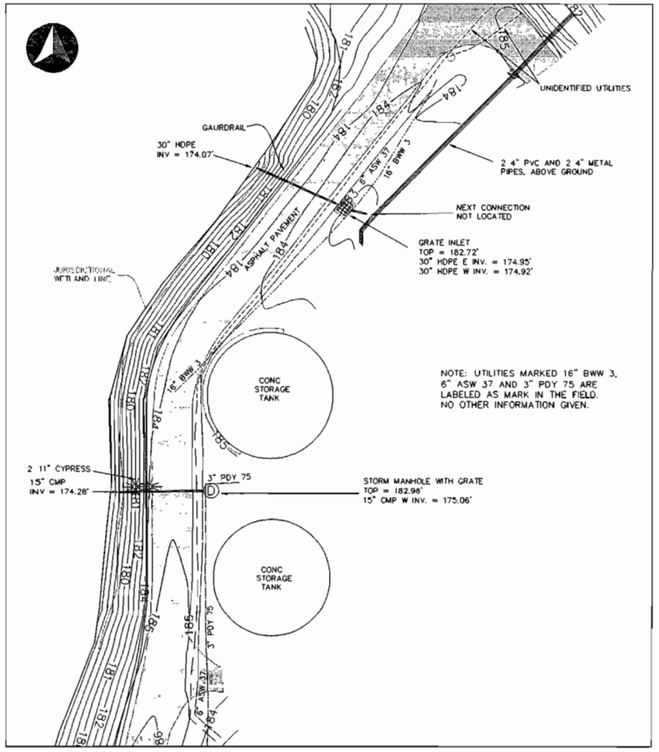
GAINESVILLE RENEWABLE ENERGY CENTER
GAINESVILLE, FL

SHEET TITLE:

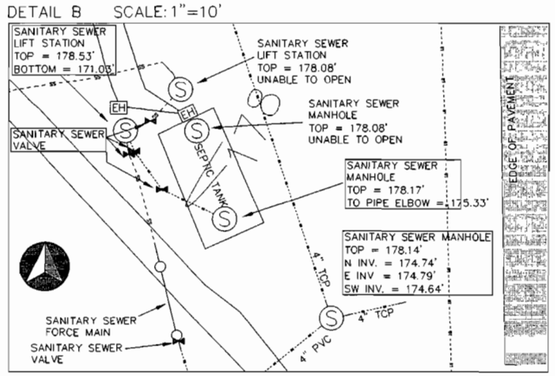
BOUNDARY AND TOPOGRAPHIC SURVEY

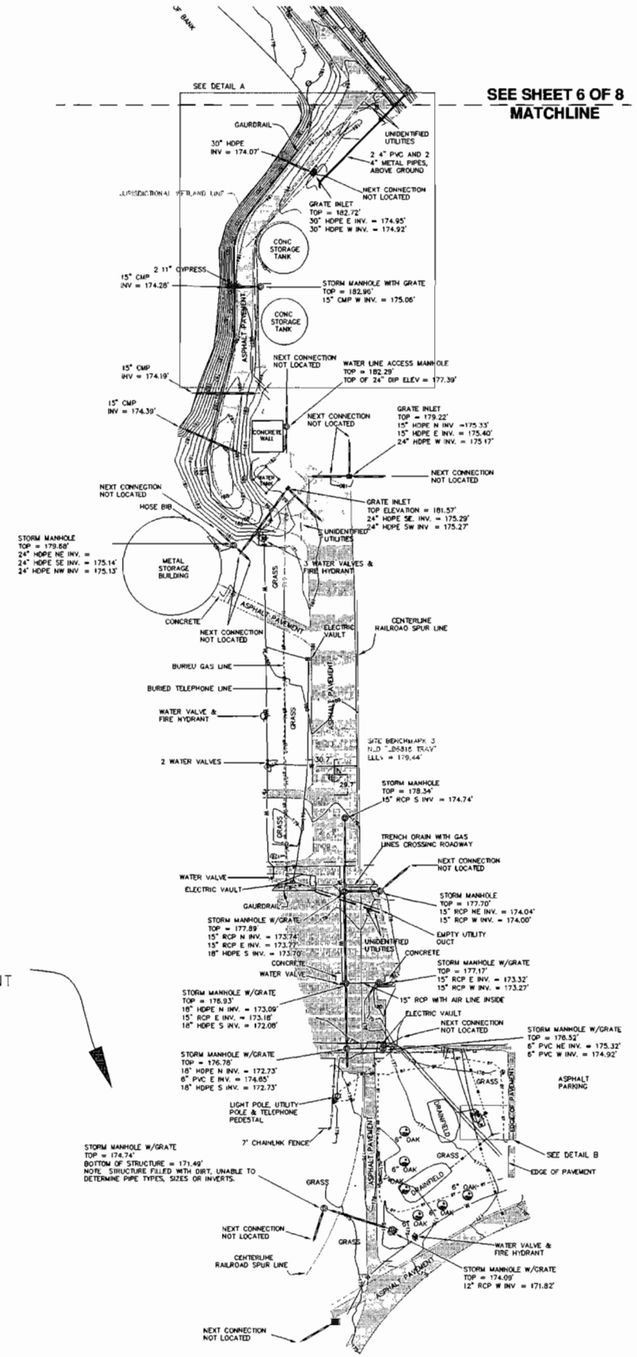
PROJECT NUMBER	8527-001
DRAWING DATE	09/11/09
SHEET NUMBER	6 OF 8

DETAIL A SCALE: 1"=40'



DETAIL B SCALE: 1"=10'





CITY OF GAINESVILLE
DEERHAVEN POWER PLANT

CITY OF GAINESVILLE
DEERHAVEN POWER PLANT

100' 50' 0 100' 200'
SCALE: 1" = 100'

NO	DATE	DESCRIPTION
		REVISIONS
1	11/03/09	ADDITIONAL TOPOGRAPHIC INFORMATION: US441, ALACHUA CO.
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		126TH LANE, CONSTRUCTION LAYDOWN AREA EAST OF SITE, UTILITY
		CORRIDOR EAST OF SITE, GUARD HOUSE AREA. ADD SITE
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GENESIS GROUP
FROM VISION TO REALITY
FL LC 26000202, FL LB 0006816, FL CA 00009660

GGI, LLC dba GENESIS GROUP
2507 CALLAWAY ROAD, SUITE 100
TALLAHASSEE, FLORIDA 32303
(850) 224-4400 (850) 681-3600 FAX

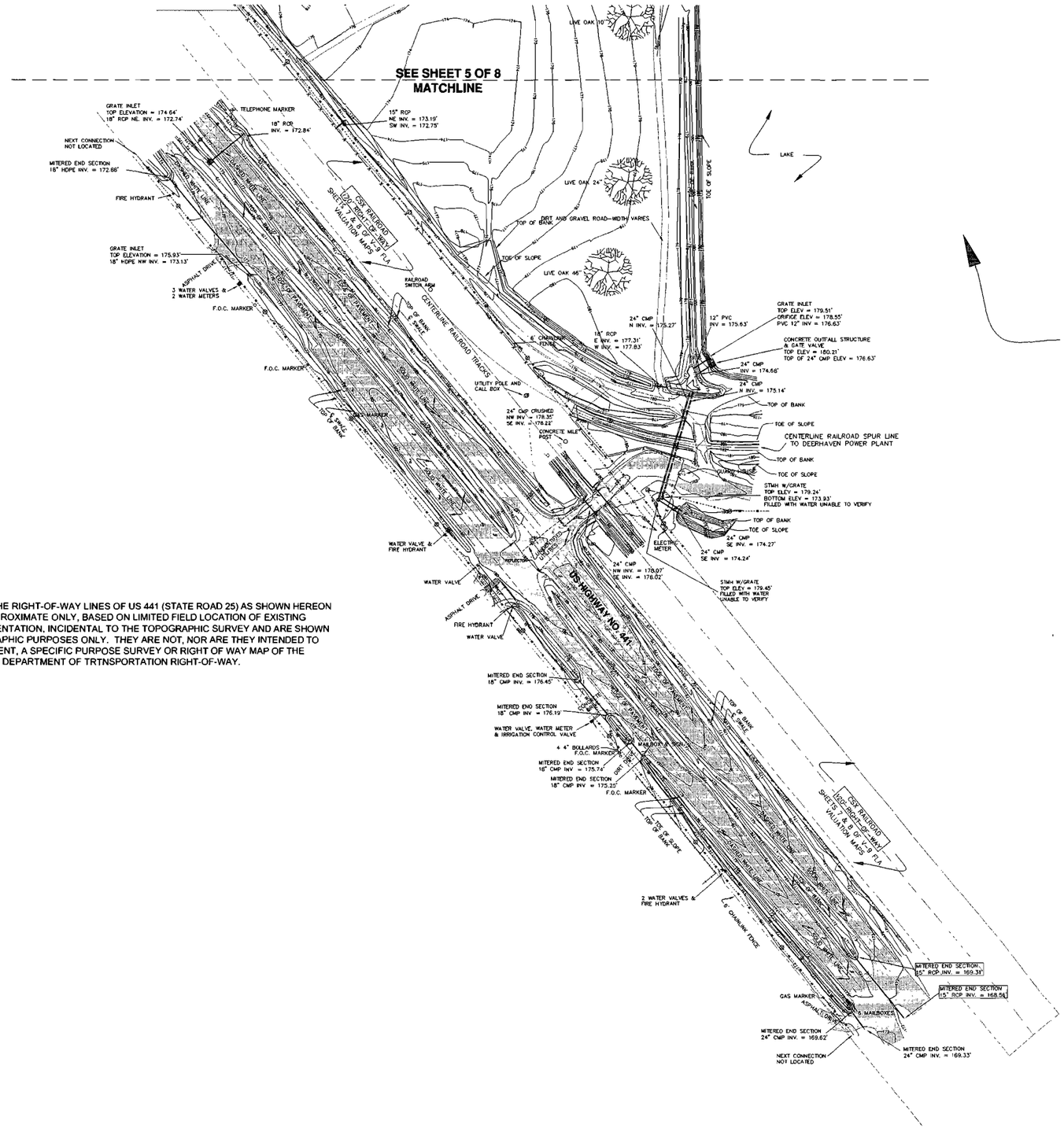
SURVEY DATE: 08/17/09
DRAWN BY: J.L.E., S.A.Y.
CHECKED BY: W.L.M.
SCALE: 1"=100'

PREPARED FOR:
AMERICAN RENEWABLES
75 ARLINGTON STREET, SUITE 704
BOSTON, MA 02166

PROJECT NAME:
GAINESVILLE RENEWABLE ENERGY CENTER
GAINESVILLE, FL

SHEET TITLE:
BOUNDARY AND TOPOGRAPHIC SURVEY

PROJECT NUMBER: 8527-001
DRAWING DATE: 09/11/09
SHEET NUMBER: 7 OF 8



NOTE: THE RIGHT-OF-WAY LINES OF US 441 (STATE ROAD 25) AS SHOWN HEREON ARE APPROXIMATE ONLY, BASED ON LIMITED FIELD LOCATION OF EXISTING MONUMENTATION, INCIDENTAL TO THE TOPOGRAPHIC SURVEY AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY. THEY ARE NOT, NOR ARE THEY INTENDED TO REPRESENT, A SPECIFIC PURPOSE SURVEY OR RIGHT OF WAY MAP OF THE FLORIDA DEPARTMENT OF TRTNSPORTATION RIGHT-OF-WAY.

100' 50' 0 100' 200'
SCALE 1" = 100'

NO	DATE	REVISIONS DESCRIPTION
1	11/03/09	ADDITIONAL TOPOGRAPHIC INFORMATION US441, ALACHUA CO
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2507 CALLAWAY ROAD, SUITE 100
TALLAHASSEE, FLORIDA 32303
(850) 224-4400 (850) 681-3600 FAX

SURVEY DATE: 08/17/09
DRAWN BY: J.L.E., S.A.Y.
CHECKED BY: W.L.M.
SCALE: 1"=100'

PREPARED FOR
AMERICAN RENEWABLES
75 ARLINGTON STREET, SUITE 704
BOSTON, MA 02166

PROJECT NAME
GAINESVILLE RENEWABLE
ENERGY CENTER
GAINESVILLE, FL

SHEET TITLE
BOUNDARY AND TOPOGRAPHIC SURVEY

PROJECT NUMBER
8527-001
DRAWING DATE
09/11/09
SHEET NUMBER
8 OF 8

ATTACHMENT C

STORMWATER MANAGEMENT PLAN (ZACHRY)

NO	REVISIONS	DATE	DESIGNER	DM REVIEWER
0	ISSUED FOR FILING			

ZACHRY

ZACHRY ENGINEERING CORPORATION - 1515 ARAPAHOE ST., TOWER 1, SUITE 900; DENVER, CO 80202-4256
AMARILLO, TX CHARLOTTE, NC HOUSTON, TX MINNEAPOLIS, MN OMAHA, NE SAN ANTONIO, TX

Zachry Engineering Corporation Confidential
This calculation package contains confidential information that is proprietary to Zachry Engineering Corporation (ZEC) which shall not be used, disclosed, or reproduced in any manner by any non-ZEC party without ZEC's prior written permission.

C-A013756-SRWS001 R0

GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
CALCULATION PACKAGE
SITE RELATED WORK
STORMWATER PIPE

DAVID F. HOLLRAH LICENSE No PE 68723 STATE OF FLORIDA PROFESSIONAL ENGINEER 1/19/2010

DATE	DESIGNER	REVIEWER	DM REVIEWER
1/19/10	SD Read	DM ANDERSON	M.J.PETERSON

CALCULATION NUMBER	PAGES	REV
C-A013756-SRWS001	40	0

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2.0	Design Methodology	3
3.0	Design Inputs	3
4.0	Assumptions	3
5.0	References	3
6.0	Calculations	4
7.0	Summary of Results	35
8.0	Conclusions	35

Attachments:

A. Site Drawing

B. Area Drawing

C. IDF Curve Graph

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1.0 Purpose and Scope

The following calculations will provide the piping calculations for Gainesville project located in Gainesville, Florida.

2.0 Design Methodology

The Rational Method is used to determine flow volumes.

For calculating pipe flow Manning's equation is used. Design storms are 3-year 10-minute per EDA recommendation. The intensity for this storm is 6.2 in/hr.

Runoff coefficients are determined based off of tabulated values.

An HDPE French Drain system will drain the fuel yard. The combination of the HDPE pipe and ditch will convey the stormwater to the drain fields at the north and northeast ends of the fuel yard.

3.0 Design Inputs

Located within the calculation.

4.0 Assumptions

The runoff coefficient for the site is estimated to be 0.9 for a heavy industrial site. This is used for both construction and post construction. In areas where the runoff may be lower, a runoff coefficient value is calculated based on a weighted average.

5.0 References

1. Florida DOT Drainage Manual; http://www.dot.state.fl.us/rddesign/dr/files/May2008DrainageManual.pdf
2. Wurbs, Ralph. A (2002). Water Resources Engineering. Upper Saddle River, NJ: Prentice Hall.
3. Mecosta County Drain Commissioner; Subdivision Drainage Rules and Storm Water Design Criteria; Rational Runoff Coefficients.doc

6.0 Calculations

See following pages:

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Runoff Coefficient Calculations and Determinations:

North Drainage Swale: Post-Construction		
Item	Area	c
Total		
[ac]	1.25	
Ditch		0.3
[ac]	0.75	
Road		0.95
[ac]	0.50	
composite c	0.56	

North Drainage Swale: Construction		
Item	Area	c
Total		
[ac]	1.25	
Ditch		0.6
[ac]	0.75	
Rock		0.85
[ac]	0.50	
composite c	0.70	

South Drainage Swale: Post-Construction		
Item	Area	c
Total		
[ac]	4.49	
Ditch		0.3
[ac]	3.07	
Road		0.95
[ac]	1.42	
composite c	0.51	

South Drainage Swale: Construction		
Item	Area	c
Total		
[ac]	4.49	
Ditch		0.6
[ac]	3.07	
Rock		0.85
[ac]	1.42	
composite c	0.68	

Example:

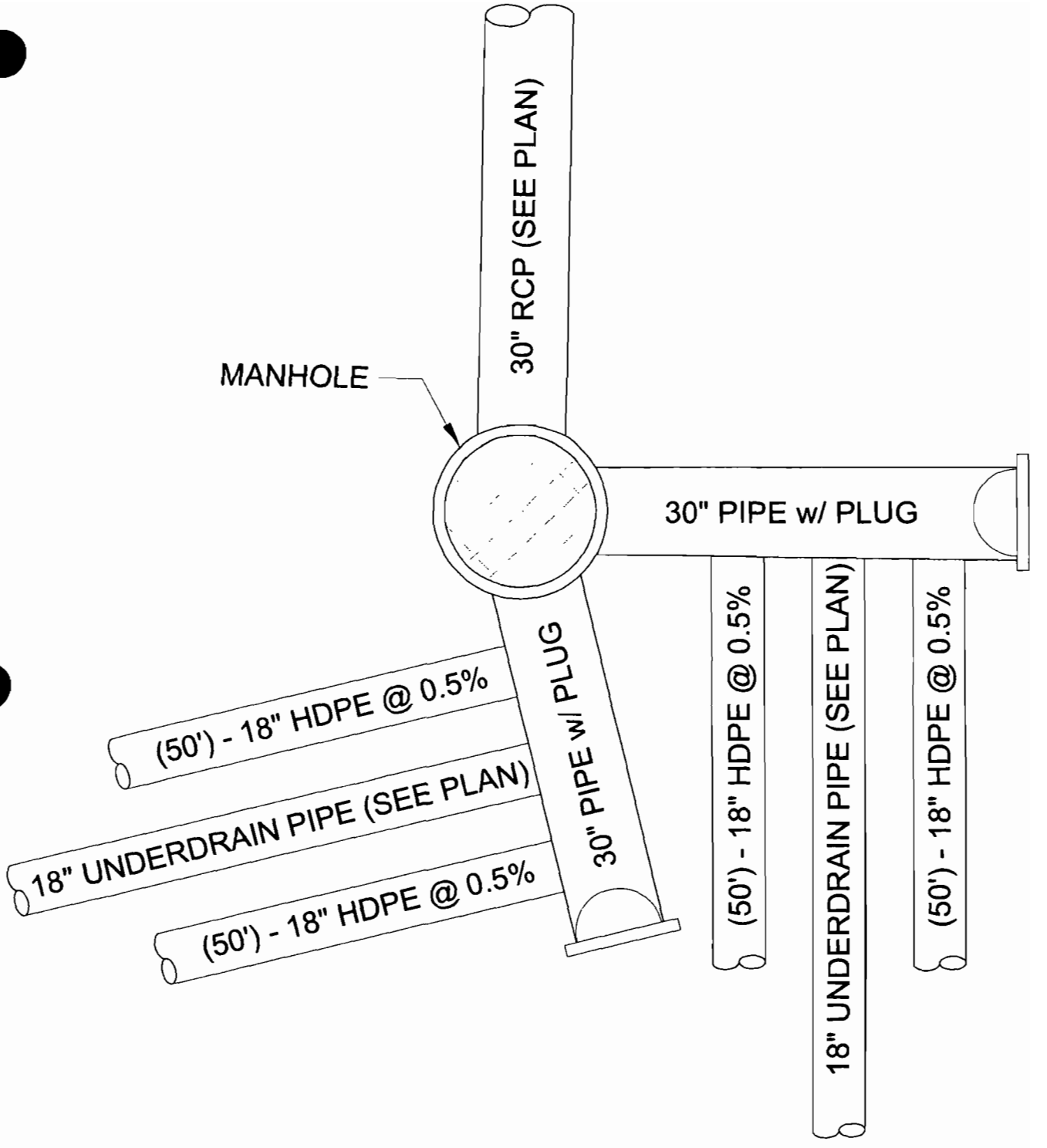
$$c_1 := \sum_{i=1}^{n} \left(\frac{A_n}{A_T} \cdot c_n \right)$$

FUEL YARD

The fuel yard utilizes a HDPE French Drain system to convey the stormwater off of the site. Manholes 5 and 9 have a "drain field" in order to collect all of the incoming french drain stormwater. The series of pipes collects the water and sends it through the outlet pipe.

The calculation assumes the drain field inlet flow as being six separate pipes with their flows being summed to obtain a total inlet flow.

Manholes SMH 01 and SMH02 are used to collect and treat oil in the stormwater from the truck dumper and scale house areas on the site.



DETAIL A S10002 01

Area 2A Outlet Pipe

Site Data		
c	0.9	
i	6.2	[in/hr]
A	10.25	[ac]
Q	57.20	[ft^3/s]

Slope	0.02	[ft/ft]
Pipe Diameter	30	[in]
	2.5	[ft]

USE MANNINGS EQUATION	
R	0.625
Cm	1.49
n	0.012

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

(RCP)

Velocity [V]	12.84	[fps]
Flow [Q]	63.01	[cfs]

OK

Area 2B Outlet Pipe

Site Data		
c	0.9	
i	6.2	[in/hr]
A	8.43	[ac]
Q	47.04	[ft^3/s]

Slope	0.015	[ft/ft]
Pipe Diameter	30	[in]
	2.5	[ft]

USE MANNINGS EQUATION	
R	0.625
Cm	1.49
n	0.012

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

(RCP)

Velocity [V]	11.12	[fps]
Flow [Q]	54.57	[cfs]

OK

Area 2A Inlet

Worst Case over 2B

Site Data		
c	0.9	
i	6.2	[in/hr]
A	10.25	[ac]
Q	57.20	[ft^3/s]

PIPE 1

Slope	0.005	[ft/ft]
Pipe Diameter	18	[in]
	1.5	[ft]

USE MANNINGS EQUATION	
R	0.375
Cm	1.49
n	0.009

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

(HDPE)

Velocity [V]	6.09	[fps]
Flow [Q]	10.76	[cfs]

TOTAL FLOW	**64.55 cfs**

OK

Pipe 1 x 3 x 2

(6 total pipes)

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in SMH 01

*Yellow cells are for input
**Green cell requires goal seek w/ the calculated target value (purple cell)
by changing the channel depth (blue cell)

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.390	acres	(Approximate area draining into MH)
	2.18		
Q(storm,culvert) =	4.46	cfs	(add Q from MH 28)

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	4.46	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.25	feet			
Slope =	0.005	decimal			
Target value =	0.508			Iterated value =	0.504

Channel Characteristics Output					
Calculated normal depth inside culvert =	0.92	feet		Culvert cross-sectional area =	1.23	sq. ft.
Water cross-sectional area =	0.97	sq. ft.		Flow velocity =	4.61	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in SMH 02

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.250	acres	(Approximate area draining into MH)
Q(storm,culvert) =	**1.40**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	1.40	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.25	feet			
Slope =	0.003	decimal			
Target value =	0.205		**Iterated value =**	0.205	

Channel Characteristics Output					
Calculated normal depth inside culvert =	**0.52**	feet	**Culvert cross-sectional area =**	**1.23**	sq. ft.
Water cross-sectional area =	**0.48**	sq. ft.	**Flow velocity =**	**2.89**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 28

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.410	acres	(Approximate area draining into MH)
Q(storm,culvert) =	**2.29**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	2.29	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.25	feet			
Slope =	0.005	decimal			
Target value =	0.261			**Iterated value =**	0.260

Channel Characteristics Output					
Calculated normal depth inside culvert =	**0.60**	feet		**Culvert cross-sectional area =**	**1.23** sq. ft.
Water cross-sectional area =	**0.58**	sq. ft.		**Flow velocity =**	**3.96** ft/s

POWER BLOCK

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 10

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.390	acres	(Approximate area draining into MH)
Q(storm,culvert) =	**2.18**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	2.18	cfs			
n =	0.012	no units	(reinforced concrete pipe)		
d_o =	1.25	feet			
Slope =	0.005	decimal			
Target value =	0.248		**Iterated value =**	0.248	

Channel Characteristics Output					
Calculated normal depth inside culvert =	**0.58**	feet	**Culvert cross-sectional area =**	**1.23**	sq. ft.
Water cross-sectional area =	**0.56**	sq. ft.	**Flow velocity =**	**3.90**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 11

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.180	acres	(Approximate area draining into MH)
	1.00		
Q(storm,culvert) =	**3.18**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking				
Q =	3.18	cfs		
n =	0.012	no units	(reinforced concrete pipe)	
d_o =	1.25	feet		
Slope =	0.005	decimal		
Target value =	0.362		**Iterated value =**	0.360

Channel Characteristics Output					
Calculated normal depth inside culvert =	**0.73**	feet	**Culvert cross-sectional area =**	**1.23**	sq. ft.
Water cross-sectional area =	**0.74**	sq. ft.	**Flow velocity =**	**4.31**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 12

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.150	acres	(Approximate area draining into MH)
	0.84		
Q(storm,culvert) =	**4.02**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	4.02	cfs			
n =	0.012	no units	(reinforced concrete pipe)		
d_o =	1.25	feet			
Slope =	0.018	decimal			
Target value =	0.241		**Iterated value =**	0.241	

Channel Characteristics Output					
Calculated normal depth inside culvert =	**0.57**	feet	**Culvert cross-sectional area =**	**1.23**	sq. ft.
Water cross-sectional area =	**0.54**	sq. ft.	**Flow velocity =**	**7.37**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 13

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.400	acres	(Approximate area draining into MH)
Q(storm,culvert) =	**2.23**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	2.23	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.25	feet			
Slope =	0.0035	decimal			
Target value =	0.304		**Iterated value =**	0.302	

Channel Characteristics Output					
Calculated normal depth inside culvert =	**0.65**	feet	**Culvert cross-sectional area =**	**1.23**	sq. ft.
Water cross-sectional area =	**0.64**	sq. ft.	**Flow velocity =**	**3.46**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 14

*Yellow cells are for input
**Green cell requires goal seek w/ the calculated target value (purple cell)
by changing the channel depth (blue cell)

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.210	acres	(Approximate area draining into MH)
	1.17		
Q(storm,culvert) =	3.40	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	3.40	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.25	feet			
Slope =	0.0033	decimal			
Target value =	0.477			Iterated value =	0.477

Channel Characteristics Output					
Calculated normal depth inside culvert =	0.88	feet		Culvert cross-sectional area =	1.23	sq. ft.
Water cross-sectional area =	0.92	sq. ft.		Flow velocity =	3.69	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 15

*Yellow cells are for input
**Green cell requires goal seek w/ the calculated target value (purple cell)
by changing the channel depth (blue cell)

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.360	acres	(Approximate area draining into MH)
Q(storm,culvert) =	2.01	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	2.01	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.25	feet			
Slope =	0.005	decimal			
Target value =	0.229			Iterated value =	0.226

Channel Characteristics Output					
Calculated normal depth inside culvert =	0.55	feet		Culvert cross-sectional area =	1.23 sq. ft.
Water cross-sectional area =	0.52	sq. ft.		Flow velocity =	3.86 ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 16

*Yellow cells are for input
**Green cell requires goal seek w/ the calculated target value (purple cell)
by changing the channel depth (blue cell)

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.330	acres	(Approximate area draining into MH)
	1.84		
Q(storm,culvert) =	7.25	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	7.25	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.5	feet			
Slope =	0.0038	decimal			
Target value =	0.948			Iterated value =	0.947

Channel Characteristics Output					
Calculated normal depth inside culvert =	1.28	feet		Culvert cross-sectional area =	1.77	sq. ft.
Water cross-sectional area =	1.60	sq. ft.		Flow velocity =	4.53	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 17

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.600	acres	(Approximate area draining into MH)
	3.35		
Q(storm,culvert) =	**14.01**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	14.01	cfs			
n =	0.012	no units	(RCP)		
d_o =	2	feet			
Slope =	0.005	decimal			
Target value =	1.595			**Iterated value =**	1.202

Channel Characteristics Output					
Calculated normal depth inside culvert =	**1.13**	feet		**Culvert cross-sectional area =**	**3.14**	sq. ft.
Water cross-sectional area =	**1.82**	sq. ft.		**Flow velocity =**	**7.69**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 18

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.630	acres	(Approximate area draining into MH)
	3.52		
Q(storm,culvert) =	**17.52**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	17.52	cfs			
n =	0.012	no units	(RCP)		
d_o =	2	feet			
Slope =	0.005	decimal			
Target value =	1.996			**Iterated value =**	1.602

Channel Characteristics Output					
Calculated normal depth inside culvert =	**1.37**	feet		**Culvert cross-sectional area =**	**3.14**	sq. ft.
Water cross-sectional area =	**2.28**	sq. ft.		**Flow velocity =**	**7.67**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 19

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.700	acres	(Approximate area draining into MH)
	3.91		
Q(storm,culvert) =	**21.43**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	21.43	cfs			
n =	0.012	no units	(RCP)		
d_o =	2	feet			
Slope =	0.005	decimal			
Target value =	2.440		**Iterated value =**	2.052	

Channel Characteristics Output					
Calculated normal depth inside culvert =	**1.72**	feet	**Culvert cross-sectional area =**	**3.14**	sq. ft.
Water cross-sectional area =	**2.87**	sq. ft.	**Flow velocity =**	**7.47**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 20

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.120	acres	(Approximate area draining into MH)
Q(storm,culvert) =	**0.67**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	0.67	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.25	feet			
Slope =	0.005	decimal			
Target value =	0.076			**Iterated value =**	0.076

Channel Characteristics Output					
Calculated normal depth inside culvert =	**0.31**	feet		**Culvert cross-sectional area =**	**1.23**	sq. ft.
Water cross-sectional area =	**0.24**	sq. ft.		**Flow velocity =**	**2.82**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 21

*Yellow cells are for input
**Green cell requires goal seek w/ the calculated target value (purple cell)
by changing the channel depth (blue cell)

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.300	acres	(Approximate area draining into MH)
	1.67		
Q(storm,culvert) =	23.77	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	23.77	cfs			
n =	0.012	no units	(RCP)		
d_o =	2.5	feet			
Slope =	0.005	decimal			
Target value =	2.707			Iterated value =	2.324

Channel Characteristics Output					
Calculated normal depth inside culvert =	1.47	feet		Culvert cross-sectional area =	4.91	sq. ft.
Water cross-sectional area =	2.99	sq. ft.		Flow velocity =	7.95	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 22

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.950	acres	(Approximate area draining into MH)
Q(storm,culvert) =	**5.30**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	5.30	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.25	feet			
Slope =	0.005	decimal			
Target value =	0.604			**Iterated value =**	0.605

Channel Characteristics Output					
Calculated normal depth inside culvert =	**1.14**	feet		**Culvert cross-sectional area =**	**1.23** sq. ft.
Water cross-sectional area =	**1.17**	sq. ft.		**Flow velocity =**	**4.51** ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 23

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	1.010	acres	(Approximate area draining into MH)
	5.64		
Q(storm,culvert) =	**10.94**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	10.94	cfs			
n =	0.012	no units	(RCP)		
d_o =	2	feet			
Slope =	0.005	decimal			
Target value =	1.246			**Iterated value =**	1.245

Channel Characteristics Output					
Calculated normal depth inside culvert =	**1.15**	feet		**Culvert cross-sectional area =**	**3.14**	sq. ft.
Water cross-sectional area =	**1.87**	sq. ft.		**Flow velocity =**	**5.85**	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 24

*Yellow cells are for input
**Green cell requires goal seek w/ the calculated target value (purple cell)
by changing the channel depth (blue cell)

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.460	acres	(Approximate area draining into MH)
	2.57		
Q(storm,culvert) =	13.50	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	13.50	cfs			
n =	0.012	no units	(RCP)		
d_o =	2	feet			
Slope =	0.005	decimal			
Target value =	1.538			Iterated value =	1.538

Channel Characteristics Output					
Calculated normal depth inside culvert =	1.33	feet		Culvert cross-sectional area =	3.14	sq. ft.
Water cross-sectional area =	2.21	sq. ft.		Flow velocity =	6.11	ft/s

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 25

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.9	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	0.530	acres	(Approximate area draining into MH)
	2.96		
Q(storm,culvert) =	**40.23**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	40.23	cfs			
n =	0.012	no units	(RCP)		
d_o =	3	feet			
Slope =	0.005	decimal			
Target value =	4.582		**Iterated value =**	4.195	

Channel Characteristics Output					
Calculated normal depth inside culvert =	**1.88**	feet	**Culvert cross-sectional area =**	**7.07**	sq. ft.
Water cross-sectional area =	**4.67**	sq. ft.	**Flow velocity =**	**8.61**	ft/s

SOUTH DITCH
MH 26

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 26

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.68	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	2.530	acres	(Approximate area draining into MH)
Q(storm,culvert) =	**10.67**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	10.67	cfs			
n =	0.012	no units	(RCP)		
d_o =	2	feet			
Slope =	0.005	decimal			
Target value =	1.215		**Iterated value =**	1.216	

Channel Characteristics Output					
Calculated normal depth inside culvert =	**1.13**	feet	**Culvert cross-sectional area =**	**3.14**	sq. ft.
Water cross-sectional area =	**1.84**	sq. ft.	**Flow velocity =**	**5.81**	ft/s

NORTH DITCH
MH 27

Gainesville
Open Channel Flow w/ Manning's Equation, Calculation of Depth for Water in Outlet Pipe in MH 27

***Yellow cells are for input**
****Green cell requires goal seek w/ the calculated target value (purple cell) by changing the channel depth (blue cell)**

Q =ciA

Developed Site Input			
c =	0.7	no units	(calculated composite c value)
i =	6.2	in/hr	(3 yr - 10 min Event)
A =	1.470	acres	(Approximate area draining into MH)
Q(storm,culvert) =	**6.38**	cfs	

$Q = (1.49/n)*A*R_h^{2/3}*S_e^{1/2}$

Q = Flow rate (cfs)
n = Manning's coefficient
d_o = Culvert inside diameter (ft)
Slope = Culvert longitudinal slope
d = culvert normal depth (ft)

Manning's Input & Microsoft Excel Goal Seeking					
Q =	6.38	cfs			
n =	0.012	no units	(RCP)		
d_o =	1.25	feet			
Slope =	0.02	decimal			
Target value =	0.363		**Iterated value =**	0.364	

Channel Characteristics Output					
Calculated normal depth inside culvert =	**0.73**	feet	**Culvert cross-sectional area =**	**1.23**	sq. ft.
Water cross-sectional area =	**0.74**	sq. ft.	**Flow velocity =**	**8.57**	ft/s

7.0 Summary of Results

Manhole	Pipe Size [in]	Pipe Material
MH 1	18	HDPE
MH 2	18	HDPE
MH 3	18	HDPE
MH 4	18	HDPE
MH 5	30	RCP
MH 6	18	HDPE
MH 7	18	HDPE
MH 8	18	HDPE
MH 9	30	RCP
MH 10	15	RCP
MH 11	15	RCP
MH 12	15	RCP
MH 13	15	RCP
MH 14	15	RCP
MH 15	15	RCP
MH 16	15	RCP
MH 17	24	RCP
MH 18	24	RCP
MH 19	24	RCP
MH 20	15	RCP
MH 21	30	RCP
MH 22	15	RCP
MH 23	24	RCP
MH 24	24	RCP
MH 25	30	RCP
MH 26	24	RCP
MH 27	18	RCP
MH 28	15	RCP
SMH 01	15	RCP
SMH 02	15	RCP

8.0 Conclusions

The results of these calculations show that the stormwater piping is sufficient.

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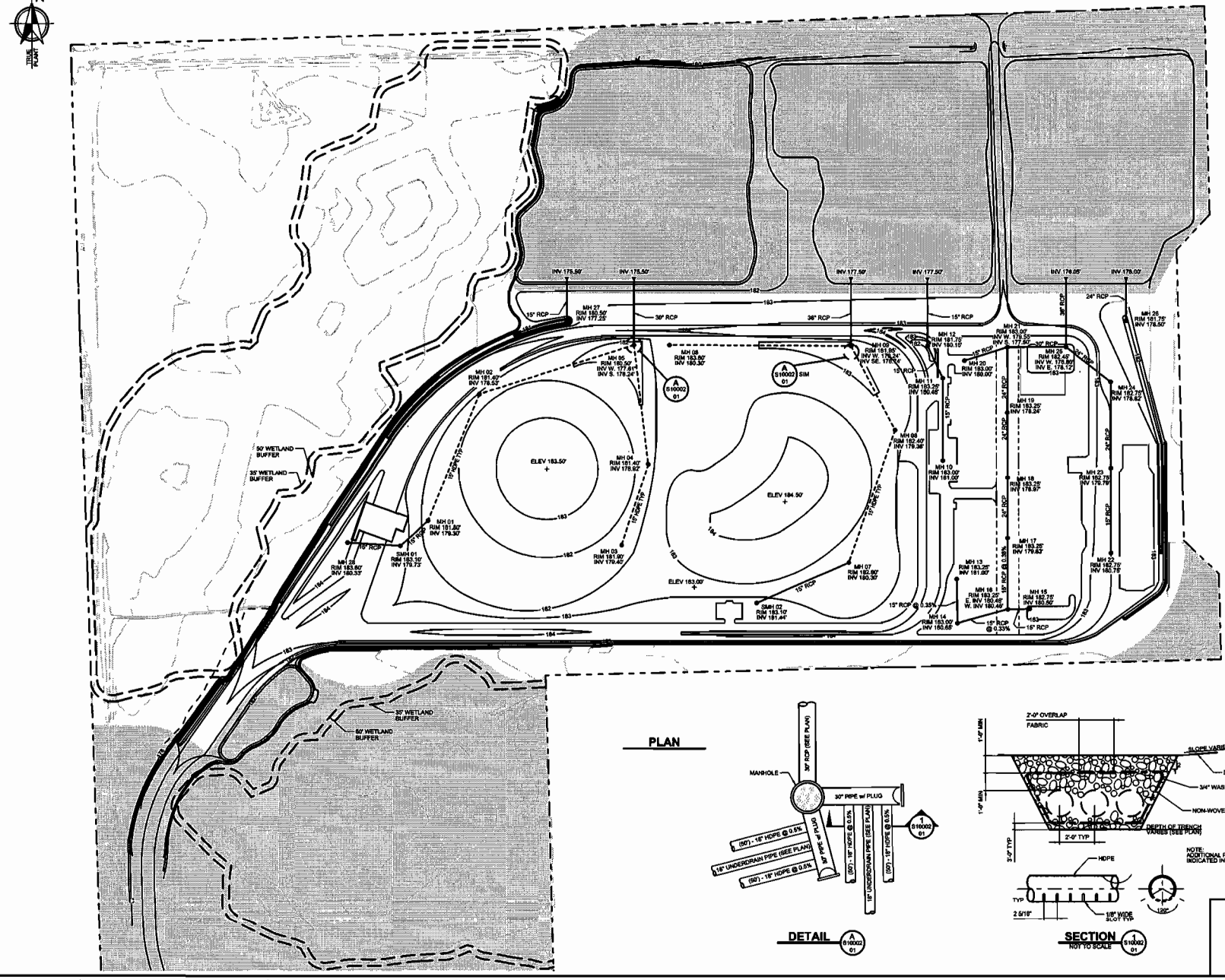

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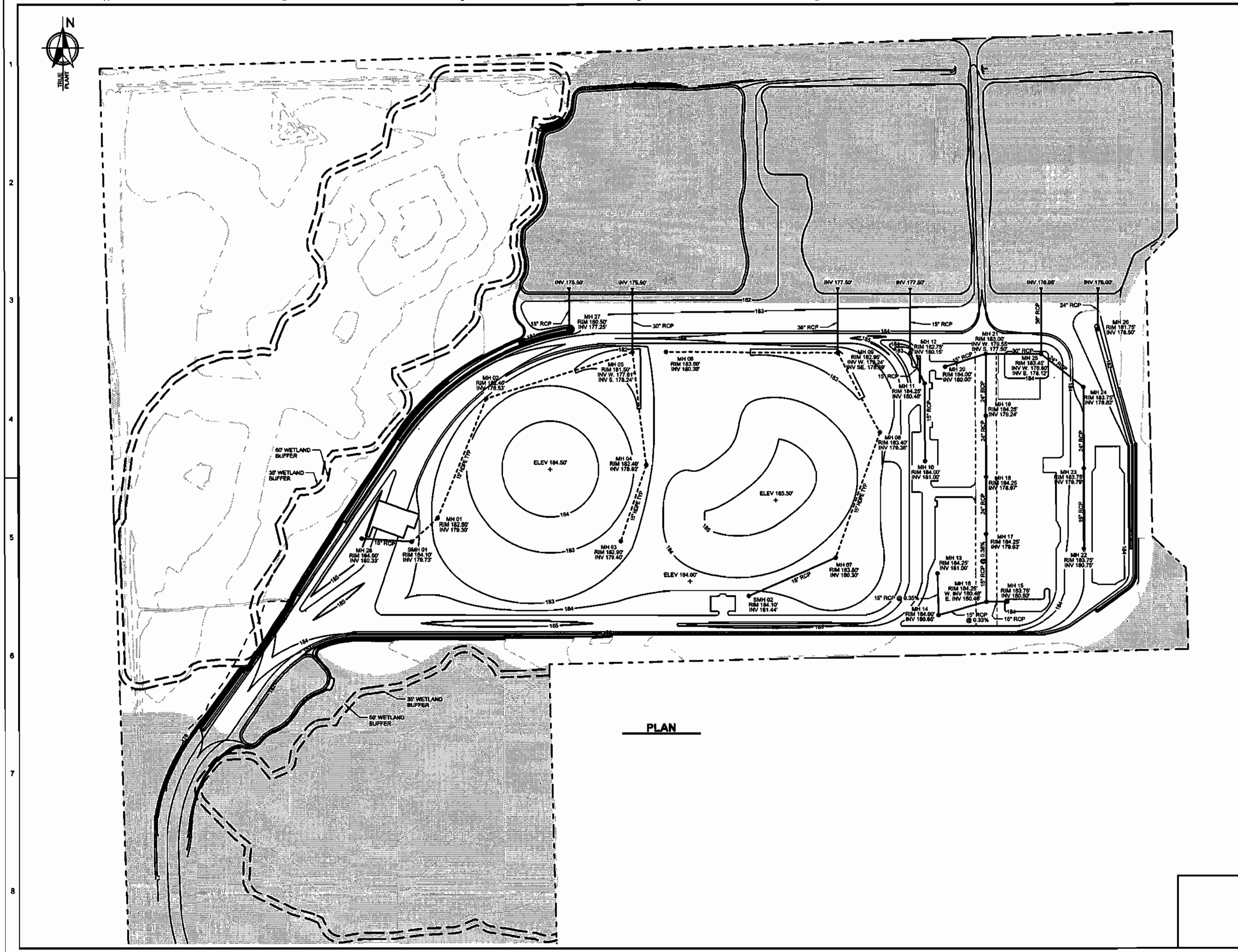

SCALE
SCALE IN FEET

LEGEND

- - - -	UNDERDRAIN (HDPE)
——	STORMWATER PIPE REINFORCED CONCRETE PIPE (RCP)
▼	OUTLET PIPE APRON
●	MANHOLE (MH) OR SKIMMER MANHOLE (SMH)
	FLOW ARROW
	EXISTING CONTOUR
——	FINAL CONTOUR
— -	PLANT BOUNDARY
	COVERED BY ENG, DENMAN & ASSOCIATES SCOPE (FOR REFERENCE ONLY)
——	STORMWATER BASIN
— -	WETLAND BUFFER

GENERAL NOTES

1. ALL RCP PIPES ARE AT 0.5% GRADE SLOPE MINIMUM UNO.
2. ALL HPDE PIPES ARE AT 0.25% GRADE SLOPE MINIMUM UNO.
3. TOC FOR FOUNDATIONS ARE 185.07.
3. EXISTING CONTOURS ARE BASED UPON EXISTING GENESIS CERTIFIED SURVEY FILE GREC.DWG POSTED 9/14/09.
4. SKIMMER MANHOLES WILL LOCALLY TREAT STORMWATER WHEN OIL IS PRESENT

REFERENCE DRAWINGS

1. GAINESVILLE RENEWABLE ENERGY CENTER BIOMASS GENERATING FACILITY; EXISITING CONTOURS AND DRAINAGE AREAS PLAN; D013756-SRWS10001 SHT 01
2. GAINESVILLE RENEWABLE ENERGT CENTER BIOMASS GENERATING FACILITY; FINAL & CONSTRUCTION DRAINAGE AREAS PLAN; D013756-SRWS10001 SHT 02
3. GAINESVILLE RENEWABLE ENERGY CENTER BIOMASS GENERATING FACILITY; CONSTRUCTION GRADING PLAN AND DETAILS; D013756-SRWS10002 SHT 01

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Gainesville Renewable Energy Center

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BIOMASS GENERATING FACILITY

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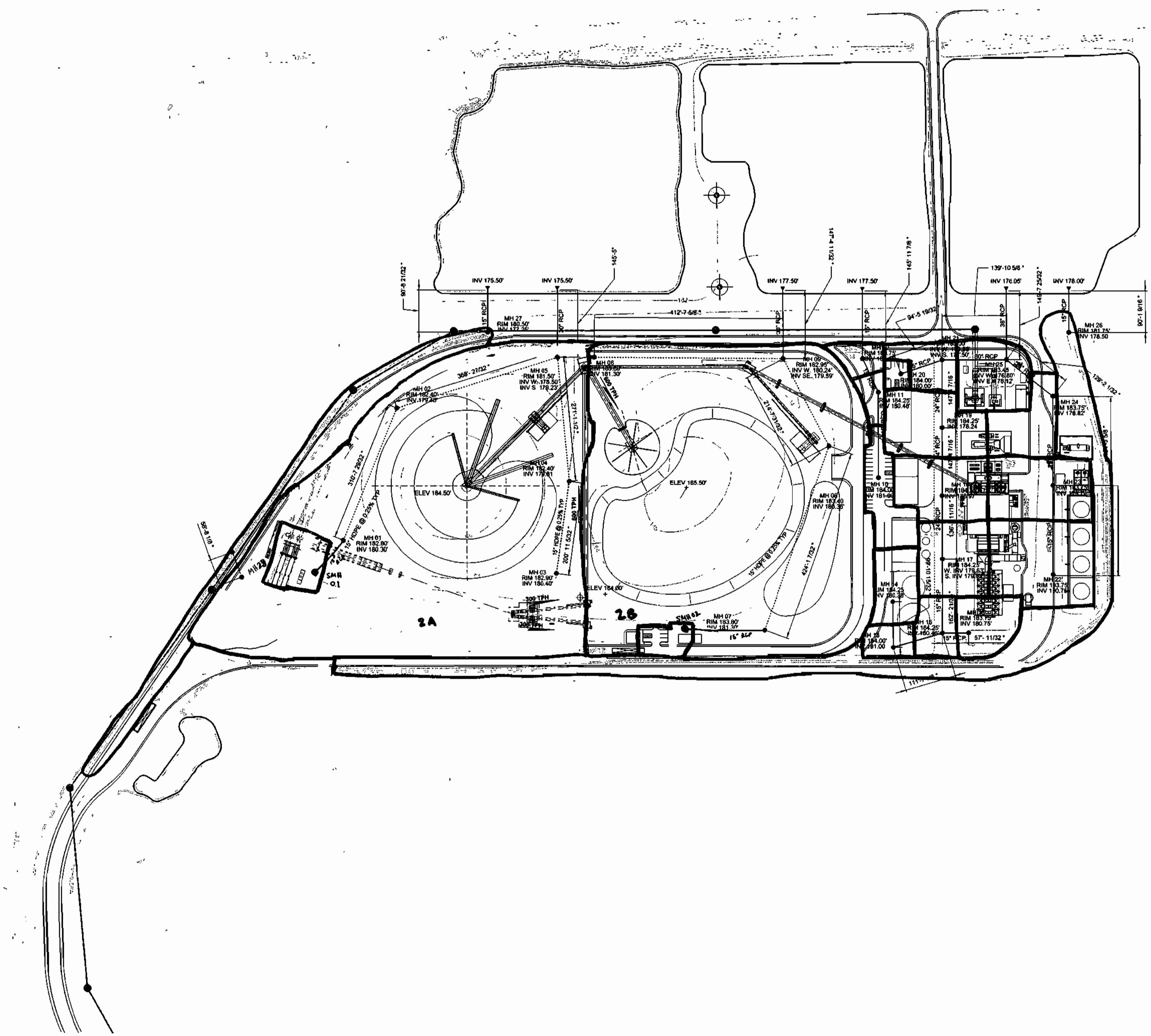
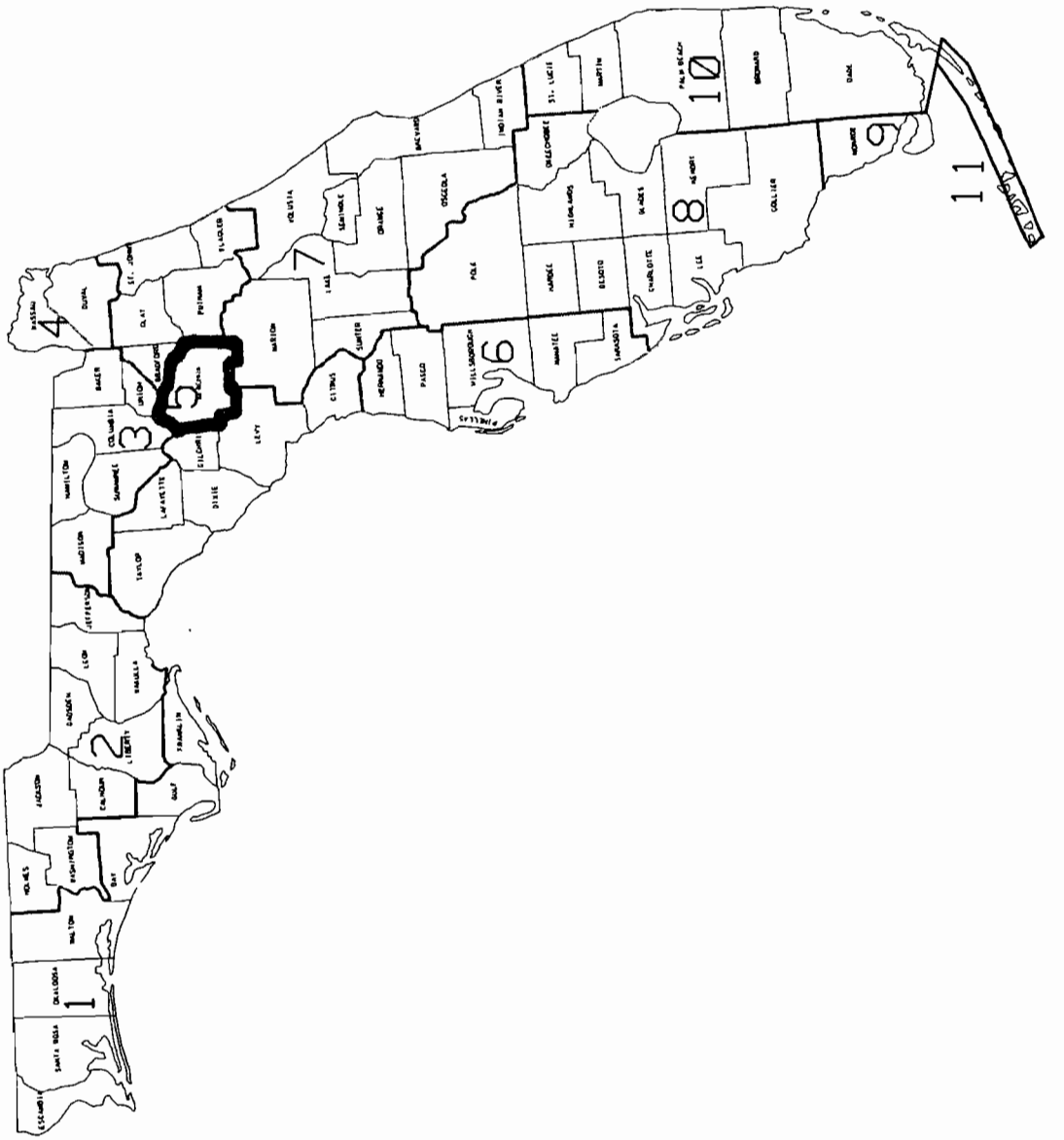
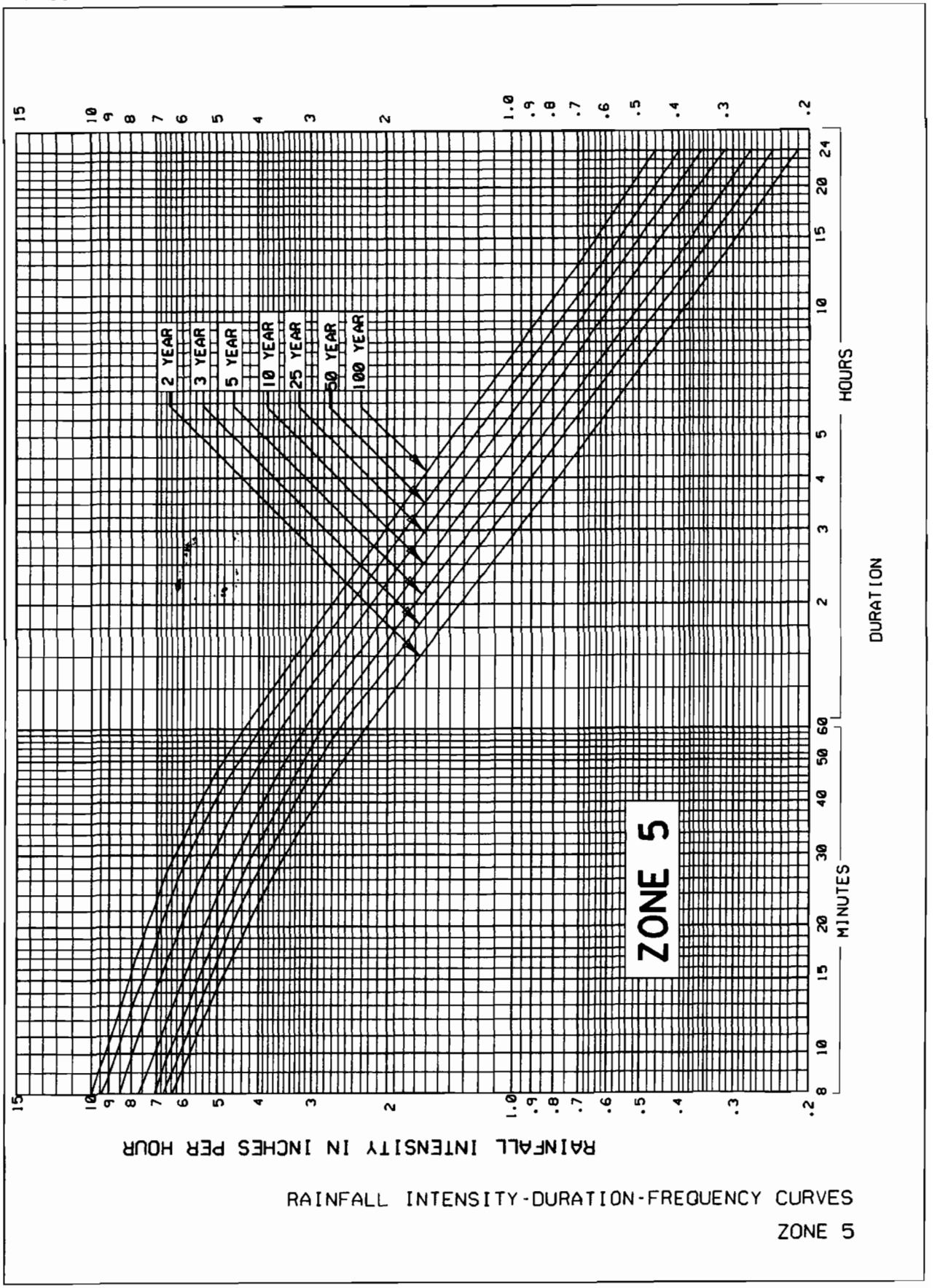

INV 175.50'
INV 175.50'
INV 177.50'
INV 177.50'
INV 178.05'
INV 178.00'
139'-10 5/8"
412'-7-5/8"
15" RCP
30" RCP
MH 27
RIM 180.50'
MH 26
RIM 181.75'
INV 178.50
MH 05
RIM 181.50'
MH 02
MH 06
MH 09
RIM 182.95'
INV W. 180.24'
INV SE. 179.59'
MH 20
RIM 184.00'
MH 11
RIM 184.25'
MH 24
RIM 183.75'
INV 178.82'
ELEV 184.50'
ELEV 185.50'
ELEV 184.60'
MH 04
MH 08
RIM 183.40
MH 01
RIM 182.80'
INV 180.30'
MH 03
RIM 182.90'
INV 180.40'
MH 07
RIM 183.60'
MH 10
MH 17
MH 22
RIM 183.75'
MH 14
MH 15
RIM 184.25'
MH 13
15" HDPE @ 0.25% TYP
15" RCP
57'-11/32"
300 TPH
2A
2B
MH 23
SMH 01
SMH 02

ZONES FOR PRECIPITATION IDF CURVES DEVELOPED BY THE DEPARTMENT





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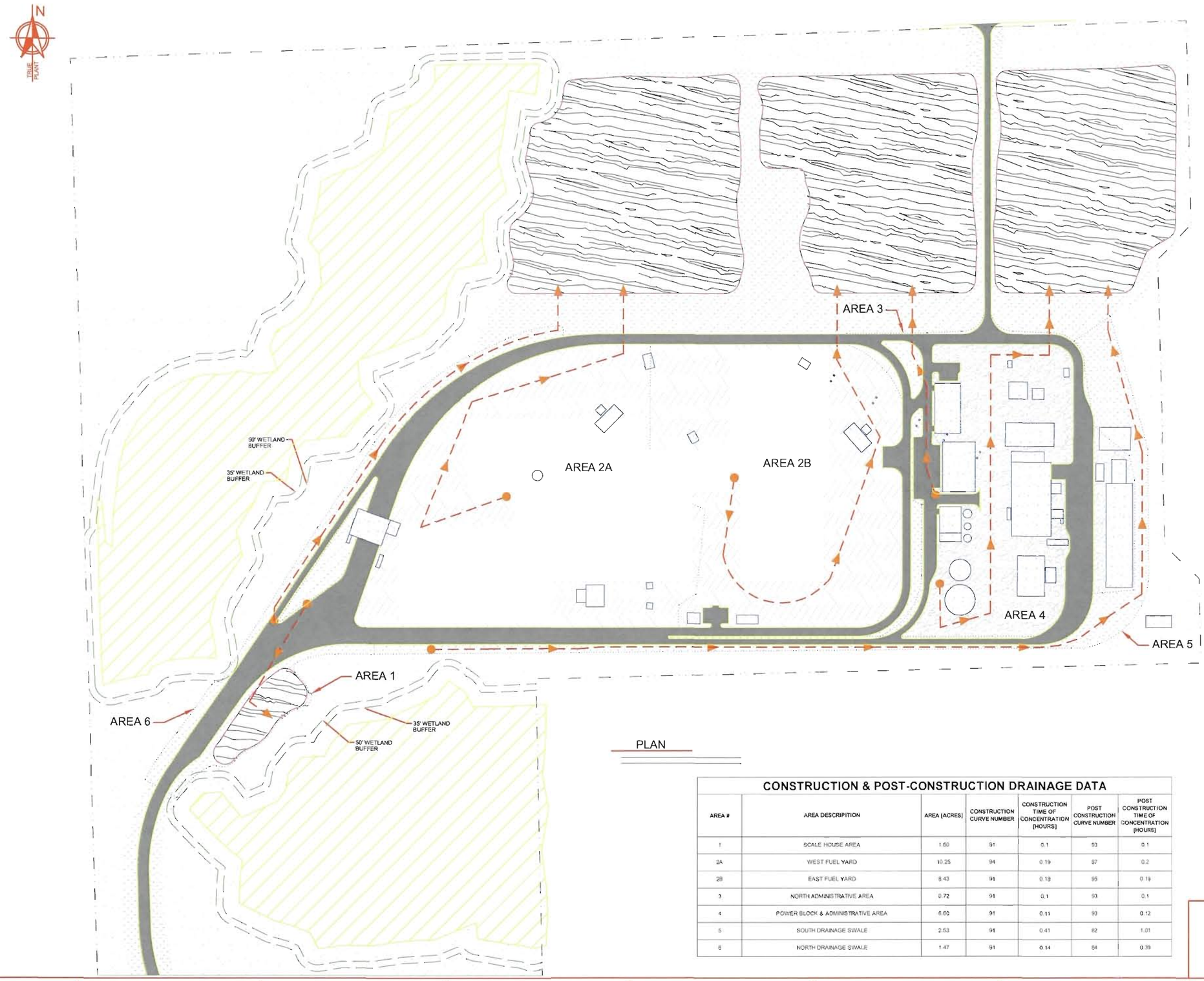

PLAN

GENERAL NOTES

1. LONGEST FLOW PATH DEFINES LARGEST HYDRAULIC LENGTH IN SUB-AREA

REFERENCE DRAWINGS

1. GAINESVILLE RENEWABLE ENERGY CENTER BIOMASS GENERATING FACILITY; SITE; CONSTRUCTION GRADING; PLAN AND DETAILS; D013756-SRWS10002 SH 01
2. GAINESVILLE RENEWABLE ENERGY CENTER BIOMASS GENERATING FACILITY; SITE; FINAL GRADING; PLAN; D013756-SRWS10003 SH 01

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CONSTRUCTION & POST-CONSTRUCTION DRAINAGE DATA

AREA #	AREA DESCRIPITION	AREA (ACRES)	CONSTRUCTION CURVE NUMBER	CONSTRUCTION TIME OF CONCENTRATION (HOURS)	POST CONSTRUCTION CURVE NUMBER	POST CONSTRUCTION TIME OF CONCENTRATION (HOURS)
1	SCALE HOUSE AREA	1.60	91	0.1	93	0.1
2A	WEST FUEL YARD	10.25	94	0.19	97	0.2
2B	EAST FUEL YARD	8.43	91	0.18	95	0.19
3	NORTH ADMINISTRATIVE AREA	0.72	91	0.1	93	0.1
4	POWER BLOCK & ADMINISTRATIVE AREA	6.60	91	0.11	93	0.12
5	SOUTH DRAINAGE SWALE	2.53	91	0.41	82	1.01
6	NORTH DRAINAGE SWALE	1.47	91	0.14	84	0.39

NO.	REVISION	DATE	DRAWN	CHECKED	APPROVED
C	ISSUED FOR COMMENTS PER CHANGE IN SITE LAYOUT				
B	ISSUED FOR COMMENTS	10/29/09	DMA	DMA	GPL	SDR
A	ISSUED FOR COMMENTS				

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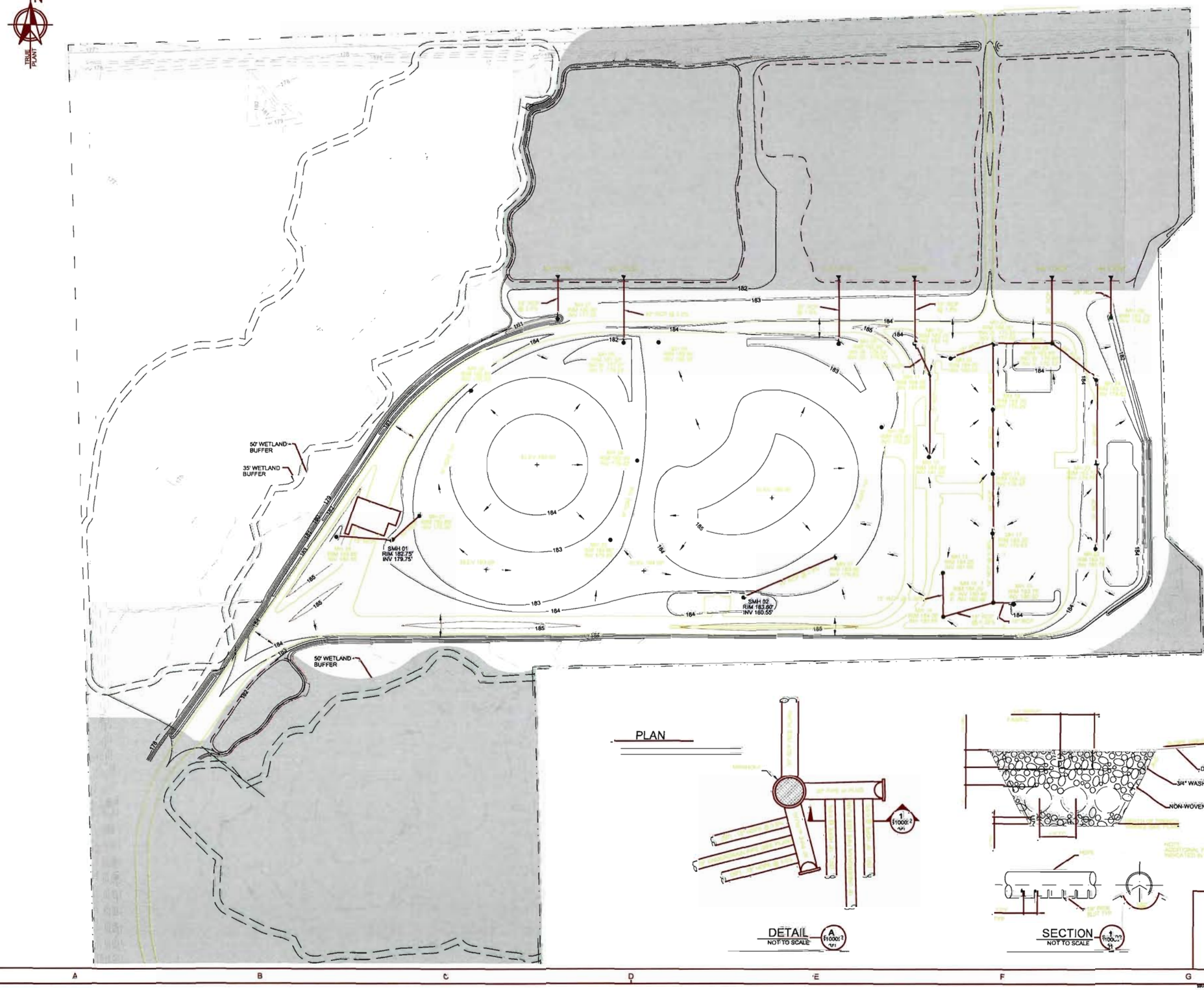
GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY
SITE
FINAL & CONSTRUCTION DRAINAGE AREAS
PLAN

DESIGNED	DATE	DRAWN	DATE	CHECKED	DATE
D.M.ANDERSEN	10/29/09	S.D.READ	10/29/09	G.P.LINO	10/29/09	M.J.PETERSON	10/29/09
APPROVED M.J.PETERSON		DRAWING NUMBER D013756-SRWS10001		SHEET 02	REV C



SCALE
SCALE IN FEET

LEGEND

- UNDERDRAIN (HDPE)
- STORMWATER PIPE REINFORCED CONCRETE PIPE (RCP)
- OUTLET PIPE APRON
- MANHOLE (MH) OR SKIMMER MANHOLE (SMH)
- FLOW ARROW
- EXISTING CONTOUR
- FINAL CONTOUR
- PLANT BOUNDARY
- COVERED BY SCOPE (FOR REFERENCE ONLY)
- STORMWATER BASIN
- WETLAND BUFFER

GENERAL NOTES

1. ALL RCP PIPES ARE AT 0.5% GRADE SLOPE MINIMUM UNO.
2. ALL HPDE PIPES ARE AT 0.25% GRADE SLOPE MINIMUM UNO.
3. TOC FOR FOUNDATIONS ARE 185.00'.
4. EXISTING CONTOURS ARE BASED UPON GENESIS CERTIFIED SURVEY FILE GREC.DWG POSTED 11/09/09.
5. SKIMMER MANHOLES WILL CAPTURE OIL WITH STORMWATER FOR REMOVAL.
6. ALL MANHOLE OUTLET ELEVATIONS ARE AT THE LOWEST INLET ELEVATIONS.

REFERENCE DRAWINGS

1. GAINESVILLE RENEWABLE ENERGY CENTER BIOMASS GENERATING FACILITY; SITE; EXISTING CONTOURS AND DRAINAGE AREAS PLAN; D013756-SRWS10001 SH 01
2. GAINESVILLE RENEWABLE ENERGY CENTER BIOMASS GENERATING FACILITY; SITE; FINAL & CONSTRUCTION DRAINAGE AREAS PLAN; D013756-SRWS10001 SH 02
3. GAINESVILLE RENEWABLE ENERGY CENTER BIOMASS GENERATING FACILITY; SITE; CONSTRUCTION GRADING; PLAN AND DETAILS; D013756-SRWS10002 SH 01

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PLAN

DETAIL
NOT TO SCALE

SECTION
NOT TO SCALE

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A	ISSUED FOR COMMENTS		HDWM	GMA	GMA	GR
B	ISSUED FOR COMMENTS		HDWM	GMA	GMA	GR
C	ISSUED FOR COMMENTS		HDWM	GMA	GMA	GR

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GAINESVILLE RENEWABLE ENERGY CENTER
BIOMASS GENERATING FACILITY

SITE
FINAL GRADING PLAN

DRAWN	DESIGNED	CHECKED	APPROVED
D M ANDRUSZ	D D READ	G P LIN	M J PETERSON

APPROVED	DRAWING NUMBER	SHEET	REV
M J PETERSON	D013756-SRWS10002	01	C

ATTACHMENT D

CULTURAL RESOURCE ASSESSMENT SURVEY

CULTURAL RESOURCE ASSESSMENT SURVEY
GAINESVILLE RENEWABLE ENERGY CENTER
ALACHUA COUNTY, FLORIDA

Prepared for:

Environmental Consulting & Technology, Inc.
3701 NW 98th Street
Gainesville, Florida 32606

By:

Archaeological Consultants, Inc.
8110 Blaikie Court, Suite A
Sarasota, Florida 34240

Marion Almy - Project Manager
Elizabeth A. Horvath - Project Archaeologist
Justin Winkler - Archaeologist

January 2010

EXECUTIVE SUMMARY

Archaeological Consultants, Inc. (ACI) performed a cultural resource assessment survey (CRAS) for the proposed Gainesville Renewable Energy Center (GREC) in Alachua County. The purpose of the survey was to locate and identify any cultural resources located within the tract, and to assess their significance in terms of eligibility for listing in the National Register of Historic Places (NRHP). The Florida Division of Historical Resources (FDHR) reviewed this project under Chapters 267 and 403, *Florida Statutes* (*FS*) and required that a cultural resource assessment survey be conducted of the proposed development area (Kammerer 2009). All work was carried out in conformity with the specifications set forth in Chapter 1A-46, *Florida Administrative Code* (*FAC*) and the *Cultural Resource Management Standards and Operational Manual* (FDHR 2003). The survey described in this report was conducted in January 2010.

Archaeological background research, including a review of the Florida Master Site File (FMSF) and the NRHP indicated that no archaeological sites are recorded within the project area. However, the 1977 cultural resource assessment survey of the Deerhaven Generating Station (DGS) reported that a projectile point was recovered in the southwestern corner of the tract, a historic homestead was once located in the northern portion of the tract, and a sawmill was located southeast of the tract (Miller 1977). In addition, nine previously recorded archaeological sites are within 1.6 kilometers (km) [1 mile (mi)] of the tract, as well as several other cultural resources noted by Miller, but not recorded as sites. Based on the environmental setting, the project area has a moderate potential for the occurrence of aboriginal archaeological sites.

Background research, including a review of the FMSF and the NRHP, revealed no previously recorded historic structures within the tract. The Jacksonville, Gainesville, and Gulf Railroad, recorded as 8AL5393, runs along the southern boundary of the tract, but will not be impacted by the proposed facilities. The current survey revealed an absence of historic structures within the project area. However, it was determined that there was a moderate to high probability for the occurrence of historic archaeological deposits once associated with the homestead and/or sawmill.

The cultural resource assessment survey for the GREC consisted of surface reconnaissance combined with systematic and judgmental subsurface testing. As a result of this survey, no evidence of the features noted more than 30 years ago (Miller 1977) was found. This was not unexpected due to extensive agriculture and silviculture which no doubt removed the trash, glass, and bricks once noticed. Thus, no archaeological sites or historic structures, which are listed, determined eligible, or considered potentially eligible for listing in the NRHP, were identified within the proposed Gainesville Renewable Energy Center tract. As a result, no significant properties will be affected by this proposed development project, and no further work is recommended.

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1.0 INTRODUCTION

ACI performed a CRAS of the GREC in Alachua County (Figure 1.1). The GREC will be located on an approximately 131-acre tract within the boundaries of the approximately 1,146-acre previously certified site for the Gainesville Regional Utilities (GRU) existing DGS. The GREC parcel is not actively used by GRU and does not contain any facilities associated with the DGS.

The GREC project will involve the construction and operation of a nominal net 100-MW (nominal gross 116-MW) biomass-fired electrical power plant and associated facilities on the approximately 131-acre tract. The main electrical generating facilities for GREC will consist of a bubbling fluidized bed (BFB) boiler and conventional steam turbine generator. The BFB boiler will be capable of accommodating a wide range of clean, woody biomass fuels. Flue gas from the BFB boiler will pass through air emission control equipment and exhaust to the atmosphere through one 230-foot (ft) (70 meters [m]) tall stack. Other facilities in the main power block area will include an administration building; warehouse; water and wastewater treatment facilities; sand and fly and bottom ash handling and storage facilities; emergency diesel generator and firewater pump; a switchyard; and biomass fuel delivery, handling, and storage facilities.

The purpose of the survey was to locate and identify any cultural resources located within the tract, and to assess their significance in terms of eligibility for listing in the NRHP. The FDHR reviewed this project under Chapters 267 and 403, *FS* and required that a cultural resource assessment survey be conducted of the proposed development area (Kammerer 2009). All work was carried out in conformity with the specifications set forth in Chapter 1A-46, *FAC* and the *Cultural Resource Management Standards and Operational Manual* (FDHR 2003). The survey described in this report was conducted in January 2010.

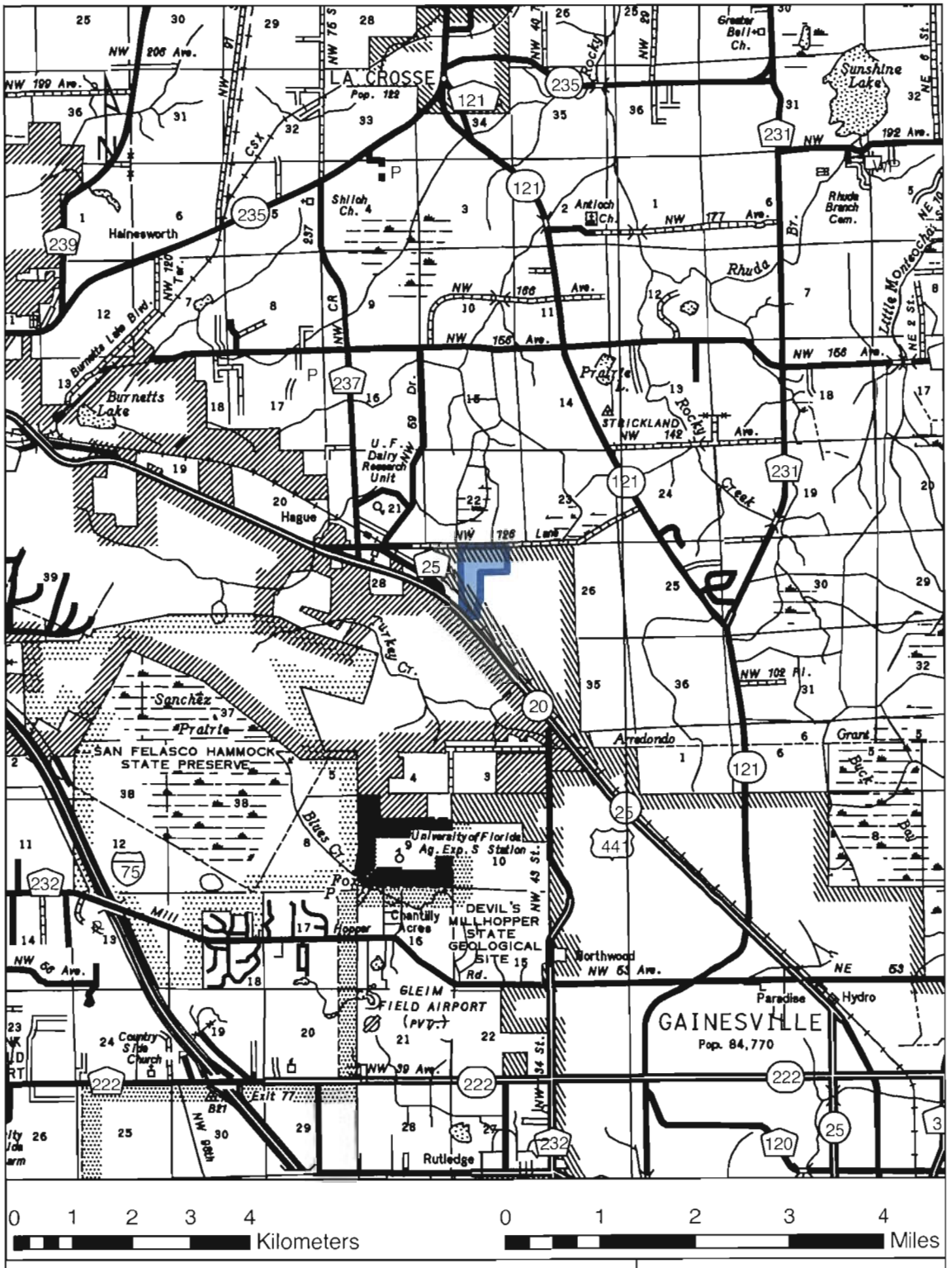


Figure 1.1. Location of the Gainesville Renewable Energy Center, Section 27, Township 8 South, Range 19 East, Alachua County (Surveying and Mapping Office 2000).

2.0 ENVIRONMENTAL SETTING

2.1 Location and Environment

The GREC project area is located in Section 27 of Township 8 South, Range 19 East (United States Geological Survey [USGS] 1981) (Figure 2.1). The approximately 131-acre project area is located within the GRU DGS tract, between NW 128th Lane and US 441. The tract is presently undeveloped and has historically been used for agriculture and pine silviculture. Most of the tract is actively managed for timber production and has been altered by land preparation (furrowing) and periodic harvesting of timber. The tract is transected by numerous unpaved trails and is surrounded by manmade ditches.

Photo 2.1. General project setting.

2.2 Physiography and Geology

The project area is situated within the Northern Highlands of the Northern or Proximal physiographic zone. The Northern and Central Highlands are remnants of a once integrated highland that has been partitioned by erosion and solution. There are a number of ancient marine terraces within the Florida. The project area is located on the Wicomico terrace (Healy 1975). Elevation of the tract is between 55-56 m (180-185 ft) above mean sea level. The area is underlain by the Tertiary Coosawatchie formation with a surface lithology of clayey sand (Knapp 1978; Scott 2001; Scott et al. 2001).

2.3 Soils and Vegetation

The GREC project area is situated within the Pomona-Wauchula-Newnan soil association that is associated with the flatwoods, slight knolls, and transitional areas between the uplands and flatwoods (US Department of Agriculture [USDA] 1985).

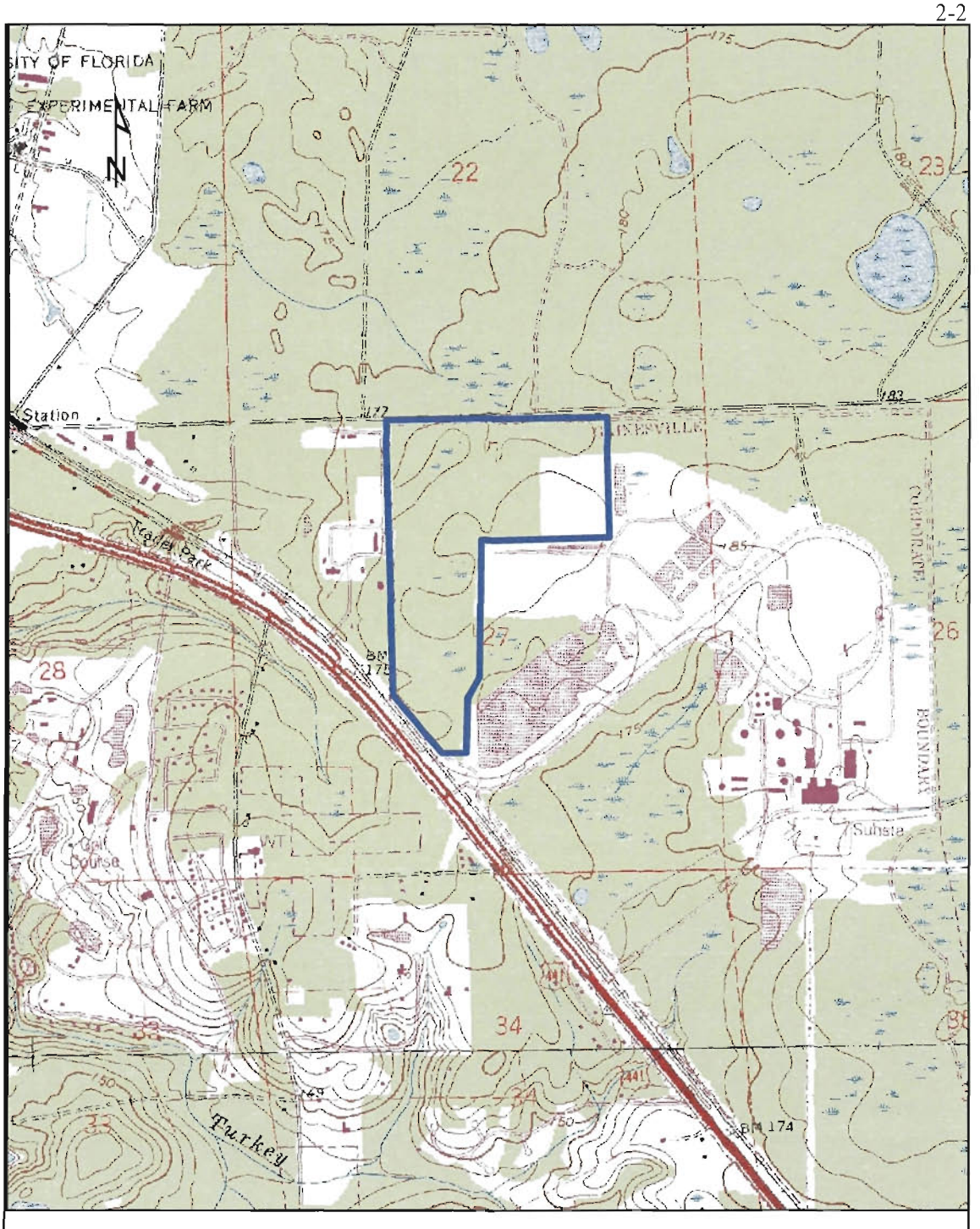


Figure 2.1. Environmental setting of the Gainesville Renewable Energy Center, Section 27, Township 8 South, Range 19 East (USGS Alachua 1981 and Gainesville West 1981).

Specifically, the project area is underlain by the somewhat poorly drained Chipley sand and the poorly drained Pomona and Wauchula sands. The depressional areas on the tract are underlain by Monteocha loamy sand, which is very poorly drained. Pomona and Wauchula sand supports longleaf and slash pine with an understory of sawpalmetto, waxmyrtle, gallberry, brackenfern, pineland threeawn, blueberry, huckleberry, bluestem, and running oak. Vegetation associated with Monteocha loamy sand consists primarily of cypress, but some areas support swamp tupelo, pone pine, bay, and other water tolerant hardwoods. The better-drained Chipley sand supports slash and longleaf pine as well as water, laurel, and live oak. The understory consists of waxmyrtle, sumac, blackberry, gallberry, scattered sawpalmetto, carpetgrass, and pineland threeawn.

2.4 Paleo-Environment

The early environment of the region was different from that seen today. Sea levels were lower, the climate was arid, and fresh water was scarce. An understanding of human ecology during the earliest periods of human occupation in Florida cannot be based on observations of the modern environment because of changes in water availability, botanical communities, and faunal resources. Aboriginal inhabitants would have developed cultural adaptations in response to the environmental changes taking place, which were then reflected in settlement patterns, site types, artifact forms, and subsistence economies.

Due to the arid conditions between 16,500 and 12,500 years ago, the perched water aquifer and potable water supplies were absent (Dunbar 1981:95). Palynological studies conducted in Florida and Georgia suggest that between 13,000 and 5000 years ago, this area was covered with an upland vegetation community of scrub oak and prairie (Watts 1969, 1971, 1975). However, the environment was not static. Evidence recovered from the inundated Page-Ladson Site in north Florida has clearly demonstrated that there were two periods of low water tables and dry climatic conditions and two episodes of elevated water tables and wet conditions (Dunbar 2006c).

By 5000 years ago, a climatic event marking a brief return to Pleistocene climatic conditions induced a change toward more open vegetation. Southern pine forests replaced the oak savannahs. Extensive marshes and swamps developed along the coasts and subtropical hardwood forests became established along the southern tip of Florida (Delcourt and Delcourt 1981). Northern Florida saw an increase in oak species, grasses, and sedges (Carbone 1983). At Lake Annie, in south central Florida, pollen cores were dominated by wax myrtle and pine. The assemblage suggests that by this time, a forest dominated by longleaf pine along with cypress swamps and bayheads existed in the area (Watts 1971, 1975). About 5000 years ago, surface water was plentiful in karst terrains and the level of the Floridan aquifer rose to 1.5 m (5 ft) above present levels. With the establishment of warmer winters and cooler summers than in the preceding early Holocene, the fire-adapted pine communities prevailed. These depend on the high summer precipitation caused by the thunderstorms and the accompanying lightning strikes to spark the fires (Watts et al. 1996; Watts and Hansen 1994). The increased precipitation also resulted in the formation of the large swamp systems such as the Okefenokee and Everglades (Gleason and Stone 1994). After this time, modern floral, climatic, and environmental conditions began to be established.

3.0 CULTURAL CHRONOLOGY

A discussion of the culture history of a given area is included in cultural resource assessment reports to provide a framework within which the local archaeological and historical record can be examined. Archaeological and historical sites are not individual entities, but rather are part of once dynamic cultural systems. As a result, individual sites cannot be adequately examined or interpreted without reference to other sites and resources in the general area.

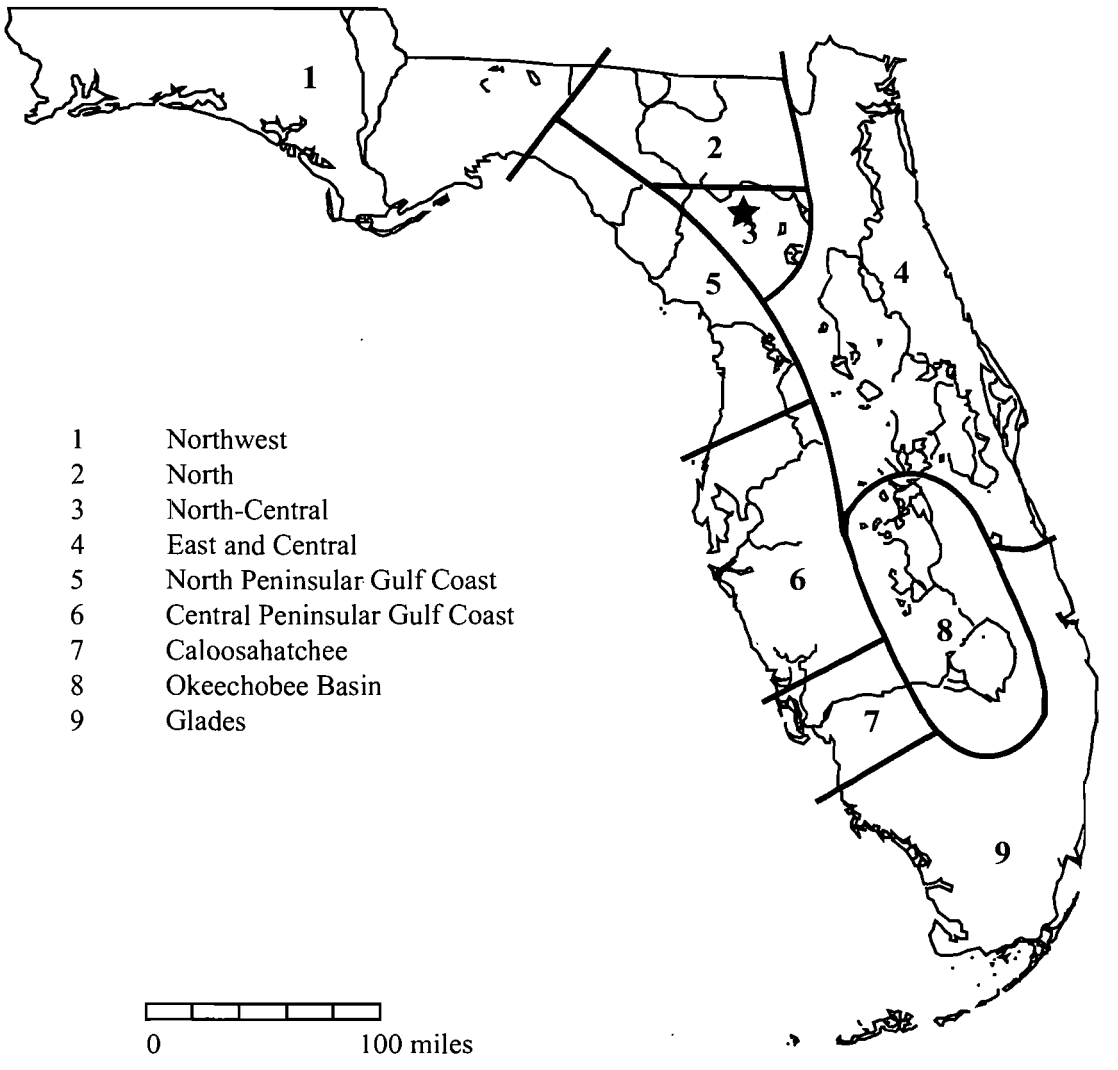
In general, archaeologists summarize the culture history of an area (i.e. an archaeological region) by outlining the sequence of archaeological cultures through time. These are defined largely in geographical terms, but also reflect shared environmental and cultural factors. The project area is located in the North-Central archeological region which extends from northern Lake County north to the Santa Fe River, between the St. Johns (East and Central Lakes) to the east and the coastal lowlands (North Peninsular Gulf Coast) to the west (Milanich and Fairbanks 1980) (Figure 3.1). The Paleo-Indian, Archaic (Early, Middle, and Late), Deptford, Cades Pond, and Alachua cultural periods have been defined based on unique sets of material cultural traits such as stone tools and ceramics, as well as subsistence, settlement, and burial patterns.

The local history of the region is divided into four broad periods based initially upon the major governmental powers. The first period, Colonialism, occurred during the exploration and control of Florida by the Spanish and British from around 1513 until 1821. At that time, Florida became a territory of the United States and 21 years later became a State (Territorial and Statehood). The Civil War and Aftermath (1861-1899) period deals with the Civil War, the period of Reconstruction following the war, and the late 1800s, when the transportation systems were dramatically increased and development throughout the state expanded. The Twentieth Century has subperiods based on important historic events such as the World Wars, the Boom of the 1920s, and the Depression. Each of these periods evidenced differential development and utilization of the region, thus effecting the historic site distribution across the land.

3.1 Paleo-Indian

The Paleo-Indian stage is the earliest known cultural manifestation in Florida, dating from roughly 12,000 to 7500 Before Common Era (B.C.E.) (Milanich 1994). When human populations were arriving in Florida, the sea levels were still as much as 40 to 60 m (130-200 ft) below present levels and coastal regions of Florida extended miles beyond present-day shorelines (Faught 2004). Thus, many of these sites have been inundated (cf., Faught and Donoghue 1997).

The Paleo-Indian period has been sub-divided into three horizons based upon characteristic tool forms (Austin 2001). Traditionally, it is believed that the Clovis Horizon (10,500-9000 B.C.E.) represents the initial occupation of Florida and is defined based upon the presence of the fluted Clovis points. These are somewhat more common in north Florida. However, recent work, may indicate that Suwannee and Simpson points are contemporary with or predate Clovis (Dunbar 2006a; Stanford 1991). The Suwannee Horizon (9000-8500 B.C.E.) is the most well known of the three Paleo-Indian horizons. The lanceolate-shaped, unfluted Simpson and Suwannee projectile points are diagnostic of this time period (Bullen 1975; Daniel and Wisenbaker 1987; Purdy 1981). The Suwannee tool kit includes a variety of scrapers, adzes, spokeshaves, unifacially retouched flakes, and blade-like flakes as well as bone and ivory foreshafts, pins, awls, daggers, anvils, and abraders (Austin 2001:23).



Post- 500 B.C.E. regions of precolumbian Florida

Figure 3.1. Florida Archaeological Regions. The project area (★) is within the North-Central Region.

The smaller Tallahassee, Santa Fe, and Beaver Lake projectile points have traditionally been attributed to Late Paleo-Indian Horizon (8500-8000 B.C.E.) (Milanich 1994). However, many of these points have been recovered stratigraphically from Late Archaic or Early Woodland period components and thus, may not date to this time period at all (Austin 2001; Farr 2006). Florida notched or pseudo-notched points, including the Union, Greenbriar, and Hardaway-like points may represent Late Paleo-Indian types, but these types have not been recovered from datable contexts; their temporal placement remains uncertain (Dunbar 2006a:410).

Although the Paleo-Indian period is generally considered to have been cooler and drier, there were major variations in the inland water tables resulting from large-scale environmental fluctuations. There have been two major theories as to why most Paleo-Indian materials have been recovered from inundated sites. The "Oasis" theory posits that due to low water tables and scarcity of potable water, the Paleo-Indians and associated game resources clustered around the few available sinkholes containing water (Neill 1964). Ben Waller postulated that they gathered around "river-crossings" to ambush the large Pleistocene animals as they crossed the rivers (Waller 1970). This implies periods of elevated water levels. Based on the research along the Aucilla and Wacissa Rivers, it appears that both theories are correct, depending upon what the local environmental conditions were at that time (Dunbar 2006b). As such, during the wetter periods, populations became more dispersed because the water resources were abundant and the animals they relied on could roam over a wider range. In addition to being "tethered" to water sources, most of the Paleo-Indian sites are close to sources of good quality lithic resources. The settlement pattern consist of the establishment of semi-permanent habitation areas and the movement of the resources from their sources of procurement to the residential locale by specialized task groups (Austin 2001:25).

Some of the information about this period has been derived from the underwater excavations at Little Salt Spring and Warm Mineral Springs (Clausen et al. 1979). The Harney Flats Site has provided a rich body of data concerning Paleo-Indian life ways. Analysis indicates that this site was used as a quarry-related base camp with special use activity areas (Daniel and Wisenbaker 1987). It has been suggested that Paleo-Indian settlement was probably related to the scheduling of "tool-kit replacement, social needs, and the availability of water," among other factors (Daniel and Wisenbaker 1987:175). Investigations along the Aucilla and Wacissa Rivers, as well as other sites within the north Florida rivers have provided important information on how the Paleo-Indians adapted to their environment (Webb 2006). Studies of the Pleistocene faunal remains clearly demonstrate the importance of these animals not just for food, but as the raw material for their bone tool industry (Dunbar and Webb 1996).

3.2 Archaic

As the Paleo-Indian period ended, climatic changes occurred and the Pleistocene megafauna disappeared. The disappearance of the mammoths and mastodons resulted in a reduction of open grazing lands, and thus, the subsequent disappearance of grazers such as horse, bison, and camels. With the reduction of open habitat, the herd animals were replaced by the more solitary, woodland browser: the white-tailed deer (Dunbar 2006a:426). The intertwined data of megafauna extinction and cultural change suggests a rapid and significant disruption in both faunal and floral assemblages and the Bolen people represent the first culture adapted to the Holocene environment (Carter and Dunbar 2006). This included a more specialized toolkit and the introduction of chipped-stone woodworking implements.

However, because of a lack of excavated collections and the poor preservation of bone and other organic materials in the upland sites, our knowledge of the full range of the Early Archaic tool assemblages is uncertain (Carter and Dunbar 2006; Milanich 1994). Discoveries at the Page-Ladson, Little Salt Spring, and Windover sites indicate that bone and wood tools were also used (Clausen et al. 1979; Doran 2002; Webb 2006). The archaeological record suggests a diffuse, yet well-scheduled, pattern of exploiting both coastal and interior resources. Because water sources were much more numerous and larger than in earlier times, the Early Archaic peoples could sustain larger populations, occupy sites for longer periods, and perform activities that required longer occupation at a specific locale (Milanich 1994:67).

By approximately 6500 years ago marked environmental changes, which had profound influence upon human settlement and subsistence practices, occurred. Humans adapted to this changing environment and regional and local differences are reflected in the archaeological record (Russo 1994a, 1994b; Sassaman 2008). Among the landscape alterations were rises in sea and water table levels that resulted in the creation of more available surface water. In addition to changed hydrological conditions, this period is characterized by the spread of mesic forests and the beginnings of modern vegetation communities including pine forests and cypress swamps.

The archaeological record for the Middle Archaic is better understood than the Early Archaic. The stemmed, broad blade projectile points, including Newnan, Levy, Marion, and Putnam types, are diagnostic of this period (Bullen 1975). Population growth, as evidenced by the increased number of sites and accompanied by increased socio-cultural complexity, is also assumed for this time (Milanich and Fairbanks 1980). Site types include large base camps, smaller special-use campsites, quarries, and burial areas. The most common sites are the smaller campsites, which were most likely used for hunting or served as special-use extractive sites for such activities as gathering nuts or other botanical materials. Base camps are defined by larger artifact assemblages and a wider variety of tool forms.

During the Late Archaic period, population increased and became more sedentary. The abundant wetland resources allowed larger settlements to be maintained. It is likely that the change in settlement patterns is related to environmental changes. By the end of the Middle Archaic, the climate closely resembled that of today; vegetation changed from those species which preferred moist conditions to pines and mixed forests (Watts and Hansen 1988). The adaptation to this environment allowed for a wider variety of resources to be exploited and a wider variation in settlement patterns. Shellfish, fish, and other food sources were now available from coastal and freshwater wetlands resulting in an increase population size. The projectile point styles of the Middle Archaic continued with the addition of Culbreath, Lafayette, Clay, and Westo types (Bullen 1975). The first fired clay pottery was made in Florida about 4000 years ago and was tempered with fibers (Spanish moss or palmetto). Recent research has revealed that the plain and decorated Orange period ceramics were contemporaneous (Sassaman 2003).

3.3 Deptford

The Deptford period (500 B.C.E.-200 Common Era [C.E.]) has been well documented as a coastal culture along the Gulf and Atlantic shorelines. The sites tend to be located in live oak-magnolia hammocks immediately adjacent to saltwater marshes. Sea level rise since the Deptford period had inundated some sites and formed islands out of others. Smaller inland sites, probably for hunting, are also known, but less well understood. Deptford subsistence strategies were based on hunting and gathering with an emphasis on the coastal resources. Coastal sites, often located in saltwater marshes, are easily identified by the presence of shell middens. Archaeologists believe

the Deptford people spent most of the year along the lagoons and salt marshes. Seasonally, small groups may have moved inland and up the rivers to exploit the riverine and hammock resources (Milanich and Fairbanks 1980:72). By about 100 C.E., the Deptford settlement pattern began to change; villages were now being established in the interior as opposed to only the special-use campsites (Milanich 1994:114).

Deptford pottery is easily identified and is characterized by linear patterns of small rectangles or squares on the outside of pots. Simple stamp, linear check stamp, and check stamp patterns were applied by pressing a carved wooden paddle into the moist clay prior to firing. Other pottery was decorated by wrapping the wooden paddle with a cord and pressing it into the moist clay. Spanish moss was replaced by better tempering agents such as sand and grit. Lithic, worked shell, and worked bone artifacts tend to be scarce at Deptford sites, suggesting that wood was primarily used as the raw material for their tools (Milanich 1994:126).

Evidence of culture changes is seen beginning around 100 B.C.E. by the increased interaction, construction of burial and other ceremonial mounds, and the movement of peoples into the interior on a permanent basis. The Yent ceremonial complex has been described by Sears (1962) for the panhandle and north peninsula gulf coast area based upon the excavations at the Crystal River, Yent, and Pierce Mounds. Not all late Deptford sites appear to be associated with that complex as cremations and midden burials have been reported from non-mound sites.

3.4 Weeden Island

The Weeden Island related cultures (100-750 C.E.) evolved out of the preceding Deptford period. There are several variants of the Weeden Island culture. The project area is situated within the Cades Pond area. All of the known Cades Pond sites are located south of the Santa Fe River and north of Orange Lake in eastern Alachua and western Clay and Putnam Counties. No Cades Pond sites are located in western Alachua County (Milanich 1994:229). Ceremonialism and its expressions, such as the construction of complex burial mounds containing exotic and elaborate grave offerings, reached their greatest development during this time. Similarly, the subsistence economy, divided between maritime and terrestrial animals and perhaps horticultural products, represents the maximum effective adjustment to the environment.

Milanich (1994:168) believes there are six basic types of Weeden Island sites. These include (1) villages, (2) village(s) with burial mounds, (3) villages without mounds but within three miles of a village with one or more mounds, (4) mound-village complexes, consisting of a village with two or more mounds, (5) isolated burial mounds, and (6) task-specific (special-use) sites such as lithic quarries, hunting camps, and other resource extractive camps. Villages were nuclear settlements with the associated midden deposit often being horseshoe shaped. All villages within this region were located next to extensive wetlands, large lakes, or both. It has been noted that villages were also proximate to other aquatic habitats, sand hills, pine scrub, and flatwoods (Milanich et al. 1984; Sigler-Lavelle 1980). Settlement along the wetlands would have provided the optimal setting for collecting the resources required by the site occupants. Although upland resources such as deer, nuts, and other animals were utilized, most of the protein was obtained from the wetlands (Cumbaa 1972). When the early mounds and villages were abandoned, new villages and mound were established nearby. As the villages grew, new communities budded off and moved nearby (Milanich 1994:236).

Mound sites contain a number of Weeden Island ceramic types. These are among some of the finest ceramics in the southeast; they are often thin, well-fired, burnished, and decorated with

incising, punctation, complicated stamping, and animal effigies (Milanich 1994:211). These ceramics can be divided into three general categories - mortuary pottery, prestige/elite pottery, and utilitarian wares. It should be noted though that undecorated ceramics are most common in the village areas whereas the decorated types are most often associated with the burial mounds. The village wares consist almost entirely of sand tempered plain while the ceremonial wares included St. Johns Plain and Dunns Creek Red. Milanich and his colleagues note that greater time and effort was spent on the manufacture of the certain decorated wares as opposed to the undecorated wares and the elite pottery was usually better made (Milanich et al. 1984).

Hunting implements would have included the Columbia, Jackson, and Bradford points used on spears or as hafted knives, and possibly Pinellas points, which would have tipped arrows. These people had a unique cultural adaptation to the wetlands and forest of north-central Florida. However, around 600 C.E., the Cades Pond people were displaced by the Alachua, and new cultural practices, focusing on agricultural pursuits, are evident.

3.5 Alachua

The Alachua had a sufficiently different culture from the preceding Cades Pond that they were believed to have moved into the area from northern or coastal Georgia, although an inland Georgia group (Ocmulgee) is more likely than a coastal one (Milanich et al. 1976). The Alachua culture was initially defined as a sedentary agricultural complex with extensive villages situated in areas with good soil. Their pottery was decorated with cord- and cob-marking. In addition, burial mounds were constructed, but were less common than previously (Goggin 1949:39).

Alachua sites tend to be large middens with little or no freshwater shell located in areas of good agricultural soils. Although Alachua sites are found around the same wetlands and lakes as Cades Pond sites, the Alachua sites are located in areas of higher elevation and loamier soils. The use of agriculture also resulted in fewer animal species being utilized (Milanich 1994:335). Fish were still primarily caught with nets, and the lack of larger fish in the faunal assemblages suggests that gigs, spears, and arrow were not often used. Deer was probably the most important meat source (Milanich 1994:339). Other materials recovered from the villages include abundant pottery, bone tools, and lithic artifacts. The lithic material included Pinellas points, drills, gravers, spokeshaves, ovoid knives, and a variety of grinding equipment. Fewer bone tools are associated with the Alachua culture as compared to the Cades Pond.

The ceramics used during the Alachua period have been divided into two subperiods: Hickory Pond (600-1250 C.E.) and Alachua (1250-1539 C.E.). The end date of 1539 was when the de Soto *entrada* came through the area. Hickory Pond sites are identified by the presence of cord marking while the Alachua period sites are identified by the use of cob marking. It is not until the Alachua period that evidence for maize horticulture is obtained.

Based on the excavations of the Richardson Site on the west side of Orange Lake, Alachua villages were roughly 200 m (656 ft) square. The houses, which were roughly eight meters (26 ft) in diameter, were spaced 20 m (66 ft) apart. Drying racks and storage cribs were located between the structured. Hearths, storage pits, and smudge pits were located within the houses (Milanich 1972). Testing at the Law School Mound, Woodward Mound, and Henderson Mound all indicated utilization during the earlier Hickory Pond period (Bullen 1949; Fradkin and Milanich 1977; Loucks 1976). Thus, it is possible that by the Alachua period, burial mounds ceased to be utilized.

3.6 Colonialism

The cultural traditions of the native Floridians ended with the advent of European expeditions to the New World. The initial events, authorized by the Spanish crown in the 1500s, ushered in devastating European contact. The colonial period begins with the arrival of the Pánfilo de Narvaéz expedition in 1528 and Hernando de Soto in 1539. Hernando de Soto passed through the Potano territory on his way to Apalachee province in 1539. In the wake of this *entrada* through the southeast, thousands of natives were decimated from the battles as well as the introduction of European diseases such as small pox, measles, and typhoid fever to which the natives had no immunity (Gannon 1996).

The Western Timucuan Indians, known as the Potano, were present throughout the area when the Europeans first arrived. These are the historic counterparts of the Alachua. The de Soto expedition headed north from Tampa Bay and passed through several towns on its way to Apalachee during the summer of 1539. One of his possible routes followed the Alachua Trail, which led along the west side of Orange Lake (Milanich and Hudson 1993:146, Figure 132). Five villages were reported by the de Soto expedition and include Itaraholata, Potano, Utinasmocharra, Malapaz, and Chloupaha. These ran in a north/south line from the Sumter/Marion county line into northwest Alachua County near the Santa Fe River. The influence of the Europeans greatly affected the occupants of the region.

In the early 1570s, Phillip II of Spain issued the Ordinances of Pacification, Patronage, and Laying Out of Towns (Bushnell 1996) which brought about the beginning of the mission chain across north Florida. During the Mission Period, (1567-1705) attempts were made to missionize the aboriginal population at about 80 mission centers throughout Florida (Hann 1996b:78). The Franciscan friars arrived in the Potano territory in 1606, with the establishment of San Francisco de Potano. Shortly thereafter, missions were established at San Miguel, Santa Ana, and San Buenaventura (Hann 1996a:165). Hann (1996a:231) notes that during the 1650s, there was massive depopulation in the western Timucuan area due to European diseases, harsh labor practices, forced relocation by the Spaniards, and the failed 1656 revolt. Before that, however, Worth (1998:69) reports that between the first missionization of this region in 1608 and the early part of 1617, almost 12,000 Timucuans had been baptized, only half of which remained alive in 1617. The Florida Mission System was dealt a fatal blow in 1702 by the English and Creek raids, which destroyed the remaining missions in north and northwest Florida.

Mission period archaeological sites in central north Florida are characterized by a ceramic assemblage containing Jefferson and Goggin wares as well as European manufactured items like majolica, olive jar, iron, and glass beads. Jefferson ceramics are defined as being grog-tempered with complicated stamped, check stamped, and incised designs as well as being cob marked, punctated, or roughened. Goggin wares are shell tempered and either plain, incised, or cord marked (Worth 1992:201-204).

The area that now constitutes the State of Florida was ceded to England in 1763 after two centuries of Spanish possession. England governed Florida until 1783, when the Treaty of Paris returned Florida to Spain. The influence of the Spaniards during this second tenure was limited. In the 1700s, members of the Creek Nation and remnants of other southeastern Indian groups moved into Florida, becoming known as the Seminoles. Their early history can be divided into two basic periods: *colonization* (1716-1767) when the initial movement of Creek towns into Florida occurred and *enterprise* (1767-1821) which was an era of prosperity under the British and Spanish rule prior to the American presence (Mahon and Weisman 1996). Weisman (1989:4)

reports that the sites tend to be shallow and have a single component. The Seminoles focused on hunting, raising cattle, and horticultural pursuits. They also crossed back and forth into Georgia and Alabama conducting raids and welcoming escaped slaves that resulted in General Andrew Jackson's invasion of Spanish Florida in 1818, which became known as the First Seminole War.

3.7 Territorial and Statehood

The First Seminole War and the 1819 Adams-Onis Treaty resulted in Florida being established as a territory of the United States in 1821. The state was subsequently divided into two counties: Escambia and St. Johns, which were divided by the Suwannee River. The establishment of Florida as a territory of the United States resulted in an increase in population movement into the state. Alachua County was carved from St. Johns County in 1824. Unfortunately, for these earlier settlers, the Seminoles, who had arrived a century earlier, were not willing to leave. In an attempt to ease the tensions, the Federal government and the Seminole Indians signed the Treaty of Moultrie Creek in 1823. The Indians were to relinquish all their lands for a roughly four million acre reservation in the center of the peninsula (Mahon 1985). Besides decreasing the size of the Seminole land holdings, the Treaty left them with land poorly suited to cultivation. Since neither side lived up to the agreements, conflicts continued.

The U.S. government concluded that the only way to solve the "Indian problem" was to remove the Seminoles from Florida entirely. The Treaty of Paynes Landing (1832) and the Treaty of Fort Gibson (1833) were drawn up with Indian deportation as the primary goal. These treaties infuriated the Indians and the subsequent increase in hostility and violence culminated in the beginning of the Second Seminole War (1835-1842). Much of the action during this war took place in and around Alachua County. The area around Orange Lake was used by Seminoles "for green-corn dances and councils, from which small war-parties emerged, cutting off travelers and express-riders" (Sprague 1964:252). As such, a series of fortifications were established to help protect the supply routes. Settlers were concentrated at the larger forts and towns, and often were from government rations (Weismantel 1996). At the end of the war, the remaining Seminoles settled in the Everglades and Big Cypress Swamp.

The general project area was first surveyed in 1831 by Joshua A. Coffee and then 19 years later by A. M. Randolph. Neither depicted any historic features within Section 27 on the Plats nor were any features discussed within their field notes (State of Florida 1831, 1834, 1850a, 1850b). The project area was described as 1st, 2nd, and 3rd rate land with pine, oak, ash, laurel, dogwood, and white oak timber. William L. Campbell purchased about half of Section 27 in 1859 (State of Florida n.d.:98).

In 1845, the State of Florida was admitted to the Union, with Tallahassee as the state capitol. In 1850, the US Congress passed an Act to enable states to reclaim the "swamp lands" within their limits. These lands were given to the States by the Federal Government and in Florida were put into the Internal Improvement Fund. In 1855, the Florida Railroad was constructed from Fernandina to Gainesville, and by 1861, it was completed to Cedar Keys. In 1855, the Third Seminole War, or Billy Bowlegs War, began because of pressure placed on Native Americans remaining in Florida to move to the west (Covington 1982). The war started in Collier County, in southwest Florida, and sporadically continued until 1858 when the U.S. Government resorted to monetary incentives to induce the remaining Seminoles to move west.

3.8 Civil War and Aftermath

In 1861, Florida followed South Carolina's lead and seceded from the Union in a prelude to the Civil War. Florida had much at stake in this war as evidenced in a report released from Tallahassee in June 1861. It listed the value of land in Florida as $35,127,721 and the value of slaves in the state at $29,024,513 (Dunn 1989:59). Even though the Florida coast experienced a naval blockade during the war, the interior of the state saw very little military action. However, the railroad tracks were damaged around Gainesville during some of the fighting. The State did help supply beef to the Confederacy. The only major battle fought in north Florida was the Battle of Olustee, which took place some ten miles east of Lake City in 1864. Though the Confederate Army won the battle, most of the State remained under Union control until the end of the war.

Immediately following the war, the South underwent a period of "Reconstruction" to prepare the Confederate States for readmission to the Union. The program was administered by the U.S. Congress, and on July 25, 1868, Florida officially returned to the Union (Tebeau 1980:251). The end of the Civil War stimulated growth in the area. Southerners sought new homes to escape the unrest in the neighboring ex-Confederate states, and the war brought prosperity to a large number of Northerners who sought vacation homes in warmer climates. The Homestead Act of 1866 opened public land in Florida to homesteaders. However, ex-confederates were ineligible and only freed slaves and loyal white settlers were eligible for the 80-acre farms. This was a period of economic hardship for the previous plantation owners due to the emancipation of the slaves. After the war, most of the plantations in the area converted from cultivating sugar cane and cotton to growing citrus.

During the Reconstruction period, Florida's financial crisis, born of pre-war railroad bonded indebtedness, led Governor William Bloxham to search for a buyer for an immense amount of state lands. Bloxham's task was to raise adequate capital in one sale to free from litigation the remainder of state lands for desperately needed revenue. In 1881, Hamilton Disston purchased four million acres from the State. This "Disston Purchase" enabled the distribution of large land subsidies to railroad companies, inducing them to begin extensive construction programs for new lines throughout the state. Henry Plant and Henry Flagler assisted with this venture by developing the east and west coast via their railroads (Harner 1973). The Plant Investment System bought the other half of Section 27 in 1885 (State of Florida n.d.:98). The railroad, with its ability to rapidly transport produce and people, had an immediate impact on the entire region. More settlers gained access to the state, land for citrus groves grew more accessible, and adequate and economical transportation for citrus crops and naval stores became a reality.

The Great Freeze of 1894-95 severely affected the citrus industry in the region. In 1894, growers in the state had shipped more than one billion oranges to markets in the nation; only three percent of that amount was shipped the following year. The freeze not only destroyed the fruit, but also killed the trees. The region entered a period of depression with many residents leaving Florida, thereby causing the dissolution of many small towns. Henry Flagler came to the rescue by lending money for seeds and expenses and they would transport the produce on his rail lines (Weismantel 1996). This began the diversification into cattle and truck crops including watermelons, cantaloupes, cabbage, and cucumbers. Sea Island cotton continued to be an important crop. The 1915 boll weevil epidemic ended the prosperous Sea Island cotton industry.

3.9 20th Century

The turn of the century prompted optimism and an excitement over growth and development. With increased financial resources and machinery, extensive reaches of land were now available for development. An improving road system, increasing services, and a growing population were additional significant features of the era. The first twenty years of the new century witnessed the advent of progressivism in which governments expanded their services beyond the traditional limits of the previous century.

Many small communities developed largely as lumber and turpentine towns along the route of the railroads. From the 1870s until World War I, turpentine and lumber played a major role in the economy of the region. Lumber, mill, crate, and turpentine companies thrived and mill towns were built. Harvesting of the pine resin brought turpentine camps that included a turpentine still, living quarters, buildings for producing barrels and pots, maintenance sheds for wagons, along with mule barns, and a commissary (Federal Writers' Project [FWP] 1939:61). By 1910, Florida ranked first in the production of naval stores (FWP 1939:378).

In 1914, prosperity ended with the outbreak of war between Germany and England. Both countries were large consumers of turpentine and resin. Although the U.S. was a neutral nation at first, trade with Germany and England was precarious. Later, the German submarine warfare destroyed the naval stores traffic. Because of the war, the livelihood of many area residents dwindled and turpentine workers moved to larger cities to find work. Sawmills often purchased the remaining timber, while developers purchased the land to later subdivide and sell.

By 1926-27, the Florida real estate market collapsed. The 1926 real estate economy in Florida was based upon such wild land speculations that banks could not keep track of loans or property values. Confidence in the Florida real estate market quickly diminished, investors could not sell lots, and depression hit Florida earlier than the rest of the nation. At the same time, the agricultural industry suffered a devastating infestation by the Mediterranean fruit fly, which endangered the future of the entire citrus industry (Mormino and Pizzo 1983:167). To make the situation even worse two hurricanes hit south Florida in 1926 and 1928. The hurricanes destroyed confidence in Florida as a tropical paradise and created a flood of refugees fleeing northward. Soon after, the October 1929 stock market crash and the onset of the Great Depression left the area in a state of stagnation.

By the mid-1930s, the New Deal programs implemented by the Franklin D. Roosevelt administration started employing large numbers of workers, helping to revive the economy of the state. The programs, aimed at pulling the nation out of the Depression, were instrumental in the construction of roads, bridges, parks, and public buildings.

By 1940, recovery from the Great Depression was imminent. The incoming service personnel and their families renewed the area economy. Federal roads, channel building, and airfield construction for the wartime defense effort brought numerous Americans into Florida. As World War II ended, Florida experienced a population boom during which the state's population increased from 1,897,414 to 2,771,305 from 1940 to 1950 (US Census Bureau [USCB] 1995). After the war, car ownership increased making the American public more mobile and vacations inexpensive. As veterans returned, the trend in new housing focused on the development of small tract homes in new subdivisions bordering larger cities. The construction of the Florida Turnpike and Interstate 75 in the 1960s and 1970s drew large-scale development away from the communities along the more rural highways and as such most of the region remains rural in

nature. Alachua County had 217,955 residents in 2000, over half of which lived in the Gainesville area (USCB 2009).

A review of the aerial photographs available from the Publication of Archival Library & Museum Materials (PALMM) revealed no major development of the tract. The 1937, 1949, and 1955 aerials depict a structure along an east/west trending road in the northwest portion of the tract, with the road being widened and straightened by 1949 (PALMM 1937, 1949, 1955). The northern 40 acres of the tract had been cleared, but the remainder of the area looks to have been pine flatwoods. By 1961, the structure is no longer evident and by 1968, a small north/south trending dirt road runs along the eastern boundary of the project area (PALMM 1961, 1968).

4.0 RESEARCH CONSIDERATIONS AND METHODOLOGIES

4.1 Background Research and Literature Review

A review of archaeological and historical literature, records, and other documents and data pertaining to the project area was conducted. The focus of this research was to ascertain the types of cultural resources known in the project vicinity, their temporal/cultural affiliations, site location information, and other relevant data. This included a review of sites listed in the NRHP, the FMSF, cultural resource survey reports, published books and articles, unpublished manuscripts, maps, and interviews. The FMSF data in this report were obtained in January 2010 though it may not reflect all recorded resources as according to FMSF staff, input may be one month or more behind receipt of reports and site files. No persons were available for interviews, thus no informant interviews were conducted.

4.1.1 Archaeological Considerations

For archaeological survey projects of this kind, specific research designs are formulated prior to initiating fieldwork in order to delineate project goals and strategies. Of primary importance is an attempt to understand, based on previous investigations, the spatial distribution of known resources. Such knowledge serves not only to generate an informed set of expectations concerning the kinds of sites which might be anticipated to occur within the project area, but also provides a valuable regional perspective, and thus, a basis for evaluating any sites discovered.

Archaeological background research, including a review of FMSF and the NRHP indicated that no archaeological sites are recorded within the project area; however, nine archaeological sites have been recorded within 1.6 km (1 m) of the tract (Table 4.1; Figure 4.1). The first four sites (8AL369-381) were recorded as part of the University of Florida Site Survey in 1962. The 1977 cultural resource assessment survey of the Deerhaven Generating Station collected additional data on 8AL369 and 8AL370; the former was considered potentially eligible for listing in the NRHP. As such, Honerkamp conducted archaeological excavations at the Deerhaven 2 Site, recovering lithic and ceramic data indicative of occupation during the Early Archaic through Hickory Pond periods. The site had been subject to extensive disturbance through natural processes and the site retained poor stratigraphic integrity, and, as such, he believed the data recovered was sufficient to mitigate any adverse effects to the site and no additional investigations were recommended (Honerkamp 1977). No evidence of 8AL370 was discovered by Miller, who noted that the area had been bulldozed (Miller 1977).

Table 4.1. Previously recorded archaeological sites proximate to the GREC.

SITE #	SITE NAME	SITE TYPE	CULTURE
AL00369	Deerhaven 2	Artifact scatter	Archaic; Deptford; Weeden Island; Alachua
AL00370	Mineral Springs	Lithic scatter/quarry	Aboriginal
AL00380	NN	Lithic scatter/quarry	Aboriginal
AL00381	NN	Artifact scatter	Aboriginal with pottery
AL02581	Brooke Point #1	Lithic scatter	Aboriginal lacking pottery
AL02582	Brooke Point #2	Lithic scatter	Aboriginal lacking pottery
AL02583	Brooke Point #3	Lithic scatter	Aboriginal lacking pottery
AL02584	Brooke Point #4	Lithic scatter	Aboriginal lacking pottery
AL02585	Brooke Point #5	Lithic scatter	Aboriginal lacking pottery

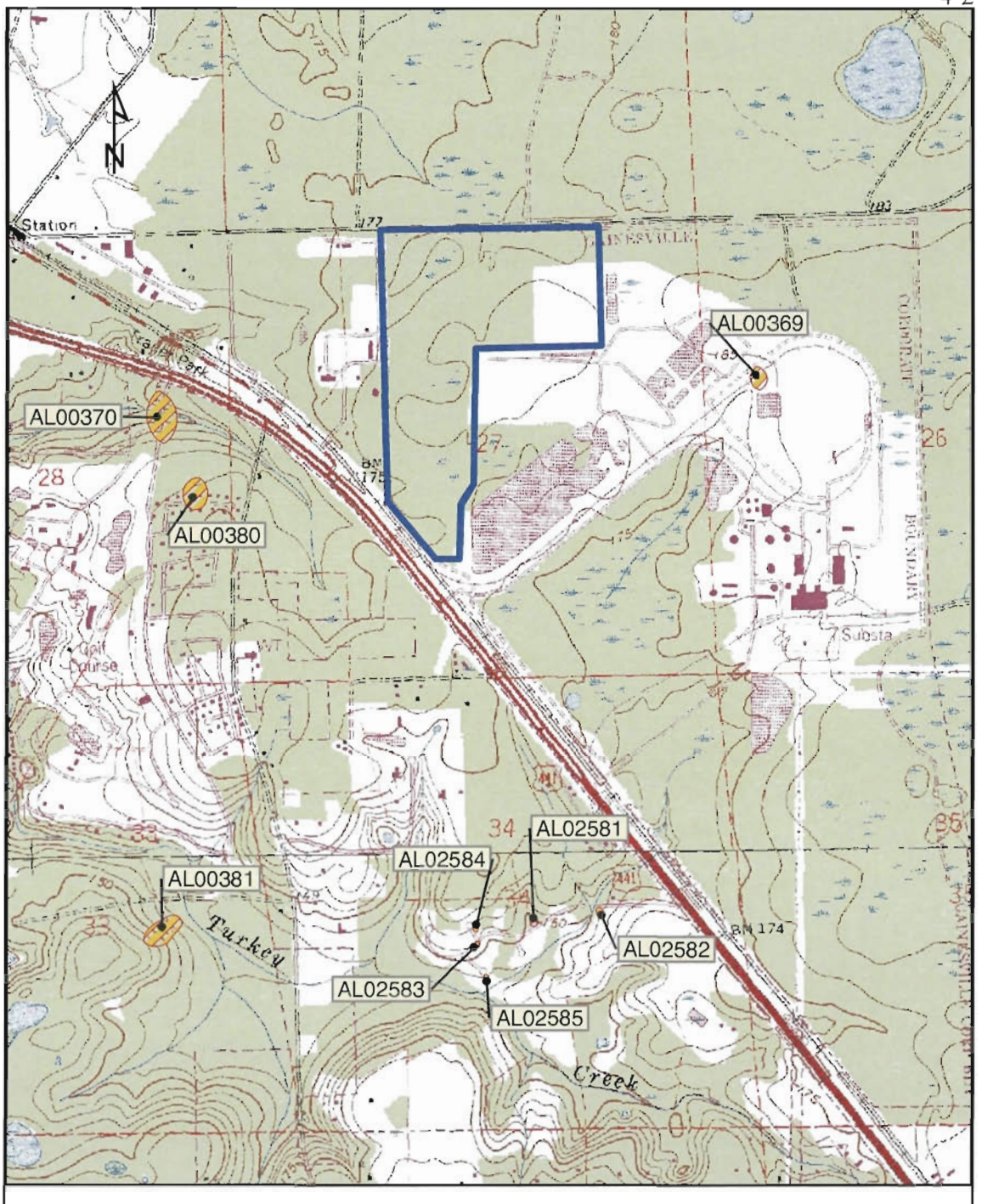


Figure 4.1. Location of the previously recorded archaeological sites proximate to the GREC (USGS Alachua 1981 and Gainesville West 1982).

8AL2581-2585 were recorded as low-density lithic scatters during the surveys associated with Ken Johnson's search of Aguacaleyquen and Cali (Johnson 1987; Ruhl 2009). However, none of the sites was discussed in the report.

In addition to the two sites reported above, Miller reported a number of other cultural resources within and near the DGS tract but did not record them as archaeological sites. These included a projectile point that was recovered in the southwestern corner of the tract near a springhead, a historic homestead located in the northern portion of the tract, and a sawmill located southeast of the project area (Figure 4.2) (Miller 1977). The homestead reportedly belonged to Marshall Green during the early part of the 20th century, and later on, the 40-acre tract had been cultivated by Ralph Cellon. When Miller visited the location of the homestead, he noted only a thicket of plum trees and a few piles of trash and rubble. Early and Emmet Baird operated the sawmill from around 1885 until 1905. It was located in a mature hardwood hammock along US 441 and was evidenced by glass and brick as well as some ornamental plants when Miller visited the area more than 30 years ago.

SEARCH conducted extensive background research on the archaeological sites contained within the unincorporated areas of the County. No evidence of 8AL369 was discovered during that survey, though the site area was reported disturbed by a railroad spur, berms, and a retention pond. The focus of the county-wide investigations was to determine whether the previously recorded sites were extant, and based upon the locations of those sites, develop an archaeological site location predictive model (Austin et al. 2001). The following year, the model was tested and refined based upon ground truthing within lands owned by the County. This resulted in the recording of eight new sites, seven of which were located within zones of high archaeological potential and the other was within a zone of moderate archaeological potential. The environmental factors of significance are:

- The presence of better-drained (i.e., somewhat poorly or better), in the uplands, particularly those that are loamy or have a loamy subsoil;
- Ridge and hill crests or slopes, particularly in poorly drained areas;
- Access to water or wetland resources (i.e., within 400 m);
- Access to chert resources in the limestone plain; and
- Access to multiple resource zones from the Northern Highlands Transitional Zone (SEARCH 2001:63).

The project area has a moderate probability for aboriginal archaeological site occurrence due the somewhat poorly drained soils and the presence of a number of wetland features on the tract. Review of the aerial photographs and previous report on the project area revealed the presence of a farmstead in the northern portion of the property. Thus, there is a high probability for the occurrence of historic resources as well.

4.1.2 Historical Considerations

Examination of the FMSF indicated that no historic structures are currently recorded within the project area. In addition to pre-Columbian archaeological sites, the potential for yet unrecorded historic period archaeological sites was assessed. Historical documents and literature, including the nineteenth century federal surveyor's plat and field notes, were reviewed. Given the results of the historic research, evidence of a homestead and possibly the sawmill complex was considered possible.

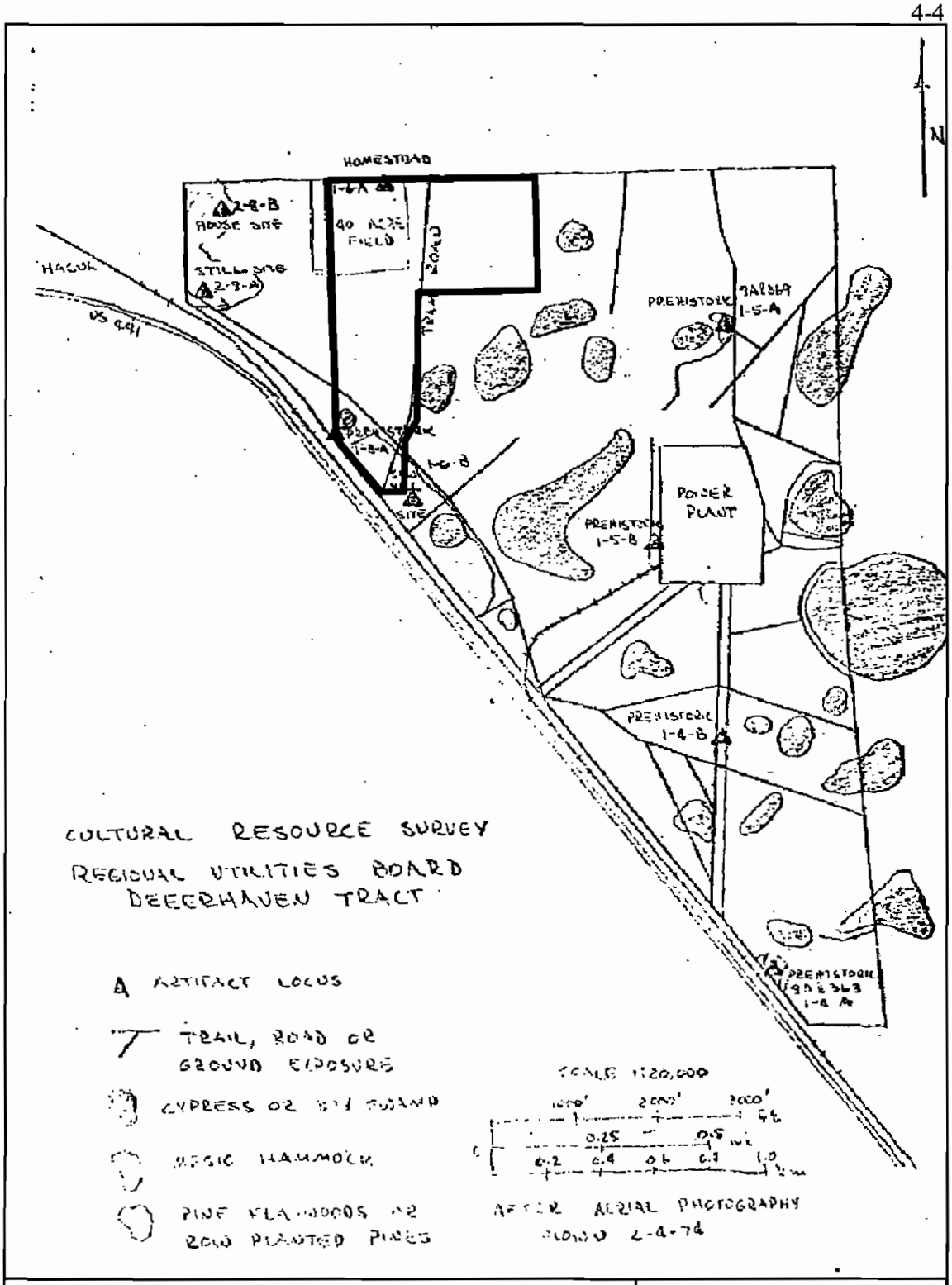


Figure 4.2. Location of the project area relative to the previous investigations by Miller (1977).

4.2 Field Methodology

The field methodology consisted of surface reconnaissance combined with systematic subsurface testing at 25 m (82 ft) intervals in those areas expected to contain cultural resources, i.e. where Miller (1977) reported cultural resource. In addition, shovel testing was conducted at 50 m (164 ft) intervals around the wetland features and judgmentally throughout the remainder of the tract. Shovel tests were circular, and measured approximately 50 cm (20 in) in diameter by a meter (3.3 ft) in depth. The soil removed from the shovel tests was screened through 6.4 mm (0.25 in) mesh hardware cloth to assure the recovery of any artifacts. The locations of all shovel tests were plotted on the aerial map, and, following the recording of relevant data such as environmental setting, stratigraphic profile, and artifact finds, all shovel tests were backfilled.

4.3 Unexpected Discoveries

If human burial sites such as Indian mounds, lost historic and prehistoric cemeteries, or other unmarked burials or associated artifacts were found, then the provisions and guidelines set forth in Chapter 872.05, *FS* (Florida's Unmarked Burial Law) were to be followed. However, it was not anticipated that such sites would be found during this survey.

4.4 Laboratory Methods and Curation

No artifacts were recovered, and thus no laboratory methods were utilized. The field notes, maps, and other project documentation will be stored at ACI in Sarasota unless the client wishes otherwise.

5.0 SURVEY RESULTS AND CONCLUSIONS

5.1 Results

The cultural resource assessment survey conducted for the Gainesville Renewable Energy Center consisted of surface reconnaissance combined with systematic and judgmental subsurface testing (Figure 5.1). A total of 80 shovel tests was excavated. Forty of the 80 shovel tests were excavated at 25 m (82 ft) intervals: 16 were excavated in the vicinity of the once extant homestead, 11 were excavated in the vicinity of the reported sawmill, and 13 were excavated in the vicinity of where Miller found a projectile point in 1977. In addition, 25 shovel tests were placed at 50 m (164 ft) intervals around the wetland features and 15 were judgmentally placed throughout the remainder of the tract. All shovel tests were sterile and no cultural materials were noted on the surface. The visual reconnaissance revealed an absence of historic structures on the parcel. The security guard was questioned concerning any cultural resources on the property, but he had no information to contribute.

The testing in the homestead area, in the northwest corner of the project area, revealed a stratigraphy of 0-30 cm (0-12 in) dark brown sand underlain by light brown sand. The saw mill area, located in the southeast corner of the project area, had a stratigraphy of 0-50 cm (0-20 in) dark gray sand underlain by dark brown sand. The southwest corner of the project area, where the projectile point has previously been recovered, evidenced a stratigraphy of 0-30 cm (0-12 in) dark gray sand underlain by light brown sand. The judgmental tests and tests around the southern wetland revealed a stratigraphy of 0-50 cm (0-20 in) dark gray sand, 50-70 cm (20-28 in) dark brown hardpan, and 70-100 cm (28-39 in) light gray sandy clay. The northern wetland area had a stratigraphy of 0-50 cm (0-20 in) dark brown sand underlain by light brown sand, and the central wetland area had a stratigraphy of 0-50 cm (0-12 in) dark gray sand underlain by gray sand.

5.2 Conclusions

The cultural resource assessment survey for the GREC consisted of surface reconnaissance combined with systematic and judgmental subsurface testing. As a result of this survey, no previously noted features (trash, thicket of trees, and broken glass) observed by Miller (1977) were found. This was not unexpected due to 30 years of agriculture and silviculture. Thus, no archaeological sites or historic structures, which are listed, determined eligible, or considered potentially eligible for listing in the NRHP, were identified within the proposed Gainesville Renewable Energy Center tract. Therefore, no significant properties will be affected by this proposed development project, and no further work is recommended.

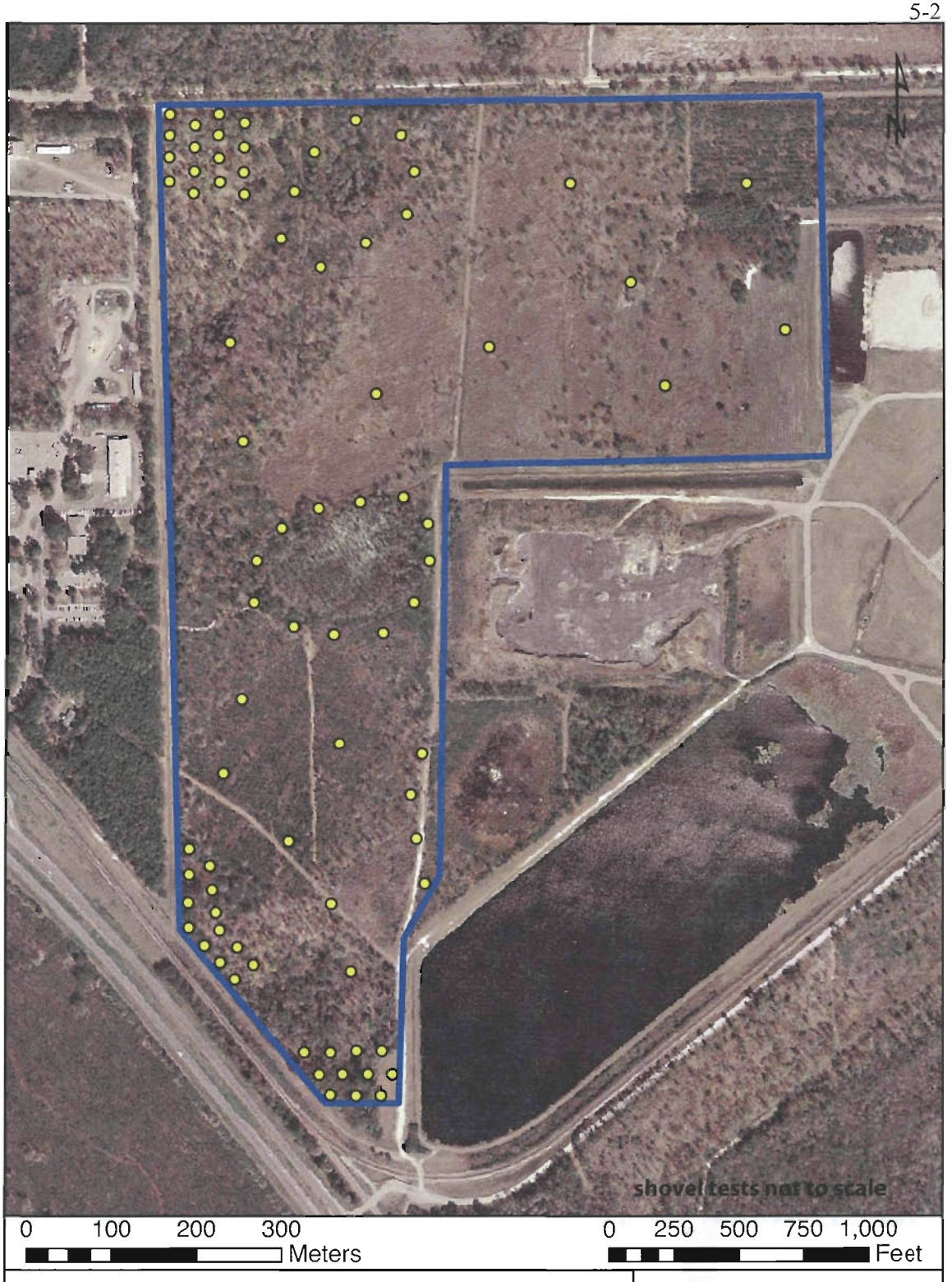


Figure 5.1. Approximate location of the shovel tests within the GREC project area, Section 27, Township 8 South, Range 19 East (USGS Alachua 2004).

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APPENDIX A: SHPO correspondence

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. James S. Gordon
Gainesville Renewable Energy Center
75 Arlington Street, 5th Floor
Boston, Massachusetts 20009

December 22, 2009

Re: DHR Project File No.: 2009-6973 / Received by DHR: December 1, 2009
Gainesville Renewable Energy Center
Site Certification Application
Alachua County

Dear Mr. Gordon:

Our office has reviewed the referenced project in accordance with Chapters 267 and 403, *Florida Statutes*, regarding possible impact to historic properties listed, or eligible for listing, in the National Register of Historic Places, or otherwise of historical, architectural or archaeological value.

We note that while Section 5.9 of this application references a prior cultural resources assessment, it does not address the specifics of that assessment. A search of our records indicates that what was then called the Deerhaven Generating Plant Expansion was subjected to a cultural resources assessment in 1977. Several cultural resources were identified but for various reasons were not recorded in the Florida Master Site File (FMSF). Consequently, any recent searches of the FMSF would not reveal the presence of resources that may in fact still be located within the project area. Furthermore, the significance of historic resources on the property may have increased in the 32 years since the survey was conducted. Because of this, it is the request of this agency that a professional archaeologist perform a cultural resource survey of the property, including subsurface testing, in order to relocate cultural resources identified in the 1977 survey and to assess the probability that additional archaeological sites and/or historic properties might be present.

If this application is referencing a more recent cultural resources assessment, a new survey may not be necessary. Regardless, detailed references to specific cultural resource assessment(s) and associated findings should be incorporated into your application.

Because this letter and its contents are a matter of public record, cultural resource consultants who have knowledge of our survey request may contact an applicant or the project agent. This should in no way be interpreted as an endorsement by this agency. The Division of Historical Resources does not maintain a list of professional consultants who are qualified to work in the State of Florida and/or who meet *The Secretary of the Interior's Historic Preservation Professional Standards* [Volume 62, Number 119, page 33707 (June 20, 1997)], ("Professional Qualifications"), or as amended in the future. However, the American Cultural Resources Association (ACRA) maintains a listing of

professional consultants (www.acra-crm.org/southeast.html). In addition, the Register of Professional Archaeologists (RPA) maintains a membership directory for locating professional archaeologists as well as other professional preservation consultants (www.rpanet.org/about.htm). Many qualified historic preservation professionals are not members of these organizations, and omission from the directories does not imply that someone does not meet the Secretary's Standards or that the resultant work would not be acceptable. Conversely, inclusion on the lists is no guarantee that a product will automatically be acceptable.

If you have any questions concerning our comments, please contact Samantha Earnest, Historic Preservationist, by electronic mail at *swearnest@dos.state.fl.us*, or by telephone at 850-245-6333 or 800-847-7278.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Historic Preservationist Supervisor
Compliance Review Section
Bureau of Historic Preservation

PC: Mr. Mike Halpin, DEP 3700

APPENDIX B: Survey Log

Ent D (FMSF only) ___/___/___

Survey Log Sheet

Florida Master Site File
Version 4.1 1/07

Survey # (FMSF only) _____

Consult *Guide to the Survey Log Sheet* for detailed instructions.

Identification and Bibliographic Information

Survey Project (name and project phase) CRAS Gainesville Renewable Energy Center, Phase I

Report Title (exactly as on title page) Cultural Resource Assessment Survey Gainesville Renewable Energy Center Alachua County, Florida

Report Author(s) (as on title page– individual or corporate; last names first) Archaeological Consultants, Inc. (ACI)

Publication Date (year) 2010 **Total Number of Pages in Report** (count text, figures, tables, not site forms) 34

Publication Information (Give series and no. in series, publisher and city. For article or chapter, cite page numbers. Use the style of *American Antiquity*.)
ACI (2010) Cultural Resource Assessment Survey Gainesville Renewable Energy Center Alachua County, Florida. Conducted for Environmental Consulting & Technology Inc., Gainesville by ACI, Sarasota.

Supervisor(s) of Fieldwork (whether or not the same as author[s]; last name first) Almy, Marion

Affiliation of Fieldworkers (organization, city) ACI, Sarasota

Key Words/Phrases (Don't use the county, or common words like *archaeology, structure, survey, architecture*. Limit each word or phrase to 25 characters.) homestead, sawmill

Survey Sponsors (corporation, government unit, or person who is directly paying for fieldwork)
Name Environmental Consulting and Technology, Inc.
Address/Phone 3701 NW 98th Street, Gainesville, FL 32606

Recorder of *Log Sheet* Horvath, Elizabeth A. **Date *Log Sheet* Completed** 01 /25 /10

Is this survey or project a continuation of a previous project? ☑ No ☐ Yes: **Previous survey #(s) (FMSF only)** _____

Mapping

Counties (List each one in which field survey was done - do not abbreviate; use supplement sheet if necessary) Alachua

USGS 1:24,000 Map(s) : Map Name/Date of Latest Revision (use supplement sheet if necessary): Alachua 1981

Description of Survey Area

Dates for Fieldwork: Start 01 /18/ 10 **End** 01/ 21/ 10 **Total Area Surveyed** (fill in one) _____ hectares 132 acres

Number of Distinct Tracts or Areas Surveyed 1

If Corridor (fill in one for each): **Width** _____ meters _____ feet **Length** _____ kilometers _____ miles

Survey Log Sheet

Survey #_____

Research and Field Methods

Types of Survey (check all that apply): ☑ archaeological ☑ architectural ☑ historical/archival ☐ underwater ☐ other: _____

Preliminary Methods (✓Check as many as apply to the project as a whole.)

- ☐ Florida Archives (Gray Building)
- ☐ Florida Photo Archives (Gray Building)
- ☑ Site File property search
- ☑ Site File survey search
- ☑ library research- *local public*
- ☑ library-special collection - *nonlocal*
- ☑ Public Lands Survey (maps at DEP)
- ☐ local informant(s)
- ☑ local property or tax records
- ☐ newspaper files
- ☑ literature search
- ☐ Sanborn Insurance maps
- ☑ other historic maps
- ☑ soils maps or data
- ☑ windshield survey
- ☑ aerial photography
- ☐ other (describe) _____

Archaeological Methods (✓Check as many as apply to the project as a whole.)

☐ Check here if **NO** archaeological methods were used.

- ☐ surface collection, controlled
- ☐ surface collection, uncontrolled
- ☑ shovel test-1/4"screen
- ☐ shovel test-1/8" screen
- ☐ shovel test 1/16"screen
- ☐ shovel test-unscreened
- ☐ other screen shovel test (size: ____)
- ☐ water screen (finest size: ____)
- ☐ posthole tests
- ☐ auger (size: ____)
- ☐ coring
- ☐ test excavation (at least 1x2 M)
- ☐ block excavation (at least 2x2 M)
- ☐ soil resistivity
- ☐ magnetometer
- ☐ side scan sonar
- ☐ unknown
- ☐ other (describe): _____

Historical/Architectural Methods (✓Check as many as apply to the project as a whole.)

☐ Check here if **NO** historical/architectural methods were used.

- ☐ building permits
- ☐ commercial permits
- ☐ interior documentation
- ☐ demolition permits
- ☑ exposed ground inspected
- ☐ local property records
- ☐ neighbor interview
- ☐ occupant interview
- ☐ occupation permits
- ☐ subdivision maps
- ☑ tax records
- ☐ unknown
- ☐ other (describe): _____

Scope/Intensity/Procedures background research, surface reconnaissance, systematic subsurface testing @ 25 & 50 m intervals as well as judgmentally, 50 cm diameter, 1 m deep, 6.4 mm mesh screen; 80 ST, all sterile

Survey Results (cultural resources recorded)

Site Significance Evaluated? ☐ Yes ☑ No If *Yes*, circle NR-eligible/significant site numbers below.

Site Counts: Previously Recorded Sites 0 **Newly Recorded Sites** 0

Previously Recorded Site #'s with Site File Update Forms (List site #'s without "8." Attach supplementary pages if necessary) _____

Newly Recorded Site #'s (Are you sure all are originals and not updates? Identify methods used to check for updates, i.e., researched Site File records. List site #'s without "8." Attach supplementary pages if necessary.) _____

Site Form Used: ☑ Site File Paper Form ☐ SmartForm II Electronic Recording Form

REQUIRED: ATTACH PLOT OF SURVEY AREA ON PHOTOCOPIES OF USGS 1:24,000 MAP(S)

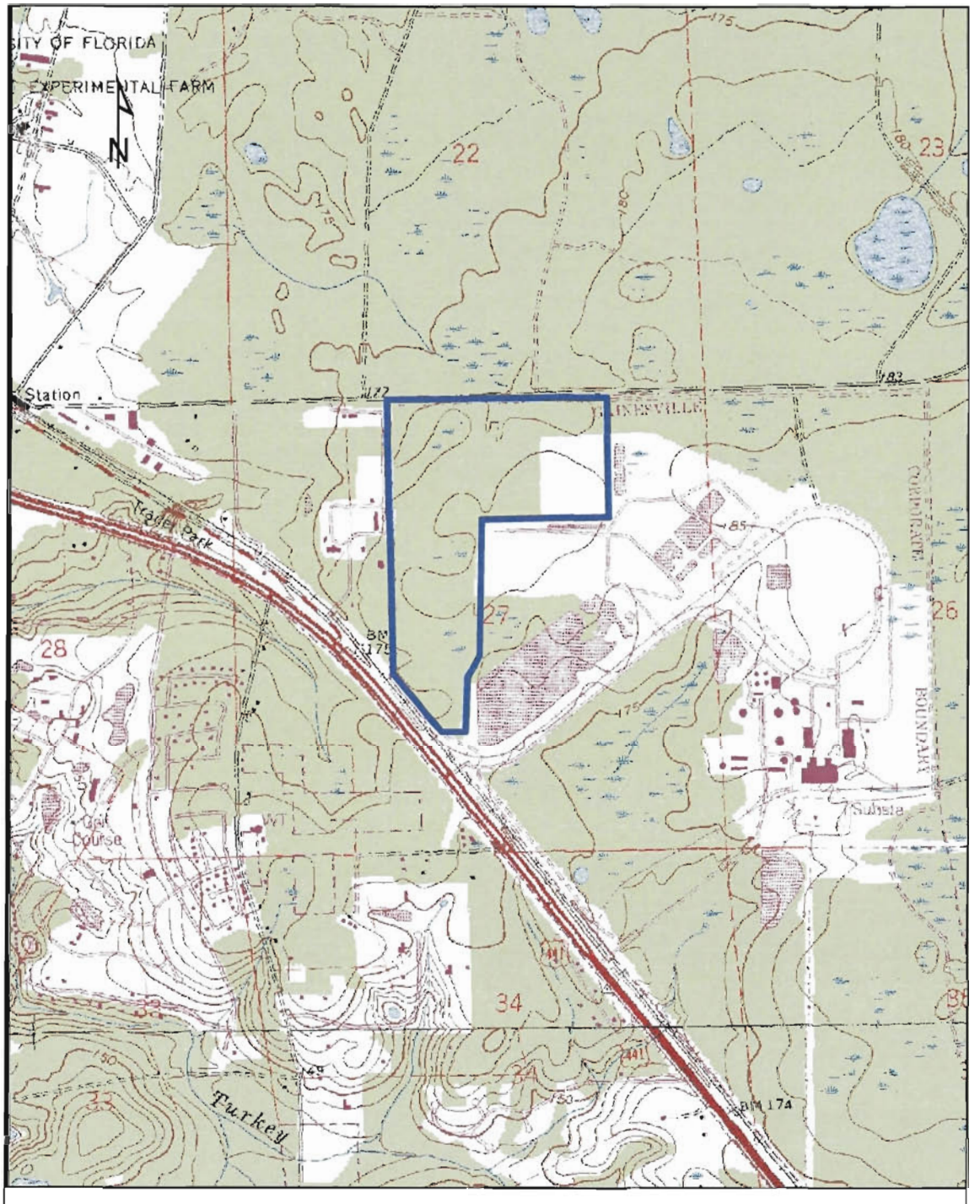
DO NOT USE SITE FILE USE ONLY DO NOT USE

BAR Related

- ☐ 872
- ☐ CARL
- ☐ 1A32 # _____
- ☐ UW

BHP Related

- ☐ State Historic Preservation Grant
- ☐ Compliance Review: CRAT # _____



Gainesville Renewable Energy Center
Section 27, Township 8 South, Range 19 East
USGS Alachua 1981
Alachua County