

May 1, 2018

Cory D. Dilmore, PE
Environmental Administrator
Florida Department of Environmental Protection
Permitting and Compliance Assistance Program
2600 Blair Stone, MS #4565
Tallahassee, Florida 32399

RE: Citrus County Central Landfill
Minor Operations Permit Modification Application for GCCS Expansion and Gas
Migration Control System
FDEP Solid Waste Operations Permit No.: 21375-025-SO-01
Jones Edmunds Project No.: 03860-069-01

Dear Mr. Dilmore:

On behalf of the Citrus County Board of County Commissioners (BOCC), Jones Edmunds is submitting the enclosed application for a Minor Operations Permit Modification at the Citrus County Central Landfill in Lecanto, Florida. This minor permit modification application proposes expansion and modification of the existing gas collection and control system (GCCS) at the active Class I Landfill, modification of the existing passive gas control system at the closed Class I Landfill, and modifications to the monitoring network to reflect recently installed groundwater monitoring wells and gas monitoring probes. The intent of the proposed modifications is to improve and increase landfill gas collection and to reduce landfill gas migration outside the limits of waste while improving the groundwater and landfill gas monitoring network.

Enclosed is Application Form 62-071.900(1), supporting documentation, engineering drawings, and an Operations Plan specific to the proposed project. The County will submit the permit application fee electronically in the amount of \$250. Parts of the application that are not applicable or have no change from previous submittals were marked accordingly.

If you have any questions or would like to discuss, please contact me at (352) 377-5821 or at csawyer@jonesedmunds.com.

Sincerely,



Carol G. Sawyer, PE
Project Engineer
730 NE Waldo Road
Gainesville, Florida 32641

M:\03860-CitrusCounty\059-01 GCCS Expansion\Minor SW Permit Mod App\LTR_CitrusGCCS-MinorMod.docx

Enclosures

**CITRUS COUNTY CENTRAL LANDFILL
GAS COLLECTION AND CONTROL SYSTEM EXPANSION
AND GAS MIGRATION CONTROL SYSTEM
MINOR OPERATIONS PERMIT MODIFICATION APPLICATION**

Prepared for:

Citrus County Board of County Commissioners
3600 W. Sovereign Path, Suite 267
Lecanto, Florida 34461



Prepared by:

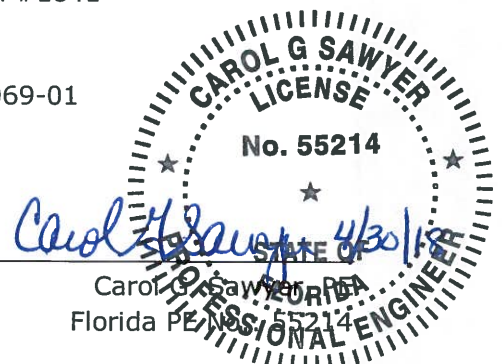
Jones Edmunds
730 NE Waldo Road
Gainesville, Florida 32641

JonesEdmunds

Certificate of Engineering Authorization #1841

Jones Edmunds Project No.: 03860-069-01

April 2018



Carol G. Sawyer, P.E.
Florida PE No. 55214

TABLE OF CONTENTS

INTRODUCTION

APPLICATION TO CONSTRUCT, OPERATE, MODIFY, OR CLOSE A SOLID WASTE
MANAGEMENT FACILITY – FDEP FORM 62-701.900(1)

SUPPORTING DOCUMENTATION

PART D	SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL
PART G	CONSTRUCTION REQUIREMENTS
PART K	LANDFILL OPERATION REQUIREMENTS
PART L	WATER QUALITY MONITORING REQUIREMENTS
PART N	GAS MANAGEMENT SYSTEM REQUIREMENTS

ATTACHMENT N.2 LANDFILL GAS MONITORING INVENTORY

APPENDICES

Appendix A	Operation Plan
Appendix B	Permit Drawings
Appendix C	Technical Specifications
Appendix D	Water Quality Monitoring Plan

INTRODUCTION

1 INTRODUCTION

This permit application and supporting documents are being submitted on behalf of the Citrus County Board of County Commissioners (BOCC) for the Citrus County Central Landfill (CCCL) in Lecanto, Florida. The enclosed permit application is requesting a minor permit modification to the facility's solid waste operations permit for the following:

1. Expansion and modification of the gas collection and control system (GCCS) at the active Class I Landfill.
2. Modification of the existing passive gas control system at the closed Class I Landfills.
3. Modification of the existing groundwater monitoring network to include the recently installed assessment wells.
4. Updates to the landfill gas (LFG) migration compliance monitoring requirements.

The intent of the proposed modifications are to improve and increase LFG collection and reduce LFG migration outside the limits of waste while improving the groundwater and LFG monitoring networks.

The CCCL is in Lecanto, Florida, at 230 W. Gulf to Lake Highway (State Highway [SR] 44). The facility consists of an active, lined 32-acre Class I Landfill (Phases 1, 1A, 2, and 3) and three closed Class I Landfills. Two of the three closed landfills are unlined. The active landfill has an active GCCS, and the closed landfills have passive LFG vents. The facility operates under the following Florida Department of Environmental (FDEP) permits:

- Solid Waste Operations: Permit No. 21375-025-SO-01 (expires August 15, 2026)
- Title V Air Operations: Permit No. 0170366-006-AV (expires July 12, 2021)

This application is for a minor modification of the solid waste operations permit. The proposed project does not include any modifications to the GCCS flare; therefore, a Title V permit modification is not required. Modifications to the GCCS will be documented in the required Title V semi-annual reports.

1.1 PROPOSED GCCS EXPANSION AT ACTIVE CLASS I LANDFILL

The active 32-acre lined Class I Landfill (Phases 1, 1A, 2, and 3) began accepting waste in 1991, and has available capacity until approximately 2032. An intermediate closure cover is maintained in Phases 1/1A and 2; and active waste filling occurs in Phase 3. Changes to the gas collection system are proposed to improve collection efficiency of the system and to augment the existing gas wellfield. No changes are proposed to the gas control system (i.e., blower and flare station).

Citrus County elected to install an active GCCS in 2010 before reaching regulatory thresholds. LFG extraction wells are in Phases 1 and 1A and a portion of Phase 2. The GCCS consists of 11 vertical collection wells, nine remote wellheads at leachate cleanouts, 8- and 10-inch high-density polyethylene (HDPE) header pipe, condensate

sumps, and a 750-standard cubic foot-per-minute (scfm) flare that thermally destructs the collected gas. The proposed GCCS expansion project includes the following:

- Demolish seven wellheads at the leachate cleanouts (W-1, -2, -3, -4, -6, -7, and -9) and associated lateral LFG piping.
- Demolish three remote wellheads (EW-8R, EW-9R, and EW-10R) to downslope vertical gas risers. The remote wellhead connections will be relocated based on the new header pipe layout (RW-8, RW-9, and RW-10).
- Demolish four vertical gas collection wells (EW-4 through EW-7), and install seven new vertical gas collection wells (EW-12 through EW-18) in Phase 1. The new wells will be 80 feet deep (with 60 feet of slotted pipe) and will be at least 40 feet above the bottom liner.
- Demolish the two self-draining condensate traps (CT-1 and CT-2), and install one condensate trap, CS-3, with a dedicated pneumatic pump on the west side of Phase 2.
- Install one new vertical gas collection well outside the lined active Class I Landfill near background groundwater monitoring well MW-7, and connect to the active GCCS. LFG monitoring data collected from within the riser of MW-7 shows possible evidence of LFG migration. This new gas collection well will be approximately 100 feet deep and 20 feet from MW-7. This new well is intended to capture LFG outside the lined area before it comes into contact with the groundwater.
- Install four new horizontal gas collector trenches in Phases 2 and 3 with remote wellhead connections (HC-1 through HC-4) and 6-inch lateral piping. The horizontal trenches will drain to the north into Phase 3.
- Install new 8-inch HDPE SDR 17 header piping, 6-inch HDPE SDR 17 lateral piping, a 2-inch compressed air line, and a 4-inch condensate drain line with all new LFG piping.
- Install dedicated dewatering pumps into existing vertical gas wells EW-1, EW-2, and EW-3.

1.2 PROPOSED LFG MIGRATION SYSTEM AT CLOSED CLASS I LANDFILLS

1.2.1 BACKGROUND

The three closed Class I Landfills are west of the active landfill. The landfills are identified as Closed Landfill Area A (4.25 acres, unlined), Closed Landfill Area B (24 acres, unlined), and Lined Closed Landfill Area (7 acres, lined). These disposal areas were active from 1975 through 1990. The closed landfill areas have passive gas control vents. The 7-acre closed lined landfill area originally had a minor passive gas extraction system with sparker-type flares on top of vents. The sparker flares were removed and modified to passive gas control vents.

On September 20, 2005, the Citrus County BOCC executed Consent Agreement #05-1078 with FDEP to address issues of reported groundwater exceedances in downgradient groundwater monitoring wells since 2002 and exceedances of the lower explosive limit (LEL) for combustible gases (calibrated to methane) at the LFG monitoring probes since November 2003. The BOCC implemented the Groundwater Investigation Plan and the Landfill Gas Compliance Action Plan that were detailed in the Consent Agreement. SCS Engineers implemented the Landfill Gas Compliance Action Plan. Jones Edmunds implemented the Groundwater Investigation Plan.

The Consent Agreement required the BOCC to obtain a lease expansion agreement from the Division of Forestry/State Lands and provide a copy to FDEP. On October 5, 2005, the Department of Agriculture and Consumer Services Division of Forestry issued a Special Arrangement of Accommodations to grant Citrus County Solid Waste Management Division permission to access the Withlacoochee State Forest to install and monitor 19 gas probes (GP-1 through GP-19) and groundwater monitoring wells (MW-10 through MW-17) next to the CCCL.

In accordance with the Consent Agreement, monitoring wells (MW-10 through MW-15 and MW-17) were installed in October and November 2005. One water-level monitoring well (MW-16) was installed between the lined and unlined cells to provide additional groundwater flow information.

A permit modification requesting changes to (1) the landfill property boundary, (2) the zone of discharge, (3) the groundwater monitoring network, and (4) the LFG monitoring network was submitted to and approved by FDEP (Modification 21375-011 to existing Permit No. 21375-008-SO/01). The modified landfill property boundary extends approximately 300 feet from the previous west, south, and east property boundaries.

On July 18, 2006, Jones Edmunds conducted groundwater sampling for the Second Semiannual 2006 permit-required compliance monitoring. Groundwater results from MW-10, located just north of the closed Class I cells, reported concentrations of Benzene, Methylene Chloride, and Vinyl Chloride above the State drinking water standards. Jones Edmunds re-sampled MW-10 on August 31, 2006. Concentrations of Benzene and Methylene Chloride were at the Primary Drinking Water Standard (PDWS) and Vinyl Chloride exceeded the PDWS.

The confirmed exceedance of Vinyl Chloride in MW-10 initiated implementation of a Site Assessment Report (SAR) in accordance with Rule 62-780, of the Florida Administrative Code (FAC), as required by Consent Agreement #05-1078. The site assessment was conducted to delineate the horizontal and vertical extent of contamination in addition to any potential environmental or public health threats.

Site assessment activities included installing two assessment wells for vertical and horizontal delineation of contaminant migration. Vertical assessment well MW-19 was installed, clustered with MW-10, and screened at a deeper interval. Horizontal assessment well MW-18 was installed approximately 150 feet northwest of MW-10 and screened to intersect the water table. The SAR was submitted to FDEP on October 10, 2007, identifying migrating LFG as the cause of the groundwater contamination.

FDEP met with the County and Jones Edmunds and requested additional information to verify that migrating LFG was the source of the contamination. Jones Edmunds conducted LFG speciation sampling on gas samples collected from MW-10 and MW-17. The sampling showed that LFG in the well risers contained the parameter of concern volatile organic compounds (VOCs) at sufficient concentrations to cause the observed groundwater exceedances. The results of the gas sampling are documented in the SAR Response to FDEP's Request for Additional Information (RAI) dated January 2009.

Based on the information presented in the SARs, FDEP requested that active remediation be implemented to remediate the groundwater around MW-10. In October 2010, Jones

Edmunds installed the solar-powered soil vapor extraction system near MW-10. Since the system installation, the VOCs observed in the groundwater decreased in MW-10 but have recently reappeared in MW-19, and similar concentrations of the same parameters are observed in MW-21 east of MW-10.

Due to the newly observed parameter exceedances, Jones Edmunds submitted a Landfill Gas Assessment and Groundwater Delineation Plan to FDEP on March 22, 2017, documenting a plan to expand the LFG and groundwater monitoring systems north of the closed Class I Landfills. Three new groundwater monitoring wells (MW-19D, MW-18D, and MW-22) and 11 new gas monitoring probes (GP-20 through GP-30) were installed in July 2017. Jones Edmunds prepared and submitted to the FDEP Southwest District the Landfill Gas Assessment and Groundwater Delineation Report dated November 28, 2017. Based on the continued observations of groundwater parameter exceedances and discussions with FDEP Southwest District, the County authorized Jones Edmunds to design a dedicated LFG extraction system at the closed Class I Landfills to increase the LFG extraction efficiency in this area.

1.2.2 PROPOSED LFG MIGRATION CONTROL SYSTEM

The proposed LFG extraction system at the closed landfills will be connected to the passive gas vents on the north end of the closed landfill areas and will incorporate the gas extraction wells currently connected to the solar-powered extraction system. The vents and wells will connect to a small dedicated blower system, which will greatly increase the vacuum on the system compared to the solar-powered unit.

This application proposes the following LFG migration-control system design using some of the existing passive LFG vents along the north portion of the closed landfill cells:

- Decommission the existing solar-powered soil-vapor extraction system.
- Retrofit 13 existing gas vents with LFG extraction wellheads. The wellheads will allow for monitoring as needed. Of the 13 gas vents, 11 are installed within the closed landfills and two are part of the existing solar soil-vapor extraction system installed north of Closed Landfill Area B.
- Install 4- and 6-inch SCH 80 polyvinyl chloride (PVC) LFG piping to connect the modified passive gas wells to the blower-skid station. The LFG piping installation is designed to not interfere with the 40-mil geomembrane closure cap installed at the 7-acre Closed Landfill Area.
- Install a pre-fabricated, pre-wired blower skid station with a UL-rated control panel outside the limits of waste of the Closed Class I Landfill areas. This system will apply negative pressure to the gas wells, induce low pressure inside the landfill area to create a preferential pathway for the gas generated, and inhibit lateral gas migration. The collected gas will then be vented to the atmosphere through a 15-foot-high vent stack.
- Install a condensate trap with an electric pump downslope of the blower skid station for liquids management. Liquids generated by the system will be discharged into an existing leachate collection riser installed at the 7-acre Closed Landfill Area.

1.3 PROPOSED UPDATES TO THE MONITORING NETWORK

1.3.1 PROPOSED UPDATES TO THE GROUNDWATER MONITORING NETWORK

Appendix 3, Part II, Specific Condition 4 of the current operations permit requires the semiannual sampling of assessment wells MW-18 and MW-19 for field parameters and the laboratory parameters Benzene, Methylene Chloride, and Vinyl Chloride. This permit modification requests that the three newly installed assessment wells MW-19D, MW-18D, and MW-22 be added to this permit condition.

1.3.2 PROPOSED LFG MIGRATION COMPLIANCE MONITORING NETWORK

The LFG monitoring network was modified in 2017 from the approved gas management system design included in Consent Agreement #05-1078. The modifications are documented in the Landfill Gas Assessment and Groundwater Delineation Report, dated November 28, 2017.

The new monitoring network includes the existing gas monitoring probes (GP1 through GP-19) and 11 new LFG monitoring probes (GP-20 through GP-30). The probes were constructed as required in the consent order with long sections of slotted pipe, and have been retrofitted for monitoring at varying depths in each probe as described in Part N. The LFG monitoring probes are monitored quarterly. This permit requests that the specific conditions in Section II, Part E, Gas Management System Requirements, of the current permit be updated to reflect the modifications presented herein.

1.4 CONSENT AGREEMENT EVALUATION

The County has been working diligently to ensure that all conditions of Consent Agreement #05-1078 are met and we are appreciative all of the assistance that FDEP has given to help the site stay in compliance with the Consent Agreement and State rules. FDEP has, at the County's request, explored the possibility of closing out the Consent Agreement and still maintaining authority to enforce the remediation of the groundwater parameter exceedances observed at the site; however, at this time, FDEP does not believe that the Consent Agreement can be closed.

FDEP, Citrus County, and Jones Edmunds attended a meeting at the FDEP Southwest District office on February 15, 2018, to discuss the Consent Agreement status and the next steps required to close out the Agreement. Based on that meeting, we determined that the new assessment wells and new LFG compliance monitoring probes need to be included in the permit. The County also requested guidance from FDEP on a plan for closing out the Consent Agreement.

This permit modification requests adding the new assessment wells and updated LFG compliance monitoring network to the permit. The County requests guidance and a plan from FDEP to close out the Consent Agreement. Based on the new assessment wells, additional gas probes, and construction of the gas migration control system at the closed landfills, can a timeline or criteria be established for evaluation and closeout? This permit requests that the specific conditions in Section II, Part D, Water Quality Monitoring Requirements, and Part E, Gas Management System Requirements, be revised to reflect the

current site conditions and monitoring. Is there a mechanism for revising the permit language to include a plan for evaluation and closeout of the Consent Agreement?

1.5 FINANCIAL ASSURANCE

The proposed LFG migration system at the Closed Class I Landfills will not impact the long-term care operations or costs of the facility; therefore, the financial assurance long-term care cost estimate for the closed landfills has not been revised.

The proposed GCCS expansion/modification will not impact the closure or long-term care cost estimate at the active Class I Landfill. The site is operating under a 10-year permit that requires a revised closure and long-term care cost estimate be submitted by August 12, 2021.

**Application for a Permit to Construct,
Operate, Modify, or Close a Solid Waste
Management Facility**

FDEP Form 62-701.900(1)



Florida Department of Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

DEP Form #: 62-701.900(1), F.A.C.

Form Title: Application to Construct, Operate, Modify, or
Close a Solid Waste Management Facility

Effective Date: February 15, 2015

Incorporated in Rule: 62-701.330(3), F.A.C.

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

APPLICATION TO CONSTRUCT, OPERATE, MODIFY, OR CLOSE A SOLID WASTE MANAGEMENT FACILITY

APPLICATION INSTRUCTIONS AND FORMS

Northwest District
160 Governmental Street
Suite 308
Pensacola, FL 32502-5794
850-595-8300

Northeast District
7777 Baymeadows Way West
Suite 100
Jacksonville, FL 32256-7590
904-256-1700

Central District
3319 Maguire Boulevard
Suite 232
Orlando, FL 32803-3767
407-897-4100

Southwest District
13051 North Telecom Pkwy
Temple Terrace, FL 33637
813-470-5700

South District
2295 Victoria Ave, Suite 364
P.O. Box 2549
Fort Myers, FL 33901-3881
239-344-5600

Southeast District
3301 Gun Club Road
MSC 7210-1
West Palm Beach, FL 33406
561-681-6600

INSTRUCTIONS TO APPLY FOR A SOLID WASTE MANAGEMENT FACILITY PERMIT

I. General

Solid Waste Management Facilities shall be permitted pursuant to Section 403.707, Florida Statutes (FS) and in accordance with Florida Administrative Code (FAC) Chapter 62-701. A permit application shall be submitted in accordance with the requirements of Rule 62-701.320(5)(a), F.A.C., to the appropriate Department office having jurisdiction over the facility. The appropriate fee in accordance with Rule 62-701.315, FAC, shall be submitted with the application by check made payable to the Department of Environmental Protection (DEP).

Complete appropriate sections for the type of facility for which application is made. Entries shall be typed or printed in ink. All blanks shall be filled in or marked "Not Applicable" or "No Substantial Change". Information provided in support of the application shall be marked "Submitted" and the location of this information in the application package indicated. The application shall include all information, drawings, and reports necessary to evaluate the facility. Information required to complete the application is listed on the attached pages of this form.

II. Application Parts Required for Construction and Operation Permits

- A. Landfills and Ash Monofills - Submit Parts A through S
- B. Asbestos Monofills - Submit Parts A, B, C, D, E, F, I, K, M, O through S
- C. Industrial Solid Waste Disposal Facilities - Submit Parts A through S

NOTE: Portions of some Parts may not be applicable.

NOTE: For facilities that have been satisfactorily constructed in accordance with their construction permit, the information required for A, B and C type facilities does not have to be resubmitted for an operation permit if the information has not substantially changed during the construction period. The appropriate portion of the form should be marked "no substantial change".

III. Application Parts Required for Closure Permits

- A. Landfills and Ash Monofills - Submit Parts A, B, L, N through S
- B. Asbestos Monofills - Submit Parts A, B, M, O through S
- C. Industrial Solid Waste Disposal Facilities - Submit Parts A, B, L through S

NOTE: Portions of some Parts may not be applicable.

IV. Permit Renewals

The above information shall be submitted at time of permit renewal in support of the new permit. However, facility information that was submitted to the Department to support the expiring permit, and which is still valid, does not need to be re-submitted for permit renewal. Portions of the application not re-submitted shall be marked "no substantial change" on the application form.

V. Application Codes

S	-	Submitted
LOCATION	-	Physical location of information in application
N/A	-	Not Applicable
N/C	-	No Substantial Change

VI. Listing of Application Parts

PART A:	GENERAL INFORMATION
PART B:	DISPOSAL FACILITY GENERAL INFORMATION
PART C:	PROHIBITIONS
PART D:	SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL
PART E:	LANDFILL PERMIT REQUIREMENTS
PART F:	GENERAL CRITERIA FOR LANDFILLS
PART G:	LANDFILL CONSTRUCTION REQUIREMENTS
PART H:	HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS
PART I:	GEOTECHNICAL INVESTIGATION REQUIREMENTS
PART J:	VERTICAL EXPANSION OF LANDFILLS
PART K:	LANDFILL OPERATION REQUIREMENTS
PART L:	WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS
PART M:	SPECIAL WASTE HANDLING REQUIREMENTS
PART N:	GAS MANAGEMENT SYSTEM REQUIREMENTS
PART O:	LANDFILL CLOSURE REQUIREMENTS
PART P:	OTHER CLOSURE PROCEDURES
PART Q:	LONG-TERM CARE
PART R:	FINANCIAL ASSURANCE
PART S:	CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

**STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
APPLICATION FOR A PERMIT TO CONSTRUCT, OPERATE, MODIFY OR CLOSE A
SOLID WASTE MANAGEMENT FACILITY**

Please Type or Print

PART A. GENERAL INFORMATION

1. Type of disposal facility (check all that apply):

- | | |
|---|--|
| <input type="checkbox"/> Class I Landfill | <input type="checkbox"/> Ash Monofill |
| <input type="checkbox"/> Class III Landfill | <input type="checkbox"/> Asbestos Monofill |
| <input type="checkbox"/> Industrial Solid Waste | |
| <input type="checkbox"/> Other (describe): | |

NOTE: Waste Processing Facilities should apply on Form 62-701.900(4), FAC;
Yard Trash Disposal Facilities should notify on Form 62-701.900(3), FAC;
Compost Facilities should apply on Form 62-709.901(1), FAC; and
C&D Disposal Facilities should apply on Form 62-701.900(6), FAC

2. Type of application:

- ☐ Construction
☐ Operation
☐ Construction/Operation
☐ Closure
☐ Long-term Care Only

3. Classification of application:

- | | |
|----------------------------------|--|
| <input type="checkbox"/> New | <input type="checkbox"/> Substantial Modification |
| <input type="checkbox"/> Renewal | <input type="checkbox"/> Intermediate Modification |
| | <input type="checkbox"/> Minor Modification |

4. Facility name: _____

5. DEP ID number: _____ County: _____

6. Facility location (main entrance):

7. Location coordinates:

Section: _____ Township: _____ Range: _____

Latitude: _____ ° _____ ' _____ " Longitude: _____ ° _____ ' _____ "

Datum: _____ Coordinate method: _____

Collected by: _____ Company/Affiliation: _____

8. Applicant name (operating authority): _____
Mailing address: _____
Street or P.O. Box City State Zip
Contact person: _____ Telephone: (____) _____
Title: _____

E-Mail address (if available) _____
9. Authorized agent/Consultant: _____
Mailing address: _____
Street or P.O. Box City State Zip
Contact person: _____ Telephone: (____) _____
Title: _____

E-Mail address (if available) _____
10. Landowner (if different than applicant): _____
Mailing address: _____
Street or P.O. Box City State Zip
Contact person: _____ Telephone: (____) _____

E-Mail address (if available) _____
11. Cities, towns, and areas to be served:

12. Population to be served:
Current: _____ Five-Year Projection: _____
13. Date site will be ready to be inspected for completion: _____
14. Expected life of the facility: _____ years
15. Estimated costs:
Total Construction: \$ _____ Closing Costs: \$ _____
16. Anticipated construction starting and completion dates:
From: _____ To: _____
17. Expected volume or weight of waste to be received:
_____ yds³/day _____ tons/day _____ gallons/day

PART B. DISPOSAL FACILITY GENERAL INFORMATION

1. Provide brief description of disposal facility design and operations planned under this application:

2. Facility site supervisor: _____

Title: _____ Telephone: (____) _____

E-Mail address (if available)

3. Disposal area: Total acres: _____ Used acres: _____ Available acres: _____

4. Weighing scales used: ☐ Yes ☐ No

5. Security to prevent unauthorized use: ☐ Yes ☐ No

6. Charge for waste received: _____ \$/yds³ _____ \$/ton

7. Surrounding land use, zoning:

☐ Residential

☐ Industrial

☐ Agricultural

☐ None

☐ Commercial

☐ Other (describe):

8. Types of waste received:

☐ Household

☐ C & D debris

☐ Commercial

☐ Shredded/cut tires

☐ Incinerator/WTE ash

☐ Yard trash

☐ Treated biomedical

☐ Septic tank

☐ Water treatment sludge

☐ Industrial

☐ Air treatment sludge

☐ Industrial sludge

☐ Agricultural

☐ Domestic sludge

☐ Asbestos

☐ Other (describe):

9. Salvaging permitted: ☐ Yes ☐ No
10. Attendant: ☐ Yes ☐ No Trained operator: ☐ Yes ☐ No
11. Trained spotters: ☐ Yes ☐ No Number of spotters used: _____
12. Site located in: ☐ Floodplain ☐ Wetlands ☐ Other (describe):

13. Days of operation: _____
14. Hours of operation: _____
15. Days working face covered: _____
16. Elevation of water table: _____ ft. Datum Used: _____
17. Number of monitoring wells: _____
18. Number of surface monitoring points: _____
19. Gas controls used: ☐ Yes ☐ No Type controls: ☐ Active ☐ Passive
- Gas flaring: ☐ Yes ☐ No Gas recovery: ☐ Yes ☐ No
20. Landfill unit liner type:
- | | |
|---|---|
| <input type="checkbox"/> Natural soils | <input type="checkbox"/> Double geomembrane |
| <input type="checkbox"/> Single clay liner | <input type="checkbox"/> Geomembrane & composite |
| <input type="checkbox"/> Single geomembrane | <input type="checkbox"/> Double composite |
| <input type="checkbox"/> Single composite | <input type="checkbox"/> None |
| <input type="checkbox"/> Slurry wall | <input type="checkbox"/> Other (describe):

_____ |
21. Leachate collection method:
- | | |
|---|---|
| <input type="checkbox"/> Collection pipes | <input type="checkbox"/> Double geomembrane |
| <input type="checkbox"/> Geonets | <input type="checkbox"/> Gravel layer |
| <input type="checkbox"/> Well points | <input type="checkbox"/> Interceptor trench |
| <input type="checkbox"/> Perimeter ditch | <input type="checkbox"/> None |
| <input type="checkbox"/> Other (describe):

_____ | |

22. Leachate storage method:

<input type="checkbox"/> Tanks	<input type="checkbox"/> Surface impoundments
<input type="checkbox"/> Other (describe):	

23. Leachate treatment method:

<input type="checkbox"/> Oxidation	<input type="checkbox"/> Chemical treatment
<input type="checkbox"/> Secondary	<input type="checkbox"/> Settling
<input type="checkbox"/> Advanced	<input type="checkbox"/> None
<input type="checkbox"/> Other (describe):	

24. Leachate disposal method:

<input type="checkbox"/> Recirculated	<input type="checkbox"/> Pumped to WWTP
<input type="checkbox"/> Transported to WWTP	<input type="checkbox"/> Discharged to surface water/wetland
<input type="checkbox"/> Injection well	<input type="checkbox"/> Percolation ponds
<input type="checkbox"/> Evaporation	<input type="checkbox"/> Spray irrigation
<input type="checkbox"/> Other (describe):	

25. For leachate discharged to surface waters:

Name and Class of receiving water:

26. Storm Water:

Collected: ☐ Yes ☐ No

Type of treatment:

Name and Class of receiving water:

27. Environmental Resources Permit (ERP) number or status:

PART C. PROHIBITIONS (62-701.300, FAC)

LOCATION

- | | | |
|----------------------------------|---|---|
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 1. Provide documentation that each of the siting criteria will be satisfied for the facility; (62-701.300(2), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 2. If the facility qualifies for any of the exemptions contained in Rules 62-701.300(12), (13) and (16) through (18), FAC, then document this qualification(s); |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 3. Provide documentation that the facility will be in compliance with the burning restrictions; (62-701.300(3), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 4. Provide documentation that the facility will be in compliance with the hazardous waste restrictions; (62-701.300(4), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 5. Provide documentation that the facility will be in compliance with the PCB disposal restrictions; (62-701.300(5), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 6. Provide documentation that the facility will be in compliance with the biomedical waste restrictions; (62-701.300(6), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 7. Provide documentation that the facility will be in compliance with the Class I surface water restrictions; (62-701.300(7), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 8. Provide documentation that the facility will be in compliance with the special waste for landfills restrictions; (62-701.300(8), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 9. Provide documentation that the facility will be in compliance with the liquid restrictions; (62-701.300(10), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 10. Provide documentation that the facility will be in compliance with the used oil and oily waste restrictions; (62-701.300(11), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 11. Provide documentation that the facility will be in compliance with the CCA treated wood restrictions; (62-701.300(14), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 12. Provide documentation that the facility will be in compliance with the dust control restrictions; (62-701.300(15), FAC) |

PART D. SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL (62-701.320, FAC)

LOCATION

- | | |
|--|---|
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 1. A minimum of one completed electronic application form, all supporting data and reports; (62-701.320(5)(a), FAC) |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 2. Engineering and/or professional certification (signature, date, and seal) provided on the applications and all engineering plans, reports, and supporting information for the application; (62-701.320(6), FAC) |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 3. A letter of transmittal to the Department; (62-701.320(7)(a), FAC) |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 4. A completed application form dated and signed by the applicant; (62-701.320(7)(b), FAC) |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 5. Permit fee specified in Rule 62-701.315, FAC in check or money order, payable to the Department; (62-701.320(7)(c), FAC) |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 6. An engineering report addressing the requirements of this rule and with the following format: a cover sheet, text printed on 8 ½ inch by 11 inch consecutively numbered pages, a table of contents or index, the body of the report and all appendices including an operation plan, contingency plan, illustrative charts and graphs, records or logs of tests and investigations, engineering calculations; (62-701.320(7)(d), FAC) |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 7. Operation Plan and Closure Plan; (62-701.320(7)(e)1, FAC) |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 8. Contingency Plan; (62-701.320(7)(e)2, FAC) |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 9. Plans or drawings for the solid waste management facilities in appropriate format (including sheet size restrictions, cover sheet, legends, north arrow, horizontal and vertical scales, elevations referenced to NGVD 1929) showing: (62-701.320(7)(f), FAC) |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | a. A regional map or plan with the project location in relation to major roadways and population centers; |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | b. A vicinity map or aerial photograph no more than one year old showing the facility site and relevant surface features located within 1000 feet of the facility; |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | c. A site plan showing all property boundaries certified by a Florida Licensed Professional Surveyor and Mapper; |
| S <input type="checkbox"/> _____ N/A <input type="checkbox"/> N/C <input type="checkbox"/> | d. Other necessary details to support the engineering report, including referencing elevations to a consistent, nationally recognized datum, and identifying the method used for collecting latitude and longitude data; |

LOCATION**PART D CONTINUED**S ☐ _____ N/A ☐ N/C ☐

10. Documentation that the applicant either owns the property or has legal authority from the property owner to use the site; (62-701.320(7)(g), FAC)

S ☐ _____ N/A ☐ N/C ☐

11. For facilities owned or operated by a county, provide a description of how, if any, the facilities covered in this application will contribute to the county's achievement of the waste reduction and recycling goals contained in Section 403.706, FS; (62-701.320(7)(h), FAC)

S ☐ _____ N/A ☐ N/C ☐

12. Provide a history and description of any enforcement actions taken by the Department against the applicant for violations of applicable statutes, rules, orders, or permit conditions relating to the operation of any solid waste management facility in the state; (62-701.320(7)(i), FAC)

S ☐ _____ N/A ☐ N/C ☐

13. Proof of publication in a newspaper of general circulation of notice of application for a permit to construct or substantially modify a solid waste management facility; (62-701.320(8), FAC)

S ☐ _____ N/A ☐ N/C ☐

14. Provide a description of how the requirements for airport safety will be achieved, including proof of required notices if applicable. If exempt, explain how the exemption applies; (62-701.320(13), FAC)

S ☐ _____ N/A ☐ N/C ☐

15. Explain how the operator and spotter training requirements and special criteria will be satisfied for the facility; (62-701.320(15), FAC)

PART E. LANDFILL PERMIT REQUIREMENTS (62-701.330, FAC)**LOCATION**S ☐ _____ N/A ☐ N/C ☐

1. Regional map or aerial photograph no more than five years old showing all airports that are located within five miles of the proposed landfill; (62-701.330(3)(a), FAC)

S ☐ _____ N/A ☐ N/C ☐

2. Plot plan with a scale not greater than 200 feet to the inch showing: (62-701.330(3)(b), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. Dimensions;

S ☐ _____ N/A ☐ N/C ☐

b. Locations of proposed and existing water quality monitoring wells;

S ☐ _____ N/A ☐ N/C ☐

c. Locations of soil borings;

S ☐ _____ N/A ☐ N/C ☐

d. Proposed plan of trenching or disposal areas;

S ☐ _____ N/A ☐ N/C ☐

e. Cross sections showing original elevations and proposed final contours which shall be included either on the plot plan or on separate sheets;

LOCATION**PART E CONTINUED**S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐

f. Any previously filled waste disposal areas;

g. Fencing or other measures to restrict access;

3. Topographic maps with a scale not greater than 200 feet to the inch with five foot contour intervals showing: (62-701.330(3)(c), FAC)

a. Proposed fill areas;

b. Borrow areas;

c. Access roads;

d. Grades required for proper drainage;

e. Cross sections of lifts;

f. Special drainage devices if necessary;

g. Fencing;

h. Equipment facilities;

4. A report on the landfill describing the following: (62-701.330(3)(d), FAC)

a. The current and projected population and area to be served by the proposed site;

b. The anticipated type, annual quantity, and source of solid waste expressed in tons;

c. Planned active life of the facility, the final design height of the facility, and the maximum height of the facility during its operation;

d. The source and type of cover material used for the landfill;

5. Provide evidence that an approved laboratory shall conduct water quality monitoring for the facility in accordance with Chapter 62-160, FAC; (62-701.330(3)(g), FAC)

6. Provide a statement of how the applicant will demonstrate financial responsibility for the closing and long-term care of the landfill; (62-701.330(3)(h), FAC)

PART F. GENERAL CRITERIA FOR LANDFILLS (62-701.340, FAC)

LOCATION

S ☐ _____ N/A ☐ N/C ☐

1. Describe (and show on a Federal Insurance Administration flood map, if available) how the landfill or solid waste disposal unit shall not be located in the 100 year floodplain where it will restrict the flow of the 100 year flood, reduce the temporary water storage capacity of the floodplain unless compensating storage is provided, or result in a washout of solid waste; (62-701.340(3)(b), FAC)

S ☐ _____ N/A ☐ N/C ☐

2. Describe how the minimum horizontal separation between waste deposits in the landfill and the landfill property boundary shall be 100 feet, measured from the toe of the proposed final cover slope; (62-701.340(3)(c), FAC)

PART G. LANDFILL CONSTRUCTION REQUIREMENTS (62-701.400, FAC)

LOCATION

S ☐ _____ N/A ☐ N/C ☐

1. Describe how the landfill shall be designed so the solid waste disposal units will be constructed and closed at planned intervals throughout the design period of the landfill, and shall be designed to achieve a minimum factor of safety of 1.5 using peak strength values to prevent failures of side slopes and deep-seated failures; (62-701.400(2), FAC)

S ☐ _____ N/A ☐ N/C ☐

2. Landfill liner requirements; (62-701.400(3), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. General construction requirements; (62-701.400(3)(a), FAC)

S ☐ _____ N/A ☐ N/C ☐

(1) Provide test information and documentation to ensure the liner will be constructed of materials that have appropriate physical, chemical, and mechanical properties to prevent failure;

S ☐ _____ N/A ☐ N/C ☐

(2) Document foundation is adequate to prevent liner failure;

S ☐ _____ N/A ☐ N/C ☐

(3) Constructed so bottom liner will not be adversely impacted by fluctuations of the ground water;

S ☐ _____ N/A ☐ N/C ☐

(4) Designed to resist hydrostatic uplift if bottom liner located below seasonal high ground water table;

S ☐ _____ N/A ☐ N/C ☐

(5) Installed to cover all surrounding earth which could come into contact with the waste or leachate;

LOCATIONS ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**PART G CONTINUED**

b. Composite liners; (62-701.400(3)(b), FAC)

- (1) Upper geomembrane thickness and properties;
- (2) Design leachate head for primary leachate collection and removal system (LCRS) including leachate recirculation if appropriate;
- (3) Design thickness in accordance with Table A and number of lifts planned for lower soil component;

c. Double liners; (62-701.400(3)(c), FAC)

- (1) Upper and lower geomembrane thickness and properties;
- (2) Design leachate head for primary LCRS to limit the head to one foot above the liner;
- (3) Lower geomembrane sub-base design;
- (4) Leak detection and secondary leachate collection system minimum design criteria ($k \geq 10$ cm/sec, head on lower liner ≤ 1 inch, head not to exceed thickness of drainage layer);

d. Standards for geosynthetic components; (62-701.400(3)(d), FAC)

- (1) Factory and field seam test methods to ensure all geomembrane seams achieve the minimum specifications;
- (2) Geomembranes to be used shall pass a continuous spark test by the manufacturer;
- (3) Design of 24-inch-thick protective layer above upper geomembrane liner;
- (4) Describe operational plans to protect the liner and leachate collection system when placing the first layer of waste above a 24-inch-thick protective layer;
- (5) HDPE geomembranes, if used, meet the specifications in GRI GM13, and LLDPE geomembranes, if used, meet the specifications in GRI GM17;
- (6) PVC geomembranes, if used, meet the specifications in PGI 1104;

LOCATIONS ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**PART G CONTINUED**

- (7) Interface shear strength testing results of the actual components which will be used in the liner system;
- (8) Transmissivity testing results of geonets if they are used in the liner system;
- (9) Hydraulic conductivity testing results of geosynthetic clay liners if they are used in the liner system;
- e. Geosynthetic specification requirements; (62-701.400(3)(e), FAC)
- (1) Definition and qualifications of the designer, manufacturer, installer, QA consultant and laboratory, and QA program;
- (2) Material specifications for geomembranes, geocomposites, geotextiles, geogrids, and geonets;
- (3) Manufacturing and fabrication specifications including geomembrane raw material and roll QA, fabrication personnel qualifications, seaming equipment and procedures, overlaps, trial seams, destructive and non-destructive seam testing, seam testing location, frequency, procedure, sample size, and geomembrane repairs;
- (4) Geomembrane installation specifications including earthwork, conformance testing, geomembrane placement, installation personnel qualifications, field seaming and testing, overlapping and repairs, materials in contact with geomembranes, and procedures for lining system acceptance;
- (5) Geotextile and geogrids specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials and any overlying materials;
- (6) Geonet and geocomposites specifications including handling and placement, conformance testing, stacking and joining, repair, and placement of soil materials and any overlying materials;
- (7) Geosynthetic clay liner specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials and any overlying materials;

LOCATIONS ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**PART G CONTINUED**

f. Standards for soil liner components; (62-701.400(3)(f), FAC)

- (1) Description of construction procedures including over-excavation and backfilling to preclude structural inconsistencies and procedures for placing and compacting soil components in layers;
- (2) Demonstration of compatibility of the soil component with actual or simulated leachate in accordance with EPA Test Method 9100, or an equivalent test method;
- (3) Procedures for testing in situ soils to demonstrate they meet the specifications for soil liners;
- (4) Specifications for soil component of liner including at a minimum:
 - (a) Allowable particle size distribution, and Atterberg limits including shrinkage limit;
 - (b) Placement moisture and dry density criteria;
 - (c) Maximum laboratory-determined saturated hydraulic conductivity using simulated leachate;
 - (d) Minimum thickness of soil liner;
 - (e) Lift thickness;
 - (f) Surface preparation (scarification);
 - (g) Type and percentage of clay mineral within the soil component;
- (5) Procedures for constructing and using a field test section to document the desired saturated hydraulic conductivity and thickness can be achieved in the field;

g. If a Class III landfill is to be constructed with a bottom liner system, provide a description of how the minimum requirements for the liner will be achieved;

LOCATION**PART G CONTINUED**S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**3. Leachate collection and removal system (LCRS); (62-701.400(4), FAC)****a. The primary and secondary LCRS requirements; (62-701.400(4)(a), FAC)**

- (1) Constructed of materials chemically resistant to the waste and leachate;
- (2) Have sufficient mechanical properties to prevent collapse under pressure;
- (3) Have granular material or synthetic geotextile to prevent clogging;
- (4) Have a method for testing and cleaning clogged pipes or contingent designs for reducing leachate around failed areas;

b. Other LCRS requirements; (62-701.400(4)(b), (c) and (d), FAC)

- (1) Bottom 12 inches having hydraulic conductivity $\geq 1 \times 10^{-3}$ cm/sec;
- (2) Total thickness of 24 inches of material chemically resistant to the waste and leachate;
- (3) Bottom slope design to accommodate for predicted settlement and still meet minimum slope requirements;
- (4) Demonstration that synthetic drainage material, if used, is equivalent or better than granular material in chemical compatibility, flow under load, and protection of geomembranes liner;
- (5) Schedule provided for routine maintenance of LCRS.

4. Leachate recirculation; (62-701.400(5), FAC)**a. Describe general procedures for recirculating leachate;****b. Describe procedures for controlling leachate runoff and minimizing mixing of leachate runoff with storm water;****c. Describe procedures for preventing perched water conditions and gas buildup;**

LOCATION**PART G CONTINUED**S ☐ _____ N/A ☐ N/C ☐

d. Describe alternate methods for leachate management when it cannot be recirculated due to weather or runoff conditions, surface seeps, wind-blown spray, or elevated levels of leachate head on the liner;

S ☐ _____ N/A ☐ N/C ☐

e. Describe methods of gas management in accordance with Rule 62-701.530, FAC;

S ☐ _____ N/A ☐ N/C ☐

f. If leachate irrigation is proposed, describe treatment methods and standards for leachate treatment prior to irrigation over final cover, and provide documentation that irrigation does not contribute significantly to leachate generation;

S ☐ _____ N/A ☐ N/C ☐

5. Leachate storage tanks and leachate surface impoundments; (62-701.400(6), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. Surface impoundment requirements; (62-701.400(6)(b), FAC)

S ☐ _____ N/A ☐ N/C ☐

(1) Documentation that the design of the bottom liner will not be adversely impacted by fluctuations of the ground water;

S ☐ _____ N/A ☐ N/C ☐

(2) Designed in segments to allow for inspection and repair, as needed, without interruption of service;

S ☐ _____ N/A ☐ N/C ☐

(3) General design requirements;

S ☐ _____ N/A ☐ N/C ☐

(a) Double liner system consisting of an upper and lower 60-mil minimum thickness geomembrane;

S ☐ _____ N/A ☐ N/C ☐

(b) Leak detection and collection system with hydraulic conductivity ≥ 1 cm/sec;

S ☐ _____ N/A ☐ N/C ☐

(c) Lower geomembrane place on subbase ≥ 6 inches thick with $k \leq 1 \times 10^{-5}$ cm/sec or on an approved geosynthetic clay liner with $k \leq 1 \times 10^{-7}$ cm/sec;

S ☐ _____ N/A ☐ N/C ☐

(d) Design calculation to predict potential leakage through the upper liner;

S ☐ _____ N/A ☐ N/C ☐

(e) Daily inspection requirements, and notification and corrective action requirements if leakage rates exceed that predicted by design calculations;

S ☐ _____ N/A ☐ N/C ☐

(4) Description of procedures to prevent uplift, if applicable;

LOCATIONS ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**PART G CONTINUED**

(5) Design calculations to demonstrate minimum two feet of freeboard will be maintained;

(6) Procedures for controlling vectors and off-site odors;

b. Above-ground leachate storage tanks; (62-701.400(6)(c), FAC)

(1) Describe tank materials of construction and ensure foundation is sufficient to support tank;

(2) Describe procedures for cathodic protection for the tank, if needed;

(3) Describe exterior painting and interior lining of the tank to protect it from the weather and the leachate stored;

(4) Describe secondary containment design to ensure adequate capacity will be provided and compatibility of materials of construction;

(5) Describe design to remove and dispose of stormwater from the secondary containment system;

(6) Describe an overfill prevention system, such as level sensors, gauges, alarms, and shutoff controls to prevent overfilling;

(7) Inspections, corrective action, and reporting requirements;

(a) Weekly inspection of overfill prevention system;

(b) Weekly inspection of exposed tank exteriors;

(c) Inspection of tank interiors when tank is drained, or at least every three years;

(d) Procedures for immediate corrective action if failures detected;

(e) Inspection reports available for Department review;

c. Underground leachate storage tanks; (62-701.400(6)(d), FAC)

LOCATIONS ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**PART G CONTINUED**

(1) Describe materials of construction;

(2) A double-walled tank design system to be used with the following requirements:

(a) Interstitial space monitoring at least weekly;

(b) Corrosion protection provided for primary tank interior and external surface of outer shell;

(c) Interior tank coatings compatible with stored leachate;

(d) Cathodic protection inspected weekly and repaired as needed;

(3) Describe an overfill prevention system, such as level sensors, gauges, alarms, and shutoff controls to prevent overfilling, and provide for weekly inspections;

(4) Inspection reports available for Department review;

6. Liner systems construction quality assurance (CQA); (62-701.400(7), FAC)

a. Provide CQA Plan including:

(1) Specifications and construction requirements for liner system;

(2) Detailed description of quality control testing procedures and frequencies;

(3) Identification of supervising professional engineer;

(4) Identify responsibility and authority of all appropriate organizations and key personnel involved in the construction project;

(5) State qualifications of CQA professional engineer and support personnel;

LOCATION**PART G CONTINUED**S ☐ _____ N/A ☐ N/C ☐

(6) Description of CQA reporting forms and documents;

S ☐ _____ N/A ☐ N/C ☐

b. An independent laboratory experienced in the testing of geosynthetics to perform required testing;

S ☐ _____ N/A ☐ N/C ☐

7. Soil liner CQA; (62-701.400(8), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. Documentation that an adequate borrow source has been located with test results, or description of the field exploration and laboratory testing program to define a suitable borrow source;

S ☐ _____ N/A ☐ N/C ☐

b. Description of field test section construction and test methods to be implemented prior to liner installation;

S ☐ _____ N/A ☐ N/C ☐

c. Description of field test methods, including rejection criteria and corrective measures to insure proper liner installation;

S ☐ _____ N/A ☐ N/C ☐

8. For surface water management systems at aboveground disposal units, provide documentation showing the design of any features intended to convey stormwater to a permitted or exempted treatment system; (62-701.400(9), FAC)

S ☐ _____ N/A ☐ N/C ☐

9. Gas control systems; (62-701.400(10), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. Provide documentation that if the landfill is receiving degradable wastes, it will have a gas control system complying with the requirements of Rule 62-701.530, FAC;

S ☐ _____ N/A ☐ N/C ☐

10. For landfills designed in ground water, provide documentation that the landfill will provide a degree of protection equivalent to landfills designed with bottom liners not in contact with ground water; (62-701.400(11), FAC)

PART H. HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS (62-701.410(2), FAC)**LOCATION**S ☐ _____ N/A ☐ N/C ☐

1. Submit a hydrogeological investigation and site report including at least the following information:

S ☐ _____ N/A ☐ N/C ☐

a. Regional and site specific geology and hydrology;

S ☐ _____ N/A ☐ N/C ☐

b. Direction and rate of ground water and surface water flow including seasonal variations;

LOCATIONS ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**PART H CONTINUED**

c. Background quality of ground water and surface water;

d. Any on-site hydraulic connections between aquifers;

e. Site stratigraphy and aquifer characteristics for confining layers, semi-confining layers, and all aquifers below the site that may be affected by the disposal facility;

f. Description of topography, soil types, and surface water drainage systems;

g. Inventory of all public and private water wells within a one mile radius of the site including, where available, well top of casing and bottom elevations, name of owner, age and usage of each well, stratigraphic unit screened, well construction technique, and static water level;

h. Identify and locate any existing contaminated areas on the site;

i. Include a map showing the locations of all potable wells within 500 feet of the waste storage and disposal areas;

2. Report signed, sealed, and dated by P.E. and/or P.G.

PART I. GEOTECHNICAL INVESTIGATION REQUIREMENTS (62-701.410(3) and (4), FAC)**LOCATION**S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐

1. Submit a geotechnical site investigation report defining the engineering properties of the site including at least the following:

a. Description of subsurface conditions including soil stratigraphy and ground water table conditions;

b. Investigate for the presence of muck, previously filled areas, soft ground, and lineaments;

c. Estimates of average and maximum high water table across the site;

d. Evaluation of potential for fault areas and seismic impact zones;

e. Foundation analysis including:

LOCATION**PART I CONTINUED**S ☐ _____ N/A ☐ N/C ☐

(1) Foundation bearing capacity analysis;

S ☐ _____ N/A ☐ N/C ☐

(2) Total and differential subgrade settlement analysis;

S ☐ _____ N/A ☐ N/C ☐

(3) Slope stability analysis;

S ☐ _____ N/A ☐ N/C ☐

f. Evaluation of potential for sinkholes and sinkhole activity at the site that is based upon the investigations required in Rule 62-701.410(3)(f), F.A.C.;

S ☐ _____ N/A ☐ N/C ☐

g. A geotechnical report providing a description of methods used in the investigation, and includes soil boring logs, laboratory results, analytical calculations, cross sections, interpretations, conclusions, and a description of any engineering measures proposed for the site;

S ☐ _____ N/A ☐ N/C ☐

2. Report signed, sealed, and dated by P.E. and/or P.G.

PART J. VERTICAL EXPANSION OF LANDFILLS (62-701.430, FAC)**LOCATION**S ☐ _____ N/A ☐ N/C ☐

1. Describe how the vertical expansion shall not cause or contribute to any violations of water quality standards or criteria, shall not cause objectionable odors, or adversely affect the closure design of the existing landfill;

S ☐ _____ N/A ☐ N/C ☐

2. Describe how the vertical expansion over unlined landfills will meet the requirements of Rule 62-701.400, FAC with the exceptions of Rule 62-701.430(1)(c), FAC;

S ☐ _____ N/A ☐ N/C ☐

3. Provide foundation and settlement analysis for the vertical expansion;

S ☐ _____ N/A ☐ N/C ☐

4. Provide total settlement calculations demonstrating that the final elevations of the lining system, gravity drainage, and no other component of the design will be adversely affected;

S ☐ _____ N/A ☐ N/C ☐

5. Minimum stability factor of safety of 1.5 for the lining system component interface stability and for deep stability;

S ☐ _____ N/A ☐ N/C ☐

6. Provide documentation to show the surface water management system will not be adversely affected by the vertical expansion;

S ☐ _____ N/A ☐ N/C ☐

7. Provide gas control designs to prevent accumulation of gas under the new liner for the vertical expansion;

PART K. LANDFILL OPERATION REQUIREMENTS (62-701.500, FAC)

LOCATION

- | | | |
|----------------------------------|---|---|
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 1. Provide documentation that the landfill will have at least one trained operator during operation and at least one trained spotter at each working face; (62-701.500(1), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 2. Provide a landfill operation plan including procedures for: (62-701.500(2), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | a. Designating responsible operating and maintenance personnel; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | b. Emergency preparedness and response, as required in subsection 62-701.320(16), FAC; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | c. Controlling types of waste received at the landfill; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | d. Weighing incoming waste; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | e. Vehicle traffic control and unloading; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | f. Method and sequence of filling waste; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | g. Waste compaction and application of cover; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | h. Operations of gas, leachate, and stormwater controls; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | i. Water quality monitoring; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | j. Maintaining and cleaning the leachate collection system; |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 3. Provide a description of the landfill operation record to be used at the landfill, details as to location of where various operational records will be kept (i.e. DEP permit, engineering drawings, water quality records, etc.); (62-701.500(3), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 4. Describe the waste records that will be compiled monthly and provided to the Department annually; (62-701.500(4), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 5. Describe methods of access control; (62-701.500(5), FAC) |
| S <input type="checkbox"/> _____ | N/A <input type="checkbox"/> N/C <input type="checkbox"/> | 6. Describe load checking program to be implemented at the landfill to discourage disposal of unauthorized waste at the landfill; (62-701.500(6), FAC) |

LOCATION**PART K CONTINUED**S ☐ _____ N/A ☐ N/C ☐

7. Describe procedures for spreading and compacting waste at the landfill that include: (62-701.500(7), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. Waste layer thickness and compaction frequencies;

S ☐ _____ N/A ☐ N/C ☐

b. Special considerations for first layer of waste placed above the liner and leachate collection system;

S ☐ _____ N/A ☐ N/C ☐

c. Slopes of cell working face and side grades above land surface, and planned lift depths during operation;

S ☐ _____ N/A ☐ N/C ☐

d. Maximum width of working face;

S ☐ _____ N/A ☐ N/C ☐

e. Description of type of initial cover to be used at the facility that controls:

S ☐ _____ N/A ☐ N/C ☐

(1) Vector breeding/animal attraction;

S ☐ _____ N/A ☐ N/C ☐

(2) Fires;

S ☐ _____ N/A ☐ N/C ☐

(3) Odors;

S ☐ _____ N/A ☐ N/C ☐

(4) Blowing litter;

S ☐ _____ N/A ☐ N/C ☐

(5) Moisture infiltration;

S ☐ _____ N/A ☐ N/C ☐

f. Procedures for applying initial cover, including minimum cover frequencies;

S ☐ _____ N/A ☐ N/C ☐

g. Procedures for applying intermediate cover;

S ☐ _____ N/A ☐ N/C ☐

h. Time frames for applying final cover;

S ☐ _____ N/A ☐ N/C ☐

i. Procedures for controlling scavenging and salvaging;

S ☐ _____ N/A ☐ N/C ☐

j. Description of litter policing methods;

S ☐ _____ N/A ☐ N/C ☐

k. Erosion control procedures;

LOCATION**PART K CONTINUED**S ☐ _____ N/A ☐ N/C ☐

8. Describe operational procedures for leachate management including: (62-701.500(8), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. Leachate level monitoring;

S ☐ _____ N/A ☐ N/C ☐

b. Operation and maintenance of leachate collection and removal system, and treatment as required;

S ☐ _____ N/A ☐ N/C ☐

c. Procedures for managing leachate if it becomes regulated as a hazardous waste;

S ☐ _____ N/A ☐ N/C ☐

d. Identification of treatment or disposal facilities that may be used for off-site discharge and treatment of leachate;

S ☐ _____ N/A ☐ N/C ☐

e. Contingency plan for managing leachate during emergencies or equipment problems;

S ☐ _____ N/A ☐ N/C ☐

f. Procedures for recording quantities of leachate generated in gal/day and including this in the operating record;

S ☐ _____ N/A ☐ N/C ☐

g. Procedures for comparing precipitation experienced at the landfill with leachate generation rates and including this information in the operating record;

S ☐ _____ N/A ☐ N/C ☐

h. Procedures for water pressure cleaning or video inspecting leachate collection systems;

S ☐ _____ N/A ☐ N/C ☐

9. Describe how the landfill receiving degradable wastes shall implement a gas management system meeting the requirements of Rule 62-701.530, FAC; (62-701.500(9), FAC)

S ☐ _____ N/A ☐ N/C ☐

10. Describe procedures for operating and maintaining the landfill stormwater management system to comply with the requirements of Rule 62-701.400(9), FAC; (62-701.500(10), FAC)

S ☐ _____ N/A ☐ N/C ☐

11. Equipment and operation feature requirements; (62-701.500(11), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. Sufficient equipment for excavating, spreading, compacting, and covering waste;

S ☐ _____ N/A ☐ N/C ☐

b. Reserve equipment or arrangements to obtain additional equipment within 24 hours of breakdown;

S ☐ _____ N/A ☐ N/C ☐

c. Communications equipment;

LOCATIONS ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**PART K CONTINUED**

d. Dust control methods;

e. Fire protection capabilities and procedures for notifying local fire department authorities in emergencies;

f. Litter control devices;

g. Signs indicating operating authority, traffic flow, hours of operation, and disposal restrictions;

12. Provide a description of all-weather access road, inside perimeter road, and other on-site roads necessary for access at the landfill; (62-701.500(12), FAC)

13. Additional record keeping and reporting requirements; (62-701.500(13), FAC)

a. Records used for developing permit applications and supplemental information maintained for the design period of the landfill;

b. Monitoring information, calibration and maintenance records, and copies of reports required by permit maintained for at least 10 years;

c. Maintain annual estimates of the remaining life of constructed landfills, and of other permitted areas not yet constructed, and submit this estimate annually to the Department;

d. Procedures for archiving and retrieving records which are more than five years old;

PART L. WATER QUALITY MONITORING REQUIREMENTS (62-701.510, FAC)**LOCATION**S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐

1. A water quality monitoring plan shall be submitted describing the proposed ground water and surface water monitoring systems, and shall meet at least the following requirements:

a. Based on the information obtained in the hydrogeological investigation and signed, dated, and sealed by the P.G. or P.E. who prepared it; (62-701.510(2)(a), FAC)

LOCATIONS ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**PART L CONTINUED**

b. All sampling and analysis performed in accordance with Chapter 62-160, FAC; (62-701.510(2)(b), FAC)

c. Ground water monitoring requirements; (62-701.510(3), FAC)

- (1) Detection wells located downgradient from and within 50 feet of disposal units;
- (2) Downgradient compliance wells as required;
- (3) Background wells screened in all aquifers below the landfill that may be affected by the landfill;
- (4) Location information for each monitoring well;
- (5) Well spacing no greater than 500 feet apart for downgradient wells and no greater than 1500 feet apart for upgradient wells, unless site specific conditions justify alternate well spacings;
- (6) Properly selected well screen locations;
- (7) Monitoring wells constructed to provide representative ground water samples;

(8) Procedures for properly abandoning monitoring wells;

(9) Detailed description of detection sensors, if proposed;

d. Surface water monitoring requirements; (62-701.510(4), FAC)

- (1) Location of and justification for all proposed surface water monitoring points;
- (2) Each monitoring location to be marked and its position determined by a registered Florida land surveyor;

e. Initial and routine sampling frequency and requirements; (62-701.510(5), FAC)

- (1) Initial background ground water and surface water sampling and analysis requirements;

LOCATION**PART L CONTINUED**S ☐ _____ N/A ☐ N/C ☐

(2) Routine monitoring well sampling and analysis requirements;

S ☐ _____ N/A ☐ N/C ☐

(3) Routine surface water sampling and analysis requirements;

S ☐ _____ N/A ☐ N/C ☐

f. Describe procedures for implementing evaluation monitoring, prevention measures, and corrective action as required; (62-701.510(6), FAC)

S ☐ _____ N/A ☐ N/C ☐

g. Water quality monitoring report requirements; (62-701.510(8), FAC)

S ☐ _____ N/A ☐ N/C ☐

(1) Semi-annual report requirements; (see paragraphs 62-701.510(5)(c) and (d), FAC for sampling frequencies)

S ☐ _____ N/A ☐ N/C ☐

(2) Documentation that the water quality data shall be provided to the Department in an electronic format consistent with requirements for importing into Department databases, unless an alternate form of submittal is specified in the permit;

S ☐ _____ N/A ☐ N/C ☐

(3) Two and one-half year, or annual, report requirements, or every five years if in long-term care, signed dated, and sealed by P.G. or P.E.;

PART M. SPECIAL WASTE HANDLING REQUIREMENTS (62-701.520, FAC)**LOCATION**S ☐ _____ N/A ☐ N/C ☐

1. Describe procedures for managing motor vehicles; (62-701.520(1), FAC)

S ☐ _____ N/A ☐ N/C ☐

2. Describe procedures for landfilling shredded waste; (62-701.520(2), FAC)

S ☐ _____ N/A ☐ N/C ☐

3. Describe procedures for asbestos waste disposal; (62-701.520(3), FAC)

S ☐ _____ N/A ☐ N/C ☐

4. Describe procedures for disposal or management of contaminated soil; (62-701.520(4), FAC)

S ☐ _____ N/A ☐ N/C ☐

5. Describe procedures for disposal of biological wastes; (62-701.520(5), FAC)

PART N. GAS MANAGEMENT SYSTEM REQUIREMENTS (62-701.530, FAC)

LOCATION

S ☐ _____ N/A ☐ N/C ☐

1. Provide documentation for a gas management system that will: (62-701.530(1), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. Be designed to prevent concentrations of combustible gases from exceeding 25% the LEL in structures and 100% the LEL at the property boundary;

S ☐ _____ N/A ☐ N/C ☐

b. Be designed for site specific conditions;

S ☐ _____ N/A ☐ N/C ☐

c. Be designed to reduce gas pressure in the interior of the landfill;

S ☐ _____ N/A ☐ N/C ☐

d. Be designed to not interfere with the liner, leachate control system, or final cover;

S ☐ _____ N/A ☐ N/C ☐

2. Provide documentation that will describe locations, construction details, and procedures for monitoring gas at ambient monitoring points and with soil monitoring probes; (62-701.530(2), FAC)

S ☐ _____ N/A ☐ N/C ☐

3. Provide documentation describing how the gas remediation plan and odor remediation plan will be implemented; (62-701.530(3), FAC)

S ☐ _____ N/A ☐ N/C ☐

4. Landfill gas recovery facilities; (62-701.530(5), FAC)

S ☐ _____ N/A ☐ N/C ☐

a. Provide information required in Rules 62-701.320(7) and 62-701.330(3), FAC;

S ☐ _____ N/A ☐ N/C ☐

b. Provide information required in Rule 62-701.600(4), FAC, where relevant and practical;

S ☐ _____ N/A ☐ N/C ☐

c. Provide estimates of current and expected gas generation rates and description of condensate disposal methods;

S ☐ _____ N/A ☐ N/C ☐

d. Provide description of procedures for condensate sampling, analyzing, and data reporting;

S ☐ _____ N/A ☐ N/C ☐

e. Provide closure plan describing methods to control gas after recovery facility ceases operation, and any other requirements contained in Rule 62-701.400(10), FAC;

PART O. LANDFILL FINAL CLOSURE REQUIREMENTS (62-701.600, FAC)

LOCATION

S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	1. Closure permit requirements; (62-701.600(2), FAC)
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	a. Application submitted to the Department at least 90 days prior to final receipt of wastes;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	b. Closure plan shall include the following:
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	(1) Closure design plan;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	(2) Closure operation plan;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	(3) Plan for long-term care;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	(4) A demonstration that proof of financial assurance for long-term care will be provided;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	2. Closure design plan including the following requirements: (62-701.600(3), FAC)
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	a. Plan sheet showing phases of site closing;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	b. Drawings showing existing topography and proposed final grades;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	c. Provisions to close units when they reach approved design dimensions;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	d. Final elevations before settlement;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	e. Side slope design including benches, terraces, down slope drainage ways, energy dissipaters, and description of expected precipitation effects;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	f. Final cover installation plans including:
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	(1) CQA plan for installing and testing final cover;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	(2) Schedule for installing final cover after final receipt of waste;
S <input type="checkbox"/> _____	N/A <input type="checkbox"/> N/C <input type="checkbox"/>	(3) Description of drought resistant species to be used in the vegetative cover;

LOCATIONS ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐S ☐ _____ N/A ☐ N/C ☐**PART O CONTINUED**

(4) Top gradient design to maximize runoff and minimize erosion;

(5) Provisions for cover material to be used for final cover maintenance;

g. Final cover design requirements;

(1) Protective soil layer design;

(2) Barrier soil layer design;

(3) Erosion control vegetation;

(4) Geomembrane barrier layer design;

(5) Geosynthetic clay liner design, if used;

(6) Stability analysis of the cover system and the disposed waste;

h. Proposed method of stormwater control;

i. Proposed method of access control;

j. Description of the proposed or existing gas management system which complies with Rule 62-701.530, FAC;

3. Closure operation plan shall include: (62-701.600(4), FAC)

a. Detailed description of actions which will be taken to close the landfill;

b. Time schedule for completion of closing and long-term care;

c. Describe proposed method for demonstrating financial assurance for long-term care;

d. Operation of the water quality monitoring plan required in Rule 62-701.510, FAC;

e. Development and implementation of gas management system required in Rule 62-701.530, FAC;

LOCATION**PART O CONTINUED**

- S ☐ _____ N/A ☐ N/C ☐ 4. Certification of closure construction completion and final reports including: (62-701.600(6), FAC)
- S ☐ _____ N/A ☐ N/C ☐ a. Survey monuments; (62-701.600(6)(a), FAC)
- S ☐ _____ N/A ☐ N/C ☐ b. Final survey report; (62-701.600(6)(b), FAC)
- S ☐ _____ N/A ☐ N/C ☐ c. Closure construction quality assurance report; (62-701.400(7), FAC)
- S ☐ _____ N/A ☐ N/C ☐ 5. Declaration to the public; (62-701.600(7), FAC)
- S ☐ _____ N/A ☐ N/C ☐ 6. Official date of closing; (62-701.600(8), FAC)
- S ☐ _____ N/A ☐ N/C ☐ 7. Justification for and detailed description of procedures to be followed for temporary closure of the landfill, if desired; (62-701.600(9), FAC)

PART P. OTHER CLOSURE PROCEDURES (62-701.610, FAC)**LOCATION**

- S ☐ _____ N/A ☐ N/C ☐ 1. Describe how the requirements for use of closed solid waste disposal areas will be achieved; (62-701.610(1), FAC)
- S ☐ _____ N/A ☐ N/C ☐ 2. Describe how the requirements for relocation of wastes will be achieved; (62-701.610(2), FAC)

PART Q. LONG-TERM CARE (62-701.620, FAC)**LOCATION**

- S ☐ _____ N/A ☐ N/C ☐ 1. Maintaining the gas collection and monitoring system; (62-701.620(5), FAC)
- S ☐ _____ N/A ☐ N/C ☐ 2. Stabilization report requirements; (62-701.620(6), FAC)
- S ☐ _____ N/A ☐ N/C ☐ 3. Right of access; (62-701.620(7), FAC)
- S ☐ _____ N/A ☐ N/C ☐ 4. Requirements for replacement of monitoring devices; (62-701.620(8), FAC)
- S ☐ _____ N/A ☐ N/C ☐ 5. Completion of long-term care signed and sealed by professional engineer; (62-701.620(9), FAC)

PART R. FINANCIAL ASSURANCE (62-701.630, FAC)

LOCATION

S ☐ _____ N/A ☐ N/C ☐

1. Provide cost estimates for closing, long-term care, and corrective action costs estimated by a P.E. for a third party performing the work, on a per unit basis, with the source of estimates indicated; (62-701.630(3) & (7), FAC)

S ☐ _____ N/A ☐ N/C ☐

2. Describe procedures for providing annual cost adjustments to the Department based on inflation and changes in the closing, long-term care, and corrective action plans; (62-701.630(4) & (8), FAC)

S ☐ _____ N/A ☐ N/C ☐

3. Describe funding mechanisms for providing proof of financial assurance and include appropriate financial assurance forms. (62-701.630(5), (6), & (9), FAC)

PART S. CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

1. Applicant:

The undersigned applicant or authorized representative of Citrus County Board of County Commissioners is aware that statements made in this form and attached information

are an application for a minor operations modification permit from the Florida Department of Environmental Protection, and certifies that the information in this application is true, correct, and complete to the best of his/her knowledge and belief. Further, the undersigned agrees to comply with the provisions of Chapter 403, Florida Statutes, and all rules and regulations of the Department. It is understood that the Permit is not transferable, and the Department will be notified prior to the sale or legal transfer of the permitted facility.


Signature of Applicant or Agent

Randall Olney, PE, Public Works Director

Name and Title (please type)

randall.olney@citrusbocc.com

E-Mail Address (if available)

3600 Sovereign Path, Suite 212

Mailing Address

Lecanto, FL 34461

City, State, Zip Code

(352) 527-5477

Telephone Number

Date: 4/30/2018

Attach letter of authorization if agent is not a government official, owner, or corporate officer.

2. Professional Engineer registered in Florida (or Public Officer if authorized under Sections 403.707 and 403.7075, Florida Statutes):

This is to certify that the engineering features of this solid waste management facility have been designed/examined by me and found to conform to engineering principles applicable to such facilities. In my professional judgment, this facility, when properly maintained and operated, will comply with all applicable statutes of the State of Florida and rules of the Department. It is agreed that the undersigned will provide the applicant with a set of instructions of proper maintenance and operation of the facility.


Signature

Carol G. Sawyer, Professional Engineer

Name and Title (please type)

730 NE Waldo Road

Mailing Address

Gainesville, FL 32641

City, State, Zip Code

csawyer@jonesedmunds.com

E-Mail Address (if available)

(352) 377-5821

Telephone Number

Date: 5/1/2018

No. 55214

Florida Registration Number (please affix seal)

Supporting Documentation

PART D – SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL

1 APPLICATION FORM AND ALL SUPPORTING DATA AND REPORTS

Rule 62-701.320(5)(a), Florida Administrative Code (FAC), requires one electronic copy of the application, engineering plans, and reports, and all supporting information for the proposed construction, substantial modification, operation, or closure of a facility.

2 PROFESSIONAL CERTIFICATIONS

Jones Edmunds has prepared this application and is an authorized engineering firm in Florida (Certificate of Authorization #1841). The application plans, reports, and supporting information have been signed and sealed by Carol G. Sawyer, PE, a registered Professional Engineer in Florida (Florida PE No. 55214), as the Engineer of Record. Applicable sections of the application have also been signed and sealed by Mark D. Hadlock, PE, a registered Professional Engineer in Florida (Florida PE No. 56871) and Troy D. Hays, PG, a registered Professional Geologist in Florida (Florida PG No. 2679).

During the construction of the gas collection and control system (GCCS) and the landfill gas (LFG) control migration system, the Engineer of Record or another qualified professional working under the supervision of the Engineer of Record will routinely inspect the landfill construction to ensure that design integrity is maintained.

3 LETTER OF TRANSMITTAL

A letter of transmittal is included with this permit application.

4 APPLICATION FORM

Florida Department of Environmental Protection (FDEP) Form No. 62-701.900(1), effective date February 15, 2015, has been completed and is signed and dated by the applicant and Jones Edmunds.

5 PERMIT FEE

In accordance with Rule 62-701.315, FAC, a \$250 permit application fee for a Minor Operation Permit Modification is provided with this permit application in the form of a check.

6 ENGINEERING REPORT

This application and supporting documentation meet the requirements of an Engineering Report required by Rule 62-701.320(7)(d), FAC.

7 OPERATION PLAN AND CLOSURE PLAN

No changes are proposed to the landfill final closure requirements and procedures provided in Part O of the permit renewal application submitted by SCS Engineers in April 2016.

The proposed modifications in this application will impact portions of the approved Operation Plan dated April 18, 2016, prepared by SCS Engineers. As part of this permit modification application, Jones Edmunds is only revising those sections of the approved Operation Plan that are related to the proposed gas system expansion/modifications presented in this application. Jones Edmunds has prepared a stand-alone, supplemental Operation Plan specific to the operation and management of the landfill GCCS and the LFG migration system. The stand-alone plan identifies those sections of the approved plan that are being revised and superseded. The supplemental Operation Plan is provided in Appendix A.

8 CONTINGENCY PLAN

No changes are proposed to the Emergency Incidents and Contingency Plan in the approved Operation Plan dated April 18, 2016.

9 PLANS OR DRAWINGS

The engineering plans and permit drawings for the *Citrus County Central Landfill GCCS Expansion and Gas Migration Control* Permit Drawings are provided in Appendix B. The Permit Drawing Set provides details of the existing conditions and of the proposed modifications and construction.

a. Regional Map or Plan

No changes proposed to the regional map or plan provided with the permit renewal application submitted by SCS Engineers in April 2016.

b. Vicinity Map or Aerial Photograph

No changes proposed to the vicinity map provided with the permit renewal application submitted by SCS Engineers in April 2016.

c. Site Plan

The site property boundary is provided on the *Existing Conditions Plan*, Drawing C1, of the Permit Drawings in Appendix B. No changes in the property boundary have occurred since the last permit application submission in April 2016. The previously submitted boundary survey has not been resubmitted.

d. Supporting Details

The Permit Drawings in Appendix B of this application provide other necessary details to support the Engineering Report.

A topographic survey of the Citrus County Central Landfill was performed by Pickett Surveying & Photogrammetry; the survey drawing was dated September 28, 2017. The Permit Drawings reflect this most recent survey as shown on Drawing C1, Existing Conditions Plan. The site coordinates are referenced to the West Zone of the Florida State Plane Coordinate System, North American Datum of 1983 (NAD 83). Elevations are to North American Vertical Datum of 1988 (NAVD 88). The latitude and longitude coordinates of the site were determined by Jones Edmunds using datum World Geodetic System 84 (WGS84).

10 DOCUMENTATION FROM PROPERTY OWNER

The Citrus County Board of County Commissioners owns the property within the limits of the proposed project. No changes in property ownership have occurred since the last permit application submission. Copies of the previously submitted warranty deeds and boundary surveys have not been resubmitted.

11 COUNTY WASTE REDUCTION AND RECYCLING GOALS

No changes to the facility's waste reduction and recycling goals are proposed in this permit application.

12 HISTORY AND DESCRIPTION OF ENFORCEMENT ACTIONS

In 2009, FDEP issued the following consent order against the County, *Final Consent Agreement #05-1078*, dated October 27, 2009.

FDEP issued a letter report dated August 15, 2017 to the Citrus County Division of Solid Waste Management, which noted their discussions with the County regarding the on-going assessment activities related to the Consent Agreement, and several action items related to their routine inspection of the site. The County submitted a response letter to FDEP dated August 30, 2017, addressing the items identified in FDEP's letter report and means of rectifying and/or proving compliance with the identified areas of concern.

No additional enforcement actions have occurred since this time.

13 PROOF OF PUBLICATION AND NOTIFICATION LETTERS

This permit application is a minor modification to the operations permit; therefore, a Notice of Application is not required to be published.

14 AIRPORT SAFETY

No changes proposed to the information provided with the permit renewal application submitted by SCS Engineers in April 2016.

15 OPERATOR TRAINING REQUIREMENTS

No changes proposed to the information provided with the permit renewal application submitted by SCS Engineers in April 2016.

PART G – LANDFILL CONSTRUCTION REQUIREMENTS

Part G.9 demonstrates that the design of the landfill gas collection and control system (GCCS) expansion and landfill gas (LFG) migration control system at the Citrus County Central Landfill (CCCL) meets the Florida Department of Environmental Protection (FDEP) design standards for construction at a landfill in accordance with Rule 62-701.400, Florida Administrative Code (FAC). Part G.9 provides design details to provide reasonable assurance that the proposed design meets the minimum design standards of the Rule and, therefore, the performance standards of Subsection 62-701.400(10) and Rule 62-701.530, FAC.

1 PLANNED CONSTRUCTION AND CLOSURE

Not applicable.

2 LANDFILL LINER REQUIREMENTS

Not applicable.

3 LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS)

Not applicable.

4 LEACHATE RECIRCULATION

Not applicable.

5 LEACHATE STORAGE TANKS AND LEACHATE SURFACE IMPOUNDMENTS

Not applicable.

6 LINER SYSTEMS CQA

Not applicable.

7 SOIL LINER CQA

Not applicable.

8 SURFACE WATER MANAGEMENT SYSTEMS

Not applicable.

9 GAS CONTROL SYSTEMS

- a. The CCCL operates a passive LFG collection system at the closed Class I Landfills and an active GCCS at the active Class I Landfill. The facility operates under FDEP Air Operations Permit No. 0170366-006-AV (expires July 12, 2021) that meets the requirements of Rule 62-701.530, FAC, and New Source Performance Standards (NSPS), Subpart WWW – Standards of Performance for Municipal Solid Waste Landfills.

Citrus County elected to install the active GCCS in 2010 before reaching regulatory thresholds. LFG extraction wells are in Phases 1 and 1A and a portion of Phase 2. The GCCS consists of 11 vertical collection wells, nine remote wellheads at leachate cleanouts, 8- and 10-inch high-density polyethylene (HDPE) header pipe, condensate sumps, and a 750-standard cubic foot-per-minute (scfm) flare that thermally destructs the collected gas. The proposed GCCS expansion project includes the following:

- Demolish seven wellheads at the leachate cleanouts (W-1, -2, -3, -4, -6, -7, and -9) and associated lateral landfill gas piping.
- Demolish three remote wellheads (EW-8R, EW-9R, and EW-10R) to downslope vertical gas risers. The remote wellhead connections will be relocated based on the new header pipe layout (RW-8, RW-9, and RW-10).
- Demolish four vertical gas collection wells (EW-4 through EW-7), and install seven new vertical gas collection wells (EW-12 through EW-18) in Phase 1. The new wells will be 80 feet deep (with 60 feet of slotted pipe) and will be at least 40 feet above the bottom liner.
- Demolish the two self-draining condensate traps (CT-1 and CT-2), and install one condensate trap, CS-3, with a dedicated pneumatic pump on the west side of Phase 2.
- Install one new vertical gas collection well outside the lined active Class I Landfill near background groundwater monitoring well MW-7, and connect it to the active GCCS. LFG monitoring data collected from within the riser of MW-7 shows possible evidence of LFG migration. This new gas collection well will be approximately 100 feet deep and 20 feet from MW-7. This new well is intended to capture LFG outside the lined area before it comes into contact with the groundwater.
- Install four new horizontal gas collector trenches in Phases 2 and 3 with remote wellhead connections (HC-1 through HC-4) and 6-inch lateral piping. The horizontal trenches will drain to the north into Phase 3.
- Install new 8-inch HDPE SDR 17 header piping, 6-inch HDPE SDR 17 lateral piping, a 2-inch compressed air line, and a 4-inch condensate drain line with all new LFG piping.
- Install dedicated dewatering pumps into existing vertical gas wells EW-1, EW-2, and EW-3.

Methane accumulation within the active landfill will be controlled by vacuum applied by the active GCCS. This system reduces the gas pressure within the landfill without interfering or causing the liner, leachate collection and removal system (LCRS), or

final cover to fail; mitigates gas stress on the future final cover vegetation; and eliminates the driving force for subsurface migration of gases and prevents combustible gases from exceeding 25 percent of the lower explosion limit (LEL) in the surrounding structures. Spacing between the wells was selected based on previous experience to prevent combustible gases from exceeding 100 percent of the LEL at the property boundary.

The landfill GCCS expansion will be installed as shown on the Drawings in Appendix B.

The three closed Class I Landfills are west of the active landfill and were active from 1975 through 1990. The closed landfills have passive gas control vents. The 7-acre closed lined landfill area originally had a minor passive gas extraction system with sparker-type flares on top of vents. The sparker flares were removed and modified to passive gas control vents. The intent of the proposed LFG migration control at the closed landfills is to reduce landfill gas migration outside the limits of waste and improve the groundwater and LFG monitoring networks. The proposed LFG extraction system at the closed landfills will be connected to the passive gas vents on the north end of the closed landfill areas and will incorporate the gas extraction wells currently connected to the solar-powered extraction system. The vents and wells will be connected to a small dedicated blower system, which will greatly increase the vacuum on the system compared to the solar-powered unit.

This application proposes the following LFG migration-control system design using some of the existing passive LFG vents along the north portion of the closed landfill cells:

- Decommission the existing solar-powered soil-vapor extraction system.
- Retrofit 13 existing gas vents with LFG extraction wellheads. The wellheads will allow for monitoring as needed. Of the 13 gas vents, 11 are installed within the closed landfills and two are part of the existing solar-powered soil-vapor extraction system installed north of the Closed Landfill Area B.
- Install 4- and 6-inch SCH 80 polyvinyl chloride (PVC) LFG piping to connect the modified passive gas wells to the blower-skid station. The LFG piping installation is designed to not interfere with the 40-mil geomembrane closure cap installed at the 7-acre closed lined landfill area.
- Install a pre-fabricated, pre-wired blower-skid station with a UL-rated control panel outside the limits of waste of the Closed Class I Landfill areas. This system will apply negative pressure to the gas wells, induce low pressure inside the landfill area to create a preferential pathway for the gas generated, and inhibit lateral gas migration. The collected gas will then be vented to the atmosphere through a 15-foot-high vent stack.
- Install a condensate trap with an electric pump downslope of the blower-skid station for liquids management. Liquids generated by the system will be discharged into an existing leachate collection riser installed at the 7-acre closed lined landfill area.

The technical specifications for this project are included in Appendix C.

10 LANDFILLS IN GROUNDWATER

Not applicable.

PART K - LANDFILL OPERATION REQUIREMENTS (RULE 62-701.500, FAC)

The following sections that are marked "No Change" refer to no proposed changes to the procedures and supporting information provided in Part K of the permit renewal application and Operation Plan submitted by SCS Engineers in April 2016. Items that are being revised as part of this minor permit modification have been identified and supporting documents provided. This permit application will require minor modifications to the approved Operation Plan. Jones Edmunds has prepared a stand-alone Operation Plan provided in Appendix A that addresses only those items that are being revised and will supplement the current approved plan.

1 TRAINED OPERATOR

No Change.

2 LANDFILL OPERATION PLAN

a. Operating and Maintenance Personnel

No Change.

b. Emergency Preparedness and Response

No Change.

c. Waste Control

No Change.

d. Weighing Waste

No Change.

e. Traffic Control and Unloading

No Change.

f. Filling Waste

No Change.

g. Waste Compaction and Application of Cover

No Change.

h. Gas, Leachate and Stormwater Controls

No change to Section K.10 and K.11 of the April 2016 Operation Plan. The following sections of the April 2016 Operation Plan were revised as part of this permit

application to reflect the proposed landfill gas (LFG) expansion/modification project and additional gas monitoring probes installed at the site since 2016:

- Section K.2.h.7, Condensate Management System Monitoring and Maintenance
- K.9, Landfill Gas Monitoring

The revisions are included in the stand-alone Operation Plan provided in Appendix A.

i. Water Quality Monitoring

Section K.2.i of the April 2016 Operation Plan was revised as part of this permit application. Jones Edmunds revised the March 2016 Groundwater Monitoring Plan that is included as Appendix I of the April 2016 Operation Plan to reflect the new assessment wells that were installed in 2017. The revised Water Quality Monitoring Plan is included in Appendix D.

j. Leachate Collection System Maintenance

No Change.

3 DESCRIPTION OF THE LANDFILL OPERATION RECORD

No Change.

4 WASTE RECORDS

No Change.

5 METHODS OF ACCESS CONTROL

No Change.

6 LOAD CHECKING PROGRAM

No Change.

7 PROCEDURES FOR SPREADING AND COMPACTING WASTE

No Change.

8 OPERATIONAL PROCEDURES FOR LEACHATE MANAGEMENT

No Change.

9 GAS MANAGEMENT SYSTEM

Section K.9 of the April 2016 Operation Plan was revised as part of this permit application to reflect the proposed LFG expansion/modification project and additional gas monitoring probes installed at the site since 2016. The revisions are included in the stand-alone Operation Plan provided in Appendix A.

10 OPERATING AND MAINTAINING STORMWATER MANAGEMENT SYSTEM

No Change.

11 EQUIPMENT AND OPERATION FEATURE REQUIREMENTS

No Change.

12 ALL-WEATHER ACCESS ROAD, INSIDE PERIMETER ROAD, AND OTHER ROADS

No Change.

13 ADDITIONAL RECORD KEEPING AND REPORTING

No Change.

PART L – WATER QUALITY MONITORING REQUIREMENTS

1 WATER QUALITY MONITORING PLAN

This water quality monitoring plan (WQMP) has been prepared in accordance with Chapter 62-701.510(2)(a), Florida Administrative Code (FAC), for the Citrus County Central Landfill (CCCL). Jones Edmunds has revised the WQMP included as Appendix I of the approved Operation Plan dated April 18, 2016. The revised WQMP reflects new groundwater monitoring wells that were installed as detailed in the Citrus County Central Landfill Gas Assessment and Groundwater Delineation Report dated November 28, 2017. The revised WQMP is included in Appendix D.

The WQMP:

- Describes a monitoring network that includes an array of groundwater monitoring wells to detect and characterize potential impacts from the landfill.
- Specifies the methods for collecting and analyzing groundwater, surface water, and leachate samples and reporting the results to the Florida Department of Environmental Protection (FDEP).
- Describes actions to be taken if an impact is detected.
- Will be evaluated every 2.5 years during the active life of the facility, or as specified in the permit, and updated as needed to remain in compliance with Chapter 62-701.510(8)(b), FAC.

The overriding purpose of water quality monitoring, as stated in Rule 62-701.340(1), FAC, is to control the movement of waste and waste constituents into the environment so that water quality standards and criteria and air quality standards will not be violated. Water quality monitoring is designed to demonstrate that the design, construction, operation, maintenance, and closure of a landfill are meeting this primary performance standard.

The outline of this WQMP follows the format of FDEP Form 62-701.900(1), Part L.

a. Basis, and Sign and Seal (62-701.510(2)(a), FAC)

This WQMP is based on the information obtained from site-specific hydrogeological data as referenced in the most recent permit renewal applications.

This WQMP has been signed, dated, and sealed in accordance with Chapter 62-701.510(2)(a), FAC.

b. Sampling and Analysis (62-701.510(2)(b), FAC)

Sampling and analyses will be performed in accordance with Chapter 62-160 (Quality Assurance), Chapter 62-701.510(2)(b), FAC, and the FDEP Standard Operating Procedures 001/01. All analysis will be performed by a laboratory certified by the National Environmental Laboratory Accreditation Program (NELAP). Citrus County is currently using Enco Laboratories – Florida certification number E83182 – for the analyses.

c. Groundwater Monitoring Requirements (62-701.510(3), FAC)

The current monitoring network is shown on Figure L.1.c. The only changes to the current groundwater monitoring network are:

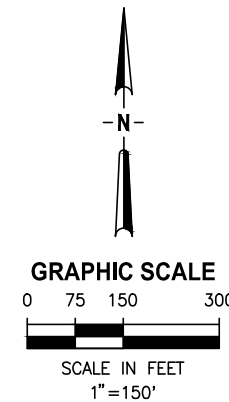
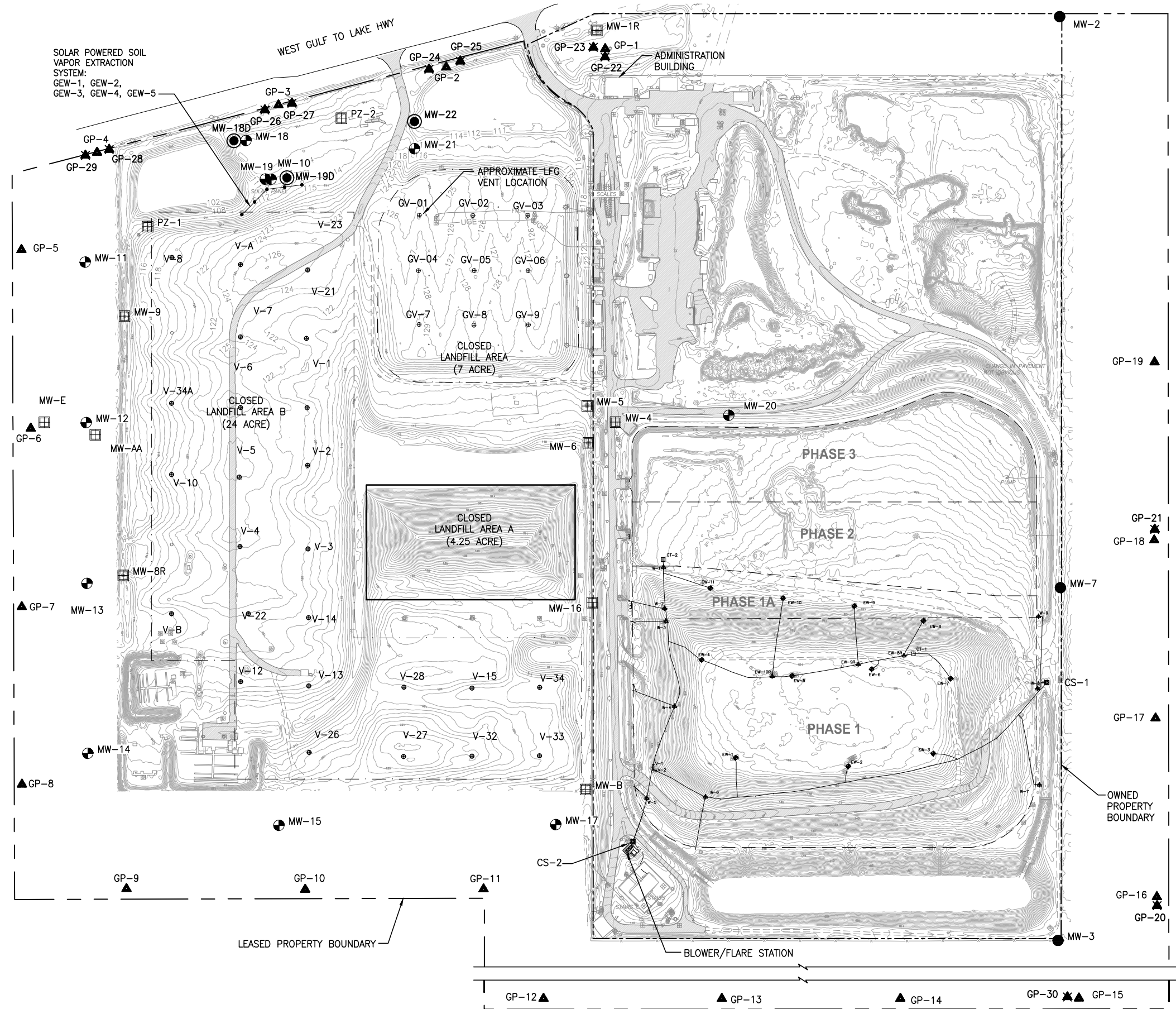
- Add the assessment wells installed in 2017 to the assessment monitoring permit condition. The new assessment wells are MW-18D, MW-19D, and MW-22.

The proposed monitoring network is outlined in Table L.1.c.

Table L.1.c Groundwater Monitoring Network

ID	Designation	Sample Frequency
Compliance Network Wells		
MW-3	Background	Semiannually
MW-7	Background	Semiannually
MW-10	Compliance	Semiannually
MW-11	Compliance	Semiannually
MW-12	Compliance	Semiannually
MW-13	Compliance	Semiannually
MW-14	Compliance	Semiannually
MW-15	Compliance	Semiannually
MW-17	Compliance	Semiannually
MW-20	Compliance	Semiannually
MW-21	Compliance	Semiannually
Piezometers		
MW-1R	Piezometer	Semiannually
MW-2	Piezometer	Semiannually
MW-5	Piezometer	Semiannually
MW-6	Piezometer	Semiannually
MW-8R	Piezometer	Semiannually
MW-9	Piezometer	Semiannually
MW-16	Piezometer	Semiannually
MW-AA	Piezometer	Semiannually
MW-B	Piezometer	Semiannually
MW-E	Piezometer	Semiannually
PZ-1A	Piezometer	Semiannually
PZ-2A	Piezometer	Semiannually
Assessment Wells		
MW-18	Assessment	Semiannually
MW-19	Assessment	Semiannually
MW-18D*	Assessment	Semiannually
MW-19D*	Assessment	Semiannually
MW-22*	Assessment	Semiannually

Note: * Designates new well installed in November 2017.



LEGEND

- EW-1 LFG EXTRACTION WELL
- EW-10 DOWNSLOPE LFG EXTRACTION WELL
- EW-8R REMOTE LFG EXTRACTION WELLHEAD
- HEADER/LATERAL
- CS-2 CONDENSATE SUMP
- MW-7 BACKGROUND WELLS
- MW-13 COMPLIANCE MONITORING WELL
- V-33 PASSIVE GAS VENT
- GV-06 PASSIVE GAS VENT (INSTALLED 2009)
- PZ-1 PIEZOMETERS
- MW-9 PIEZOMETERS
- GP-1 GAS PROBE
- W-7 LEACHATE CLEANOUT RISER WELLHEAD
- GP-21 NEW LFG PROBE (2017)
- MW-22 NEW GW MONITORING WELL (2017)

- NOTES:**
1. TOPOGRAPHIC CONTOURS PREPARED BY PICKETT SURVEYING, DATED 09/28/17.
 2. EXISTING LFG VENTS MAY NOT BE LABELED AS SHOWN.

FIGURE L.I.c
MONITORING NETWORK
CITRUS COUNTY CENTRAL LANDFILL
CITRUS COUNTY, FLORIDA

LAST SAVED: 3/22/2018 12:39 PM BY: PUPSTILL PATH: \\JEACAD\DRAWING\03860 CITRUS COUNTY 059 GCOS\FIGURES\03860059FIG-L-I-C.DWG PLOTTED: 3/22/2018 12:45 PM BY: PAUL UPSTILL

(1) Detection Wells

The site has no detection wells.

(2) Downgradient Compliance Wells

The monitoring network has nine compliance wells: MW-10, MW-11, MW-12, MW-13, MW-14, ME-15, MW-17, MW-20, and MW-21.

(3) Background Wells

The current monitoring network has two background wells: MW-3 and MW-7. Refer to Figure L.1.c. Background wells are used to characterize background groundwater conditions for comparison to the results of downgradient well analyses.

(4) Location Information for Monitoring Wells

The location information of all monitoring wells are shown in Figure L.1.c and Table L.1.c(1).

(5) Well Spacing

Rule 62-701.510(3)(d)3, FAC, requires downgradient wells be spaced no greater than 500 feet apart along the downgradient boundaries of the landfill. No change is proposed. In accordance with Rule 62-701.510(3)(d)3, FAC, the background wells are placed within 1,500 feet of the adjacent wells, allowing adequate representation of ambient, un-impacted groundwater conditions.

(6) Well Screens

The well screen intervals are selected appropriately, based on the site conditions. The wells are screened in the only laterally continuous aquifer identified at the site.

(7) Well Construction

The monitoring wells are constructed to provide representative samples from the zones monitored. Table L.1.c(1) summarizes the existing well construction information.

(8) Well-Abandonment Procedures

No wells are proposed to be abandoned. Wells will be abandoned properly as specified in Rule 40B-3.531, FAC., with prior FDEP approval.

(9) Detection Sensors

Detection sensors are not used at the site and none are proposed.

Table L.1.c(1) Groundwater Monitoring Well Locations and Construction Details

Well Name	Well Designation	Date Installed	Top of Casing Elevation (ft NGVD)	Screen Details							Filter Pack (Silica Sand)	Well Location	
				Total Depth (ft BLS)	Total Depth (ft BTOC)	Length (ft)	Depth (ft BLS)		Elevation (ft. NGVD)			Easting (Ft.)	Northing (Ft.)
							Top	Bottom	Top	Bottom			
MW-AA	Piezometer	NR	105.85	116	117.4	10	106	116	-1.6	-11.6	NR	514330.1915	1642944.6946
MW-B	Piezometer	NR	113.30	128	128.8	20	108	128	4.5	-15.5	NR	515703.188	1641952.201
MW-E	Piezometer	NR	109.36	118	120.9	20	98	118	8.5	-11.5	NR	514187.411	1642978.872
MW-1R	Piezometer	NR	118.07	125	127.8	10	115	125	0.3	-9.7	NR	515734.4675	1644075.0314
MW-2	Piezometer	NR	136.05	161	163.8	15	146	161	-12.8	-27.8	NR	517016.947	1644134.012
MW-3	Background	NR	120.31	119	119.8	15	104	119	15.5	0.5	NR	517026.689	1641528.493
MW-5	Piezometer	NR	120.98	120	122.5	10	110	120	8.5	-1.5	NR	515706.7199	1643027.5870
MW-6	Piezometer	NR	118.27	122	124.7	10	112	122	3.6	-6.4	NR	515710.8712	1642921.8127
MW-7	Background	NR	128.47	137	139.06	20	117	137	9.4	-10.6	NR	517032.495	1642518.150
MW-8R	Piezometer	NR	117.96	128	127.98	20	108	128	10.0	-10.0	NR	514408.379	1642551.088
MW-9	Piezometer	NR	113.29	121	120.96	20	101	121	12.3	-7.7	NR	514411.959	1643276.437
MW-10	Compliance	11/2/05	113.37	120.5	120.0	20	100.5	120.5	13.4	-6.6	20/30	514808.4751	1643659.0352
MW-11	Compliance	11/2/05	104.69	112.0	111.7	20	92.0	112.0	13.0	-7.0	Gravel	514299.5523	1643424.8999
MW-12	Compliance	11/2/05	103.36	110.0	109.5	20	90.0	110.0	13.9	-6.1	20/30	514306.5574	1642972.8677
MW-13	Compliance	11/10/05	111.92	120.0	119.5	20	100.0	120.0	12.4	-7.6	20/30	514299.7062	1642543.8233
MW-14	Compliance	11/10/05	108.50	116.0	115.5	20	96.0	116.0	13.0	-7.0	20/30	514302.3733	1642085.7341
MW-15	Compliance	11/10/05	123.58	130.0	129.6	20	110.0	130.0	14.0	-6.0	20/30	514845.7153	1641844.4367
MW-16	Piezometer	10/31/05	119.64	127.0	126.6	20	107.0	127.0	13.0	-7.0	20/30	515765.2792	1642292.6040
MW-17	Compliance	11/3/05	110.85	118.0	117.5	20	98.0	118.0	13.4	-6.7	20/30	515619.9611	1641846.2474
MW-18	Assessment	1/23/07	115.82	120.0	119.7	20	100.0	120.0	16.1	-3.9	20/30	514730.9420	1643746.0676
MW-19	Assessment	1/22/07	113.50	140.0	139.6	10	130.0	140.0	-16.1	-26.1	20/30	514816.3731	1643660.2048
MW-20	Compliance	1/12/11	119.76	125.70	125.0	20	105.0	125.0	14.76	-5.24	20/30	516104.004	1642999.189
MW-21	Compliance	1/12/11	115.63	125.40	125.0	20	105.0	125.0	10.63	-9.37	20/30	515259.800	1643743.909
MW-18D	Assessment	7/31/17	115.68	140.00	139.6	10	130.0	140.0	-13.92	-23.92	20/30	514743.728	1643744.784
MW-19D	Assessment	7/29/17	113.59	160.00	159.6	5	155.0	160.0	-41.01	-46.01	20/30	514825.267	1643661.619
MW-22	Assessment	8/1/17	113.79	125.00	124.5	20	105.0	125.0	9.29	-10.71	20/30	515212.968	1643815.567
PZ-1 A	Piezometer	1/26/07	110.97	120.0	119.7	20	100.0	120.0	11.3	-8.7	20/30	514454.2759	1643505.5893
PZ-2 A	Piezometer	1/24/07	116.82	120.0	119.8	20	100.0	120.0	17.0	-3.0	20/30	515020.7612	1643833.4593

Notes:

Updated with County survey information dated September 14, 2017.

BTOC = Below Top of Casing

ft = Feet

BLS = Below Land Surface

NR = Not recorded

NGVD = National Geodetic Vertical Datum

(10) Well Screens

The well screen intervals are selected appropriately based on the site conditions. The wells are screened in the only laterally continuous aquifer identified at the site.

(11) Well Construction

The monitoring wells are constructed to provide representative samples from the zones monitored. Table L.1.c(1) summarizes the existing well construction information.

(12) Well-Abandonment Procedures

No wells are proposed to be abandoned. Wells will be abandoned properly as specified in Rule 40B-3.531, FAC., with prior FDEP approval.

(13) Detection Sensors

Detection sensors are not used at the site and none are proposed.

d. Surface Water Monitoring Requirements (62-701.510(4), FAC)

Surface water is only sampled at the site if a discharge from one of the detention areas occurs. No routine surface water sampling is performed at the site.

- (1) The site has no proposed surface water monitoring points.
- (2) The site has no existing surface water monitoring points.

e. Sampling Frequency Requirements (62-701.510(5), FAC)

(1) Initial Background Groundwater and Surface Water Sampling

All new monitoring wells required by permit will be sampled for parameters listed in Chapters 62-701.510(7)(a) and (7)(c), FAC (Table L.1.e(1)).

Table L.1.e(1) Initial Groundwater Sampling Parameters

Field Parameters	Laboratory Parameters
Static Water Level	Total Ammonia – N
Specific Conductivity	Chlorides
pH	Iron
Dissolved Oxygen	Mercury
Turbidity	Nitrate – N
Temperature	Sodium
Colors and Sheens (by observation)	Total Dissolved Solids
	40 CFR 258, Appendix I and II

All new background surface water stations are required to be sampled for the parameters listed in Table L.1.e(3). No new background surface water stations are proposed at this time.

(2) Routine Monitoring Well Sampling and Analysis

The compliance and background wells will be sampled semiannually for the parameters listed in Chapter 62-701.510(7)(a), FAC, and listed in Table L.1.e(2).

Table L.1.e(2) Semiannual Groundwater Sampling Parameters

Field Parameters	Laboratory Parameters
Static Water Level	Total Ammonia – N
Specific Conductivity	Chlorides
pH	Iron
Dissolved Oxygen	Mercury
Turbidity	Nitrate – N
Temperature	Sodium
Colors and Sheens (by observation)	Total Dissolved Solids
	40 CFR 258, Appendix I

The assessment wells will be sampled semiannually for the parameters listed in Table L.1.e(2)a.

Table L.1.e(2)a Semiannual Assessment Sampling Parameters

Field Parameters	Laboratory Parameters
Static Water Level	Benzene
Specific Conductivity	Methylene Chloride
pH	Vinyl Chloride
Dissolved Oxygen	
Turbidity	
Temperature	
Colors and Sheens (by observation)	

(3) Routine Surface Water Sampling and Analysis

Surface water is only sampled if a discharge off the landfill property occurs. If discharge off the property occurs, samples will be collected for the parameters listed in Chapter 62-701.510 (7)(b), FAC, and as listed in Table L.1.e(3).

Table L.1.e(3) Surface Water Sampling Parameters

Field Parameters	Laboratory Parameters
Specific Conductivity	Unionized Ammonia
pH	Total hardness (as mg/L CaCO ₃)
Dissolved Oxygen	Biochemical Oxygen Demand (BOD)
Turbidity	Iron
Temperature	Mercury
Colors and Sheens (by observation)	Nitrate - N
	Total Dissolved Solids (TDS)
	Total Organic Carbon (TOC)
	Fecal Coliform
	Total Phosphorus (as mg/L P)
	Chlorophyll A
	Total Nitrogen
	Chemical Oxygen Demand (COD)
	Total Suspended Solids (TSS)
	40 CFR Part 258, Appendix I

f. Procedures for Implementing Evaluation Monitoring (62-701.510(6), FAC)

If monitoring parameters are detected in wells at concentrations that are significantly above background water quality or that are at concentrations above FDEP's water quality standards or criteria specified in Chapter 62-520, FAC, the well will be re-sampled within 30 days after the initial analytical data are received to confirm the data. If the data are confirmed or the well is not re-sampled, FDEP will be notified in writing within 14 days of the finding. Upon notification by FDEP, evaluation monitoring will be initiated in accordance with Chapter 62-701.510(6), FAC.

g. Water Quality Monitoring Report Requirements (62-701.510(8), FAC)

- (1) Water quality monitoring reports will be submitted to FDEP semiannually. The report will include at least the following:
 - a) The applicant name and ID number, sample collection dates, and analysis dates.
 - b) All analytical results, including peaks even below maximum contaminant levels.
 - c) Identification numbers of all surface water and groundwater monitoring points.
 - d) Applicable water quality criteria.
 - e) Quality assurance, quality control notations.
 - f) Method detection limits.

- g) STORET code numbers for all parameters.
 - h) Water levels recorded before evacuating wells or sample collection (continuous round) with elevations referenced to the top of casing and land surface at each well to within 0.01 foot (NGVD 29).
 - i) Updated groundwater table contour map signed and sealed by a PG or PE. Contour intervals will be no greater than 1 foot.
 - j) A summary of water quality criteria that are exceeded.
- (2) Water quality data will be provided electronically in a format consistent with requirements for importing into FDEP databases and in compliance with the permit.
- (3) A technical report signed, sealed, and dated by a PG or PE will be submitted to FDEP every 2.5 years. The report will summarize and interpret the water quality and leachate monitoring results and water level measurements collected during the report period. The report will include at least the following:
- a) Tabular display of data showing all detected parameters.
 - b) Graphical display of any leachate key indicator parameters.
 - c) Hydrographs for all monitoring wells.
 - d) Trend analysis of any monitoring parameter consistently detected.
 - e) Comparisons between shallow-, medium-, and deep-zone wells.
 - f) Comparisons between background water quality and the water quality in detection and compliance wells.
 - g) Correlations between related parameters such as total dissolved solids and specific conductance.
 - h) Discussions of erratic and/or poorly correlated data.
 - i) Interpretation of groundwater contour maps including an evaluation of groundwater flow rates.
 - j) An evaluation of the adequacy of the water quality monitoring frequency and sampling locations based on site conditions.

PART N – GAS MANAGEMENT SYSTEM REQUIREMENTS

1 GAS MANAGEMENT SYSTEM DESIGN

Landfill gas (LFG) generated at the Citrus County Central Landfill (CCCL) is managed passively and actively. At the closed Class I Landfill cells, gas is collected by a series of passive vents to minimize the potential for offsite migration of LFG.

At the active Class I Landfill (Phases 1, 1A, 2, and 3), gas is collected by an active gas collection and control system (GCCS) and thermally treated (flared). The County voluntarily installed the active GCCS in 2010. The GCCS collects LFG generated in Phases 1, 1A, and a portion of Phase 2. Changes to the GCCS are proposed to improve the collection system efficiency and to augment the existing gas wellfield. No changes are proposed to the gas control system (i.e., blower and flare station). This modification proposes to expand the existing GCCS into Phases 2 and 3 by augmenting the current wellfield with new vertical and horizontal gas extraction wells and demolishing poor-performing gas extraction wells. This modification also proposes to retrofit the existing system with new or replacement piping and appurtenances to improve the system's collection efficiency.

There are three closed Class I Landfills west of the active landfill. The landfills are identified as Closed Landfill Area A (4.25 acres, unlined), Closed Landfill Area B (24 acres, unlined), and Lined Closed Landfill Area (7 acres, lined). These disposal areas were active from 1975 through 1990. The closed landfill areas have passive gas control vents. The 7-acre closed lined landfill area originally had a minor passive gas extraction system with sparker-type flares on top of vents. The sparker flares were removed and modified to passive gas-control vents. The proposed LFG extraction system at the closed landfills will be connected to the passive gas vents on the north end of the closed landfill areas and will incorporate the gas extraction wells currently connected to the solar-powered extraction system. The vents and wells will connect to a small dedicated blower system, which will greatly increase the vacuum on the system compared to the solar-powered unit. This proposed modification is the result of continued observations of groundwater parameter exceedances and discussions with the FDEP Southwest District. The intent is to increase the LFG extraction efficiency in this area.

The proposed details of the existing system and proposed design are provided in the Drawings, included in Appendix B.

- a. The passive gas venting system and active GCCS has been designed to prevent gas concentrations of combustible gases from exceeding 25 percent of the lower explosive limit (LEL) in structures and 100-percent LEL at the property boundary.
- b. The current and proposed active GCCS uses a combination of vertical and horizontal gas collectors designed to meet the specific site conditions. The locations of vertical gas wells in Phases 1, 1A, and 2 are based on an assumed 100-foot radius of influence and are arranged to achieve adequate coverage of gas-producing areas. The horizontal collection wells have been located to manage gas generated from the upper two-thirds of waste in-place and future disposed waste. The passive gas

collection system at the closed landfills is being revised to provide additional vacuum to improve gas extraction efficiency in this area.

- c. Negative pressure will be applied to all vertical and horizontal gas collection wells installed to prevent gas migration from moving laterally in accordance with Subsection 62-701.530(1)(a)3, Florida Administrative Code (FAC).
- d. The GCCS has been designed to avoid interfering with the bottom liner, the leachate control system, or the final cover system installed at the active and closed Class I Landfills.

2 GAS MONITORING INFORMATION

Gas monitoring is performed in accordance with Rule 62-701.530, FAC.

In 2017, 11 new LFG monitoring probes, GP-20 through GP-30, were installed along the north and east property boundaries in accordance with the approved *Landfill Gas Assessment and Groundwater Delineation Plan* submitted to FDEP on June 9, 2017. Construction details of the new probes were provided in the *Landfill Gas Assessment and Groundwater Delineation Report* submitted to FDEP on November 29, 2017. Additionally, the existing LFG monitoring probes were retrofitted with dedicated tubing to varying depths in the probe to allow gas measurements at varying intervals in each probe. Table N.2 shows the LFG monitoring probes construction details. All probes are monitored at each depth quarterly. The LFG monitoring probes are included on the Existing Conditions Plan, Drawing C1, of the CCCL GCCS Expansion and Gas Migration Control System Drawings in Appendix B.

LFG is also monitored quarterly in the groundwater monitoring wells and at the following ambient locations:

- Administration Building
- Modular Building
- Shop
- Scale House
- Leachate Treatment Facility
- Firing Range
- Hazardous Waste Drop-Off Center

Refer to Attachment N.2 for the LFG monitoring tables.

Table N.2 Landfill Gas Probe Details

Gas Probe ID	Probe Depth (ft)	Length of Slotted Pipe (ft)	Solid Pipe Length Below Grade (ft)	Tubing lengths		
				Length of Clear (ft)	Length of Blue (ft)	Length of Black (ft)
GP-1	40	35	5	40	20	
GP-2	40	35	5	40	20	
GP-3	40	35	5	40	20	
GP-4	40	35	5	40	20	
GP-5	40	35	5	40	20	
GP-6	40	35	5	40	20	
GP-7	40	35	5	40	20	
GP-8	40	35	5	40	20	
GP-9	40	35	5	40	20	
GP-10	40	35	5	40	20	
GP-11	40	35	5	40	20	
GP-12	80	75	5	75	50	25
GP-13	80	75	5	75	50	25
GP-14	80	75	5	75	50	25
GP-15	80	75	5	75	50	25
GP-16	80	75	5	75	50	25
GP-17	80	75	5	75	50	25
GP-18	80	75	5	75	50	25
GP-19	75	70	5	70	50	25
GP-20	110	10	100		105	
GP-21	120	10	110		115	
GP-22	75	10	65	70		
GP-23	105	10	95	100		
GP-24	75	10	65	70		
GP-25	105	10	95	100		
GP-26	75	10	65	70		
GP-27	105	10	95	100		
GP-28	75	10	65	70		
GP-29	105	10	95	100		
GP-30	110	10	100		105	

3 GAS AND ODOR REMEDIATION

GAS REMEDIATION PLAN

The *Landfill Gas Assessment and Groundwater Delineation Report*, submitted to FDEP on November 29, 2017, describes the results of expanded gas and groundwater monitoring at the closed Class I Landfills. The report also identified that remediation of gas migration outside the limits of waste would be achieved by installing a dedicated soil-vapor extraction blower station and vent stack at the closed Class I Landfill Area (7-acre cell) and Area B.

In response to the *Landfill Gas Assessment and Groundwater Delineation Report* (referenced above), the *Gas Migration Control Remediation Plan* will be as follows:

- Decommission the existing solar-powered soil-vapor extraction system.
- Retrofit 13 passive gas vents with LFG extraction wellheads, including two vents installed as part of the existing solar-powered soil-vapor extraction system. Temporarily dewater modified gas wells before installing the wellhead or gas piping.
- Install 4- and 6-inch high-density polyethylene (HDPE) LFG piping to connect the modified passive gas wells to the blower-skid station. Installation of LFG piping has been designed to avoid interfering with the 40-mil geomembrane closure cap installed at the 7-acre Lined Closed Landfill Area.
- Install a pre-fabricated, pre-wired blower-skid station with a control panel outside the limits of waste of the closed landfill areas. Install a condensate trap with electric pump downslope of the blower-skid station for management of liquids. Liquids generated by the system will be discharged into the existing leachate collection and removal system (LCRS) installed at the 7-acre Lined Closed Landfill Area.
- Install electrical wiring to serve the blower system control panel and condensate trap electric pump outside the limits of waste of the closed landfill areas.
- Use the soil-vapor extraction blower system to apply negative pressure to gas vents installed in the 7-acre Lined Closed Landfill Area and 24-acre Landfill Area B and to induce low pressure inside the landfill areas to create a preferential pathway for LFG generated and inhibit lateral gas migration.

Appendix B, Drawings, provides details of the proposed LFG migration control system.

ODOR REMEDIATION PLAN

There are no proposed changes to the odor remediation plan proposed with the permit renewal application submitted by SCS Engineers in April 2016.

4 LANDFILL GAS RECOVERY FACILITIES

- a. The active GCCS operates in accordance with a Title V Air Operation Permit (FDEP Permit No. 1250008-007-AV). The proposed modifications/expansion to the GCCS will also fall under the requirements of the air operations permit.
- b. Waste disposal activities are ongoing at the facility. At landfill closure, the Closure Permit Application will address any integration of the GCCS with the intended end use.
- c. The permitted GCCS is designed to handle the maximum expected landfill recovery rates over the life of the Class I Landfill. Gas condensate is collected in condensate sumps for disposal within the leachate force main system. The County meets the Title V GCCS reporting and operation requirements.
- d. Gas condensate is collected in condensate sumps for disposal to the leachate storage tanks. Condensate is not sampled or analyzed.

- e. Waste disposal activities are ongoing at the facility. At landfill closure, the landfill will continue to operate the GCCS in accordance with the Title V permit requirements. The Closure Plan will address methods to control gas after the recovery facility ceases operation and other requirements in Rule 62-701.400(10), FAC.

Attachment N.2

Landfill Gas Monitoring Inventory

LANDFILL GAS MONITORING **CITRUS COUNTY CENTRAL LANDFILL**

General Data

Date:		Sampler:	
Time:		Sky Conditions:	
Air Temperature (deg C):		Measuring Device:	

Sampling Data

Station I.D.	Date Sampled	Time Sampled	Depth of Intake (Feet)	O2 % Volume	CO2 % Volume	Methane		Station Type
						Peak Recorded Concentration as % LEL	Peak Recorded Concentration as % Volume	
GP-1			20					Gas Well
GP-1			40					Gas Well
GP-2			20					Gas Well
GP-2			40					Gas Well
GP-3			20					Gas Well
GP-3			40					Gas Well
GP-4			20					Gas Well
GP-4			40					Gas Well
GP-5			20					Gas Well
GP-5			40					Gas Well
GP-6			20					Gas Well
GP-6			40					Gas Well
GP-7			20					Gas Well
GP-7			40					Gas Well
GP-8			20					Gas Well
GP-8			40					Gas Well
GP-9			20					Gas Well
GP-9			40					Gas Well
GP-10			20					Gas Well
GP-10			40					Gas Well
GP-11			20					Gas Well
GP-11			40					Gas Well
GP-12			25					Gas Well
GP-12			50					Gas Well
GP-12			75					Gas Well
GP-13			25					Gas Well
GP-13			50					Gas Well
GP-13			75					Gas Well
GP-14			25					Gas Well
GP-14			50					Gas Well

**LANDFILL GAS MONITORING
CITRUS COUNTY CENTRAL LANDFILL**

General Data

Date:		Sampler:	
Time:		Sky Conditions:	
Air Temperature (deg C):		Measuring Device:	

Sampling Data

Station I.D.	Date Sampled	Time Sampled	Depth of Intake (Feet)	O2 % Volume	CO2 % Volume	Methane		Station Type
						Peak Recorded Concentration as % LEL	Peak Recorded Concentration as % Volume	
GP-14			75					Gas Well
GP-15			25					Gas Well
GP-15			50					Gas Well
GP-15			75					Gas Well
GP-16			25					Gas Well
GP-16			50					Gas Well
GP-16			75					Gas Well
GP-17			25					Gas Well
GP-17			50					Gas Well
GP-17			75					Gas Well
GP-18			25					Gas Well
GP-18			50					Gas Well
GP-18			75					Gas Well
GP-19			25					Gas Well
GP-19			50					Gas Well
GP-19			75					Gas Well
GP-20			105					Gas Well
GP-21			115					Gas Well
GP-22			70					Gas Well
GP-23			100					Gas Well
GP-24			70					Gas Well
GP-25			100					Gas Well
GP-26			70					Gas Well
GP-27			100					Gas Well
GP-28			70					Gas Well
GP-29			100					Gas Well
GP-30			105					Gas Well
Admin Building			-					Structure
Mod Bldg			-					Structure
Shop			-					Structure

**LANDFILL GAS MONITORING
CITRUS COUNTY CENTRAL LANDFILL**

General Data

Date:		Sampler:	
Time:		Sky Conditions:	
Air Temperature (deg C):		Measuring Device:	

Sampling Data

						Methane		Station Type
Station I.D.	Date Sampled	Time Sampled	Depth of Intake (Feet)	O2 % Volume	CO2 % Volume	Peak Recorded Concentration as % LEL	Peak Recorded Concentration as % Volume	
Scale House			-					Structure
Treatment Facility			-					Structure
Firing Range			-					7 Structures
Haz Waste Drop off Center			-					4 Structures

**LANDFILL GAS MONITORING
CITRUS COUNTY CENTRAL LANDFILL**

General Data

Date:	Sampler:
Time:	Sky Conditions:
Air Temperature (deg C):	Measuring Device:

Sampling Data

Station I.D.	Time Sampled	O2 % Volume	CO2 % Volume	Methane		Station Type
				Peak Recorded Concentration as % LEL	Peak Recorded Concentration as % Volume	
MW-1R						GW Well
MW-2						GW Well
MW-3						GW Well
MW-5						GW Well
MW-6						GW Well
MW-7						GW Well
MW-8R						GW Well
MW-9						GW Well
MW-10						GW Well
MW-11						GW Well
MW-12						GW Well
MW-13						GW Well
MW-14						GW Well
MW-15						GW Well
MW-16						GW Well
MW-17						GW Well
MW-18						GW Well
MW-19						GW Well
MW-20						GW Well
MW-21						GW Well
MW-AA						GW Well
MW-B						GW Well
MW-E						GW Well
PZ-1						GW Well
PZ-2						GW Well

Appendix A

**CITRUS COUNTY CENTRAL LANDFILL
CLASS I LANDFILL
SUPPLEMENTAL OPERATION PLAN**

Prepared for:

Citrus County Board of County Commissioners
3600 W. Sovereign Path, Suite 267
Lecanto, Florida 34461

Prepared by:

Jones Edmunds
730 NE Waldo Road
Gainesville, Florida 32641

Certificate of Engineering Authorization #1841

Jones Edmunds Project No.: 03860-069-01

April 2018

INTRODUCTION

PURPOSE

This document serves as a Supplemental Operation Plan for the Citrus County Central Landfill. This plan supersedes specific sections of the approved Operations Plan prepared by SCS Engineers dated April 18, 2016. This Supplemental Operation Plan addresses the modifications proposed in the April 2018 permit application for the Landfill Gas Migration Control System and the Gas Collection and Control System Expansion prepared by Jones Edmunds.

Section K.9 of the April 2016 Operation Plan was revised to reflect the 2018 proposed modifications. For ease of review and use by the County, Jones Edmunds has revised SCS' Section K.9, Landfill Gas Monitoring, by using tracked changes.

K.9 LANDFILL GAS MONITORING (RULE 62-701.500(9), F.A.C.)

This LFG monitoring program for the Central Landfill has been prepared in accordance with Rule 62-701.530, F.A.C. As described below, the plan includes monitoring for subsurface LFG migration at the facility property boundary adjacent to the active landfill (Phases 1/1A, 2 and 3) and the closed 60-acre landfill, and in on-site structures. The LFG monitoring program is designed to confirm compliance with the requirements of Rule 62-701.530(1)(a)1, F.A.C., which requires the following:

- The methane concentration in on- or off-site structures may not exceed 25 percent of the lower explosive limit (LEL). The LEL for methane is five percent by volume in air. Therefore, the maximum allowable concentration in on- or off-site structures is 1.25-percent methane by volume.
- The methane concentration at or beyond the landfill property boundary may not exceed the LEL (i.e., 5 percent methane by volume).

As explained below, the monitoring plan was prepared based on site-specific conditions.

K.9.a BACKGROUND INFORMATION

In November and December of 2005, ~~eighteen~~19 permanent monitoring probes were installed along the new property boundary of the site. A new property boundary agreement has been established with the Florida Division of Forestry and FDEP. The landfill gas monitoring network was modified in 2017 from the approved gas management system design included in the Final Consent Agreement #05-1078. Due to the newly observed parameter exceedances, Jones Edmunds submitted a Landfill Gas Assessment and Groundwater Delineation Plan to FDEP on March 22, 2017, documenting a plan to expand the landfill gas and groundwater monitoring systems north of the closed Class I Landfills. The modifications were completed and are documented in the Landfill Gas Assessment and Groundwater Delineation Report, prepared by Jones Edmunds dated November 28, 2017. The new monitoring network includes the existing gas monitoring probes (GP-1 through GP-19) and 11 new landfill gas monitoring probes (GP-20 through GP-30). The probes were constructed as required in the consent order with long sections of slotted pipe and have been retrofitted for monitoring at varying depths in each probe as described in Part N of the permit modification application. The landfill gas monitoring probes are monitored quarterly. The 19 monitoring probes are now the only LFG compliance points at the site. The remaining 62 permanent LFG probes and 13 interim probes have been abandoned in place. Figure 9-1 is a site map showing the LFG monitoring probe locations and Figure 9-2 shows a detail of the gas probes.

K.9.b LANDFILL AREAS

The landfill areas on site include the closed 60-acre landfill, a part of which is approximately seven acres that has a bottom liner as well as a geosynthetic cap liner; and the active Phase 1/1A, Phase 2, and Phase 3 landfill cells. The balance of the closed 60-acre landfill is unlined but has been capped with a geosynthetic membrane and protective soil cover. The depth of waste in the closed 60-acre landfill is approximately 40 feet below ground surface. The active Class I Landfill (Phase 1/1A, and Phase 2, and 3) landfill areas have has a geomembrane bottom liner system, and the bottom depth of refuse is approximately 80 feet below ground surface. Groundwater is present approximately 110 feet below ground surface, and the soil at the site is primarily silty and clayey sand.

The GCCS at the active Class I Landfill is designed to provide a means of relieving internal gas pressures within the landfill and prevent fugitive emissions of LFG to the atmosphere through the cover soils and the subsurface migration of LFG to the surrounding areas. The GCCS ~~for Phases 1/1A and 2~~ includes the following features:

- LFG extraction wells (EW-1 through EW-11) installed in 2009 are composed of 6-inch PVC pipe, installed in a 30-inch borehole and backfilled with FDOT No. 4 stone. The borehole ~~was~~will be sealed with a hydrated bentonite plug and backfilled to grade with clean soil backfill.
- New LFG extraction wells (EW-12 through EW-18) will consist of 8-inch PVC pipe installed in a 36-inch borehole and backfilled with gravel. The borehole will be sealed with a hydrated bentonite plug and backfilled to grade with clean soil backfill.
- New horizontal gas collector trenches in Phases 2 and 3 with remote wellhead connections (HC-1 through HC-4) will consist of 6-inch lateral piping. The horizontal trenches will drain to the north into Phase 3. Horizontal gas collectors will be installed by constructing a horizontal collector pipe surrounded by porous non-carbonate, non-calcareous media and wrapped in a geotextile filter fabric. Porous media may include tire chips, crushed concrete, or gravel as allowed by permit
- Tie-ins ~~will be~~are made to the existing LCRS risers and ~~these will be~~are connected to the header/lateral system, routing LFG to the blower/flare station.
- A below grade header/lateral network ~~will be~~is installed. All piping will be HDPE SDR 17.
- A 2" HDPE SDR 9 air supply line ~~will be~~is installed at the blower/flare and compressor location to CS-1 on the east side of the Class I cells.
- A condensate sump (CS-2) with a pneumatic pump ~~will be~~is installed at the blower/flare station. An O&M manual for the pneumatic pump ~~will be~~was submitted to the FDEP with the report of construction completion.

- The ~~S~~self-draining condensate traps (CT-1 and CT-2) will be abandoned and replaced with one condensate trap (CS-3) with a dedicated pneumatic pump on the west side of Phase 2-located at engineered low points in the header system for the collection of condensate. The ~~trap~~sumps will allow for the drainage of condensate from the header and lateral system ~~back into the landfill~~to the leachate storage tanks.
- Collected LFG ~~will be~~is routed to the blower/flare station for combustion via the 750 scfm candlestick flare.

If it is necessary to perform video inspection or cleanout the LCRS via these risers, this can be accomplished by closing the 2-inch wellhead gate valve, disconnecting the flexible hose, and removing the quick release caps or flanged lids and associated piping. For details of the ~~Phase 3~~ GCCS please see the ~~Phase 3~~ Construction documents.

The gas migration control system installed at the Closed Class I Landfills will be inspected periodically. All components and fittings including wellheads, condensate sump, and blower skid will be visually inspected for damage and/or proper function. The blower station will be operated and maintained according to the manufacturer's specifications. If any problems are identified at the blower station or condensate sump, repairs shall be completed as soon as possible. All maintenance and repair activities will be recorded and filed on site.

Pneumatic pumps will be periodically visually inspected to ensure proper operation by checking the pump counters and recording cycle counts for each pump in operation. The sumps and condensate knockout pot will be visually inspected to determine if the pumps are maintaining liquid levels at low level.

K.9.c MONITORING OF ON-SITE STRUCTURES

In order to ensure the safety of workers inside and around permanent structures on site, ambient air will be monitored on a quarterly basis in on-site structures in accordance with the requirements of Rule 62-701.530(2)(a), F.A.C. As stated above, and in Rule 62-701.530(1)(a), F.A.C., the methane concentration in on- or off-site structures may not exceed 25 percent of the LEL, or 1.25 percent methane by volume. The following gas monitoring will be performed in structures at the facility.

- Explosive gas alarms located in the scale house building and leachate treatment plant electrical room will provide continuous monitoring for unacceptable concentrations of explosive gas. These monitors are designed to sound an alarm when methane concentrations exceed 25 percent of the LEL. The signal remains on as long as gas is present, and a red alarm light stays on after an alarm condition in order to alert personnel that methane was detected during their absence. Log sheets will be kept at each location to record when the alarm has been triggered, and each alarm will be calibrated or replaced on a regular basis according to the schedule recommended by the manufacturer.

- On a quarterly basis the following structures will be monitored:
 - Administration building
 - Scale house
 - Leachate treatment plant
 - Gun ranges
 - Modular Building
 - Shop
 - Hazardous Waste Drop-Off Center

Monitoring will consist of using handheld instruments to monitor for combustible gases at all slab penetrations, floor drains, cracks in the slabs, along baseboards, in electrical boxes and outlets, and in enclosed spaces such as closets and ground-level cabinets.

K.9.d GAS MONITORING PROCEDURES

K.9.d.1 Monitoring Procedures for Probes

Each probe will be monitored on a quarterly basis for static pressure and methane concentration, or combustible gases using an instrument calibrated to methane. Methane will be measured and recorded in terms of a percent by volume in air or as a percentage of the LEL. The monitoring equipment will be calibrated each day prior to the monitoring.

The general procedure for monitoring at each probe will be as follows:

1. Record meteorological conditions including ambient temperature and barometric pressure.
2. Calibrate the methane monitoring equipment.
3. Purge any calibration gas or gas from previous probes from the methane monitoring instrument.
4. Zero the pressure gauge.
5. Prior to monitoring, note any damage to the probe, and repair if necessary. Failure to repair damage to the above ground casing, cap, or monitoring probe can affect the validity of the monitoring results.
6. Attach the sampling hose to the pressure meter and the labcock valve on the monitoring probe.
7. Record the time of monitoring for the probe.
8. Open the labcock valve.
9. Measure and record the pressure in the probe.
10. Close the labcock valve.
11. Connect the methane monitoring instrument to the sampling hose.
12. Open the labcock valve.

13. Turn on the meter and observe the gas concentration readings, noting any spikes in concentration.
14. After the gas concentration readings stabilize, record the steady-state reading, making note of any spike that occurred prior to reaching a steady-state reading. Note that per Rule 62-701.530(2)(b), F.A.C., purging of the probe is not allowed.
15. Remove the instrument and hose, and close the labcock valve.
16. Repeat steps 3 through 15 for each probe.

Any problems encountered during monitoring, observations, or other pertinent information that could impact the interpretation of the data shall be recorded.

K.9.d.2 Monitoring Procedures for On-Site Structures

The following on-site structures will be monitored for methane or combustible gas on a quarterly basis using handheld field instruments in accordance with Rule 62-701.530(2)(a), F.A.C.:

- Administration building
- Scale house
- Leachate treatment plant
- Gun ranges
- Modular Building
- Shop
- Hazardous Waste Drop-Off Center

Methane will be monitored and recorded in terms of the percent by volume in air or as a percentage of the LEL, and the monitoring equipment will be calibrated each day prior to the monitoring.

The general locations for monitoring at each structure will be as described below.

Administration Building--

A handheld meter will be used to monitor for methane at each of the following locations:

- Along the baseboards in each of the rooms, closets, and hallways
- In all ground-level cabinets
- At the floor drains in the bathrooms
- At all electrical outlets in each room and hallway
- At electrical panels inside and outside the building
- At outdoor electrical outlets

Scale House, Modular Building, and Shop--

A handheld meter will be used to monitor for methane in the scale house, modular building, and shop at each of the following locations:

- Along the baseboards
- At any cracks in the concrete slab or flooring
- In all ground-level cabinets
- At all electrical outlets inside and outside of the building
- At electrical panels inside and outside the building

Leachate Treatment Plant and Hazardous Waste Drop-off Center--

Methane concentration will be checked at the following locations at the leachate treatment plant until it is removed:

- At any cracks in the concrete slab or flooring
- In any ground-level cabinets
- At all electrical outlets inside and outside of the building
- At electrical panels inside and outside the building

Gun Ranges--

There are two gun ranges on site that are operated by the Withlacoochee Technical Institute on the closed 60-acre landfill. At both gun ranges, the following locations will be monitored for methane.

- At cracks in the concrete slabs
- At all electrical outlets and switches
- At all slab penetrations, such as support posts for the roofs of the firing platforms

K.9.e REPORTING

Results of the monitoring will be reported to FDEP quarterly. A copy of the monitoring form is included as Appendix GA to this plan.

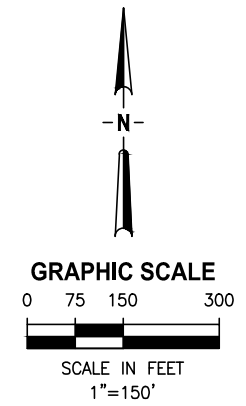
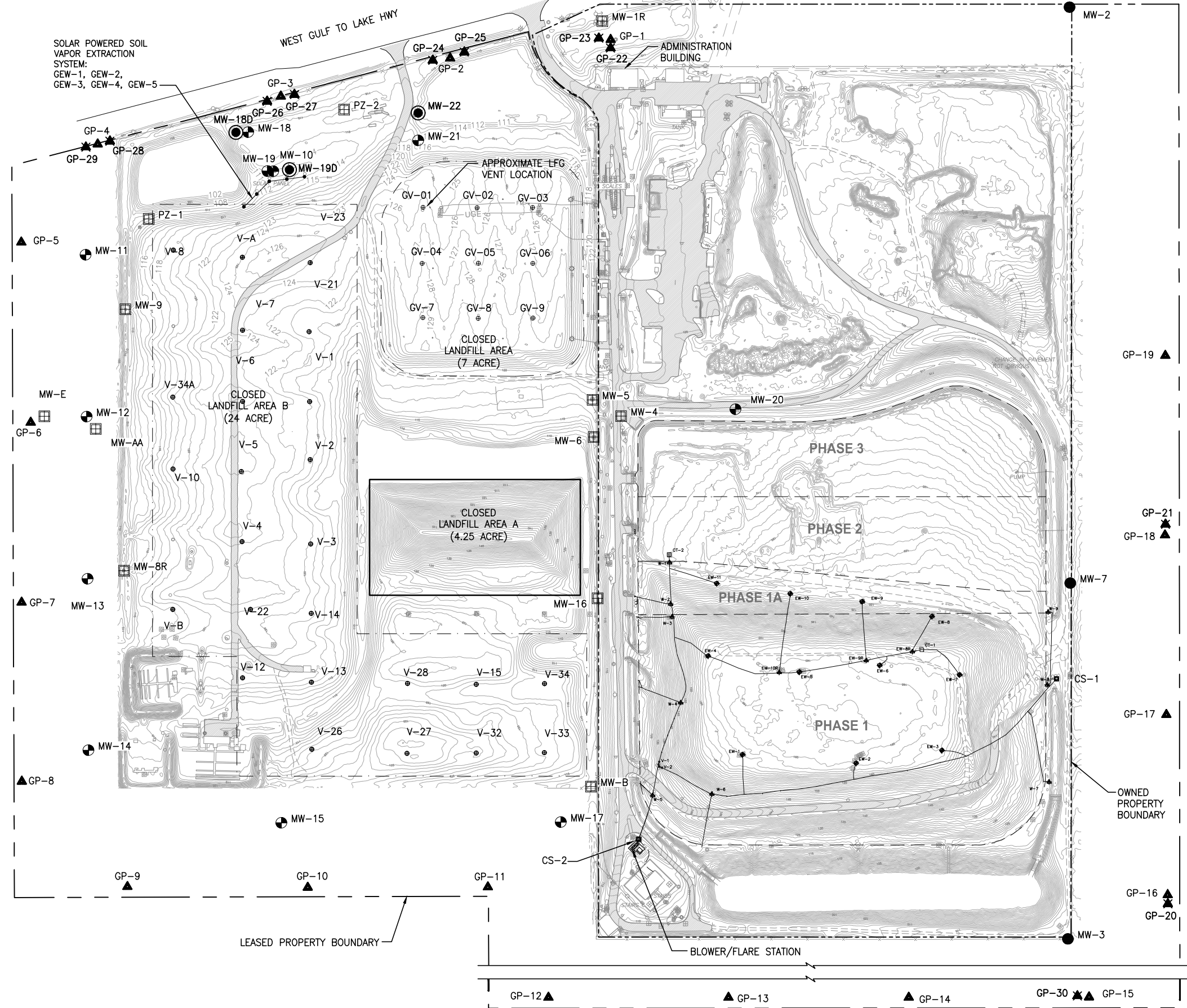
If the results of the monitoring show that combustible gas concentrations exceed the limits specified in Rule 62.701.530(1)(a), F.A.C., Citrus County will take the following actions:

- Immediately take all necessary steps to ensure protection of human health and notify FDEP of the exceedances.
- Within seven days of the detections, submit to FDEP for approval a gas remediation plan. The gas remediation plan must describe the nature and extent of the problem and the proposed remedy. The remedy must be completed within 60 days of detection unless otherwise approved by FDEP.

K.9.f ROUTINE ODOR CONTROL

The site is inspected on a daily basis for odors at the point of compliance. Potential sources for odors include; incoming waste, workplace activities, landfill gas, condensate systems, and leachate collection and handling systems. In the event that an odor is detected and a source identified, appropriate steps will be taken to mitigate the incident. The installation of the GCCS should eliminate odors generated by the decomposition of waste.

Deodorants and odor neutralizers will be maintained on site and utilized if soil cover does not mitigate the odor issues at the working face. Daily cover provides an effective seal against the odors. If odors persist daily cover will be increased and cover procedures will be reviewed and altered if necessary.



LEGEND

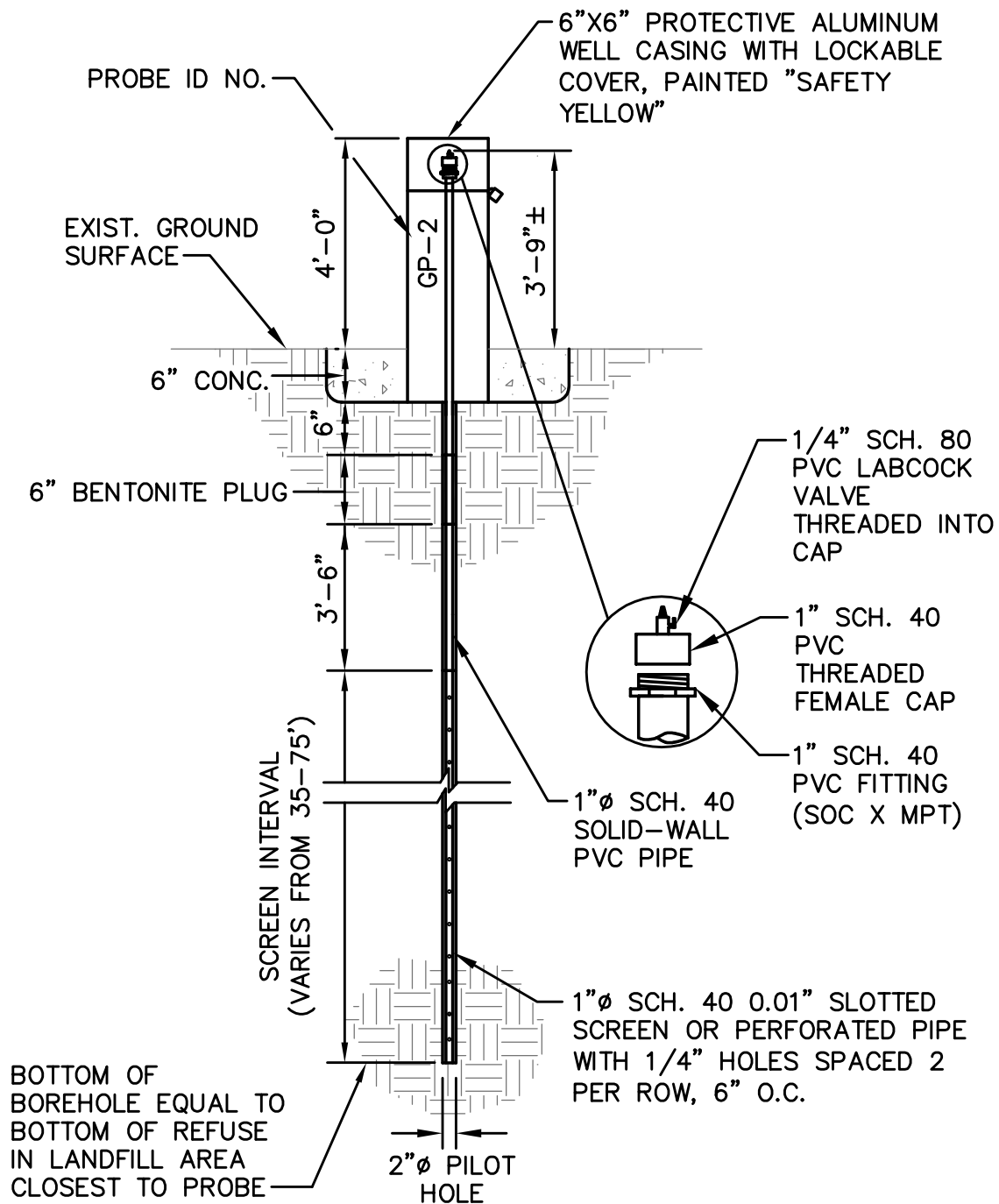
- EW-1 LFG EXTRACTION WELL
- EW-10 DOWNSLOPE LFG EXTRACTION WELL
- EW-8R REMOTE LFG EXTRACTION WELLHEAD
- HEADER/LATERAL
- CS-2 CONDENSATE SUMP
- MW-7 BACKGROUND WELLS
- MW-13 COMPLIANCE MONITORING WELL
- V-33 PASSIVE GAS VENT
- GV-06 PASSIVE GAS VENT (INSTALLED 2009)
- PZ-1 PIEZOMETERS
- MW-9 PIEZOMETERS
- GP-1 GAS PROBE
- W-7 LEACHATE CLEANOUT RISER WELLHEAD
- GP-21 NEW LFG PROBE (2017)
- MW-22 NEW GW MONITORING WELL (2017)

- NOTES:**
1. TOPOGRAPHIC CONTOURS PREPARED BY PICKETT SURVEYING, DATED 09/28/17.
 2. EXISTING LFG VENTS MAY NOT BE LABELED AS SHOWN.

FIGURE 9.1
MONITORING NETWORK
CITRUS COUNTY CENTRAL LANDFILL
CITRUS COUNTY, FLORIDA

LAST SAVED: 3/26/2018 2:57 PM BY: PUPSTILL PATH: N:\03860 CITRUS COUNTY\059 GCS\FIGURES\03860059FIG-MON-NET.DWG PLOTTED: 4/5/2018 11:48 AM BY: RUHANI BHUIA

G:\PROJECT\Citrus\09208040.03\Operations\PermitRenewal\Figures\084003\EG-Mon-Probe-Detail.DWG Dec 01, 2009 - 2:59pm Layout Name: Monitoring Probe Plan Br: 2378sda



SCS ENGINEERS

Figure 9-2. LFG Monitoring Probe Detail, Citrus County Central Landfill

APPENDIX A

LANDFILL GAS MONITORING **CITRUS COUNTY CENTRAL LANDFILL**

General Data

Date:		Sampler:	
Time:		Sky Conditions:	
Air Temperature (deg C):		Measuring Device:	

Sampling Data

Station I.D.	Date Sampled	Time Sampled	Depth of Intake (Feet)	O2 % Volume	CO2 % Volume	Methane		Station Type
						Peak Recorded Concentration as % LEL	Peak Recorded Concentration as % Volume	
GP-1			20					Gas Well
GP-1			40					Gas Well
GP-2			20					Gas Well
GP-2			40					Gas Well
GP-3			20					Gas Well
GP-3			40					Gas Well
GP-4			20					Gas Well
GP-4			40					Gas Well
GP-5			20					Gas Well
GP-5			40					Gas Well
GP-6			20					Gas Well
GP-6			40					Gas Well
GP-7			20					Gas Well
GP-7			40					Gas Well
GP-8			20					Gas Well
GP-8			40					Gas Well
GP-9			20					Gas Well
GP-9			40					Gas Well
GP-10			20					Gas Well
GP-10			40					Gas Well
GP-11			20					Gas Well
GP-11			40					Gas Well
GP-12			25					Gas Well
GP-12			50					Gas Well
GP-12			75					Gas Well
GP-13			25					Gas Well
GP-13			50					Gas Well
GP-13			75					Gas Well
GP-14			25					Gas Well
GP-14			50					Gas Well

LANDFILL GAS MONITORING **CITRUS COUNTY CENTRAL LANDFILL**

General Data

Date:		Sampler:	
Time:		Sky Conditions:	
Air Temperature (deg C):		Measuring Device:	

Sampling Data

Station I.D.	Date Sampled	Time Sampled	Depth of Intake (Feet)	O2 % Volume	CO2 % Volume	Methane		Station Type
						Peak Recorded Concentration as % LEL	Peak Recorded Concentration as % Volume	
GP-14			75					Gas Well
GP-15			25					Gas Well
GP-15			50					Gas Well
GP-15			75					Gas Well
GP-16			25					Gas Well
GP-16			50					Gas Well
GP-16			75					Gas Well
GP-17			25					Gas Well
GP-17			50					Gas Well
GP-17			75					Gas Well
GP-18			25					Gas Well
GP-18			50					Gas Well
GP-18			75					Gas Well
GP-19			25					Gas Well
GP-19			50					Gas Well
GP-19			75					Gas Well
GP-20			105					Gas Well
GP-21			115					Gas Well
GP-22			70					Gas Well
GP-23			100					Gas Well
GP-24			70					Gas Well
GP-25			100					Gas Well
GP-26			70					Gas Well
GP-27			100					Gas Well
GP-28			70					Gas Well
GP-29			100					Gas Well
GP-30			105					Gas Well
Admin Building			-					Structure
Mod Bldg			-					Structure
Shop			-					Structure

**LANDFILL GAS MONITORING
CITRUS COUNTY CENTRAL LANDFILL**

General Data

Date:		Sampler:	
Time:		Sky Conditions:	
Air Temperature (deg C):		Measuring Device:	

Sampling Data

						Methane		Station Type
Station I.D.	Date Sampled	Time Sampled	Depth of Intake (Feet)	O2 % Volume	CO2 % Volume	Peak Recorded Concentration as % LEL	Peak Recorded Concentration as % Volume	
Scale House			-					Structure
Treatment Facility			-					Structure
Firing Range			-					7 Structures
Haz Waste Drop off Center			-					4 Structures

**LANDFILL GAS MONITORING
CITRUS COUNTY CENTRAL LANDFILL**

General Data

Date:	Sampler:
Time:	Sky Conditions:
Air Temperature (deg C):	Measuring Device:

Sampling Data

Station I.D.	Time Sampled	O2 % Volume	CO2 % Volume	Methane		Station Type
				Peak Recorded Concentration as % LEL	Peak Recorded Concentration as % Volume	
MW-1R						GW Well
MW-2						GW Well
MW-3						GW Well
MW-5						GW Well
MW-6						GW Well
MW-7						GW Well
MW-8R						GW Well
MW-9						GW Well
MW-10						GW Well
MW-11						GW Well
MW-12						GW Well
MW-13						GW Well
MW-14						GW Well
MW-15						GW Well
MW-16						GW Well
MW-17						GW Well
MW-18						GW Well
MW-19						GW Well
MW-20						GW Well
MW-21						GW Well
MW-AA						GW Well
MW-B						GW Well
MW-E						GW Well
PZ-1						GW Well
PZ-2						GW Well

Appendix B

CITRUS COUNTY CENTRAL LANDFILL

GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM

CITRUS COUNTY, FLORIDA

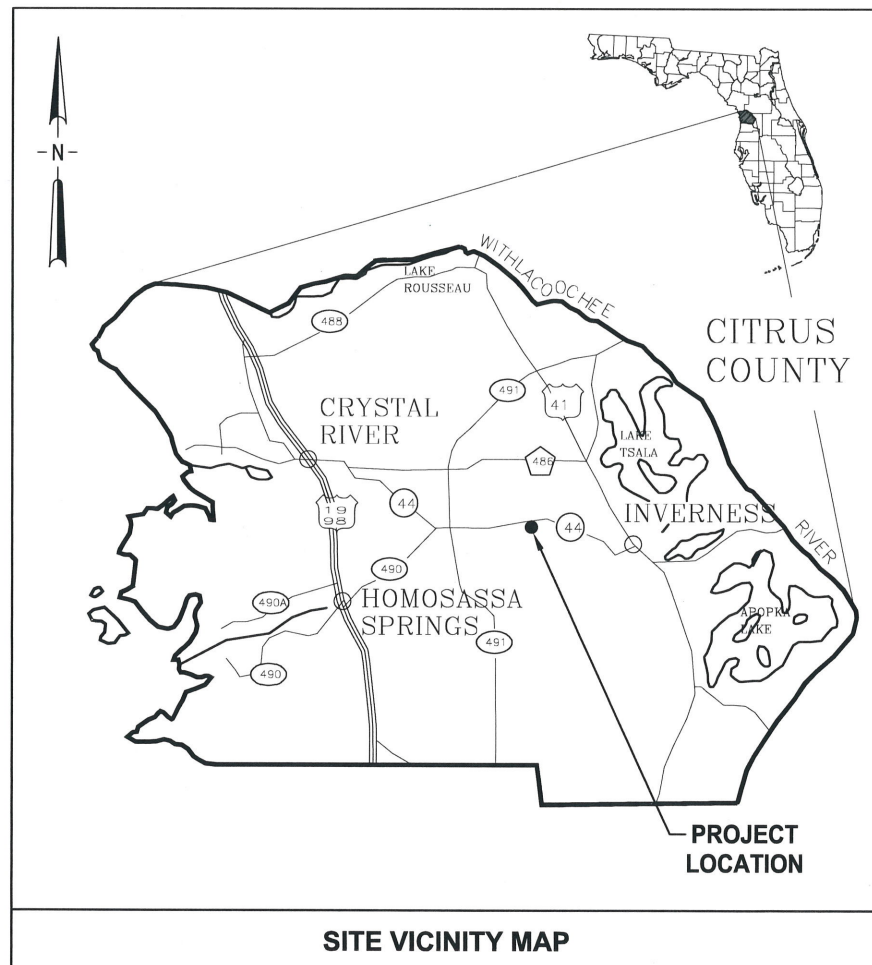
PREPARED FOR:
CITRUS COUNTY BOARD OF
COUNTY COMMISSIONERS



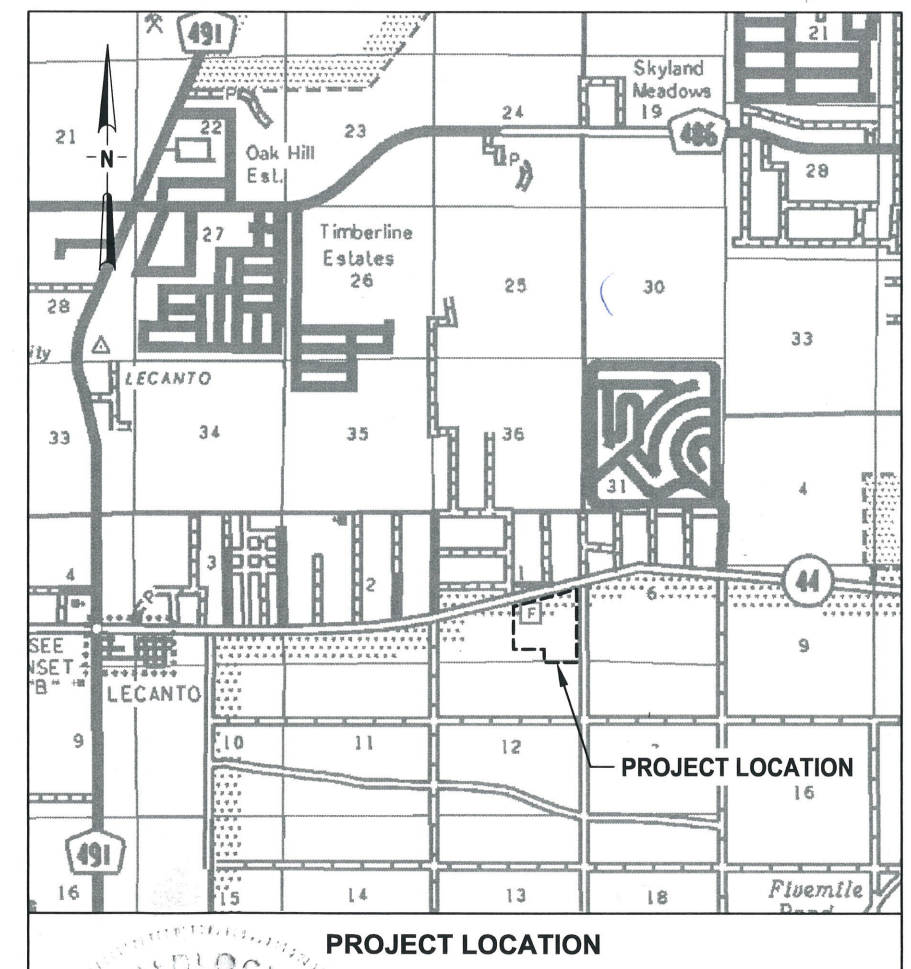
PREPARED BY:

JonesEdmunds

CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821



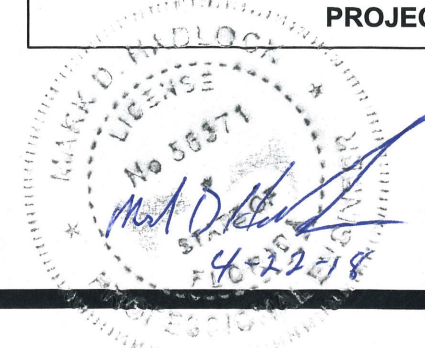
SITE VICINITY MAP



PROJECT LOCATION

PROJECT No: 03860-059-01

APRIL 2018



PERMIT

LEGEND

	EXISTING STORMWATER INLET		EW-1	EXISTING LFG EXTRACTION WELL
	EXISTING SPOT ELEVATION		EW-10	EXISTING DOWNSLOPE LFG EXTRACTION WELL
	EXISTING LIMITS OF WASTE		EW-8R	EXISTING REMOTE LFG EXTRACTION WELLHEAD
	EXISTING FORCE MAIN			EXISTING HEADER/LATERAL
	PROPOSED GAS COLLECTION PIPING		CS-2	EXISTING CONDENSATE SUMP
	OVERHEAD ELECTRIC SERVICE		MW-7	EXISTING BACKGROUND WELLS GROUNDWATER ELEVATION
	UNDERGROUND ELECTRIC		MW-13	EXISTING COMPLIANCE MONITORING WELL
	CLEAN SOIL		V-33	EXISTING PASSIVE GAS VENT
	EXISTING WASTE		GV-06	EXISTING PASSIVE GAS VENT (INSTALLED 2009)
			PZ-1	EXISTING PIEZOMETERS
			MW-9	EXISTING PIEZOMETERS
			GP-1	EXISTING GAS PROBE
			W-7	EXISTING LEACHATE CLEANOUT RISER WELLHEAD
			LCR-1	EXISTING LEACHATE COLLECTION RISER

ABBREVIATIONS

ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
DIA	DIAMETER
Ø	DIAMETER
EL	ELEVATION
ELB	ELBOW
GCCS	GAS COLLECTION AND CONTROL SYSTEM
HDPE	HIGH DENSITY POLYETHYLENE
LCRS	LEACHATE COLLECTION REMOVAL SYSTEM
LFG	LANDFILL GAS
MAX	MAXIMUM
MIN	MINIMUM
MNPT	MALE NATIONAL PIPE THREAD
MPT	MALE PIPE THREAD
MSW	MUNICIPAL SOLID WASTE
NTS	NOT TO SCALE
OC	ON CENTER(S)
OCEW	ON CENTER EACH WAY
OD	OUTSIDE DIAMETER
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
P.E.	PROFESSIONAL ENGINEER
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
RED	REDUCER
SCH	SCHEDULE
SDR	STANDARD DIMENSION RATIO
SS	STAINLESS STEEL
TBD	TO BE DETERMINED
THRD	THREADED
TYP	TYPICAL
W/	WITH
WWF	WELDED WIRE FABRIC

SITE HEALTH AND SAFETY NOTES

- THIS PROJECT INVOLVES WORK IN AND AROUND A CLOSED AND ACTIVE CLASS I LANDFILL. THE CONTRACTOR SHALL PROTECT ALL PERSONNEL FROM ALL HAZARDS ASSOCIATED WITH WORKING AT A LANDFILL, INCLUDING CONTACT WITH LEACHATE AND OTHER CONTAMINATED MEDIA, LANDFILL GASES, MICROBIOLOGICAL AIRBORNE CONTAMINANTS, DANGEROUS CHEMICALS, SHARP OBJECTS, AND OTHER HAZARDS (CHEMICAL, PHYSICAL, AND RADIOLOGICAL, ETC.). AT A MINIMUM, THE CONTRACTOR SHALL COMPLY WITH THE BEST MANAGEMENT PRACTICES AVAILABLE FROM THE SOLID WASTE ASSOCIATION OF NORTH AMERICA (SWANA). THE CONTRACTOR SHALL TAKE PRECAUTIONS NECESSARY TO ASSURE WORKER HEALTH AND SAFETY IN COMPLIANCE WITH OSHA CHAPTERS 1910 AND 1926 (SPECIFICALLY WITH 1910.120), AND OTHER APPLICABLE REGULATIONS. A HEALTH AND SAFETY PLAN SHALL BE PREPARED AND APPROVED PRIOR TO BEGINNING ANY WORK ON-SITE.
- THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT PERSONNEL FROM ASPHYXIATION, POISONING, EXPLOSION, AND/OR OTHER HAZARDS DUE TO THE PRESENCE OF LANDFILL GASES, LEACHATE, WASTE, ETC. THIS INCLUDES BUT IS NOT LIMITED TO A CONFINED SPACE MONITOR THAT IS CAPABLE OF DETECTING EXPLOSIVE CONDITIONS AND HYDROGEN SULFIDE.
- CONTRACTOR SHALL PROVIDE A HEALTH AND SAFETY SUPERVISOR ON-SITE DURING ALL PERIODS OF WORK.
- CONTRACTOR SHALL PROTECT EMPLOYEES FROM LANDFILL DISPOSAL OPERATIONS AND TRAFFIC FLOW OPERATING IN THE ACTIVE CLASS I LANDFILL. ALL EMPLOYEES SHALL WEAR ORANGE PROTECTIVE VESTS AT ALL TIMES WHEN WORKING WITHIN THE LIMITS OF THE ACTIVE LANDFILL.
- THE HEALTH AND SAFETY PLAN WILL BE MAINTAINED ON-SITE AT ALL TIMES. ALL EMPLOYEES INCLUDING SUBCONTRACTORS ARE REQUIRED TO BE FAMILIAR WITH THE PLAN AND SIGN THAT THEY HAVE RECEIVED AND REVIEWED THE PLAN AND THAT THEY WILL ABIDE BY IT.

DEWATER PUMP AND ACCESSORIES
PRODUCT AND MATERIALS SPECIFICATIONS

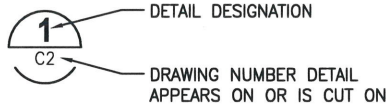
- SHORT AP4 PLUS BOTTOM LOADING AUTOPUMP
 - CONTROLLERLESS PNEUMATIC OPERATION
 - FULLY AUTOMATIC AIR-ON-DEMAND PERFORMANCE
 - BOTTOM LOADING INTAKE
 - 3" EXTENDED STAINLESS STEEL FLUID INLET SCREEN
 - STAINLESS STEEL DISCHARGE CHECK VALVE
 - FRP CASING
 - STAINLESS STEEL SUPPORT HARNESS
 - FITS INSIDE A 4" ID (100 MM) WELL OR LARGER
 - EXPANDED 5-YEAR PARTS & LABOR WARRANTY
- AP4 AUTOPUMP STAINLESS STEEL EASY-FITTINGS KIT FOR NYLON TUBING
 - EASY-FITTINGS INSTALLED ON AP4 PUMP
 - 1/2" OD PUMP AIR SUPPLY TUBING
 - 5/8" OD PUMP AIR EXHAUST TUBING
 - 1" OD PUMP FLUID DISCHARGE TUBING
 - INCLUDES CLAMPS FOR TUBING AND EXHAUST DEFLECTOR
 - CAN BE USED WITH EITHER SINGLE OR JACKETED TUBING
- FILTER/REGULATOR AND CYCLE COUNTER
 - WITH 3 PIGTAIL WITH BRASS QUICK-CONNECT SOCKET AND PLUG FOR AIR IN AND BRASS QUICK-CONNECT SOCKET FOR AIR OUT (REQUIRES BRACKET). NOTE: IF THE DISTANCE FROM THE CUSTOMER'S AIR SUPPLY LINE TO THE FILTER/REGULATOR (NORMALLY MOUNTED AT THE WELL HEAD) IS GREATER THAN 3', A CUSTOM PIGTAIL LENGTH WILL BE REQUIRED.
- DUAL-EXTRACTION 8" WELL CAP FOR 2" GAS PIPE (INCLUDES 8" FERNCO SLEEVE, 4 x 2 REDUCING FERNCO
 - PUMP SUPPORT LINE EYEBOLT PASS THROUGH COMPRESSION FITTINGS FOR 1", 5/8", AND 1/2" OD TUBES, FILTER/REGULATOR BRACKET AND 2 SPARE PLUGGED HOLES (3/4" NPT) FOR LEVEL MEASUREMENT OPTIONS
- NYLON 12 PUMP JACKETED TUBING BUNDLE INCLUDES:
 - 1/2" OD AIR SUPPLY TUBING
 - 5/8" OD EXHAUST TUBING
 - 1" OD DISCHARGE TUBING
- EASY LEVEL-HIGH LEVEL INDICATOR
- QED ELECTRIC TOPDRIVE PUMP
 - PUMP MODEL LEP 1507-E
 - 120V ELECTRIC DRIVE ASSEMBLY
 - BOTTOM LOADING INTAKE
 - 3/4" OD DISCHARGE TUBING
 - SEAL ASSEMBLY BUNA-N
 - ON-OFF CYCLE TIMER, WIRELESS INTERFACE
 - FITS INSIDE A 6" ID WELL CASING OR LARGER
 - 2 YEAR MANUFACTURER WARRANTY

TEMPORARY GAS WELL DEWATERING NOTES

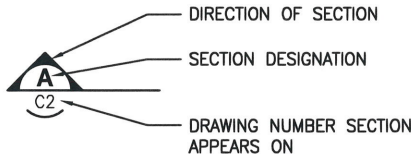
- FOR THE DURATION OF THE PROJECT, PROVIDE COMPRESSED AIR DEWATERING PUMP SYSTEM TO PUMP DOWN LIQUID LEVELS IN GAS WELLS V-A, V-7, V-8, V-21, V-23, GV-1, GV-2, GV-3, GV-5 AND GV-6 (SEE C4).
- PROVIDE A MINIMUM OF 2 PUMP SYSTEMS TO BE MOVED BETWEEN WELLS TO KEEP LIQUID LEVELS LOW (SEE C4).
- DISCHARGE LIQUIDS INTO LCR-1 OR LCR-2 (SEE C4).
- PROVIDE WRITTEN LIQUID LEVEL MEASUREMENTS IN EACH OF THE LISTED WELLS ONCE PER WEEK.

DRAWING INDEX

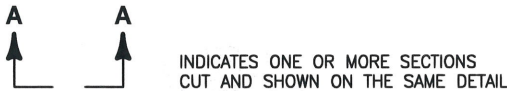
DWG	DESCRIPTION
GENERAL	
G1	COVER
G2	LEGEND, ABBREVIATIONS, GENERAL NOTES, AND DRAWING INDEX
G3	GENERAL NOTES
CIVIL	
C1	EXISTING CONDITIONS PLAN
C2	GCCS EXPANSION DEMOLITION PLAN
C3	GCCS EXPANSION PLAN
C4	GAS MIGRATION CONTROL PLAN
C5	GAS DEMOLITION DETAILS
C6	GAS DEMOLITION DETAILS
C7	GAS DETAILS
C8	GAS DETAILS
C9	GAS DETAILS
C10	GAS DETAILS
C11	GAS DETAILS
C12	GAS DETAILS
C13	GAS MIGRATION CONTROL DETAILS
C14	GAS MIGRATION CONTROL DETAILS
C15	GAS MIGRATION CONTROL DETAILS
C16	GAS MIGRATION CONTROL DETAILS



DETAIL DESIGNATION



SECTION DESIGNATION



SECTION DESIGNATION

LTR.	DATE	REVISIONS	BY	APPRD.	CHECKED

DESIGNED MHADLOCK

DRAWN PUPSTILL

CHECKED CSAWYER



CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA

LEGEND, ABBREVIATIONS, GENERAL
NOTES, AND DRAWING INDEX

CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY	APR 2018	03860-059-01
MARK D. HADLOCK	SCALE	DWG. NO.
P.E. # 56871	NONE	G2

GENERAL NOTES

- SURVEY PROVIDED BY PICKETT AND ASSOCIATES, INC.
- CONSTRUCTION MONUMENTS FOR VERTICAL AND HORIZONTAL CONTROL HAVE BEEN PROVIDED AT THE PROJECT SITE. THE CONTRACTOR SHALL VERIFY THE ACCURACY OF THESE MONUMENTS TO HIS/HER OWN SATISFACTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROPER VERTICAL AND HORIZONTAL ALIGNMENT OF CONSTRUCTED FACILITIES AND FINISHED GRADE.
- ANY NATIONAL GEODETIC VERTICAL DATUM 1988 (NGVD88) MONUMENT WITHIN THE LIMITS OF CONSTRUCTION SHALL BE PROTECTED. IF IN DANGER OF DAMAGE, THE CONTRACTOR SHALL NOTIFY:

FLORIDA STATE GEODETIC ADVISOR

RONNIE L. TAYLOR
NOAA, NATIONAL GEODETIC SURVEY
NATIONAL OCEAN SERVICE ADVISOR
C/O BUREAU OF SURVEYS AND MAPPING, FLDEP
3900 COMMONWEALTH BLVD, MAIL STOP 105
TALLAHASSEE, FL 32399
TELEPHONE: (850)245-2610
FAX: (850)245-2545
E-MAIL: Ronnie.Taylor@noaa.gov

IN THE EVENT THAT MR TAYLOR IS UNAVAILABLE, CONTACT:

ASSISTANT GEODETIC ADVISOR

RANDY WEGNER
NOAA, NATIONAL GEODETIC SURVEY
ASSISTANT NATIONAL OCEAN SERVICE ADVISOR
BUREAU OF SURVEYS AND MAPPING
3900 COMMONWEALTH BLVD, MAIL STOP 105
TALLAHASSEE, FL 32399
TELEPHONE: (850)245-2606
E-MAIL: Randy.Wegner@dep.state.fl.us
- THE CONTRACTOR SHALL PROVIDE A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF FLORIDA TO ESTABLISH THE CONSTRUCTION SITE LAYOUT, PERFORM TOPOGRAPHIC SURVEYS, AND PERFORM ALL OTHER REQUIRED SURVEYING SERVICES. ALL SURVEYS SHALL BE SIGNED AND SEALED BY REGISTERED SURVEYOR.
- LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN TO THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THESE PLANS. THE CONTRACTOR SHALL VERIFY, PRIOR TO CONSTRUCTION, THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES (WHETHER OR NOT SHOWN ON THE PLANS) AFFECTING THEIR OWN WORK.
- THE CONTRACTOR SHALL VERIFY ALL CLEARANCES PRIOR TO CONSTRUCTION.
- THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY WHEN CONFLICTS BETWEEN DRAWINGS AND ACTUAL CONDITIONS ARE DISCOVERED.
- FIELD CONDITIONS MAY NECESSITATE SLIGHT ALIGNMENT AND GRADE DEVIATION OF THE PROPOSED CONSTRUCTION TO AVOID OBSTACLES, AS ORDERED BY THE ENGINEER. THE CONTRACTOR SHALL CONSTRUCT THE PROPOSED FACILITIES TO THE ORDERED DEVIATION WITHOUT INCREASE IN THE CONTRACT PRICE OR TIME.
- THE CONTRACTOR SHALL PROVIDE AT LEAST 48 HOURS NOTICE TO THE VARIOUS UTILITY COMPANIES IN ORDER TO PERMIT THE LOCATION OF EXISTING UNDERGROUND UTILITIES IN ADVANCE OF CONSTRUCTION. CONTACT SUNSHINE STATE ONE CALL AT 1-800-432-4770.
- THE CONTRACTOR SHALL BE AWARE THAT THERE MAY BE SOME UTILITY CONFLICTS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE AND PROTECT ANY AND ALL EXISTING UTILITIES ON THIS PROJECT WITHOUT INCREASE IN THE CONTRACT PRICE OR TIME.
- THE INFORMATION PROVIDED IN THESE PLANS IS SOLELY TO ASSIST THE CONTRACTOR IN ASSESSING THE NATURE AND EXTENT OF THE CONDITIONS WHICH MAY BE ENCOUNTERED DURING THE COURSE OF WORK. ALL CONTRACTORS ARE DIRECTED, PRIOR TO BIDDING, TO CONDUCT WHATEVER INVESTIGATIONS THEY MAY DEEM NECESSARY TO ARRIVE AT THEIR OWN CONCLUSIONS REGARDING THE ACTUAL CONDITIONS THAT WILL BE ENCOUNTERED, AND UPON WHICH THEIR BIDS SHALL BE BASED.
- _____, C/L, & * ARE EXAMPLES OF DRAWING ELEMENTS WHICH HAVE BEEN SCREENED/SHADOWED TO INDICATE EXISTING CONDITIONS.

- THE CONTRACTOR SHALL BE AWARE THAT THE CONSTRUCTION SITE IS AN ACTIVE LANDFILL AND THAT LANDFILL GAS MAY MIGRATE ONTO THE CONSTRUCTION SITE. THE CONTRACTOR SHALL TAKE PROVEN MEANS TO PROTECT PERSONNEL AND FACILITIES FROM RELATED HAZARDS, INCLUDING EXPLOSION, ASPHYXIATION, AND POISONING DUE TO THE PRESENCE OF LANDFILL GASES.
- THE CONTRACTOR SHALL NOT INTERFERE WITH FACILITY OPERATIONS. THE CONTRACTOR SHALL COORDINATE WITH AND NOTIFY THE OWNER A MINIMUM OF 48 HOURS IN ADVANCE OF ALL PLANNED UTILITY OUTAGES AND ROAD CROSSINGS.
- THE CONTRACTOR SHALL TAKE WHATEVER MEANS NECESSARY TO PROTECT GROUNDWATER MONITORING AND GAS EXTRACTION WELLS FROM DAMAGE DURING CONSTRUCTION. THE CONTRACTOR SHALL REPAIR OR REPLACE GROUNDWATER MONITORING AND GAS EXTRACTION WELLS DAMAGED DURING CONSTRUCTION WITH LIKE MATERIALS AND CONSTRUCTION METHODS AS APPROVED BY THE ENGINEER AND FDEP WITHOUT INCREASE IN THE CONTRACT PRICE OR TIME TO THE OWNER'S SATISFACTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY SHOULD DAMAGE OCCUR TO ANY GROUNDWATER MONITORING WELLS OR GAS EXTRACTION WELLS.
- THE CONTRACTOR SHALL PREVENT DISTURBANCE TO AND UNDERMINING OF ADJACENT STRUCTURES, SLABS, PIPING, LINERS, AND OTHER UTILITIES OR FACILITIES DURING CONSTRUCTION.
- THE CONTRACTOR SHALL REPLACE ALL EXISTING PAVING, STABILIZED EARTH, CURBS, DRIVEWAYS, FENCES, GRASSING, SIGNS, LINERS, AND OTHER IMPROVEMENTS WITH SAME TYPE OF MATERIAL THAT WAS REMOVED DURING CONSTRUCTION OR AS DIRECTED BY THE ENGINEER TO EQUAL OR BETTER CONDITION WITHOUT INCREASE IN THE CONTRACT PRICE OR TIME TO THE OWNER'S SATISFACTION.
- THE CONTRACTOR SHALL COMPLY WITH ALL TERMS, CONDITIONS, AND REQUIREMENTS OF ALL APPLICABLE PERMITS, INCLUDING FDEP, EPA, AND WATER MANAGEMENT DISTRICT PERMITS FOR THE SITE. ALL PERMITS OBTAINED BY THE OWNER WILL BE AVAILABLE TO THE CONTRACTOR FOR EXAMINATION.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BECOME FAMILIAR WITH THE OSHA EXCAVATION SAFETY STANDARDS AND TO ABIDE BY THEM AS COVERED UNDER THE MOST CURRENT VERSION OF THE FLORIDA TRENCH SAFETY ACT.
- THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ENVIRONMENTAL PROTECTION DURING THE LIFE OF THE CONTRACT. THE CONTRACTORS' OPERATIONS SHALL COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS, INCLUDING THOSE PERTAINING TO WATER, AIR, SOLID WASTE, HAZARDOUS WASTE, HAZARDOUS MATERIALS, OILY SUBSTANCES, AND NOISE POLLUTION. THE CONTRACTOR SHALL IMPLEMENT EROSION AND SEDIMENTATION CONTROL MEASURES AS NECESSARY TO COMPLY WITH THESE REGULATIONS FOR BOTH TEMPORARY AND PERMANENT CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING STORMWATER RUNOFF, SOLID WASTE, LANDFILL GAS, AND LEACHATE FROM ENTERING OR IMPACTING THE AREAS OF THE WORK. THE CONTRACTOR SHALL INSTALL AND MAINTAIN MANAGEMENT AND CONTROL DEVICES INCLUDING DIVERSION/COLLECTION BERMS, DITCHES, PUMPING STATIONS, WALLS, LINERS, ETC. TO COMPLY WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS WITHOUT INCREASE IN THE CONTRACT PRICE OR TIME.
- WASTE EXCAVATED DURING WELL CONSTRUCTION SHALL BE TRANSPORTED BY END OF WORK DAY TO THE LANDFILL ACTIVE FILLING AREA AS DIRECTED BY THE COUNTY.
- STORMWATER SHALL BE DIRECTED AROUND THE WELL DURING CONSTRUCTION AND WASTE EXCAVATED DURING CONSTRUCTION SHALL NOT BE ALLOWED TO BE IN CONTACT WITH STORMWATER OUTSIDE THE ACTIVE FILLING AREA.
- INTERMEDIATE COVER SHALL BE REPLACED IN ACCORDANCE WITH FDEP RULE 62-701.500(7)(G) IN ALL AREAS WHEN THE COVER IS DISTURBED.
- THE CONTRACTOR SHALL MAINTAIN A CLEAR PATH FOR ALL SURFACE WATER DRAINAGE STRUCTURES AND DITCHES DURING ALL PHASES OF CONSTRUCTION AND SHALL USE FDEP AND WATER MANAGEMENT DISTRICT APPROVED CONSTRUCTION TECHNIQUES TO MANAGE STORMWATER SUCH THAT THE IMPACT TO CONSTRUCTION AND LANDFILL OPERATIONS IS MINIMIZED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF DAMAGE DUE TO STORMWATER RUNOFF WITHIN THE LIMITS OF CONSTRUCTION OR DISTURBANCE.
- FDOT INDICES SHALL REFER TO THE "2014 FLORIDA DEPARTMENT OF TRANSPORTATION ROADWAY AND TRAFFIC DESIGN STANDARDS."
- THE CONTRACTOR SHALL PROVIDE CONTROL AND MAINTENANCE OF TRAFFIC IN ACCORDANCE WITH FDOT INDEX 600 THROUGH 665, OSHA, AND OTHER APPLICABLE REGULATORY REQUIREMENTS AND AS NECESSARY TO PROVIDE FOR SITE SAFETY DURING CONSTRUCTION.

LANDFILL GAS SYSTEM CONSTRUCTION NOTES

- THE LANDFILL GAS COLLECTION WELLFIELD SHALL REMAIN ACTIVE THROUGHOUT THE DURATION OF THE CONSTRUCTION CONTRACT.
- ALL ACTIVITIES THAT WILL OR HAVE THE POTENTIAL TO INTERRUPT GAS FLOW OR ALLOW AIR INTO THE GCCS, HOWEVER BRIEF, MUST BE SCHEDULED WITH THE OWNER AND ENGINEER IN ADVANCE.
- ALL UNSCHEDULED INTERRUPTIONS OF THE GCCS, HOWEVER BRIEF, MUST BE REPORTED TO THE OWNER AND ENGINEER AND CORRECTED IMMEDIATELY.
- VENTING OF UNCOMBUSTED LFG FOR MORE THAN 1 HOUR IS NOT PERMITTED AND MUST BE REPORTED TO THE OWNER AND ENGINEER AND CORRECTED IMMEDIATELY.
- ALL PREPARATION WORK MUST BE COMPLETED PRIOR TO THE COORDINATED SCHEDULED OUTAGE OF THE GCCS SO THAT THE WORK CAN BE ACCOMPLISHED WITH MINIMAL INTERRUPTION TO GCCS.
- PROVIDE TEMPORARY FITTINGS AND PIPING AS NEEDED TO MAINTAIN THE GCCS AND AIR SUPPLY IN SERVICE.
- CAP ALL ABANDONED LINES AND GAS WELLS WITH FUSION FITTINGS FOR HDPE AND GLUED WITH SCREWS FOR PVC.
- ALL MISCELLANEOUS METAL PARTS WILL BE 316 SS UNLESS OTHERWISE NOTED.
- HORIZONTAL AND VERTICAL FIELD ADJUSTMENTS WILL BE MADE TO PROVIDE THE NECESSARY ALIGNMENT, ELEVATION AND SLOPE WITHOUT ADDITIONAL COMPENSATION.
- HDPE GAS COLLECTION AND CONDENSATE RETURN PIPE WILL BE SDR 17, UNLESS OTHERWISE NOTED.
- HDPE COMPRESSED AIR PIPE WILL BE SDR 9 UNLESS OTHERWISE NOTED.
- ALL SOLID HDPE PIPING WILL BE PLACED AND BACKFILLED WITH 12" MINIMUM CLEAN SOIL ALL DIRECTIONS.
- CONSTRUCTION DETAILS FOR TWO SEPARATE PROJECTS ARE CONTAINED IN THIS DRAWING SET. THE CITRUS COUNTY CENTRAL CLASS I LANDFILL IS AN ACTIVE MUNICIPAL SOLID WASTE LANDFILL THAT INCLUDES AN ACTIVE CLASS I LANDFILL AREA TO THE EAST AND CLOSED CLASS I LANDFILL AREA TO THE WEST.
 - THE GCCS EXPANSION PROJECT IS LOCATED AT THE ACTIVE CLASS I LANDFILL (PHASE 1/1A, 2, AND 3).
 - THE GAS MIGRATION CONTROL PROJECT IS LOCATED AT THE CLOSED 7-ACRE LANDFILL AREA AND CLOSED 24-ACRE LANDFILL AREA B.

DEMOLITION NOTES

- AS-BUILT SURVEY INFORMATION OF THE PHASE 1/1A AND 2 GAS COLLECTION AND CONTROL SYSTEM AND CLOSED 7-ACRE RECLOSURE AREA PREPARED BY BBLs SURVEYORS AND MAPPERS, INC., DATED MAY 10, 2010.
- CONTRACTOR SHALL REMOVE ALL EQUIPMENT UP TO 3-FT MINIMUM BELOW GRADE. FOR EQUIPMENT INSTALLED MORE THAN 3-FT BELOW GRADE CONTRACTOR MAY CAP AND ABANDON IN PLACE.
- CONTRACTOR SHALL PROVIDE TO COUNTY ALL EQUIPMENT REMOVED FROM EXISTING STRUCTURES INCLUDING WELLHEAD, PUMPS, AND FITTINGS.

LTR.	DATE	REVISIONS	BY	APPRD.	CHECKED

DESIGNED MHADLOCK

DRAWN PUPSTILL

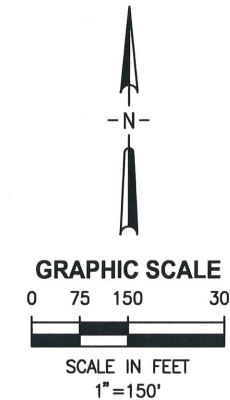
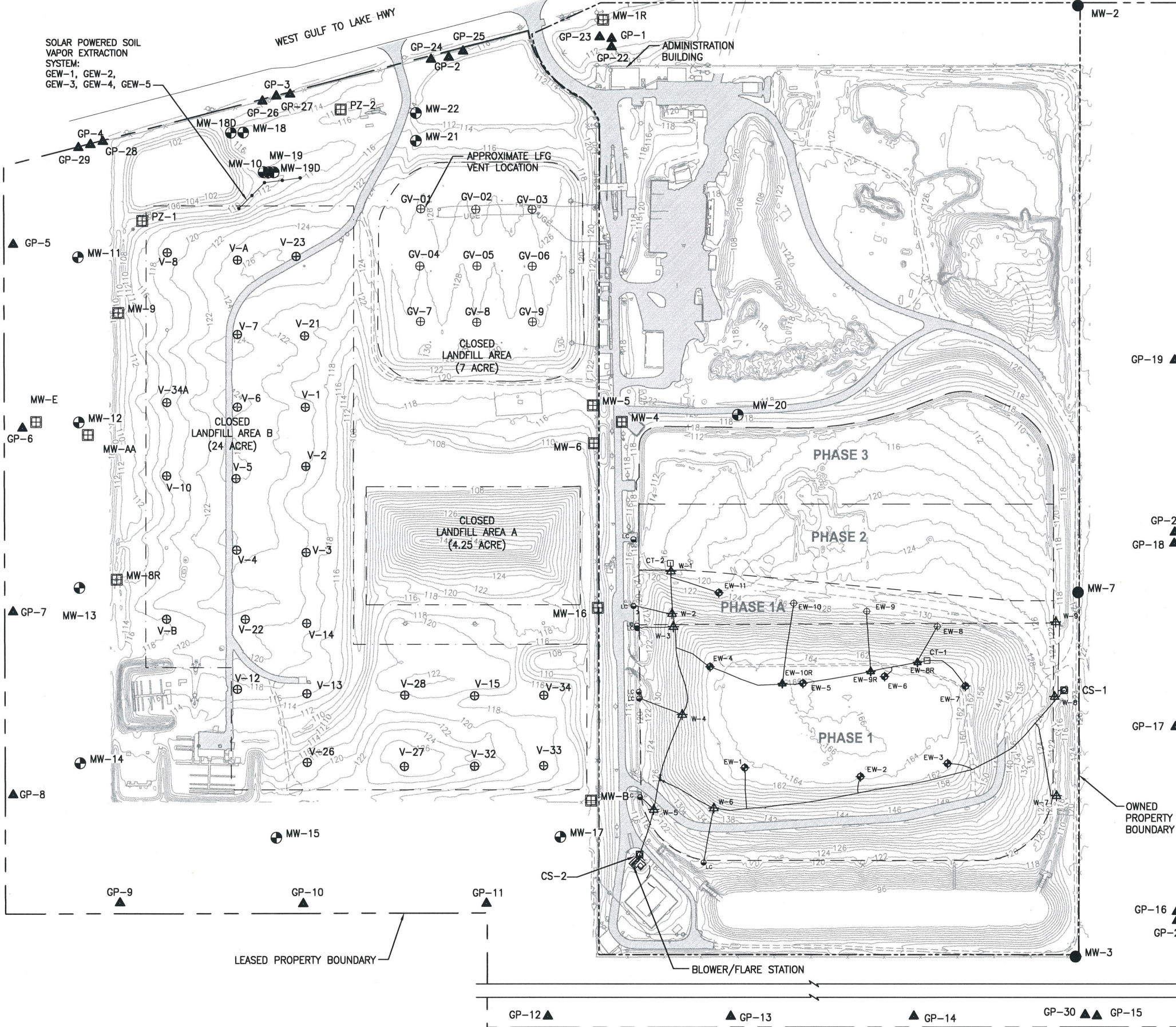
CHECKED CSAWYER



CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA

GENERAL NOTES

CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY	APR 2018	03860-059-01
MARK D. HADLOCK	SCALE	DWG. NO.
P.E. #56871	NONE	G3



LEGEND

- EW-1 EXISTING LFG EXTRACTION WELL
- EW-10 EXISTING DOWNSLOPE LFG EXTRACTION WELL
- EW-8R EXISTING REMOTE LFG EXTRACTION WELLHEAD
- W-1 EXISTING LEACHATE CLEANOUT RISER WELLHEAD
- EXISTING LFG PIPING
- CS-2 EXISTING CONDENSATE SUMP
- CT-1 EXISTING CONDENSATE TRAP
- LC EXISTING LEACHATE CLEANOUT
- MW-7 EXISTING BACKGROUND GROUNDWATER MONITORING WELL
- MW-13 EXISTING COMPLIANCE GROUNDWATER MONITORING WELL
- V-33 EXISTING PASSIVE LFG VENT
- GV-06 EXISTING PASSIVE LFG VENT (INSTALLED 2009)
- PZ-1 EXISTING PIEZOMETER
- MW-9 EXISTING PIEZOMETER
- GP-1 EXISTING GAS PROBE
- W-7 EXISTING LEACHATE CLEANOUT RISER WELLHEAD

- NOTES:
- TOPOGRAPHIC CONTOURS PREPARED BY PICKETT SURVEYING, DATED 09/28/17.
 - EXISTING LFG VENTS LABELING MAY VARY IN THE FIELD.
 - AS-BUILT INFORMATION OF EXISTING SYSTEM PREPARED BY BBLS SURVEYORS AND MAPPERS, INC. DATED MAY 10, 2010.

PERMIT

SAVED: 1/3/2018 3:29 PM PUPSTILL \\JECAD\DRAWING\03860 CITRUS COUNTY\059 GCCS\CONTRACT DRAWINGS\CIVIL\03860059-C01.DWG

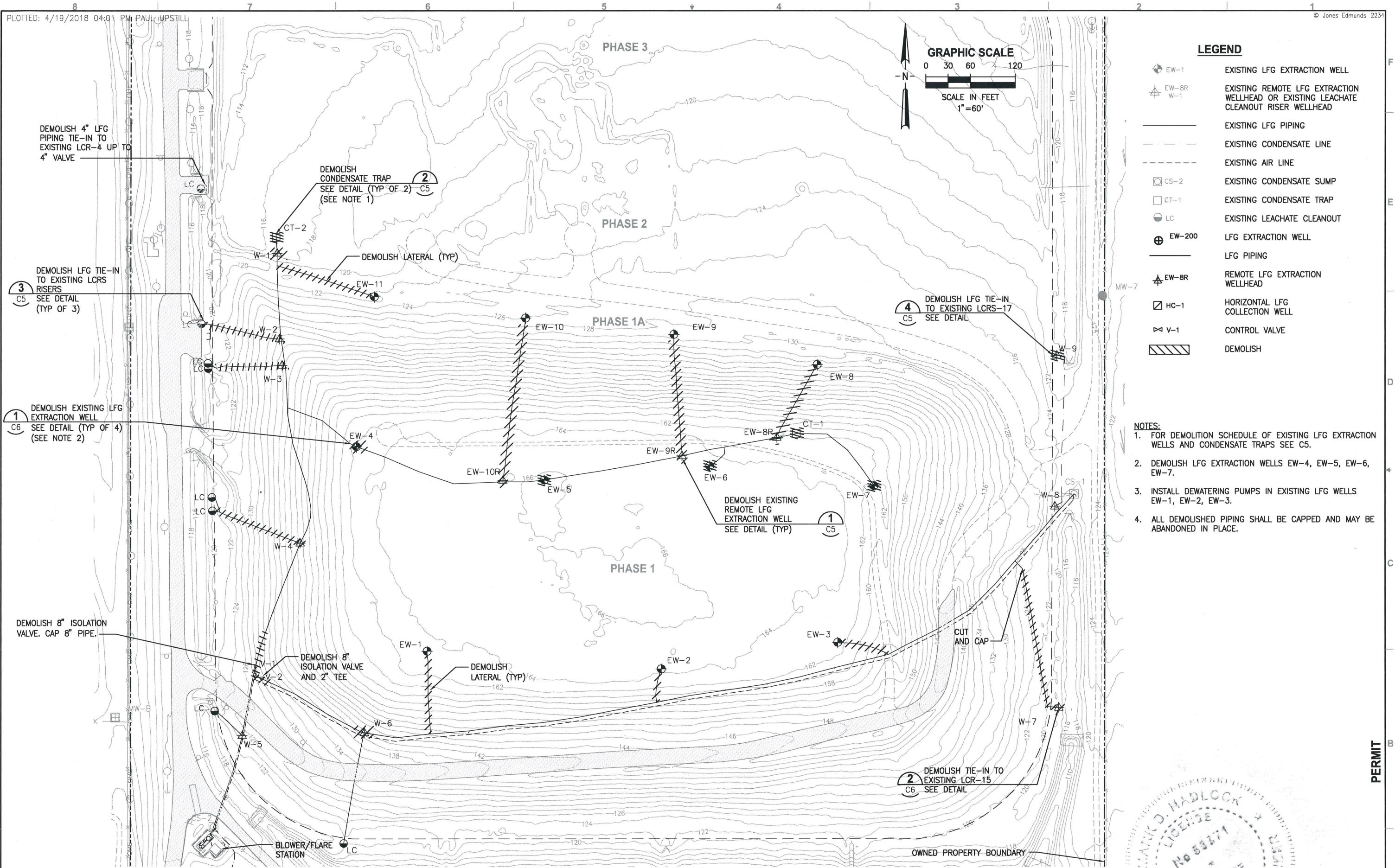
A						DESIGNED	<u>MHADLOCK</u>
						DRAWN	<u>PUPSTILL</u>
						CHECKED	<u>CSAWYER</u>
	LTR.	DATE	REVISIONS		BY	APPRD.	

JonesEdmunds
 CERTIFICATE OF AUTHORIZATION #1841
 730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA

EXISTING CONDITIONS PLAN

CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY	APR 2018	03860-059-01
MARK D. HADLOCK	SCALE	DWG. NO.
P.E. # 56871	AS NOTED	C1



LEGEND

- EW-1 EXISTING LFG EXTRACTION WELL
- EW-8R W-1 EXISTING REMOTE LFG EXTRACTION WELLHEAD OR EXISTING LEACHATE CLEANOUT RISER WELLHEAD
- EXISTING LFG PIPING
- EXISTING CONDENSATE LINE
- EXISTING AIR LINE
- CS-2 EXISTING CONDENSATE SUMP
- CT-1 EXISTING CONDENSATE TRAP
- LC EXISTING LEACHATE CLEANOUT
- EW-200 LFG EXTRACTION WELL
- LFG PIPING
- EW-8R REMOTE LFG EXTRACTION WELLHEAD
- HC-1 HORIZONTAL LFG COLLECTION WELL
- V-1 CONTROL VALVE
- DEMOLISH

NOTES:

- FOR DEMOLITION SCHEDULE OF EXISTING LFG EXTRACTION WELLS AND CONDENSATE TRAPS SEE C5.
- DEMOLISH LFG EXTRACTION WELLS EW-4, EW-5, EW-6, EW-7.
- INSTALL DEWATERING PUMPS IN EXISTING LFG WELLS EW-1, EW-2, EW-3.
- ALL DEMOLISHED PIPING SHALL BE CAPPED AND MAY BE ABANDONED IN PLACE.

PERMIT

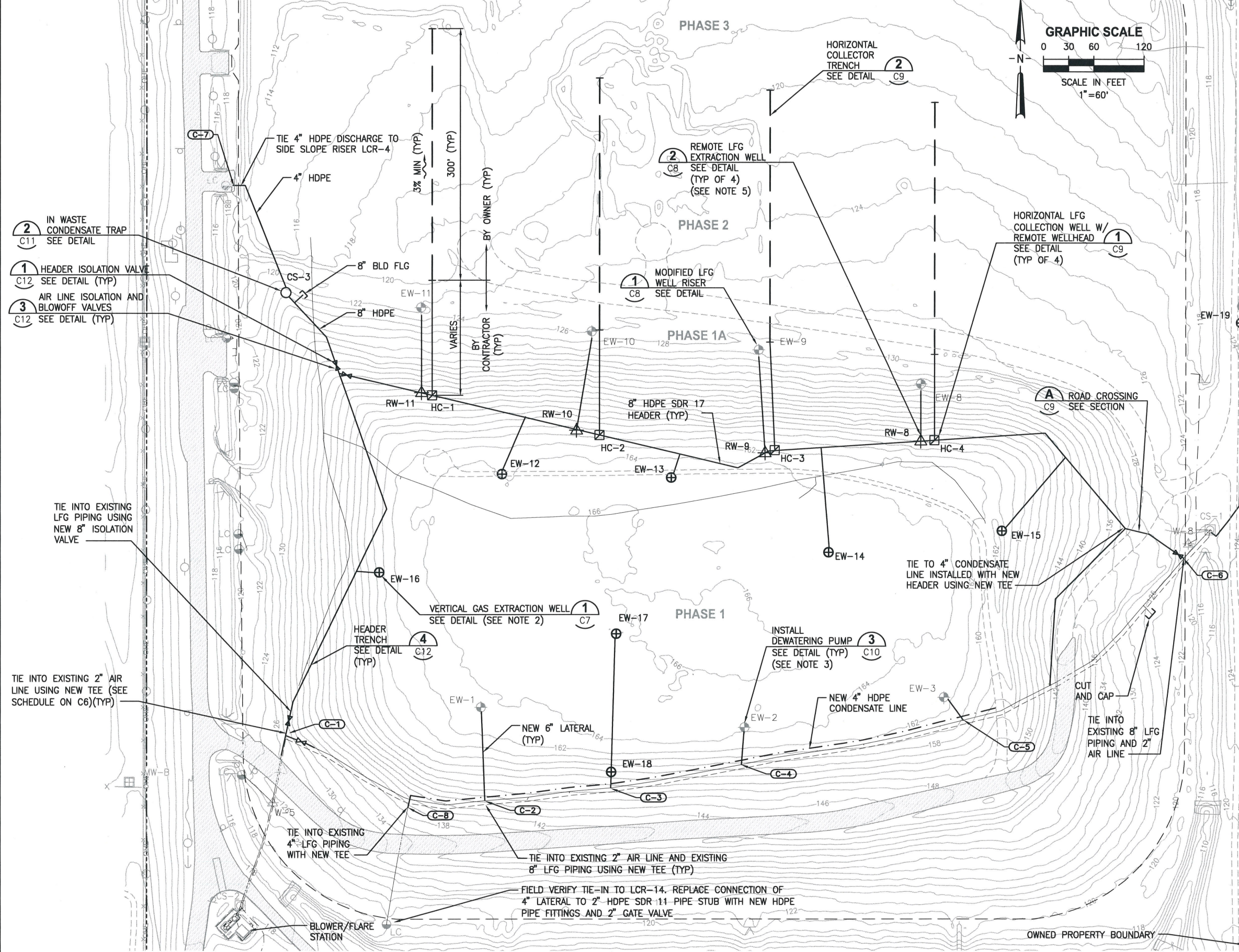
						DESIGNED	<u>MHADLOCK</u>
						DRAWN	<u>PUPSTILL</u>
						CHECKED	<u>CSAWYER</u>
LTR.	DATE	REVISIONS			BY	APPRD.	

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

**CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA**

GCCS EXPANSION DEMOLITION PLAN

CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY	APR 2018	03860-059-01
MARK D. HADLOCK	SCALE	DWG. NO.
P.E. # 56871	AS NOTED	C2



LEGEND

- EW-1 EXISTING LFG EXTRACTION WELL
- EW-8R W-1 EXISTING REMOTE LFG EXTRACTION WELLHEAD OR EXISTING LEACHATE CLEANOUT RISER WELLHEAD
- EXISTING LFG PIPING
- EXISTING CONDENSATE LINE
- EXISTING AIR LINE
- CS-2 EXISTING CONDENSATE SUMP
- CT-1 EXISTING CONDENSATE TRAP
- LC EXISTING LEACHATE CLEANOUT
- EW-15 LFG EXTRACTION WELL
- LFG PIPING
- RW-10 REMOTE LFG EXTRACTION WELLHEAD
- HC-1 HORIZONTAL LFG COLLECTION WELL
- CONTROL VALVE
- 2" HDPE COMPRESSED AIR LINE
- 4" HDPE CONDENSATE LINE
- C-2 CONNECTIONS

NOTES:

- DEWATERING PUMPS TO BE INSTALLED IN EXISTING LFG WELLS EW-1, EW-2, EW-3.
- INSTALL 8" ISOLATION CONTROL VALVE AS SHOWN. CO-LOCATE COMPRESSED AIR VALVES SAME LOCATION AS 8" HEADER ISOLATION VALVES.
- INCLUDE 2" COMPRESSED AIR AND 4" CONDENSATE LINE WITH ALL NEW PIPE UP TO EACH WELLHEAD.
- MAINTAIN 5% MINIMUM SLOPE ON PIPING UNLESS OTHERWISE STATED.
- COVER ALL NEW PIPE AS REQUIRED. (4) C12

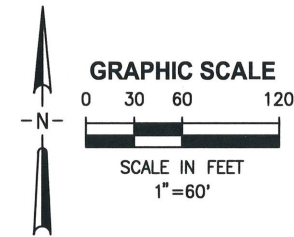
						DESIGNED	<u>MHADLOCK</u>
						DRAWN	<u>PUPSTILL</u>
						CHECKED	<u>CSAWYER</u>
LTR.	DATE	REVISIONS			BY	APPRD.	

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA

GCCS EXPANSION PLAN

CERTIFICATE OF AUTHORIZATION #1841 APPROVED BY MARK D. HADLOCK P.E. # 56871	DATE APR 2018	PROJECT NO. 03860-059-01
SCALE AS NOTED	DWG. NO. C3	

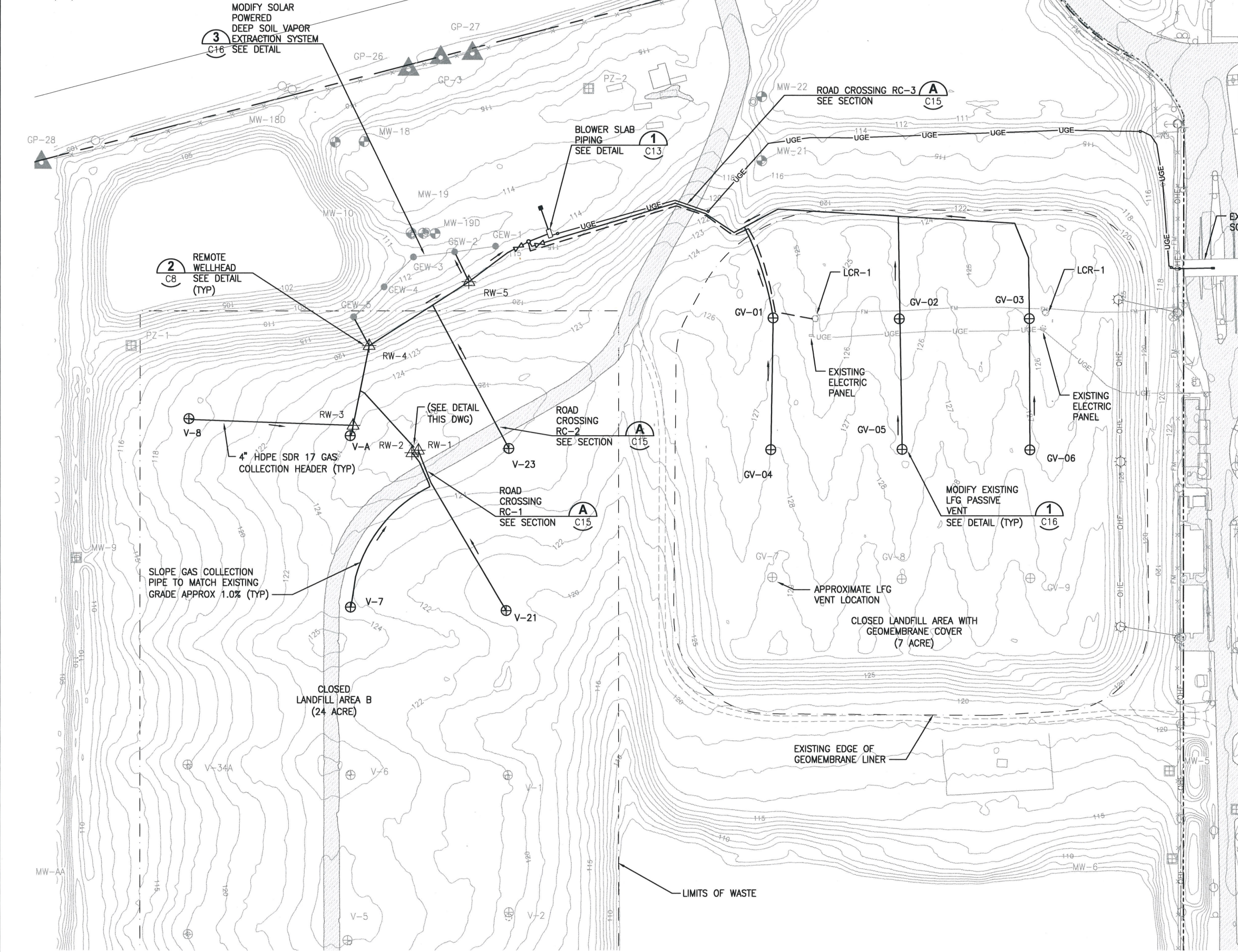
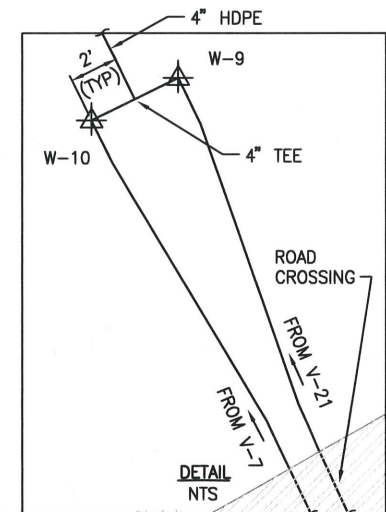


LEGEND

- LCR-1 EXISTING LEACHATE COLLECTION RISER
- ⊕ V-33 EXISTING PASSIVE GAS VENT
- ⊕ GV-06 EXISTING PASSIVE GAS VENT
- GEW-1 SOIL VAPOR EXTRACTION WELL
- HEADER/LATERAL
- CONDENSATE DISCHARGE
- △ RW-1 REMOTE WELLHEAD
- ⊕ GV-04 VENT CONNECTION
- RC-1 ROAD CROSSING
- PIPE SLOPE

NOTES:

1. MAINTAIN 1% SLOPE ON ALL PIPING.
2. ALL GAS PIPE ON THIS DRAWING IS 4" SDR 17 UNLESS OTHERWISE NOTED.
3. SECURE PIPE TO PREVENT MOVEMENT DURING CONCRETE PLACEMENT.
4. FIELD LOCATE EXISTING UGE AND FORCE MAIN FOR LCR-1 AND LCR-2 AND ADJUST NEW PIPE TO AVOID CONFLICT.



					DESIGNED	<u>MHADLOCK</u>
					DRAWN	<u>PUPSTILL</u>
LTR.	DATE	REVISIONS		BY	APPRD.	CHECKED <u>CSAWYER</u>

JonesEdmunds

CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA

GAS MIGRATION CONTROL PLAN

CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY: <i>[Signature]</i>	APR 2018	03860-059-01
MARK D. HADLOCK 4-22-18	SCALE	DWG. NO.
P.E. # 56871	AS NOTED	C4



DEMOLITION SCHEDULE



- NOTES:
1. FULLY EXCAVATE AND REMOVE CONDENSATE TRAP.
 2. OCCURS AT 2 LOCATIONS, CT-1 AND CT-2.

NTS

DESIGNED MHADLOCK

DRAWN PUPSTILL

CHECKED CSAWYER

JonesEdmunds
 CERTIFICATE OF AUTHORIZATION #1841
 730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

**CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA**

GAS DEMOLITION DETAILS

CERTIFICATE OF AUTHORIZATION #1841
APPROVED BY *M. D. Hadlock*
MARK: D. HADLOCK 4-22-
P.E. # 56871

DATE _____

APR 2018

SCALE

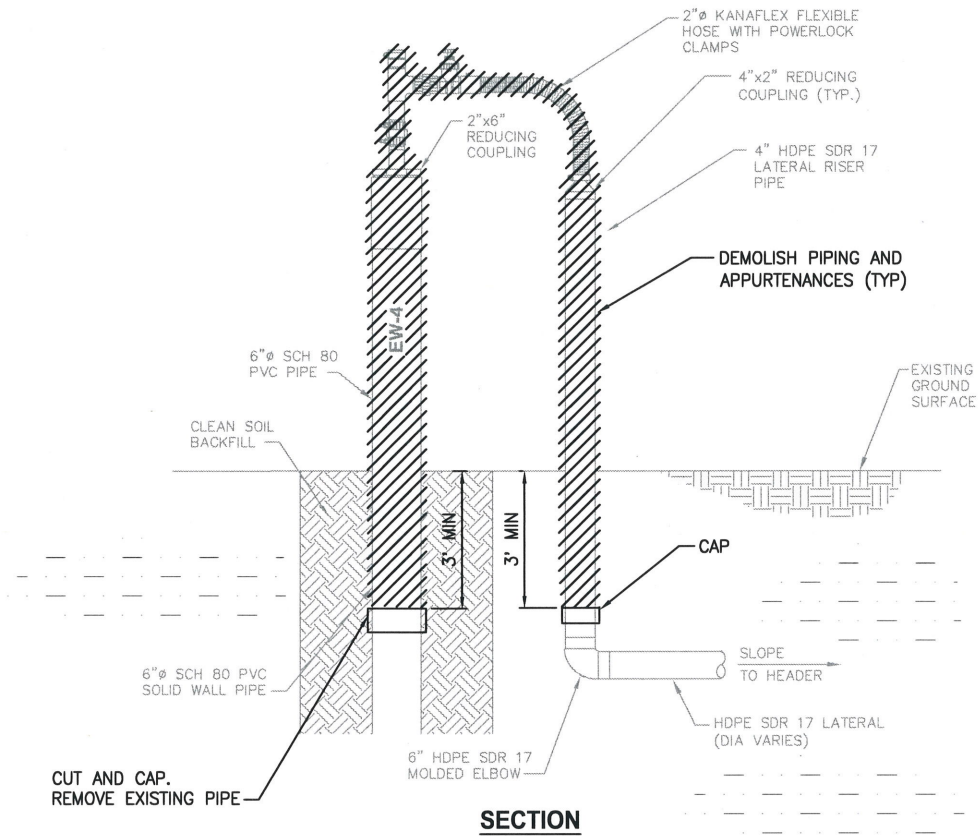
AS NOTED

PROJECT NO.

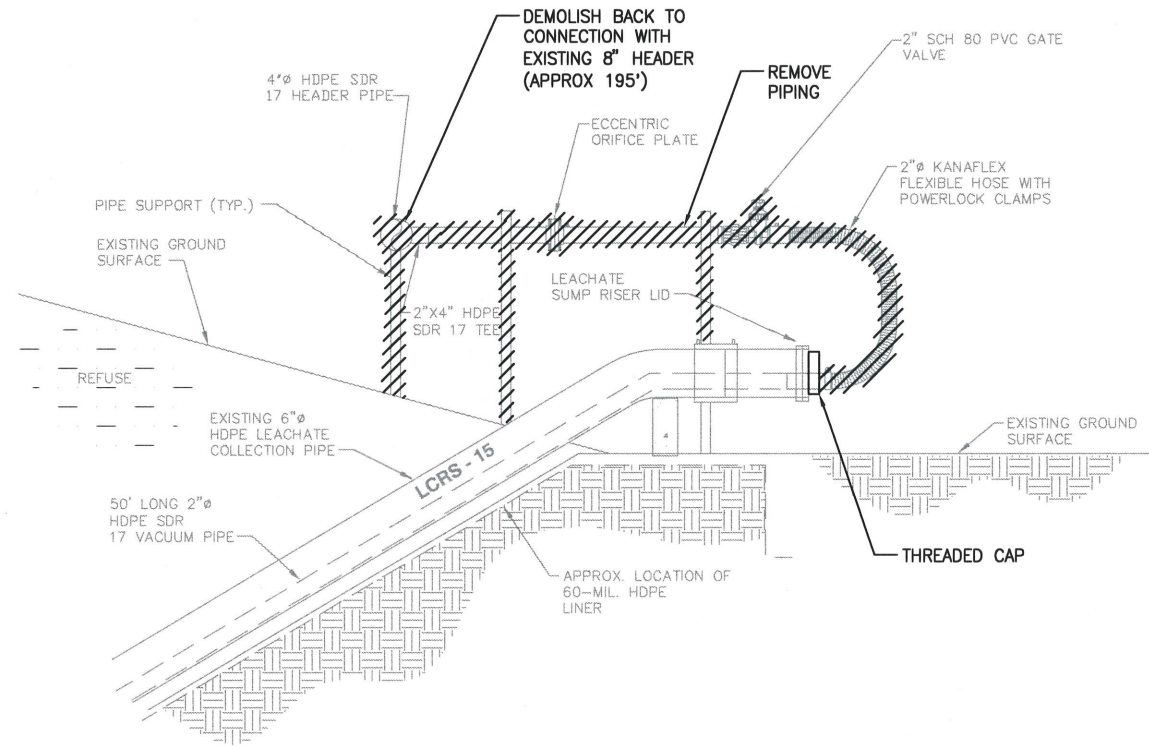
03860-059-01

DWG. NO.	
----------	--

C5



DEMOLISH EXISTING LFG EXTRACTION WELL DETAIL 1
 NTS



DEMOLISH TIE-IN TO EXISTING LCRS-15 DETAIL 2
 NTS

CONNECTION TO EXISTING LFG PIPING SCHEDULE					
CONNECTION	NORTHING	EASTING	EXISTING GRADE	TOP OF PIPE	FITTING
C-1	1642033	515895	132	126	-
C-2	1641926	516132	147	144	-
C-3	1641945	516279	152	150	-
C-4	1641968	516436	158	157	-
C-5	1642031	516740	156	151	-
C-6	1642217	516963	123	122	-
C-7	1642653	515826	-	125	-
C-8	1641932	515038	141	141	-
EW-8	1642424	516649	135	-	SEE DETAIL
EW-9	1642465	516455	129	-	SEE DETAIL
EW-10	1642487	516256	126	-	SEE DETAIL
EW-11	1642515	516052	122	-	SEE DETAIL

					DESIGNED	MHADLOCK
					DRAWN	PUPSTILL
LTR.	DATE	REVISIONS		BY	APPRD.	CHECKED CSAWYER

JonesEdmunds
 CERTIFICATE OF AUTHORIZATION #1841
 730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

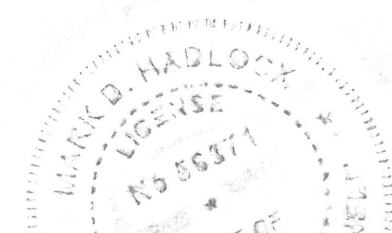
CITRUS COUNTY CENTRAL LANDFILL
 GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
 CITRUS COUNTY, FLORIDA

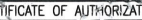
GAS DEMOLITION DETAILS

CERTIFICATE OF AUTHORIZATION #1841 APPROVED BY MARK D. HADLOCK P.E. # 56871		DATE APR 2018	PROJECT NO. 03860-059-01
SCALE AS NOTED		DWG. NO. C6	

PERMIT

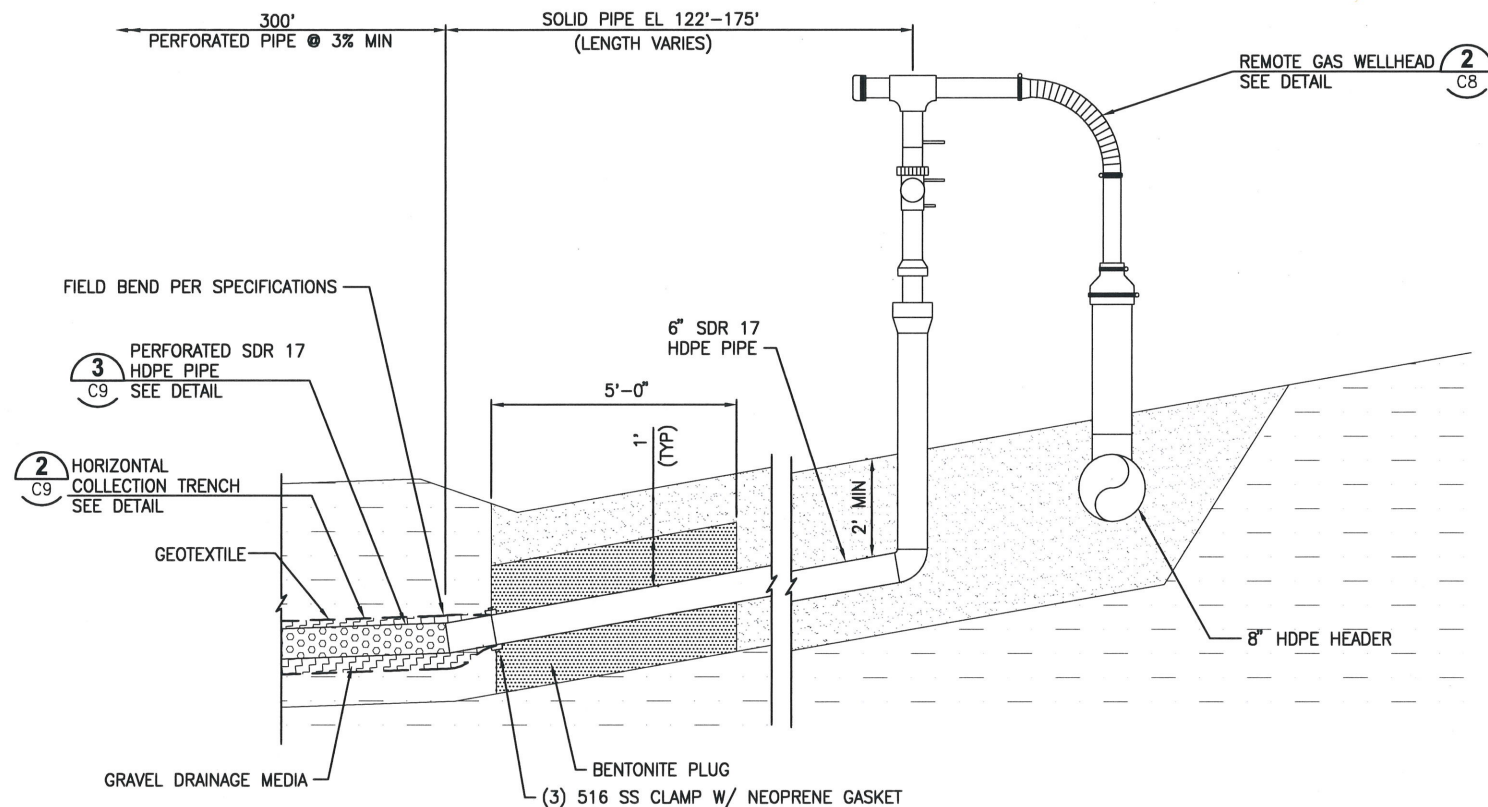
C3,C8,C16



CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY 	APR 2018	03860-059-01
MARK D. HADLOCK 4-22-18	SCALE	DWG. NO.
P.E. # 56871	AS NOTED	C7

PERMIT B

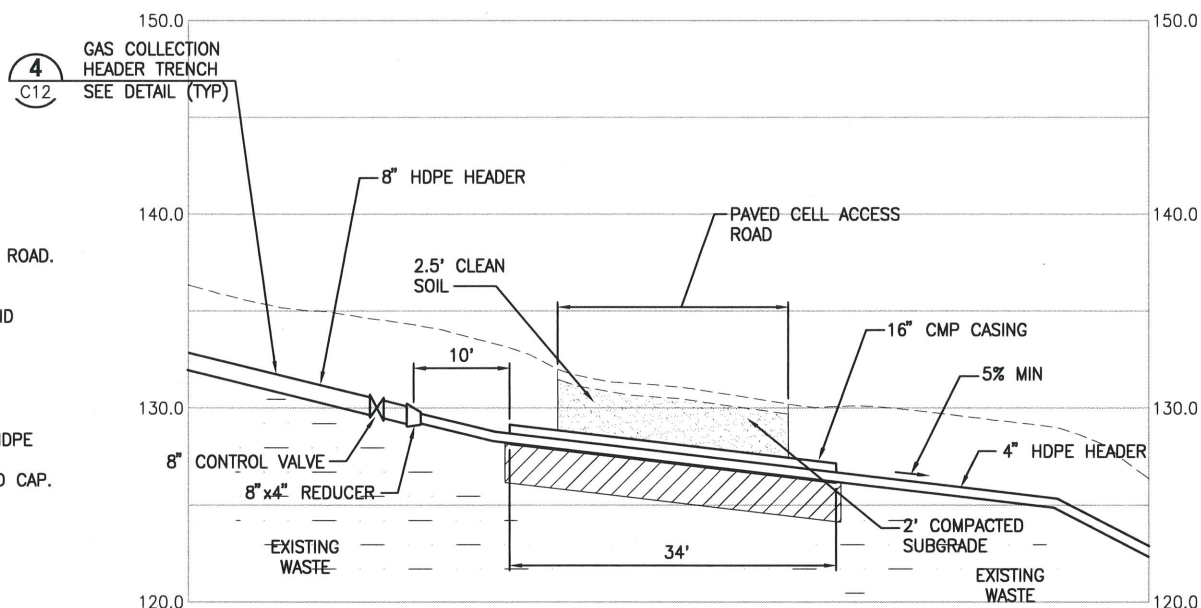
DATE APR 2018	PROJECT NO. 03860-059-01
SCALE AS NOTED	DWG. NO. C8



NOTES:

1. USE (3) STAINLESS STEEL CLAMPS FOR GEOTEXTILE BOOT.
2. MATCH SOLID PIPE SLOPE TO EXISTING GRADE. KEEP 5% MINIMUM.
3. ADD BENTONITE PLUG IN PIPE TRENCH AT THE LAST 5' OF SOLID PIPE.

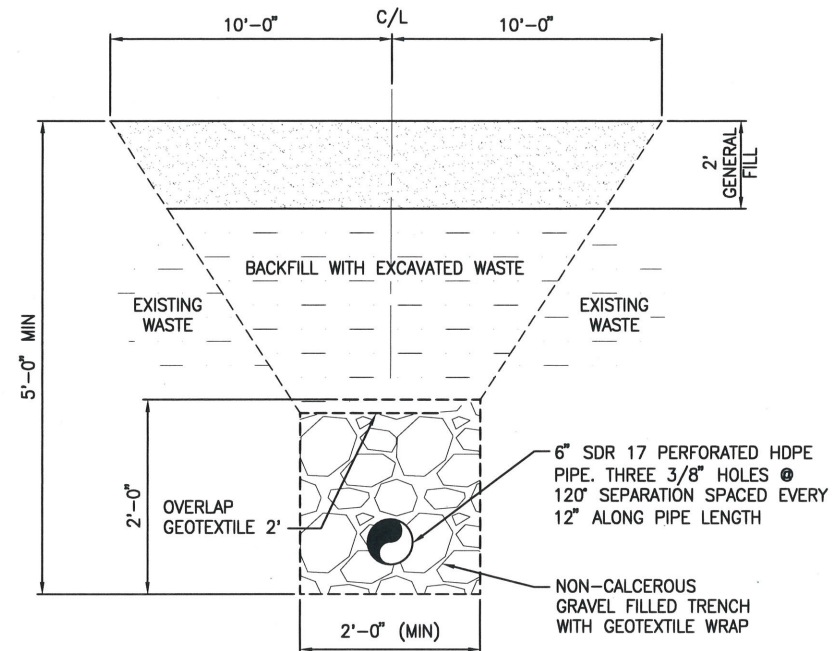
HORIZONTAL COLLECTOR DETAIL 1
NTS



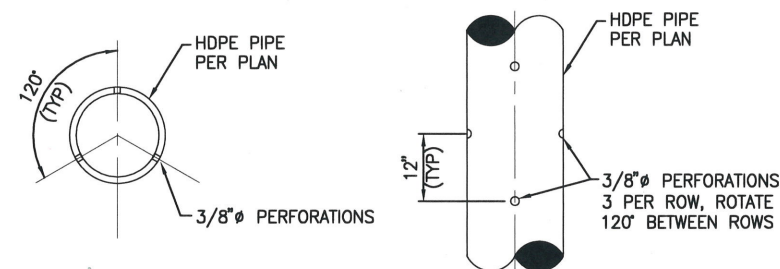
ROAD CROSSING SECTION A
NTS

NOTES:

1. 2.5' MINIMUM SOIL COVER OVER CMP.
2. EXTEND CMP CASING 5' MINIMUM PAST EDGE OF ROAD.
3. OVER EXCAVATE ROAD CROSSING AND PLACE 2' MINIMUM OF COMPACTED FILL BELOW AND AROUND CMP.
4. PLUG ENDS OF CMP WITH FOAM CONCEPTS ES 24-005, BOTH ENDS.
5. INCLUDE SPARE 1-4" HDPE AND 1-2" SDR 9 HDPE LINES IN ROAD CROSSING. EXTEND 10' ON BOTH SIDES, ANGLE UP TO WITHIN 2' OF SURFACE AND CAP.
6. RESTORE ROAD TO MATCH ORIGINAL CONDITIONS.



HORIZONTAL COLLECTOR TRENCH DETAIL 2
NTS



GAS COLLECTION PIPE DETAIL 3
NTS

						DESIGNED	<u>MHADLOCK</u>
						DRAWN	<u>PUPSTILL</u>
						CHECKED	<u>CSAWYER</u>
LTR.	DATE	REVISIONS			BY	APPRD.	

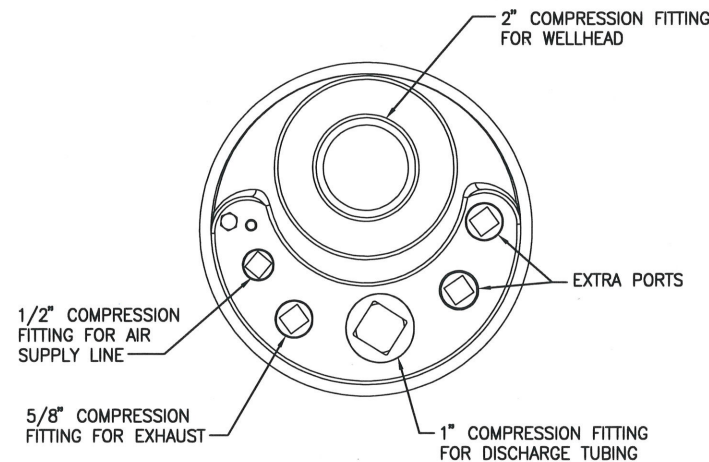
JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

**CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA**

GAS DETAILS

CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY: <i>Mark D. Hadlock</i>	APR 2018	03860-059-01
MARK D. HADLOCK P.E. # 56871	SCALE	DWG. NO.
	AS NOTED	C9

PERMIT

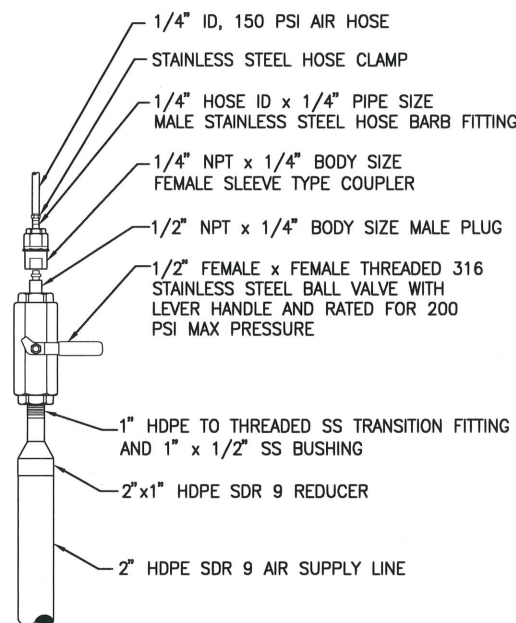


NOTE:
QED 8" PRECISION WELL CAP MODEL GWC 8284.

WELLHEAD ADAPTER FOR DEWATERING PUMP DETAIL 1

NTS

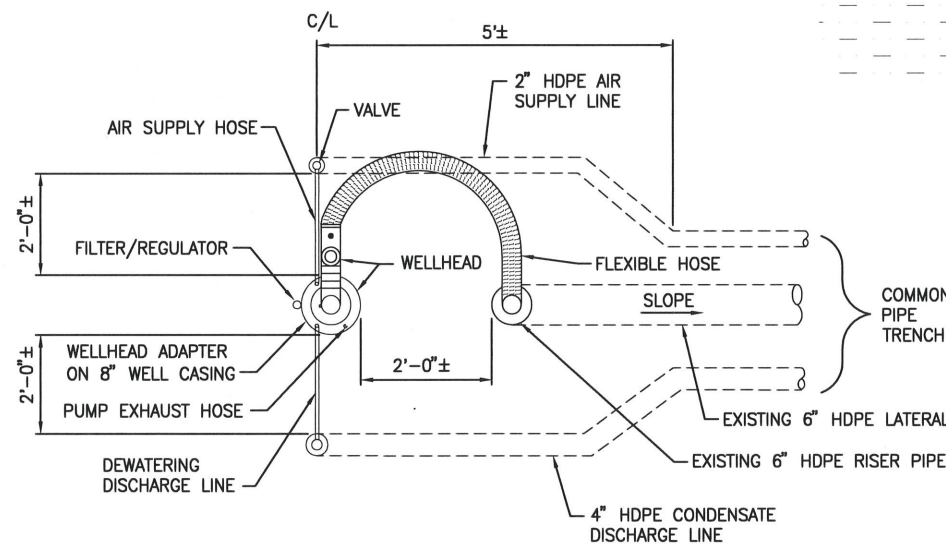
C10



AIR SUPPLY LINE VALVE DETAIL 2

NTS

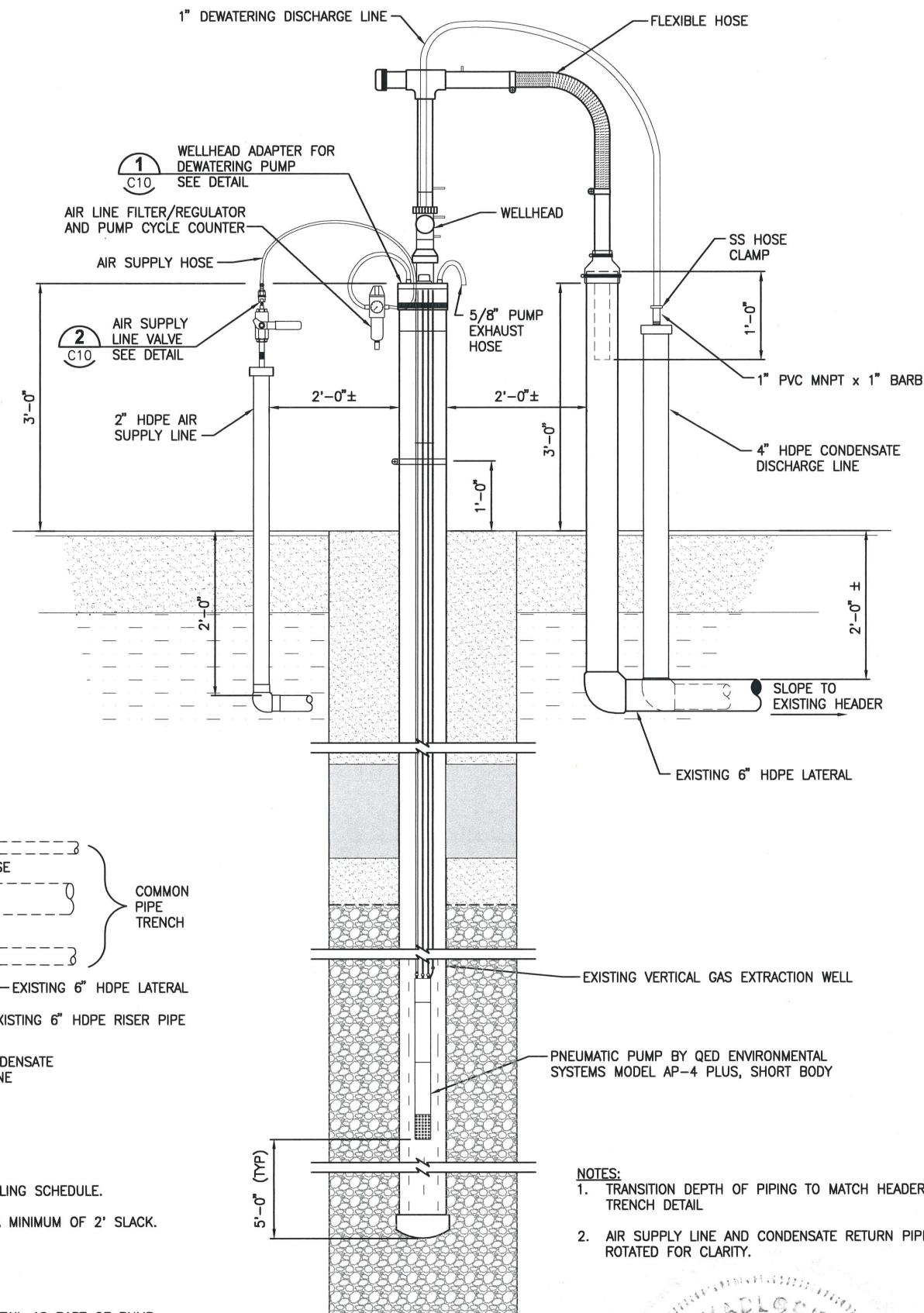
C10



PLAN

NOTES:

1. LOCATION OF EXTRACTION WELLS WITH A DEWATERING PUMP IS SHOWN ON DRILLING SCHEDULE.
2. COMPRESSED AIR AND DEWATERING DISCHARGE HOSES TO BE INSTALLED WITH A MINIMUM OF 2' SLACK.
3. TIE AIR SUPPLY LINE TO EXISTING 2" HDPE AIR SUPPLY LINE WITH TEE.
4. RETURN CONDENSATE INTO GAS RISER.
5. EXISTING WELLS EW-1, EW-2, AND EW-3 WILL BE MODIFIED TO MATCH THE DETAIL AS PART OF PUMP INSTALLATION (SEE C3).



SECTION

NOTES:

1. TRANSITION DEPTH OF PIPING TO MATCH HEADER TRENCH DETAIL
2. AIR SUPPLY LINE AND CONDENSATE RETURN PIPES ROTATED FOR CLARITY.

DEWATERING PUMP INSTALLATION DETAIL 3

NTS

C3

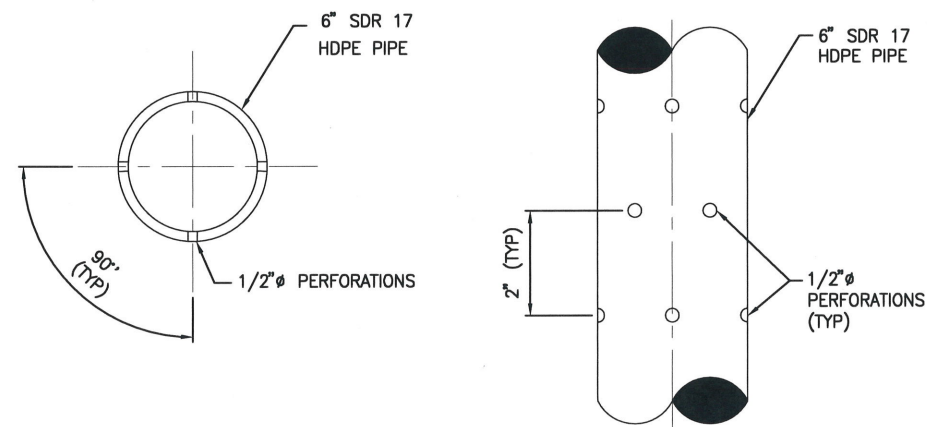
						DESIGNED	<u>MHADLOCK</u>
						DRAWN	<u>PUPSTILL</u>
LTR.	DATE	REVISIONS			BY	APPRD.	CHECKED <u>CSAWYER</u>

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

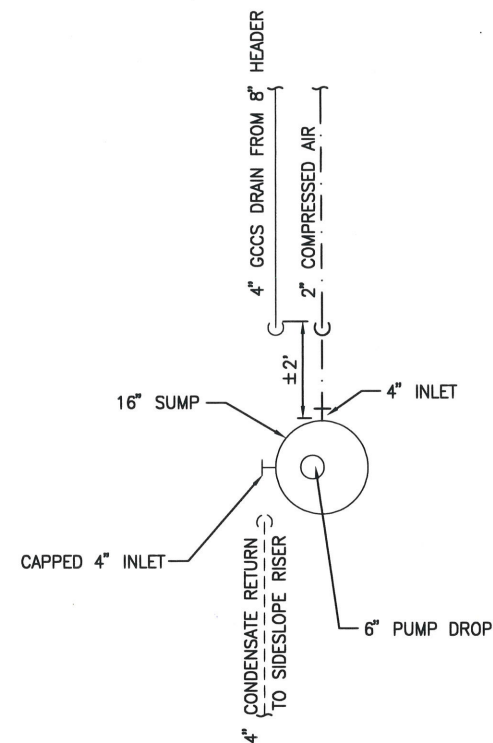
CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA

GAS DETAILS

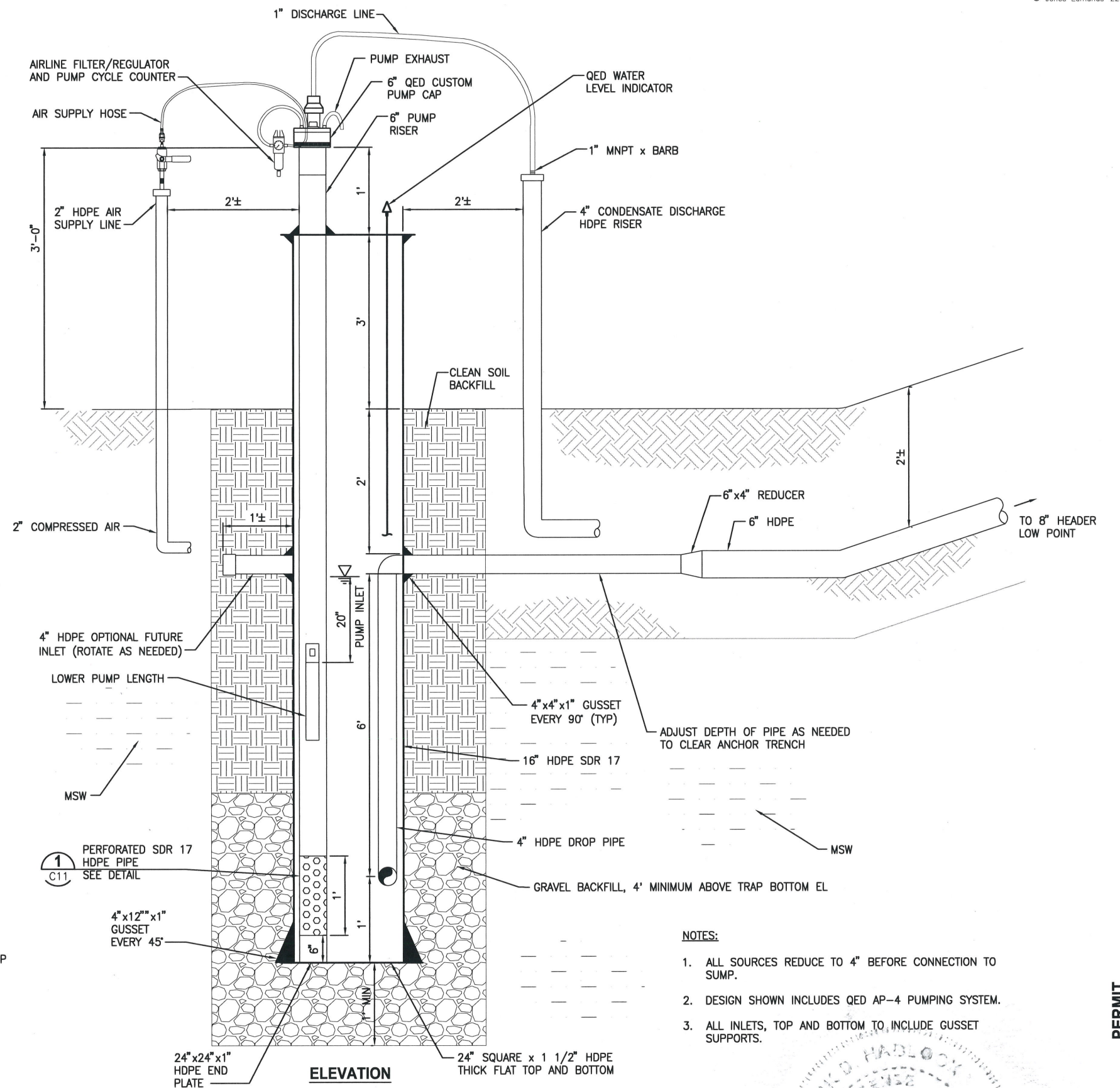
CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY	APR 2018	03860-059-01
MARK D. HADLOCK	SCALE	DWG. NO.
P.E. # 56871	AS NOTED	C10



PERFORATED
SDR 17 HDPE PIPE DETAIL 1
NTS C11, C14



PLAN



IN WASTE CONDENSATE TRAP DETAIL **2**

NTS C3

NOTES:

1. ALL SOURCES REDUCE TO 4" BEFORE CONNECTION TO SUMP.
2. DESIGN SHOWN INCLUDES QED AP-4 PUMPING SYSTEM.
3. ALL INLETS, TOP AND BOTTOM TO INCLUDE GUSSET SUPPORTS.

					DESIGNED	MHADLOCK
					DRAWN	PUPSTILL
					CHECKED	CSAWYER
LTR.	DATE	REVISIONS		BY	APPRD.	

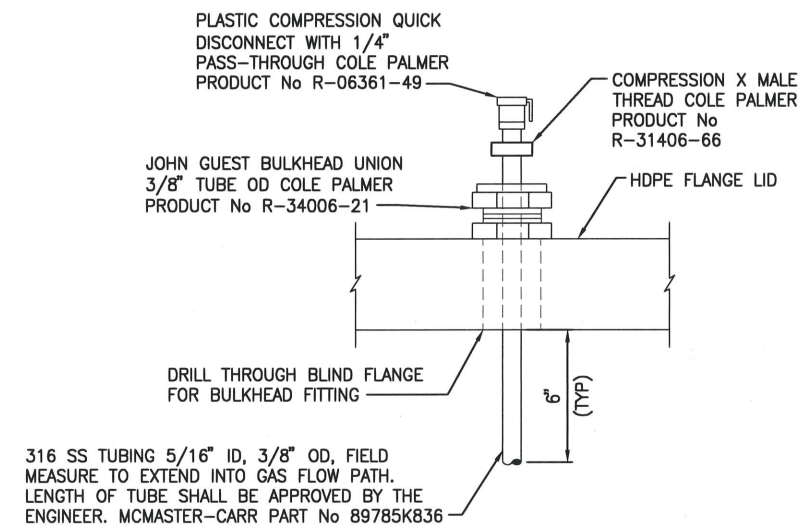
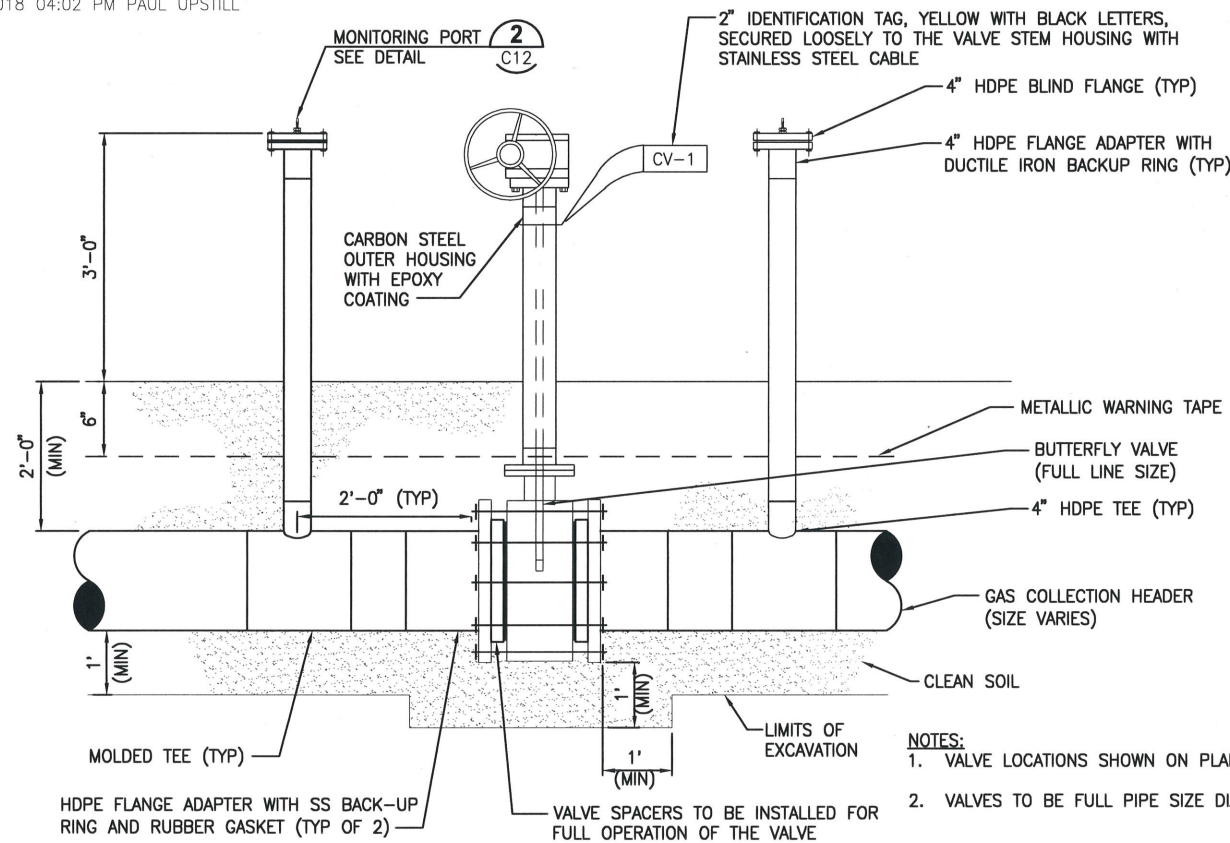


**CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA**

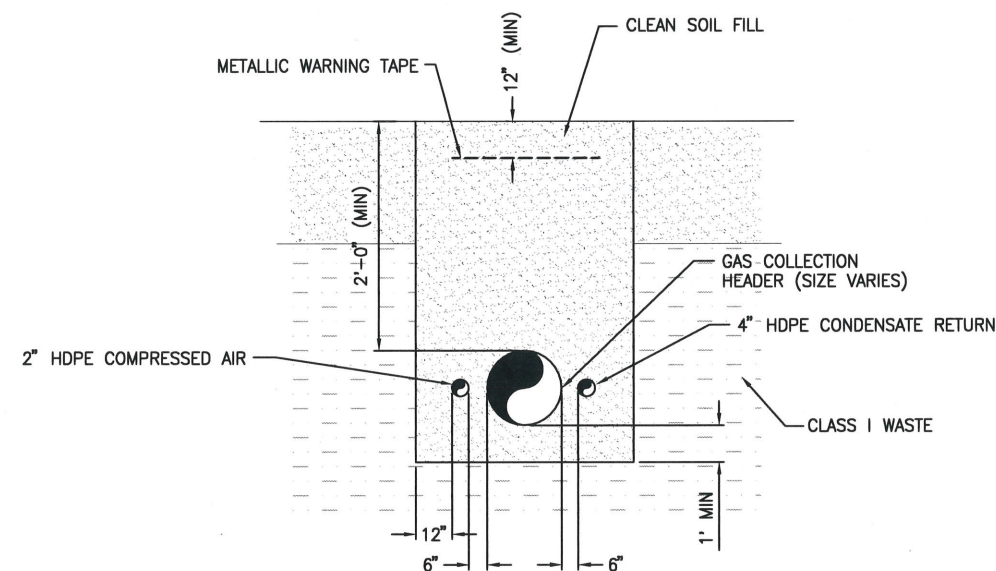
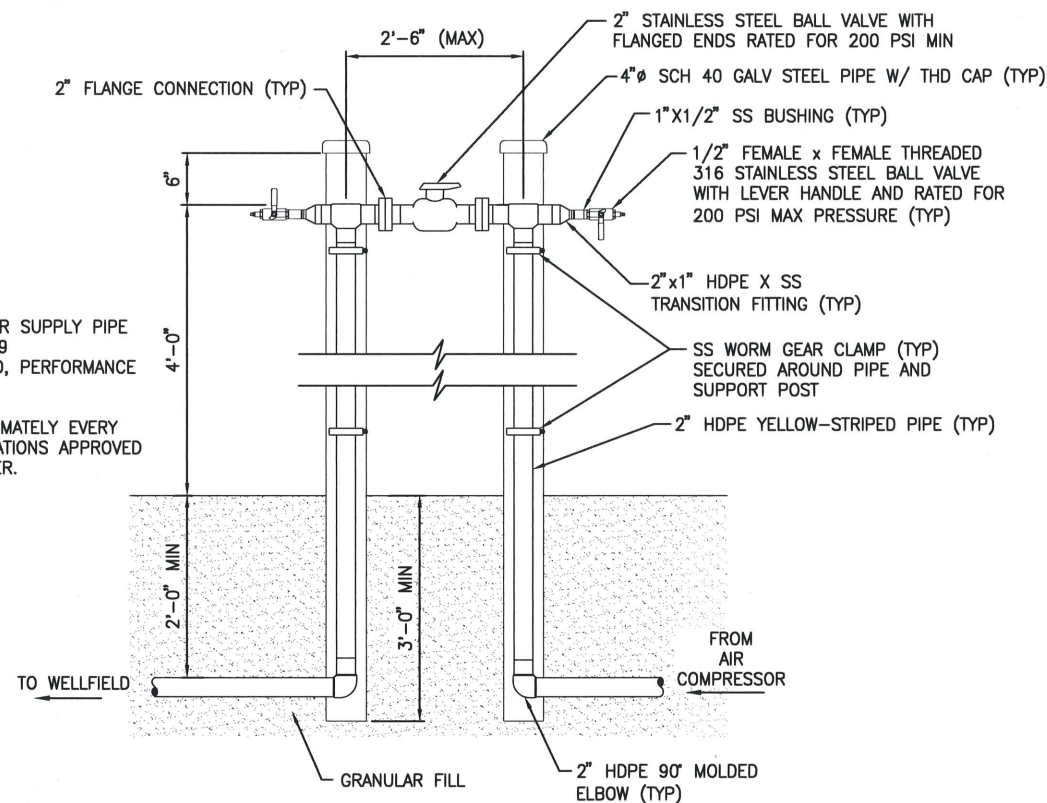
GAS DETAILS

CERTIFICATE OF AUTHORIZATION #3841	DATE	PROJECT NO.
APPROVED BY <i>Mark D. Hadlock</i> 4-22-18	APR 2018	03860-059-01
MARK D. HADLOCK	SCALE	DWG. NO.
P.E. # 56871	AS NOTED	C11

B



- NOTES:**
- ALL 2" HDPE AIR SUPPLY PIPE SHALL BE SDR 9 YELLOW-STRIPED, PERFORMANCE PIPE 6400.
 - LOCATE APPROXIMATELY EVERY 500 LF AT LOCATIONS APPROVED BY THE ENGINEER.



TYPICAL GAS COLLECTION HEADER TRENCH DETAIL 4

NTS

PERMIT

SAVED: 1/3/2018 3:29 PM PUPSTILL \\JEDCAD\DRAWING\03860 CITRUS COUNTY\059 GCCS\CONTRACT DRAWINGS\CIVIL\03860059-C12.DWG

LTR.	DATE	REVISIONS	BY	APPR.

DESIGNED MHADLOCK
DRAWN PUPSTILL
CHECKED CSAWYER

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA

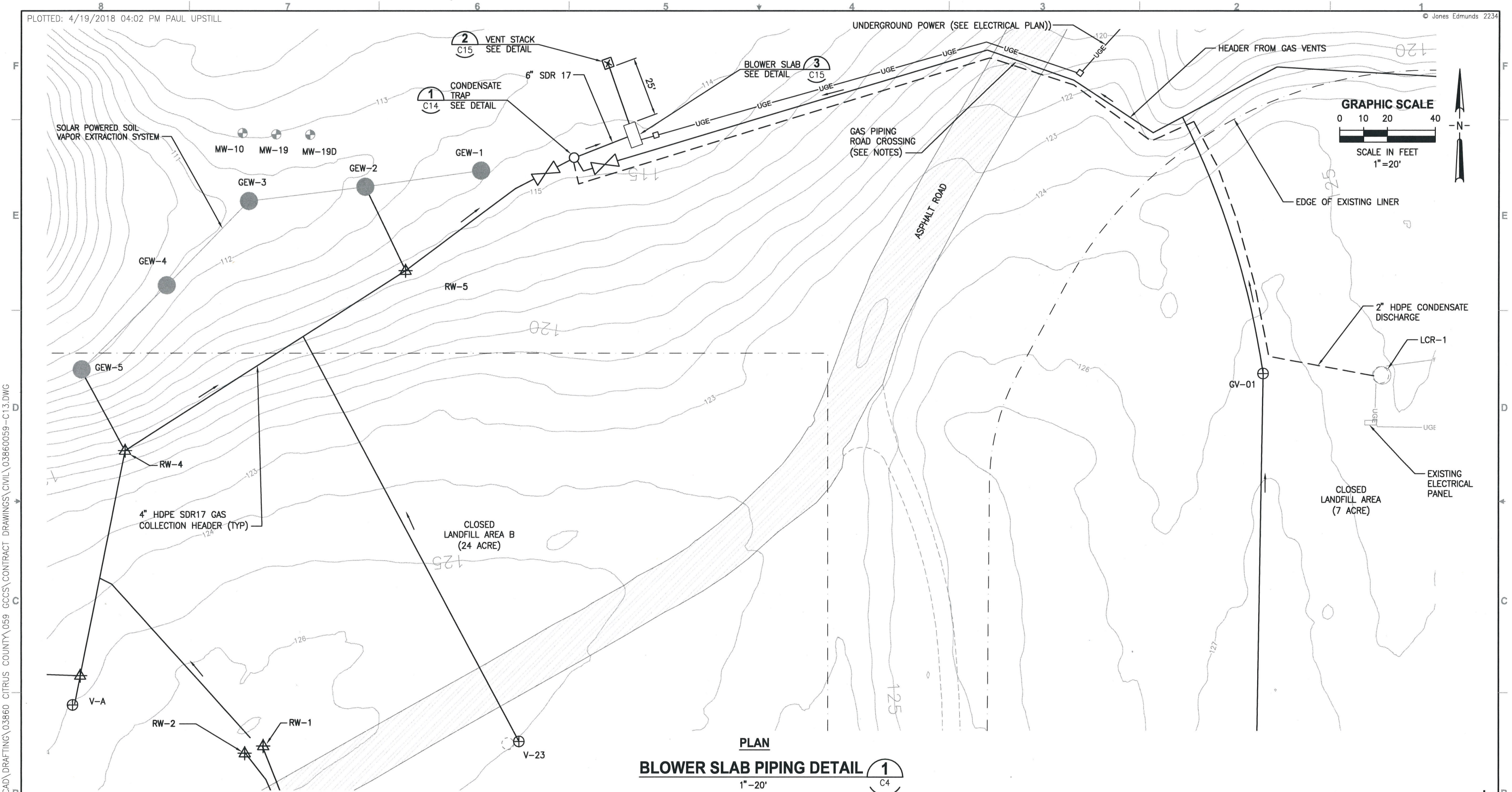
GAS DETAILS

CERTIFICATE OF AUTHORIZATION #1841
APPROVED BY
MARK D. HADLOCK
P.E. # 56871

DATE
APR 2018
SCALE
AS NOTED

PROJECT NO.
03860-059-01
DWG. NO.
C12

SAVED: 3/16/2018 12:18 PM PUPSTILL \\UEACAD\DRAWING\03860 CITRUS COUNTY\059 GCCS\CONTRACT DRAWINGS\CIVIL\03860059-C13.DWG



PLAN
BLOWER SLAB PIPING DETAIL 1
1" = 20' C4

- NOTES:
1. ENCASE LFG PIPING WITH 2' MINIMUM SOIL COVER OVER CMP.
 2. EXTEND CMP CASING 5' MINIMUM PAST EDGE OF ROAD.
 3. OVER EXCAVATE ROAD CROSSING AND PLACE 2' MINIMUM OF COMPACTED FILL BELOW AND AROUND CMP.
 4. PLUG ENDS OF CMP WITH FOAM CONCEPTS ES 24-005, BOTH ENDS.

						DESIGNED	MHADLOCK
						DRAWN	PUPSTILL
						CHECKED	CSAWYER
LTR.	DATE	REVISIONS	BY	APPRO.			

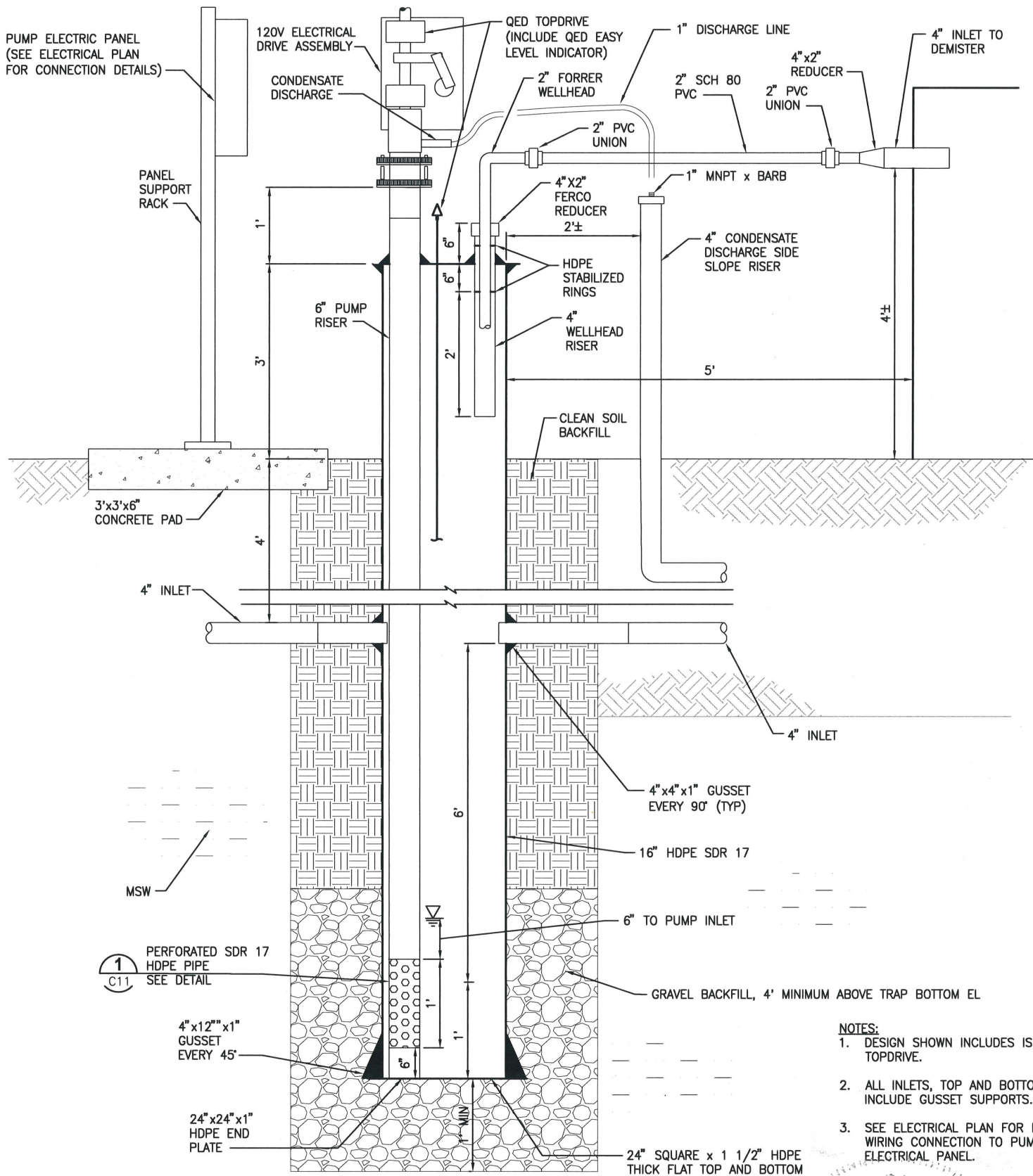
JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA

GAS MIGRATION CONTROL DETAILS

CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY MARK D. HADLOCK P.E. # 56871	ARR: 2018	03860-059-01
SCALE	DWG. NO.	
AS NOTED	C13	

PERMIT



ELEVATION
CONDENSATE TRAP DETAIL 2
NTS C13

- NOTES:
1. DESIGN SHOWN INCLUDES IS QED TOPDRIVE.
 2. ALL INLETS, TOP AND BOTTOM TO INCLUDE GUSSET SUPPORTS.
 3. SEE ELECTRICAL PLAN FOR ELECTRICAL WIRING CONNECTION TO PUMP ELECTRICAL PANEL.

PERMIT

						DESIGNED	MHADLOCK
						DRAWN	PUPSTILL
						CHECKED	CSAWYER
LTR.	DATE	REVISIONS	BY	APPRD.			

JonesEdmunds
CERTIFICATE OF AUTHORIZATION #1841
730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

CITRUS COUNTY CENTRAL LANDFILL
GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
CITRUS COUNTY, FLORIDA

GAS MIGRATION CONTROL DETAILS

CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY MARK D. HADLOCK P.E. # 56871	APR 2018	03860-059-01
SCALE	AS NOTED	DWG. NO. C14

NOTES:
1. RESTORE ROAD TO MATCH ORIGINAL CONDITIONS.



NTS



2. ROAD CROSSING TO BE FILLED WITH 1500 PSI MINIMUM CONCRETE.

NTS



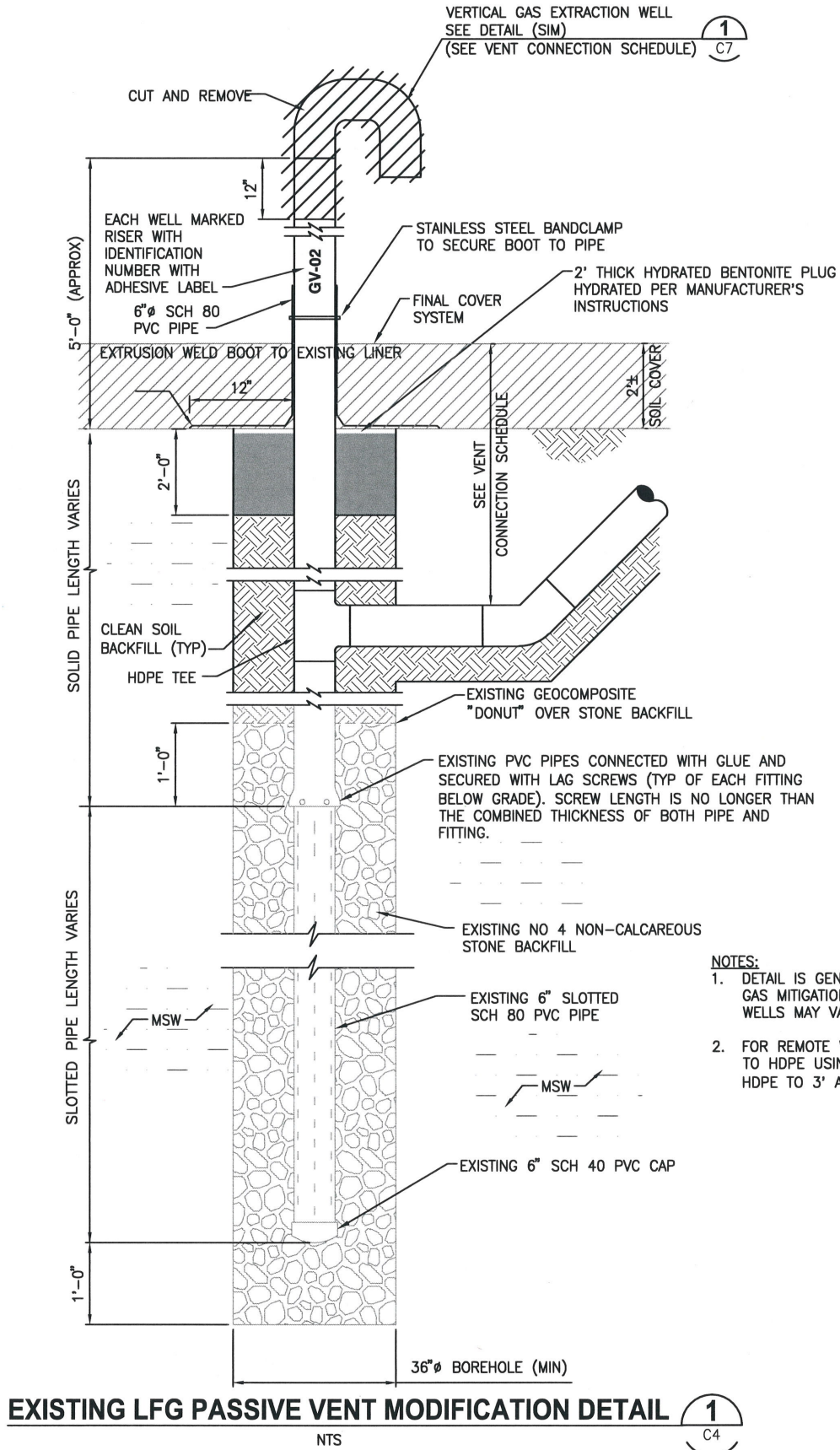
- NOTES:**
1. CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS.
 2. ALL INTERCONNECTING PIPING TO BE SCH 80 PVC.
 3. ALL BLOWER SYSTEM COMPONENTS TO BE PRE-FABRICATED, SKID MOUNTED PER SPECIFICATIONS.
 4. FIELD ADJUST VENT STACK INLET TO MATCH BLOWER SKID OUTLET.

NTS

CHECKED CSAWYER



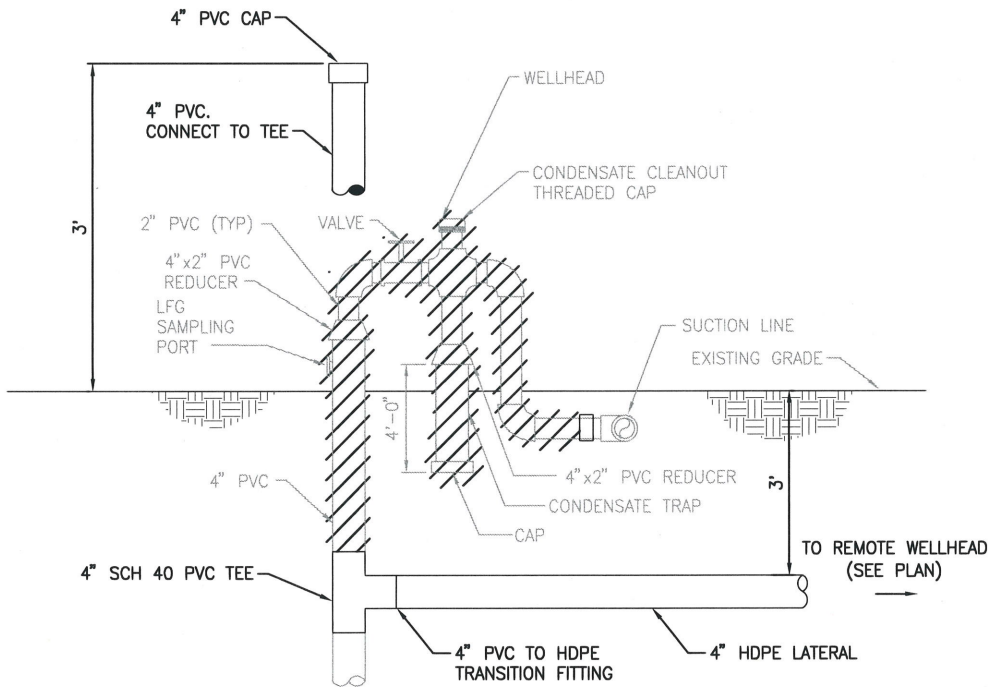
DATE APR 2018	PROJECT NO. 03860-059-01
SCALE AS NOTED	DWG. NO. C15



VENT CONNECTIONS SCHEDULE					
WELL ID	NORTHING	EASTING	APPROX GROUND SURFACE (FT)	WELLHEAD LOCATION	DEPTH OF CONNECTION (FT)
GV-1	1643552	515236	125	ON WELL	
GV-2	1643553	515387	125	ON WELL	
GV-3	1643553	515538	124	ON WELL	-2
GV-4	1643398	515235	127	ON WELL	
GV-5	1643397	515389	126	ON WELL	-2
GV-6	1643398	515540	126	ON WELL	-2
V-7	1643218	514737	125	REMOTE	-5
V-8	1643440	514545	120	REMOTE	-2
V-21	1643214	514921	121	REMOTE	-3
V-23	1643430	514898	127	ON WELL	
V-A	1643420	514737	126	ON WELL	
GEW-5	1643561	514741	113	REMOTE	-2
GEW-2	1643638	514860	114	REMOTE	-2

NOTES:

- ON-WELL WELLHEADS TO MATCH 1 C7
- DEPTH OF CONNECTION APPLIES TO REMOTE WELLHEADS. REMOTE WELLHEADS TO MATCH 2 C8



DESIGNED	MHADLOCK
DRAWN	PUPSTILL
CHECKED	CSAWYER
BY	
APPRO.	

JonesEdmunds
 CERTIFICATE OF AUTHORIZATION #1841
 730 NE WALDO ROAD, GAINESVILLE, FLORIDA 32641 / (352) 377-5821

CITRUS COUNTY CENTRAL LANDFILL
 GCCS EXPANSION AND GAS MIGRATION CONTROL SYSTEM
 CITRUS COUNTY, FLORIDA

GAS MIGRATION CONTROL DETAILS

CERTIFICATE OF AUTHORIZATION #1841	DATE	PROJECT NO.
APPROVED BY	APR 2018	03860-059-01
MARK D. HADLOCK	SCALE	DWG. NO.
P.E. # 56871	AS NOTED	C16

Appendix C

TABLE OF CONTENTS

DIVISION 2—SITE CONSTRUCTION

02220	DEMOLITION AND MODIFICATIONS
02525	LANDFILL GAS EXTRACTION WELLS AND WELLHEADS
02550	PIPE AND PIPE FITTINGS

DIVISION 3—CONCRETE

03250	CONCRETE JOINTS AND JOINT ACCESSORIES
-------	---------------------------------------

DIVISION 15—MECHANICAL

15055	PIPING SYSTEMS—GENERAL
15110	MANUAL, CHECK, AND PROCESS VALVES
15250	SMALL-DIAMETER PIPING
15575	LANDFILL GAS BLOWER/VENT STACK SYSTEM

DIVISION 16—ELECTRICAL

16401	LOW-VOLTAGE ELECTRICAL WORK – GENERAL REQUIREMENTS
-------	--

SECTION 02220
DEMOLITION AND MODIFICATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals required and demolish, modify, remove, and dispose of work shown on the Drawings and as specified in this Section.
- B. The work includes but is not limited to demolishing, modifying, and removing existing materials, equipment, or work necessary to install the new work as shown on the Drawings and as specified in this Section and to connect with existing work in an approved manner.
- C. Demolition, modifications, and removals which may be specified under other Sections shall conform to requirements of this Section.
- D. Demolition and modifications include:
 - 1. Removal and disposal of existing self-draining condensate traps CT-1 and CT-2 as shown on the Drawings.
 - 2. Removal and disposal of existing remote wellheads and existing leachate cleanout wellheads as shown on the Drawings.
 - 3. Modification of existing well risers and connection to remote wellhead as shown on the Drawings.
 - 4. Connection of lateral gas piping and compressed air line to existing gas piping as shown on the Drawings.
 - 5. Modification of condensate sumps CS-1 and CS-2 with new pump installation.
 - 6. Demolition and repair of asphalt road as described in Specification 02700, Paving, and as shown on the Drawings.
 - 7. Modification of existing PVC passive gas vents to install wellhead or connect to remote wellhead, as shown on the Drawings.
 - 8. On-site disposal of materials.
- E. Blasting and the use of explosives will not be permitted for any demolition work.

1.02 RELATED WORK

- A. Section 01100, Summary of Work.
- B. Section 01330, Submittals and Acceptance.

- C. Section 01350, Environmental Protection Procedures.
- D. Section 02525, Landfill Gas Extraction Wells and Wellheads.
- E. Section 02550, Pipe and Pipe Fittings.
- F. Section 02700, Paving.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. Submit to the Engineer two copies of proposed methods and operations of demolition of the structures and modifications before beginning work. Include in the schedule the coordination of shutoff, capping, and continuation of service as required.
- B. Furnish a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Owner's operations. The sequence shall be compatible with sequence of construction and shutdown coordination requirements.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS (NOT USED)

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 RECORD DRAWINGS (NOT USED)

1.13 JOB CONDITIONS

- A. Protection

1. The Contractor shall conduct the demolition and removal work to prevent damage or injury to structures, equipment, piping, instrumentation, conduit, light fixtures, etc., and to adjacent features which might result from falling debris or other causes, and so as not to interfere with the use and free and safe passage to and from adjacent structures.

B. Scheduling

1. Carry out operations so as to avoid interference with operations and work in the existing facilities. One leachate tank shall be in operation at all times.

C. Notification

1. At least 48 hours before beginning demolition or removal, notify the Engineer in writing of the proposed schedule of the demolition or removal. The Owner shall inspect the existing equipment and identify and mark those items which are to remain the property of the Owner. No removals shall be started without the permission of the Engineer.

D. Conditions of Structures

1. The Owner and the Engineer assume no responsibility for the actual condition of the structures to be demolished or modified.
2. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable. However, variations within a structure may occur before the start of demolition work.

E. Repairs to Damage

1. The Contractor shall promptly repair damage caused to adjacent facilities by demolition operation when directed by the Engineer and at no cost to the Owner. Repairs shall be made to a condition at least equal to that which existed before construction.

F. Traffic Access

1. The Contractor shall conduct demolition and modification operations and remove equipment and debris to ensure minimum interference with roads onsite and to ensure minimum interference with occupied or used facilities.

2. Special attention is directed towards maintaining safe and convenient access to the existing facilities by site personnel and site associated vehicles.

1.14 RULES AND REGULATIONS

- A. The Florida Building Code shall control the demolition, modification, or alteration of the existing buildings or structures.

1.15 DISPOSAL OF MATERIAL

- A. Salvageable material and equipment shall become the property of the Owner. The Contractor shall dismantle all such items to a size that can be readily handled and deliver them to a designated storage area.
- B. All other material and items of equipment shall become the Contractor's property and must be removed from the site or disposed on site in the County's landfill.
- C. Storing or selling removed items on the site will not be allowed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. All materials and equipment removed from existing work shall become the property of the Contractor, except for those which the Owner has identified and marked for his/her use. All materials and equipment marked by the Owner to remain shall be carefully removed so as not to be damaged and shall be cleaned and stored on or adjacent to the site in a protected place specified by the Engineer or loaded onto trucks provided by the Owner.
- B. The Contractor shall dispose of all demolition materials, equipment, debris, and all other items—except those marked by the Owner to remain—in conformance with all existing applicable laws and regulations.
- C. Pollution Controls
 1. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.

- a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
- b. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing before starting the work.

3.02 STRUCTURAL REMOVALS

- A. The Contractor shall remove structures to the lines and grades shown unless otherwise directed by the Engineer.
- B. All demolition debris shall be removed and disposed of in the County landfill unless otherwise approved by the Engineer.
- C. After parts or all of slabs and like work which tie into new work or existing work are removed, the point of junction shall be neatly repaired so as to leave only finished edges and surface exposed.

3.03 CLEAN-UP

- A. The Contractor shall remove from the site all debris resulting from the demolition operations as it accumulates. Upon completion of the work, the Contractor shall remove all materials, equipment, waste, and debris of every sort and shall leave the premises clean, neat, and orderly.

END OF SECTION

SECTION 02525
LANDFILL GAS EXTRACTION WELLS AND WELLHEADS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall provide all labor, equipment, materials, and appurtenances necessary to drill, install, and make ready landfill gas (LFG) extraction wells and wellheads as specified herein and as indicated on the Drawings.
- B. The slotted pipe, gravel, geotextile, bentonite, and soil backfill shall be set at depths and thicknesses shown on the Drawings or as designated in the field by the Engineer. It is expected that combustible and asphyxiant gases will be venting from boreholes drilled into waste within the footprint of the landfill. The Contractor's bid price shall include provision for all equipment and procedures necessary to safely install wells and borings under this condition. All work shall be performed by qualified workers in accordance with the best standards and practices available.
- C. Upon completion of each new extraction well or boring, the Contractor shall dispose of all construction and drilling refuse materials in the active landfill as directed by the Engineer.

1.02 RELATED WORK

- A. Section 01330, Submittals and Acceptance.
- B. Section 02550, Pipe and Pipe Fittings.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. The Contractor shall prepare and submit to the Engineer, for review and approval, Certificates of Compliance for all materials furnished and manufacturers' brochures containing complete information and instructions pertaining to storing, handling, installing, and inspecting pipe and appurtenances furnished as described in Section 01330, Submittals and Acceptance.
- B. The Contractor shall prepare and submit to the Engineer for review and approval, Shop Drawings showing dimensions, materials, and manufacturer's information

for pipe, pipe perforations, fittings, bentonite, and wellhead components before material delivery.

- C. At least 2 weeks before construction, the Contractor shall submit to the Engineer for review and approval, results of the pre-construction survey as stated in Article 3.01 of this Section.
- D. One week prior to well drilling, the Contractor shall submit an example well boring log and construction log. The example log shall be completed with all of the required descriptions and pertinent information required under Article 3.04 of this Section.
- E. At least two weeks prior to construction, the Contractor shall submit to the Engineer for review and approval, results of the gradation test for the gravel and sieve analysis for the soil backfill, samples of all well backfill materials (if requested), the name of the vendor(s), and source of gravel and backfill materials furnished.
- F. At the end of each day, the Contractor shall provide copies of the handwritten well boring and completion logs of each well drilled on that day. Information to be included on the well logs is listed in Article 3.04 of this Section.
- G. Final boring logs based on field information shall be typewritten and submitted with the Record Documents and shall include a description of the boring depth, location, and excavated material.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM D420 – Standard Guide to Site Characterization for Engineering, Design, and Construction Purposes.
 - 2. ASTM D422 – Standard Method for Particle-Size Analysis of Soils
 - 3. ASTM D1452 – Standard Practice for Soil Investigation and Sampling by Auger Borings

4. ASTM D1784 – Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
5. ASTM D1785 – Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
6. ASTM D2487 – Standard Classification of Soils for Engineering Purposes (Unified Classification System).
7. ASTM D2488 – Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
8. ASTM D2513 – Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings.
9. ASTM D2564 – Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
10. ASTM D2855 – Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
11. ASTM D3282 – Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.
12. ASTM D5261 – Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

1.06 QUALITY ASSURANCE

- A. A professional experienced in installation of landfill gas wells shall be responsible for observing and documenting information related to all boring and installation activities.
- B. Inspect well materials for cleanliness, deformations, and imperfections, and ensure conformance with Specifications prior to use.

1.07 WARRANTIES (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 RECORD DRAWINGS (NOT USED)

PART 2 PRODUCTS

2.01 SOIL

A. Soil Fill Requirements

1. Backfill material shall be clean granular soil meeting the Soils Classification Groups A-1, A-2-4, and A-3 according to ASTM D3282 or Groups SP, SM, and SC according to ASTM D2487, free of rocks and other material greater than 1 inch in any dimension.
2. A source of borrow is available on site.

2.02 GRAVEL

- #### A.
- Gravel shall be non-carbonate (5%), non-organic (5%) granite No. 57 stone per AASHTO.

2.03 BENTONITE

- #### A.
- “Bentonite Plug” as used in the Drawings, shall refer to an annular well seal comprised of hydrated granular sodium bentonite of a thickness as indicated on the Drawings. Bentonite material shall consist of clay greater than 90% sodium montmorillonite, without additives.
- #### B.
- Bentonite shall be hydrated according to the manufacturer’s instructions before backfilling with soil. Bentonite shall be hydrated in 6-inch lifts according to Paragraph 3.05B of this Section.

2.04 GEOTEXTILE

- #### A.
- Geotextile used for separation of backfill materials shall be a minimum of 8 ounces/square yard nonwoven polypropylene or polyester filaments according to ASTM D5261.

2.05 PVC PIPE

- #### A.
- All polyvinyl chloride (PVC) pipe and pipe fittings, except where indicated on the Drawings, shall be Schedule 80 PVC conforming to ASTM D1784, ASTM D1785 (for pipe), and ASTM D2467 (for fittings). Acceptable manufacturers include Nibco Chemtrol (574-295-3000), CertainTeed (610-341-7000), ASAHI/America (800-343-3618), or approved equal.

- B. The slots in the extraction well piping shall be as specified on the Drawings. Perforations/slots shall be drilled or fabricated into the pipe at the pipe extrusion plant or fabrication shop. Any burrs remaining after drilling shall be removed before pipe is delivered to the job site.
- C. All PVC pipe shall be stamped by the manufacturer with the following information at 5-foot intervals:
 - 1. Manufacturer name or trademark.
 - 2. Nominal pipe size.
 - 3. Type of plastic (e.g., PE 3608).
 - 4. Standard dimension ratio (SDR) or Schedule (SCH) value.
 - 5. ASTM designations (i.e., ASTM D2513).
- D. Pipe and fittings shall be homogenous throughout and shall be free from cracks, holes, foreign inclusions, and other defects.
- E. PVC pipe and pipe fittings shall be manufactured from a compound which meets the requirements of Type 1, Grade 1, Polyvinyl Chloride PVC 1120, Class 12454-B, as outlined in ASTM D1784. A Type 1, Grade 1 compound is characterized as having the highest requirements for mechanical properties and chemical resistance.
 - 1. Compound from which pipe is produced shall have a design stress rating of 2,000 psi at 73°F, listed by the Plastic Piping Institute.
 - 2. Materials from which pipe and pipe fittings are manufactured shall have been tested and approved by NSF International.

2.06 WELLHEAD MATERIALS

- A. Wellheads shall be 2-inch schedule 80 PVC QED or Waste Management Style as shown on the Drawings. Wellheads shall include monitoring ports, control valve, quick-change orifice discs of 0.40, 0.50, 0.75, 1.0, 1.25, and 1.40-inch orifice discs supplied for each wellhead constructed of 1/16-inch stainless steel with orifice plate size engraved in the plate.

2.07 FLEXIBLE HOSE

- A. Flexible hose shall be the diameter of the well head and made of flexible PVC with rigid PVC helix, smooth bore, and corrugated O.D. Hose shall be manufactured by Kanaflex, Model 101-PS or equivalent as approved by the Engineer. Hose clamps shall be Kanaflex Powerlock Clamps PS (stainless steel), or approved equal.

2.08 WELL IDENTIFICATION

- A. Upon completion of well drilling, the Contractor shall paint the well identification number on the well casing using 3-inch tall stenciled letters and white or yellow paint. Lettering by hand or by any other means shall not be permitted.

PART 3 EXECUTION

3.01 PRECONSTRUCTION SERVICES

- A. The Contractor shall survey and stake the extraction well locations before drilling. Preconstruction layout surveying shall be done by a Florida Licensed Professional Surveyor.
- B. The Contractor shall supply surveyed ground elevations of the proposed extraction wells to the Engineer so that the design well depths may be confirmed at least 1 week before drilling.
- C. Extraction well locations must be approved in writing and may be adjusted by the Engineer before drilling begins.

3.02 JOINING OF PVC PIPE

- A. Joining of pipe shall be in accordance with ASTM D2855.
- B. Solvent Welding: A coating of primer as recommended by pipe supplier shall be applied to the entire interior surface of the fitting socket and to an equivalent area on the exterior of the pipe prior to applying solvent cement. The solvent cement shall comply with the requirements of ASTM D2564 and shall be applied in strict accordance with manufacturer's specifications. Pipe shall not be primed or solvent welded during precipitation or when atmospheric temperature is below 40 degrees F or above 90 degrees F.
- C. Curing: After solvent welding, the pipe shall remain undisturbed until cement has thoroughly set. As a guideline for joint setting time, use 1 hour for ambient temperatures 60–90 degrees F or 2 hours when ambient temperature is 40–60 degrees F.
- D. Pipe and fittings that do not fit together to form a tight fitting will be rejected.
- E. In addition, lag screws shall be installed at each PVC coupling to secure vertical piping during placement in well boring.

1. Four lag screws per coupling or two lag screws per bell fitting shall be installed. Screws shall be 316 stainless steel.
2. The length of the lag screws shall equal, but not exceed, the sum of the pipe and coupling (or bell fitting) wall thicknesses. Under no circumstances may the screw length exceed the sum of the pipe and coupling wall thickness.

3.03 DRILLING

- A. The Contractor shall coordinate the start of the drilling with the Engineer and Owner. The Contractor shall notify the Engineer in writing at least 1 day before the start of drilling.
- B. The Contractor shall provide at all times a thoroughly experienced, competent driller during all operations at the drill site.
- C. The Contractor must use dry drilling equipment.
- D. Wells are to be drilled to the depth and diameter as shown on the Drawings. The boring depths shown on the Drawings may be adjusted in the field by the Engineer. Under no circumstances are the drilling depths from the well schedule on the Drawings to be exceeded unless approved by the Engineer in writing in advance.
 1. Wet Borings:
 - a. The Owner and Engineer shall be notified of wet boring conditions.
 - b. If water is encountered in a boring, the Contractor may be directed by the Owner and the Engineer to drill beyond the point at which it was encountered. If wet conditions remain, at the direction of the Owner and the Engineer, the boring may be terminated (after driller has attempted to advance boring for 2 hours) and the length of perforated pipe adjusted by the Engineer. If wet conditions cease (e.g., due to a perched water layer), then drilling will continue to the design depth.
 - c. If water is encountered in a boring at a shallow depth, the Engineer may decrease the well depth and length of perforated pipe, or relocate the well.

2. Abandoned Borings:

- a. If, in the opinion of the Owner and the Engineer, the borehole has not reached a sufficient depth to function as an effective extraction well, the Contractor shall abandon this borehole by backfilling it with cuttings removed during drilling. Soil shall be backfilled and compacted to ground surface. The Contractor shall supply additional soil backfill to refill any settlement within the abandoned borehole, as approved by the Engineer.
- b. If cuttings are unsuitable as backfill (for example, box springs, tires, etc.) the Contractor shall use soil backfill materials.

E. The bore for the well shall be straight and the well pipe shall be installed in the center of the borehole.

1. The Contractor shall take all necessary precautions to maintain the well pipe vertically plumb during the entire backfill operation of the borehole to the satisfaction of the Engineer.
2. The grate over the borehole that is used to keep the well casing plumb shall not be removed until the borehole is backfilled to within 2 feet of ground surface.
3. If the pipe is installed out of plumb, as determined by the Engineer, the Contractor, at his own expense, shall correct the alignment.
4. The well casing shall extend above ground surface as shown on the Drawings. No pipe couplings shall be installed above grade or within 10 feet of ground surface below grade.

3.04 WELL LOGS

A. The Contractor shall keep detailed well logs for all wells drilled. Information recorded on the well logs shall include the following:

1. Location of well based on State Plane.
2. Total depth of well.

3. Visual description of refuse at 5-foot intervals:
 - a. Type of refuse encountered including the estimated percentage of the following components (by volume) on visual inspection:
 - (1) Paper/Cardboard
 - (2) Plastic
 - (3) Yard refuse
 - (4) Construction debris
 - (5) Textiles
 - (6) Tires
 - (7) Sludge
 - (8) Dirt
 - (9) Ash
 - (9) Soil
 - b. Moisture content (approximate in percentages – 25%, 50%, 75%, 100%).
 - c. State of decomposition (approximate).
 - d. Temperature of excavated refuse.
 4. Occurrence, depth, and thickness of water-bearing zones.
 5. Length of slotted pipe and solid pipe below grade.
 6. Thickness, description, and depth from ground surface of backfill layers.
 7. Length of above ground riser stick-up pipe.
- B. Field copies of the well logs shall be provided to the Engineer. If the Contractor fails to provide field copies of well logs to the Owner at the end of each day, the Contractor will not be allowed to conduct any further drilling activities until the logs have been submitted and reviewed by the Engineer.
- C. The Contractor shall submit typed final copies of the well logs with the Record Drawings in accordance with Section 01330, Submittals and Acceptance. Typed final copies of the well logs shall be submitted as Record Drawings. Handwritten logs will not be acceptable for submittal with the Record Drawings.

3.05 JOINING OF PIPES

- A. Pipes shall be joined as specified in Section 02550, Pipe and Pipe Fittings. In addition lag screws shall be installed at each PVC coupling to secure vertical piping during placement in well boring.
 - 1. Four lag screws per coupling or bell fitting shall be installed. Screws shall be 316 stainless steel.
 - 2. The length of the lag screw shall be equal, but not exceed, the sum of the pipe and coupling (or bell fitting) wall thickness. Under no circumstances may the screw length exceed the sum of the pipe and coupling wall thickness.

3.06 BACKFILLING

- A. Backfilling of the well shall commence immediately after well drilling is completed and the well piping has been installed in the borehole.
 - 1. Backfill materials shall be placed carefully within the wells to the dimensions shown on the Drawings and as approved by the Engineer.
 - 2. Gravel and soil backfill containing foreign material may be rejected by the Owner or the Engineer on the basis of a visual examination.
 - 3. Well piping and backfill shall be installed with a safety grate installed over the boring. The safety grate shall remain in place until backfill is within 2 feet of existing ground surface.
- B. Bentonite Plug shall be backfilled and hydrated in 6-inch lifts. The Contractor shall soak each lift according to the manufacturer's instructions prior to filling the next one. A minimum of six bags of bentonite shall be poured into the center of the borehole per 6-inch lift.
- C. Soil backfill shall be rodded in the boring to provide even distribution and compaction.

3.07 REFUSE DISPOSAL

- A. The Contractor shall dispose of excavated refuse in the active landfill at the working face of the Class 1 landfill in coordination with the Owner.

3.08 TEMPORARY CAP

- A. The Contractor shall temporarily cap the riser pipe of the vertical extraction well immediately after well pipe installation to prevent venting of LFG into the atmosphere. The Contractor shall remove this cap during the installation of the wellheads. Lag screws may be necessary due to the internal gas pressure within the well.

3.09 WELLHEAD INSTALLATION

- A. Wellheads shall be installed in accordance with manufacturer's recommendations.
- B. The Contractor shall install vertical extraction well and wellheads in accordance with the manufacturer's recommendations. PVC pipe sections of the wellhead shall be airtight. The Contractor shall repair any leaks at no additional cost to the Owner.
- C. The Contractor shall install flexible hose on all wells so that hose has no sags, as shown on the Drawings. However, flexible hose shall not be taut. Provide enough slack to accommodate minor pipe settlement, as approved by the Engineer.

END OF SECTION

SECTION 02550
PIPE AND PIPE FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall supply all materials, equipment, and labor needed to install complete and make ready for use all pipe, pipe fittings, and valves as specified herein and as indicated on the Drawings.

1.02 RELATED WORK

- A. Section 01330, Submittals
- B. Section 02525, Landfill Gas Extraction Wells and Wellheads

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. The Contractor shall prepare and submit to the Engineer, for review and approval prior to commencement of construction, certificates of compliance on materials furnished and manufacturer's brochures containing complete information and instructions pertaining to the storage, handling, installation, inspection of each type of pipe, pipe fitting, and valve furnished.
- B. The Shop Drawings shall show the following:
 - 1. All dimensions, slopes, and invert elevations at connections to other pipes.
 - 2. All tie-ins to the existing gas, compressed air, and condensate return piping systems shall be field-verified and shown on the Shop Drawings. This shall include pipe size and burial depth at a minimum.
 - 3. Pipe dimensions for each pipe size used:
 - a. Average outside diameter.
 - b. Average inside diameter.
 - c. Minimum average wall thickness.
 - 4. Each pipe and fitting size to be used.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society for Testing and Materials (ASTM)

1. ASTM D 1248 – Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
2. ASTM D 1784 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
3. ASTM D 1785 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
4. ASTM D 2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and other gravity-flow applications.
5. ASTM D 2467 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
6. ASTM D 2513 – Standard Specification for Thermoplastic Gas Pressure Pipe Tubing and Fittings
7. ASTM D 2564 – Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
8. ASTM D 2774 – Standard Practice for Underground Installation of Thermoplastic Pressure Piping
9. ASTM D 2855 – Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
10. ASTM D 3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

B. American National Standard Institute (ANSI)

1. ANSI B 31.8 – Code for Pressure Piping, Appendix N

1.06 QUALIFICATIONS (NOT USED)

1.07 TESTING REQUIREMENTS (NOT USED)

1.08 MAINTENANCE (NOT USED)

1.09 RECORD DRAWINGS (NOT USED)

PART 2 PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- A. All PVC pipe and pipe fittings, except where indicated on the Drawings, shall be Schedule 80 PVC conforming to ASTM D 1784, ASTM D 1785 (for pipe), and ASTM D 2467 (for fittings). Acceptable manufacturers include Nibco Chemtrol (574-295-3000), CertainTeed (610-341-7000), ASAHI/America (800-343-3618), or approved equal.
- B. PVC pipe and pipe fittings shall be manufactured from a compound which meets the requirements of Type 1, Grade 1, Polyvinyl Chloride PVC 1120, Class 12454-B, as outlined in ASTM D 1784. A Type 1, Grade 1 compound is characterized as having the highest requirements for mechanical properties and chemical resistance.
 - 1. Compound from which pipe is produced shall have a design stress rating of 2,000 psi at 73 degrees F, listed by the Plastic Piping Institute.
 - 2. Materials from which pipe and pipe fittings are manufactured shall have been tested and approved by NSF International.
 - 3. Pipe shall be homogenous throughout and shall be free from cracks, holes, foreign inclusions, and other defects.

2.02 PVC FLANGES

- A. Flanges shall be Schedule 80 PVC and shall be plate type, ANSI Class 150 pounds.
- B. The studs, nuts, and washers for the flanges installed above grade shall be hot dipped galvanized steel. The studs, nuts, and washers for flanges installed below ground shall be 316 stainless steel. All threads shall be coated with anti-seize compound.
- C. Flange gaskets shall be full-face neoprene.

2.03 FLEXIBLE PVC PIPE

- A. Flexible PVC pipe shall be as manufactured by Kanaflex Corporation, Compton, California (310-637-1616), Series 101-PS, or approved equal.

- B. Fasteners for flexible PVC pipe shall be Kanaflex 101-PS power lock clamps, or approved equal.

2.04 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

A. General:

1. All HDPE pipe 3-inch diameter and greater as indicated on the Drawings shall be Iron Pipe Size (IPS) Standard Dimension Ratio (SDR) 17 unless otherwise noted on the Drawings. Design working pressure for SDR 17 pipe shall not be less than 100 psi at 73.4 degrees F.
2. Air supply pipes shall be SDR 9 with yellow striping. Design working pressure for SDR 9 pipe shall not be less than 200 psi at 73.4°F
3. Pipe shall be extruded from a Type III, Class C, Category 5, Grade P34 compound with a hydrostatic design stress of 800 psi at 73.4°F. It shall be classified as cell 345464C according to ASTM D 3350 and have the material designation of PE 3608. Manufacturer's literature shall be adhered to when "manufacturer's recommendations" are specified.

B. HDPE Fittings

1. Fittings shall be manufactured from polyethylene compound having cell classification equal to or exceeding the compound used in the pipe.
2. All fittings between 3 and 12 inches and smaller shall be molded SDR 11 or 17.
3. All fittings to be used for air supply shall be molded SDR 9.

2.05 FLANGES FOR HDPE PIPE

- A. Flanges for HDPE pipe installed above ground shall be ductile iron and finished with zinc chromate primer.
- B. Flanges for pipe installed below grade shall be 316 stainless steel.
- C. The studs, nuts, and washers for the flanges installed above grade shall be hot dipped galvanized steel. The studs, nuts, and washers for the flanges installed below ground shall be 316 stainless steel. All threads shall be coated with anti-seize compound.
- D. Flange gaskets shall be full-face neoprene.

2.06 PIPE MARKINGS

All PVC and HDPE pipe shall be stamped by the manufacturer with the following information at 5-foot intervals:

- A. Manufacturer name or trademark
- B. Nominal pipe size
- C. Type of plastic (e.g., PE 3608)
- D. Standard dimension ratio (SDR) or Schedule (SCH) value
- E. ASTM designations (i.e., ASTM D 2513)

2.07 PIPELINE LOCATOR/METALLIC WARNING TAPE

- A. For landfill gas header and laterals as shown on the Drawings, tape shall be detectable locator/warning tape imprinted with the words "Caution Gas Line Buried Below."

PART 3 EXECUTION

3.01 GENERAL

- A. Pipe shall be stored or stacked so as to prevent damage by marring, crushing, or piercing. Maximum stacking height shall be limited to 6 feet.
- B. Pipe and pipe fittings shall be handled carefully in loading and unloading. They shall be lifted by hoists and lowered on skidways in such a manner as to avoid shock. Derricks, ropes, or other suitable equipment shall be used for lowering the pipe into the extraction well borings. Pipe and pipe fittings shall not be dropped or dumped.

3.02 FIELD QUALITY CONTROL

- A. Pipe may be rejected for failure to conform to the Specifications or for the following reasons:
 - 1. Fractures or cracks passing through pipe wall, except single crack not exceeding 2 inches in length at either end of the pipe which could be cut off and discarded. Pipes within one shipment shall be rejected if defects exist in more than 5 percent of shipment or delivery.
 - 2. Cracks sufficient to impair strength, durability or serviceability of pipe.
 - 3. Defects indicating improper proportioning, mixing, or molding.

4. Damaged ends, where such damage prevents making a satisfactory joint.
 5. Scratches or gouges of depth greater than 10 percent of pipe wall thickness.
- B. Acceptance of fittings, stubs, or other specially fabricated pipe sections shall be based on visual inspection at job site and documentation of conformance to these Specifications.
 - C. The Engineer shall be notified by Contractor prior to burial of pipe.
 - D. The Owner reserve the right to require destructive testing of any fusion weld on HDPE pipe.

3.03 PVC PIPE STORAGE

- A. At the end of each day, all open ends of joined pipe shall be capped or otherwise covered to prevent entry by animals or debris.

3.04 PVC PIPE INSTALLATION

- A. PVC pipe installation shall conform to these Specifications, the manufacturer's recommendations, and as outlined in ASTM D 2774.
- B. Pipe shavings and debris shall be removed from the inside of all pipes using a method approved by the Engineer.

3.05 JOINING OF PVC PIPE

- A. Joining of pipe shall be in accordance with ASTM D2855.
- B. Preparation:
 1. All pipe shall be inspected for cuts, scratches, or other damage prior to installation. Pipe with imperfections shall not be used. All burrs, chips, etc. shall be removed from pipe interior and exterior.
 2. The interior of the pipe shall be cleared of foreign matter; e.g., loose dirt, tape, pipe shavings, and paper. All loose dirt and moisture shall be wiped from the interior and exterior of the pipe end and the interior of the fitting. A "chimney sweep-type" brush or approved alternative shall be used to clean the inside of the pipes of shavings created during cutting or perforating the pipe.

3. All pipe cuts shall be square, perpendicular to the center line of pipe. Pipe ends shall be beveled prior to applying primer and solvent cement so that the cement is not wiped off during insertion into the fitting socket.
- C. Solvent Welding: A coating of primer as recommended by pipe supplier shall be applied to the entire interior surface of the fitting socket and to an equivalent area on the exterior of the pipe prior to applying solvent cement. The solvent cement shall comply with the requirements of ASTM D 2564 and shall be applied in strict accordance with manufacturer's specifications. Pipe shall not be primed or solvent welded during precipitation or when atmospheric temperature is below 40 degrees F or above 90 degrees F.
- D. Curing: After solvent welding, the pipe shall remain undisturbed until cement has thoroughly set. As a guideline for joint setting time, use 1 hour for ambient temperatures 60–90 degrees F, or 2 hours when ambient temperature is 40–60 degrees F. The pipe shall be set in a position that creates a bond around the complete circumference of the pipe.
- E. Alignment: Pipe and pipe fittings shall be selected so as to minimize the linear deviation at the joints and so that joints present a smooth surface. Pipe and fittings that do not fit together to form a tight fitting will be rejected.

3.06 FLEXIBLE PVC PIPE CONNECTIONS

- A. Connections to pipe shall be made with clamps in accordance with manufacturer's step-by-step procedures and recommendations and as approved by the Engineer.

3.07 HDPE PIPE HANDLING

- A. HDPE pipe shall not be bent more than the minimum radius recommended by the manufacturer for type, grade, and SDR. Care shall be taken to avoid imposing strains that will overstress or buckle the HDPE piping or impose excessive stress on the joints.
- B. Joining HDPE Pipe:
 1. Only two methods shall be used to join HDPE pipe: heat fusion and mechanical joining.
 - a. Mechanical joining shall be accomplished with HDPE flange adapters, neoprene gaskets, and ductile iron/stainless steel back-up flanges and shall be used only where shown on the Drawings. Refer also to Article 3.09.

- b. Heat fusion joints shall be made in accordance with manufacturer's step-by-step procedures and recommendations.
 - (1) Fusion equipment and a trained operator shall be provided by the Contractor. Pipe fusion equipment shall be of the size and nature to adequately weld all pipe sizes and fittings necessary to complete the project (refer to Article 2.10).
 - (2) Branch saddle fusions shall be made in accordance with manufacturer's recommendations and step-by-step procedures. Branch saddle fusion equipment shall be of the size to facilitate saddle fusion within the pipe trench.
 - (3) Heat fusion shall be performed outside the trench whenever practical.
 - (4) Before heat fusing pipe, each length shall be inspected for the presence of dirt, sand, mud, shavings, and other debris, and any foreign material shall be completely removed.
 - (5) At the end of each day, all open ends of fused pipe shall be capped or otherwise covered to prevent entry by animals or debris.
 - (6) Electrofusion fittings may be used where space is not suitable for butt fusion equipment as approved by the Engineer.
- c. According to the manufacturer's instructions, no fusion shall be performed in precipitation unless a shelter is provided.

3.08 HDPE PIPE INSTALLATION

- A. Pipe installation shall comply with the requirements of ASTM D2321, PPI TR-31/9-79, and the manufacturer's recommendations.
- B. Lengths of fused pipe to be handled as one segment shall not exceed 500 feet.
- C. The Owner or the Engineer shall be notified prior to any pipe being installed in the trench to have an opportunity to inspect the following items:
 - 1. All butt and saddle fusions.
 - 2. Pipe integrity.

3. Trench excavation and bedding material for rocks and foreign material.
 4. Proper trench slope.
 5. Trench contour to ensure the pipe will have uniform and continuous support.
 6. Proposed backfill sand and soil.
- D. Any irregularities found by the Engineer during this inspection must be corrected before lowering the pipe into the trench. Pipe shall be allowed sufficient time to adjust to trench temperature prior to any testing, segment tie-ins, and/or backfilling.
- E. Tie-ins shall be made out of the trench whenever possible. When tie-ins are to be made in a trench, a bell hole shall be excavated large enough to ensure an adequate and safe work area.
- F. The Contractor shall collect all pipe shavings and discard in a trash receptacle. Shavings shall not be left on the ground.
- G. All installed HDPE pipe shall be marked in 25-foot intervals corresponding to the stationing required for slope confirmation and conformance surveying. For main pipeline, station numbering shall be continuous and sequential. Station numbering shall be referenced in daily logs to document pipe installation progress.

3.09 FLANGED CONNECTIONS

- A. Flanged connections above grade shall be constructed with ductile iron back-up rings and hot-dipped galvanized hardware.
- B. Flanged connections below grade shall be constructed with 316 stainless back-up rings and hardware.
- C. All threads shall be coated with anti-seize compound.

3.10 PIPE SUPPORTS

- A. All piping and valves shall be supported in such a manner as to prevent any stress being transmitted between sections and connected equipment and appurtenances.

3.11 SEGMENT TESTING

- A. The HDPE laterals and connections to LFG header, air supply lines, and condensate discharge line pipeline segments greater than 100 linear feet shall be subjected to pressure tests as described herein to detect any leaks in the piping.

The Contractor shall accept the responsibility for locating, uncovering (if previously backfilled), and repairing any leaks detected during testing.

- B. Polyethylene piping shall be butt welded together into testing segments. Segments shall be connected to a testing apparatus on one end and fitted with fusion-welded caps on all openings.
- C. The segment to be tested shall be allowed time to reach constant and/or ambient temperature before initiating the test.
- D. The test pressure for LFG laterals, header, and condensate/dewatering pipes shall be 30 psig. The test pressure for air supply line shall be 100 psig.
- E. Pressure drop during the test shall not exceed 1 psi over 1 hour. The Engineer shall sign off on a test form to indicate test compliance.
- F. The Engineer shall be notified prior to commencement of the testing procedure and shall be present during the test.
- G. All equipment for this testing procedure, including an adequately sized air compressor, fittings, caps/pipe plugs, etc., shall be furnished by the Contractor. Other necessary equipment includes a flange adaptor with a steel or brass blind flange. Tapped and threaded into the blind flange will be a temperature gauge with a scale of 0 to 100 degrees C with 1-degree intervals, a pressure gauge with a scale that spans 0 to 40 psi with 1 psi increments, an appropriate valve to facilitate an air compressor hose, and a ball valve to release pipe pressure at completion of test. Pipe reducers shall be used to adapt test flange to size of pipe being tested.

3.12 TEST FAILURE

- A. The following steps shall be performed when a pipe segment fails the 1 psi over 1 hour test described in Article 3.11 E above.
 - 1. The pipe and all fusions shall be inspected for cracks, pinholes, or perforations.
 - 2. All blocked risers and capped ends shall be inspected for leaks.
 - 3. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.
- B. All pipe and fused joint leaks shall be repaired by cutting out the leaking area and refusing the pipe.

- C. After all leaks are repaired, a retest shall be performed in accordance with Article 3.11.

3.13 TEST REPORTING

- A. Each test (pass or failure) shall be reported in writing on a form approved by the Engineer.
- B. If failure occurs, Contractor shall note the following:
 - 1. Location of failure segment.
 - 2. Nature of leaks.
 - 3. Repairs performed.
 - 4. Results of test.

END OF SECTION

SECTION 03250
CONCRETE JOINTS AND JOINT ACCESSORIES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals required and install accessories for concrete joints as shown on the Drawings and as specified in this Section.

1.02 RELATED WORK

- A. Section 03930, Modifications and Repair to Concrete.

1.03 SUBMITTALS

- A. The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:
 - 1. Premolded joint fillers: Product data, including catalogue cut, technical data, storage requirements, installation requirements, location of use, and conformity to ASTM standards.
 - 2. Compressible joint filler: Product data, including catalogue cut, technical data, storage requirements, installation requirements, location of use, and conformity to ASTM standards.
 - 3. Bonding agents: Product data, including catalogue cut, technical data, storage requirements, product life, application requirements, and conformity to ASTM standards.
- B. Certifications
 - 1. Certification that all materials used within the joint system are compatible with each other.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C881—Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - 2. ASTM C1059—Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
 - 3. ASTM D1751—Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- B. Federal Specifications
 - 1. FS SS-S-210A—Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 WEATHER CONSTRAINTS (NOT USED)

PART 2 PRODUCTS

2.01 GENERAL

- A. The use of the manufacturer's name and model or catalog number is to establish the standard of quality and general configuration desired.
- B. All materials used together in a given joint (bond breakers, joint fillers, sealants, etc.) shall be compatible with one another. Coordinate selection of suppliers and products to ensure compatibility. Under no circumstances shall asphaltic bond breakers or joint fillers be used in joints receiving sealant.

2.02 MATERIALS

A. Bonding Agent

1. Epoxy bonding agent shall be a two-component, solvent-free, moisture-insensitive, epoxy-resin material conforming to ASTM C881, Type II. The bonding agent shall be Sikadur 32 Hi Mod by Sika Corporation of Lyndhurst, NJ; Concessive Liquid (LPL) by Master Builders of Cleveland, OH; or equal.

B. Compressible Joint Filler

1. The joint filler shall be a non-extruded watertight strip material use to fill expansion joints between structures. The material shall be capable of being compressed at least 40% for 70 hours at 68°F and subsequently recovering at least 20% of its original thickness in the first half hour after unloading.

PART 3 EXECUTION

3.01 INSTALLATION

A. Expansion Joints

1. Remove all existing bonding agent from concrete expansion joint and prepare surface according to manufactures instructions for installing the new bonding agent.
2. Position joint filler in all expansion joints that do not have joint filler already in place.
3. Install bonding agent according to manufacturer's recommendations over the joint filler ensuring water tight bond to concrete surfaces and that the bonding agent fills the entire width of the expansion joint.
4. Allow sufficient time for the bonding agent to cure according to the manufacturer's recommendations.

END OF SECTION

SECTION 15055
PIPING SYSTEMS—GENERAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Specification describes responsibilities and requirements for Piping Systems including the following:
 - 1. Labor, materials, tools, equipment, and services to be furnished in accordance with the provisions of the Contract Documents. The materials to be used for the piping systems are listed by service in the Contract Drawings.
 - 2. Coordination of work with other trades.
 - 3. Furnishing and installing all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation, although such work is not specifically indicated.

1.02 RELATED WORK

- A. Section 01300, Contract Administration.
- B. Section 01330, Submittals and Acceptance.
- C. Division 15, Mechanical.

1.03 SUBMITTALS

The Contractor shall submit the following in accordance with Section 01330, Submittals and Acceptance:

- A. If the Contractor deviates from the piping layout as shown on the Contract Drawings, the Contractor shall submit scaled piping drawings showing locations and dimensions to and from fittings, valves, tanks, equipment, structures, and related appurtenances. Provide scaled drawings to a minimum scale of 1 inch equals 10 feet. Provide details to minimum scale of 1/8 inch equals 1 foot. Elevations shall correspond to reference vertical elevation datum shown or provided for this project.
- B. Copies of any manufacturer's written directions regarding material handling, delivery, storage, and installation.
- C. Submit copies of forms documenting required field pressure testing work and results.

- D. Submit manufacturer's data sheet for gaskets supplied showing dimensions and bolting recommendations.
- E. Support Systems:
 - 1. Identify support, guide, and anchor type by catalog number and shop/contract drawing detail number.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society of Mechanical Engineers (ASME)

- 1. ASME B1.1—Unified Inch Screw Threads (UN and UNR Thread Forms).
- 2. ASME B1.20.1—Pipe Threads, General Purpose (Inch).
- 3. ASME B16.21—Nonmetallic Flat Gaskets for Pipe Flanges.
- 4. ASME B18.2.1—Square, Hex, Heavy Hex, and Askew Head Bolts, and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).
- 5. ASME B18.2.2—Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).
- 6. ASME B31.1—Power Piping.
- 7. ASME B31.1—Process Piping.
- 8. ASME BPVC—Boiler and Pressure Vessel Code.

B. American Society for Testing and Materials (ASTM)

- 1. ASTM A183—Specification for Carbon Steel Track Bolts and Nuts.
- 2. ASTM A193/A193M—Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and other Special Purpose Applications.
- 3. ASTM A194/A194M—Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both.
- 4. ASTM A307—Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
- 5. ASTM D1330—Standard Specification for Rubber Sheet Gaskets.

6. ASTM F467—Standard Specification for Nonferrous Nuts for General Use.

C. American Water Works Association (AWWA)

1. AWWA C111/A21.11—Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
2. AWWA C207—Steel Pipe Flanges for Waterworks Service, Sizes 4 -inch through 144 inch. (100 mm through 3,600 mm).

D. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)

1. MSS SP -58—Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation.

E. NSF International (NSF)

1. NSF 61—Drinking Water System Components – Health Effects.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

- A. Warranties shall be in accordance with Division 0, Bidding and Contracting Requirements, and Specification Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall protect the pipe from kinks, cuts, end damage, and other defects when transporting all piping. Binding and tie-down methods shall not damage or deflect the pipes in any way. Pipe damaged during shipment shall be rejected.
- B. Pipe shall be stored on level ground, preferably turf or sand, free of sharp objects that could damage the pipe. Stacking of any pipe shall be limited to a height that will not cause excessive deformation of the lower layers of pipe under anticipated temperature conditions. When necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such widths to not allow deformation of the pipe at the point of contact with the sleeper or between supports. Pipe shall not be removed from storage until bedding or sub-grade work is complete and ready to receive the pipe.
- C. The joined pipe shall be handled in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Ropes, fabric, or rubber-protected

slings and straps shall be used when handling pipe. Chains, cables, or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe. Pipe or fittings shall not be dropped. Slings for handling joined pipe shall not be positioned at socket-welded joints. Sections of the pipes with cuts and gouges shall be removed and the ends of the pipe rejoined. The Contractor shall repair all damaged pipe exterior coatings in accordance with the manufacturer's written instructions before the pipe is installed. Pipe with damaged linings shall be rejected.

- D. The Contractor shall cover all pipe stored on the site with canvas or other opaque material to protect it from sunlight. Provide air circulation under the covering.
- E. The Contractor shall inspect all pipe, fittings, and other accessories upon delivery and during the work. Any defective or damaged materials found during field inspection or during tests shall be removed from the site and replaced by and at the expense of the Contractor.
- F. The interior of all pipe, fittings, and other accessories shall be kept free from dirt and foreign matter at all times. Fittings shall be drained and stored in a manner that will protect them from damage by freezing.
- G. Gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-delivered-to-site and first-to-be-installed rotation basis. Mechanical-joint glands, bolts, and washers shall be handled and stored in a manner that will ensure proper use with respect to types and sizes.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 OPERATIONS AND MAINTENANCE (O&M) MANUALS (NOT USED)

1.13 DEFINITIONS OF BURIED, EXPOSED, AND SUBMERGED PIPING

- A. Buried piping is piping buried in soil, beneath a structure and/or encased in concrete. Where an exterior pipe coating is specified to be factory- or field-applied, the Contractor shall provide the coating up to the penetration of a structure. Piping encased in concrete does not require an exterior coating other than what is factory furnished.

- B. Exposed piping is piping in any of the following conditions or locations:
 - 1. Above ground.
 - 2. Inside buildings, vaults, or other structures.
 - 3. In underground concrete trenches or galleries.
- C. Submerged piping is considered to be all piping within a liquid holding tank.

1.14 SYSTEM DESIGN REQUIREMENTS

- A. General
 - 1. The Specifications and Drawings are not all inclusive of explicit piping details; provide piping for intended use in compliance with laws and regulations, including ASME B31.1 Code (Power Piping).
 - 2. Pressure ratings and materials specified represent minimum acceptable standards for piping systems.
 - 3. Piping Systems: Suitable for the services specified and intended.
- B. Support Systems
 - 1. The absence of pipe supports and details on the Drawings shall not relieve the Contractor of responsibility for sizing and providing supports for this project.
 - 2. Select and design within the specified spans and component requirements.
 - 3. Comply with requirements of MSS SP 58, Pipe Hangers and Supports – Materials, Design, and Manufacture.
 - 4. Criteria for structural design and selection of pipe support system components:
 - a. Dead loads imposed by the weight of the pipes filled with water, within specified spans and component requirements, plus any insulation.
 - b. Safety factor: Minimum of 5.
 - 5. Design, size, and space support anchoring devices, including anchor bolts, inserts, and other devices used to anchor the support, to withstand the shear and pullout loads imposed by loading and spacing on each particular support.

C. Adapters

1. No attempt has been made to show all adapters, spool pieces, reducers, bushings, or other fittings required to accommodate the connection of pipes, fittings, and valves of various joint design and sizes throughout the project. The Contractor is completely responsible for providing, at his expense, all adapters, reducers, sleeves, spool pieces, and other fittings and appurtenances necessary for connection of pipe (for the same pipe material of or a transition of pipe materials), valves, fittings, and appurtenances throughout the project, which shall be constructed of appropriate materials, coated and lined to match the materials, coatings, and linings specified for the connected components. All adapters, reducers, sleeves, spool pieces, and other fittings shall be coated and lined in accordance with the specifications for each individual pipe system.

D. Unions

1. No attempt has been made to show all unions required for the project. The Contractor shall provide unions at all connections of threaded pipe to installed equipment unless deleted by the Engineer, in writing, at certain locations. The unions shall meet or exceed the quality of materials, pressure rating, service, and painting requirements of connected piping.

PART 2 PRODUCTS

2.01 PIPING SYSTEM GENERAL REQUIREMENTS SCHEDULE

- A. Unless noted otherwise in the Drawings, piping system materials, fittings, and appurtenances are subject to requirements of the individual Specifications for the piping systems.

2.02 THREAD FORMING FOR STAINLESS STEEL BOLTS

- A. Form threads for stainless steel bolts by rolling, not by cutting or grinding.

2.03 BOLTS AND NUTS FOR FLANGES FOR DUCTILE IRON PIPE FLANGES

- A. Bolts, washers, and nuts for submerged Class 150 flanges shall be Type 304 stainless steel conforming to ASTM A193 (Grade B8) for bolts and ASTM A194 (Grade 8) for nuts. Fit shall be Classes 2A conforming to ANSI B1.1 when connecting to cast-iron valves having body bolt holes.

2.04 BOLTS AND NUTS FOR PVC PIPE FLANGES

- A. Bolts, washers, and nuts for buried and submerged flanges and flanges located outdoors above ground or in vaults and structures shall be Type 304 stainless steel conforming to ASTM A193, Grade B8, for bolts and ASTM A194, Grade 8, for nuts.
- B. The Contractor shall provide a washer under each nut and under each bolt head. Washers shall be of the same material as the nuts.

2.05 LUBRICANT FOR STAINLESS STEEL BOLTS AND NUTS

- A. Anti-seize thread lubricant shall be applied to the thread portion of all (above grade and below grade) stainless steel bolts (stainless steel tie rods, etc.) during assembly. Anti-seize lubricant shall be chloride free and shall be nongalling NSF approved. Anti-seize thread lubricant shall be Jet-Lube “Nikal,” John Crane “Thred Gard Nickel,” Never-Seez “Pure Nickel Special,” or Permatex “Nickel Anti-Seize.”

2.06 FLANGE GASKETS FOR STEEL, DUCTILE IRON, AND STAINLESS STEEL PIPE

- A. Flange gaskets shall be in accordance with AWWA C207, except as modified in this Section. Gaskets shall be ring type. All gasket material shall be suitable for the fluid being conveyed and shall be resistant to free chlorine concentrations up to 10 mg/L. All gasket material shall be rated to the surge pressures listed in the pipe schedule. Gaskets shall be EPDM, Viton, or an approved equal.

2.07 FLANGE GASKETS FOR PVC PIPE

- A. Gaskets for flanged joints shall be full faced, 1/8-inch thick, having a Brinell Hardness of 50 to 70 durometer A. Gasket material shall be EPR unless noted or specified otherwise. Gasket material for sodium hypochlorite service shall be Viton ETP unless noted or specified otherwise. Gaskets shall be compatible with the fluids conveyed.

PART 3 EXECUTION

3.01 PREPARATION

- A. Field Alignment
 - 1. The piping shown on the Contract Drawings is generally indicative of the work, with symbols and notations provided for clarity. However, the Contract Drawings are not an exact representation of all conditions

involved; therefore, install piping to suit actual field conditions and measurements as approved by the Engineer. No extra compensation will be made for work due to differences between indicated and actual dimensions.

2. The Contractor shall install all adapters, fittings, flanged connections, closures, restrained joints, etc. not specified but necessary for a complete installation acceptable to the Engineer.
3. The Contract Drawings do not indicate all adapters, fittings, spool pieces, bushings, unions, supports, hangers, and other items required to accommodate the installing and connecting of pipe, fittings, valves, and equipment of various joint designs and sizes. Provide such required items of appropriate designs, materials, coatings, and linings.

3.02 PIPE PRODUCTS INSPECTION

- A. The Contractor shall obtain from the pipe manufacturer a certificate of inspection to the effect that the pipe, fittings, gaskets, glands, bolts, and nuts supplied for this Contract have been inspected at the plant and that they meet the requirements of these specifications. The Contractor shall submit these certificates to the Engineer before installing the pipe materials. The Contractor shall visually inspect all pipe and fittings at delivery and before they are lowered into the trench to be installed. Pipe or fittings that do not conform to these Specifications or have been damaged in any manner will be rejected and the Contractor must remove them immediately. The entire product of any plant may be rejected when, in the opinion of the Engineer, the methods or quality assurance and uniformity of manufacturer fail to secure acceptable and uniform pipe products or where the materials used produce inferior pipe products.

3.03 REMOVAL OF EXISTING PIPE AND FITTINGS

- A. Pipe specifically identified on the Drawings to be removed or replaced from service shall be physically removed. The limits of pipe to be removed shall be specifically called for in the plans or shall be approved in writing by the Engineer. Any other removal not specifically called for shall be approved in writing and shall be considered incidental to construction of other items in the contract and the Contractor will not receive compensation for such work.
- B. The removed pipe, fitting, and appurtenances will become the Contractor's property and the Contractor shall be responsible for proper disposal and any required permits for disposal. All removed materials can be disposed at no charge in the County's landfill.

3.04 BURIED PIPING AND PIPE FITTINGS

A. Installation

1. Inspect all piping for defects and remove all lumps or excess coatings before installation. The inside of the mechanical joint and outside of plain-end pipe shall be cleaned before joining pipe. Caution shall be taken to prevent damage to the pipe during lowering into the trench. Remove all foreign matter that has entered the pipe during storage and installation. The Contractor shall cover the pipe ends during installation to prevent debris from entering the pipe. No debris, tools, clothing, or other material shall be placed in the pipe.
2. After being placed in the trench, the pipe shall be brought to the proper line and grade by compacting the approved backfill material under it, except at the bell end. Joint deflection shall not exceed 75% of the manufacturer's limit.
3. The Contractor shall install temporary water-tight plugs on the pipe ends during the time that the pipe is in the trench but no work is in progress. If there is water in the trench upon beginning work, this plug shall remain in place until the trench has been pumped dry, unless otherwise approved by the Engineer, the Engineer's Representative, or the Owner's Representative.
4. Coat threaded portions of stainless steel bolts and nuts with lubricant before assembly.
5. Restrained plugs or caps shall be inserted into all buried dead end pipes, tees, or crosses. Provide blind flanges for all flanged exposed piping. Restrained plugs and caps installed for pressure testing shall be fully secured and blocked to withstand the test pressure.
6. Where plugging is required because of contract division or phasing for later connection, the ends of such lines shall be equipped with a suitable cast-iron or ductile-iron plug/cap or blind flange with or without a blowoff cock, as shown on the Drawings. Installation or removal of such plugging shall be considered incidental to the work and the Contractor shall not be compensated by the Owner for performing this work.

3.05 FLANGED JOINTS FOR EXPOSED PIPE AND FITTINGS

- A. When bolting flanged joints, the Contractor shall take care to avoid restraint on the opposite end of the pipe or fitting, which would prevent uniform gasket compression or which would cause unnecessary stress in the flanges. One flange shall be free to move in any direction while the flange bolts are being tightened. Bolts shall be tightened gradually and at a uniform rate to ensure uniform compression of the gasket, in accordance with pipe and fitting manufacturer's recommendations.

- B. Coat threaded portions of stainless steel bolts and nuts with lubricant before assembly.

3.06 FLUSHING, CLEANING, TESTING AND INSPECTION OF PIPING

- A. All newly installed piping shall be pressure tested to ensure that there are no leaks. The pressure testing shall consist of opening all valves to the new section of pipe and observing flow through the new section under normal operating conditions. There are no high-pressure pipes on this project.

END OF SECTION

SECTION 15110
MANUAL, CHECK, AND PROCESS VALVES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals required and install complete and ready for operation all valves as shown in the Drawings and as specified in this Section. All valves shall be complete with all necessary manual actuators, valve boxes, extension stems, and floor stands, which are required for proper valve operation and completion of the work.
 - 1. All valves shall be of the sizes shown in the Drawings. All equipment of the same type shall be from one manufacturer, unless authorized in writing by the Engineer.
 - 2. The valves shall include but not be limited to the following:
 - a. Plug Valves

1.02 RELATED WORK

- A. Section 01330, Submittals and Acceptance.
- B. Section 15055, Piping Systems—General.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. Product technical submittal data shall contain the following information and data:
 - 1. Acknowledgment that products submitted meet requirements of standards referenced.
 - 2. Manufacturer's installation instructions.
 - 3. Manufacturer's operation and maintenance manuals.
 - 4. Data of valves, actuators, and accessories:
 - a. Pressure and temperature rating.

- b. Materials of construction, with ASTM reference and grade.
- c. Linings and coatings.
- d. Dimensions and weight.
- e. Flow coefficient.
- f. Actuators and accessories details.
- g. Manufacturer's product brochure, cut-sheets, and parts diagrams.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

A. American Society of Mechanical Engineers (ASME)

- 1. ASME B1.1—Unified Inch Screw Threads (UN and UNR Thread Forms).
- 2. ASME B1.20.1—Pipe Threads, General Purpose (Inch).
- 3. ASME B16.21—Nonmetallic Flat Gaskets for Pipe Flanges.
- 4. ASME B18.2.1—Square, Hex, Heavy Hex, and Askew Head Bolts, and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).
- 5. ASME B18.2.2—Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).
- 6. ASME B31.1—Power Piping.
- 7. ASME B31.1—Process Piping.
- 8. ASME BPVC—Boiler and Pressure Vessel Code.

B. American Society for Testing and Materials (ASTM)

- 1. ASTM A183—Specification for Carbon Steel Track Bolts and Nuts.
- 2. ASTM A193/A193M—Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and other Special Purpose Applications.
- 3. ASTM A194/A194M—Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both.
- 4. ASTM A307—Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
- 5. ASTM D1330—Standard Specification for Rubber Sheet Gaskets.
- 6. ASTM F467—Standard Specification for Nonferrous Nuts for General Use.

- C. American Water Works Association (AWWA)
 - 1. AWWA C111/A21.11—Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 2. AWWA C207—Steel Pipe Flanges for Waterworks Service, Sizes 4 -inch through 144 inch. (100 mm through 3,600 mm).
- D. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)
 - 1. MSS SP -58—Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and Installation.
- E. NSF International (NSF)
 - 1. NSF 61—Drinking Water System Components – Health Effects.

1.06 QUALITY ASSURANCE (NOT USED)

1.07 WARRANTIES

- A. Warranties shall be in accordance with Division 0, Bidding and Contracting Requirements, and Specification Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. All valves, unless otherwise directed, shall be loaded and unloaded by lifting, and under no circumstances shall valves be dropped, skidded, or rolled. Valves shall not be stacked or placed under pipe, fittings, or other valves in such a manner that damage could result.
- B. Slings, hooks, or tongs used for lifting shall be padded in such a manner as to prevent damage to exterior surface or interior linings and valve components. If any part of the coating, lining, or components is damaged, the repairs or replacement shall be made by the Contractor at his expense and in a manner satisfactory to the Engineer before attempting to install such valves.
- C. Only new valves will be allowed for installation and shall be stored in a manner to prevent damage and be kept free of dirt, mud, or other debris.

1.09 QUALIFICATIONS

- A. All of the valves shall be products of well-established firms which are fully experienced, reputable, have been selling this product for a minimum of 10 years, and are qualified in the manufacture of the particular product furnished. The

valves shall be designed, constructed, and installed in accordance with the requirements and procedures of applicable AWWA standards and shall comply with these Specifications as applicable.

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 OPERATIONS AND MAINTENANCE (O&M) MANUALS (NOT USED)

1.13 VALVE TYPE CLASSIFICATIONS

A. Ball Valves (Type 200 series):

1. Type 210: Double-Union PVC Ball Valves, 3 Inches and Smaller, for Water and Light Chemical Service.

B. Plug Valves (Type 900 series):

1. Type 920: Cast-Iron Non-Lubricated Eccentric Plug Valves, 4 Inches and Larger.

PART 2 PRODUCTS

2.01 GENERAL

- A. Valves are identified in the Drawings by size and type number. For example, a callout of 36V300 refers to a 36-inch-diameter Type 300 valve. A Type 300 valve is a flanged, rubber-seated butterfly valve that is 4 inches through 72 inches for exposed service.
- B. All valves shall be complete with all necessary geared actuators, chainwheels and chains, handwheels, levers, valve bonnets, valve boxes, extension stems, operating nuts, and T-handle wrenches, which are required for proper valve operating and completing of the work included under this Section. Renewable parts including discs, packing, and seats shall be of types specified in this Section and acceptable by valve manufacturer for the intended service. All units shall have the name of the manufacturer and the size of the valve cast on the body or bonnet or shown on a permanently attached stainless-steel plate in raised embossed letters. All isolation valves shall be suitable for the intended service with bubble-tight shutoff to flow in either direction.

- C. Bronze or brass components in contact with water shall comply with the following requirements:

Constituent	Content
Zinc	7% maximum
Aluminum	2% maximum
Lead	8% maximum
Copper + Nickel + Silicon	83% minimum

- D. Valves and valve operators shall be factory prepared and primed and field finish coated.

2.02 VALVE ACTUATORS

- A. All valves shall open counter clockwise as viewed from the top. Unless otherwise required by the Owner, the direction of rotation of the wheel or wrench nut to open each valve shall be to the left (counterclockwise). Each valve body or actuator shall have the word "Open" cast on it and an arrow indicating the direction to open.
- B. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. All exposed nuts, bolts, and washers shall be AISI Type 316 stainless steel. Unless noted otherwise, valves shall be equipped with the following manual actuators:
1. Buried or Submerged Valves 8 Inches and Larger: Geared actuators with 2-inch-square operating nuts (with valve bonnets, valve boxes, and extension stems as required) and wrench.
- C. All buried valves shall have non-rising stems. All buried valves 3 feet below grade or deeper as measured at the valve centerline shall be furnished with an operator stem extension (with locking feature to attach extension stem to the nut) to extend the operating nut within 6 inches from the top of the valve box cover.

2.03 VALVE END CONNECTIONS

- A. Provide valve end connections conforming to connected piping and as shown in the Drawings. Generally, all buried valves shall be mechanical joint type end connectors. Exposed valves shall be screwed-end, socket-weld end, or flanged to conform to adjacent exposed connected piping system.
- B. Comply with the following standards:
1. Threaded: ANSI B1.20.1.
 2. Flanged: ANSI B16.1 Class 125 unless other noted or AWWA C207.

3. Mechanical (gland) Type: AWWA C111.
 4. Soldered: ANSI B16.18.
- C. Nuts, Bolts, and Washers: Wetted or internal to be bronze or stainless-steel. Exposed to be zinc or cadmium-plated.
- D. Epoxy Interior Coating: Provide epoxy coating for all interiors of ferrous valve body surfaces in accordance with AWWA C550. Coatings shall be NSF-approved for valves in all potable water piping services. Coatings shall not be required for stainless-steel valve interiors.

2.04 VALVE BOXES

- A. All buried valves 2-inch size and larger shall be equipped with a standard cast-iron roadway valve box. Valve boxes shall be of the slip or sliding type with a round lid marked "Drain". The box shall be designed to prevent transfer of the surface loads directly to the valve or piping. Valve boxes must have a minimum adjustable range of 12 inches and a minimum inner diameter of 6 inches. All valve boxes and lids shall be produced from grey cast-iron conforming to the latest revision of specification for grey iron castings, ASTM designation A48, Class 20A-25A. All castings shall be true and free of holes and shall be cleaned according to good foundry practice, chipped and ground as needed to remove fins and rough places on castings. Valve boxes have to be rated to sustain FDOT H-20 loadings and have a minimum depth of 8 inches. The valve box lid shall fit flush in the top of the box without forcing and shall not rock, tip, or rattle.
- B. Valve boxes shall be as manufactured by Tyler Pipe, Geneco, Star Pipe Products, or equal.

2.05 EXTENSION STEMS

- A. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover. Extension stems shall be Type 316 stainless steel, solid core, and shall be complete with 2-inch-square operating nut. The connections of the extension stems to the operating nuts and to the valves shall withstand without damage a pull of 300 foot-pounds.

- B. Extension stem diameters shall be as tabulated below:

Valve Size (inches)	Minimum Extension Stem Diameter (inches)
2	3/4
3, 4	7/8
6	1
8	1-1/8
10, 12	1-1/4
14	1-3/8
16, 18	1-1/2
20, 24, 30, 36	1-3/4
42, 48, 54	2

2.06 BALL VALVES (TYPE 200 SERIES)

- A. Type 210—Double-Union PVC Ball Valves, 3 Inches and Smaller, for Water and Light Chemical Service:

1. Unless noted otherwise, ball valves installed in PVC piping systems 3 inches and smaller shall be constructed from PVC per ASTM D1784, rated to 150 psi minimum from 30 to 120°F, double-union design with two-way blocking capability, socket end connection except where threaded or flanged-end valves are specifically shown in the Drawings, double EPDM O-ring seals and EPDM backing cushions, PTFE seals, ABS handle, NSF-61 certified. Provide stem extensions when valves are installed in insulated piping. Stem extensions shall be of sufficient length to bring the bottom of the operating handle above the outside of the insulation. Valves shall be as manufactured by Asahi/America Inc., Quarter-Bloc Ball Valve Series, or approved equal.

2.07 PLUG VALVES (TYPE 900 SERIES)

- A. Plug and Seating Design for Eccentric Plug Valves (Types 900, 910, and 920): Eccentric plug valves shall comply with MSS SP-108 and the following. Provide a rectangular or circular plug design, with an associated rectangular or round seat. Provide bidirectional seating design. The valve shall seat with the rated pressure upstream and downstream of the closed plug. Provide geared actuators sized for bidirectional operation.
- B. For Types 900, 910, 920, and eccentric plug valves, the metallic portion of the plug shall be one-piece design and shall be without external reinforcing ribs which result in a space between the rib and the main body of the plug through which water can pass. Valves shall be repackable without any disassembly of valve or actuator. The valve shall be capable of being repacked while under the

design pressure in the open position. Nowhere in the valve or actuators shall the valve shaft be exposed to iron-on-iron contact. Sleeve bearings shall be stainless-steel in valve sizes 20 inches and smaller and bronze or stainless-steel in valve sizes 24 inches and larger. Provide enclosed worm-gear actuators for valves 6 inches and larger.

- C. Rubber compounds shall have less than 2% volume increase when tested in accordance with ASTM D471 after being immersed in distilled water at a temperature of $73.4^{\circ}\text{F} \pm 2^{\circ}\text{F}$ for 70 hours.
- D. Type 920—Cast-Iron Non-Lubricated Eccentric Plug Valves, 4 Inches and Larger:
 - 1. Plug valves 4 inches and larger shall be of the non-lubricated eccentric type with resilient faced plugs and shall be furnished with flanges or mechanical-joint end connections to match connecting piping and as shown in the Drawings. Flanged valves shall be 125-lb flanges and faced and drilled to the ANSI B16.1, 125-lb standard. Mechanical joint ends shall conform to AWWA C111. Valve bodies shall be of ASTM A126 Class B cast-iron. Valves shall be furnished with a welded overlay seat of not less than 90% pure nickel. Seat area shall be raised, with raised surface completely covered with weld to ensure that the plug face contacts only nickel. Screwed-in seats shall not be acceptable. The plug shall have a cylindrical seating surface eccentrically offset from the center of the plug shaft. The interference between the plug face and body seat, with the plug in the closed position, shall be externally adjustable in the field with the valve in the line under pressure. Plugs shall be resilient faced with Hycar (Acrylonitrile-Butadiene) or Buna N, formulated and constructed to be suitable for use with wastewater. Minimum port areas shall be 80% of full pipe flow area. Valves shall have sleeve-type metal bearings and shall be of sintered, oil-impregnated, permanently lubricated Type 316 ASTM. Nonmetallic bearings shall not be acceptable. Valve shaft seals shall be of the multiple V-ring type or U-cup type and shall be externally adjustable and replaceable without removing the bonnet or actuator from the valve under pressure. Valves using O-ring seals or non-adjustable packing shall not be acceptable. All exposed nuts, bolts, springs, washers, and other fasteners shall be 300-series stainless-steel. Valve working pressure ratings shall be a minimum of 150 psi. Each valve shall be given a hydrostatic and seat test with certified copies of proof-of-design test reports as outlined in AWWA C504, Section 5.5. Plug valves shall be DeZurik PEC Series, Henry Pratt Company “Ballcentric” Series, or approved equal.

PART 3 EXECUTION

3.01 JOINTS

- A. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseal or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.
- B. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.
- C. Install lug-type valves with separate hex head machine bolts at each bolt hole and each flange (two bolts per valve bolt hole).
- D. Install grooved-end couplings for valves in accordance with Section 15055, Piping Systems—General.

3.02 INSTALLING BURIED VALVES

- A. Connect the valve, coat the flanges, apply tape wrapping or polyethylene encasement, and place and compact the backfill to the height of the valve stem.
- B. Place block pads under the extension pipe to maintain the valve box vertical during backfilling and repaving and to prevent the extension pipe from contacting the valve bonnet.
- C. Mount the upper slip pipe of the extension in midposition and secure with backfill around the extension pipe. Pour the concrete ring allowing a depression so the valve box cap will be flush with the pavement surface.
- D. Install debris cap as close as possible under the cast-iron cover without interfering with the cover operation. Trim flexible skirt to provide a smooth contact with the interior or the extension pipe.

3.03 FIELD COATING BURIED VALVES

- A. Wrap buried metal valves 6 inches and larger with polyethylene sheet.

ISOLATION VALVE CARD

Date of Installation _____

Contract Drawing Number _____

Closest Street Address to Valve or Location of Valve

Size of Valve (inches) _____

Circle Type of Valve: Gate Butterfly

GPS Coordinate @ Valve _____

Installation Foreman _____

Confirm Photos are attached _____

Isolation Valve Layout

Provide a brief sketch of the installed configuration. Show depths of the water line and show three ties to the isolation valve:

Depth @ Main (feet) _____

Contractor Signature

Resident Observer Signature

(Rev 2 – 15 Oct 2006)

END OF SECTION

SECTION 15250
SMALL-DIAMETER PIPING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall provide small-diameter pipe and fittings (nominal diameters less than 4 inches unless noted otherwise on the Drawings) as shown on the Contract Drawings.

1.02 RELATED WORK

- A. Section 01330, Submittals and Acceptance.

1.03 SUBMITTALS

- A. The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A53/A53M—Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2. ASTM A90/A90M—Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
 - 3. ASTM A105/A105M—Standard Specification for Carbon Steel Forgings for Piping Applications.
 - 4. ASTM A182/A182M—Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
 - 5. ASTM A193/A193M—Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and other Special Purpose Applications.

6. ASTM A194/A194M—Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
7. ASTM A312/A312M—Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
8. ASTM A320/A320M—Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service.
9. ASTM D1784—Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
10. ASTM D1785—Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
11. ASTM D2464—Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
12. ASTM D2466—Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
13. ASTM D2467—Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
14. ASTM D2564—Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
15. ASTM F439—Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
16. ASTM F441/F441M—Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
17. ASTM F493—Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
18. ASTM F656—Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

B. American Society of Mechanical Engineers (ASME)

1. ASME B1.20.1—Pipe Threads, General Purpose (Inch).
2. ASME B16.5—Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24 Metric/Inch Standards.
3. ASME B16.11—Forge Fittings, Socket-Welding and Threaded.
4. ASME B18.2.1—Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).
5. ASME B36.10M—Welded and Seamless Wrought Steel Pipe.
6. ASME B36.19M—Stainless Steel Pipe.

C. Plastic Pipe Institute (PPI)

1. PPI TR-31—Underground Installation of Polyolefin Piping.

- D. National Sanitation Foundation (NSF)

1.06 QUALITY ASSURANCE

- A. The Contractor shall strictly adhere to the manufacturer's written storage, handling, installation, and joining.

1.07 WARRANTIES

- A. Warranties shall be in accordance with Division 0, Bidding and Contracting Requirements, and Specification Section 01780, Warranties and Bonds.

1.08 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 OPERATIONS AND MAINTENANCE (O&M) MANUALS (NOT USED)

PART 2 PRODUCTS

2.01 GENERAL

- A. All pipe joints and fittings shall have the same schedule, pressure ratings, thermal resistance, chemical resistance, and other pertinent properties as the pipe being joined or connected. Plastic fittings shall be manufactured of the same resin as used in the manufacture of the pipe being joined.
- B. Each pipe length shall be clearly marked with the manufacturer's name or trademark, applicable ASTM standards, size, pressure rating, and/or schedule.
- C. Provide line size reducing tees for connecting lateral or instrumentation to pipe systems. Seal threaded fittings with Teflon™ tape or Teflon™ paste. Engage threaded fittings in accordance with ASTM A53.
- D. All flange bolts, nuts, and washers shall be AISI Type 316 stainless steel, ASTM A193, Grade B8M hex head bolts and ASTM A194, Grade 8M hex head nuts unless noted otherwise. Bolts shall be fabricated in accordance with ANSI B18.2.1 and shall be provided with washers. Treat all bolts with anti-galling compound before assembly.

2.02 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- A. Pipe: ASTM D1785, manufactured from Class 12454-B rigid PVC compounds with a hydrostatic design stress of 13.8 MPa (2,000 psi) designated as PVC 1120. Provide Schedule 80 PVC piping and socket-welded fittings and Schedule 80 PVC threaded fittings, unless noted otherwise on the Drawings or in the Specifications.
- B. Joints: Solvent-welded unless flanged or threaded joints are required for connection to the existing equipment. Solvent cement shall be as specified in ASTM D2564 for PVC pipe.
- C. Fittings:
 - 1. Solvent-welded: ASTM D2466 or D2467, manufactured from Class 12454-B rigid PVC compound; solvent cement conforming to ASTM D2564. Solvent cement shall be as specified in ASTM D2564 for PVC pipe and ASTM F493 for CPVC pipe.
 - 2. Threaded: ASTM D2464 manufactured from Class 12454-B rigid PVC compound; thread tape of Teflon. Only Schedule 80 PVC threaded pipe fittings shall be used.
- D. Flanges: PVC Schedule 80 ANSI Class 150 flanges manufactured from rigid PVC compounds conforming to ASTM D1784.
 - 1. Gaskets: Flat-face elastomer as specified and compatible for pipe system service.
 - 2. Bolts: AISI Type 316 stainless steel conforming to ASTM A320, Grade B. Titanium shall be used for sodium hypochlorite service piping, valve flanges, and fittings.
- E. Unions: ASTM D2467 manufactured from Class 12454-B rigid PVC compound with elastomer o-rings as specified and compatible for service. Schedule size to match adjacent piping.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. The Contractor shall lay and maintain all pipes straight and true to line in conformance with the lines, grades, and. Line and grade tolerances, where applicable, shall be in accordance with limits given for specific material.

- B. Pipe ends shall be kept clear and clean and the Contractor shall ensure that inside surfaces are maintained smooth and free from any projections that may interfere with joint assembly or flow through the completed line.
- C. Existing piping flanged joints that are disassembled by the Contractor shall be fitted with new gaskets, as specified, upon reassembly.

3.02 PRESSURE AND LEAKAGE TESTS

- A. Pressure Testing
 - 1. The Contractor shall pressure test and leak test all new PVC piping as required in Section 15055, Piping Systems—General.

END OF SECTION

SECTION 15575
LANDFILL GAS BLOWER/VENT STACK SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The work described in this section consists of furnishing all labor, materials, equipment; equipment acceptance and unloading at the site; and incidentals necessary to furnish, install a pre-fabricated landfill gas blower skid assembly with interconnecting piping system, condensate knockout pot and mounted control panel, and separate vent stack as shown on the Drawings and as specified herein, including all appurtenances to provide a complete landfill gas handling system ready for operation.
- B. The Gas Blower System provider shall be responsible for all electrical wiring connections local to the Gas Blower System for operation and control of all equipment related to the Landfill Gas Blower System and through systems indicated herein. The Gas Blower System provider shall coordinate the connection points and terminations for power and communication signal external to the system with the Landfill's electrical contractor.
- C. The Gas Blower System provider shall furnish all equipment and services as outlined in this Specification. Equipment will be fully fabricated, finished, and tested as described herein prior to delivery.
- D. The Gas Blower System provider will identify on the shop drawings the size and location of field installation connections.
- E. This work includes the site civil work construction including subgrade preparation, foundations, equipment erection, and service connection including the required equipment and materials.
- F. The following items are not included in this scope of work:
 - 1. Permits/Licenses: The Gas Blower System provider will not be responsible for Florida Department of Environmental Protection permits/licenses required for installation and/or operation of the equipment. The Gas Blower System provider will be responsible for any local permitting requirements.

1.02 RELATED WORK

- A. Section 16401 – Low Voltage Electrical Work – General Requirements.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. Manufacturer's Shop Drawings of all equipment and accessories shall be submitted to and approved by the Engineer prior to shipment and shall be tested for conformance with these Specifications prior to acceptance and final payment by the Owner. The following materials and shop drawing information shall be submitted at a minimum:
 - 1. Certified Shop Drawings showing all important details of construction and dimensions, component parts, and lists of materials
 - 2. Descriptive literature, bulletins, and/or catalogs of the equipment.
 - 3. Complete control panel diagrams and elevations showing all components, wires, connections, and numbered terminals.
 - 4. Complete electrical interconnect diagram showing all wires and terminals between the control panel and external devices.
 - 5. Exceptions and/or deviations to the applicable requirements, Plans, Specifications, and applicable codes and standards.
 - 6. Certification of UL listing for the complete skid-mounted Gas Blower System controls (final factory assembly, including control panel, conduits, and wiring) by a Nationally Recognized Testing Laboratory (NRTL), or approval by an independent third-party testing agency as suitable for the intended use as an explosive gas handling system. The testing agency must be a NRTL. Failure to supply this certification before shipping will result in the Owner rejecting the delivery. Field certification of the completed assembly is not required.
- B. Gas Blower System provider shall provide a detailed Operations and Maintenance Manual before Final Acceptance. The Manual shall include all components of the prefabricated blower unit. The Manual shall be prepared specifically for this installation and shall include all required catalog cuts, drawings, equipment list, descriptions, definitions, procedures, and information necessary to instruct operating and maintenance personnel unfamiliar with such equipment. The

Manual shall include a list of suppliers, with phone numbers and contact, for equipment parts that may need servicing or replacement.

- C. Gas Blower System provider shall submit manufacturer's current recommended method of installation for skid provided.
- D. Submit warranties as specified in this Specification.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCE STANDARDS

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. Local laws and ordinances.
- B. State and Federal laws.
- C. National Electrical Code.
- D. National Electrical Manufacturers Association (NEMA).
- E. Uniform Building Code (UBC).
- F. American National Standards Institute (ANSI).
- G. American Society of Mechanical Engineers (ASME).
- H. American Gas Association (AGA).
- I. Institute of Electrical and Electronic Engineers (IEEE).
- J. Instrument Society of America (ISA).
- K. Industrial Risk Insurance (IRI).
- L. Factory Mutual (FM).
- M. Environmental Protection Agency (EPA).
- N. Occupational Safety and Health Administration (OSHA).

- O. American Society for Testing and Materials (ASTM).
- P. National Fire Protection Association (NFPA)
 - 1. NFPA 70—National Electrical Code (NEC).
 - 2. NFPA 497—Recommended Practice for the Classification of Flammable Liquids, Gases or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.
- Q. Underwriters Laboratories, Inc. (UL)
 - 1. UL 50—Enclosures for Electrical Equipment, Non-Environmental Considerations.
 - 2. UL 698—Standard for Industrial Control Equipment for Use in Hazardous (Classified) Locations
 - 3. UL 698A—Standard for Industrial Control Panels for Use in Hazardous (Classified) Locations

1.06 QUALITY ASSURANCE

- A. Products used in the work of this Section shall be produced by manufacturers regularly engaged in the manufacture of landfill gas handling, processing, and combustion systems and with a history of successful production acceptable to the Engineer.
- B. The complete system (final factory assembly, including control panel, conduits, and wiring) must be UL listed or approved by an independent third-party testing agency as suitable for the intended use as an explosive gas handling system. The testing agency must be an NRTL. The certification will be printed on a steel placard and attached individually to the Gas Handling System, Vent Stack, and Control System.
- C. The Gas Blower/Vent Stack System provider shall follow the Quality Control Procedures as outlined by the applicable national codes and standards adhered to in the design, engineering, manufacture, assembly and test of the Blower/Vent Stack Station equipment, including but not limited to:
 - 1. Structural Design: AISC.
 - 2. Drawings: ANSI S5.1.
 - 3. Fabrication (welding): AWS.

4. Electrical (components): UL/NRTL.
 5. Electrical (wiring): NEC.
 6. Painting, Sandblast: SSPL, SP-6.
- D. The nondestructive testing of the Blower/Vent Stack Station equipment shall include:
1. Welding: 100% visual inspection.
 2. Dimensional: All dimensions to drawings, correct position and sizing of all connects.
 3. Piping: 100% visual inspection (in/out).
 4. Painting: Visual inspection/instrument check using microtest coating thickness gauge.
 5. Wiring: Functional check.
 6. Controls: Functional check and process simulation.

1.07 WARRANTIES

- A. The Gas Blower/Vent Stack System provider shall warrant the units being supplied to the Owner against defects in workmanship and material for 1 year from the date of equipment acceptance by the Owner. If the equipment fails to perform as specified, the equipment manufacturer shall promptly repair or replace the defective equipment without any cost to the Owner (including handling and shipment costs).

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall properly protect all parts so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation.
- B. The equipment shall be delivered on site as fully assembled as transportation will allow. Factory-assembled parts and components shall not be dismantled for shipment unless approved by the Engineer.
- C. Finished surfaces of all exposed openings shall be protected by wooden blanks, strongly built, and securely bolted thereto.

1.09 QUALIFICATIONS

- A. The Landfill Gas Blower/Vent Stack System, including all ancillary equipment, shall be furnished by a manufacturer who is fully experienced, reputable, and qualified in the manufacture of the equipment to be furnished. The equipment shall be designed and fabricated in accordance with the best practices and methods. The manufacturer shall have experience in supplying equipment for landfill gas handling systems.
- B. The Contractor shall be fully experienced and qualified in the installation of the system described in the specifications and as shown on the Drawings. The Contractor shall have experience in installing equipment for landfill gas handling systems.

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 OPERATIONS AND MAINTENANCE (O&M) MANUALS

- A. Refer to Article 1.03.

1.13 PERFORMANCE

- A. Landfill Gas Blower
 - 1. Equipment specified herein is intended to be standard equipment for use in a landfill gas handling system.
 - 2. The blowers shall be designed for continuous operation in an outdoor environment and shall conform to the following, measured at standard 14.7 psia and 68 degrees F condition:
 - a. Number required 1
 - b. Rated capacity, scfm 150
 - c. Minimum capacity, scfm 10
 - d. Site elevation 114 feet
 - e. Gas composition

- | | | | |
|----|-----|--|----------|
| | (1) | Methane | 0 to 55% |
| | (2) | Carbon Dioxide | 0 to 50% |
| | (3) | Oxygen | 0 to 21% |
| | (4) | Balance (e.g., N ₂) | 0 to 79% |
| | (5) | Trace gases (e.g., VOCs, H ₂ S) | 0 to 1% |
| f. | | Blower inlet vacuum, inches of water | -15 |
| g. | | Blower outlet pressure, inches of water | 10 |
| h. | | Landfill gas inlet temperature | |
| | (1) | Maximum, °F | 125 |
| | (2) | Minimum, °F | 50 |
| 3. | | When rated flow rate is reduced to the minimum flow rate, the blower under the specified inlet conditions shall not surge or overload the motor. | |
| 4. | | Each blower equipment rating shall be based on data previously established by tests in accordance with the ASME Power Test Code for Centrifugal Blowers. | |

PART 2 PRODUCTS

2.01 GENERAL

- A. Equipment shall not have been in service, except for shop tests, at any time prior to delivery. The equipment shall be furnished factory-assembled to the extent possible and ready for installation.
- B. Equipment shall be designed and proportioned to have the strength, stability, and stiffness for the intended service including any additional stresses which may occur during fabrication, transportation, handling, and erection. Ample room and facilities shall be provided for inspection, repairs, and adjustments.
- C. These Specifications are intended to give a general description of what is required, but do not cover all requirements of the equipment and services needed to provide a fully functional system meeting the requirements of the specifications. Auxiliary equipment necessary for proper operation of the proposed Landfill Gas Blower and Vent Stack System not mentioned in these Specifications or shown on the Drawings shall be furnished and installed.
- D. A brass or stainless steel nameplate shall be attached to each piece of equipment in a conspicuous place. The following information shall be plainly marked on the

nameplate: name and address of the manufacturer, serial number, model number, pertinent information regarding electrical requirements, size and capacity, and any other information necessary for complete identification.

- E. If necessary, modifications shall be made in the manufacturer's standard product to make it conform to the specific requirements of the Specifications and to requirements contained in regulations issued by public agencies. Such modifications shall be noted in the shop drawing submittals.

2.02 GAS BLOWER SYSTEM

A. Skid Support Structure

1. The support structure shall be aluminum, welded, or galvanized steel.
 - a. If the Carbon steel is galvanized: Galvanizing shall be to ASTM A123/A123M and ASTM A153/A153M guidelines. Touch-up procedures for coating bare spots shall be to ASTM A780 guidelines.
2. Welds shall be performed and inspected in accordance with AWS D1.1 standards.

B. Blower Assembly: The skid-mounted gas blower system shall be a prefabricated system, and shall include the following components, or equivalent:

1. Inlet/Outlet shall be 4-inch-diameter IP ANSI 150 flange connections with DI back-up rings.
2. Blower: AMETEK Rotron Blower, Model Number EN505AX58ML, 1.5 Hp, 230V, single phase.
3. Vacuum Relief Valve: Fisher, Model Number 289H-41.
4. Vacuum Gauge: 0-80 inches W.C
5. Pressure Gauge: 0-30 inches W.C.
6. Gas Handling Piping:
 - a. Piping on the gas handling system skid shall be 2-inch schedule 40 carbon steel, or Engineer's approved equal. The same specification applies to tees, elbows, wyes, flanges, and other pipe fittings. Flanges shall conform to ANSI 150-pound specifications.

- b. The gaskets shall be full-face rubber or Engineer's approved equal, 1/16 inch to 1/8 inch in thickness, and shall meet the requirements of ANSI Specification A21.11.
 - c. Piping and fittings shall be supported so as to prevent any strain being transmitted between sections and connected equipment and appurtenances. Release of any joint shall result in no transverse piping movement and shall allow easy removal and replacement of any piping component. Supports in addition to those shown on the Drawings may be required.
- 7. Condensate Moisture Separator (knockout pot): Gasho moisture separator, Model Number GX-100DL with SS inline filter/ demister material, or equivalent:
 - a. Clear PVC 2-inch Site Tube with three XP float level switches.
 - b. 4-inch side-access port.
 - c. Oberdorfer Bronze Gear Pump Model 992R with ½-Hp, XP, 230V, single-phase motor rated for 4 GPM, or Engineer-approved equal.
 - d. Manual sludge pump, check valve, and drain valve.
 - e. The moisture separator shall be fabricated from HDPE or 304 stainless steel. It shall be of a vertical, cylindrical design with element removal from the top. Nozzle flanges shall meet ANSI 150-pound specifications.
 - f. Condensate Removal: There shall be a 2-inch Iron Pipe Size flanged pipe coupling in the bottom of the assembly for condensate removal.
 - g. The moisture separator assembly shall be located, installed, and pre-plumbed on the gas handling system skid.
 - h. Capable of operating under blower maximum vacuum pressure.
- 8. System Control Panel: At a minimum, the system control panel shall be UL-certified and include the following:
 - a. NEMA 4X stainless-steel enclosure (for Class I Division 2 hazardous area), mounted approx. 36" above grade.

- b. Door interlocked disconnect switch
- c. Main circuit breaker switch
- d. Auxiliary 20-amp single pole circuit breaker used for external condensate pump.
- e. Enclosure heater with thermostat.
- f. Two Hand Off-Auto (HOA) for condensate transfer pump and blower.
- g. 24-hour electronic timer – Intermatic ET 1100 or equal.
- h. Adjustable time-delay relay.
- i. Combination motor starters for each motor: (1) condensate transfer pump and (2) blower.
- j. Elapsed-time meter for each motor.
- k. Run-light for each motor
- l. Alarm lights (Hi Level, Motor Thermostat, (1) spare).
- m. Transient voltage surge suppressor.
- n. Single-phase voltage monitor.
- o. Alarm reset button.
- p. Control circuitry and/or programming for manual and automatic operation.
- q. Refer to Section 16401 and the Contract Drawings for additional requirements.
- r. The system as installed must be in compliance with the NEC and associated NFPA documentation for classified areas as indicated above. Any and all ancillary equipment required to comply with these standards shall be provided at no additional cost to the owner. This includes but is not limited to all interconnecting

conduit, conduit seals, and ancillary equipment listed for the classified environment.

9. Operational Description: The Gas Handling Skid System shall operate in the following manner:

2.03 VENT STACK SYSTEM

- A. The landfill gas Vent Stack system shall be 4-inch schedule 40 steel, installed as shown on the Drawings, including all components for a complete and operational system.
- B. The Vent Stack shall be located 25 feet from the blower station and shall include all interconnect piping, and pipe stands required.
- C. The landfill gas Vent Stack system inlet elevation shall be field adjusted to match blower assembly skid outlet.
- D. Finish: the Contractor shall either sand blast and prime or galvanize the exterior of the carbon steel used for the vent stack.
 1. If the carbon steel is sand-blast prepared and primed: Sand blasting shall be to SP-6 guidelines. An inorganic zinc primer, solvent or water based, with a minimum of 14-lb metallic zinc content per gallon shall be applied. Minimum application will involve 1 coat, 4 MDFT cover. Acceptable coating suppliers include Ameron Protective Coatings (Brea, CA), DuPont Chemical Company (Wilmington, DE), Glidden Company (Cleveland, OH), and Koppers Company (Pittsburgh, PA).
 2. If the carbon steel is galvanized: Galvanizing shall be to ASTM A123/A123M and ASTM A153/A153M guidelines. Touch-up procedures for coating bare spots shall be to ASTM A780 guidelines.

2.04 VARIABLE FREQUENCY DRIVES (VFD) (NOT USED)

2.05 AUXILIARY EQUIPMENT

- A. Gauges: The system shall be equipped with the following gauges as a minimum:
 1. Pressure, Vacuum, and Differential Gauges: Gauges shall be Capsuhelic gauges as manufactured by Dwyer Instruments, Inc., Marietta, Georgia, or equal. Gauges shall read "INCHES OF WATER." Graduations shall be at intervals of 1 inch of water.

- a. Flame arrester pressure drop indicator. Gauge shall be capable of measuring 0 to 15 in-W.C., differential pressure.
 - b. Moisture separator pressure drop indicator. Gauge shall be capable of measuring 0 to 15 in-W.C., differential pressure.
 - c. Blower vacuum and pressure indicators. Vacuum gauges shall be capable of measuring 0 to 80 in-W.C. Pressure gauges shall be capable of measuring 0 to 30 in-W.C.
 - d. System vacuum indicator. A vacuum gauge shall be mounted upstream of the demister as indicated on the Drawings. It shall be capable of measuring 0 to 80 in-W.C.
 - e. System pressure indicator. A pressure gauge shall be mounted downstream of the blowers' outlet valves as indicated on the Drawings. It shall be capable of measuring 0 to 30 in-W.C.
2. Blower inlet and outlet temperature indicators: Dial-type temperature gauges shall be provided at the inlet and outlet of each blower. The gauges shall range from 0 to 200 degrees F.

B. Sampling Ports:

1. Gas and pressure sampling ports on HDPE shall be 1/4-inch barbed fittings with rubber dust caps to match the monitoring ports on the wellheads. Gas and pressure sampling ports on steel piping shall be stainless steel and include ball valves and 1/4-inch barbed fittings. Parts shall be commonly available. Sampling ports shall be installed in the following locations:
 - a. Upstream and downstream of the flame arrester.
 - b. Upstream and downstream of the moisture separator at the demister.
 - c. Inlet and outlet pipe of the demister.
 - d. Inlet pipe to blower.
 - e. Outlet pipe from blower.

2.06 IGNITION PROCEDURE (NOT USED)

2.07 SPARE PARTS (NOT USED)

PART 3 EXECUTION

3.01 INSTALLATION

- A. The manufacturer/supplier shall install the following items on the main skid:
 - 1. Blower-Motor Assemblies.
 - 2. Moisture Separator Assembly (knockout).
 - 3. Interconnecting piping and fittings.
 - 4. Control Panel.
- B. The flame arrester shall be installed on the Vent Stack inlet pipe and pipe supports shall be used.
- C. All equipment shall be installed in strict accordance with the manufacturer's recommendations and codes and standards.
- D. All skid-mounted equipment shall be installed plumb and perpendicular to piping.
- E. Marred or abraded surfaces of equipment shall be cleaned and refinished to match original finish.
- F. The Gas Blower System provider shall coordinate the electrical work with the contracted electrician, the equipment manufacturer, and control panel fabricator to provide a complete, integrated, and automatic system, and to maintain the UL certification.

3.02 STARTUP AND TESTING

- A. Factory Test: Prior to shipment, the entire station equipment and all circuits, control systems and devices, including all alarm signals, shall be tested. All apparatus shall be cleaned, adjusted and made ready for shipment after testing. Complete test reports shall be provided to the Engineer which show that all system controls operated correctly prior to shipment.
- B. A factory representative with complete knowledge of proper operation and maintenance shall be provided for a minimum of 4 hours of on-site startup assistance for the installation and start-up of the system and to instruct representatives of the Owner and/or the Engineer on proper operation and maintenance of the blower system. If there are difficulties in operation of the equipment due to gas blower system provider's or manufacturer's design or fabrication, additional service shall be provided at no cost to the Owner.

- C. Functional and Validation Tests: Upon completion of the installation, functional and validation tests shall be performed by the gas blower system provider with the assistance of the provider's representative, in the presence of the Engineer. Time and labor required by the Gas Blower System provider to successfully complete testing are not included in the above 4-hour period.

END OF SECTION

SECTION 16401
LOW-VOLTAGE ELECTRICAL WORK—GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals necessary for a complete corrosion-resistant and operable electrical installation, including all fees, charges, and permits necessary. Work of this Section includes electrical installation requirements for equipment of other sections. This Section is general and may include specifications for materials and equipment not contained within the scope of this project.
- B. The Contractor shall provide temporary and permanent electrical services of proper voltage and phase as required for the Project. All single-phase temporary receptacle outlets shall be provided with ground fault protection in accordance with NEC Article 590.6 and installed in accordance with NEC 406.8.
- C. The Contractor shall coordinate the work of this Section with others involved in the construction of the project.
- D. The Contractor shall coordinate with the local power company to schedule and arrange for connection of the proposed electrical systems to the electrical distribution system.
- E. The Contractor shall demolish equipment as indicated on the Plans. All electrical equipment removed from service shall be carefully removed to avoid damage and returned to the Owner in good condition. The Contractor shall document the transfer of all equipment to the Owner in the form of a returned equipment spreadsheet which, at a minimum, describes the equipment, the model number, the serial number, the condition of the equipment when it was removed from service, the date of equipment transfer, and a signature indicating the Owner's receipt of the equipment.

1.02 RELATED WORK

- A. The provisions of all other technical Sections of the Specifications are fully applicable to this Section as if incorporated in this Section. Specification 15575, Landfill Gas Blower/Vent Stack System contains other specific requirements related to the electrical system of this design and shall be coordinated with this

specification section, providing specific details and/or modifications as listed therein.

- B. Sections 1 through 7 and Division 1 of these Specifications are a part of this Section as if incorporated in this Section.

1.03 SUBMITTALS

The Contractor shall submit shop drawings in accordance with Section 01330, Submittals and Acceptance:

- A. The Contractor shall submit a complete list of materials and equipment to be incorporated in the work to the Owner for review within 30 days after the Award of Contract.
- B. The list shall include catalog numbers, cut sheets, diagrams, and other descriptive data required to demonstrate conformance with the Specifications. Partial lists will not be acceptable.
- C. The basis of acceptance shall be the manufacturer's published ratings for the equipment. The manufacturer shall be regularly engaged in the manufacture of products specified.
- D. Shop drawings shall be submitted for the following items of equipment:
 - 1. Wiring Devices.
 - 2. Safety Switches.
 - 3. Circuit Breakers.
 - 4. Motors.
 - 5. Motor Starters.
 - 6. Control Devices.
 - 7. Lighting Fixtures.
 - 8. Surge Protection Device.
 - 9. Concrete Handholes and Pull Boxes.
- E. Contents of the shop drawings shall include the following:
 - 1. Details of construction, outline and assembly drawings.
 - 2. Dimensions.
 - 3. Materials.
 - 4. Finish.
 - 5. Ratings.
 - 6. Accessories.

7. Trim.
 8. Engineering data.
 9. Test Equipment datasheets and proposed test procedures for testing the grounding system.
- F. The Contractor shall submit the manufacturer's literature for the equipment listed in Paragraph 1.03.D above to the Owner for review, including the following:
1. Written description of equipment function, normal operating characteristics and limiting conditions.
 2. Recommended assembly, installation, alignment, adjustment, and calibration instructions.
 3. Operating instructions.
 4. Guide to troubleshooting.
 5. Maintenance instructions and timetables.
 6. Parts List and an assembly drawing with the parts identified.
- G. Surge protection device submittals shall include the following:
1. UL 1449 peak let-through voltage documentation.
 2. Category C3 peak let-through voltage test results.

1.04 WORK SEQUENCE (NOT USED)

1.05 REFERENCES

Reference standards and recommended practices referred to in this Specification Section shall be the latest revision of any such document in effect at the bid time. The following documents are a part of this Section. Where this Section differs from these documents, the requirements of this Section shall apply.

- A. American National Standards Institute (ANSI)
1. ANSI C12.20—Electricity Meters 0.1, 0.2, and 0.5 Accuracy Classes.
 2. ANSI C80.1—Electrical Rigid Steel Conduit.
- B. American Society for Testing and Materials (ASTM)
1. ASTM A36/A36M—Standard Specification for Carbon Structural Steel.
 2. ASTM A48/A48M—Standard Specification for Gray Iron Castings.
 3. ASTM A153/A153M—Standard Specification for Zinc Coating (Hot - Dip) on Iron and Steel Hardware.

4. ASTM B8—Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
- C. American Bearing Manufacturers Association (ABMA)
1. ABMA Std 20—Radial Bearings of Ball, Cylindrical Roller, and Spherical Roller Types, Metric Design
- D. Federal Specifications and Standards (FSS)
1. FSS A-A-50552—Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible.
 2. FSS A-A-50553A—Fittings for Conduit, Metal (Thick-Wall (Rigid) and Thin-Wall (EMT) Type).
 3. FSS A-A-50563A—Conduit Outlet Boxes, Bodies and Entrance Caps, Electrical: Cast Metal.
 4. FSS A-A-55809B—Insulation Tape, Electrical, Pressure-Sensitive Plastic.
 5. FSS A-A-55810—Conduit, Metal, Flexible.
 6. FSS A-A-59213—Splice Connectors.
 7. FSS A-A-59544—Cable and Wire, Electrical (Power, Fixed Installation).
 8. FSS W-C-375D—Circuit Breakers, Molded Case; Branch Circuit and Service.
 9. FSS W-C-596G/GEN—Connector, Electrical Power (General Specification).
 10. FSS W-S-896G—Switches, Toggle (Toggle and Lock), Flush-Mounted (General Specification)
- E. Institute of Electrical and Electronics Engineers (IEEE)
1. IEEE 112—Standard Test Procedure for Polyphase Induction Motors and Generators.
 2. IEEE 117—Standard Test Procedure for Thermal Evaluation of Systems of Insulating Materials for Random-Wound AC Electric Machinery.
 3. IEEE 519—Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
 4. IEEE C2—National Electrical Safety Code (NESC).
 5. IEEE C62.41.1—Guide on the Surges Environment in Low-Voltage (1,000 V and Less) AC Power Circuits.
- F. Intertek
1. ETL-PVC-001—Independent third party testing standard to signify compliance to coating adhesion performance.

G. National Electrical Manufacturers Association (NEMA)

1. NEMA ICS 1—Industrial Control and Systems: General Requirements.
2. NEMA ICS 6—Industrial Control and Systems: Enclosures.
3. NEMA MG 1—Motors and Generators.
4. NEMA TC 2—Electric Polyvinyl Chloride (PVC) Conduit.
5. NEMA TC 3—Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
6. NEMA WD 1—General Color Requirements for Wiring Devices.

H. National Fire Protection Association (NFPA)

1. NFPA 70—National Electrical Code (NEC).
2. NFPA 101—Life Safety Code.

I. Underwriters Laboratories, Inc. (UL)

1. UL 6—Electrical Rigid Metal Conduit – Steel.
2. UL 50—Enclosures for Electrical Equipment, Non-Environmental Considerations.
3. UL 83—Thermoplastic-Insulated Wires and Cables.
4. UL 360—Standard for Liquid-Tight Flexible Metal Conduit.
5. UL 467—Grounding and Bonding Equipment.
6. UL 489—Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit -Breaker Enclosures.
7. UL 498—Standard for Attachment Plugs and Receptacles.
8. UL 508—Standard for Industrial Control Equipment.
9. UL 510—Standard for Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape.
10. UL 514A—Metallic Outlet Boxes.
11. UL 514B—Conduit, Tubing, and Cable Fittings.
12. UL 514C—Standard for Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.
13. UL 651—Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.
14. UL 797—Electrical Metallic Tubing - Steel.
15. UL 1449—Standard for Surge Protective Devices.
16. UL 1660—Liquid-Tight Flexible Nonmetallic Conduit.

1.06 QUALITY ASSURANCE

- A. PVC-coated metal conduit must comply with UL 6 for safety and ETL PVC-001 for performance.

1.07 WARRANTIES

- A. Warranties shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01780, Warranties and Bonds.
- B. All equipment and materials supplied shall be warranted against defective design, materials, and workmanship for a minimum of 1 year, or as specified in this Section, against normal use. The warranty period shall begin once the total project is accepted by the Owner and shall cover replacement of equipment and/or repair, including labor, travel time, and miscellaneous expenses at no cost to the Owner for the full warranty period.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall adhere to the requirements specified in Section 01650, Delivery, Storage, and Handling, for storage and protection of the items specified in this Section.
- B. The Contractor shall deliver materials with manufacturer's tags and labels and UL labels intact. Packaged material shall be delivered in the manufacturer's original, unopened containers bearing the manufacturer's name, brand, and UL label. Materials and equipment shall be stored in a dry, clean location. Handle and store so as to avoid damage. Items delivered in broken, damaged, rusted, or unlabeled condition shall be removed from the project site immediately and replaced with acceptable items. The Contractor shall provide suitable protection of materials and equipment from dust and moisture. The Contractor shall be responsible for the condition of materials and equipment until they are accepted by the Owner.

1.09 QUALIFICATIONS (NOT USED)

1.10 TESTING REQUIREMENTS (NOT USED)

1.11 MAINTENANCE (NOT USED)

1.12 OPERATIONS AND MAINTENANCE (O&M) MANUALS

- A. Operations and Maintenance Manuals shall be in accordance with General Conditions, Supplementary Conditions, and Specification Section 01830, Operations and Maintenance Manuals.
- B. Before final acceptance of this project, an operation and maintenance manual shall be submitted to the Owner. The manual shall include manufacturer's literature as outlined in Paragraph 1.03.F above, drawings corrected in accordance with shop drawing review comments and including all modifications, and lists of suppliers and/or service shops that can provide parts and accessories and equipment repair for the items of equipment listed in Paragraph 1.03.D above. The lists shall include a contact name, telephone number, and address.
- C. A test report detailing the results of the grounding system test shall be provided with the O&M Manual.

1.13 CODES, INSPECTIONS, AND FEES

- A. The Contractor shall obtain all necessary permits and inspections required for the work of this Section and pay all charges incidental to this work. The Contractor shall deliver to the Owner all certificates of inspection issued by authorities having jurisdiction.

1.14 PROJECT REQUIREMENTS (NOT USED)

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. All material and equipment shall be new and listed or labeled for use within the United States by a Nationally Recognized Testing Laboratory (NRTL). Equipment shall be provided with a specific listing, such as UL, when indicated in this Section or in other portions of the Contract Documents. Only products by manufacturers regularly engaged in the production of specified units will be acceptable.
- B. Where two or more units which perform the same function or are of the same class of equipment or materials are required, provide all units from a single manufacturer.
- C. Provide materials and equipment of suitable composition to perform satisfactorily when exposed to corrosive conditions of the project site.

1. Provide breather and drain fittings in all raceways and enclosures where necessary to prevent condensation or trapping of moisture.
2. Provide heaters in all control panels to prevent condensation.

2.02 CONDUIT

- A. **Rigid Metal Conduit:** Rigid metal conduit shall be zinc-coated steel and shall conform to UL 6. Fittings shall be cast or malleable iron, zinc-coated, and shall conform to FSS A-A-50563A and UL 514B.
1. PVC-coated rigid steel conduit, elbows, and fittings shall be coated with a bonded polyvinylchloride which is permanently fused on at the factory.
 - a. Must meet UL 6 safety standards and carry the ETL-PVC-001 verified label.
 - b. Aboveground conduit system PVC coating shall have a minimum thickness of 40 mils. Couplings and condulets shall have overlapping pressure sealing sleeves.
 - c. Below-ground conduit system PVC coating shall have a minimum thickness of 40 mils.
 - d. Below-ground conduit system PVC coating for extreme corrosive conditions shall have a minimum thickness of 40 mils and shall have external and internal bonded coatings.
- B. **Rigid Nonmetallic Conduit:** Rigid nonmetallic conduit shall be polyvinyl chloride compound and shall conform to NEMA TC-2 and UL 651. Conduit shall be sunlight resistant, rated for use with 90 °C conductors. Fittings shall be of the same polyvinyl chloride compound and from the same manufacture as the conduit and shall conform to NEMA TC-3 and UL 514B. Conduit and fittings shall be joined by a solvent cement. The type of cement and the procedure for application shall be as recommended by the conduit manufacturer. The conduit shall be Carlon Plus 80, or equal.
- C. **Liquidtight Flexible Metal Conduit:** Liquidtight flexible metal conduit shall be made with galvanized steel flexible conduit covered with an extruded PVC jacket. Fittings shall be compression type specifically designed for use with flexible conduit and shall form watertight connections. Box connectors shall have an “O” ring between the fitting body and the enclosure.

2.03 BOXES

- A. General: Boxes shall be sized as recommended by the NEC or as shown on the Drawings.
 - 1. Boxes shall be nonmetallic or code-gauge galvanized steel, stainless steel, or cast metal, as specified or shown on the Drawings.
 - 2. Cast metal boxes shall be cast iron and shall be gasketed of the type indicated on the Drawings.
- B. Outlet Boxes: Outlet boxes shall be sheet steel or cast metal.
 - 1. Sheet steel boxes shall be cadmium-coated or zinc-coated.
 - 2. Cast metal boxes shall conform to FSS A-A-50563A.
 - 3. Fixture outlet boxes and junction boxes shall be 4-inch, octagonal.
 - 4. Switch and receptacle outlet boxes shall be 2 inches wide by 4 inches high by 2 inches deep.
 - 5. Junction box extensions and covers shall conform to UL 514A.
 - 6. Boxes installed in wet locations or on exterior surfaces shall be cast metal with gasketed covers.

2.04 WIRING DEVICES

- A. Toggle Switches: Toggle switches shall be specification grade and shall conform to FSS W-S-896F(1) and shall be totally enclosed with bodies of molded compound and a mounting strap.
 - 1. Handles shall be ivory.
 - 2. Wiring terminals shall be screw type, back- or side-wired.
 - 3. Switches shall be rated, quiet type, 20 amperes, 277 volts.
 - 4. Switches shall be suitable for control of tungsten filament lamp loads with “T” marking of UL.
 - 5. No more than one switch is allowed in a single gang position of a switch box.
- B. Receptacles: Receptacles shall be specification grade and shall conform to FSS W-C-596G(2), NEMA WD-1, and UL 498.
 - 1. Single and duplex receptacles for general purpose use shall be heavy-duty specification grade, 20 amperes, 125 volts, three-wire grounding, NEMA configuration 5-20R.

2. Special purpose single receptacles shall be heavy-duty specification grade, 20 amperes, 250 volts, three-wire grounding, NEMA configuration 6-20R, unless indicated otherwise on the Drawings.
3. Ground fault circuit interrupter receptacles shall be duplex, 20 amperes, 125 volts, three-wire grounding, NEMA configuration 5-20R.
 - a. Receptacles shall have a nominal sensitivity to ground leakage current of 4 to 6 milliamps and shall interrupt the current supply for any value of ground leakage current exceeding the trip level of 4 to 6 milliamps on the load side of the receptacle with a maximum tripping time of 1/30th of a second.
 - b. Receptacles shall provide protection for any device connected to the circuit beyond the receptacle.
 - c. Receptacles shall have test and reset buttons accessible on the face of the receptacle.
4. Receptacles shall be suitable for mounting in a standard outlet box and shall have a high-impact nylon face.
5. Wiring terminals shall be screw type, back- or side-wired.
6. Color of device face shall be ivory.
7. Receptacles shall be Leviton, Hubbell, Pass & Seymour or approved equal.

2.05 DEVICE PLATES

Cover Plates: Cover plates shall conform to UL 514A.

- A. Furnish one-piece type to suit devices installed, with round or beveled edges.
- B. Weatherproof switch cover plates shall be spring-loaded gasketed type with individual cover for each switch. Receptacle covers shall be weatherproof with or without the attachment plug cap inserted.
- C. Waterproof receptacle cover plates shall have screw cap for each outlet. The plug shall have a matching screw attachment to maintain the rating when the plug is attached. The screw cap shall be permanently attached to the cover plate by a chain. A matching plug shall be provided for each cover plate.
- D. Zinc-coated steel or cast-metal plates shall be used on unfinished walls.

- E. Satin-finish stainless steel plates shall be used on finished walls.
- F. The Contractor shall provide metal screws with countersunk heads and finish to match the finish of the plate.

2.06 WIRE AND CABLE

- A. Conductors: All conductors shall be annealed soft drawn copper, conforming to ASTM B8, FSS A-A-59544, UL 83, and the latest requirements of the NEC. All conductors shall have THW or THWN type insulation, rated at 600 volts, unless specifically noted otherwise.
 - 1. Other types of insulation may be used as permitted by the NEC. The Contractor shall be responsible for change in conduit size and conductor size to maintain the ampacity of the circuit.
 - 2. Wire #8 AWG and larger shall be stranded concentric lay. Wire sizes #14, #12, and #10 AWG shall be stranded for control and motor power and solid for light and receptacle circuits.
 - 3. Conductors shall be as manufactured by Senator Wire & Cable Company, Larabee Wire Manufacturing Company, Inc., Southwire Company, or equal.
 - 4. Conductors installed between Adjustable Speed Drives (ASD) and motors shall be shielded ASD cables for conductor sizes AWG 4/0 and below. ASD cables shall be rated for up to 1000V and have cross-linked polyethylene (XLPE) Type XHHW-2 insulation on current-carrying conductors. ASD cables with current-carrying conductors of size No 2 and smaller shall have an insulated grounding conductor. Larger cables may have insulated or bare grounding conductors. ASD cables shall have a braided or tape shield. The outer jacket shall be black sunlight and oil-resistant PVC. ASD cables shall be rated for 90°C in wet or dry locations and shall be suitable for direct burial. ASD cables shall be designed specifically for use in ASD applications. The Contractor shall install the ASD cables in accordance with the cable manufacturer's and the ASD manufacturer's recommendations. ASD cables shall be manufactured by Belden, or approved equal.
 - 5.
- B. Conductor splices shall conform to FSS A-A-59213. Acceptable: Scotchcast Splicing Kit, 3M Company. Plastic tape shall conform to FSS A-A-55809A.

2.07 SAFETY SWITCHES

- A. Safety switches shall be NEMA heavy-duty type and UL listed. Switches shall be rated as indicated on the Drawings.
 - 1. All switches shall have switch blades which are fully visible in the OFF position when the door is open. Switches shall have permanently attached arc suppressors, hinged or otherwise attached to permit easy access to line-side lugs without removal of the arc suppressor. Lugs shall be UL listed for copper and aluminum cables and front removable. All current-carrying parts shall be plated by electrolytic processes.
 - 2. Switches shall have a quick-make and quick-break operating handle and mechanism which shall be an integral part of the box, not the cover. Padlocking provisions shall be provided for padlocking in the OFF position only, with at least three padlocks. Switches shall have a dual-cover interlock to prevent unauthorized opening of the switch door in the ON position or closing of the switch mechanism with the door open.
- B. Enclosures: Switches installed indoors shall be furnished in NEMA 1 general-purpose enclosure with knockouts, unless otherwise specified. Switches located outdoors shall be furnished in NEMA 4X enclosures.
 - 1. Covers on NEMA 1 enclosures shall be attached with butt-type pin hinges.
 - 2. NEMA 4X switches shall be furnished in stainless steel enclosures without knockouts. The means of sealing the cover shall be positive, with 30-through 200-ampere switches having quick release latches with pin type hinges and gaskets. Enclosures shall be of Code-gauge stainless steel.
- C. The switch jaws shall be multi-spring type for positive grip of the switch blades. The fuse clips shall be spring-reinforced, positive-pressure type, or electrolytic copper.
- D. Switches shall be as manufactured by Square D, General Electric, Cutler-Hammer, or Siemens. All switches shall be by the same manufacturer.

2.08 CIRCUIT BREAKERS

- A. The Contractor shall provide molded-case thermal magnetic circuit breakers of the type, size, and electrical characteristics specified or indicated on the Drawings. Circuit breakers used as service entrance disconnects shall be suitable and rated as service entrance equipment.

- B. Circuit breakers shall be of single-unit construction, and multi-pole circuit breakers shall have trip elements in each pole with common trip bar. Frame size 225 amperes or larger shall have adjustable magnetic instantaneous trip and shall have interchangeable thermal magnetic trip units.
- C. Shunt trip shall be installed in circuit breakers where required by the Drawings or Specifications.
- D. Circuit breaker interrupting ratings shall be equal to the available short circuit current at the point of installation with the minimum ratings as follows:

<u>Frame Size</u>	<u>240 V</u>	<u>480 V</u>
100 A	18,000	14,000
225 A	25,000	22,000
400 A	42,000	30,000
800 A	42,000	30,000
1,200 A	42,000	30,000

- E. Provide NEMA Type 1 enclosures for general duty indoor use. Enclosures shall be NEMA 4X stainless steel for exterior locations unless indicated otherwise.
- F. Circuit breakers shall be as manufactured by General Electric, Siemens, Square D, or Cutler-Hammer.

2.09 MOTORS

- A. Motors shall be provided with the equipment driven by the motor, unless otherwise indicated or specified, and shall conform to the latest requirements of NEMA, IEEE, ANSI, NEC, and ABMA standards, where applicable.
 - 1. Motors shall be of sufficient capacity to operate the driven equipment, under all load and operating conditions, without exceeding 100% of the motor's nameplate horsepower rating, excluding the service factor, and without exceeding the motor's rated temperature limits.
 - 2. Motors shall be furnished with permanent, highly visible stainless steel nameplates. Nameplates shall include all motor ratings, accessories, and special features.
- B. Motors may be single speed or variable speed as required for the application.
 - 1. Motors for variable-speed applications shall be designed for operation at the rated maximum speed and at reduced speed throughout the variable-speed range without overloading. Motors for variable-speed operation

shall be inverter duty rated and compatible with the associated variable-speed control equipment and operating conditions, including the effects of harmonic current and voltage distortion. Motors for variable-speed operation shall be equipped with a normally closed automatic reset winding thermostat in addition to all accessory equipment recommended by the variable-speed equipment manufacturer. Thermostat leads shall be brought to the motor connection box.

- C. Motors shall be NEMA Design B, unless otherwise indicated or specified, and shall be suitable for continuous duty operation. Motor currents and torque shall be in accordance with NEMA MG1-12.34 and MG1-12.37.
 - 1. Three-phase, single-speed, squirrel-cage induction motors less than 50 HP shall be rated 208-230/460 volt for use on 208-, 240-, or 480-volt, three-phase, 60-Hz systems.
 - 2. Single-phase general-purpose induction motors shall be split-phase or capacitor start rated 115/230-208 volt, single-phase, 60 Hz. Motors 1-1/2 HP and larger shall be NEMA Design M. Motors smaller than 1-1/2 HP shall be NEMA Design L or N. Motor currents and torque shall be in accordance with NEMA MG1-12.31, MG1-12.32, and MG1-12.33.
- D. Motors shall be provided with Class F non-hygroscopic insulation system using materials and an insulation system evaluated in accordance with IEEE 117 classification tests. Temperature rise shall be limited to a maximum of 80° C, by resistance, at a service factor of 1.0 in an ambient temperature of 40° C. Motors shall have multiple dips and bakes of varnish treatment for additional protection.
- E. Motors larger than 5 HP shall be provided with locked-rotor current not exceeding NEMA Code letter “G.”
- F. Motors shall be furnished with a minimum service factor of 1.15.
- G. Motors shall be suitable for full voltage across-the-line-type starting, unless otherwise specified or indicated on the Drawings.
- H. Motors shall be equipped with ball, open, single-row, deep-groove Conrad-type bearings conforming to the AFBMA Standard 20. Drive end bearings may be cylindrical roller type for belted drives.
 - 1. Bearing life shall be 17,500 hours minimum for belted applications and 100,000 hours minimum for flexible direct-coupled applications.
 - 2. The bearing identification number shall be stamped on the motor nameplate.

3. The lubrication system shall consist of a capped grease fitting inlet, a relief plug 180 degrees from inlet, and a grease reservoir in bracket and cast inner cap.
 4. Bearings shall be greased by the manufacturer with a premium moisture-resistant polyuria-thickened grease containing rust inhibitors and suitable for operation over a temperature range of -25° C to 120° C.
- I. The motor enclosure, including frame with integrally-cast feet and/or vertical P-base mounting, end brackets, bearing inner caps, fan guards, and conduit box and cover shall be ASTM Type A48, Class 25 cast iron or better.
1. Conduit boxes shall be provided with the number and size of conduit connections, as shown on the Drawings. The conduit box shall allow rotation to accommodate conduit connection. Provision for grounding shall be made using a mounted clamp-type lug in the conduit box.
 2. Motors shall be equipped with lifting lugs. Motor enclosures shall be equipped with stainless-steel screens for all openings in accordance with NEMA MG 1 for guarded machines.
 3. Vertical hollow-shaft motors shall be equipped with non-reverse ratchets to prevent backspin.
 4. Motors shall be NEMA MG 1 open drip-proof, weather-protected Type I, totally enclosed fan-cooled, or explosion-proof as specified in other Sections of the Specifications or indicated on the Drawings.
- J. Submersible motors shall be explosion-proof and NRTL listed for Class 1, Division 1, Group C & D hazardous locations as defined by the NEC.
1. All electrical components shall be housed in an air-filled or oil-filled cast-iron, watertight enclosure which is sealed by the use of O-rings. Joints shall be rabbeted with extra-large overlaps.
 2. Automatic reset, normally closed, thermal overloads shall be imbedded in the motor winding to provide overheating protection.
 3. Moisture-detection probes shall be incorporated to detect moisture in either the seal or stator cavity by measuring resistivity between the probes. Float-type devices or single probe-to-ground moisture detectors are not acceptable.
 4. Submersible motors shall have power and control conductors housed in multi-conductor cables of sufficient length to reach the control panel or junction box as indicated on the Drawings. Cable leads shall allow cable-to-motor connections to be accomplished in the field without soldering. Cable entrance to the motor shall be sealed.
 5. Submersible motors shall be designed to allow either fully submerged or completely dry operation.

- K. Polyphase motors shall be of an energy-efficient design having a minimum efficiency rating as listed in NEMA MG 1-12.55, Table 12-6C.
 - 1. Motor efficiency shall be determined in accordance with NEMA MG 1-12.54.1 and IEEE 112, Method B.
 - 2. Efficiency rating shall be labeled on the motor nameplate in compliance with NEMA MG 1-12.54.2.
- L. Motors shall be capable of the following starts per hour, unless otherwise specified, without overheating or causing damage to the motor.
 - 1. 60 HP and below, six starts per hour.
 - 2. Above 60 HP, four starts per hour.
 - 3. Submersible motors, 10 starts per hour.
- M. Motors 5 HP and above, except submersible motors, shall be provided with a 120-volt single-phase space heater. Leads shall be brought to the motor terminal box.

2.10 MOTOR STARTERS

- A. Magnetic Motor Starters: Magnetic motor starters shall be rated in accordance with NEMA standards, sizes, and horsepower ratings. Starters shall be sized for the horsepower ratings as indicated on the Drawings or required by the driven equipment. Minimum sizes and type of starter shall be as indicated on the Drawings and shall have the following features:
 - 1. Magnetic starters shall be equipped with double-break silver-alloy contacts. All contacts shall be replaceable without removing power wiring or removing the starter from the panel or enclosure.
 - 2. Coils shall be of molded construction. All coils shall be replaceable from the front without removing the starter from the panel or enclosure.
 - 3. Overload relays shall be the melting-alloy type with a replaceable control module. Thermal units shall be of one-piece construction and interchangeable. The starter shall be inoperative if the thermal unit is removed. Three-phase starters shall have overload relays in all three phases. Reset button shall be accessible without opening the door or panel. Visible trip indication for overload phase indication shall be provided. The relay shall have a Form C contact, which operates when the overload relay trips; the contact shall be wired to terminal blocks for remote use.
 - 4. A phase-failure relay shall be provided for all motor starters and shall have solid-state sensing circuitry monitoring all three phases. The relay shall have isolated DPDT contacts and shall protect the motor against the loss

of one of the three phases: voltage unbalance in excess of 10% rated voltage, phase reversal, and undervoltage. Undervoltage shall be adjustable to 75% of rated voltage. The relay shall be Square D Company Class 8430 or approved equal.

5. All motor starters shall have their own control power transformer for individual starter control voltage, except where installed in control panels in which a common control power transformer may be incorporated. Control voltage shall be 120 VAC. Control power transformers shall be sized to include motor space heater load, starter or contactor coil, timers, relays, and other devices as indicated or specified. Primary inputs and the ungrounded secondary output of the control power transformer shall be fused.
6. Starters shall be suitable for adding at least four external electrical interlocks of any arrangement, normally open or normally closed. Starters shall be supplied with a minimum of two interlock contacts.
7. All magnetic starters shall be provided with terminal blocks for wiring devices external to the starter enclosure. The starter shall be supplied in a NEMA 1 enclosure unless otherwise indicated or specified.
8. The starter shall be capable of starting the motor the number of times per hour stated for motors or as required by the pumping sequence, without causing damage to the starter.
9. Panel-mounted elapsed-time meters shall have six register wheels indicating up to 99,999.9 hours, without a reset knob, and be rated at 115 VAC, 60 Hz. The panel manufacturer shall provide one meter for each motor installed and connect the meter so that the meter will record the time that the motor is energized.
10. Equip all magnetic controllers and/or starters, unless otherwise noted, with a three-position selector switch labeled "Hand-Off-Automatic" or as indicated. Switch in Hand position shall start motor.
11. Equip all magnetic controllers and/or starters with indicating lights as follows: green-power on, red-running.
12. A list of overload relay heater elements installed in each starter shall be included in the Operation and Maintenance Manual. The list shall identify the starter by name of equipment and show the type, size, and model number of the heater element.

B. Full-Voltage Non-reversing Starters (FVNR): Full-voltage non-reversing motor starters shall be designed for across-the-line full-voltage starting and stopping of squirrel-cage motors and shall be the combination type with motor circuit protector unless otherwise indicated.

1. The starters shall be rated 600 VAC, 60 Hz.

- C. Full-Voltage Reversing Starters (FVR): Full-voltage reversing motor starters shall be designed for across-the-line full-voltage starting and stopping of squirrel-cage motors and shall be the combination type with motor circuit protector unless otherwise indicated.

1. The starters shall be rated 600 VAC, 60 Hz.

- D. Control Devices:

1. Pushbutton control, when indicated on the Drawings, shall be non-illuminated, momentary contact (unless otherwise indicated), oil-tight, pushbutton with no guard. Pushbutton controls shall be Square D Type “K” or approved equal.
2. Selector switch operators, when indicated on the Drawings, shall be two- or three-position, non-illuminated, oil-tight switches with normal return to all positions. Selector switch operators shall be Square D Type “K” or approved equal.
3. Pilot lights shall be 120-volt LED push-to-test type.
4. Control relays shall be double pole, double throw sealed, plug-in type relays with din rail or panel mount base, rated for 10A current at 120Vac, with internal LED pilot light to indicate relay coil is energized.
5. Provide time delay relays in all motor starters larger than 5 HP to provide a sequenced start-up of motors upon energization. Sequence shall start with largest motor, next largest, etc. The timer shall have a range of 5 to 180 seconds.

2.11 ADJUSTABLE SPEED DRIVES (ASD) FOR MOTORS SMALLER THAN 100 HP (NOT USED, SEE SPECIFICATION SECTION 15575)

2.12 LIGHTING FIXTURES AND COMPONENTS

- A. Lighting fixtures similar and equal to the types indicated on the Drawings shall be furnished and installed complete with all ballasts, lamps, starters, lenses, accessory hardware, and associated equipment to provide a complete and working lighting system. Each fixture furnished shall be designed for the wattage and lamp type indicated on the Drawings and/or specified in this Section.
- B. Ensure lighting fixtures conform to UL 1598. Ensure fixtures in hazardous areas conform to UL 844. Provide labeling indicating specific lamp type and ANSI ballast type for use in the fixture.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of

tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Ballasts

1. Electronic fluorescent ballasts shall comply with UL 935 and ANSI C82.11. Shall be capable of operating the type and quantity of lamps specified. Shall have a Class A sound rating and operate at 42 kHz or higher. Ballast shall have a total harmonic distortion rating less than 10 percent.

E. Lamps

1. Lamps of the proper type, wattage, and voltage rating shall be furnished and installed in each fixture. Lamps shall be delivered to the project site in their original cartons. Unless otherwise indicated, lamps shall comply with the following:
 - a. Fluorescent lamps shall be standard cool white, with 3,150 initial lamp lumens, 40-watt power usage, and 20,000-hour lamp life.

2.13 SURGE PROTECTION DEVICE

- A. Primary surge protection device (SPD) shall be installed at the main service on the load side of the main breaker or automatic transfer switch as indicated on the Drawings.

1. Primary service SPD shall be listed in accordance with UL 1449-3rd Edition and shall be tested to Category C3 (20 kV, 10 kA, 8/20 μ sec. Waveform) in accordance with ANSI/IEEE C62.41 and C62.45. Suppressors shall meet or exceed the following criteria:
 - a. Single impulse current rating of 160,000 amperes per phase (8/20 μ sec. waveform).
 - b. Pulse life rating of 1,000 occurrences with no clamping drift for Category C (8/20 μ sec. waveform).
 - c. UL 1449 peak let-through voltage shall not exceed the following:

<u>Voltage</u>	<u>L-N</u>	<u>N-G</u>
120/208 or 120/240	500	500
277/480	800	800

- d. The test for Category C3 peak let-through voltage ANSI/IEEE C.62.41 (20 kV-1.2/50 μ s) shall be conducted by an independent testing laboratory. Documentation of the test shall be submitted with the shop drawings.
- e. Peak let-through voltage measured in UL and ANSI/IEEE testing shall include the effect of 6-inch leads connected to the complete unit.
- f. Turn-on and turn-off times shall be less than 1.0 nanosecond.

B. Secondary SPD shall be installed on the secondary side of step-down transformers or at the associated panelboards, at control panels, and at motor disconnects or junction boxes as indicated on the Drawings. Suppressors at panelboards shall be connected to a 30-amp multi-pole breaker. All other suppressors shall be fused.

1. Secondary SPD shall be listed in accordance with UL 1449-3rd Edition. Suppressors shall meet or exceed the following criteria:

- a. Single impulse current rating of 80,000 amperes per phase (8/20 μ sec. waveform).
- b. Pulse life rating of 1,000 occurrences with no clamping drift for Category C (8/20 μ sec. waveform).
- c. UL 1449 peak let-through voltage shall not exceed the following:

<u>Voltage</u>	<u>L-N</u>	<u>N-G</u>
120/208 or 120/240	500	500
277/480	800	800

- d. The test for Category C3 peak let-through voltage ANSI/IEEE C.62.41 (20 kV-1.2/50 μ s) shall be conducted by an independent testing laboratory. Documentation of the test shall be submitted with the shop drawings.

- e. Peak let-through voltage measured in UL and ANSI/IEEE testing shall include the effect of 6-inch leads connected to the complete unit.
 - f. Turn-on and turn-off times shall be less than 1.0 nanosecond.
- C. Minimum requirements for surge suppressors:
 - 1. Provide suppression elements between each phase or leg and the system neutral and between the neutral conductor and ground.
 - 2. Each module of modular type suppressors shall be externally fused. The status of each module shall be monitored on the front of the enclosure and on each module.
 - 3. The suppressor failure mode shall be of a “fail-short” design.
 - 4. Visible indication of proper connection and operation shall be provided.
 - 5. Modular-type suppressors shall have an internal disconnect and current limiting fuses. Encapsulated suppressors shall have external fuse or circuit breaker protection.
 - 6. Terminals shall be provided for all necessary power and ground connections and shall accommodate #10 to #1 AWG wire sizes.
 - 7. Suppressors shall be of solid-state componentry and shall operate bidirectionally.
 - 8. Suppressors shall have a warranty guarantee period of at least 5 years.
- D. All SPDs shall be of the same manufacture and shall be installed in accordance with the manufacturer’s installation instructions. The mounting position shall be selected to provide the shortest lead possible between the suppressor and the point of connection.
- E. SPDs shall be as manufactured by Advanced Protection Technologies, Inc., PQ Protection, LEA, or approved equal.

2.14 GROUNDING

- A. Ground rods shall be copper-clad steel, 3/4-inch-x-10-foot sectional type, with couplings and driving studs for installation.
- B. The conductor shall be bare, stranded copper, complying with ASTM B8, for main power ground and instrument ground, unless otherwise indicated. Grounding conductors run in conduit shall have green insulation.
- C. Connection to the ground rod shall be made with exothermic welding kits by Cadweld or approved equal. “Acorn” type clamps are not acceptable. Ground

connections to equipment frames, building steel, etc., shall be made with equipment grounding lugs or clamps intended for grounding purposes.

2.15 PLASTIC CAUTION TAPE

- A. The Contractor shall provide a continuous non-metallic caution tape, 12 inches below finished grade, above each duct or conduit run. The tape shall be 6 inches wide, imprinted to indicate underground electric utilities, as manufactured by Griffolyn, Terra-Tape, or equal.

2.16 PRECAST PRODUCTS

- A. Concrete Handholes: Concrete handholes shall conform to the dimensions shown on the Drawings, shall be designed to AASHTO H-20 loading, and shall be constructed of 4,000-psi (minimum) reinforced concrete.
 - 1. Handholes shall have full-size aluminum (T6061-T6) diamond plate pedestrian covers with reinforcing angles, rated for 300 pounds per square foot unless otherwise indicated. Covers shall be removable and shall be provided with lifting holes (four per cover). Covers larger than 4-foot-x-4-foot nominal shall be of sectional construction. Aluminum angles with flat bars shall be set into the inside of walls flush with the top to match covers.
 - 2. Handholes shall be open bottom unless otherwise indicated or specified.
 - 3. Handholes shall have pulling eyes cast in the wall opposite duct entry. The conduit shall be terminated in a handhole with end bells grouted in entrance windows with non-shrink grout.
 - 4. Power and/or signal cables shall be supported on heavy-duty non-metallic cable racks with adjustable arms and be held in place with non-metallic tie wraps. Racks shall be maximum 3 feet apart with a minimum of one per wall of handhole. Racks shall be attached to handhole walls in accordance with the rack manufacturer's recommendation with a minimum of three anchors per rack. An anchor shall be located in holes immediately above each adjustable arm.
 - 5. Handholes shall be installed on a 6-inch-thick bed of gravel. The gravel shall be compacted before casting or setting handholes. Handholes shall protrude 2 inches minimum above surrounding grade.
- B. Concrete Pull Box: The pull box shall be constructed of reinforced concrete or polymer concrete and shall be Brooks Products, Inc., Quazite, or equal. Covers shall be provided with lifting slot, bolts, and "ELECTRIC" logo.

PART 3 EXECUTION

3.01 LAYOUT OF CONDUIT AND WIRING SYSTEMS

- A. The Contractor shall lay out the work and shall be responsible for all necessary lines, levels, elevations, and measurements. The Drawings indicate the extent and general arrangement of the components. The Contractor shall become familiar with the work of other trades engaged in the construction. The exact routing of raceways and locations of equipment may be governed by structural conditions and obstructions. The Contractor shall coordinate with the details of equipment shop drawings for power and control connections to equipment furnished by others. This is not to be construed as permitting redesigning systems.
- B. Submit all requests for changes in the proposed layout due to structural features, equipment locations, and similar conditions to the Owner, with the following provisions:
 - 1. Detail the reasons for the changes.
 - 2. Submit requests within 30 days after award of Contract.
 - 3. Make no changes without written approval of the Owner.
- C. Examine areas scheduled to receive electrical equipment and material for conditions which will adversely affect the execution, permanence, or quality of the work. Determine field conditions by actual measurement. Do not proceed with installation until defects have been corrected.

3.02 INSTALLATION

- A. General: Comply with NEC, NESC, local codes, and rules and regulations of local agencies having jurisdiction. Coordinate electrical installation of systems and packaged equipment items specified in other Sections of these Specifications.
 - 1. Conductors, circuit breakers, motor controllers, and protective devices indicated or specified shall be sized to serve the electrical equipment furnished and shall meet all requirements of the NEC. Voltage drop shall be limited to 3%, including main service, feeder, and branch circuit.
 - 2. Coordinate protective, control, and signaling devices.
- B. Grounding and Bonding: The Contractor shall establish a grounding and bonding system that electrically connects metal structural materials, equipment enclosures, conduits, outlet boxes, cabinets, motor frames, fixtures, devices, transformer cases, switchgear enclosures, incoming service neutral conductor, and the earth. The common point of attachment for the grounding and bonding system shall be

at the main service disconnect unless otherwise indicate in this Section or in the Drawings. The grounding and bonding system shall be properly bonded and sized in accordance with NEC. Solidly bond all non-current-conducting metal parts to the electrical installation grounding bus. A green insulated grounding conductor shall be carried with each circuit.

1. Provide common grounds throughout the system.
2. Provide a ground grid consisting of driven copper-clad steel ground rods connected by bare copper conductor at the service entrance and/or as shown on the Drawings. Resistance to remote earth shall be 10 ohms or less before connection to the system.
3. Minimum burial depth of ground rods and ground ring (halo) conductors shall be 24 inches below finished grade (BFG). Plastic warning marking tape shall be installed above buried ground conductors 12 inches BFG for the entire length of buried conductors.
4. All ground connections BFG shall be by exothermic weld process (including connection of lightning protection system downleads) with the exception of connections in the ground test well, which shall be connected using UL-listed mechanical brass clamps.

C. Identification: Equipment such as but not limited to disconnect switches, motor starters, control panels, etc., shall be clearly marked.

1. Identify all devices operating at more than 250 VAC phase-to-phase or 125 VAC phase-to-ground with red enamel letters or numerals of appropriate height applied with a stencil.
2. Except as otherwise noted, all equipment shall be marked with engraved nameplates of laminated two-color phenolic plastic having white letters. Attach each nameplate with stainless steel screws. Align nameplates on equipment being marked in the center near the top.
3. Control panels shall have designation in 1/2-inch-high letters and voltage in 1/4-inch-high letters centered above the door on exterior trim.
4. Mark equipment mounted remotely from the source of power (such as pumps and fans) with equipment number, source of power, and starter location. Where starters are remotely mounted, marking shall include equipment name, number, and location.
5. Conductors shall be identified at each termination, pull box, junction box, handhole, point of entry to or exit from wireways, panelboards, control panels, and other points of access. Tags or labels shall be securely affixed

to the conductor in visible locations. Tags shall be durable plastic with the designation stamped on one side with suitable dies. Labels shall be permanent with legible black characters on white heat-shrink tubing or equivalent identification acceptable to the Owner.

- a. Power conductors shall be color-coded to identify phases, neutral and switch legs, using plastic, self-sealing tape. Tags or labels shall identify the switchboard, MCC, panel, etc., it is served from and the circuit number.
- b. The control conductor (including monitor and instrumentation conductors) shall be identified by color coding and tag or label as to wire number (corresponding to the manufacturer's wiring diagram) and equipment name.
- c. Power wiring and control wiring shall be identified in all handholes with a waterproof permanent tag attached to the cable with plastic cable ties.

D. Equipment Connections: Provide complete system with all power and control connections required for proper operation.

E. Conduit:

1. Rigid galvanized steel (RGS) conduit may be used as follows:
 - a. Exposed with PVC coating where indicated on the Drawings.
 - b. Concealed in poured concrete.
 - c. Below grade with PVC coating where indicated on the Drawings.
2. Rigid non-metallic (PVC) conduit may be used as follows:
 - a. Below-grade direct burial, Schedule 40.
3. Burial depth of conduit shall be measured from the top of the conduit to the top surface of finished grade, pavement, concrete, or similar cover as follows:
 - a. 24 inches (minimum) below unpaved areas.
 - b. 30 inches (minimum) below stabilized subbase in paved areas.
4. For concrete slabs on grade and foundations, conduit burial depth shall be measured from the bottom of the concrete slab or foundation as follows:

- a. 12 inches (minimum) below concrete slabs on grade or foundations.
5. It shall be the responsibility of the Electrical Contractor to coordinate the location and depths of all electrical conduits to be installed under this Contract with other trades. Particular attention shall be given to all locations where conduits enter a structure or building from underground. Proper clearances from the top of the conduits to the bottom of slabs and foundations shall be maintained.
6. Where conduits rise through slabs on grade, curved portion of bends shall not be visible above the finished slab.
7. Conduit stub-up to above grade and conduit stub-up out of or from below floor slab shall be rigid galvanized steel with PVC coating from and including the last 90° bend.
8. Avoid bends and offsets, where possible. Make bends and offsets with an approved hickey or conduit bending machine. Install plastic (PVC) coated conduit and fittings in accordance with the manufacturer's installation manual using tools designed for installing plastic (PVC) coated conduit and fittings. Touch up any and all damaged areas with manufacturer-recommended coating compound. Do not install crushed or deformed conduit. Use expansion fittings or other approved devices where conduit or tubing crosses expansion joints. Prevent dirt or trash from lodging in conduits, boxes, and fittings. Free clogged conduit of all obstructions or replace conduit.
9. Installers of PVC-coated metal conduit must be certified by the manufacturer and be able to present a valid, unexpired, certified installer card prior to starting installation.
10. Supports:
 - a. Pipe straps, wall brackets, hangers, or ceiling trapeze.
 - b. Use wood screws or screw-type nails for fastening to wood. Use toggle bolts for fastening to hollow masonry units. Use concrete inserts or expansion anchors for fastening to concrete. Use machine screws, welded threaded studs, or spring-tension clamps for fastening to steel work.
 - c. Power-driven threaded studs may be used in lieu of expansion bolts or machine or wood screws where acceptable to the Owner.
 - d. Do not weld conduit or pipe straps to steel structures.

- e. Non-metallic conduit through 1-inch size shall use one-hole snap-strap clamps and 1-1/4-inch through 2-inch shall use two-hole snap-strap clamps, with maximum spacing between supports as outlined in the NEC based on 50°C conductor temperature. Clamps shall be manufactured from a nylon compound.
- 11. Expansion couplings shall be used in all straight lengths of non-metallic conduit in exposed applications. Maximum spacing between expansion couplings shall be 100 feet.
- 12. Connections: All conduits, where they enter sheet metal enclosures such as panelboards, pull boxes or outlet boxes, shall be secured in place by galvanized locknuts and bushings, one locknut inside of box with bushing on conduit end and one locknut outside of box for rigid conduit. The locknuts shall be tightened against the box without deforming the box.
 - a. Conduit connections shall use fittings to maintain NEMA rating of enclosures.
 - b. All bushings and conduit box connectors shall have the insulating material permanently fastened to the fittings.
 - c. Grounding bushings shall be used in switchgear and motor control centers.
 - d. Conduit connections exposed in wet locations shall be by watertight threaded hub. Metallic conduit box connections may use a two-piece hub with built-in recessed neoprene gasket such as Appleton Uni-Seal. Non-metallic conduit box connectors may use a neoprene flat washer or “O” ring placed over threads of the fitting between the shoulder of the fitting and the box.

F. Duct Banks:

- 1. Conduit: Conduit shall be Schedule 80 PVC of the number and size as indicated on the Drawings.
 - a. Conduits shall maintain a continuous slope between handholes and shall be sloped toward handholes with a minimum grade of 3 inches per 100 feet, where practical.
 - b. Conduits shall terminate in handholes with end bells.
 - c. Thoroughly clean each conduit after installation. Pass a mandrel not less than 12 inches long with a diameter 1/4 inch less than the inside dimension through each conduit.
 - d. Conduit shall follow straight lines, as far as possible, with spacing both horizontally and vertically maintained by spacers

manufactured by the conduit manufacturer. Securely anchor conduit to prevent movement during placement of backfill or concrete encasement. Conduit couplings shall be staggered by rows. Long radius bends shall be used where deviation from straight lines is necessary.

- e. Concrete encasement, where indicated on the Drawings, shall be constructed to the dimensions shown. Trench bottoms shall be tamped firm and even. Suitably braced side forms shall be employed. Concrete shall be installed in a continuous pour to eliminate joints.
- f. The high point of conduits between handholes shall have a minimum of 18 inches cover below the finished grade.
- g. The entire underground conduit/duct system shall be watertight. Seal conduits to exclude moisture at each building or structure.
- h. Provide plastic caution tape above the duct run 12 inches below finished grade.

G. **Cast-in-Place Concrete Handholes:** Cast-in-place concrete handholes shall conform to the dimensions shown on the Drawings, shall be designed to AASHTO H-20 loading, and shall be constructed of 4,000 psi reinforced concrete. The construction shall conform to the methods, form, mixture, placement, and curing as specified in Section 03301, Cast-in-Place Concrete.

- 1. Handholes shall have full-size aluminum (T6061-T6) diamond plate pedestrian covers with reinforcing angles, rated for 300 pounds per square foot unless otherwise indicated. Covers shall be removable and shall be provided with lifting holes (four per cover). Covers larger than 4-foot-x-4-foot nominal shall be of sectional construction. Aluminum angles with flat bars shall be set into inside of walls flush with the top to match covers.
- 2. Handholes shall be open bottom unless otherwise indicated or specified.
- 3. Handholes shall have pulling eyes cast in the wall opposite duct entry. Conduit shall be terminated in handhole with end bells.
- 4. Power and/or signal cables shall be supported on heavy-duty non-metallic cable racks with adjustable arms and be held in place with non-metallic tie wraps. Racks shall be maximum 3 feet apart with a minimum of one per wall of handhole. Racks shall be attached to handhole walls in accordance with the rack manufacturer's recommendation with a minimum of three anchors per rack. An anchor shall be located in holes immediately above each adjustable arm.
- 5. Cast-in-place handholes shall have 6-inch-thick walls reinforced with 4-inch-x-4-inch W2.9 x W2.9 WWF.

6. Handholes shall be installed on a 6-inch-thick bed of gravel. The gravel shall be compacted before casting or setting handholes. Handholes shall protrude 2 inches minimum above surrounding grade.

H. Boxes:

1. The Contractor shall provide outlet, pull, junction, or terminal boxes in wiring or conduit systems wherever required for pulling wires, making connections, and mounting devices or fixtures.
 - a. Indicated locations are approximate only. Coordinate actual location with all work to be performed in the space or area and for the equipment to be served.
 - b. Locate outlets so that fixtures and other items will be symmetrically located according to the space or area layout.
 - c. Outdoor switch and receptacle outlets shall use non-metallic boxes and covers.
2. Outlet boxes in exposed work or wet locations shall be cast metal. Sheet metal boxes shall be concealed in walls or ceiling. Non-metallic boxes shall be used with non-metallic conduit.
3. Supports:
 - a. In open overhead spaces, cast boxes threaded to rigid metallic conduit need not be separately supported unless used for fixture support.
 - b. Use wood screws or screw-type nails for fastening to wood. Use toggle bolts for fastening to hollow masonry units. Use concrete inserts or expansion anchors for fastening to concrete. Use machine screws or welded, threaded studs for fastening to steel work.
 - c. Power-driven threaded studs may be used in lieu of expansion bolts or machine or wood screws where acceptable to the Engineer and the Owner.

I. Wiring Devices: Receptacles installed outdoors shall be the ground-fault circuit-interrupter type.

J. Wiring:

1. The Contractor shall provide a complete system of conductors as indicated.

2. Size shall be as required by the NEC and shall be #12 AWG minimum for power and lighting circuits and #14 AWG minimum for control and alarm circuits.
 3. Crimp-on insulated wire terminals shall be used on stranded wire for terminations.
 4. Splices shall be in accessible locations only and shall be insulated-pressure type for #10 AWG and smaller wires. For #8 AWG and larger, use solderless connectors covered with an insulation material equivalent to the conductor insulation.
- K. Lighting Fixtures: All fixtures and supports shall be carefully laid out and equipped with suitable swivel hangers, canopies, and/or other auxiliaries as required to ensure that fixtures are plumb without bending or offsetting stems, rods, or supports and properly aligned both lengthwise and crosswise except that where obstructions or conflicts are encountered the fixtures shall be relocated as directed by the Engineer or the Owner and installed in such a manner as to provide a finished, neat, and workmanlike installation.
- L. Appearance: All items shall be cleaned or touched up as necessary to ensure first-class condition.

3.03 FIELD TESTS AND OBSERVATION

- A. General: Do not enclose or cover any work until it has been observed, tested, and accepted.
1. Provide all personnel, equipment, and instruments required for observation and testing.
 2. Demonstrate that all circuits and devices are in operating condition. Tests shall include the following:
 - a. Megger all motor windings before operation for insulation resistance and, if found low, dry out windings to secure acceptable insulation resistance.
 - b. Check control center components, buses, starters, breakers, relays, alarms, interlocks, etc., and place in service in accordance with the manufacturer's instructions. Inspect and adjust electrical equipment before energization.
 - c. Megger all power cables and wiring for insulation resistance and record.

- d. Check all motors for correct lubrication and lubricate, if required, in accordance with the manufacturer's instructions.
 - e. Check direction of rotation of all motors and reverse, if necessary.
- 3. Assemble in binders and turn over to the Owner all instruction bulletins, lubrication schedules, operating instructions, pamphlets, parts lists, prints, etc. accompanying or attached to apparatus and equipment.
- 4. Notify the Engineer and the Owner 1 week before test date.
- B. Ground Rod Test: Before any wire is connected to ground rods, test each rod for resistance to ground.
 - 1. The testing instrument shall be a direct reading, single test, portable ground testing megger.
 - 2. The test procedure shall be as recommended by the manufacturer of the test instrument used.
 - 3. The make and model of the test instrument and a copy of the test procedure shall be submitted to the Owner before the test is conducted.
 - 4. Do not conduct tests within 48 hours after rainfall or during foggy weather.
 - 5. If ground resistance exceeds 10 ohms, additional grounds shall be driven.
 - 6. The grounding test shall be witnessed by the Engineer or other representative of the Owner. A copy of the test results and method shall be included in the maintenance manual. Deliver one copy of the test results to the Engineer and the Owner within 1 week after the test.

3.04 ADJUST AND CLEAN

- A. The Contractor shall remove excess and waste materials from the project site.
- B. Remove defective work and replace with material that meets Specification requirements or repair to the satisfaction of the Owner.
- C. Touch up scratches, abrasions, voids and other defects in factory- or shop-finished surfaces.

END OF SECTION

Appendix D

**CITRUS COUNTY CENTRAL LANDFILL
WATER QUALITY MONITORING PLAN
WACS FACILITY NO. SWD/09/39859**

Prepared for:

Citrus County
230 W. Gulf to Lake Highway
Lecanto, Florida 34461



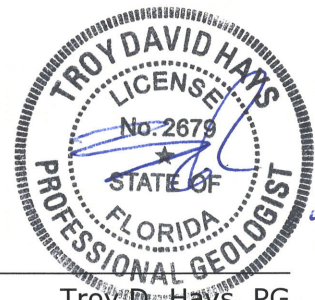
Prepared by:

Jones Edmunds
730 NE Waldo Road
Gainesville, Florida 32641

PE Certificate of Authorization #1841

PG Certificate of Authorization #133

April 2018



4/19/18

Troy D. Hays, PG

Florida License No. 2679

WATER QUALITY MONITORING PLAN FOR THE CITRUS COUNTY CENTRAL LANDFILL

This Water Quality Monitoring Plan (WQMP) details the compliance sampling required at the Citrus Central Landfill. This monitoring plan follows the format of Part L – Water Quality Monitoring Requirements – of the State of Florida Application for a Permit to Construct, Operate, Modify, or Close a Solid Waste Management Facility.

The only change to this WQMP from the previous plan (dated March 2016) is the addition of the three new groundwater assessment wells to the semiannual assessment sampling events. Wells MW-18D, MW-19D, and MW-22 will be sampled semiannually for the assessment monitoring parameters listed in Table e(2)(b).

Attachment 1 is a site map that shows the groundwater monitoring network with the addition of the three new assessment wells.

WATER QUALITY MONITORING PLAN

a. Sign and Seal

The water quality monitoring plan has been signed, dated, and sealed in accordance with Chapter 62-701.510(2)(a), FAC.

b. Sampling and Analysis

All sampling and analysis have been performed in accordance with Chapter 62-160, FAC; 62-701.510(2)(b), FAC; the FDEP Standard Operating Procedures 001/01; and the current Permit No. 21375-018-SO/01.

c. Groundwater Monitoring Requirements

- (1) The existing monitoring network has no detection wells.
- (2) The existing monitoring network has nine compliance wells – MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-17, MW-20, and MW-21.
- (3) The existing monitoring network has two background wells – MW-3 and MW-7.
- (4) Attachment 1 shows the locations of each groundwater monitoring well in the proposed monitoring network. Attachment 2 is a table that provides well construction information for all existing wells.

With the inclusion of the three new wells, five assessment wells – MW-18, MW-18D, MW-19, MW-19D, and MW-22 – are in the monitoring network.

- (5) Well spacing is less than 500 feet across the downgradient direction of groundwater flow and approximately 1,500 feet apart across the upgradient direction of groundwater flow in the uppermost aquifer –the Floridan aquifer – within the zone of discharge.
- (6) The screened intervals of the monitoring wells were positioned to encounter the water table of the unconfined Floridan aquifer throughout normal seasonal fluctuation.
- (7) The wells are constructed to provide representative groundwater samples from the zones monitored. Attachment 2 provides well construction information for all wells.
- (8) Unused wells and piezometers will be abandoned properly, as specified in Rule 40D-3.531, FAC, and the rules of the Southwest Florida Water Management District.
- (9) The site has no detection sensors.

d. Surface Water Monitoring Requirements

Surface water is only required to be sampled if a discharge off the Citrus County Central Landfill property occurs. The sample will be collected from the body of water from which the discharge occurred.

e. Sampling Frequency and Requirements

- (1) Newly installed wells and replacement wells will be sampled for the parameters listed in Rules 62-701.510(7)(a) and (7)(c), FAC, within 2 weeks of well completion and development.

- (2) Routine monitoring well sampling and analysis requirements:

- (a) Water samples from all monitoring wells (background and compliance) will be sampled semiannually for the parameters listed in Section 62-701.510(7)(a), FAC, as tabulated in Table e(2)(a).

Table e(2)(a) Monitoring Well Sampling Parameters

Field Parameters	Laboratory Parameters
Static Water Levels	Total Ammonia -N
Specific Conductivity	Chlorides
pH	Iron
Dissolved Oxygen	Mercury
Turbidity	Nitrate
Temperature	Sodium
Colors and Sheens (by observation)	Total Dissolved Solids (TDS)
	Those parameters listed in 40 CFR Part 258, Appendix I.

- (b) Assessment wells – MW-18, MW-18D, MW-19, MW-19D, and MW-22 – will be sampled semiannually for the parameters listed in Table e(2)(b).

Table e(2)(b) Assessment Well Sampling Parameters

Field Parameters	Laboratory Parameters
Static Water Levels	Benzene
Specific Conductivity	Methylene Chloride
pH	Vinyl Chloride
Dissolved Oxygen	
Turbidity	
Temperature	
Colors and Sheens (by observation)	

- (3) Surface water is only required to be sampled if a discharge off the Citrus County Central Landfill property occurs. If discharge off the property occurs, samples will be collected for the parameters listed in Section 62-701.510(7)(b), as tabulated in Table e(3).

Table e(3) Surface Water Sampling Parameters

Field Parameters	Laboratory Parameters
Specific Conductivity	Unionized Ammonia
pH	Total Hardness
	Biochemical Oxygen Demand (BOD5)
Dissolved Oxygen	Iron
Turbidity	Mercury
Temperature	Nitrate
Colors and Sheens (by observation)	Total Dissolved Solids (TDS)
	Total Organic Carbon (TOC)
	Fecal Coliform
	Total Phosphorus
	Chlorophyll A
	Total Nitrogen
	Chemical Oxygen Demand (COD)
	Total Suspended Solids (TSS)
	Those parameters listed in 40 CFR Part 258, Appendix I.

f. Evaluation Monitoring, Prevention Measures, and Corrective Action

(1) Groundwater Corrective Actions

If monitoring parameters are detected in wells at concentrations that are significantly above background water quality or that are at concentrations above FDEP's water quality standards or criteria specified in Rule 62-520, FAC, the well will be re-sampled within 30 days after the initial analytical data are received to confirm the data. If the data are confirmed or the well is not re-sampled, FDEP will be notified in writing within 14 days of the finding. Upon notification by FDEP, evaluation monitoring will be initiated in accordance with Chapter 62-701.510(6), FAC.

(2) Surface Water Corrective Actions

Surface water is only sampled on a per-discharge event. FDEP will be notified within 24 hours of discovery of a discharge event.

g. Water Quality Monitoring Report Requirements

Groundwater monitoring reporting is required and has been completed in accordance with Chapter 62-701.510(8), FAC.

(1) Groundwater compliance monitoring reports are submitted to FDEP semiannually in accordance with the current permit (FDEP Permit No. 21375-018-SO/01). Additionally, these reports are submitted in accordance with the requirements of Section 62-701.510(8)(a), FAC.

(2) Water quality data will be provided electronically in a format consistent with requirements for importing into FDEP databases and in compliance with the permit.

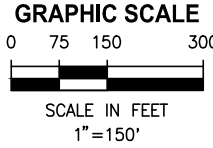
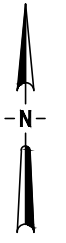
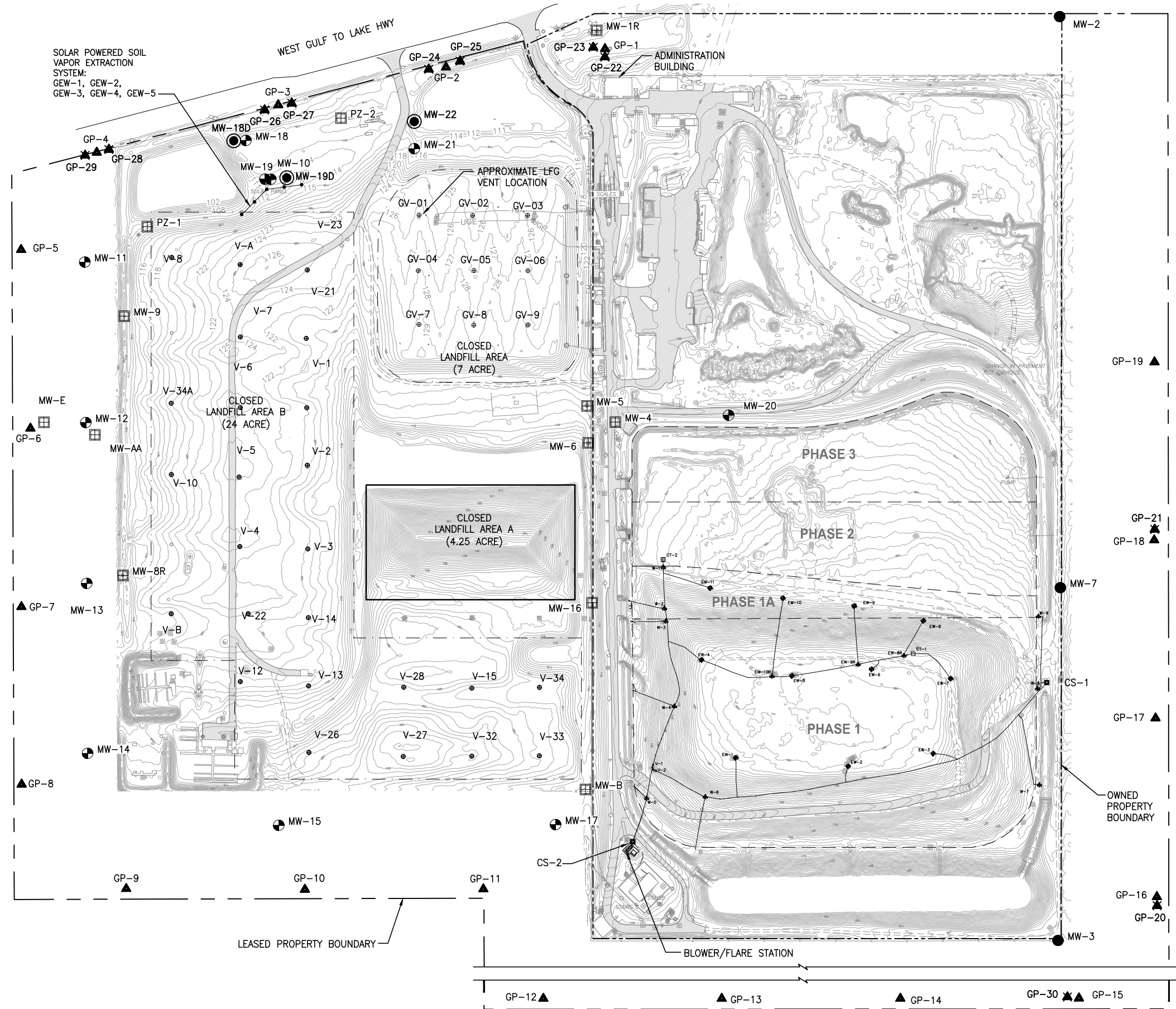
(3) A technical report signed, sealed, and dated by a PG or PE will be submitted to FDEP every 2.5 years in accordance with the requirements of Chapter 62-701.510(8)(b), FAC. The most recent report dated March 2018 summarized data from the First Semiannual 2015 through the First Semiannual 2017 sampling events. The report summarizes and interprets the water quality and water level measurements collected during the past 2.5 years. The report included the following:

- a) Tabular display of data showing all detected parameters.
- b) Graphical display of any leachate key indicator parameters.
- c) Hydrographs for all monitoring wells.
- d) Trend analysis of any monitoring parameter consistently detected.
- e) Comparisons between shallow-, medium-, and deep-zone wells.
- f) Comparisons between background water quality and the water quality in detection and compliance wells.

- g) Correlations between related parameters such as total dissolved solids and specific conductance.
- h) Discussions of erratic and/or poorly correlated data.
- i) Interpretation of groundwater contour maps including an evaluation of groundwater flow rates.
- j) An evaluation of the adequacy of the water quality monitoring frequency and sampling locations based on site conditions.

Attachment 1
Site Map

LAST SAVED: 3/26/2018 2:56 PM BY: PUPSTILL PATH: \\JEACAD\DRAWING\03860 CITRUS COUNTY\059 GCS\FIGURES\03860059FIG-MON-NET.DWG PLOTTED: 3/26/2018 02:56 PM BY: PAUL UPSTILL



LEGEND

- EW-1 LFG EXTRACTION WELL
- EW-10 DOWNSLOPE LFG EXTRACTION WELL
- EW-8R REMOTE LFG EXTRACTION WELLHEAD
- CS-2 CONDENSATE SUMP
- MW-7 BACKGROUND WELLS
- MW-13 COMPLIANCE MONITORING WELL
- V-33 PASSIVE GAS VENT
- GV-06 PASSIVE GAS VENT (INSTALLED 2009)
- PZ-1 PIEZOMETERS
- MW-9 PIEZOMETERS
- GP-1 GAS PROBE
- W-7 LEACHATE CLEANOUT RISER WELLHEAD
- GP-21 NEW LFG PROBE (2017)
- MW-22 NEW GW MONITORING WELL (2017)

- NOTES:**
1. TOPOGRAPHIC CONTOURS PREPARED BY PICKETT SURVEYING, DATED 09/28/17.
 2. EXISTING LFG VENTS MAY NOT BE LABELED AS SHOWN.

MONITORING NETWORK
CITRUS COUNTY CENTRAL LANDFILL
CITRUS COUNTY, FLORIDA

ATTACHMENT 2

Well Construction Information

Well Name	Well Designation	Date Installed	Top of Casing Elevation (ft NGVD)	Screen Details							Filter Pack (Silica Sand)	Well Location	
				Total Depth (Ft. BLS)	Total Depth (ft BTOC)	Length (ft)	Depth (Ft. BLS)		Elevation (Ft. NGVD)			Easting (Ft.)	Northing (Ft.)
							Top	Bottom	Top	Bottom			
MW-AA	Piezometer	NR	105.85	116	117.4	10	106	116	-1.6	-11.6	NR	514330.1915	1642944.6946
MW-B	Piezometer	NR	113.30	128	128.8	20	108	128	4.5	-15.5	NR	515703.188	1641952.201
MW-E	Piezometer	NR	109.36	118	120.9	20	98	118	8.5	-11.5	NR	514187.411	1642978.872
MW-1R	Piezometer	NR	118.07	125	127.8	10	115	125	0.3	-9.7	NR	515734.4675	1644075.0314
MW-2	Piezometer	NR	136.05	161	163.8	15	146	161	-12.8	-27.8	NR	517016.947	1644134.012
MW-3	Background	NR	120.31	119	119.8	15	104	119	15.5	0.5	NR	517026.689	1641528.493
MW-5	Piezometer	NR	120.98	120	122.5	10	110	120	8.5	-1.5	NR	515706.7199	1643027.5870
MW-6	Piezometer	NR	118.27	122	124.7	10	112	122	3.6	-6.4	NR	515710.8712	1642921.8127
MW-7	Background	NR	128.47	137	139.06	20	117	137	9.4	-10.6	NR	517032.495	1642518.150
MW-8R	Piezometer	NR	117.96	128	127.98	20	108	128	10.0	-10.0	NR	514408.379	1642551.088
MW-9	Piezometer	NR	113.29	121	120.96	20	101	121	12.3	-7.7	NR	514411.959	1643276.437
MW-10	Compliance	11/2/05	113.37	120.5	120.0	20	100.5	120.5	13.4	-6.6	20/30	514808.4751	1643659.0352
MW-11	Compliance	11/2/05	104.69	112.0	111.7	20	92.0	112.0	13.0	-7.0	Gravel	514299.5523	1643424.8999
MW-12	Compliance	11/2/05	103.36	110.0	109.5	20	90.0	110.0	13.9	-6.1	20/30	514306.5574	1642972.8677
MW-13	Compliance	11/10/05	111.92	120.0	119.5	20	100.0	120.0	12.4	-7.6	20/30	514299.7062	1642543.8233
MW-14	Compliance	11/10/05	108.50	116.0	115.5	20	96.0	116.0	13.0	-7.0	20/30	514302.3733	1642085.7341
MW-15	Compliance	11/10/05	123.58	130.0	129.6	20	110.0	130.0	14.0	-6.0	20/30	514845.7153	1641844.4367
MW-16	Piezometer	10/31/05	119.64	127.0	126.6	20	107.0	127.0	13.0	-7.0	20/30	515765.2792	1642292.6040
MW-17	Compliance	11/3/05	110.85	118.0	117.5	20	98.0	118.0	13.4	-6.7	20/30	515619.9611	1641846.2474
MW-18	Assessment	1/23/07	115.82	120.0	119.7	20	100.0	120.0	16.1	-3.9	20/30	514730.9420	1643746.0676
MW-19	Assessment	1/22/07	113.50	140.0	139.6	10	130.0	140.0	-16.1	-26.1	20/30	514816.3731	1643660.2048
MW-20	Compliance	1/12/11	119.76	125.70	125.0	20	105.0	125.0	14.76	-5.24	20/30	516104.004	1642999.189
MW-21	Compliance	1/12/11	115.63	125.40	125.0	20	105.0	125.0	10.63	-9.37	20/30	515259.800	1643743.909
MW-18D	Assessment	7/31/17	115.68	140.00	139.6	10	130.0	140.0	-13.92	-23.92	20/30	514743.728	1643744.784
MW-19D	Assessment	7/29/17	113.59	160.00	159.6	5	155.0	160.0	-41.01	-46.01	20/30	514825.267	1643661.619
MW-22	Assessment	8/1/17	113.79	125.00	124.5	20	105.0	125.0	9.29	-10.71	20/30	515212.968	1643815.567
PZ-1 A	Piezometer	1/26/07	110.97	120.0	119.7	20	100.0	120.0	11.3	-8.7	20/30	514454.2759	1643505.5893
PZ-2 A	Piezometer	1/24/07	116.82	120.0	119.8	20	100.0	120.0	17.0	-3.0	20/30	515020.7612	1643833.4593

Updated with County survey information dated September 14, 2017.

BTOC = Below Top of Casing

ft = Feet

BLS = Below Land Surface

NR = Not recorded

NGVD = National Geodetic Vertical Datum