TRAIL RIDGE LANDFILL
INCREMENTAL CLOSURE
CLOSURE PHASE 3
UNITS 24 – 47

QUALITY ASSURANCE AND QUALITY CONTROL DOCUMENTATION

PREPARED FOR:

CITY OF JACKSONVILLE, FLORIDA

PREPARED BY:

England-Thims & Miller, Inc.

VISION ▪ EXPERIENCE ▪ RESULTS

Engineers – Planners – Surveyors – Landscape Architects
14775 Old St. Augustine Road Jacksonville, Florida 32258
Certificate of Authorization Number: 2584

AND

Meskel & Associates ENGINEERING, PLLC
GEOTECHNICAL ▼ CONSTRUCTION TESTING & INSPECTION

ETM Job Number: E 11-019-P3
Date Issued: November 9, 2012

ETM
VISION • EXPERIENCE • RESULTS

www.etminc.com
tel 904-642-8990 • fax 904-646-9485
14775 Old St. Augustine Road • Jacksonville, Florida 32258

November 9, 2012

Mr. Emerson Raulerson, P.E.
Florida Department of Environmental Protection
Northeast District Office
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256-7590

Re: Trail Ridge Landfill
Incremental Side Slope Closure – Phase 3 - Side Slope Units 24 - 47
FDEP Permit No. 0013493-017-SO
ETM No. E11-019-P3

Dear Mr. Raulerson:

Please find attached the Certification of Completion for Trail Ridge Landfill, Incremental Closure – Phase 3, which includes Side Slopes Units 24-47. The Construction Quality Assurance / Quality Control documentation and As-Builts Drawings are attached.

Subject to your site inspection, the City of Jacksonville, Florida, respectfully requests your written verification that the Department accepts this incremental closure.

If you have any questions regarding this construction, please feel free to give me a call at (904) 265-3163 or email me at Lockwoods@etminc.com.

Sincerely,

ENGLAND, THIMS & MILLER, INC.

Scott Jordan Lockwood, P.E.
Project Manager

Attachment:
Quality Assurance and Quality Control Documentation (One copy / 1 PDF)

cc:	Jeff Foster, P.E.	COJ	w/attachments
	Greg Mathes	TRLF	w/attachments
	Eric Parker	TRLF	w/attachments
	Jim Purvis	TRLF	cover letter only
	Juanitta Clem, P.E.	ETM	cover letter only
	Tina Meskel, P.E.	MAE	cover letter only
	Sam Lansdale	MAE	cover letter only

Department of Environmental Protection

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

DEP Form # 62-701.900(2)
Form Title Certification of Construction Completion of a Solid Waste Management Facility
Effective Date May 19, 1994

Certification of Construction Completion of a Solid Waste Management Facility

DEP Construction Permit No: 0013493-017-SO County: Duval

Name of Project: Trail Ridge Landfill - Incremental Closure

Name of Owner: City of Jacksonville, Florida

Name of Engineer: ETM - England, Thims & Miller, Inc.

Type of Project: Class I Landfill - Incremental Closure of Phase 3 (Units 24-47)

Cost: Estimate $ _____ Actual $ 3,144,024

Site Design Quantity: 5,000 (peak) ton/day Site Acreage: 21.30 Acres

Deviations from Plans and Application Approved by DEP (attach additional pages as needed):

Deviations are shown on the attached As-Built Survey prepared by Robert M. Angas Associates, Inc. and as outlined in the attachments (refer to attachment for details).

Please find attached in the Appendix A, a deviation letter from Meskel and Associates Engineering for for Shear Strength testing method between Intermediate and Vegetative Cover Soil.

Address and Telephone No. of Site: 5110 U.S. Highway 301, Baldwin, Florida 32234

Phone Number: (904) 289-9100

Name(s) of Site Supervisor: Greg Mathes (TRLI)

Date Site inspection is requested: As soon as possible

This is to certify that, with the exception of any deviation noted above, the construction of the project has been completed in substantial accordance with the plans authorized by Construction

Permit No.: 0013493-017-SO Dated: September 16, 2009 (issued date)

Date: 11-9-2012

SCOTT J. LOCKWOOD LICENSE NO. 58426 STATE OF FLORIDA PROFESSIONAL ENGINEER

Signature of Professional Engineer

Northwest District
160 Governmental Center
Pensacola, FL 32501-5794
850-595-8360

Northeast District
7825 Baymeadows Way, Ste. B200
Jacksonville, FL 32256-7590
904-448-4300

Central District
3319 Maguire Blvd., Ste. 232
Orlando, FL 32803-3767
407-894-7555

Southwest District
3804 Coconut Palm Dr.
Tampa, FL 33619
813-744-6100

South District
2295 Victoria Ave., Ste. 364
Fort Myers, FL 33901-3881
941-332-6975

Southeast District
400 North Congress Ave.
West Palm Beach, FL 33401
561-681-6600

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DEVIATIONS MEMORANDUM

From: **Scott Jordan Lockwood, P.E.**

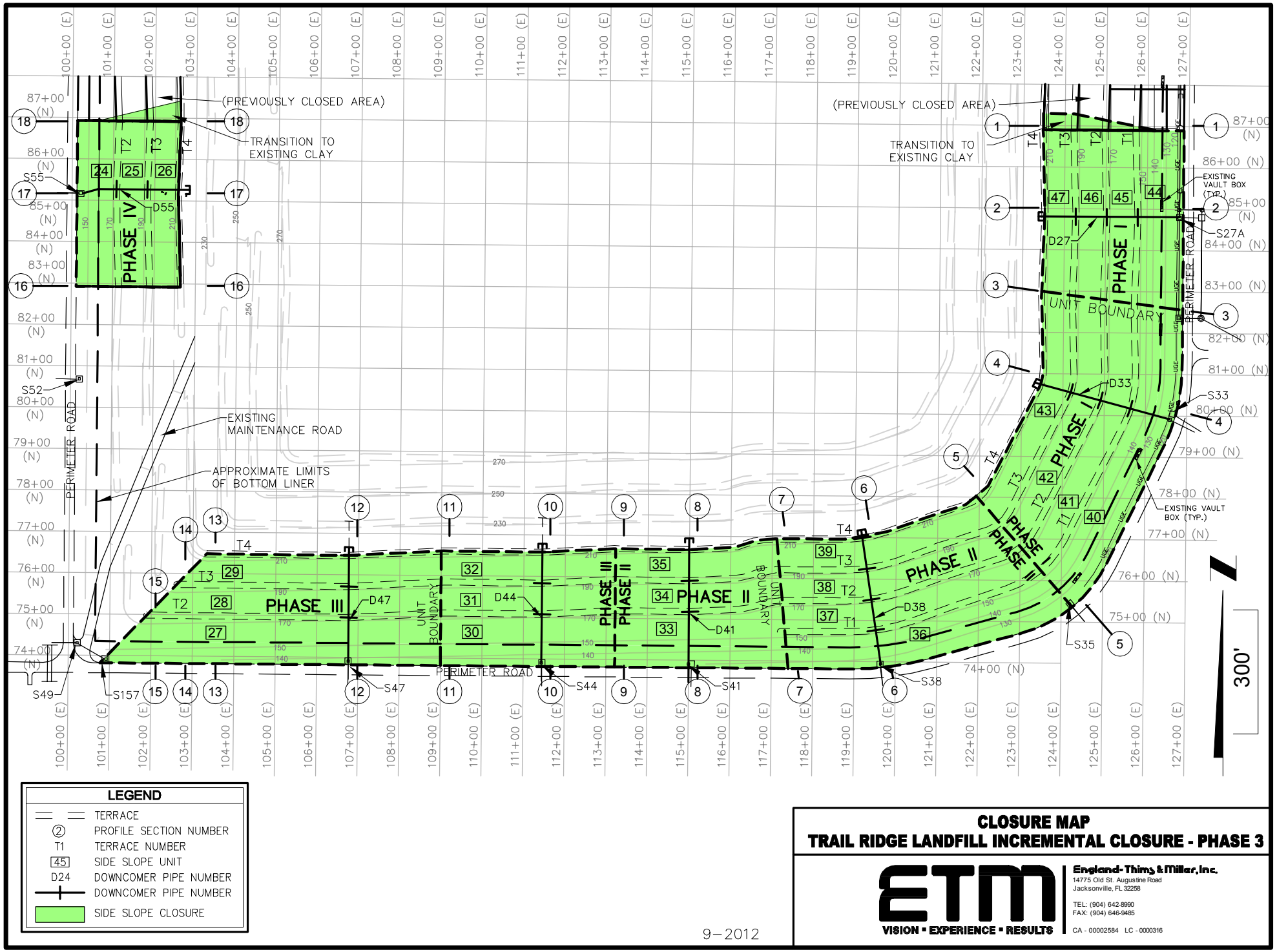
Re: **Trail Ridge Landfill Incremental Closure – Phase 3**

Date: **November 9, 2012**

Note:

1. Due to settlement, the area adjacent to Phase I (Profile 1) was adjusted so that the clay was sloped from Profile 1 northerly toward the existing clay that settled within a previous closure. This area is shown on the Tables prepared by RMA.
2. Due to settlement, the area adjacent to Phase IV (Profile 18) was adjusted so that the clay was sloped from Profile 18 northerly toward the existing clay that settled within a previous closure. This area is shown on the Tables prepared by RMA.
3. Due to a side slope seepage during construction, a 4" HDPE stand pipe was installed through the clay layer in Phase I - Terrace 1 adjacent to D-27 and in Phase IV- Terrace 2 adjacent to northerly. These seeps were subsequently repaired by ERC during construction.

England-Thims & Miller, Inc.
14775 Old St. Augustine Road, Jacksonville, Florida 32258
Phone: (904) 642-8990 • Fax: (904) 646-9485 • http://www.etminc.com



CLOSURE MAP
TRAIL RIDGE LANDFILL INCREMENTAL CLOSURE - PHASE 3

9-2012

England-Thims & Miller, Inc.
14775 Old St. Augustine Road
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PLOTTED: November 9, 2012 - 1:31 PM, BY: Scott Lockwood

G:\Landfill\Trail\11-019\Close-P3\Maps\Closure-Map.dwg

QUALITY CONTROL /
QUALITY ASSURANCE PLAN

TRAIL RIDGE LANDFILL
INCREMENTAL SIDE SLOPE CLOSURE
QUALITY ASSURANCE/QUALITY CONTROL PLAN

This plan addresses the quality assurance and quality control (QA/QC) for the incremental closure (close-as-you-go) of Trail Ridge Landfill. This program delineates the quality procedures and standards for the construction. This plan includes the closure of the side slopes only (including the reconstruction of final cover on side slopes). The top area closure has a separate QA/QC Plan.

In the context of this plan, quality assurance and quality control are defined as follows:

Quality Assurance - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service.

Quality Control - Those actions which provide a means to measure and regulate the characteristics of an item or service to contract and regulatory requirements.

The City of Jacksonville, Florida is the owner of Trail Ridge Landfill. Trail Ridge Landfill, Inc. is the permittee and operates the landfill. England, Thims & Miller, Inc. is the design engineer. The name of the Contractor for each incremental closure shall be provided to the Department of Environmental Protection (DEP), prior to construction.

All QA/QC activities (including monitoring, sampling and testing) shall be directed and conducted by third parties, whom are independent of the Contractor.

The QA/QC Plan for this project includes General QA/QC and Soils QA/QC. The General QA/QC includes full-time services to periodically observe the contractor's work to verify substantial compliance with permits, plans, specifications and design concepts. These services will include the following:

General Quality Control Monitor - shall monitor the construction for compliance with the permits, plans, specifications and design including construction to proper lines and grades, maintain daily logs and weekly progress reports of the construction (including observation data sheets, problem identification and correction logs), make note of any construction deviations, coordinate qualifying and testing of materials, monitor any waste excavation, and monitor filling. This individual shall be experienced in civil site construction and solid waste regulations.

General Quality Assurance Engineer - shall supervise the construction monitoring and waste removal to verify compliance with permits, plans, specification and design concepts. This individual shall be experienced in civil site construction and solid waste regulations and shall be a registered Professional Engineer.

The General QA/QC Program includes monitoring the following activities:

1. General Earthwork
2. Storm Drainage Installation
3. General Construction Quality Control

The Soils QA/QC for this project includes soil material qualifying, sampling and testing to verify substantial compliance with the material standards. This work will include the following:

Soils Quality Control Monitor - shall pre-qualify soil materials, monitor the installation of soil materials, determine where in-place soil materials shall be tested, and test the in-place soil materials. This individual shall be responsible for assuring that all soil materials have been pre-qualified and have a chain-of-custody from the pre-qualified source to the project site, prior to installation. This individual shall be experienced in quality assurance of soil materials and the preparation of quality assurance documentation including quality assurance forms, reports, certification and manuals. This individual shall be experienced in civil site construction and soil testing standards and procedures and shall be certified by the Quality Assurance Engineer in the duties of the project.

Soils Quality Assurance Engineer - shall supervise the soil material pre-qualifying and testing of in-place soil materials to assure compliance with the test standards and testing frequency requirements, and verify compliance with the plans, specification and design. This individual shall be experienced in quality assurance of soil materials and the preparation of quality assurance documentation including quality assurance forms, reports, certification and manuals. This individual shall hold a B.S., M.S., or Ph.D degree in civil engineering or related fields, be experienced in civil site construction and soil testing procedures, be a registered Professional Engineer, and have worked on at least two other closure projects.

The QA/QC Plan including monitoring construction of the following:

A. Final Cover (Intermediate Cover, Compacted Clay Layer and Vegetative Cover (Top Soil))

Incremental side slope closure of Trail Ridge Landfill includes a final cover consisting of 12" of intermediate cover, 12" of clay, and 24" of vegetative cover. The clay layer of the final cover must be placed in two 6" (minimum) lifts. The Soils Quality Control Monitor shall observe the clay layer construction on a full-time (on-site) basis. The QA/QC for the final cover is as follows:

1. Intermediate Cover

a. Location - The fill material shall come from an off-site source. The Soils Quality Control Monitor shall visually inspect the fill material.

b. Standard - Soil shall be free of brush, weeds, and other litter; and free of roots, stumps, stones and any other extraneous or toxic matter.

The intermediate cover material shall be tested for shear strength in the laboratory (ASTM D-4767). The material shall only be

considered suitable if the material, as documented on laboratory test specimens, can be shown to provide a minimum safety factor of 1.5 against sliding.

The intermediate cover shall be a minimum of 12" thick.

Compacted to 90% of Modified Proctor maximum dry density (ASTM D 1557), unless the soil material contains 30.0% or greater passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698).

c. Frequency - The shear strength shall be tested one time only based upon a representative sample of the material at the required density.

Depth measurements and density tests shall be conducted at the frequency of four per acre.

2. Clay Layer (referred to as Barrier Layer in Chapter 62-701, F.A.C.)

a. Borrow Source - Prior to clay layer installation, an appropriate borrow source shall be located. Suitability of the clay layer construction materials from that source shall be determined in accordance with the following:

(1) If demonstrated field experience is available from at least three prior successful projects of five or more acres each to document that a given borrow source can meet the requirements of the project specifications, then extensive laboratory testing of the borrow source will not be required. However, the source of material shall be geologically similar to and the methods of excavating and stockpiling the material shall be consistent with those used on the prior projects. Furthermore, a minimum of three representative samples from the appropriate thickness of the in-situ stratum or from stockpiles of the borrow material proposed for clay layer construction shall be submitted to the Owner=s independent soil testing laboratory to document through index testing and shear strength testing that the proposed material is consistent with the material used on prior successful projects. At a minimum, index testing shall consist of percent fines, Atterberg limits and moisture content determinations and the shear testing shall consist of triaxial testing of the clay soil and direct shear testing of the interface between the intermediate cover and the clay as well as the interface between the clay and the proposed vegetative cover material.

(2) If demonstrated field experience as defined above is not available or cannot be documented, then the following requirements shall be met.

(a) A field exploration and laboratory testing program shall be conducted by the Owner=s independent soil testing laboratory to document the

horizontal and vertical extent and the homogeneity of the soil strata proposed for use as clay layer material. A sufficient number of index tests from each potential borrow stratum shall be performed to quantify the variability of the borrow materials and to document that the proposed borrow material complies with specifications. At a minimum, the index tests shall consist of percent fines, Atterberg limits and moisture content determinations.

(b) Sufficient laboratory hydraulic conductivity tests shall be conducted on samples representative of the range invariability of the proposed borrow source (ASTM D-5084). For each such sample, test specimens shall be prepared and tested to cover the range of molding conditions (moisture content and dry density) required by project specifications. The hydraulic conductivity tests shall be conducted in triaxial type permeameters. The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured (ASTM D-5084). The borrow source will only be considered suitable if the hydraulic conductivity of the material, as documented on laboratory test specimens, can be shown to meet the requirements of the project specifications at the 98 percent confidence level.

(c) Sufficient shear strength testing of the clay material (ASTM D-4767) and direct shear testing of the interface between the intermediate cover and the clay as well as the interface between the clay and the proposed vegetative cover material (ASTM D-3080) shall be conducted on samples representative of the range in variability of the proposed borrow source. For each such sample, test specimens shall be prepared and tested to cover the range of molding conditions (moisture content and dry density) required by project specifications. The borrow source will only be considered suitable if the material, as documented on laboratory test specimens, can be shown to provide a minimum safety factor of 1.5 against sliding for both interfaces as well as the material itself.

(3) The Soils Quality Assurance Engineer shall review the pre-qualification data and shall approve or reject the clay layer material for use.

b. Test Strip - Prior to full-scale clay layer installation, a field test section or test strip shall be constructed at the site above a prepared subbase. The test strip shall be considered acceptable if the measured hydraulic conductivities of undisturbed samples from the test strip meet the requirements of the project specifications at the

98 percent confidence level. If the test section fails to achieve the desired results, additional test sections shall be constructed in accordance with the following requirements:

(1) The test section shall be of sufficient size (40' wide x 60' long, at a minimum) such that full-scale clay layer installation procedures can be duplicated within the test section;

(2) The test section shall be constructed using the same equipment for spreading, kneading and compaction and the same construction procedures (e.g., number of passes, moisture addition and homogenization, if needed) that are anticipated for use during full-scale clay layer installation;

(3) At a minimum, the clay layer test section shall be subject to the following field and laboratory testing requirements by Soils Quality Control Monitor:

(a) A minimum of five random samples of the clay layer construction material delivered to the site during test section installation shall be tested for moisture content (ASTM D-2216), percent fines (ASTM D-1140) and Atterberg limits (ASTM D-4318);

(b) At least five field density and moisture determinations shall be performed on each lift of the compacted clay layer test section;

(c) Upon completion of the test section lift, the thickness of the lift shall be measured at a minimum of five random locations to check for thickness adequacy; and

(d) A minimum of five Shelby tube or drive cylinder (ASTM D-2937) samples shall be obtained from each lift of the test section for laboratory hydraulic conductivity testing. Laboratory hydraulic conductivity testing shall be conducted in triaxial type permeameters (ASTM D-5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured (ASTM D-5084).

(e) The test strip shall meet or exceed the standards established below except the field density which shall be established by the QA Engineer, based upon the test strip results. If the test strip fails to meet these standards, the construction methods and/or material will be rejected and the test strip shall be performed again.

c. Final Cover Installation - Full scale final cover installation may begin only after completion of a successful test section. During clay layer construction, quality control testing shall be provided to document that the installed clay layer conforms to project specifications. The testing frequency for quality control testing is specified below; however, during construction of the first five acres, the frequencies shall be doubled. The clay layer shall be installed in two 6" lifts for a total minimum thickness of 12".

(1) Location - The clay layer shall be tested in place. The locations of testing shall be random locations as determined by the Soils Quality Control Monitor. If there are indications of a change in product quality or construction procedures during final cover construction, additional tests shall be performed to determine compliance.

(2) Standard

(a) Clay Layer Subgrade - Compacted to 90% of Modified Proctor maximum dry density (ASTM D-1557)D 1557), unless the soil material contains 30.0% or greater passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698). (See Intermediate Cover above).

(b) Field Density - The field density shall be established by the QA Engineer based upon the test strip results and shall be determined by Standard Proctor Density (ASTM D-698). In no case shall the field density be less than 80% of Standard Proctor Density (ASTM D-698).

(c) Thickness - Each lift (two total) shall be a minimum of 6" thick.

(d) Hydraulic Conductivity - The compacted clay layer shall have an in-place hydraulic conductivity no greater than 6.67×10^{-8} cm/sec (ASTM D-5084).

(3) Field Testing Frequency

(a) Prior to the laying of the clay layer materials, the clay layer subgrade shall be compacted to the specified density. Density tests shall be conducted at a minimum rate of two tests per acre;

(b) A minimum of two moisture content and field density determinations shall be conducted per acre per lift of the compacted clay layer. The degree of compaction shall be checked using the one-point field Proctor test or other appropriate test procedures; and

(c) A minimum of four thickness measures shall be conducted per acre per lift of the compacted clay layer.

(4) Laboratory Testing Frequency

(a) Percent fines (ASTM D-1140) of the clay layer material shall be determined at a minimum frequency of two tests per acre per lift of installed clay layer;

(b) Atterberg limits determinations shall be performed on one sample per acre per lift of installed clay layer; and

(c) Hydraulic conductivity testing of Shelby tube or drive cylinder (ASTM D-2937) samples of the compacted clay layer shall be performed at a minimum frequency of one test per acre per lift. Laboratory hydraulic conductivity tests shall be conducted in triaxial type permeameters (ASTM D-5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured.

(5) Deficiency - If the test data from a clay layer section does not meet the requirements of the project specifications, additional random samples shall be tested from that clay layer section. If such additional testing demonstrates that the thickness and hydraulic conductivity meet the requirements of the project specifications at the 95 percent confidence level, that clay layer section will be considered acceptable. If not, that clay layer section shall be reworked or reconstructed so that it does meet these requirements.

3. Clay Layer Tie-In (To Existing Clay Layer, Where Applicable)

a. Location - The edge of any existing final cover adjacent to the proposed final cover area.

b. Standard - The compacted clay layer of any existing final cover and the proposed final cover must be tied together to form one continuous seamless layer. At the interface, the existing and new clay layers shall be compacted to form a seamless connection.

c. Frequency - The Soils Quality Control Monitor shall monitor the tie-in by visual inspection on a continuous basis.

4. Vegetative Cover (Top Soil)

a. Location - The vegetative cover shall be tested in place for thickness. The location of testing shall be determined by the Soils Quality Control Monitor.

b. Standard - Top soil which is reasonably free of brush, weeds, and other litter; and relatively free of roots, stumps, stones and any other extraneous or toxic matter harmful to plant growth. Roots with a diameter greater than ⅜" shall be hand picked and removed.

The vegetative cover shall be at least 24" thick.

Prior to placement, the vegetative cover material shall be tested for shear strength in the laboratory (ASTM D-4767). The material shall only be considered suitable if the material, as documented on laboratory test specimens, can be shown to provide a minimum safety factor of 1.5 against sliding.

c. Frequency - The shear strength shall be tested one time only based upon a representative sample of the material.

Depth measurements shall be taken at the frequency of four per acre. The soil shall be monitored on a continuous basis for extraneous matter.

5. Final Cover Repairs (When Applicable)

If, during construction of the final cover system, damage is sustained on the final cover system (including the intermediate cover, clay layer and vegetative cover), the areas of damage shall be reconstructed and retested in accordance with corresponding section described above. All repair areas shall be tested at the frequencies prescribed above, unless more frequent testing is required at the discretion of the Soils Quality Assurance Engineer.

B. Downcomer Pipes

Downcomer pipes shall be installed in the final cover at the low point of the terraces, to intercept the stormwater between terraces. The downcomer pipes shall include the terrace side drains and terrace underdrain piping.

The downcomer pipes shall be constructed as shown on the Construction Drawings. The clay around the pipes shall be compacted into a uniform homogeneous material. Prior to placement of vegetative cover over the downcomer pipes, the pipe shall be inspected by the General Quality Control Monitor.

1. Location - The compacted clay layer shall be tested in place. The locations of testing shall be determined by the Soils Quality Control Monitor. If there are indications of a change in product quality or construction procedures during construction, additional tests shall be performed to determine compliance.

2. Standard –

   a. Clay Layer Subgrade - Compacted to 90% of Modified Proctor maximum dry density (ASTM D 1557)D 1557), unless the soil material contains 30.0% or greater passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698) (12" thick minimum).

   b. Field Density - The field density of the clay layer shall be as established in Section A.2.c.(2)(b) above and shall be determined by Standard Proctor Density (ASTM D 698).

   c. Thickness - Twelve inches minimum below pipe.

   d. Hydraulic Conductivity - The compacted clay layer shall have an in-place hydraulic conductivity no greater than 6.67×10^{-8} cm/sec (ASTM D 5084).

3. Field Testing Frequency -

   a. Prior to the laying of the compacted clay materials, the subbase shall be compacted to the specified density. Density tests and thickness shall be conducted at a minimum rate of one per 75 linear feet of pipe. (Minimum of one test between terraces).

   b. A minimum of one moisture content and field density determination of the compacted clay layer shall be conducted per 75 linear feet of pipe.

   c. A minimum of two thickness measures of the compacted clay layer shall be conducted per 75 linear feet of pipe.

4. Laboratory Testing Frequency -

   a. Hydraulic conductivity testing of Shelby tube or drive cylinder (ASTM D 2937) samples of the compacted clay layer shall be performed at a minimum frequency of one test per 75 linear feet of pipe (at least once between terraces). Laboratory hydraulic conductivity tests shall be conducted in triaxial type permeameters (ASTM D 5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue

until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured.

5. Deficiency - If the test data from a compacted clay layer section does not meet the requirements of the project specifications, that section shall be reworked or reconstructed so that it does meet these requirements.

C. Underdrain Filter Sand

The underdrains in the terraces shall be surrounded by filter sand as shown on the Contract Drawings. The QA/QC for the filter sand is as follows:

1. Filter Sand

a. Location - The material shall be pre-qualified prior to installation.

If the testing is done at the borrow source, a chain of custody shall be provided.

b. Standard - Clean, uniformly graded sand with a uniformity coefficient of 1.5 or greater and an effective grain size of 0.2 mm to 0.5 mm. Grain size distribution shall be conducted as part of pre-qualification.

The sand shall have a hydraulic conductivity no less than 1.0×10^{-3} cm/sec at a density of 100 percent Modified Proctor. The hydraulic conductivity testing shall be by Constant Head method (ASTM D2434).

c. Frequency - The hydraulic conductivity of the sand shall be tested once per 500 cubic yards of sand material.

D. Gas Management System (Gas Wells and Headers)

Gas wells (temporary and permanent) shall be installed in accordance with the Construction Drawings. The QA/QC for gas well materials shall be as follows:

1. Gravel for Gas Wells

a. Location - The gravel shall be pre-qualified by certification by the supplier.

b. Standard - The gravel shall be clean gravel with no fines. The gravel shall be FDOT No. 3 Course Aggregate (ASTM D 448).

The gravel shall be non-calcareous (ASTM D 4373).

c. Frequency - The gravel shall be certified by the supplier. The gravel shall be tested once per 100 C.Y.

2. Bentonite for Gas Wells

a. Location - The material shall be pre-qualified with documentation from the supplier.

b. Standard - The material shall have a hydraulic conductivity no greater than 1.0 x 10^{-8} cm/sec (ASTM D 5084).

c. Frequency - The material shall be certified by the supplier, one time only.

3. Permanent Header Pipe

The permanent header pipe shall be placed in the areas of final cover and shall be placed on the barrier soil layer, as shown on the Construction Drawings. The header pipe shall not be placed until the barrier soil has been tested and approved. The placement of the header pipe over the barrier soil layer and covering of the header pipe shall be conducted in the presence of either the Soils Quality Control Monitor or the General Quality Control Monitor.

4. Temporary Header Pipe

The temporary header pipe shall be placed in areas that have not received final cover, shall be placed on a prepared subgrade and shall be backfilled with clean fill. The header pipe shall be installed in accordance with the Construction Drawings. The pipe subgrade as well as the backfill around the pipes shall be compacted. Prior to placement of cover over the pipe, the pipe shall be inspected by the General Quality Control Monitor. The QA/QC for the installation of the temporary header pipe is as follows:

a. Location - The compacted subgrade and backfill shall be tested in place. The locations of testing shall be determined by the Soils Quality Control Monitor.

b. Standard - The subgrade and backfill shall be compacted to 85% of Standard Proctor maximum dry density (ASTM D-698) and shall be placed in 12-inch maximum lifts.

The minimum cover (clean fill) over the header pipe shall be 12 inches.

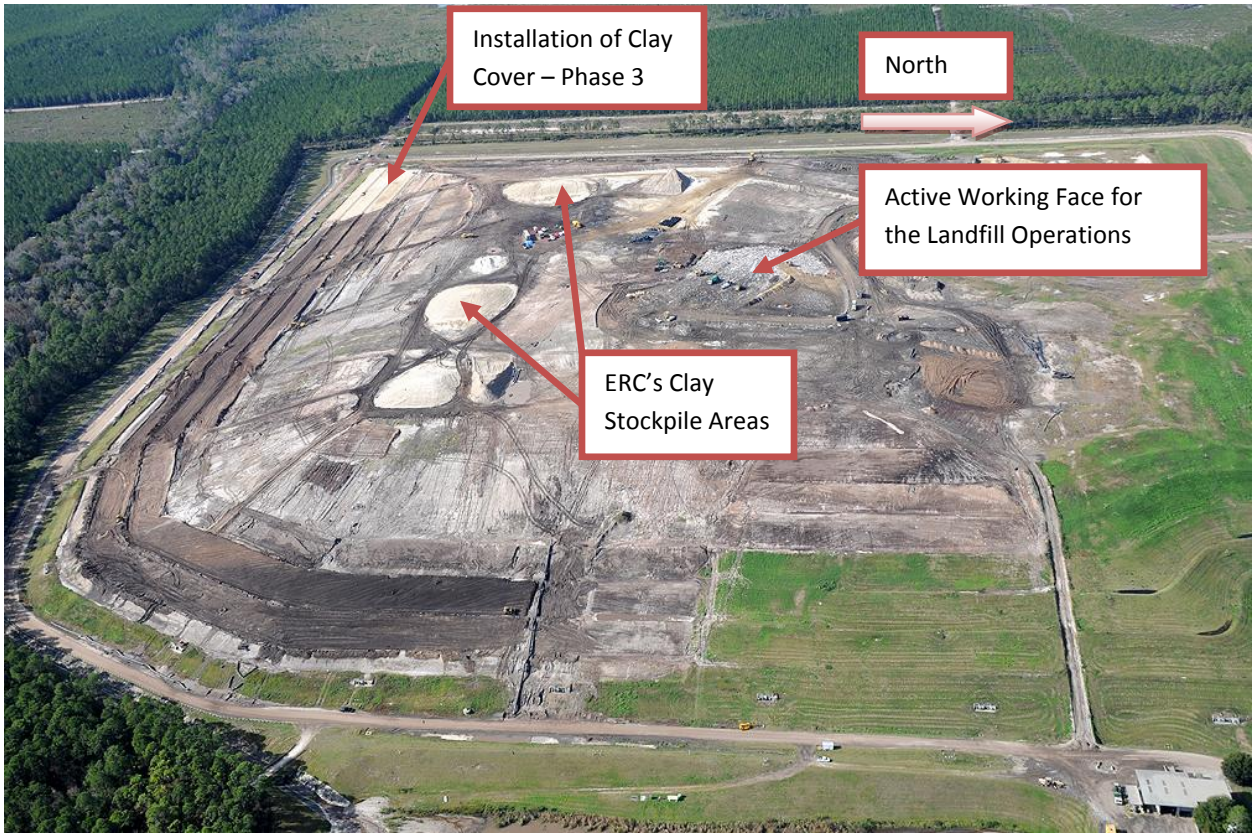
c. Frequency – The density of the subgrade and backfill shall be tested once per 500 linear feet per lift. The thickness of the cover over the pipe shall be checked once per 500 linear feet.

TRAIL RIDGE LANDFILL

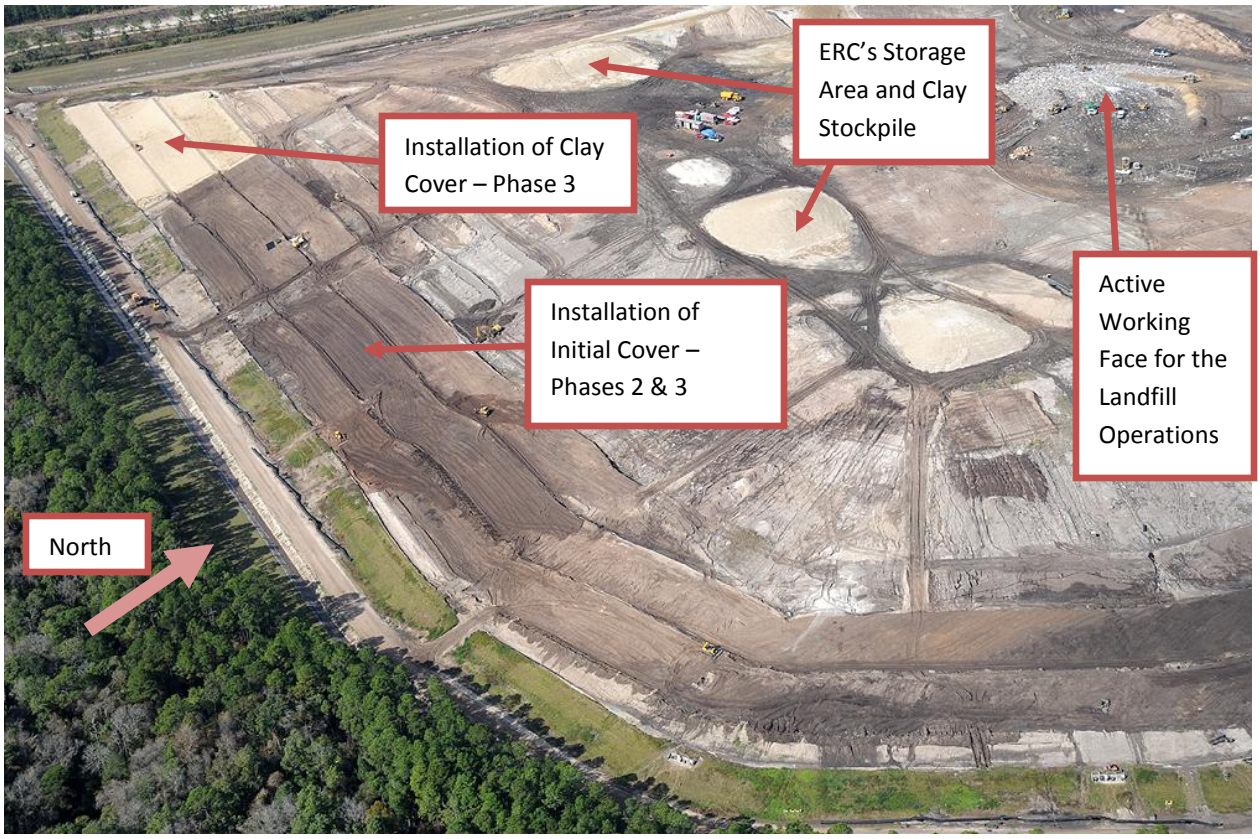
INCREMENTAL CLOSURE PHASE 3

UNITS 24 – 47

CONSTRUCTION PHOTOGRAPHS



Aerial Photograph – Trail Ridge Landfill (December 2011)



Aerial Photograph – Trail Ridge Landfill (December 2011)

Welding Downcomer

Second Lift Clay Placement – Phase III

Seal Second Lift Clay – Preparation for Underdrain - Phase III

Pushing Permanent Tube Second Lift Clay – Phase III

Final Grading Initial Cover around Air Lines – Phase III

Initial Cover - Phase III (Units 30-32)

Testing Initial Cover - Phase III (Units 30-32)

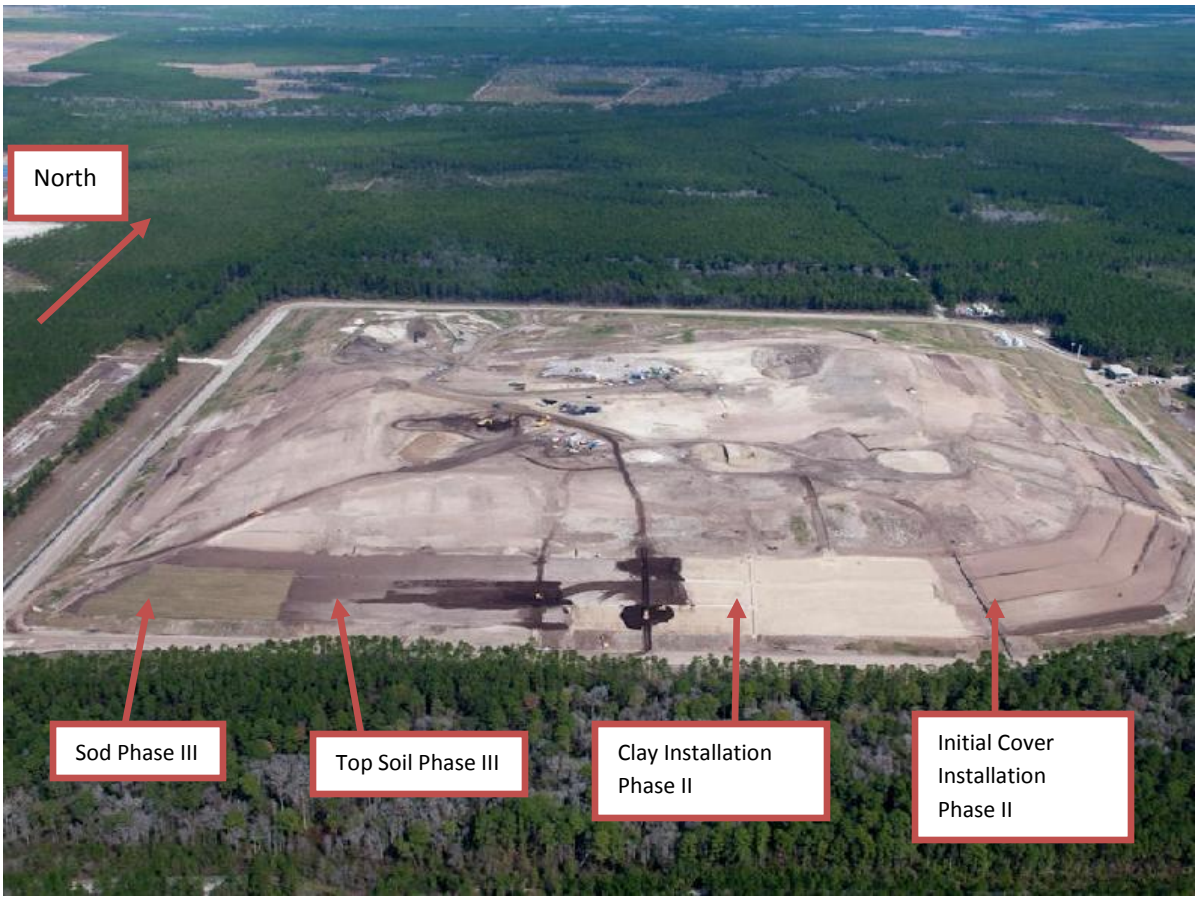
Underdrain Sand Leveling Terrace 3 – Phase III

Placing First Lift Clay (Phase 3)

Auger Clay for thickness (Phase 3)

Aerial Photograph – Trail Ridge Landfill (January 2012)

Aerial Photograph – Trail Ridge Landfill (January 2012)



Aerial Photograph - Trail Ridge Landfill (February 2012)

Aerial Photograph - Trail Ridge Landfill (February 2012)

Initial Cover Grading (Phase II)

Testing Initial Cover (Phase II)

Downcomer D-44 Clay Easement (Phase III)

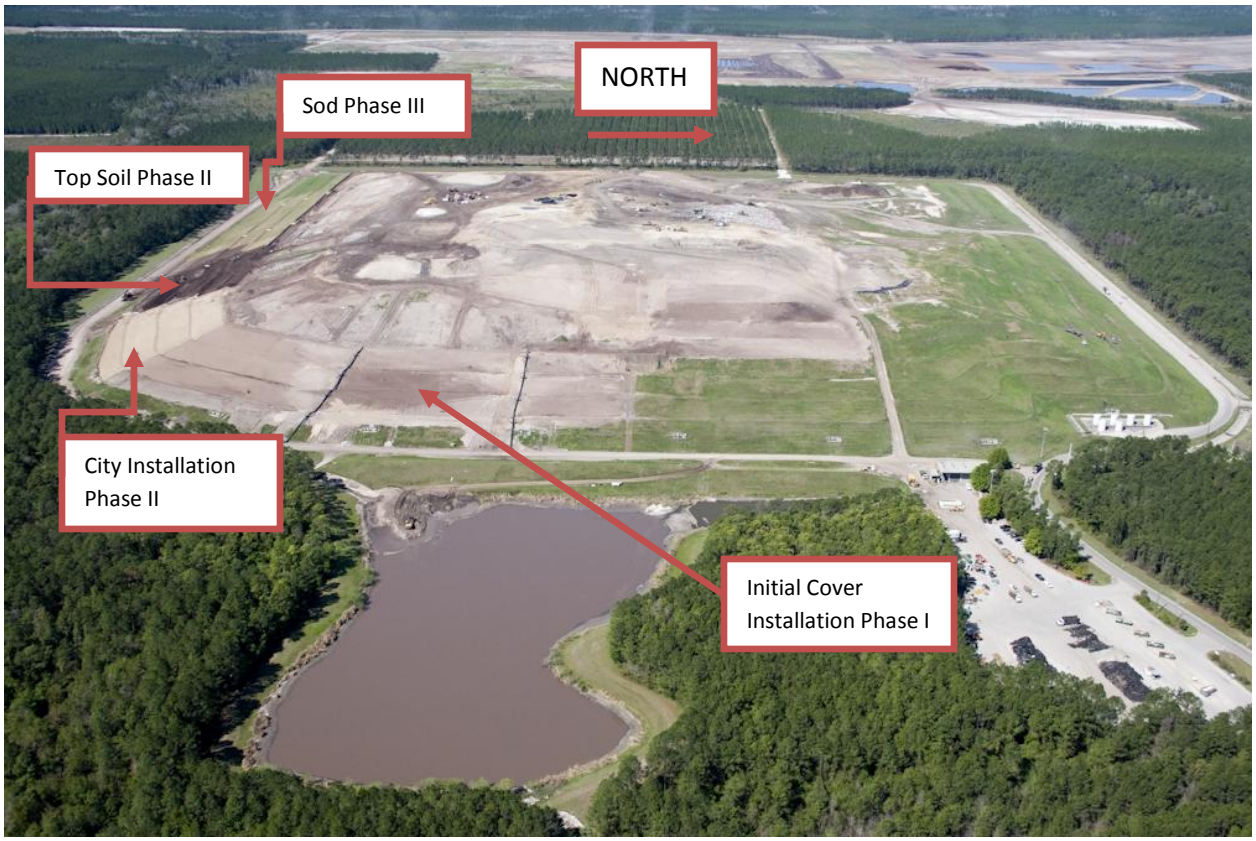
Clay Excavation for D-41 (Phase II)

Moving Downcomer D-41 to Trench (Phase II)

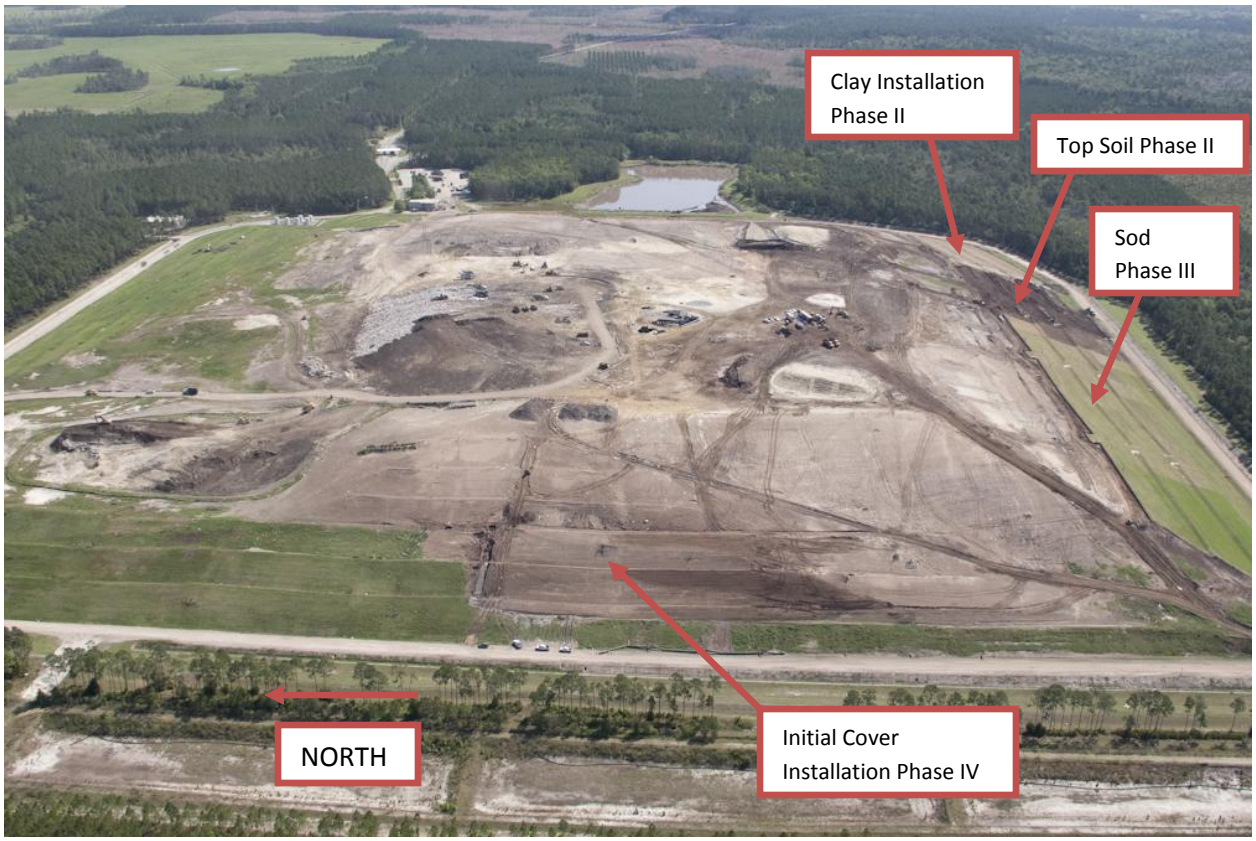
Downcomer D-41 in Clay Trench (Phase II)

Placing Top Soil (Phase III)

Completed Rip-Rap D-47 (Phase III)



Aerial Photograph - Trail Ridge Landfill (March 2012)



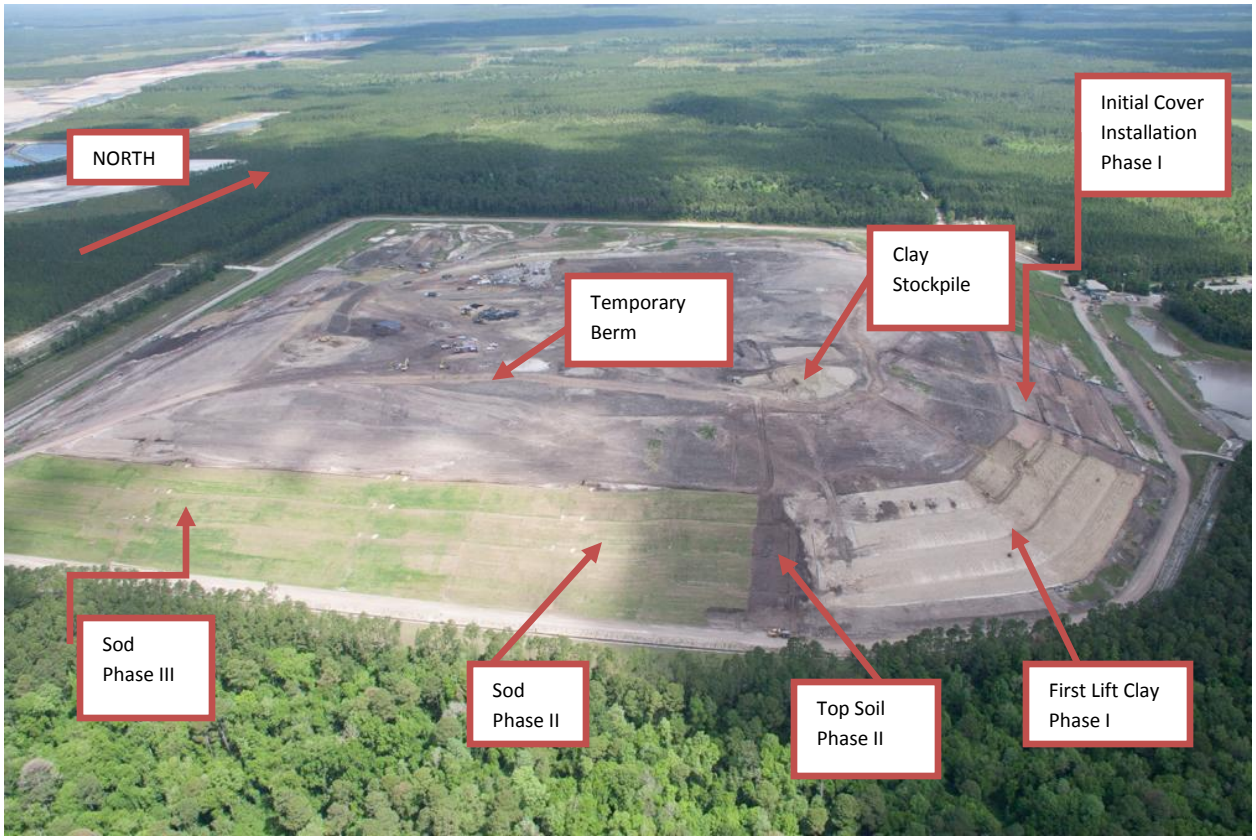
Aerial Photograph - Trail Ridge Landfill (March 2012)

Installing Sod (Phase III)

Placing First Lift Clay (Phase II)

Excavate Initial Cover at Downcomer D-38 (Phase II)

Top Soil Placement (Phase II) Terrace Underdrain installation (Phase II)



Aerial Photograph - Trail Ridge Landfill (April 2012)

Aerial Photograph - Trail Ridge Landfill (April 2012)

Density Testing Initial Cover - Phase I

Pushing Shelby Tube for Permeability Test – Phase I

Aerial Photograph - Trail Ridge Landfill (May 2012)

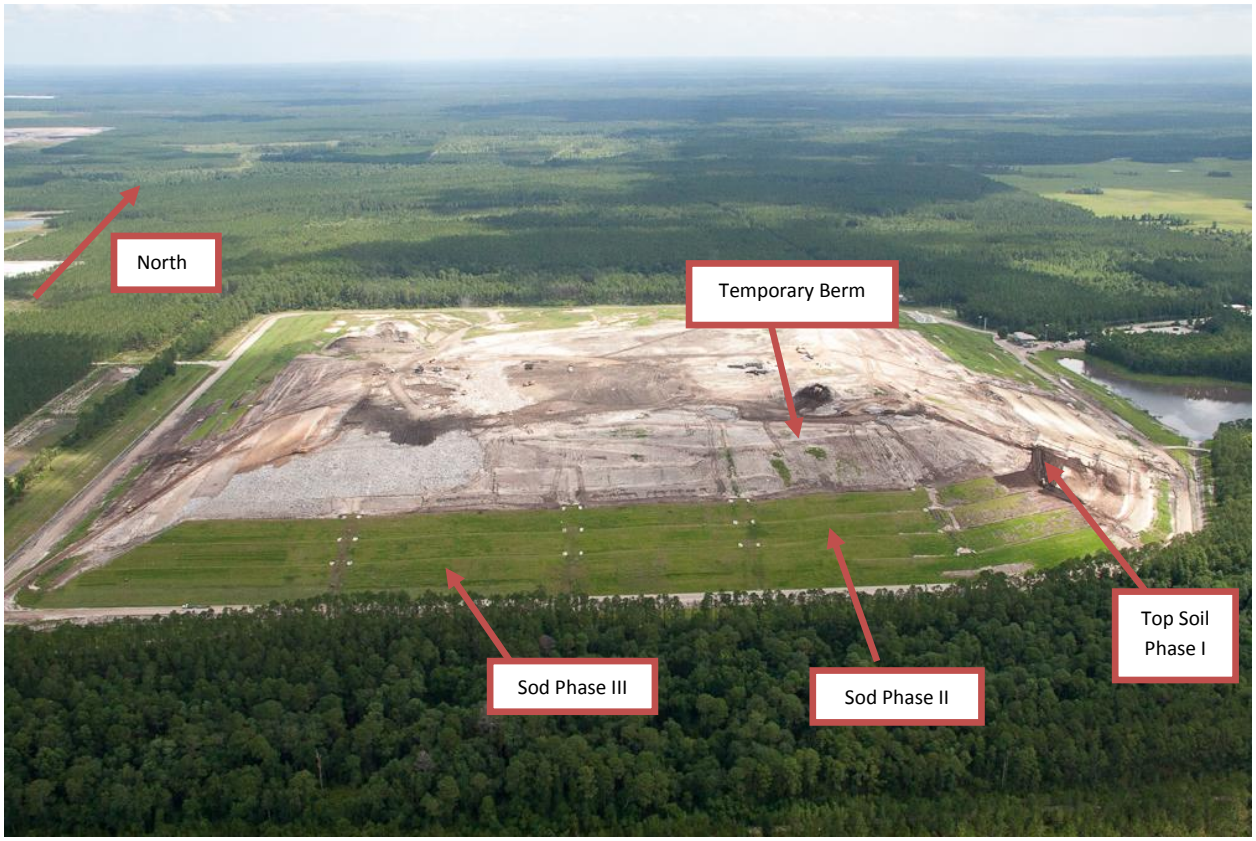
Aerial Photograph - Trail Ridge Landfill (May 2012)

Top Soil Thickness Checks (Phase II)

Placing Sod (Phase IV)

Grading 2nd Lift Clay (Phase I)

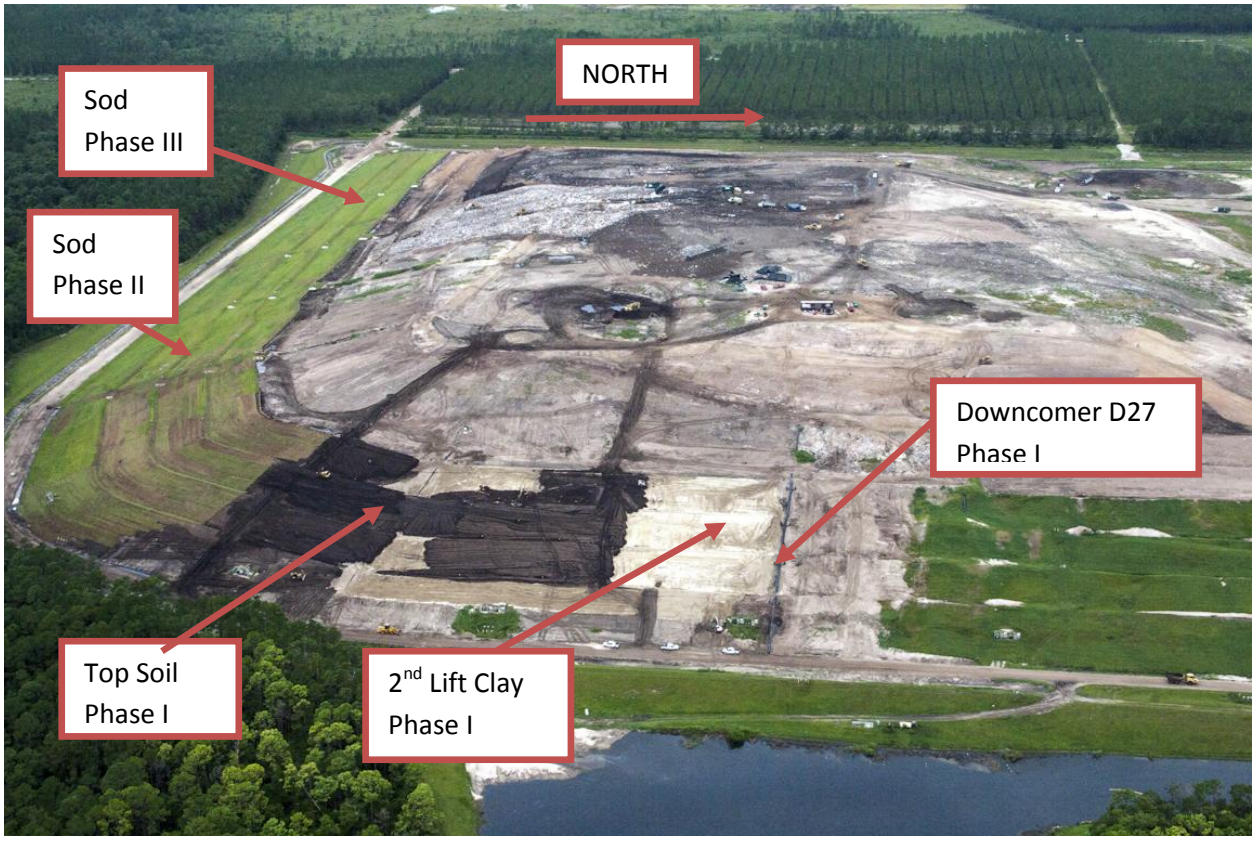
Density Testing Clay Downcomer D-27 (Phase I)



Aerial Photograph - Trail Ridge Landfill (June 2012)

Aerial Photograph - Trail Ridge Landfill (June 2012)

Aerial Photograph - Trail Ridge Landfill (July 2012)



Aerial Photograph - Trail Ridge Landfill (July 2012)

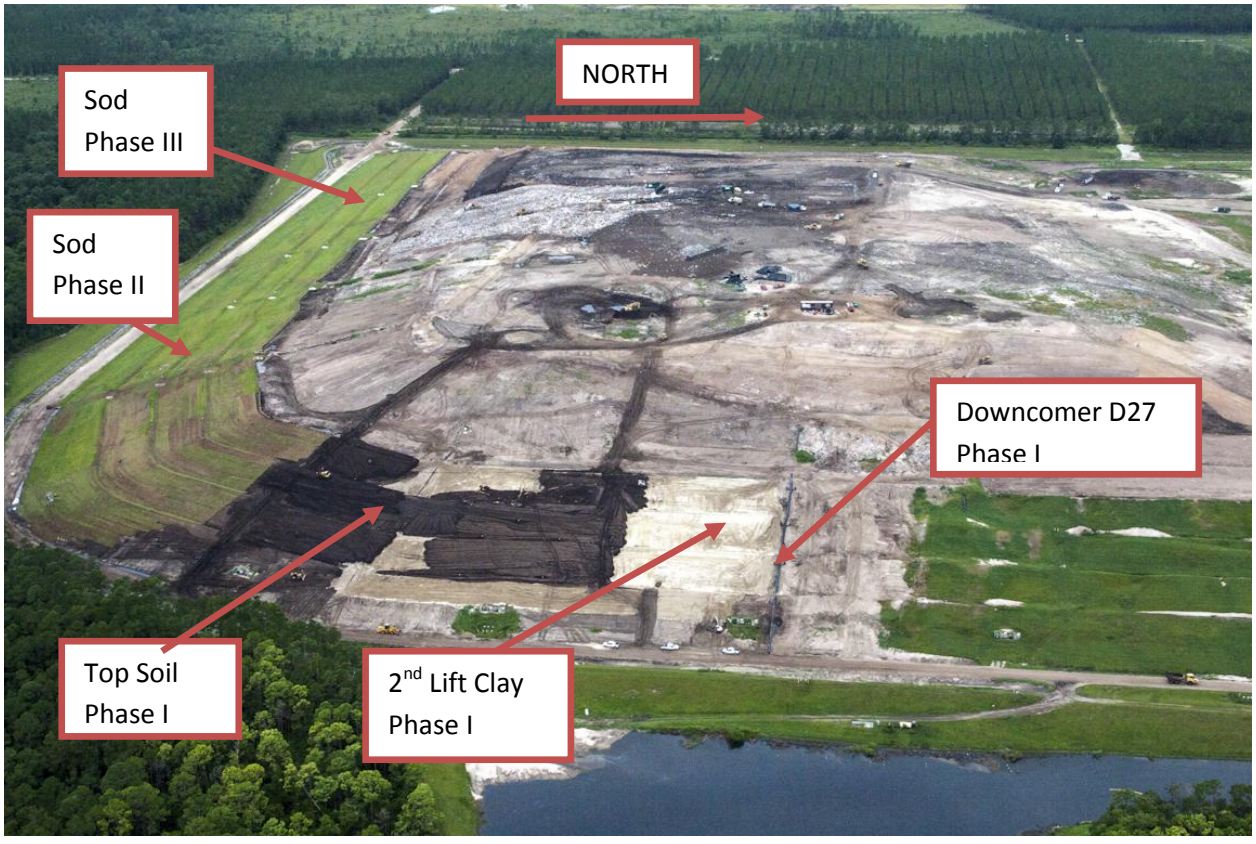
Regraded Perimeter Road Swale - Phase IV

Re-Sod - Phase IV

Sod - Phase IV

Placing Top Soil – Phase I

Aerial Photograph - Trail Ridge Landfill (July 2012)



Aerial Photograph - Trail Ridge Landfill (July 2012)

Aerial Photograph - Trail Ridge Landfill (October 2012)

Aerial Photograph - Trail Ridge Landfill (October 2012)