

**TRAIL RIDGE LANDFILL
INCREMENTAL TOP SLOPE CLOSURE
QUALITY ASSURANCE/QUALITY CONTROL PLAN**

This plan specifically addresses the quality assurance and quality control (QA/QC) for Trail Ridge Landfill, Top Area Closure. This program delineates the quality procedures and standards for the construction.

In the context of this plan, quality assurance, quality control and the plan participants 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.

Permittee - Trail Ridge Landfill, Inc.

Owner - The City of Jacksonville

Design Engineer - England, Thims & Miller, Inc.

The QA/QC Program for this project includes General QA/QC, Soils QA/QC, and Synthetic Liner System QA/QC. These QA/QC activities (including monitoring, sampling and testing) shall be directed and conducted by the third parties who are independent of the Contractor.

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.

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 construction deviations, coordinate qualifying and testing of materials, 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 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. Drainage Installation
3. Overall Liner System Installation
4. 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.

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.

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 PhD degree in civil engineering or related fields, be experienced in civil site construction and soil testing procedures and shall be a registered Professional Engineer.

The Top Area closure of Trail Ridge Landfill includes a final cover consisting of 12" of intermediate cover, a 50-mil Agru Super Gripnet[®] Drain Liner or equivalent geomembrane liner, non-woven geotextile, and 24" protective cover layer (from bottom to top). The QA/QC for the final cover is as follows:

A. INTERMEDIATE COVER

1. Location - The fill material shall come from an off-site source. The Soils Quality Control Monitor shall visually inspect the fill material.
2. 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 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).

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

B. GEOMEMBRANE LINER

The final cover shall include a 50-mil Agru Super Gripnet® Drain Liner or equivalent geomembrane liner. The geomembrane liner shall be installed, monitored and tested in accordance with the requirements of Section 02776 (LINEAR LOW DENSITY POLYETHYLENE (LLDPE) GEOMEMBRANE LINER) of the Technical Specifications.

C. NON-WOVEN GEOTEXTILE

The final cover shall include an 8-oz non-woven geotextile (filter fabric). The geotextile shall be installed, monitored and tested in accordance with the requirements of Section 02272 (FILTER FABRIC FOR SUBSURFACE PIPING AND LANDFILL CAP DRAINAGE LAYER) of the Technical Specifications.

D. PROTECTIVE COVER LAYER

After the geomembrane and non-woven geotextile have been installed, they shall be covered with a protective cover layer. The protective cover layer shall include an 18" soil fill layer and 6" top soil layer and shall be a minimum of 24" in thickness.

1. Location - The protective cover layer shall be tested in place. The location of testing shall be determined by the Soils Quality Control Monitor.
2. Standard - The protective cover soils shall be 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 1/2" shall be hand picked and removed.

The top soil layer shall be at least 24" thick.
3. Frequency - Depth measurements shall be taken at the frequency of four per acre. The soil shall be monitored on a continuous basis for extraneous matter.

E. UNDERDRAIN FILTER SAND

The underdrains shall be surrounded by filter sand.

1. 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.

2. 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).
3. Frequency - The hydraulic conductivity of the sand shall be tested once per 500 cubic yard of sand material.

F. 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 1.0×10^{-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 geomembrane layer, as shown on the Construction Drawings. The header pipe shall not be placed until the geomembrane has been tested and approved. The placement of the header pipe over the geomembrane 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.

ENGINEER OF RECORD SIGNATURE PAGE

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Project Location: End of Gilridge Drive - West of US Highway 301.
Project City / State: Duval County, Florida
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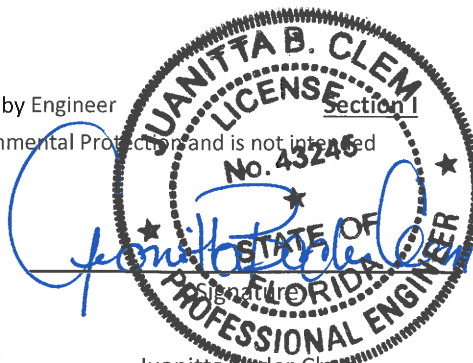
Trail Ridge Landfill - Incremental Top Slope Closure
Quality Assurance / Quality Control Plan
(Updated 1-14-15)

Portion of pages or sections of this report signed and sealed by Engineer

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Engineer of Record

8/9/2016
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