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October 28, 2009

Mr. Allen Gaither
Department of Environment and Natural Resources
Division of Waste Management
Solid Waste Section
Asheville Regional Office
2090 US Highway 70
Swannanoa, NC 28778

RECEIVED
OCT 28 2009
SOLID WASTE SECTION
ASHEVILLE REGIONAL OFFICE

Subject: Permit Modification
Closed Landfill Permit # 44-01-INDUS-1979
International Paper Landfill 5
Canton, North Carolina

Dear Mr. Gaither,

Altamont Environmental, Inc. (Altamont), on behalf of International Paper Company and WNC Communities, is submitting this Permit Modification for the closed International Paper Company landfill, Permit # 44-01-INDUS-1979 (Site) for your review and approval. The landfill consists of two landfill areas, the Landfill 5B Area and the Landfill 5C Area. The landfill was officially closed in 1999. Originally, a Landfill 5A Area was proposed, however this area was never constructed. The Landfill 5B Area contains existing athletic fields operated by the Town of Canton, and the Landfill 5C Area is currently used for hay production.

This Permit Modification includes several changes to post closure uses specified in the existing closure permit letter dated October 25, 1999 issued by the North Carolina Department of Natural Resources-Solid Waste Section. Please note that some of the uses in the attached modification include existing uses not specified in the referenced permit letter. In general, the modifications include the following:

- **Western North Carolina Regional Livestock Center on the Landfill 5C Area** – Since the closing of the livestock market in Asheville Western North Carolina in 2004, livestock producers have been forced to travel long distances to markets outside western North Carolina to markets in east Tennessee, upstate South Carolina, and north Georgia. This has resulted in added expense and reduced value of livestock. In response, the Western North Carolina Regional Livestock Center (WNCRLC) was formed and grant money has been obtained to construct a facility in this region, and specifically is proposed to be constructed outside of the waste boundary on the Landfill 5C Area with additional fill material and parking areas to be placed over a portion of the waste. Continual landfill gas monitoring equipment will be installed in enclosed buildings constructed within the Landfill 5C Area. The landfill gas investigation plan will be expanded to include: installation of landfill gas probes between waste and WNCRLC structures, continuous monitoring for landfill gas within enclosed structures, and monitoring for landfill gas will be increased at additional locations.

- **International Paper Sports Complex on the Landfill 5B Area**– The Town of Canton utilizes the Landfill 5B Area for use as an athletic facility. This facility includes five buildings. This existing use has not been added to the list of approved uses attached to the landfill permit. Continuous landfill gas monitoring equipment will be installed inside buildings located within the Landfill 5B Area. The landfill gas investigation plan will be expanded to include: installation of landfill gas probes at the property line between landfill waste and existing nearby offsite structures, continuous monitoring for landfill gas within enclosed structures, and monitoring for landfill gas will be increased at additional locations.
- **Hay Production at the Site**– In order to promote a healthy stand of grassy vegetation on and around the landfill, grassy areas on the Site are seeded, fertilized, mowed, and harvested for hay. This use has not been added to the list of approved uses attached to the landfill permit.

A permit modification fee of $1,500 was submitted September 25, 2009 to the Natural Resources-Solid Waste Section.

International Paper Company, WNC Communities, and Altamont would like to thank the Solid Waste Section for assistance with the attached request for permit modification in order to include the uses described above. If you have questions with anything regarding this permit modification, please call us at (828)281-3350.

Sincerely,

ALTAMONT ENVIRONMENTAL, INC.

Joel D. Lenk, P.G.

Paul Dow, P.E.

Enclosures: Request for Permit Modification
CD Copy of Request for Permit Modification

Cc: Mr. Tom Richardson, International Paper Company
Mr. L.T. Ward, WNC Communities
Mr. Al Matthews, Town of Canton

ALTAMONT ENVIRONMENTAL, INC.

ENGINEERING & HYDROGEOLOGY

Request for Permit Modification

Closed Landfill Permit # 44-01-INDUS-1979
International Paper Company
Canton, North Carolina

October 28, 2009

Prepared for
International Paper Company

Submitted to
North Carolina Department of Environment and Natural Resources Solid Waste Section

Prepared by
Altamont Environmental, Inc.
231 Haywood Street
Asheville, NC 28801
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Request for Permit Modification

Closed Landfill Permit # 44-01-INDUS-1979
International Paper Company
Canton, North Carolina

October 28, 2009

NORTH CAROLINA LICENSED SEAL 2014 GEOLOGIST JOEL D. LENK

10/28/09

Joel Lenk, P.G./Date
Project Manager

NORTH CAROLINA PROFESSIONAL SEAL 034080 ENGINEER PAUL DOW

10/28/09

Paul Dow, P.E/Date
Project Engineer

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1.0 Introduction

In 1979, the North Carolina Department of Environment and Natural Resources (DENR) Solid Waste Section (SWS) issued Landfill Permit # 44-01-INDUS-1979 to Champion International Corporation (acquired in total by International Paper Company [IP] in 2000) for its industrial waste landfill in Canton, North Carolina (Site). The Site, which is known as Landfill 5, consists of two fill areas, 5B and 5C. On October 25, 1999, the SWS issued a closure letter (Appendix A) for the permit. The closure letter specified acceptable post-closure uses and post-closure conditions. It has been recognized that additional uses not addressed in the closure letter exist at the Site.

This document has been prepared to support a permit modification to allow three additional post-closure uses at the landfill. These are:

- Western North Carolina Regional Livestock Center on the Landfill 5C Area
- International Paper Sports Complex on the Landfill 5B Area
- Hay Production at the Site

Please note that some other anticipated future activities are also discussed in this document. These anticipated future activities are not included with this request for permit modification, are not described in detail, are not approved uses, and shall not take place until required local, state, and federal regulatory requirements have been met, approved, and documented in certified official hard copy. If and when future uses are approved, official hard copies of the supporting documentation shall be provided to the stakeholders, including but not limited to: IP, the Town of Canton, Haywood County, DENR, SWS, and applicable federal agencies.

1.1 Discussion of New Post-Closure Uses

- **Western North Carolina Regional Livestock Center on the Landfill 5C Area**– WNC Communities and the Western North Carolina Regional Livestock Center (WNCRLC) propose to construct a regional livestock auction facility on the Landfill 5C Area. The facility, will be designed, constructed, and operated by WNCRLC under a lease agreement with IP. Two metal buildings are proposed to be constructed outside of the waste boundary on the Landfill 5C Area with additional fill material and parking areas being placed over a portion of covered landfill waste. These buildings will make up the WNCRLC and will be used for livestock sales, storage, and related events. In the future, as funds become available, the WNCRLC facility will be enclosed with a fence. A fence diagram will be provided to the SWS prior to installation. Continual landfill gas monitoring equipment will be installed and maintained in enclosed areas of buildings on the Landfill 5C Area. Additionally, a landfill gas investigation plan was approved by the SWS on August 17, 2009, and was implemented between July 15, 2009 and September 16, 2009 by Altamont Environmental, Inc. (Altamont) on behalf of IP. The landfill gas investigation plan will be followed and expanded as necessary to include, at a minimum, the installation of landfill gas probes between landfill waste and WNCRLC structures. Additionally, monitoring of methane gas will be expanded to include additional landfill gas probes.

  An anticipated future activity, not included in this request for permit modification, associated with the livestock center is a covered composting facility for livestock waste generated only at the facility. Composting will improve the WNCRLC's budget by reducing the cost of manure and bedding disposal, and may create revenue by the selling of the composted agricultural waste.

Until composting is approved as a post-closure use, agricultural waste will be removed from the livestock holding area using a loader and truck and will be hauled to an appropriate offsite disposal or composting facility.

- **International Paper Sports Complex on the Landfill 5B Area –** On September 1, 2001 the Town of Canton entered into a lease agreement with IP for construction of a sports complex. The Town of Canton made the DENR aware of the redevelopment activities before they were initiated, and reportedly received verbal authorization to proceed with the facility. Apparently, the Town of Canton did not obtain final written approval from the DENR for this use. This document requests the required approval for this use at the landfill. The Town of Canton utilizes the Landfill 5B Area as an athletic facility, known as the International Paper Sports Complex (Sports Complex). Existing athletic uses at the Sports Complex include baseball fields, and a walking and cross-country running trail. The existing facility contains three baseball fields and five structures that are located on or near landfill waste. The buildings are used for storage, restrooms, concession, and offices. Due to un-recorded verbal correspondence, loss of documents due to a flood in 2004, and staff turnover within the SWS, IP, Altamont, and the Town of Canton, this post-closure use has not been properly added to the landfill permit.

  Future uses, if approved, will include but may not be limited to: additional baseball fields, batting cages, soccer fields, and a practice football field. This request for permit modification includes only the existing uses at the Sports Complex described in this modification with details shown in the appendices of this document. Each additional future use will require specific approvals by the SWS and all applicable local, state, and federal agencies.

- **Hay Production at the Site** – In order to promote a healthy stand of grassy vegetation on and around the landfill, grassy areas on the Site (including that growing on the landfill cover [excluding the baseball fields and gravel parking areas]) will continue to be seeded, fertilized, mowed, and harvested for hay.

IP requests a permit modification to allow the proposed and existing uses at the Site as described above.

2.0 Background

2.1 Site History

The Site is located in the Town of Canton in Haywood County, North Carolina. The Site's location is shown on Figure 1-Site Location Map. The Site was used as an industrial waste landfill that accepted paper and pulp waste, fly-ash, and wastewater treatment sludge. On October 25, 1999, the SWS issued a closure letter for the Site. The Site is an unlined landfill that was closed by covering the landfill waste with a soil cover of at least two feet in thickness. Since the waste was covered, a stand of grassy vegetation has been established and maintained on the landfill cover and the remainder of the Site. Periodic maintenance has also taken place in order to mitigate the impacts of differential settlement and facilitate positive conveyance and drainage of stormwater.

The Site is located on three tax lots identified by Haywood County Property Identification Numbers 8667-17-0983, 8667-07-7082, and 8667-16-3957. The combined acreage of the three tax lots is approximately 129 acres. Respectively, the tax lots are 114.70, 10.67, and 3.83 acres in size. The Site contains two distinct landfill areas, known as the Landfill 5B Area and Landfill 5C Area. Beaverdam Creek flows between the two landfill areas. The layout of the two landfill areas is shown on Figure 2-Site Layout. Baseball fields and buildings operated by the Town of Canton are located on the Landfill 5B Area, which is situated on the northwestern portion of the Site. The Landfill 5C Area is situated on the southern portion of the Site and is currently used for hay production. The WNCRLC described in this request for permit modification will be constructed on the Landfill 5C Area.

2.2 Original Closure Permit Conditions (1999) & Related Work

The SWS closure letter dated October 25, 1999, specified post-closure conditions. Each post-closure condition is listed below in bold text. A summary of work that has taken place to address each condition is also provided. Please note that some of the work described below is interrelated with work completed to satisfy post-closure permit conditions approved on October 25, 1999 and other uses to be approved by this request for permit modification:

- **Management of Landfill Gas –** A landfill gas screening event was conducted by The Fletcher Group on April 24, 2000, and a passive landfill gas investigation was conducted by Bunnell-Lammons Engineering, Inc., on March 11-16 and 18-23, 2002 prior to the Landfill 5B Area being altered for use as a Sports Complex. The results of the screening and passive landfill gas investigation are included in Appendix B.

  Altamont conducted two additional landfill gas screening events on July 15-16, 2009 and September 14-16, 2009, in response to an audit conducted by the SWS. Methane concentrations in ambient air were measured within buildings and in areas of the landfill where methane could likely accumulate. Results of these screening events are included as Appendix C. Each location will continue to be monitored at least quarterly. The results of the quarterly methane monitoring will be included with the annual water quality monitoring report submitted to the SWS.

  On July 9, 2009, Altamont submitted a landfill gas investigation plan to the SWS. The plan was approved by the SWS on August 17, 2009. The landfill gas investigation plan and approval letter are included as Appendix D. Eleven landfill gas probes and four temporary landfill gas probes were installed on the Site during the week of September 9, 2009 in accordance with the approved landfill gas investigation plan. Probes were installed on both the Landfill 5B and 5C Areas.

Landfill gas probe boring logs are included in Appendix C. Both landfill gas probe and ambient air methane monitoring locations were sampled on September 14-16, 2009. Results are included in Appendix C. Ongoing sampling will be completed on a quarterly basis. Preliminary measurements indicate that additional probes are necessary along the property boundary. The landfill gas investigation plan is in the process of being expanded and additional investigation activities will be implemented simultaneously with this request for permit modification. The plan's expansion includes, but is not limited to, installation of property boundary landfill gas probes, and continuous methane monitoring in enclosed structures on or near landfill waste.

- **Management of Surface Water –** The landfill cover is inspected quarterly to confirm that stormwater is not ponding, that stormwater conveyance features are in good repair and are effective, and that all permanent erosion control devices are maintained. Repair measures are implemented whenever inspections indicate subsidence, erosion, or other detrimental events have occurred on the landfill cover, stormwater features, or at the Site in general.
- **Air Quality –** There have not been any violations of air quality emissions regulated under Section 110 of the Clean Air Act exist at the Site.
- **Final Cover System –** The landfill cover is inspected quarterly to insure that the integrity and effectiveness of the final cover system (including vegetation), stormwater conveyance features, and any permanent erosion control devices are maintained. Repair measures are implemented whenever inspections indicate settlement, subsidence, erosion, or other detrimental events have occurred on the landfill cover or Site.
- **Proposed Uses –** This request for permit modification, if approved, will expand the list of approved uses at the Site. Each proposed use is described in detail herein and detailed figures, plans, and appendices are included in the appendices. Specifically, the uses requested to be approved are: the Sports Complex, the WNCRLC, and hay production.
- **Ongoing Solid Waste Management Activities –** The Site has not received additional solid waste since its closure, and will not in the future accept additional solid waste. Collected leachate produced by the landfill is piped via the Canton municipal sewage district line to the Town of Canton municipal sewage treatment system operated currently by Evergreen Packaging.
- **Recordation –** The Haywood County Register of Deeds files were reviewed by county staff and no record of the closure letter was found to exist. A review of county GIS data revealed that the property is listed as a landfill. The approved and modified closed landfill permit will be notarized and recorded by the Haywood County Registrar of Deeds.
- **Water Quality Monitoring and Reporting –** Annual water monitoring is conducted at the Site. A total of six groundwater monitoring wells are sampled using low-flow sampling techniques (Figure 2) and two surface water locations are sampled using dippers (Figure 2). A letter from the SWS dated July 18, 2003 approved the following list of analytes as appropriate water quality parameters:
    1. Cadmium
    2. Chloride
    3. Iron
    4. Sulfate
    5. Total Dissolved Solids

In addition, field parameters including: depth to water, temperature, pH, specific conductivity, oxidation-reduction potential, dissolved oxygen, and turbidity are measured and recorded for each groundwater sample that is collected.

Surface water is monitored on an annual basis in Beaverdam Creek at two locations near the landfill areas. One location is immediately upstream of the landfill areas and one location is immediately downstream of the landfill areas (Figure 2).

Results of the water quality monitoring are submitted to the SWS in an annual water quality monitoring report.

2.3 Site Investigations

The following post-closure Site investigations have been completed at the Site in order to satisfy SWS post-closure permit conditions and requirements.

- **Groundwater and Surface Water Monitoring –** Post-closure semiannual groundwater and surface water monitoring was conducted at the Site from May 15, 2000 through May 19, 2003. A modification to the water quality monitoring program for the Site was approved by the SWS on July 18, 2003. Subsequently, water quality monitoring was reduced to annual sampling and the required list of analytes was reduced, as described above. Annual groundwater and surface water monitoring has been conducted from November 21, 2003 to the present.
- **Landfill Gas Investigation –** Landfill gas monitoring has been completed as described in Section 2.2. Specifically, the Fletcher Group collected ambient methane screening data on April 24, 2000, as described above. Bunnell-Lammons Engineering, Inc. conducted soil gas sampling on March 11-16 and 18-23, 2002. Altamont collected ambient methane screening data on July 15-16, 2009. Altamont subsequently installed 15 landfill gas probes during the week of September 9, 2009. Altamont collected both ambient methane screening data and conducted gas probe methane sampling on September 14-16, 2009.
- **Site Integrity Inspections –** Altamont has conducted quarterly Site integrity inspections from 2001 to the present.
- **Utility Location and Geophysical Investigation –** Reed Tech, Inc. conducted a utility location and geophysical investigation at the Landfill 5C Area between the dates of July 8, 2009 and August 3, 2009.
- **Geotechnical Exploration –** Foundations Systems Engineering, P.C. completed a geotechnical evaluation of the Landfill 5C Area. Their work is described in Section 2.3.3. A report of findings was submitted to Altamont on October 13, 2009, with an addendum on October 23, 2009 (Appendix E).

2.3.1 Health and Safety Investigation and Plan

A Health and Safety investigation was conducted prior to initiating subsurface assessment and land disturbing activities associated with environmental, geotechnical, site preparation and construction. To evaluate the nature of the waste material, Altamont installed four hand auger borings and collected a representative composite sample of the waste material in the Landfill 5C Area. The waste sample was analyzed for: dioxins, metals, pH, semivolatile organic compounds, volatile organic compounds, coliforms, and total organic halides.

Results of the waste sampling were compared to National Institute for Occupational Safety and Health standards for analyte(s) detected in the sample and a Health and Safety Plan was created for all subsurface and land disturbance activities at the Site including environmental, geotechnical, site preparation, and construction work. The Health and Safety Plan is included as Appendix F.

2.3.2 Utility Location, Topographic Survey, and Geophysical Investigation

Before investigative work began on the Landfill 5C Area, the following were located: aboveground and belowground utilities, waste boundaries, leachate lines, waste thicknesses, and buffers in potential development areas. This work occurred between July 8, 2009 and August 3, 2009. In addition, a topographical and boundary survey of the relevant portions of the property was prepared by Wes Cole Land Surveying, PA for the proposed WNCRLC project area. This survey is shown on Sheets 1 through 3 in Appendix G. The utility location and cover thickness evaluation work was completed using a variety of standard locating and surveying equipment as well as ground-penetrating radar and an electromagnetic profiler. A copy of the utility location report is included in the Reed Tech, Inc. geophysical investigation as Appendix H.

2.3.3 Geotechnical Exploration

Foundation Systems Engineering, P.C., a North Carolina licensed geotechnical engineering firm conducted a geotechnical exploration of the portion of the Landfill 5C Area that will be used for the WNCRLC. The purpose of the exploration was to gather subsurface data in order to make engineering recommendations regarding site preparation, foundation type, and existing and required bearing capacities, for all areas of the WNCRLC. To accomplish this, twenty-six soil auger borings, and nine soil test borings with Standard Penetration testing were analyzed. The Foundation Systems Engineering, P.C. geotechnical report and addendum are included as Appendix E. The report gives detailed recommendations for mitigating the impact the WNCRLC will have on the landfill as well as detailed recommendations for mitigating the impact the landfill may have on construction and operation of the WNCRLC. Recommendations made in the geotechnical exploration report shall be followed during all aspects of site preparation and construction of all areas associated with the WNCRLC.

2.3.4 Landfill Gas Investigations

A description of the landfill gas evaluation was described in Section 2.2.

The attached Figure 2 indicates existing and proposed landfill gas probes and monitoring locations. Data from landfill gas screening and sampling events are included in Appendices B and C. The WNCRLC will not be constructed until landfill gas concentrations are demonstrated to be less than 25% of the lower explosive limit (LEL) in existing buildings at the Site and less that 100% of the LEL at the property line.

2.3.5 Civil Design Plans

Ambient Design Group, a land-use planning, landscape architecture, and civil engineering design firm specializing in environmentally sensitive development, provided an analysis of siting options. The proposed location of the WNCRLC building is outside of the landfill waste boundary. Ambient Design Group created a grading plan that minimized land disturbance. The proposed grading and drainage plan and erosion and sediment control plan are included in Appendix I. Recommendations made in the geotechnical exploraton, the permitted grading and drainage plan, and the permitted erosion and sediment control plan will be followed during all aspects of site preparation and construction of all areas associated with the WNCRLC.

3.0 Requested Post-Closure Permit Uses

3.1 Western North Carolina Regional Livestock Center (Landfill 5C Area)

3.1.1 Background and Description

This description expressing the need for the WNCRLC is made on behalf of all stakeholders involved in the WNCRLC project and is stated by Mr. L.T. Ward, Vice President of the WNC Communities organization. The work of Mr. Ward and his group of stakeholders is entirely responsible for the creation of the WNCRLC.

"Since the livestock market formerly located in Asheville, NC closed in 2004, Western North Carolina (WNC) livestock producers have been forced to travel long distances to markets outside of western North Carolina. Currently the closest preferred markets are located in east Tennessee, upstate South Carolina, north Georgia and eastern North Carolina. This five-year period of inconvenience and inefficient access to the local market has resulted in a reduction of the number of livestock being grown in this region and is resulting in the redevelopment of historic farmland that accentuates the culture of western North Carolina. The decline in livestock production is attributed to the loss of revenue caused by additional transportation costs to the outlying markets; additionally the situation is exacerbated by the inability of any local efforts to create a viable long-term market in WNC. Furthermore, stress to livestock, induced by the long stressful journey to outside markets, is negatively affecting the resale value of animals.

A regional group made up of farmers, producers, area leaders, and agricultural specialists formed the WNC Livestock Development Commission, under the auspices of WNC Communities, a local nonprofit organization, this commission proposed the creation of a WNC Regional Livestock Center at the closed landfill site (44-01). IP entered into a low cost, long-term lease with the WNCRLC for the regional livestock center site. The capital for the center is funded by grants from the North Carolina Tobacco Trust Fund Commission, the Golden LEAF Foundation, NC Rural Center, Appalachian Regional Commission, Agricultural Development & Farmland Preservation Trust Fund, Western North Carolina Counties, and generous contributions from area producers, businesses, and persons interested in supporting a new viable regional market.

One of the greatest assets of the proposed facility, and a benefit that bolsters the success of the project, is the cooperative community effort of civic and governmental leaders across the region and throughout the state. The following list of stakeholders were deeply engaged in the support and completion of this project:

- *WNC Livestock Development Commission*
- *WNC Beef Cattle Commission*
- *NC Department of Agriculture*
- *NC Cooperative Extension Service*
- *USDA Farm Service Agency*
- *Haywood Co. Economic Development Commission*

- *Southwestern Commission (7 counties)*
- *Land-of-Sky Regional Council (4 counties)*
- *Members of the Western Delegation*
- *Governor Beverly Perdue*
- *Congressman Heath Shuler*
- *International Paper Company*
- *Family farmers and livestock producers*
- *Reed Tech, Inc.*
- *Foundation Systems Engineering, P.C.*
- *Construction Materials Laboratory*
- *Ambient Design Group*
- *Pace Analytical Services*
- *Altamont Environmental, Inc."*

The proposed WNCRLC facility is made up of two metal buildings (one occupies approximately 46,500 square feet, the other approximately 8,000 square feet), and a portion of the Landfill 5C Area leased to the WNCRLC by IP. Proposed building locations are shown on Ambient Design Group civil design plan sheets located in Appendix I. Both buildings are covered by metal roofs. The buildings are situated away from covered landfill waste. Approximately 38,500 square feet at the southern end of the 46,500 square-foot building will serve as an open-air livestock holding and loading area. This area will have an earthen floor covered with sawdust bedding material for livestock. The remaining area of the floor will be concrete in high-traffic areas. Approximately 8,000 square feet of the north end of the building will be walled with concrete blocks built on a concrete slab. This area at the north end of the building will serve as an auditorium, lobby, banquet hall, offices, concession, ticket vending, and restrooms. A firewall will be constructed between the north and south portions of the building. Construction and occupancy of the buildings shall meet the State of North Carolina and Town of Canton building codes. Architectural plan sheets are included in Appendix J.

A portion of the driveway and a majority of parking areas will be situated above augmented landfill cover and landfill waste. Driveway and parking areas will be paved with crushed stone material placed over reinforced engineered fill that augments the landfill cover. Civil design plan sheets are included in Appendix I.

The facility will be used for the sale of livestock and related events and aspires to hold public gatherings up to four days a week. Two full-time employees will work at the facility and will generally occupy the premises five days a week for approximately 50 hours each. IP will be responsible for obtaining all required permits and approval from regulatory agencies before providing WNCRLC with authorization to begin construction.

3.1.2 Mitigation of Impact to the Landfill

3.1.2.1 Land Disturbance, Building Footprints, and Site Preparation

The design finished floor elevation (FFE) for each proposed structure was established to minimize the amount of land disturbance necessary for site preparation. In addition, the location of each structure was selected to situate the building away from the covered landfill waste. The balance of cut and fill was taken into careful consideration when determining the FFE and developing the grading plan. Recommendations made in the geotechnical report will be followed during site preparation and construction of building footings. Construction will not begin until the DENR has approved the land disturbance and sediment and erosion control measures specified for site preparation. Civil design plan sheets and architectural plan sheets shall be followed during site preparation and construction of buildings associated with the WNCRLC.

IP is ultimately responsible for maintenance of the Site, however it is anticipated that maintenance of the WNCRLC will be performed by the operators of the facility on a weekly basis, as specified in a lease agreement between IP and the WNCRLC. Should maintenance and inspection performed by the operators prove unsatisfactory or result in damage to the landfill, IP will take over the maintenance activities consistent with the terms of the lease agreement. IP's decisions will be based in part on IP's quarterly inspections of the WNCRLC.

The geotechnical exploration (Appendix E) for the WNCRLC specifies that all areas constructed for support of slopes will be stripped of topsoil, roots, and all soft, wet, and deleterious material. This material will be removed for a minimum distance of 10 feet beyond the building perimeters and proposed parking and drive areas. The integrity of cover over landfill waste and structural fill associated with the landfill shall not be compromised in any way during site preparation. Once site stripping, clearing, and grubbing operations are complete, areas requiring fill shall be proofrolled, leveled, and terraced as necessary prior to fill placement. Cut areas shall be proofrolled after having been excavated to the finished subgrade elevation. Proofrolling shall be performed utilizing a heavily loaded vehicle, such as a loaded dump truck, driven in a tight criss-cross pattern such that all soil within the cut or fill area is compacted. Areas that deflect excessively in the opinion of the onsite geotechnical engineer must be undercut to level firm soil, proofrolled, and stabilized as necessary. Proofrolling and preparation for the placement of fill for slope construction is to be performed under the direction of a geotechnical or civil engineer.

3.1.2.2 Placement of Fill Material

In order to situate WNCRLC buildings off of landfill waste, the east slope (a historic borrow area that is located away from covered waste) of the Landfill 5C Area shall be excavated to expand the flat area needed for the WNCRLC project and create usable fill material. Suitable fill material and landfill cover material excavated from the cut area shall be re-used at the WNCRLC site.

It is anticipated that the greatest man-made physical force imposed over waste on the landfill will be the weight of loaded cattle trucks, which can weigh approximately 80,000 pounds. According to the geotechnical exploration (Appendix E), an 80,000 pound truck on top of a three-foot engineered fill with geogrid will impose a force of 1,000 pounds per square foot per wheel load. This is a similar load to the average wheel load of a car. See the attached cross-sections in Figure 3 to demonstrate that the cattle

trucks will follow a route that is underlain by at least three feet of fill.

The placement of fill shall meet the following criteria as specified in the geotechnical exploration report. Compaction of the fill must meet the specifications outlined in the geotechnical report, including but not limited to:

"Once clearing/stripping/proofrolling etc. (as outlined above) are successfully completed, areas of the site requiring fill may be backfilled and compacted to finished subgrade elevation with soil fill. Up to the level of 2 feet below finished subgrade elevation, the fill should be compacted to a minimum of 98 percent of its maximum dry density as determined by the Standard Proctor test, ASTM 0 698. The top 24 inches of fill should be compacted to 100 percent Standard proctor density. The moisture content of the soil fill should be maintained within the range of +/- 2 percent of Standard Proctor Optimum moisture content during compaction.

All fill should be placed and compacted in horizontal lifts. Backfill lift thickness should be limited to a maximum of 8 inches, loose. No fill should be placed on a sloping surface. A series of benches or terraces should be used to tie the sloping hillsides and fill together. The benching should begin at the toe of the fill slope. In-place density testing should be performed concurrent with placement of all fill to ensure the desired density is achieved.

Soil fill placed beneath the proposed building and paved areas should consist of lean, silty clay, free of organics, and rock fragments larger than 4 inches in greatest dimension. The soil fill should have a liquid limit of less than 50 percent, a plasticity index of less than 30, a plastic limit below the Standard Proctor optimum moisture content, and a minimum Standard Proctor maximum dry density of 92 PCF."

Grading shall be conducted so that positive drainage away from the building, parking, and driveway area is maintained. Creation of low areas that promote ponding of stormwater shall be avoided in all areas. Particular care shall be taken with placement of fill over landfill cover and waste areas. The geotechnical exploration report and addendum are included as Appendix E.

The landfill cover shall receive fill material only in areas where it is necessary in order to construct the WNCRLC buildings, driveways, and parking areas. Buildings shall not be constructed over landfill waste. The final depth of cover over landfill waste shall not be decreased in any area.

The civil design plan sheets indicate that approximately 40 feet of cut material is required at the southeast corner of the WNCRLC site, and up to approximately 45 feet of fill is to be placed along the north end of the larger building pad in an area that is not underlain by waste. Parking and driveway areas are located to the south and west of WNCRLC buildings in areas that are underlain by waste. Fill over waste ranges in thickness from approximately two feet to approximately 15 feet. The fill is designed to mitigate impacts that the parking could potentially have on the landfill cover and covered landfill waste.

3.1.2.3 Stormwater Runoff and Erosion Control

The WNCRLC buildings and parking areas will be situated upslope of covered waste. Conveyance of stormwater from the WNCRLC has been designed such that it does not flow to, nor create erosion of the landfill cover or any structural portion of the site. Stormwater that is concentrated by the roof of the building will be routed to a low-slope stormwater ditch and on to a designed stormwater basin. The referenced stormwater basin is located adjacent to the WNCRLC driveway and is shown on the erosion and sediment control plan included as Appendix I.

3.1.2.4 Landfill Cover, Monitoring, and Maintenance

The integrity of the landfill cover and the overall condition of the Site is monitored on a quarterly basis by Altamont and a report is submitted to IP. This monitoring and reporting will continue in the future.

The area in and around the WNCRLC will be inspected by the facility operator at least weekly for impacts to the landfill cover. The weekly inspections are intended to provide early detection of deterioration so that potential problems may be repaired in a timely manner. It will be the responsibility of the WNCRLC facility operator to clean and maintain the facility, keep the grounds in a sanitary condition, inspect and maintain the continuous methane monitoring equipment on a weekly basis, inspect landfill cover on a weekly basis (as noted above), and retain in good condition all inspection and maintenance records. In the event that the buildings and/or site are evacuated in case of fire, the occurrence of methane is detected, or other situations arise in which the site is to be evacuated, qualified professionals will be notified. The facility operator will be required to immediately report to IP or its designated representative any damage that occurs to the landfill, so that repairs can be initiated promptly and impacts minimized.

3.1.2. 5 Landfill Gas Monitoring

A description of the activities related to monitoring the existence of landfill gas is provided in Section 2.2. In addition to those activities, IP will perform quarterly methane monitoring within the enclosed portions of the WNCRLC building that houses the auditorium, lobby, banquet hall, offices, concession, ticket vending, and restrooms.

In the event that a methane exceedence is found during screening of ambient air or in property boundary landfill gas probes, IP or its representatives will notify the SWS immediately. If methane is detected at or above 25% of the LEL within structures at the Site, the facility operator will immediately notify the SWS and implement engineering controls necessary to mitigate methane concentrations. Additionally, electric lighting and open flames within the structure will be extinguished and the necessity for permanent engineering controls to mitigate methane will be evaluated. If continual methane monitoring alarms are triggered, the facility operator will immediately evacuate the building(s), notify the nearest non-emergency fire and rescue services, notify IP or its representatives, and implement engineering controls.

3.2 International Paper Sports Complex (Landfill 5B Area)

3.2.1 Background and Description

The Landfill 5B Area was historically an industrial waste disposal site for the Champion International paper mill. The DENR issued a closure letter for the landfill on October 25, 1999 (Appendix A). An as-built drawing of the Landfill 5B Area titled Champion Landfill 5B As Built as of October 1, 1979 is included in Appendix K. The Town of Canton is currently under a long-term lease with IP for the use and management of the Sports Complex, which is located on the Landfill 5B Area. McGill Associates (McGill) designed and provided construction oversight for the Town of Canton for the permitting and development of the Sports Complex.

In a letter from Mr. Dale Pennell with McGill to Mr. Tim Jewett with DENR, dated November 20, 2003 (Appendix L), Mr. Pennell informed the DENR of a grading plan for the Sports Complex. The letter describes a plan for approximately four feet of fill material to be installed on top of existing Landfill 5B Area cover where the three baseball fields currently exist.

In September 2005, after fill placement and grading was completed, three baseball fields, one gravel parking area, one prefabricated wooden office shed, and one perimeter walking trail were constructed. Construction of the concession stand/restrooms building was completed in 2007. A metal storage building located near the center of the Landfill 5B Area predates the Sports Complex and is now used for storage of maintenance equipment. Two additional prefabricated wooden storage sheds were installed more recently, one in 2007 and the other in 2008.

Two prefabricated wooden storage sheds, three baseball fields, the concession stand/restrooms building, the walking trail, and the gravel parking area are used weekly for recreational activities during regular baseball season. One prefabricated wooden office shed and the large metal building are used daily.

The large metal storage building occupies approximately 12,000 square feet and has an earthen floor which is covered in plastic sheeting and several inches of crushed stone. The concession stand/restrooms building is approximately 1,400 square feet in area and has a concrete floor with drains. The three prefabricated wooden buildings occupy approximately 300 square feet each and have plywood floors. These wooden prefabricated buildings are elevated on concrete blocks such that ambient air continually passes beneath them. Sheet C3 of the McGill Record Drawing (Appendix M), illustrates the location of all existing structures associated with the Sports Complex.

3.2.2 Landfill Gas Monitoring

Continuous methane monitoring equipment will be installed inside the large metal building and the concession stand/restrooms building. The approved landfill gas investigation plan (Section 2.2) is currently being expanded to include installation of landfill gas probes at the property line between landfill waste and existing nearby offsite structures. In addition to continuous methane monitoring in buildings on the Landfill 5B Area, quarterly methane monitoring of ambient conditions at 39 locations and sampling of 6 landfill gas probes is conducted, recorded, and reported to the SWS on an annual basis.

In the event that a methane exceedence is found during screening of ambient air or in property boundary landfill gas probes, IP or its representatives will notify the SWS. If methane is detected at or above 25% of the LEL within structures at the Site, IP or the facility operator will immediately notify the SWS and implement engineering controls necessary to mitigate methane concentrations. Additionally, electric lighting and open flames within the structure will be extinguished and the necessity for permanent engineering controls will be evaluated. If continual methane monitoring alarms are triggered, the facility operator will immediately evacuate the building(s), notify the nearest non-emergency fire and rescue services, notify IP or its representatives, and implement engineering controls.

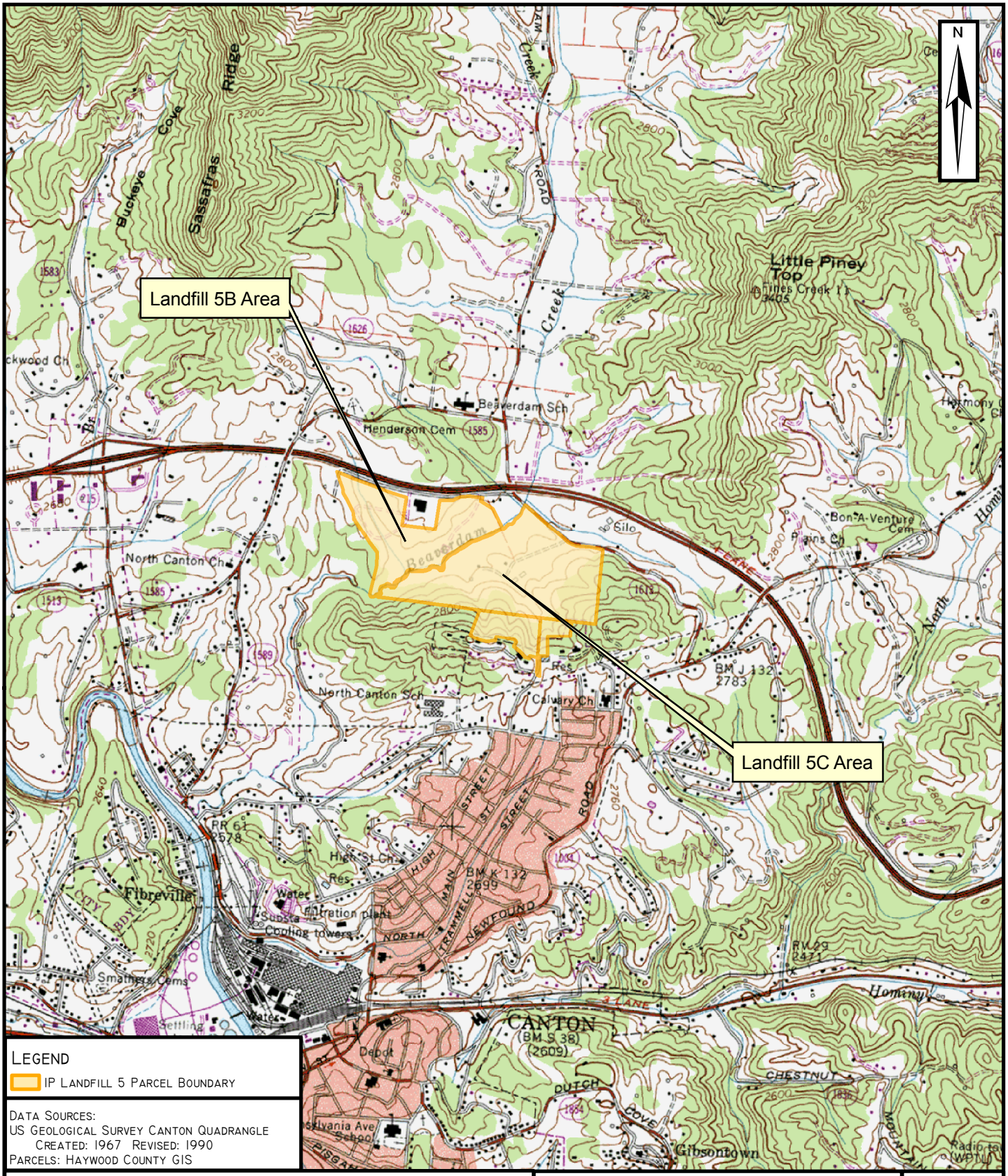
3.3 Hay Production

The production of hay on the landfill is a post-closure use that has not been attached to the 44-01 permit. This use is mutually beneficial for the landfill and the farmer that harvests the hay crop. Hay harvesting promotes a healthy stand of vegetation on the landfill cover and Site. Maintaining a healthy stand of vegetation allows stormwater uptake by the process of evapotranspiration and provides necessary erosion control.

3.4 Zoning

A letter dated October 26, 2009 included as Appendix N states that the proposed WNCRLC facility does not conflict with the Town of Canton’s zoning classifications.

FIGURES



Altamont Environmental, Inc.

Engineering & Hydrogeology

231 Haywood Street, Asheville, NC 28801
tel.828.281.3350 fac.828.281.3351
www.altamontenvironmental.com

Site Location Map

Closed International Paper Landfill 5
Solid Waste Permit # 44-01
500 Beaverdam Road
Canton, Haywood County, North Carolina

Figure

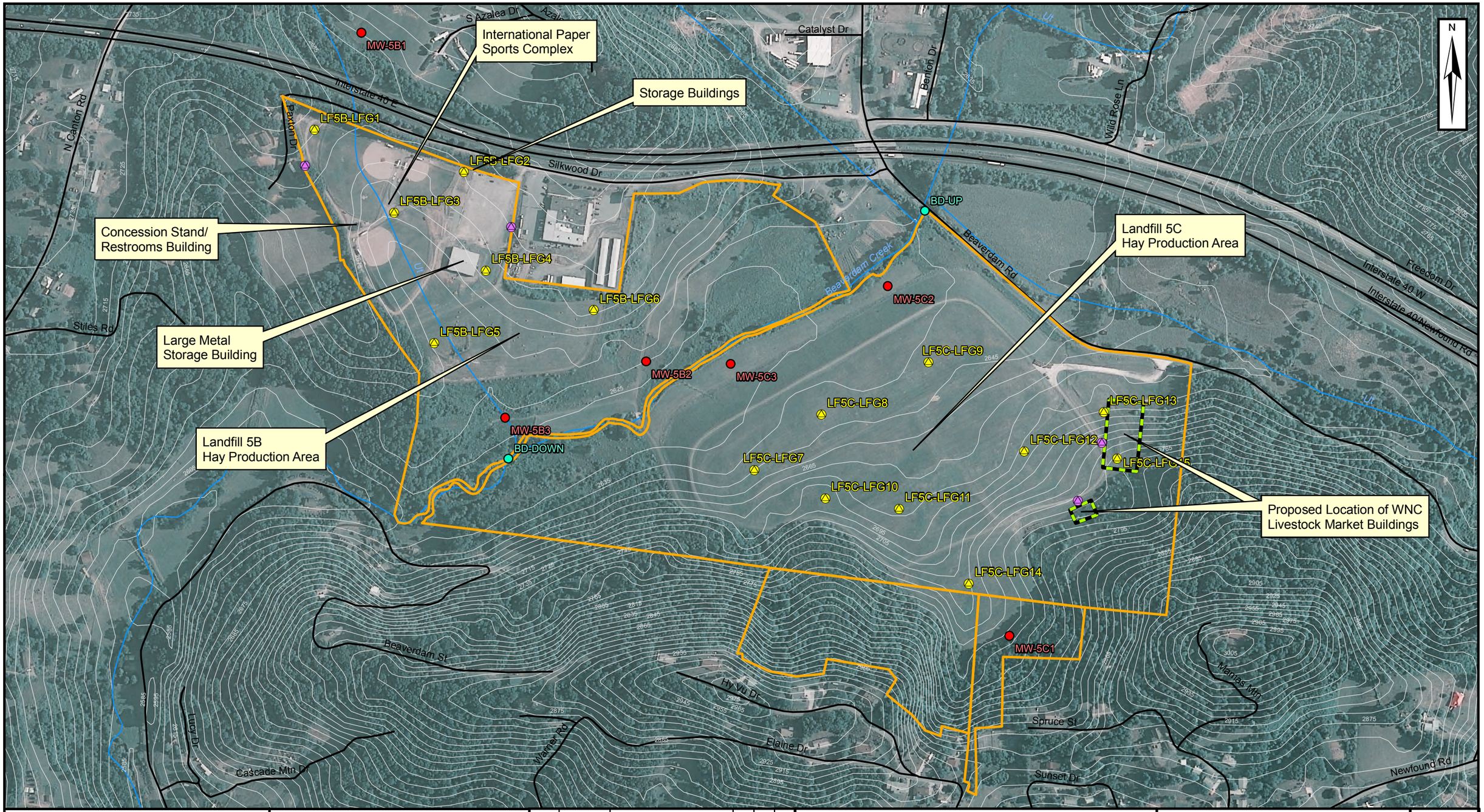
1

Drawn by: Anna Saylor
Project Manager: Joel Lenk
Client: International Paper Company
Date: 10/23/2009

Scale

0 500 1,000 2,000 Feet

P:\IP\LF 5\Livestock Market and Events Center\Figures\GIS\Figure 1-Site Location Map.mxd



Legend

- Proposed Landfill Gas Probes
- Landfill Gas Probes
- Surface Water Sample Locations
- LF 5 Monitoring Wells
- Approximate Location of WNCRLC Buildings
- IP Landfill 5 Parcel Boundary
- Haywood County Roads
- Haywood County Hydrology
- 10 Foot Interval Contour Lines

SOURCE:

2008 Color Orthophoto from NCDA Hydrology, Roads, Contour Lines, and Property Boundaries from Haywood County

REV.	DATE	DESCRIPTION	BY	CHK	APV

Altamont Environmental, Inc.
Engineering & Hydrogeology
231 Haywood Street, Asheville, NC 28801
tel.828.281.3350 fac.828.281.3351
www.altamontenvironmental.com

DRAWN BY: ANNA SAYLOR
PROJECT MANAGER: JOEL LENK
CLIENT: INTERNATIONAL PAPER CO.
DATE: 10/27/2009

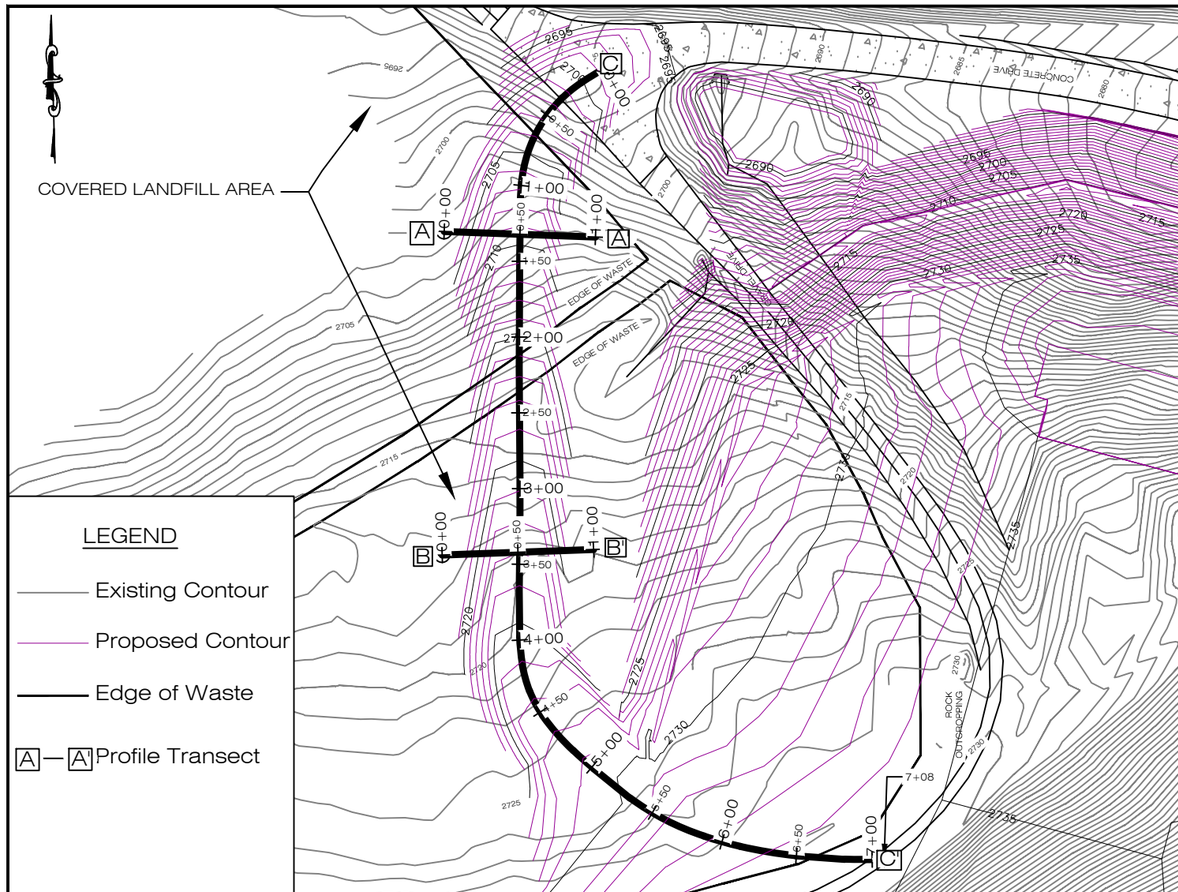
Scale: 0 100 200 400 Feet

SITE LAYOUT

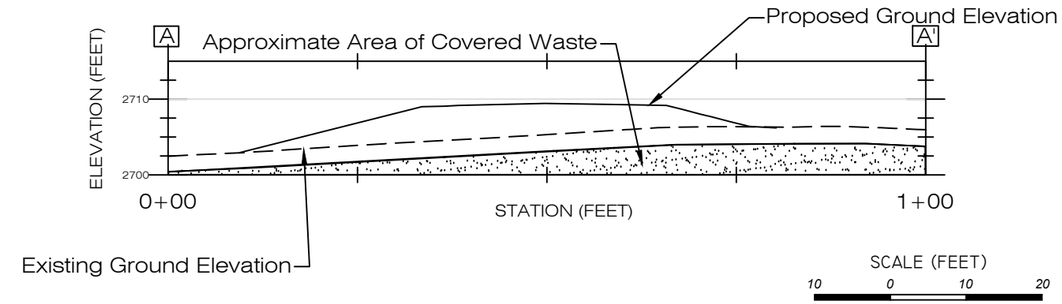
CLOSED INTERNATIONAL PAPER LANDFILL 5
SOLID WASTE PERMIT # 44-01
500 BEAVERDAM ROAD
CANTON, HAYWOOD COUNTY, NORTH CAROLINA

Figure 2

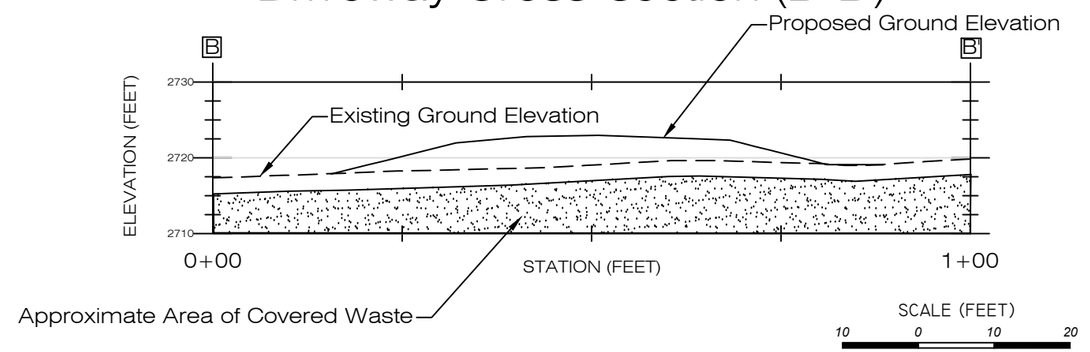
P:\IP\LF 5\Livestock Market and Events Center\Figures\GIS\Figure 2-Site Layout.mxd



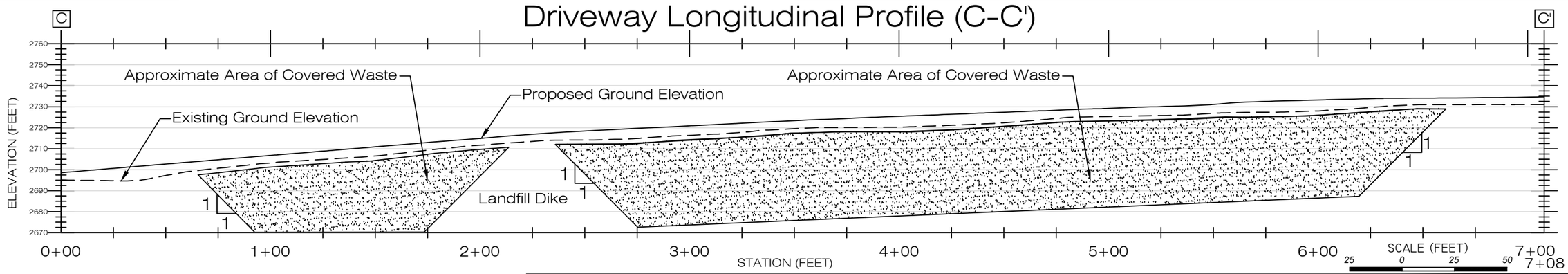
Driveway Cross-section (A-A')



Driveway Cross-section (B-B')



Driveway Longitudinal Profile (C-C')



Notes:
1. Existing topographic data obtained from Wes Cole Land Surveying, PA 07/31/09.
2. Proposed elevations from Ambient Design Group 09/30/09.
3. Edge of waste identified by geophysical investigation by Reed Tech, Inc. 07/14/09 and located by Wes Cole Land Surveying.

REV.	DATE	DESCRIPTION	BY	CHK	APV

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY
231 HAYWOOD STREET, ASHEVILLE, NC 28801
TEL.828.281.3350 FAC.828.281.3351
WWW.ALTAMONTENVIRONMENTAL.COM

DRAWN BY: PAUL DOW
PROJECT MANAGER: JOEL LENK
CLIENT: INTERNATIONAL PAPER COMPANY
DATE: 10/27/09

SCALE AS SHOWN

PROPOSED DRIVEWAY FILL PROFILES

CLOSED INTERNATIONAL PAPER LANDFILL 5
SOLID WASTE PERMIT # 44-01
500 BEAVERDAM ROAD
CANTON, HAYWOOD COUNTY, NORTH CAROLINA

FIGURE 3

P:\IP\LF 5\LIVESTOCK MARKET AND EVENTS CENTER\FIGURES\GRADING_X_SECT.DWG

APPENDIX A

LANDFILL 5 (44-01) CLOSURE LETTER OCTOBER 25, 2009

NCDENR

JAMES B. HUNT JR.
GOVERNOR

WAYNE McDEVITT
SECRETARY

WILLIAM L. MEYER
DIRECTOR

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT

October 25, 1999

Mr. Tom Ross, Director
Environmental Projects
Champion International
1 Champion Plaza
Stanford, Connecticut 06921

Re: Closure of the Champion International Industrial Waste Landfill, Haywood County, North Carolina, Permit # 44-01

Dear Mr. Ross:

The Solid Waste Section (the Section) has reviewed the closure documentation and has determined that the referenced industrial waste landfill has been closed in accordance with the applicable requirements.

The landfill is considered closed subject to the following post-closure conditions. The owner and/or operator of the facility, Champion International, is responsible for compliance with these conditions. In particular, Condition # 7 requires that, if the permit has not been previously recorded in accordance with Rule .0204, documentation shall be provided that a statement that the property has been used as a sanitary landfill is contained in the legal description of the landfill site. The legal description should be sufficient as a description in an instrument of conveyance and the statement shall be in no smaller type than that used in the body of the of the deed or instrument. Condition #8 addresses continued water quality monitoring for the existing ground water monitoring system. As a result of the on-going water quality monitoring, the Section may require additional ground water monitoring wells for assessment and, if necessary, corrective action.

Please note, that this closure shall become effective upon written notification by the owner/operator that the facility shall be maintained in compliance with the post closure conditions specified in this letter. Rule .0510 also states that when a disposal unit is closed, the permit to operate that unit is terminated and any future disposal operations will require approval by the Section.

401 OBERLIN ROAD, SUITE 150, RALEIGH, NC 27605
PHONE 919-733-4996 FAX 919-715-3605
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER - 50% RECYCLED/10% POST-CONSUMER PAPER

If there are questions regarding this closure letter, please contact or me at (919) 733-0692, extension 255.

Sincerely,

James C. Coffey

James C. Coffey, Head
Permitting Branch
Solid Waste Section

cc: Mark Poindexter
Jim Patterson

POST CLOSURE CONDITIONS

1. **MANAGEMENT OF LANDFILL GAS:** The owner and/or operator shall take the measures necessary to ensure that the closed site shall continue to meet the design standards for landfill gas found in Rule .0503(2)(a).

2. **MANAGEMENT OF SURFACE WATER:** The owner and/or operator shall take the measures necessary to ensure that the closed site shall meet the requirements of Rule .0503(2)(c). In addition, the landfill unit shall be maintained such that surface water runoff occurs in a controlled manner, and surface water shall not be impounded over waste.

3. **AIR QUALITY:** The owner/operator shall ensure that landfill units do not violate any applicable requirements developed under a State Implementation Plan approved or promulgated by the U.S. EPA Administrator pursuant to Section 110 of the Clean Air Act, as amended.

4. **FINAL COVER SYSTEM:** The integrity and effectiveness of the final cover system and any permanent erosion control devices must be maintained. This could include making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events.

5. **PROPOSED USES**: The owner/operator shall submit a proposal for the Section's review and approval addressing post closures uses of the facility. Proposed post closure uses shall not violate any post closure conditions found in this letter. In particular, plans for post closure uses shall avoid possibilities for the entrapment of methane gas. Routine landfill gas monitoring within structures and at the facility boundary may not be sufficient to detect potentially dangerous situations.

6. **ONGOING SOLID WASTE MANAGEMENT ACTIVITIES:** Continuing solid waste management activities, if any, shall not violate any post closure conditions found in this letter, and must meet any other applicable requirements.

7. **RECORDATION:** The owner/operator shall ensure that the recordation requirements for land disposal sites found in Rule .0204 are met.

8. **WATER QUALITY MONITORING AND REPORTING REQUIREMENTS:**

   a. Groundwater quality at this facility is subject to the "Classification and Water Quality Standards Applicable to the Ground waters of North Carolina," 15A NCAC 2L. This includes, but is not limited to, the provisions for detection monitoring, assessment, and corrective action.

   b. The permittee shall sample the detection monitoring wells and surface water sampling location(s) at a minimum on a semi-annual basis.

   c. Water quality detection monitoring shall continue for a minimum of five years from the date of the Section's receipt of the owner/operator's notification that the facility will be maintained in compliance with the post-closure conditions specified in this letter. After five years the Section will determine if further monitoring is to be required.

   d. Sampling equipment and methods shall conform to specifications in Attachment 1, "North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities." The sampling parameters and methods shall be those found in Attachment 2, "Sampling and Analysis Requirements for Construction and Demolition Landfills and Closed Sanitary Landfills", or an alternate list of sampling parameters as approved by the Solid Waste Section.

   e. The permittee shall maintain a record of all monitoring events and analytical data. Reports of the sampling events and analytical data shall be submitted to the Section in a timely manner.

APPENDIX B

LANDFILL GAS INVESTIGATION PRE-CONSTRUCTION OF THE INTERNATIONAL PAPER SPORTS COMPLEX

THE FLETCHER GROUP

GAS READINGS FIELD WORKSHEET

Name of Person Taking Readings: **Date:** 4-24-00

Weather Conditions: **Ambient Temperature:** ° F

Gas Monitoring Equipment: **Serial Number:** **Calibration Date:**

Atmospheric Pressure (Inches of HG):

Field Calibration:

Location	Readings	Time	LEL Meter (% LEL)	% CH_4	% CO_2	% O_2	Probe Pressure or Vacuum (Inches of H_2O)	Notes
1	Maximum							
	Stabilized	120 s	0.00	0.00	0.0	19.5	DNR	AT WELL / SW Fence
2	Maximum							
	Stabilized	120 s	0.00	0.00	0.00	20.7	DNR	Elec. conduit / 5-40
3	Maximum							
	Stabilized	240	0.00	0.00	0.00	20.7	DNR	Catch basin / S. side
4	Maximum							
	Stabilized	120	0.00	0.00	0.00	20.6	DNR	SW - 5B - 20
5	Maximum	25	0.0	0.1%	1.1	19.2	DNR	MAIN Bracken
	Stabilized	180	0.0	0.00	0.0	20.4	DNR	East of upper lot
6	Maximum							
	Stabilized	DID NOT Record > Ambient Leakage						
7	Maximum							
	Stabilized	120 s	0.00	0.00	0.00	20.6		Stormwater Pipe
8	Maximum							
	Stabilized	120	0.00	0.00	0.00	20.6		MAIN GATE
9	Maximum	31 s		31%		DNR		68 sec = 0.0 CH4
	Stabilized	VARIABLE		0.0 CH4	TO 25% CH4			
10	Maximum							
	Stabilized	120 s	0.00	0.00	0.00	20.7		Personnel gate - N. side
11	Maximum							
	Stabilized							
12	Maximum							
	Stabilized							
13	Maximum							
	Stabilized							
14	Maximum							
	Stabilized							
15	Maximum							
	Stabilized							
16	Maximum							
	Stabilized							

Notes:

4/24/00

CIC - 2055.01 Ph 5

CANTON LANDFILL 5b
ARRIVE ON SITE 1315
TASK IS TO check FOR LFG
USING LANDTEC GA-90 Meter

Check calibration
O_2 - GAS (CALIBRATION) = 4%
READING = 4.3% → OK

CH_4 → CAL = 50% / 51.3% = ok
CO_2 → CAL = 35% / 37.8% = ok

FIRST LOCATION = RED STANDPIPE WITH
CONDUIT like Fittings on top
SW Fence Line
2ND = Electrical CONDUIT - Pole # 5-40
SOUTH Fence - ABOVE OUTFALL
3RD IN CATCH BASIN NEAR POINT #2
DROP hose INTO CONDUIT 18" BGS
AT 80 sec. get Break 0.1% CH_4
Then Back to 0.0%
AT 24 sec = 0.0% CH_4 / 20.7% O_2
STABLE

CIC 4/24/00 Pg 2

4# STORMWATER CATCHBASIN (OUTFALL)
5B-20 - slip TUBE INTO the
OUTFALL Pipe

5# AT UTility Brother -
Phone conduit EAST SIDE OF upper
lot - O_2 DROPS TO 19.2
CO_2 up TO 1.1%
CH_4 0.1% AT 25 sec
Then STABLE AT 0.0 CH_4, 0.0 CO_2
20.4% O_2 180 sec

6# Check ANOTHER, SMALLER CONDUIT
SAME LOCATION - UNABLE TO
INSERT TUBE well - AMBIENT
leakage - NO READING

7# STORMWATER PIPE - IN DITCH - WEST OF
5

8# UTility CONDUIT AT MAIN GATE -
EAST SIDE

9# UTility CORRIDOR 15' SE OF
MAIN GATE
High (30% CH_4) initial
Then DROPS TO 0.0
AT 140 sec STARTS COMING
BACK up

CH4 climbs steadily - but slowly
to 230 sec (@ 26% CH4)
Then begins dropping again
at 250 sec = 0.0 CH4
260 sec begins climbing again
Peaks at 24.5% CH4
16% CO2

10th - small utility conduit at personnel
gate - N side - west of main
gate

Heavy rain begins
go inside metal bldg
find small hole - SE corner
drive rebar to ~ 12"
collect 1st reading -
0.0 / 0.0 / 20.5 @ 120 sec
drive re-bar to 18"
hole won't stay open

Try driving holes 3 other spots
unable to penetrate gravel
check ambient conditions under
pallets of material etc - no CH4

CIC 4/24/00 Pg 4

go to metal Bldg (old)

Drove one shallow probe - (12" deep) west side of good metal Bldg. Difficult to drive by hand -
0.0% CH_4, 0.0% CO_2, 20.5 O_2

Check inside old metal Bldg
1- inside wooden "office"
no CH_4
2- in small conduit near breakers
= no CH_4
3 - ambient = 0 CH_4

Check for any other locations around the site - found one > a storm water culvert SE of good metal Bldg
CH_4 = 0.0%

Check storm sewer manhole outside fence NW corner
CH_4 = 0.0%

CIC 4/24/00 Pg 5

Check GAS IN MONITORING well 5-

$CH_4 = 0.0\%$

$O_2 = 20.5\%$

Check gas in OUTFALL OF large stormwater culvert

$CH_4 = 0.0$

$O_2 = 20.6\%$

Try TO Check gas AT MW 5C3 water ~ 1' BGS ABOVE SCREEN - DID NOT Check

Check gas AT 5B-2

$CH_4 = 0.0\%$

$O_2 = 20.5$

DTW ≅ 5 FT BGS

Tried to check gas MW 5C2

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

REPORT OF SOIL GAS SAMPLING

PROPOSED TOWN OF CANTON RECREATIONAL FACILITY
FORMER CHAMPION INTERNATIONAL LANDFILL 5B
HAYWOOD COUNTY, NORTH CAROLINA

PREPARED FOR:

MCGILL ASSOCIATES

& THE TOWN OF CANTON

ASHEVILLE & CANTON, NORTH CAROLINA

NORTH CAROLINA LICENSED SEAL 1475 GEOLOGIST ANDREW W. ALEXANDER

PREPARED BY:

BUNNELL-LAMMONS ENGINEERING, INC.

GREENVILLE, SC -- ASHEVILLE, NC

JULY 19, 2002

BLE PROJECT NUMBER J01-2360-02

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

July 19, 2002

Town of Canton, NC
C/O McGill Associates, PA
PO Box 2259
Asheville, North Carolina 28802

Attention: Mr. Dale E. Pennell, P.E., P.L.S.

Subject: **Report of Soil Gas Sampling**
Proposed Town of Canton Recreational Facility
Former Champion International Corporation Landfill 5B
Silkwood Drive (NCSR 1637)
Haywood County, North Carolina
BLE Project Number J01-2360-02

Dear Mr. Pennell:

Bunnell-Lammons Engineering, Inc. (BLE) is pleased to submit this report to the Town of Canton c/o McGill Associates (McGill) of soil gas sampling at the subject site. The work was performed pursuant to your authorization of BLE Proposal Number P01-0133a, dated January 28, 2002. Included herein are a general description of the scope of services performed, assessment results, and our recommendations and conclusions.

PROJECT INFORMATION

The Town of Canton is planning to lease a 24.048-acre parcel from the site owner (International Paper Company). The subject site is a closed landfill that was operated by the former Champion International Corporation as a private landfill and was known as Landfill 5B (Figure 1). The Town of Canton is planning to convert approximately 15-acres of the property into a recreational facility for use by the general public.

The Town of Canton has retained McGill to coordinate the planning efforts. McGill, on behalf of the Town of Canton, has tasked BLE to assess landfill gas (soil gas) at four ground surface locations.

SCOPE OF SERVICES

The scope of service described herein was developed by Mr. Andrew Alexander of BLE, and Messers. Jeff Bishop, Dale Pennell, and Joel Storrow of McGill during a meeting at the McGill offices on January 25, 2002. The services documented in this report differ substantially from those proposed in BLE's proposal number P01-0333 dated October 1, 2001 which was authorized by the Town of Canton. However, before the authorized scope of service could be completed, International Paper Company denied the Town of Canton permission to conduct sampling below the landfill cap (via Geoprobe borings). Therefore, the revised scope (described below) was prepared. Please note that this revised scope of service is not preferred by BLE, McGill, or by the Town of Canton to assess

1200 WOODRUFF ROAD, SUITE B-7
GREENVILLE, SOUTH CAROLINA 29607

PHONE (864) 288-1265
FAX (864) 288-4430

the subject site but is a compromise that falls within the assessment limitations required by International Paper.

BLE mobilized to the site in accordance with the schedule on the Soil Gas Sampling Matrix (Table 1). Landfill gas-sampling data loggers were installed at two stations (Station 1 and 2) on the ground surface (Figure 2). Each sampling station consists of a self-contained battery operated landfill gas monitor (Landtec Model GEM-2000) covered by a rainproof box (Figure 3). The samplers were programmed to collect measurements every thirty minutes (while in data collection mode) and record the data digitally in the equipment's memory. Each sampler was programmed to purge stagnant air for thirty seconds prior to each sampling event.

The samplers were retrieved daily and the data was downloaded from the unit for permanent storage. A freshly charged and pre-programmed sampler was deployed in the rainproof box at the time of retrieval. This process was repeated daily for one week. At the end of the first week, two new sampling locations were selected (Station 3 and 4, Figure 2) and the process was repeated.

Please note that all sampling locations were selected by McGill based on their estimates of the waste footprint of the landfill. The sample locations (stations) were located in the field by BLE by pacing from map landmarks (e.g. power poles and fence posts). The stations have not been surveyed. BLE personnel marked each location with a labeled orange pin flag for future reference.

When complete, the assessment resulted in a five-day-long data set for each of the four sampling locations. Monitored parameters included percent methane gas, percent oxygen, percent carbon dioxide, and barometric pressure.

RESULTS

The complete data set from each station is included in Appendix A. A summary graph of the results for each station is included in Appendix B. Sampling at Stations 1 and 2 occurred from March 11-16, 2002 and sampling at Stations 3 and 4 occurred from March 18-23, 2002 (Table 1). Please note that each station's data set includes a continuous data log with the exception of Station 1 where the data logger malfunctioned from March 13-14, 2002.

The measurements from Station 1 indicate that methane gas was detected at concentrations of up to 0.1% from approximately 17:07 on March 12, 2002 through 8:41 on March 13, 2002. No landfill gas odor was noted beneath the box at the time of sampler retrieval. The presence of the methane gas corresponds with a period of low barometric pressure, which is typical of the relationship between atmospheric pressure and landfill off gassing.

Only one occurrence of methane gas (single data point) was noted in the record from Station 2. A concentration of 0.1% was noted at 13:49 on March 14, 2002. The methane gas reading does not correspond with the barometric pressure readings and therefore may be aberrant.

The measurements from Station 3 indicate that methane gas was detected at concentrations of up to 0.1% from approximately 13:29 through 16:00 on March 21, 2002 (three data points). No landfill gas

odor was noted beneath the box at the time of sampler retrieval. The presence of the methane gas corresponds with a period of low barometric pressure.

Methane gas concentrations were not noted in the record from Station 4.

CONCLUSIONS & RECOMMENDATIONS

The methane gas measured at Stations 1, 2, and 3 is present at a concentration of 0.1% which is the detection limit for the landfill gas meter. However, the methane gas was found to be present during periods of low atmospheric pressure (at Station 1 and 3), which could correspond to landfill off gassing. Methane gas could be present within the known landfill footprint and present at low concentrations at the ground surface. The results of our short-term testing are not adequate for evaluation of the maximum methane gas concentrations that could accumulate in a permanent building structure.

Since the landfill owner will not allow testing for landfill gas beneath the landfill's cap, we recommend long-term landfill gas monitoring in fill materials above the cap for a period of approximately one-year after final construction. We understand that a four to six foot soil cover (structural fill) will be placed over the entire site. We recommend installation of permanent soil gas monitoring wells within the structural fill (four to six feet deep). The wells would not penetrate the existing landfill cap. The wells should be installed with plastic flush-mount covers in non-conspicuous locations. The wells should be screened for the presence of landfill gas twice monthly using a portable landfill gas meter. If landfill gas is detected in sufficient quantity to require corrective action, a gas-venting system could be installed in the affected area(s) via trenching or vertically installed vents. This approach allows flexibility for implementation of corrective action, if required.

QUALIFICATIONS OF REPORT

The activities and evaluative approaches used in this assessment were developed as directed by the property owner, International Paper Co., but are not necessarily consistent with those normally employed in environmental assessments and waste-management projects of this type. Our evaluation of site conditions has been based on our understanding of the site and project information and the data obtained in our assessment. The general subsurface conditions utilized in our evaluation are restricted to the four sampling locations. Regardless of the thoroughness of an environmental site assessment, there is always the possibility that conditions between sampling locations will be different from that at specific locations due to the variability of subsurface conditions. Therefore, it was not possible to identify all conceivable occurrences of methane at the ground surface.

This report has been prepared on behalf of and exclusively for the use of the McGill Associates and the Town of Canton. This report and the findings contained herein shall not, in whole or in part, be relied upon by any other party, without BLE's prior written consent.

We appreciate the opportunity to serve as your environmental and geotechnical consultant at this site. If you have any questions, please do not hesitate contacting us at (864) 288-1265.

Sincerely,
BUNNELL-LAMMONS ENGINEERING, INC.

Andrew W. Alexander, P.G.
Senior Hydrogeologist
Registered, North Carolina #1475

For Thomas L. Lammons, P.G.
Principal
Registered, North Carolina #1264

Copy: Mr. William G. Stamey, Town of Canton

Attachments: Tables
Figures

Appendices: A. Soil Gas Data Logs
B. Data Plots

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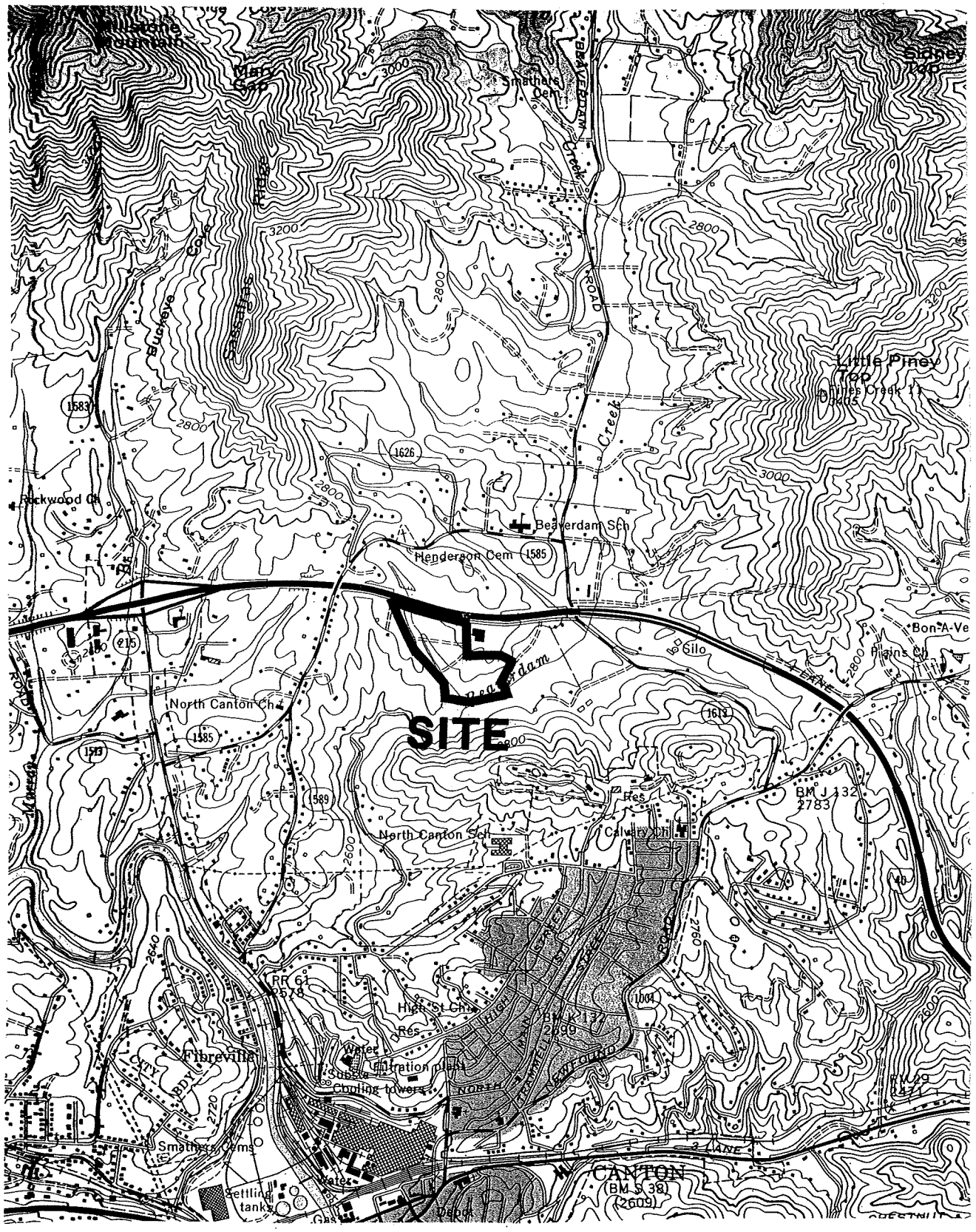
TABLES

Table 1
Soil Gas Sampling Matrix
International Paper Landfill 5B
March 11-16, 2002 and March 18-23, 2002
BLE Project J01-2360-02

Station	Deployed		Retrieved	
	Date	Time	Date	Time
One	March 11, 2002	12:46	March 12, 2002	7:43
One	March 12, 2002	8:04	March 13, 2002	8:41
One*	March 13, 2002	8:48	March 14, 2002	7:30
One	March 14, 2002	7:38	March 15, 2002	7:24
One	March 15, 2002	7:27	March 16, 2002	7:55
Two	March 11, 2002	12:35	March 12, 2002	7:37
Two	March 12, 2002	7:45	March 13, 2002	8:48
Two	March 13, 2002	8:51	March 14, 2002	7:44
Two	March 14, 2002	7:47	March 15, 2002	7:33
Two	March 15, 2002	7:35	March 16, 2002	7:57
Three	March 18, 2002	9:56	March 19, 2002	6:22
Three	March 19, 2002	6:25	March 20, 2002	7:02
Three	March 20, 2002	7:04	March 21, 2002	7:26
Three	March 21, 2002	7:28	March 22, 2002	7:20
Three	March 22, 2002	7:21	March 23, 2002	8:22
Four	March 18, 2002	8:28	March 19, 2002	6:27
Four	March 19, 2002	6:28	March 20, 2002	7:06
Four	March 20, 2002	7:09	March 21, 2002	7:31
Four	March 21, 2002	7:32	March 22, 2002	7:23
Four	March 22, 2002	7:26	March 23, 2002	8:26

Time = Military
* Data not recorded: equipment malfunction
Purge Cycle: 30 seconds (the meter's pump purged air for 30 seconds prior to each sampling event)
Sampling Interval: 30 minutes (a sample was collected every 30 minutes)
Data Recorded: Percent Oxygen, Carbon Dioxide, Methane, and Barometric Pressure
Data collected via Lantec GEM 2000 landfill gas meter

FIGURES

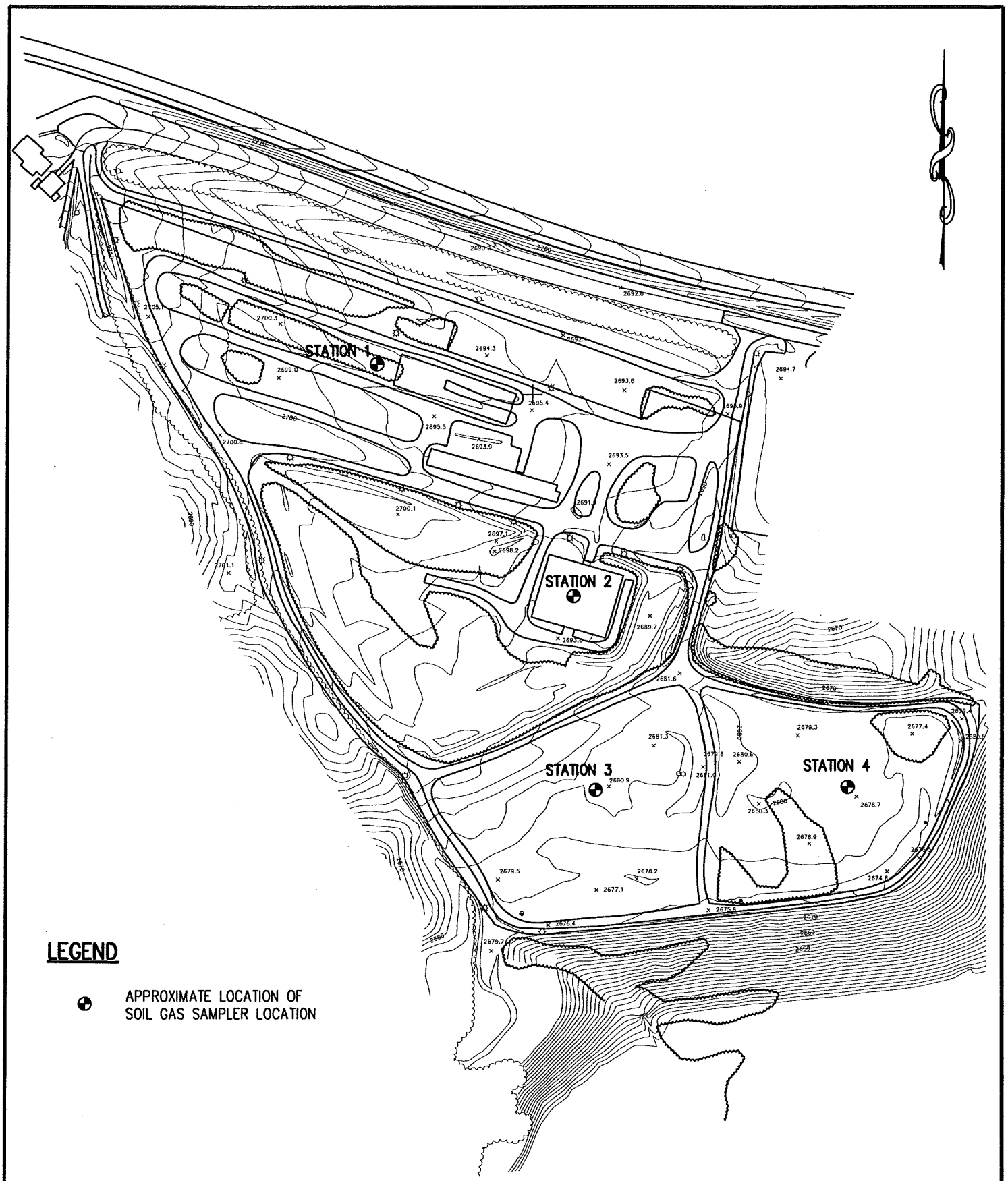


2000 1000 0 2000 4000

APPROXIMATE SCALE IN FEET

REFERENCE:
USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES, CANTON, N.C. QUADRANGLE, PHOTOREVISED 1990.

DRAWN: AEH	DATE: 04-30-02	IBLE INC. BUNNELL-LAMMONS ENGINEERING, INC. 1200 WOODRUFF ROAD, SUITE B-7 GREENVILLE, SOUTH CAROLINA 29607 PHONE: (864)288-1265 FAX: (864)288-4430	SITE LOCATION MAP CHAMPION LANDFILL 5B CANTON, NORTH CAROLINA	FIGURE 1
CHECKED: AWA	CAD: IPLF5B-SLM			
APPROVED:	JOB NO: J02-2360-02			



LEGEND

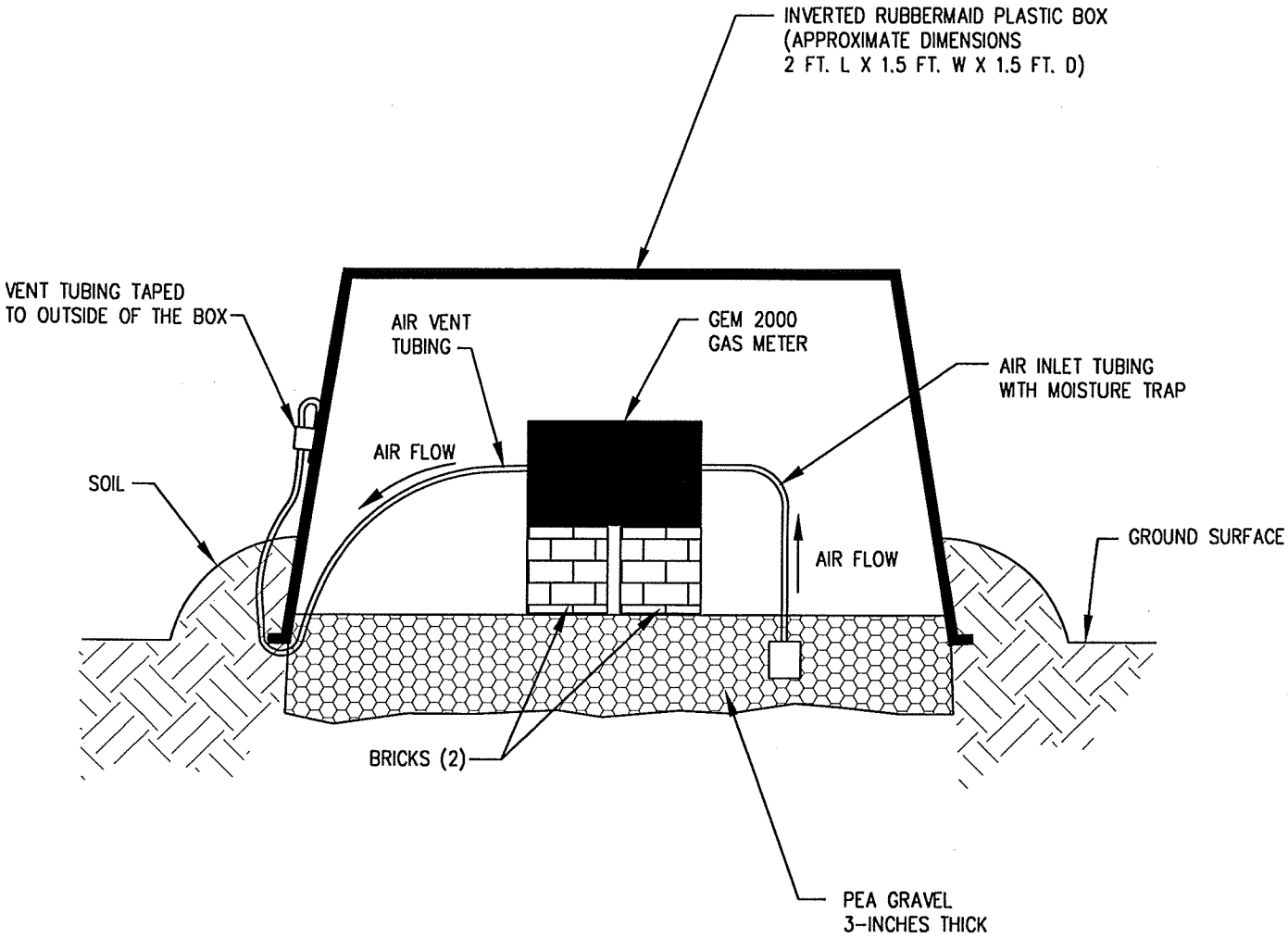
APPROXIMATE LOCATION OF SOIL GAS SAMPLER LOCATION

200 100 0 200 400

APPROXIMATE SCALE IN FEET

REFERENCE:
DRAWING PROVIDED BY McGILL ASSOCIATES OF ASHEVILLE, N.C.

DRAWN: AEH	DATE: 04-30-02	BUNNELL-LAMMONS ENGINEERING, INC. 1200 WOODRUFF ROAD, SUITE B-7 GREENVILLE, SOUTH CAROLINA 29607 PHONE: (864)288-1265 FAX: (864)288-4430	SOIL GAS SAMPLER LOCATION PLAN CHAMPION LANDFILL 5B CANTON, NORTH CAROLINA
CHECKED: AWA	CAD: IPLF5B-SLP		FIGURE 2
APPROVED:	JOB NO: J02-2360-02		



NOTES:

PURGE CYCLE: 30 SECONDS
SAMPLING INTERVAL: 30 MINUTES

NATIVE SOIL WAS MOUNDED AROUND THE OUTSIDE PERIMETER OF THE BOX AFTER EACH DEPLOYMENT.

DRAWING NOT TO SCALE

DRAWN: AEH	DATE: 04-18-02	BLE INC. BUNNELL-LAMMONS ENGINEERING, INC. 1200 WOODRUFF ROAD, SUITE B-7 GREENVILLE, SOUTH CAROLINA 29607 PHONE: (864)288-1265 FAX: (864)288-4430	SOIL GAS SAMPLER SCHEMATIC CHAMPION LANDFILL 5B CANTON, NORTH CAROLINA	FIGURE 3
CHECKED: AWA	CAD: IPLF5B-SGSS			
APPROVED:	JOB NO: J012-2360-02			

APPENDIX A

SOIL GAS DATA LOGS

Station 1 Data
International Paper Landfill 5B
March 11-16, 2002
BLE Project J01-2360-02

Date/Time	% CH4	% CO2	% O2	% O2/100	Baro (in-Hg)
3/11/02 12:46	0	0	21	0.21	27.37
3/11/02 13:16	0	0.1	21.1	0.211	27.35
3/11/02 13:46	0	0.1	20	0.2	27.36
3/11/02 14:17	0	0.1	19.9	0.199	27.34
3/11/02 14:47	0	0.1	20.3	0.203	27.33
3/11/02 15:17	0	0.1	20.7	0.207	27.34
3/11/02 15:47	0	0.1	20.6	0.206	27.33
3/11/02 16:17	0	0.1	20.6	0.206	27.33
3/11/02 16:47	0	0.1	20.6	0.206	27.32
3/11/02 17:17	0	0.1	20.6	0.206	27.31
3/11/02 17:48	0	0.2	21.1	0.211	27.33
3/11/02 18:18	0	0.2	21.5	0.215	27.33
3/11/02 18:48	0	0.3	21.3	0.213	27.31
3/11/02 19:18	0	0.3	20.9	0.209	27.31
3/11/02 19:48	0	0.3	20.5	0.205	27.32
3/11/02 20:18	0	0.3	20.2	0.202	27.34
3/11/02 20:48	0	0.3	19.9	0.199	27.32
3/11/02 21:19	0	0.3	19.8	0.198	27.32
3/11/02 21:49	0	0.4	19.6	0.196	27.31
3/11/02 22:19	0	0.4	19.6	0.196	27.34
3/11/02 22:49	0	0.4	19.5	0.195	27.34
3/11/02 23:19	0	0.4	19.3	0.193	27.3
3/11/02 23:49	0	0.4	19.1	0.191	27.3
3/12/02 0:19	0	0.4	19.2	0.192	27.32
3/12/02 0:50	0	0.4	19	0.19	27.32
3/12/02 1:20	0	0.4	19.1	0.191	27.31
3/12/02 1:50	0	0.4	19.1	0.191	27.28
3/12/02 2:20	0	0.4	19.1	0.191	27.28
3/12/02 2:50	0	0.5	18.9	0.189	27.29
3/12/02 3:20	0	0.5	19	0.19	27.29
3/12/02 3:51	0	0.5	18.9	0.189	27.27
3/12/02 4:21	0	0.5	18.9	0.189	27.24
3/12/02 4:51	0	0.5	18.7	0.187	27.24
3/12/02 5:21	0	0.5	19	0.19	27.23
3/12/02 5:51	0	0.5	18.8	0.188	27.27
3/12/02 6:21	0	0.5	18.9	0.189	27.25
3/12/02 6:51	0	0.5	18.8	0.188	27.28
3/12/02 7:21	0	0.5	18.6	0.186	27.27
3/12/02 7:43	0	0.5	18.5	0.185	27.24
3/12/02 8:04	0	0	20.7	0.207	27.39
3/12/02 8:35	0	0	20.7	0.207	27.43
3/12/02 9:05	0	0	20.6	0.206	27.44
3/12/02 9:35	0	0	20.4	0.204	27.44
3/12/02 10:05	0	0.1	20.3	0.203	27.43
3/12/02 10:35	0	0.1	20.2	0.202	27.44
3/12/02 11:05	0	0.1	20.1	0.201	27.45
3/12/02 11:35	0	0.1	20.1	0.201	27.46
3/12/02 12:06	0	0.1	20.1	0.201	27.45
3/12/02 12:36	0	0.1	20.1	0.201	27.41
3/12/02 13:06	0	0.1	20	0.2	27.4
3/12/02 13:36	0	0.1	20	0.2	27.38
3/12/02 14:06	0	0.1	20	0.2	27.35
3/12/02 14:36	0	0.1	20	0.2	27.37
3/12/02 15:06	0	0.1	20	0.2	27.36
3/12/02 15:37	0	0.1	20	0.2	27.36
3/12/02 16:07	0	0.1	20	0.2	27.35
3/12/02 16:37	0	0.1	20	0.2	27.33
3/12/02 17:07	0.1	0.1	19.9	0.199	27.32
3/12/02 17:37	0	0.1	19.9	0.199	27.33
3/12/02 18:07	0.1	0.1	20	0.2	27.34
3/12/02 18:37	0	0.1	19.9	0.199	27.32
3/12/02 19:08	0.1	0.1	20	0.2	27.33
3/12/02 19:38	0	0.1	19.9	0.199	27.33
3/12/02 20:08	0	0.1	20	0.2	27.31
3/12/02 20:38	0.1	0.1	19.9	0.199	27.32
3/12/02 21:08	0	0.1	20	0.2	27.32
3/12/02 21:38	0	0.1	20	0.2	27.33
3/12/02 22:08	0.1	0.1	19.9	0.199	27.31
3/12/02 22:39	0	0.1	19.9	0.199	27.31
3/12/02 23:09	0	0.1	19.9	0.199	27.29
3/12/02 23:39	0	0.1	20	0.2	27.28
3/13/02 0:09	0	0.1	19.9	0.199	27.27
3/13/02 0:39	0	0.1	19.9	0.199	27.26
3/13/02 1:09	0	0.1	19.9	0.199	27.25
3/13/02 1:39	0	0.1	20	0.2	27.27
3/13/02 2:10	0.1	0.1	19.9	0.199	27.24
3/13/02 2:40	0.1	0.1	19.9	0.199	27.24
3/13/02 3:10	0.1	0.1	19.9	0.199	27.21
3/13/02 3:40	0.1	0.1	19.9	0.199	27.22
3/13/02 4:10	0	0.1	20	0.2	27.19
3/13/02 4:40	0.1	0.1	20	0.2	27.21
3/13/02 5:11	0	0.1	19.9	0.199	27.19
3/13/02 5:41	0.1	0.1	19.9	0.199	27.21
3/13/02 6:11	0.1	0.1	19.9	0.199	27.21
3/13/02 6:41	0.1	0.1	19.9	0.199	27.2
3/13/02 7:11	0.1	0.1	19.9	0.199	27.2
3/13/02 7:41	0.1	0.1	19.9	0.199	27.2
3/13/02 8:11	0	0.1	19.9	0.199	27.2
3/13/02 8:41	0.1	0.1	20	0.2	27.2
3/14/02 7:38	0	0	20.4	0.204	27.3
3/14/02 8:08	0	0	20.8	0.208	27.34
3/14/02 8:39	0	0	20.7	0.207	27.36
3/14/02 9:09	0	0	20.5	0.205	27.38

3/14/02 9:39	0	0	20.4	0.204	27.37
3/14/02 10:09	0	0	20.3	0.203	27.39
3/14/02 10:39	0	0	20.3	0.203	27.37
3/14/02 11:09	0	0	20.3	0.203	27.38
3/14/02 11:40	0	0	20.3	0.203	27.36
3/14/02 12:10	0	0	20.2	0.202	27.38
3/14/02 12:40	0	0	20.2	0.202	27.36
3/14/02 13:10	0	0	20.2	0.202	27.35
3/14/02 13:40	0	0	20.3	0.203	27.31
3/14/02 14:10	0	0	20.2	0.202	27.3
3/14/02 14:40	0	0	20.3	0.203	27.31
3/14/02 15:11	0	0	20.3	0.203	27.29
3/14/02 15:41	0	0	20.3	0.203	27.3
3/14/02 16:11	0	0	20.3	0.203	27.29
3/14/02 16:41	0	0	20.3	0.203	27.29
3/14/02 17:11	0	0	20.4	0.204	27.32
3/14/02 17:41	0	0	20.4	0.204	27.31
3/14/02 18:11	0	0	20.4	0.204	27.34
3/14/02 18:42	0	0	20.4	0.204	27.35
3/14/02 19:12	0	0	20.4	0.204	27.35
3/14/02 19:42	0	0	20.4	0.204	27.35
3/14/02 20:12	0	0	20.2	0.202	27.38
3/14/02 20:42	0	0	20.3	0.203	27.39
3/14/02 21:12	0	0	20.3	0.203	27.38
3/14/02 21:43	0	0	20.3	0.203	27.38
3/14/02 22:13	0	0	20.3	0.203	27.41
3/14/02 22:43	0	0	20.3	0.203	27.42
3/14/02 23:13	0	0	20.2	0.202	27.42
3/14/02 23:43	0	0	20.2	0.202	27.39
3/15/02 0:13	0	0	20.2	0.202	27.41
3/15/02 0:43	0	0	20.2	0.202	27.39
3/15/02 1:14	0	0	20.1	0.201	27.41
3/15/02 1:44	0	0	20.1	0.201	27.41
3/15/02 2:14	0	0	20.1	0.201	27.4
3/15/02 2:44	0	0	20	0.2	27.41
3/15/02 3:14	0	0.1	20.1	0.201	27.39
3/15/02 3:44	0	0	20	0.2	27.39
3/15/02 4:14	0	0.1	20	0.2	27.39
3/15/02 4:45	0	0.1	20	0.2	27.39
3/15/02 5:15	0	0.1	20	0.2	27.39
3/15/02 5:45	0	0.1	20	0.2	27.42
3/15/02 6:15	0	0.1	20	0.2	27.42
3/15/02 6:45	0	0.1	19.9	0.199	27.43
3/15/02 7:15	0	0.1	19.9	0.199	27.43
3/15/02 7:23	0	0.1	20.1	0.201	27.43
3/15/02 7:24	0	0.1	20.1	0.201	27.43
3/15/02 7:27	0	0	20.7	0.207	27.25
3/15/02 7:57	0	0	21	0.21	27.28
3/15/02 8:27	0	0	20.9	0.209	27.27
3/15/02 8:57	0	0	20.6	0.206	27.28
3/15/02 9:27	0	0	20.4	0.204	27.28
3/15/02 9:57	0	0	20.3	0.203	27.3
3/15/02 10:27	0	0	20.2	0.202	27.29
3/15/02 10:58	0	0	20.3	0.203	27.29
3/15/02 11:28	0	0	20.3	0.203	27.27
3/15/02 11:58	0	0	20.2	0.202	27.28
3/15/02 12:28	0	0	20.2	0.202	27.27
3/15/02 12:58	0	0	20.3	0.203	27.25
3/15/02 13:28	0	0	20.4	0.204	27.26
3/15/02 13:58	0	0	20.3	0.203	27.23
3/15/02 14:29	0	0	20.4	0.204	27.22
3/15/02 14:59	0	0	20.4	0.204	27.23
3/15/02 15:29	0	0	20.5	0.205	27.22
3/15/02 15:59	0	0	20.4	0.204	27.22
3/15/02 16:29	0	0	20.4	0.204	27.2
3/15/02 16:59	0	0	20.5	0.205	27.22
3/15/02 17:29	0	0	20.5	0.205	27.23
3/15/02 17:59	0	0	20.5	0.205	27.22
3/15/02 18:30	0	0	20.5	0.205	27.24
3/15/02 19:00	0	0	20.4	0.204	27.25
3/15/02 19:30	0	0	20.4	0.204	27.24
3/15/02 20:00	0	0	20.3	0.203	27.24
3/15/02 20:30	0	0	20.3	0.203	27.26
3/15/02 21:00	0	0	20.3	0.203	27.26
3/15/02 21:30	0	0	20.2	0.202	27.27
3/15/02 22:01	0	0	20.2	0.202	27.27
3/15/02 22:31	0	0	20.1	0.201	27.27
3/15/02 23:01	0	0	20.1	0.201	27.27
3/15/02 23:31	0	0	20.1	0.201	27.26
3/16/02 0:01	0	0	20.1	0.201	27.26
3/16/02 0:31	0	0	20	0.2	27.26
3/16/02 1:02	0	0	19.9	0.199	27.26
3/16/02 1:32	0	0	19.9	0.199	27.27
3/16/02 2:02	0	0	19.9	0.199	27.26
3/16/02 2:32	0	0	20	0.2	27.24
3/16/02 3:02	0	0	20	0.2	27.23
3/16/02 3:32	0	0	20	0.2	27.22
3/16/02 4:02	0	0	19.9	0.199	27.22
3/16/02 4:33	0	0	19.9	0.199	27.22
3/16/02 5:03	0	0	19.9	0.199	27.21
3/16/02 5:33	0	0	19.9	0.199	27.22
3/16/02 6:03	0	0	19.9	0.199	27.22
3/16/02 6:33	0	0	20	0.2	27.23
3/16/02 7:03	0	0	20	0.2	27.23
3/16/02 7:33	0	0	19.9	0.199	27.24
3/16/02 7:55	0	0	19.9	0.199	27.24

Station 2 Data
International Paper Landfill 5B
March 11-16, 2002
BLE Project J01-2360-02

Date/Time	% CH4	% CO2	% O2	% O2/100	Baro (in-Hg)
3/11/02 12:35	0	0	21.1	0.211	27.4
3/11/02 13:05	0	0	21.2	0.212	27.4
3/11/02 13:35	0	0	21.2	0.212	27.37
3/11/02 14:06	0	0	21	0.21	27.36
3/11/02 14:36	0	0	20.8	0.208	27.35
3/11/02 15:06	0	0	20.7	0.207	27.36
3/11/02 15:36	0	0	20.6	0.206	27.34
3/11/02 16:06	0	0	20.5	0.205	27.35
3/11/02 16:36	0	0	20.4	0.204	27.33
3/11/02 17:06	0	0	20.3	0.203	27.33
3/11/02 17:37	0	0	20.2	0.202	27.34
3/11/02 18:07	0	0	20.1	0.201	27.35
3/11/02 18:37	0	0	20	0.2	27.36
3/11/02 19:07	0	0	20	0.2	27.36
3/11/02 19:37	0	0	19.9	0.199	27.37
3/11/02 20:07	0	0	19.8	0.198	27.38
3/11/02 20:38	0	0	19.7	0.197	27.38
3/11/02 21:08	0	0	19.7	0.197	27.39
3/11/02 21:38	0	0	19.6	0.196	27.39
3/11/02 22:08	0	0	19.6	0.196	27.38
3/11/02 22:38	0	0	19.5	0.195	27.37
3/11/02 23:08	0	0	19.4	0.194	27.38
3/11/02 23:38	0	0	19.4	0.194	27.35
3/12/02 0:09	0	0	19.3	0.193	27.35
3/12/02 0:39	0	0	19.3	0.193	27.36
3/12/02 1:09	0	0	19.3	0.193	27.35
3/12/02 1:39	0	0	19.3	0.193	27.36
3/12/02 2:09	0	0	19.2	0.192	27.33
3/12/02 2:39	0	0	19.3	0.193	27.35
3/12/02 3:09	0	0	19.3	0.193	27.32
3/12/02 3:40	0	0	19.2	0.192	27.31
3/12/02 4:10	0	0	19.2	0.192	27.31
3/12/02 4:40	0	0	19.2	0.192	27.31
3/12/02 5:10	0	0	19.2	0.192	27.3
3/12/02 5:40	0	0	19.1	0.191	27.31
3/12/02 6:10	0	0	19.1	0.191	27.31
3/12/02 6:40	0	0	19.1	0.191	27.31
3/12/02 7:11	0	0	19.1	0.191	27.31
3/12/02 7:37	0	0	19	0.19	27.3
3/12/02 7:45	0	0	20.5	0.205	27.27
3/12/02 8:15	0	0.1	20.8	0.208	27.28
3/12/02 8:45	0	0.2	20.5	0.205	27.27
3/12/02 9:15	0	0.2	20.3	0.203	27.26
3/12/02 9:45	0	0.2	20.1	0.201	27.25
3/12/02 10:16	0	0.3	20.1	0.201	27.25
3/12/02 10:46	0	0.3	20.1	0.201	27.26
3/12/02 11:16	0	0.3	20.1	0.201	27.24
3/12/02 11:46	0	0.3	20.1	0.201	27.24
3/12/02 12:16	0	0.4	20	0.2	27.23
3/12/02 12:46	0	0.4	20	0.2	27.2
3/12/02 13:16	0	0.4	20.2	0.202	27.18
3/12/02 13:47	0	0.3	20.3	0.203	27.15
3/12/02 14:17	0	0.2	20.5	0.205	27.14
3/12/02 14:47	0	0.2	20.6	0.206	27.15
3/12/02 15:17	0	0.3	20.4	0.204	27.15
3/12/02 15:47	0	0.3	20.3	0.203	27.15
3/12/02 16:17	0	0.3	20.2	0.202	27.14
3/12/02 16:47	0	0.3	20	0.2	27.13
3/12/02 17:18	0	0.4	20	0.2	27.13
~~3/12/02 17:48~~	~~0~~	~~0.4~~	~~19.9~~	~~0.199~~	~~27.13~~
3/12/02 18:18	0	0.4	19.8	0.198	27.12
3/12/02 18:48	0	0.4	19.7	0.197	27.14
3/12/02 19:18	0	0.4	19.7	0.197	27.13
3/12/02 19:48	0	0.5	19.5	0.195	27.12
3/12/02 20:18	0	0.5	19.3	0.193	27.13
3/12/02 20:49	0	0.5	19.3	0.193	27.13
3/12/02 21:19	0	0.5	19.2	0.192	27.13
3/12/02 21:49	0	0.5	19.2	0.192	27.12
3/12/02 22:19	0	0.5	19.2	0.192	27.11
3/12/02 22:49	0	0.5	19.2	0.192	27.1
3/12/02 23:19	0	0.4	19.2	0.192	27.1
3/12/02 23:49	0	0.4	19.2	0.192	27.09
3/13/02 0:20	0	0.4	19.3	0.193	27.08
3/13/02 0:50	0	0.4	19.3	0.193	27.07
3/13/02 1:20	0	0.4	19.2	0.192	27.06
3/13/02 1:50	0	0.4	19.3	0.193	27.06
3/13/02 2:20	0	0.4	19.2	0.192	27.04

3/13/02 2:50	0	0.4	19.3	0.193	27.03
3/13/02 3:20	0	0.4	19.2	0.192	27.01
3/13/02 3:51	0	0.5	19.1	0.191	27.01
3/13/02 4:21	0	0.5	19.1	0.191	27
3/13/02 4:51	0	0.5	19.1	0.191	27.01
3/13/02 5:21	0	0.5	19.1	0.191	27.01
3/13/02 5:51	0	0.5	19.1	0.191	27.01
3/13/02 6:21	0	0.5	19	0.19	27
3/13/02 6:52	0	0.6	19	0.19	26.99
3/13/02 7:22	0	0.6	19	0.19	26.99
3/13/02 7:52	0	0.6	19	0.19	27
3/13/02 8:22	0	0.6	19.1	0.191	27.02
3/13/02 8:48	0	0.5	19.1	0.191	27.02
3/13/02 8:51	0	0	20.5	0.205	27.04
3/13/02 9:22	0	0	20.8	0.208	27.05
3/13/02 9:52	0	0.1	20.8	0.208	27.06
3/13/02 10:22	0	0.1	20.5	0.205	27.04
3/13/02 10:52	0	0.2	20.5	0.205	27.06
3/13/02 11:22	0	0.2	20.4	0.204	27.03
3/13/02 11:52	0	0.2	20.4	0.204	27.03
3/13/02 12:22	0	0.2	20.6	0.206	27.04
3/13/02 12:53	0	0.2	20.6	0.206	27.04
3/13/02 13:23	0	0.2	20.7	0.207	27.05
3/13/02 13:53	0	0.2	20.6	0.206	27.05
3/13/02 14:23	0	0.2	20.6	0.206	27.03
3/13/02 14:53	0	0.2	20.6	0.206	27.04
3/13/02 15:23	0	0.1	20.5	0.205	27.05
3/13/02 15:53	0	0.1	20.8	0.208	27.04
3/13/02 16:24	0	0.1	20.8	0.208	27.05
3/13/02 16:54	0	0.1	21	0.21	27.05
3/13/02 17:24	0	0.1	20.8	0.208	27.07
3/13/02 17:54	0	0.2	20.7	0.207	27.08
3/13/02 18:24	0	0.3	20.6	0.206	27.1
3/13/02 18:54	0	0.3	20.4	0.204	27.12
3/13/02 19:24	0	0.3	20.3	0.203	27.12
3/13/02 19:55	0	0.4	20.1	0.201	27.14
3/13/02 20:25	0	0.4	19.9	0.199	27.16
3/13/02 20:55	0	0.4	19.8	0.198	27.16
3/13/02 21:25	0	0.5	19.7	0.197	27.16
3/13/02 21:55	0	0.5	19.5	0.195	27.16
3/13/02 22:25	0	0.5	19.4	0.194	27.17
3/13/02 22:55	0	0.6	19.3	0.193	27.17
3/13/02 23:26	0	0.6	19.1	0.191	27.18
3/13/02 23:56	0	0.6	18.9	0.189	27.19
3/14/02 0:26	0	0.6	18.8	0.188	27.19
3/14/02 0:56	0	0.6	18.7	0.187	27.21
3/14/02 1:26	0	0.7	18.6	0.186	27.21
3/14/02 1:56	0	0.7	18.7	0.187	27.2
3/14/02 2:26	0	0.7	18.7	0.187	27.2
3/14/02 2:57	0	0.7	18.7	0.187	27.19
3/14/02 3:27	0	0.7	18.7	0.187	27.2
3/14/02 3:57	0	0.7	18.6	0.186	27.19
3/14/02 4:27	0	0.7	18.7	0.187	27.19
3/14/02 4:57	0	0.7	18.7	0.187	27.2
3/14/02 5:27	0	0.7	18.7	0.187	27.22
3/14/02 5:57	0	0.7	18.7	0.187	27.22
3/14/02 6:27	0	0.7	18.7	0.187	27.22
3/14/02 6:58	0	0.7	18.7	0.187	27.23
3/14/02 7:28	0	0.7	18.7	0.187	27.24
3/14/02 7:44	0	0.7	18.7	0.187	27.24
3/14/02 7:47	0	0	19.4	0.194	27.2
3/14/02 8:17	0	0.1	19.5	0.195	27.19
3/14/02 8:47	0	0.2	19.6	0.196	27.21
3/14/02 9:17	0	0.2	19.7	0.197	27.21
3/14/02 9:48	0	0.2	20.1	0.201	27.21
3/14/02 10:18	0	0.2	20.5	0.205	27.2
3/14/02 10:48	0	0.2	21.2	0.212	27.19
3/14/02 11:18	0	0.2	20.8	0.208	27.19
3/14/02 11:48	0	0.1	20.2	0.202	27.2
3/14/02 12:18	0	0.1	20.9	0.209	27.21
3/14/02 12:48	0	0.1	21.1	0.211	27.22
3/14/02 13:19	0	0.1	21.1	0.211	27.21
3/14/02 13:49	0.1	0.1	21.1	0.211	27.2
3/14/02 14:19	0	0.1	21	0.21	27.18
3/14/02 14:49	0	0.1	21	0.21	27.2
3/14/02 15:19	0	0.1	21	0.21	27.18
3/14/02 15:49	0	0.1	21	0.21	27.17
3/14/02 16:19	0	0.1	20.8	0.208	27.18
3/14/02 16:50	0	0.1	20.6	0.206	27.18
3/14/02 17:20	0	0.1	20.5	0.205	27.19
3/14/02 17:50	0	0.2	20.3	0.203	27.2
3/14/02 18:20	0	0.2	21.3	0.213	27.18
3/14/02 18:50	0	0.2	21.5	0.215	27.2

3/14/02 19:20	0	0.3	21.2	0.212	27.19
3/14/02 19:50	0	0.3	21	0.21	27.2
3/14/02 20:21	0	0.4	20.8	0.208	27.18
3/14/02 20:51	0	0.4	20.6	0.206	27.19
3/14/02 21:21	0	0.4	20.3	0.203	27.21
3/14/02 21:51	0	0.5	20.1	0.201	27.21
3/14/02 22:21	0	0.5	19.9	0.199	27.19
3/14/02 22:51	0	0.5	19.8	0.198	27.22
3/14/02 23:21	0	0.5	19.7	0.197	27.19
3/14/02 23:52	0	0.5	19.5	0.195	27.18
3/15/02 0:22	0	0.6	19.5	0.195	27.2
3/15/02 0:52	0	0.6	19.3	0.193	27.2
3/15/02 1:22	0	0.6	19.2	0.192	27.18
3/15/02 1:52	0	0.6	19.2	0.192	27.2
3/15/02 2:22	0	0.6	19	0.19	27.2
3/15/02 2:52	0	0.6	19	0.19	27.2
3/15/02 3:23	0	0.6	19	0.19	27.19
3/15/02 3:53	0	0.6	18.8	0.188	27.19
3/15/02 4:23	0	0.6	18.9	0.189	27.16
3/15/02 4:53	0	0.6	18.7	0.187	27.2
3/15/02 5:23	0	0.6	18.7	0.187	27.17
3/15/02 5:53	0	0.6	18.5	0.185	27.21
3/15/02 6:23	0	0.6	18.6	0.186	27.21
3/15/02 6:54	0	0.6	18.6	0.186	27.21
3/15/02 7:24	0	0.6	18.5	0.185	27.22
3/15/02 7:33	0	0.6	18.4	0.184	27.2
3/15/02 7:35	0	0	20.5	0.205	27.23
3/15/02 8:05	0	0.1	20.4	0.204	27.25
3/15/02 8:35	0	0.1	20.1	0.201	27.24
3/15/02 9:05	0	0.1	19.9	0.199	27.24
3/15/02 9:35	0	0.1	19.8	0.198	27.24
3/15/02 10:06	0	0.1	19.8	0.198	27.25
3/15/02 10:36	0	0.1	20	0.2	27.26
3/15/02 11:06	0	0.1	20.1	0.201	27.26
3/15/02 11:36	0	0.1	20.3	0.203	27.27
3/15/02 12:06	0	0.1	20.8	0.208	27.28
3/15/02 12:36	0	0.1	21.1	0.211	27.29
3/15/02 13:06	0	0.1	21.4	0.214	27.29
3/15/02 13:37	0	0.1	21.4	0.214	27.26
3/15/02 14:07	0	0.1	21.3	0.213	27.26
3/15/02 14:37	0	0.1	21.5	0.215	27.24
3/15/02 15:07	0	0.1	21.6	0.216	27.25
3/15/02 15:37	0	0	21.8	0.218	27.23
3/15/02 16:07	0	0.1	21.7	0.217	27.24
3/15/02 16:37	0	0.1	21.7	0.217	27.23
3/15/02 17:08	0	0.1	21.6	0.216	27.2
3/15/02 17:38	0	0.1	21.3	0.213	27.2
3/15/02 18:08	0	0.1	21.2	0.212	27.2
3/15/02 18:38	0	0.2	21.2	0.212	27.22
3/15/02 19:08	0	0.3	21.1	0.211	27.21
3/15/02 19:38	0	0.3	21	0.21	27.2
3/15/02 20:08	0	0.3	20.9	0.209	27.22
3/15/02 20:39	0	0.3	20.7	0.207	27.23
3/15/02 21:09	0	0.3	20.6	0.206	27.23
3/15/02 21:39	0	0.4	20.5	0.205	27.24
3/15/02 22:09	0	0.4	20.4	0.204	27.25
3/15/02 22:39	0	0.4	20.3	0.203	27.24
3/15/02 23:09	0	0.5	20.1	0.201	27.24
3/15/02 23:39	0	0.5	20.1	0.201	27.23
3/16/02 0:10	0	0.5	20	0.2	27.23
3/16/02 0:40	0	0.5	19.9	0.199	27.23
3/16/02 1:10	0	0.5	19.9	0.199	27.23
3/16/02 1:40	0	0.5	19.9	0.199	27.23
3/16/02 2:10	0	0.5	19.9	0.199	27.22
3/16/02 2:40	0	0.5	19.8	0.198	27.21
3/16/02 3:10	0	0.5	19.8	0.198	27.2
3/16/02 3:41	0	0.5	19.8	0.198	27.2
3/16/02 4:11	0	0.5	19.9	0.199	27.19
3/16/02 4:41	0	0.4	19.9	0.199	27.18
3/16/02 5:11	0	0.4	19.9	0.199	27.18
3/16/02 5:41	0	0.4	19.9	0.199	27.19
3/16/02 6:11	0	0.4	19.9	0.199	27.2
3/16/02 6:41	0	0.4	19.9	0.199	27.21
3/16/02 7:12	0	0.4	19.9	0.199	27.2
3/16/02 7:42	0	0.4	19.9	0.199	27.2
3/16/02 7:57	0	0.4	19.9	0.199	27.21

Station 3 Data
International Paper Landfill 5B
March 18-23, 2002
BLE Project J01-2360-02

Date/Time	% CH4	% CO2	% O2	% O2/100	Baro (in-Hg)
3/18/02 9:56	0	0	20.1	0.201	27.45
3/18/02 10:26	0	0	20.3	0.203	27.47
3/18/02 10:56	0	0	20.1	0.201	27.45
3/18/02 11:26	0	0	20.3	0.203	27.45
3/18/02 11:56	0	0	20.3	0.203	27.44
3/18/02 12:26	0	0	20.2	0.202	27.45
3/18/02 12:57	0	0	20.4	0.204	27.45
3/18/02 13:27	0	0	20.3	0.203	27.43
3/18/02 13:57	0	0	20	0.2	27.4
3/18/02 14:27	0	0	19.8	0.198	27.4
3/18/02 14:57	0	0	18.7	0.187	27.38
3/18/02 15:27	0	0	18.6	0.186	27.37
3/18/02 15:57	0	0	19.1	0.191	27.39
3/18/02 16:28	0	0	20.1	0.201	27.39
3/18/02 16:58	0	0	20.4	0.204	27.4
3/18/02 17:28	0	0	20.6	0.206	27.41
3/18/02 17:58	0	0	20.5	0.205	27.42
3/18/02 18:28	0	0	20.6	0.206	27.46
3/18/02 18:58	0	0	20.6	0.206	27.46
3/18/02 19:28	0	0	20.5	0.205	27.48
3/18/02 19:59	0	0	20.5	0.205	27.49
3/18/02 20:29	0	0	20.4	0.204	27.51
3/18/02 20:59	0	0	20.4	0.204	27.54
3/18/02 21:29	0	0	20.4	0.204	27.55
3/18/02 21:59	0	0	20.3	0.203	27.54
3/18/02 22:29	0	0	20.3	0.203	27.53
3/18/02 22:59	0	0	20.3	0.203	27.53
3/18/02 23:30	0	0	20.2	0.202	27.54
3/19/02 0:00	0	0.1	20.1	0.201	27.53
3/19/02 0:30	0	0	20.2	0.202	27.55
3/19/02 1:00	0	0	20.2	0.202	27.54
3/19/02 1:30	0	0	20.1	0.201	27.54
3/19/02 2:00	0	0	20.2	0.202	27.52
3/19/02 2:30	0	0	20.1	0.201	27.54
3/19/02 3:01	0	0	20.1	0.201	27.52
3/19/02 3:31	0	0	20.1	0.201	27.54
3/19/02 4:01	0	0	20.1	0.201	27.54
3/19/02 4:31	0	0	20.1	0.201	27.52
3/19/02 5:01	0	0	20	0.2	27.53
3/19/02 5:31	0	0	20.1	0.201	27.53
3/19/02 6:01	0	0	20.1	0.201	27.54
3/19/02 6:22	0	0	20.2	0.202	27.55
3/19/02 6:25	0	0	20.2	0.202	27.4
3/19/02 6:55	0	0	20.3	0.203	27.41
3/19/02 7:25	0	0	20.3	0.203	27.42
3/19/02 7:55	0	0	20.2	0.202	27.44
3/19/02 8:25	0	0	20.2	0.202	27.43
3/19/02 8:55	0	0	20.2	0.202	27.41
3/19/02 9:25	0	0	20.2	0.202	27.41
3/19/02 9:56	0	0	20.4	0.204	27.38
3/19/02 10:26	0	0	20.5	0.205	27.37
3/19/02 10:56	0	0	20.8	0.208	27.34
3/19/02 11:26	0	0	21.2	0.212	27.36
3/19/02 11:56	0	0	21.4	0.214	27.37
3/19/02 12:26	0	0	21.2	0.212	27.36
3/19/02 12:56	0	0	21.1	0.211	27.35
3/19/02 13:27	0	0	21.1	0.211	27.33
3/19/02 13:57	0	0	21	0.21	27.28
3/19/02 14:27	0	0	20.8	0.208	27.29
3/19/02 14:57	0	0	20.7	0.207	27.28
3/19/02 15:27	0	0	20.9	0.209	27.26
3/19/02 15:57	0	0	21.1	0.211	27.29
3/19/02 16:27	0	0	21.2	0.212	27.3
3/19/02 16:58	0	0	21.3	0.213	27.31
3/19/02 17:28	0	0	21.7	0.217	27.29
3/19/02 17:58	0	0	21.6	0.216	27.33
3/19/02 18:28	0	0	21.5	0.215	27.32
3/19/02 18:58	0	0	21.4	0.214	27.32
3/19/02 19:28	0	0	21.1	0.211	27.34
3/19/02 19:58	0	0	20.8	0.208	27.35
3/19/02 20:29	0	0	20.7	0.207	27.36
3/19/02 20:59	0	0	20.5	0.205	27.35
3/19/02 21:29	0	0	20.4	0.204	27.35
3/19/02 21:59	0	0	20.3	0.203	27.35
3/19/02 22:29	0	0	20.2	0.202	27.34
3/19/02 22:59	0	0	20.1	0.201	27.34
3/19/02 23:29	0	0	20	0.2	27.33

3/19/02 23:59	0	0	19.9	0.199	27.33
3/20/02 0:30	0	0	19.9	0.199	27.32
3/20/02 1:00	0	0	19.9	0.199	27.32
3/20/02 1:30	0	0	19.9	0.199	27.3
3/20/02 2:00	0	0	19.8	0.198	27.27
3/20/02 2:30	0	0	19.8	0.198	27.26
3/20/02 3:00	0	0	19.8	0.198	27.26
3/20/02 3:31	0	0	19.7	0.197	27.24
3/20/02 4:01	0	0	19.7	0.197	27.23
3/20/02 4:31	0	0	19.7	0.197	27.22
3/20/02 5:01	0	0	19.7	0.197	27.23
3/20/02 5:31	0	0	19.7	0.197	27.24
3/20/02 6:01	0	0	19.7	0.197	27.25
3/20/02 6:31	0	0	19.7	0.197	27.24
3/20/02 7:02	0	0	19.6	0.196	27.24
3/20/02 7:04	0	0	20.1	0.201	27.38
3/20/02 7:34	0	0	20.1	0.201	27.39
3/20/02 8:04	0	0	20.1	0.201	27.36
3/20/02 8:34	0	0	20	0.2	27.38
3/20/02 9:04	0	0	20	0.2	27.36
3/20/02 9:34	0	0	20	0.2	27.32
3/20/02 10:05	0	0	19.9	0.199	27.27
3/20/02 10:35	0	0	19.7	0.197	27.23
3/20/02 11:05	0	0	20	0.2	27.21
3/20/02 11:35	0	0	20.1	0.201	27.2
3/20/02 12:05	0	0	20	0.2	27.19
3/20/02 12:35	0	0	20.2	0.202	27.19
3/20/02 13:05	0	0	20.4	0.204	27.22
3/20/02 13:36	0	0	20.4	0.204	27.23
3/20/02 14:06	0	0	20.4	0.204	27.21
3/20/02 14:36	0	0	20.5	0.205	27.22
3/20/02 15:06	0	0	20.5	0.205	27.25
3/20/02 15:36	0	0	20.5	0.205	27.26
3/20/02 16:06	0	0	20.4	0.204	27.23
3/20/02 16:36	0	0	20.4	0.204	27.28
3/20/02 17:06	0	0	20.5	0.205	27.29
3/20/02 17:37	0	0	20.4	0.204	27.27
3/20/02 18:07	0	0	20.5	0.205	27.29
3/20/02 18:37	0	0	20.4	0.204	27.32
3/20/02 19:07	0	0	20.3	0.203	27.32
3/20/02 19:37	0	0	20.3	0.203	27.32
3/20/02 20:07	0	0	20.3	0.203	27.36
3/20/02 20:38	0	0	20.3	0.203	27.36
3/20/02 21:08	0	0	20.2	0.202	27.38
3/20/02 21:38	0	0	20.1	0.201	27.38
3/20/02 22:08	0	0	20.2	0.202	27.39
3/20/02 22:38	0	0	20.1	0.201	27.35
3/20/02 23:08	0	0	20.1	0.201	27.37
3/20/02 23:38	0	0	20.1	0.201	27.37
3/21/02 0:09	0	0.1	20.2	0.202	27.38
3/21/02 0:39	0	0	20.1	0.201	27.4
3/21/02 1:09	0	0	20.1	0.201	27.39
3/21/02 1:39	0	0	20.1	0.201	27.34
3/21/02 2:09	0	0.1	20	0.2	27.35
3/21/02 2:39	0	0	20	0.2	27.36
3/21/02 3:09	0	0	20	0.2	27.34
3/21/02 3:40	0	0	20	0.2	27.36
3/21/02 4:10	0	0	20	0.2	27.36
3/21/02 4:40	0	0.1	20	0.2	27.33
3/21/02 5:10	0	0.1	19.9	0.199	27.36
3/21/02 5:40	0	0.1	20	0.2	27.35
3/21/02 6:10	0	0.1	20	0.2	27.36
3/21/02 6:41	0	0	20	0.2	27.37
3/21/02 7:11	0	0.1	20	0.2	27.37
3/21/02 7:26	0	0	20.1	0.201	27.39
3/21/02 7:28	0	0	19.9	0.199	27.24
3/21/02 7:58	0	0	19.9	0.199	27.23
3/21/02 8:28	0	0	20	0.2	27.24
3/21/02 8:58	0	0	20.1	0.201	27.26
3/21/02 9:28	0	0	20.1	0.201	27.26
3/21/02 9:58	0	0	20.1	0.201	27.26
3/21/02 10:29	0	0	20.2	0.202	27.23
3/21/02 10:59	0	0	20.6	0.206	27.24
3/21/02 11:29	0	0	20.7	0.207	27.2
3/21/02 11:59	0	0	20.8	0.208	27.23
3/21/02 12:29	0	0	20.6	0.206	27.2
3/21/02 12:59	0	0	21.1	0.211	27.2
3/21/02 13:29	0.1	0	21.2	0.212	27.22
3/21/02 14:00	0	0	21.5	0.215	27.22
3/21/02 14:30	0	0	21.6	0.216	27.22
3/21/02 15:00	0	0	22	0.22	27.21
3/21/02 15:30	0.1	0	22	0.22	27.2
3/21/02 16:00	0.1	0	22	0.22	27.21

3/21/02 16:30	0	0	21.9	0.219	27.18
3/21/02 17:00	0	0	21.9	0.219	27.19
3/21/02 17:30	0	0	22	0.22	27.2
3/21/02 18:01	0	0	22.1	0.221	27.2
3/21/02 18:31	0	0	22	0.22	27.2
3/21/02 19:01	0	0	21.8	0.218	27.2
3/21/02 19:31	0	0	21.4	0.214	27.2
3/21/02 20:01	0	0	21	0.21	27.18
3/21/02 20:31	0	0	20.8	0.208	27.2
3/21/02 21:01	0	0	20.5	0.205	27.19
3/21/02 21:32	0	0	20.3	0.203	27.2
3/21/02 22:02	0	0	20.1	0.201	27.22
3/21/02 22:32	0	0	19.9	0.199	27.25
3/21/02 23:02	0	0	19.8	0.198	27.26
3/21/02 23:32	0	0	19.6	0.196	27.26
3/22/02 0:02	0	0	19.5	0.195	27.26
3/22/02 0:33	0	0	19.3	0.193	27.27
3/22/02 1:03	0	0	19.1	0.191	27.29
3/22/02 1:33	0	0	19	0.19	27.29
3/22/02 2:03	0	0	18.8	0.188	27.31
3/22/02 2:33	0	0	18.6	0.186	27.32
3/22/02 3:03	0	0	18.5	0.185	27.34
3/22/02 3:33	0	0.1	18.3	0.183	27.35
3/22/02 4:03	0	0.1	18.1	0.181	27.36
3/22/02 4:34	0	0.1	18	0.18	27.37
3/22/02 5:04	0	0.1	17.8	0.178	27.38
3/22/02 5:34	0	0.1	17.6	0.176	27.39
3/22/02 6:04	0	0.1	17.4	0.174	27.4
3/22/02 6:34	0	0.1	17.4	0.174	27.42
3/22/02 7:04	0	0.1	17.2	0.172	27.43
3/22/02 7:20	0	0.1	17.1	0.171	27.44
3/22/02 7:21	0	0	20.3	0.203	27.45
3/22/02 7:51	0	0	21	0.21	27.49
3/22/02 8:22	0	0	20.8	0.208	27.5
3/22/02 8:52	0	0	20.6	0.206	27.51
3/22/02 9:22	0	0	20.2	0.202	27.48
3/22/02 9:52	0	0	20.1	0.201	27.47
3/22/02 10:22	0	0	20.2	0.202	27.46
3/22/02 10:52	0	0	20.2	0.202	27.45
3/22/02 11:22	0	0	20.4	0.204	27.45
3/22/02 11:53	0	0	20	0.2	27.42
3/22/02 12:23	0	0	18.9	0.189	27.42
3/22/02 12:53	0	0	18.7	0.187	27.39
3/22/02 13:23	0	0	18.8	0.188	27.37
3/22/02 13:53	0	0	18.8	0.188	27.35
3/22/02 14:23	0	0	19	0.19	27.34
3/22/02 14:53	0	0	19.2	0.192	27.35
3/22/02 15:24	0	0	19.2	0.192	27.35
3/22/02 15:54	0	0	19.3	0.193	27.36
3/22/02 16:24	0	0	19.4	0.194	27.35
3/22/02 16:54	0	0	19.6	0.196	27.36
3/22/02 17:24	0	0	20.7	0.207	27.37
3/22/02 17:54	0	0	21.7	0.217	27.41
3/22/02 18:24	0	0	21.5	0.215	27.45
3/22/02 18:54	0	0	21.3	0.213	27.47
3/22/02 19:25	0	0	20.9	0.209	27.52
3/22/02 19:55	0	0	20.6	0.206	27.56
3/22/02 20:25	0	0	20.4	0.204	27.58
3/22/02 20:55	0	0.1	20.1	0.201	27.61
3/22/02 21:25	0	0.1	19.9	0.199	27.62
3/22/02 21:55	0	0.1	19.7	0.197	27.62
3/22/02 22:25	0	0.1	19.6	0.196	27.63
3/22/02 22:56	0	0.1	19.5	0.195	27.64
3/22/02 23:26	0	0.1	19.3	0.193	27.66
3/22/02 23:56	0	0.1	19.2	0.192	27.65
3/23/02 0:26	0	0.1	19.1	0.191	27.65
3/23/02 0:56	0	0.1	19	0.19	27.65
3/23/02 1:26	0	0.1	18.9	0.189	27.66
3/23/02 1:57	0	0.1	18.8	0.188	27.66
3/23/02 2:27	0	0.2	18.7	0.187	27.67
3/23/02 2:57	0	0.2	18.6	0.186	27.68
3/23/02 3:27	0	0.2	18.6	0.186	27.67
3/23/02 3:57	0	0.2	18.6	0.186	27.68
3/23/02 4:27	0	0.2	18.4	0.184	27.67
3/23/02 4:57	0	0.2	18.4	0.184	27.69
3/23/02 5:28	0	0.2	18.4	0.184	27.7
3/23/02 5:58	0	0.2	18.4	0.184	27.7
3/23/02 6:28	0	0.2	18.3	0.183	27.72
3/23/02 6:58	0	0.2	18.2	0.182	27.71
3/23/02 7:28	0	0.2	18.2	0.182	27.73
3/23/02 7:58	0	0.1	18.3	0.183	27.71
3/23/02 8:22	0	0.1	18.6	0.186	27.66

Station 4 Data
International Paper Landfill 5B
March 18-23, 2002
BLE Project J01-2360-02

Date/Time	% CH4	% CO2	% O2	% O2/100	Baro (in-Hg)
3/18/02 8:28	0	0	20.9	0.209	27.36
3/18/02 8:30	0	0	21	0.21	27.37
3/18/02 9:00	0	0	21.2	0.212	27.36
3/18/02 9:30	0	0	21.1	0.211	27.38
3/18/02 10:00	0	0	20.9	0.209	27.36
3/18/02 10:30	0	0	20.9	0.209	27.36
3/18/02 11:01	0	0	21.2	0.212	27.38
3/18/02 11:31	0	0	21.1	0.211	27.39
3/18/02 12:01	0	0	21.3	0.213	27.36
3/18/02 12:31	0	0	21.3	0.213	27.38
3/18/02 13:01	0	0	21.3	0.213	27.37
3/18/02 13:31	0	0	21.3	0.213	27.37
3/18/02 14:01	0	0	21.3	0.213	27.34
3/18/02 14:31	0	0	21.5	0.215	27.33
3/18/02 15:02	0	0	21.1	0.211	27.34
3/18/02 15:32	0	0	21.1	0.211	27.35
3/18/02 16:02	0	0	21.4	0.214	27.35
3/18/02 16:32	0	0	21.5	0.215	27.34
3/18/02 17:02	0	0	21.4	0.214	27.36
3/18/02 17:32	0	0	21.2	0.212	27.34
3/18/02 18:02	0	0	21.1	0.211	27.35
3/18/02 18:33	0	0	21	0.21	27.35
3/18/02 19:03	0	0	21	0.21	27.38
3/18/02 19:33	0	0	20.7	0.207	27.38
3/18/02 20:03	0	0	20.7	0.207	27.39
3/18/02 20:33	0	0	20.4	0.204	27.39
3/18/02 21:03	0	0	20.4	0.204	27.38
3/18/02 21:33	0	0	20.2	0.202	27.38
3/18/02 22:04	0	0	20.1	0.201	27.38
3/18/02 22:34	0	0	20.2	0.202	27.39
3/18/02 23:04	0	0	20.1	0.201	27.36
3/18/02 23:34	0	0	20	0.2	27.36
3/19/02 0:04	0	0	19.9	0.199	27.36
3/19/02 0:34	0	0	20	0.2	27.35
3/19/02 1:04	0	0	19.9	0.199	27.37
3/19/02 1:35	0	0	19.9	0.199	27.34
3/19/02 2:05	0	0	19.8	0.198	27.34
3/19/02 2:35	0	0	19.7	0.197	27.36
3/19/02 3:05	0	0	19.7	0.197	27.33
3/19/02 3:35	0	0	19.7	0.197	27.33
3/19/02 4:05	0	0	19.7	0.197	27.35
3/19/02 4:35	0	0	19.8	0.198	27.33
3/19/02 5:05	0	0	19.6	0.196	27.36
3/19/02 5:36	0	0	19.8	0.198	27.34
3/19/02 6:06	0	0	19.6	0.196	27.35
3/19/02 6:27	0	0	19.6	0.196	27.36
3/19/02 6:28	0	0	20.3	0.203	27.39
3/19/02 6:58	0	0	20.4	0.204	27.39
3/19/02 7:28	0	0	20.3	0.203	27.39
3/19/02 7:58	0	0	20.3	0.203	27.41
3/19/02 8:28	0	0	20.3	0.203	27.4
3/19/02 8:59	0	0	20.3	0.203	27.39
3/19/02 9:29	0	0	20.4	0.204	27.38
3/19/02 9:59	0	0	20.4	0.204	27.36
3/19/02 10:29	0	0	20.6	0.206	27.33
3/19/02 10:59	0	0	20.8	0.208	27.32
3/19/02 11:29	0	0	21.2	0.212	27.33
3/19/02 11:59	0	0	21.3	0.213	27.35
3/19/02 12:30	0	0	21.3	0.213	27.33
3/19/02 13:00	0	0	21.1	0.211	27.33
3/19/02 13:30	0	0	21.1	0.211	27.31
3/19/02 14:00	0	0	20.9	0.209	27.29
3/19/02 14:30	0	0	21.1	0.211	27.26
3/19/02 15:00	0	0	21.3	0.213	27.28
3/19/02 15:30	0	0	21.2	0.212	27.28
3/19/02 16:01	0	0	21.4	0.214	27.29
3/19/02 16:31	0	0	21.3	0.213	27.27
3/19/02 17:01	0	0	21.4	0.214	27.28
3/19/02 17:31	0	0	21.5	0.215	27.3
3/19/02 18:01	0	0	21.5	0.215	27.31
3/19/02 18:31	0	0	21.5	0.215	27.32
3/19/02 19:01	0	0	21.3	0.213	27.31
3/19/02 19:32	0	0	21	0.21	27.33
3/19/02 20:02	0	0	20.9	0.209	27.34
3/19/02 20:32	0	0	20.7	0.207	27.34
3/19/02 21:02	0	0	20.6	0.206	27.34
3/19/02 21:32	0	0	20.5	0.205	27.33
3/19/02 22:02	0	0	20.3	0.203	27.33
3/19/02 22:33	0	0	20.3	0.203	27.33
3/19/02 23:03	0	0	20.2	0.202	27.31

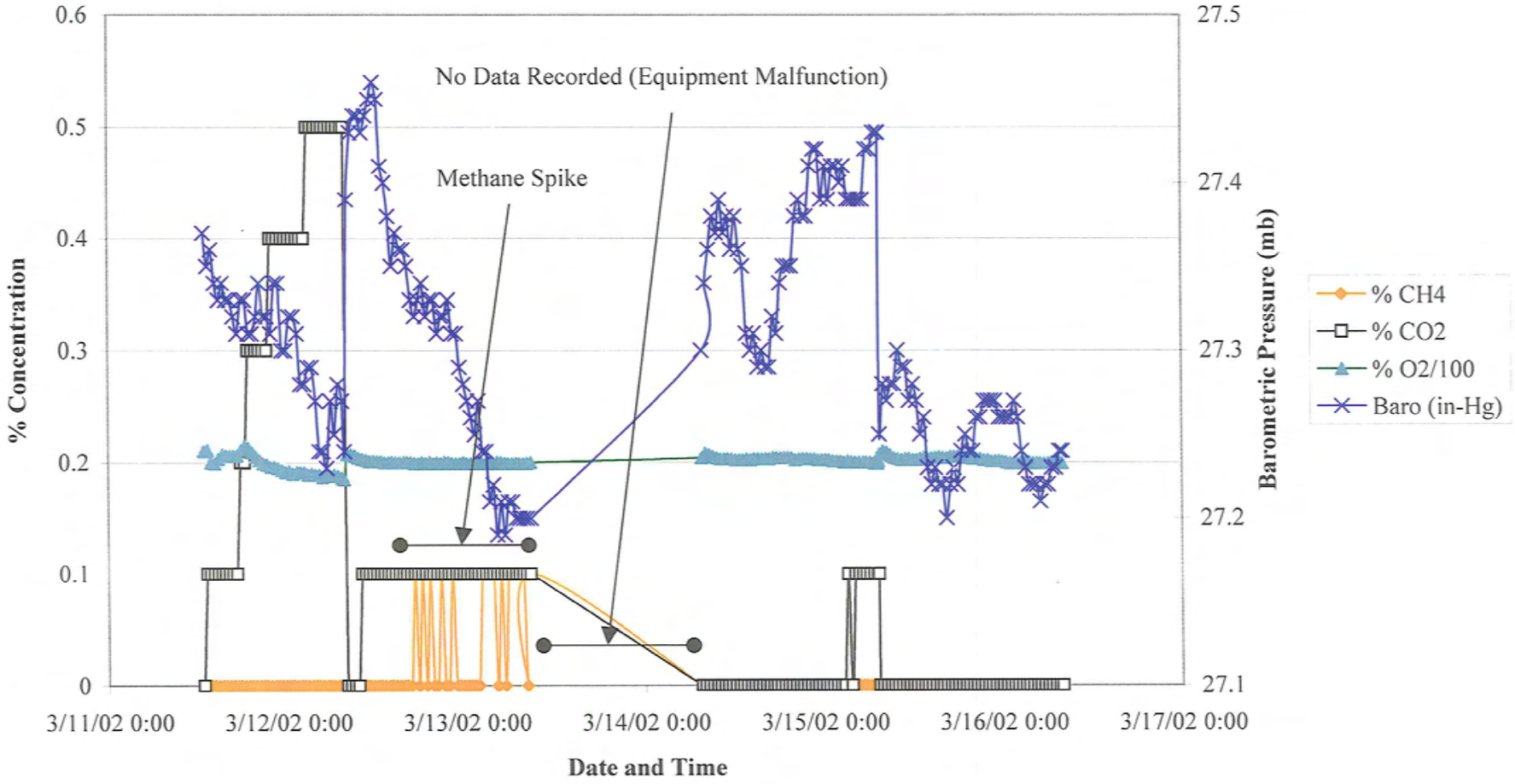
3/19/02 23:33	0	0	20.1	0.201	27.31
3/20/02 0:03	0	0	20	0.2	27.3
3/20/02 0:33	0	0	20	0.2	27.31
3/20/02 1:03	0	0	20	0.2	27.29
3/20/02 1:33	0	0	20	0.2	27.27
3/20/02 2:04	0	0	20	0.2	27.25
3/20/02 2:34	0	0	19.9	0.199	27.25
3/20/02 3:04	0	0	19.9	0.199	27.23
3/20/02 3:34	0	0	19.9	0.199	27.22
3/20/02 4:04	0	0	19.9	0.199	27.21
3/20/02 4:34	0	0	19.8	0.198	27.2
3/20/02 5:04	0	0	19.7	0.197	27.21
3/20/02 5:35	0	0	19.8	0.198	27.22
3/20/02 6:05	0	0	19.8	0.198	27.22
3/20/02 6:35	0	0	19.8	0.198	27.22
3/20/02 7:05	0	0	19.7	0.197	27.23
3/20/02 7:06	0	0	19.8	0.198	27.23
3/20/02 7:09	0	0	19.4	0.194	27.21
3/20/02 7:39	0	0	20	0.2	27.2
3/20/02 8:09	0	0	20	0.2	27.21
3/20/02 8:39	0	0	20.1	0.201	27.21
3/20/02 9:10	0	0	20.2	0.202	27.18
3/20/02 9:40	0	0	20.3	0.203	27.17
3/20/02 10:10	0	0	20.7	0.207	27.18
3/20/02 10:40	0	0	21	0.21	27.15
3/20/02 11:10	0	0	21.3	0.213	27.15
3/20/02 11:40	0	0	21.3	0.213	27.15
3/20/02 12:10	0	0	21.3	0.213	27.14
3/20/02 12:41	0	0	21.3	0.213	27.15
3/20/02 13:11	0	0	21.2	0.212	27.14
3/20/02 13:41	0	0	21.2	0.212	27.14
3/20/02 14:11	0	0	21.2	0.212	27.14
3/20/02 14:41	0	0	21.3	0.213	27.14
3/20/02 15:11	0	0	21	0.21	27.15
3/20/02 15:41	0	0	21	0.21	27.15
3/20/02 16:12	0	0	20.9	0.209	27.14
3/20/02 16:42	0	0	20.8	0.208	27.17
3/20/02 17:12	0	0	20.7	0.207	27.18
3/20/02 17:42	0	0	20.6	0.206	27.16
3/20/02 18:12	0	0	20.5	0.205	27.16
3/20/02 18:42	0	0	20.4	0.204	27.17
3/20/02 19:12	0	0	20.3	0.203	27.18
3/20/02 19:43	0	0	20.2	0.202	27.19
3/20/02 20:13	0	0	20.1	0.201	27.18
3/20/02 20:43	0	0	20.1	0.201	27.22
3/20/02 21:13	0	0	19.9	0.199	27.19
3/20/02 21:43	0	0	19.8	0.198	27.2
3/20/02 22:13	0	0	19.8	0.198	27.19
3/20/02 22:43	0	0	19.8	0.198	27.18
3/20/02 23:14	0	0	19.8	0.198	27.19
3/20/02 23:44	0	0	19.7	0.197	27.21
3/21/02 0:14	0	0	19.8	0.198	27.21
3/21/02 0:44	0	0	19.8	0.198	27.22
3/21/02 1:14	0	0	19.7	0.197	27.21
3/21/02 1:44	0	0	19.7	0.197	27.14
3/21/02 2:14	0	0	19.6	0.196	27.16
3/21/02 2:44	0	0	19.7	0.197	27.16
3/21/02 3:15	0	0	19.5	0.195	27.16
3/21/02 3:45	0	0	19.7	0.197	27.15
3/21/02 4:15	0	0	19.5	0.195	27.17
3/21/02 4:45	0	0	19.4	0.194	27.14
3/21/02 5:15	0	0	19.6	0.196	27.17
3/21/02 5:45	0	0	19.4	0.194	27.18
3/21/02 6:15	0	0	19.5	0.195	27.19
3/21/02 6:46	0	0	19.6	0.196	27.19
3/21/02 7:16	0	0	19.5	0.195	27.2
3/21/02 7:31	0	0.1	19.5	0.195	27.2
3/21/02 7:32	0	0	20.1	0.201	27.23
3/21/02 8:02	0	0	20.1	0.201	27.22
3/21/02 8:32	0	0	20.2	0.202	27.23
3/21/02 9:02	0	0	20.2	0.202	27.23
3/21/02 9:32	0	0	20.2	0.202	27.24
3/21/02 10:02	0	0	20.2	0.202	27.24
3/21/02 10:33	0	0	20.2	0.202	27.21
3/21/02 11:03	0	0	20.4	0.204	27.21
3/21/02 11:33	0	0	20.6	0.206	27.21
3/21/02 12:03	0	0	20.7	0.207	27.22
3/21/02 12:33	0	0	21	0.21	27.23
3/21/02 13:03	0	0	21.3	0.213	27.22
3/21/02 13:34	0	0	21.2	0.212	27.21
3/21/02 14:04	0	0	21.4	0.214	27.23
3/21/02 14:34	0	0	21.6	0.216	27.23
3/21/02 15:04	0	0	21.7	0.217	27.22
3/21/02 15:34	0	0	21.8	0.218	27.23
3/21/02 16:04	0	0	21.6	0.216	27.22
3/21/02 16:34	0	0	21.3	0.213	27.19

3/21/02 17:04	0	0	21.3	0.213	27.19
3/21/02 17:35	0	0	21.1	0.211	27.17
3/21/02 18:05	0	0	21.3	0.213	27.19
3/21/02 18:35	0	0	21.4	0.214	27.18
3/21/02 19:05	0	0	21.3	0.213	27.18
3/21/02 19:35	0	0	21	0.21	27.17
3/21/02 20:05	0	0	20.9	0.209	27.17
3/21/02 20:35	0	0	20.7	0.207	27.18
3/21/02 21:06	0	0	20.5	0.205	27.18
3/21/02 21:36	0	0	20.3	0.203	27.18
3/21/02 22:06	0	0	20.2	0.202	27.2
3/21/02 22:36	0	0	20	0.2	27.23
3/21/02 23:06	0	0	20	0.2	27.24
3/21/02 23:36	0	0	19.8	0.198	27.24
3/22/02 0:07	0	0	19.6	0.196	27.24
3/22/02 0:37	0	0	19.6	0.196	27.26
3/22/02 1:07	0	0	19.4	0.194	27.26
3/22/02 1:37	0	0	19.3	0.193	27.27
3/22/02 2:07	0	0	19.1	0.191	27.29
3/22/02 2:37	0	0	19.1	0.191	27.29
3/22/02 3:07	0	0	18.9	0.189	27.31
3/22/02 3:38	0	0	18.8	0.188	27.32
3/22/02 4:08	0	0	18.7	0.187	27.33
3/22/02 4:38	0	0	18.5	0.185	27.34
3/22/02 5:08	0	0	18.4	0.184	27.35
3/22/02 5:38	0	0	18.2	0.182	27.36
3/22/02 6:08	0	0	18.1	0.181	27.38
3/22/02 6:38	0	0	18	0.18	27.39
3/22/02 7:08	0	0	17.9	0.179	27.4
3/22/02 7:23	0	0	17.9	0.179	27.42
3/22/02 7:26	0	0	20.9	0.209	27.36
3/22/02 7:56	0	0	21	0.21	27.38
3/22/02 8:27	0	0	21	0.21	27.37
3/22/02 8:57	0	0	20.6	0.206	27.36
3/22/02 9:27	0	0	21	0.21	27.35
3/22/02 9:57	0	0	21.3	0.213	27.37
3/22/02 10:27	0	0	21.4	0.214	27.37
3/22/02 10:57	0	0	21.6	0.216	27.38
3/22/02 11:27	0	0	21.8	0.218	27.38
3/22/02 11:57	0	0	21.9	0.219	27.38
3/22/02 12:28	0	0	21.5	0.215	27.39
3/22/02 12:58	0	0	20.8	0.208	27.39
3/22/02 13:28	0	0	21.1	0.211	27.37
3/22/02 13:58	0	0	21.1	0.211	27.35
3/22/02 14:28	0	0	21.1	0.211	27.37
3/22/02 14:58	0	0	21	0.21	27.34
3/22/02 15:29	0	0	21	0.21	27.36
3/22/02 15:59	0	0	20.9	0.209	27.34
3/22/02 16:29	0	0	20.7	0.207	27.34
3/22/02 16:59	0	0	21.1	0.211	27.35
3/22/02 17:29	0	0	21.8	0.218	27.35
3/22/02 17:59	0	0	21.8	0.218	27.33
3/22/02 18:29	0	0	21.6	0.216	27.35
3/22/02 19:00	0	0	21.3	0.213	27.33
3/22/02 19:30	0	0	20.7	0.207	27.36
3/22/02 20:00	0	0	20.2	0.202	27.35
3/22/02 20:30	0	0	19.8	0.198	27.39
3/22/02 21:00	0	0	19.4	0.194	27.4
3/22/02 21:30	0	0	19.2	0.192	27.38
3/22/02 22:00	0	0.1	19	0.19	27.41
3/22/02 22:30	0	0.1	18.8	0.188	27.39
3/22/02 23:01	0	0.1	18.6	0.186	27.4
3/22/02 23:31	0	0.1	18.5	0.185	27.42
3/23/02 0:01	0	0.1	18.3	0.183	27.39
3/23/02 0:31	0	0.1	18.2	0.182	27.4
3/23/02 1:01	0	0.1	18.1	0.181	27.4
3/23/02 1:31	0	0.1	18	0.18	27.41
3/23/02 2:01	0	0.1	18	0.18	27.42
3/23/02 2:32	0	0.1	17.8	0.178	27.4
3/23/02 3:02	0	0.1	17.8	0.178	27.42
3/23/02 3:32	0	0.1	17.8	0.178	27.43
3/23/02 4:02	0	0.1	17.7	0.177	27.41
3/23/02 4:32	0	0.1	17.6	0.176	27.41
3/23/02 5:02	0	0.1	17.7	0.177	27.42
3/23/02 5:32	0	0.1	17.7	0.177	27.42
3/23/02 6:03	0	0.1	17.6	0.176	27.43
3/23/02 6:33	0	0.1	17.6	0.176	27.44
3/23/02 7:03	0	0.1	17.5	0.175	27.47
3/23/02 7:33	0	0.1	17.5	0.175	27.47
3/23/02 8:03	0	0.1	18	0.18	27.45
3/23/02 8:26	0	0.1	18.2	0.182	27.41

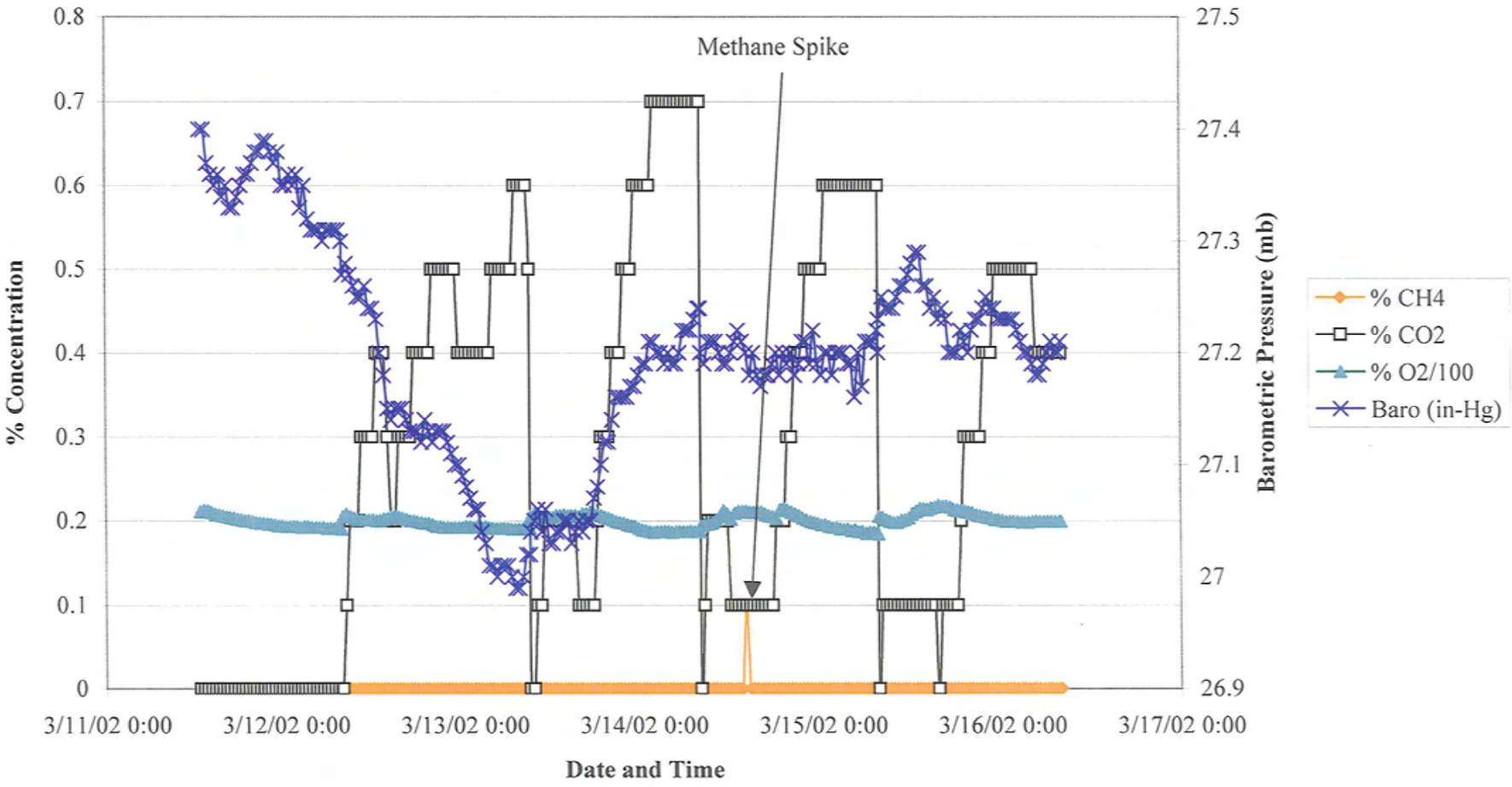
APPENDIX B

DATA PLOTS

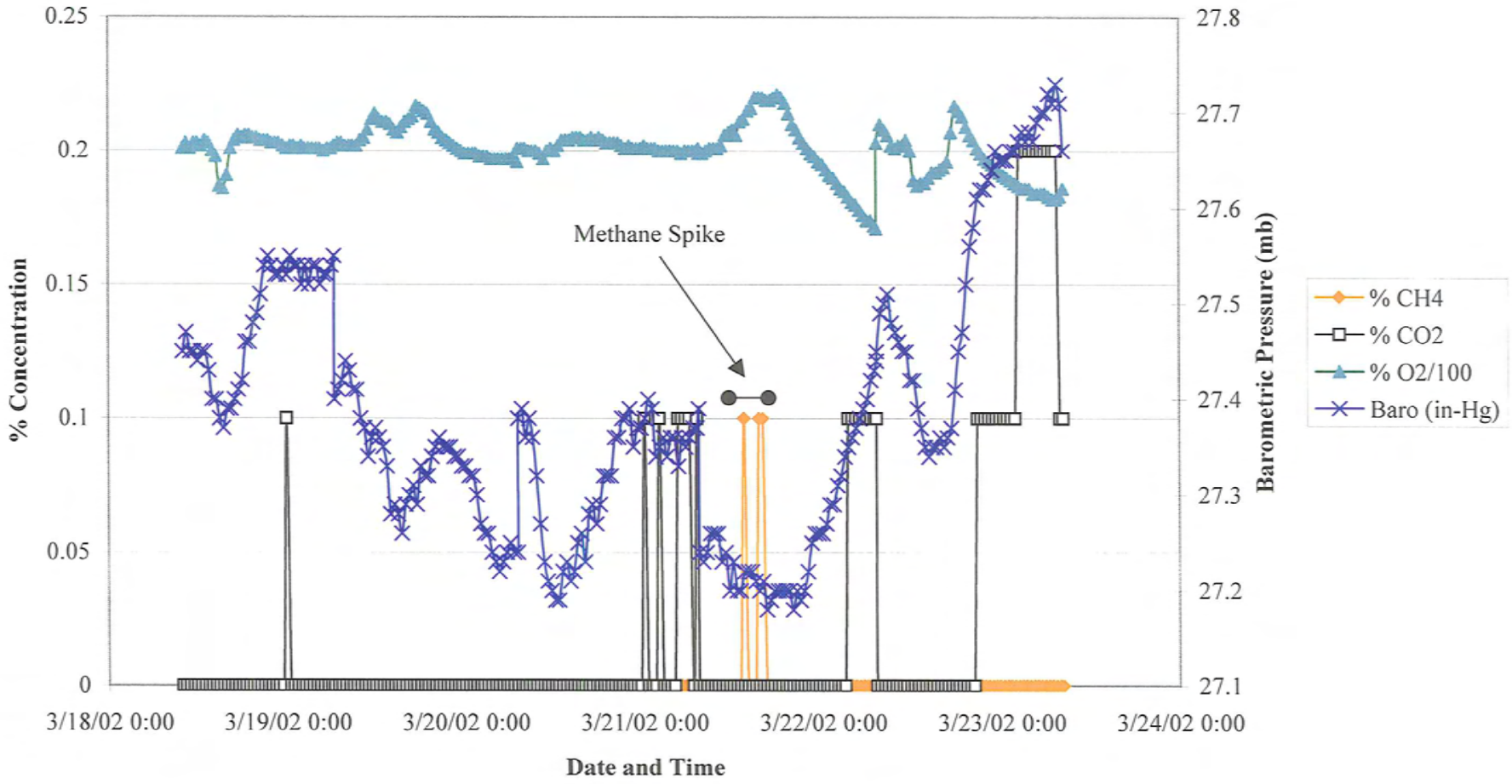
Station 1 Measurements
International Paper Landfill 5B
March 11-16, 2002
BLE Project J01-2360-02



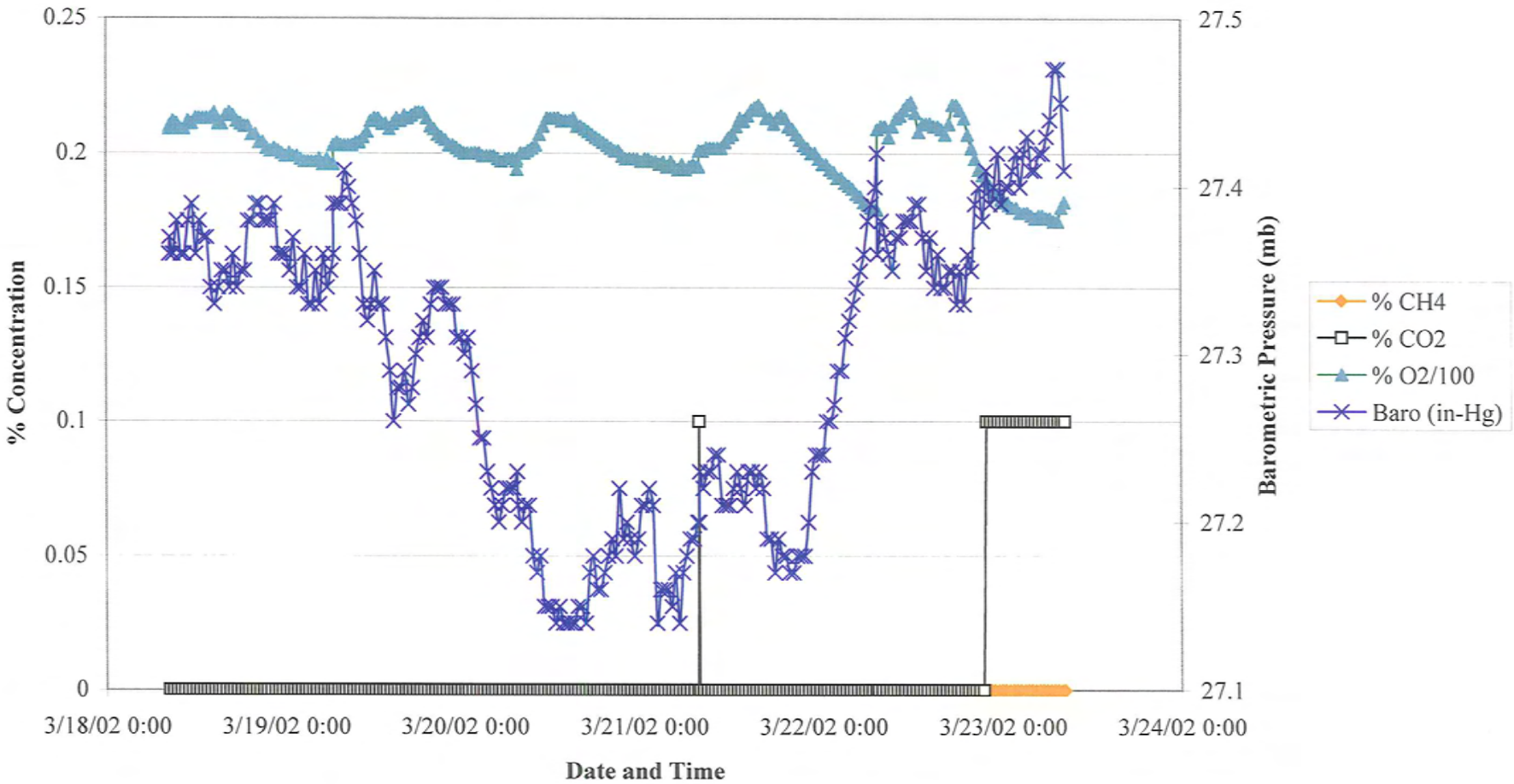
Station 2 Measurements
International Paper Landfill 5B
March 11-16, 2002
BLE Project J01-2360-02



Station 3 Measurements
International Paper Landfill 5B
March 18-23, 2002
BLE Project J01-2360-02



Station 4 Measurements
International Paper Landfill 5B
March 18-23, 2002
BLE Project J01-2360-02



APPENDIX C

LANDFILL GAS INVESTIGATION POST-CONSTRUCTION OF THE INTERNATIONAL PAPER SPORTS COMPLEX

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY
231 HAYWOOD STREET, ASHEVILLE, NC 28801
TEL.828.281.3350 FAC.828.281.3351
WWW.ALTAMONTENVIRONMENTAL.COM

Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Saylor **Date:** 7/15/2009
Weather Conditions: Overcast, Warm **Ambient Temperature:** 84 °F
Gas Monitoring Equipment: GEM 500 **Serial Number** **Calibration Date:** E1022 7/8/2009
Atmospheric Pressure: Not Recorded
Site Location: International Paper Closed Landfill 5B

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
1	Maximum	15:09	0	0.0	0.0	20.6	3rd power pole near
	Stable		0	0.0	0.0	20.6	electric box
2	Maximum	15:15	0	0.0	0.0	20.4	Cinder block vault near
	Stable		0	0.0	0.0	20.4	corrugated metal building
3	Maximum	15:16	0	0.0	0.0	20.6	Outfall culvert in NW
	Stable		0	0.0	0.0	20.2	corner of metal building
4	Maximum	15:18	0	0.0	0.0	20.2	Ambient outside of metal
	Stable		0	0.0	0.0	20.3	building
5	Maximum	15:20	0	0.0	0.0	20.4	Inside metal building under
	Stable		0	0.0	0.0	20.4	palate
6	Maximum	15:34	0	0.0	0.0	20.4	Blue outfall from french
	Stable		0	0.0	0.0	20.2	drain from south ball field
7	Maximum	15:40	0	0.0	0.0	20.6	Men's bathroom back right
	Stable		0	0.0	0.0	20.6	corner
8	Maximum	15:42	0	0.0	0.0	20.4	Concession stand under
	Stable		0	0.0	0.0	20.2	right counter
9	Maximum	15:49	0	0.0	0.3	19.9	Water meter vault near
	Stable		0	0.0	0.0	19.9	concession stand
10	Maximum	15:52	0	0.0	0.0	19.9	Fence post gate opening
	Stable		0	0.0	0.0	19.9	near restrooms
11	Maximum	15:56	0	0.0	0.0	20.3	Fence post gate opening
	Stable		0	0.0	0.0	20.2	b/w all 3 ball fields
12	Maximum	15:59	0	0.0	0.0	20.3	Fence post gate opening
	Stable		0	0.0	0.0	20.2	near 3rd base at NW field
13	Maximum	16:04	0	0.0	0.0	20.3	Drain in NW corner
	Stable		0	0.0	0.0	20.2	on NW ball field

Notes: Ambient Reading at vehicles near main entrance upon arrival showed no methane, or carbon dioxide, and oxygen was 20.6%. Pump was turned on while approaching test location for approximately 10 seconds, reading was recorded at 60+ seconds.

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WWW.ALTAMONTENVIRONMENTAL.COM

Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Saylor **Date:** 7/15/2009
Weather Conditions: Overcast, Warm **Ambient Temperature:** 84 °F
Gas Monitoring Equipment: GEM 500 **Serial Number Calibration Date:** E1022 7/8/2009
Atmospheric Pressure: Not Recorded
Site Location: International Paper Closed Landfill 5B

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
14	Maximum	16:11	0	0.0	6.4	19.9	Fence post at main
	Stable		0	0.0	6.4	13.5	entrance
15	Maximum	16:23	0	0.0	0.0	20.4	Back right corner of
	Stable		0	0.0	0.0	20.3	maintenance storage shed
16	Maximum	16:29	0	0.0	0.0	20.7	Back left corner of middle
	Stable		0	0.0	0.0	20.6	baseball storage shed
17	Maximum	16:32	0	0.0	0.2	20.6	Water meter vault near
	Stable		0	0.0	0.2	20.2	main entrance
18	Maximum	16:41	0	0.0	6.4	20.1	Water main along pine
	Stable		0	0.0	3.5	17.5	trees on north boundary rd
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						

Notes: Offsite at 17:00. Will continue with landfill gas investigation 7/16/2009.

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Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Saylor **Date:** 7/16/2009
Weather Conditions: Hot, Partly Cloudy **Ambient Temperature:** 86 °F
Gas Monitoring Equipment: GEM 500 **Serial Number** **Calibration Date:** E1022 7/8/2009
Atmospheric Pressure: Not Recorded
Site Location: International Paper Closed Landfill 5B

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
19	Maximum	14:38	2	0.1	0.0	20.5	Culvert inlet below ball
	Stable		0	0.0	0.0	20.4	fields south of NEO
20	Maximum	14:48	2	0.1	0.0	20.4	Culvert labeled 5B-1
	Stable		0	0.0	0.0	20.3	
21	Maximum	14:51	0	0.0	0.0	20.3	Culvert labeled 5B-2
	Stable		0	0.0	0.0	20.2	
22	Maximum	14:58	0	0.0	0.0	20.0	Broken electric conduit
	Stable		0	0.0	0.0	19.5	pole # 1190 5-40
23	Maximum	15:04	6	0.3	0.1	19.7	Culvert labeled 5B-3
peak at 300 sec	Stable		3	0.2	0.1	19.6	unidentifiable landfill odor
24	Maximum	15:13	0	0.0	0.1	19.8	Boring in west stormwater
	Stable		0	0.0	0.0	19.7	catch basin
25	Maximum	15:18	14	0.7	0.0	20.1	Culvert labeled 5B-4
peak at 180 sec	Stable		0	0.0	0.0	20.0	
26	Maximum	15:25	0	0.0	1.0	20.1	Boring in middle
peak at 40 sec	Stable		0	0.0	0.0	20.1	stormwater basin
27	Maximum	15:38	0	0.0	0.0	20.3	Boring in eastern
	Stable		0	0.0	0.0	20.3	stormwater basin
28	Maximum	15:45	0	0.0	0.0	20.5	Culvert inlet at SW corner of NEO
	Stable		0	0.0	0.0	20.5	fence, unidentifiable landfill odor
29	Maximum	15:49	0	0.0	0.0	20.4	Culvert inlet b/w metal building
	Stable		0	0.0	0.0	20.4	and NEO, unidentifiable landfill odor
30	Maximum	15:59	0	0.0	0.0	20.4	White outfall pipe from
	Stable		0	0.0	0.0	20.3	french drain at SW ball field
31	Maximum	16:06	0	0.0	0.0	20.8	White culvert outfall at NW
	Stable		0	0.0	0.0	20.7	corner of NW ball field

Notes: Landfill gas investigation continued from 7/15/2009.

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Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Saylor **Date:** 7/16/2009
Weather Conditions: Hot, Partly Cloudy **Ambient Temperature:** 86 °F
Gas Monitoring Equipment: GEM 500 **Serial Number** **Calibration Date:** E1022 7/8/2009
Atmospheric Pressure: Not Recorded
Site Location: International Paper Closed Landfill 5B

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
32	Maximum	16:11	0	0.0	0.0	20.7	White grate at NW corner
	Stable		0	0.0	0.0	20.5	of NW ball field
33	Maximum	16:21	0	0.0	0.0	20.5	Metal grate at NW corner
	Stable		0	0.0	0.0	20.4	of NE ball field
34	Maximum	16:25	0	0.0	0.0	20.4	Metal grate b/w 2 north
	Stable		0	0.0	0.0	20.3	ball fields, unidentifiable landfill odor
35	Maximum	16:32	0	0.0	0.0	20.5	Under football storage shed
	Stable		0	0.0	0.0	20.5	
36	Maximum	16:34	0	0.0	0.0	20.5	Under baseball storage
	Stable		0	0.0	0.0	20.4	shed
37	Maximum	16:37	0	0.0	0.0	20.5	Under maintenance storage
	Stable		0	0.0	0.0	20.3	shed
38	Maximum	16:50	0	0.0	0.0	20.5	Large creek culvert near
	Stable		0	0.0	0.0	20.4	landfill 5C
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						
	Maximum						
	Stable						

Notes:

LEGEND

Landfill Gas Investigation Locations

Methane

- No Detection
- Detection
- LF 5 PARCEL BOUNDARY
- LF 5 MONITORING WELLS

ALTAMONT ENVIRONMENTAL, INC.

ENGINEERING & HYDROGEOLOGY

50 COLLEGE STREET, ASHEVILLE, NC 28801
Tel. 828.281.3350 Fac. 828.281.3351
www.altamontenvironmental.com

DRAWN BY: ANNA SAYLOR
PROJECT MANAGER: JOEL LENK
CLIENT: INTERNATIONAL PAPER CO.
DATE: 07/17/2009

SCALE
0 80 160 320 FEET

LANDFILL GAS INVESTIGATION JULY 2009

LANDFILL 5B
CLOSED INTERNATIONAL PAPER LANDFILL
CANTON, NORTH CAROLINA

FIGURE

5

P:\IP\LF 5\LANDFILL GAS INVESTIGATION\FIGURES\LF5B LANDFILL GAS INVESTIGATION LOCATIONS.MXD

ALTAMONT ENVIRONMENTAL, INC.
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Transmitted via US Mail and email:
allen.gaither@ncdenr.gov

September 23, 2009

Mr. Allen Gaither
Division of Waste Management
Solid Waste Section
Asheville Regional Office
2090 US Highway 70
Swannanoa, NC 28778

Subject: Landfill Gas Results
Closed Landfill Permit # 4401-INDUS-1979
International Paper Landfill 5
Canton, North Carolina

Dear Mr. Gaither:

This letter presents the results of preliminary landfill gas monitoring at the above referenced site. Altamont Environmental, Inc. (Altamont) installed 11 permanent landfill gas probes and four temporary landfill gas probes on the closed International Paper (IP) Landfill 5 during the week of September 9, 2009 in accordance with the Investigation Plan approved by the North Carolina Department of Environment and Natural Resources, Solid Waste Section (NCDENR SWS) on August 17, 2009. Probes were installed on both the Landfill 5B and 5C cells and along the property boundary. Altamont measured methane and carbon dioxide levels for all probes on September 14 through 16, 2009. Additionally, Altamont measured methane concentrations in ambient air around Landfill 5B and within buildings on Landfill 5B. The results are attached.

Altamont conducted landfill gas measurements for three days with two different monitoring meters to verify meter accuracy. All landfill gas probes, with the exception of the two wells that were not installed in landfill waste, had detections of methane that exceed the lower explosive limit (LEL) for methane of five percent by volume. None of the ambient air measurements had methane detections that exceeded 25% of the LEL. One ambient air measurement at location 29 had a detection of 0.8 % methane. A temporary fence was constructed around this location to prevent access. (Note: a temporary fence was also constructed around location 25 after landfill gas monitoring was conducted on July 15 and 16, 2009.) Please refer to Figures 1 and 2 for reference.

A Landfill Gas Mitigation Plan will be sent to NCDENR SWS within 60 days.

We recently became aware of the attached letter from James C. Coffey with NCDENR SWS to the Town of Canton, dated January 9, 2003 regarding the Landfill 5B International Paper Sports Complex. We are currently attempting to clarify with the Town of Canton the status of the various items noted in the letter.

Thank you for your time. Please feel free to call or respond with any questions or comments related to this project.

Sincerely,

ALTAMONT ENVIRONMENTAL, INC.

Paul Dow, P.E.

Enclosures: Landfill Gas Measurements
Figure 1
NCDENR SWS Letter dated January 9, 2003

Cc: Ms. Andrea Keller, NCDENR SWS Compliance
Mr. Tom Richardson, International Paper Company

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY
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Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Bondurant **Date:** 9/14/2009
Weather Conditions: Cloudy **Ambient Temperature:** 78 °F
Gas Monitoring Equipment: GEM 2000 **Serial Number:** GM08260105 **Calibration Date:** 8/25/2009
Atmospheric Pressure: 27.28" Hg

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
LF5B-LFG3	Initial	14:22	>	29.0	29.0	1.4	Total well depth = 10.3' bgs
	Stable	14:25	>	32.7	31.1	1.1	Purge 40 sec.
LF5B-LFG1	Initial	14:31	>	33.6	24.0	8.7	Total well depth = 15.5' bgs
	Stable	14:34	>	51.4	38.3	2.8	Purge 62 sec.
LF5B-LFG2	Initial	14:42	>	28.2	17.8	10.5	Total well depth = 14.5' bgs
	Stable	14:45	>	33.7	21.2	8.6	Purge 58 sec.
LF5B-LFG4	Initial	14:53	>	42.2	20.9	8.2	Total well depth = 14.5' bgs
	Stable	14:55	>	52.0	24.4	5.0	Purge 58 sec.
LF5B-LFG6	Initial	15:01	50	2.5	8.0	13.8	Total well depth = 11.0' bgs
	Stable	15:05	77	3.9	12.5	10.2	Purge 44 sec.
LF5B-LFG5	Initial	15:08	>	13.2	12.2	15.3	Total well depth = 10.5' bgs
	Stable	15:11	>	45.6	42.9	2.9	Purge 42 sec.
LF5C-LFG11	Initial	15:34	>	36.4	28.7	7.3	Total well depth = 11.1' bgs
	Stable	15:39	>	47.4	37.0	3.5	Purge 44 sec.
LF5C-LFG10	Initial	15:59	>	39.2	32.9	1.5	Total well depth = 11.5' bgs
	Stable	16:02	>	39.1	33.1	0.5	Purge 45 sec.
LF5C-LFG9	Initial	16:07	>	9.2	0.1	13.7	Total well depth = 9.0' bgs
	Stable	16:11	>	11.5	0.1	12.0	Purge 36 sec.
LF5C-LFG8	Initial	16:14	>	31.9	21.4	9.6	Total well depth = 11.5' bgs
	Stable	16:16	>	36.6	24.9	7.9	Purge 45 sec.
LF5C-LFG7	Initial	16:19	>	48.3	33.9	3.7	Total well depth = 10.5' bgs
	Stable	16:22	>	52.4	37.4	2.3	Purge 41 sec.
LF5C-LFG12	Initial	16:29	>	47.8	31.9	4.7	Total well depth = 12.5' bgs
	Stable	16:32	>	55.0	35.9	2.2	Purge 50 sec.
LF5C-LFG13	Initial	16:42	0	0.0	0.5	20.4	Total well depth = 9.0' bgs
	Stable	16:44	0	0.0	0.6	20.3	Purge 36 sec.
LF5C-LFG14	Initial	16:35	>	56.1	9.1	5.5	Total well depth = 11.5' bgs
	Stable	16:38	>	64.8	10.5	3.4	Purge 45 sec.
LF5C-LFG15	Initial	16:46	0	0.0	1.2	19.3	Total well depth = 7.5' bgs
	Stable	16:49	0	0.0	2.5	17.7	Purge 36 sec.

Notes: Stable readings were taken after 60 seconds. Locations numbered as LF5X-LFGX are landfill gas probes, all others are ambient air samples. Two volumes were purged from the landfill gas probes prior to stable readings. BGS means below ground surface.

P:\IP\LF 5\Landfill Gas Investigation\Analytical\LFG 09 14-16 2009

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Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Saylor **Date:** 9/15/2009
Weather Conditions: Overcast Rainy **Ambient Temperature:** 71 °F
Gas Monitoring Equipment: GEM 2000 **Serial Number:** GM07614104 **Calibration Date:** 9/15/2009
Atmospheric Pressure: 27.78" Hg

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
15	Initial	17:12	0	0.0	0.1	20.1	
	Stable		0	0.0	0.0	20.0	
16	Initial	17:17	0	0.0	0.0	20.1	
	Stable		0	0.0	0.0	20.1	
35	Initial	17:22	0	0.0	0.0	20.1	
	Stable		0	0.0	0.0	20.1	
5	Initial	17:27	0	0.0	0.0	20.2	
	Stable		0	0.0	0.0	20.1	
7	Initial	17:31	0	0.0	0.0	20.1	
	Stable		0	0.0	0.0	20.3	
39	Initial	17:33	2	0.1	0.0	20.2	New location: women's bathroom
	Stable		0	0.0	0.0	20.2	back left corner
8	Initial	17:36	0	0.0	0.0	20.3	
	Stable		0	0.0	0.0	20.2	
LF5B-LFG6	Initial	17:50	17	0.8	2.8	17.9	Purge 42 sec.
	Stable		>	6.1	20.7	4.4	0.0% CH4 ambient around well
LF5B-LFG5	Initial	18:01	>	8.6	6.6	17.1	Purge 42 sec.
	Stable		>	47.0	42.7	1.8	0.0% CH4 ambient around well
LF5B-LFG4	Initial	18:16	>	36.0	16.7	9.4	Purge 58 sec.
	Stable		>	21.4	9.6	13.7	0.0% CH4 ambient around well
	Initial						
	Stable						
	Initial						
	Stable						
	Initial						
	Stable						
	Initial						
	Stable						
	Initial						
	Stable						

Notes: Atmospheric pressure data from Asheville Regional Airport. Stable readings were taken after 60 seconds. Locations numbered as LF5X-LFGX are landfill gas probes, all others are ambient air samples. Two volumes were purged from the landfill gas probes prior to stable readings.

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Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Saylor **Date:** 9/16/2009
Weather Conditions: Overcast Rainy **Ambient Temperature:** 70 °F
Gas Monitoring Equipment: GEM 2000 **Serial Number:** **Calibration Date:** GM07614104 9/15/2009
Atmospheric Pressure: 27.32" Hg

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
15	Initial	10:54	0	0.0	0.1	20.0	
	Stable		0	0.0	0.0	19.8	
16	Initial	10:58	0	0.0	0.0	20.0	
	Stable		0	0.0	0.0	19.8	
35	Initial	11:01	0	0.0	0.0	19.8	
	Stable		0	0.0	0.0	19.7	
8	Initial	11:07	0	0.0	0.0	19.9	
	Stable		0	0.0	0.0	19.8	
7	Initial	11:09	0	0.0	0.0	19.9	
	Stable		0	0.0	0.0	19.8	
39	Initial	11:10	0	0.0	0.0	19.8	
	Stable		0	0.0	0.0	19.8	
5	Initial	11:15	0	0.0	0.0	20.0	
	Stable		0	0.0	0.0	19.9	
LF5B-LFG2	Initial	13:53	>	48.3	33.8	3.4	0.1" of water pull on
	Stable		>	52.7	37.2	2.1	manometer, purge 58 sec.
LF5B-LFG1	Initial	14:11	>	46.1	31.6	4.2	No change in manometer
	Stable		>	11.9	8.4	16.0	reading, purge 62 sec.
31	Initial	14:22	0	0.0	0.2	19.9	
	Stable		0	0.0	0.0	20.1	
32	Initial	14:24	0	0.0	0.0	20.1	
	Stable		0	0.0	0.0	20.1	
LF5B-LFG3	Initial	14:36	>	29.8	29.9	1.4	<0.05" of water pull on
	Stable		>	32.9	32.6	0.5	manometer, purge 40 sec.
12	Initial	14:52	0	0.0	0.1	19.8	Moved location to green grate,
	Stable		0	0.0	0.0	19.9	previous location inaccessible
13	Initial	14:59	0	0.0	0.8	20.2	
	Stable		0	0.0	0.0	20.1	
34	Initial	15:05	0	0.0	0.2	20.1	
	Stable		0	0.0	0.0	20.2	

Notes: Stable readings were taken after 60 seconds. Locations numbered as LF5X-LFGX are landfill gas probes, all others are ambient air samples. Two volumes were purged from the landfill gas probes prior to stable readings.

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Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Saylor **Date:** 9/16/2009
Weather Conditions: Overcast Rainy **Ambient Temperature:** 70 °F
Gas Monitoring Equipment: GEM 2000 **Serial Number:** **Calibration Date:** GM07614104 9/15/2009
Atmospheric Pressure: 27.32" Hg

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
33	Initial	15:09	0	0.0	0.0	20.3	
	Stable		0	0.0	0.0	20.3	
18	Initial	15:12	0	0.0	4.9	16.3	
	Stable		0	0.0	4.7	16.4	
10	Initial	15:19	0	0.0	0.0	20.4	Moved location to crack in red
	Stable		0	0.0	0.0	20.4	MW, previous location inacces.
9	Initial	15:22	0	0.0	0.3	20.0	
	Stable		0	0.0	0.3	20.0	
30	Initial	15:25	0	0.0	0.0	20.5	
	Stable		0	0.0	0.0	20.4	
6	Initial	15:28	0	0.0	0.1	20.5	
	Stable		0	0.0	0.0	20.5	
11	Initial	15:33	0	0.0	3.0	17.8	Moved location to blue water
	Stable		0	0.0	3.0	17.7	vault, previous location inacces.
36	Initial	15:43	0	0.0	0.0	20.7	
	Stable		0	0.0	0.0	20.7	
37	Initial	15:45	0	0.0	0.0	20.7	
	Stable		0	0.0	0.0	20.7	
17	Initial	15:48	0	0.0	0.6	20.1	
	Stable		0	0.0	0.6	20.0	
14	Initial	15:50	0	0.0	0.0	20.8	
	Stable		0	0.0	0.0	20.6	
1	Initial	15:53	0	0.0	0.0	20.7	
	Stable		0	0.0	0.0	20.7	
29	Initial	15:57	16	0.8	0.1	20.7	
	Stable		2	0.1	0.2	20.6	
28	Initial	16:00	0	0.0	0.0	20.6	
	Stable		0	0.0	0.0	20.6	
2	Initial	16:09	0	0.0	0.0	20.8	
	Stable		0	0.0	0.0	20.7	

Notes: Stable readings were taken after 60 seconds. Locations numbered as LF5X-LFGX are landfill gas probes, all others are ambient air samples. Two volumes were purged from the landfill gas probes prior to stable readings.

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Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Saylor **Date:** 9/16/2009
Weather Conditions: Overcast Rainy **Ambient Temperature:** 70 °F
Gas Monitoring Equipment: GEM 2000 **Serial Number:** **Calibration Date:** GM07614104 9/15/2009
Atmospheric Pressure: 27.36" Hg

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
3	Initial	16:12	0	0.0	0.0	20.8	
	Stable		0	0.0	0.0	20.8	
25	Initial	16:18	0	0.0	0.0	20.8	Sample taken from four fence
	Stable		0	0.0	0.0	20.8	posts adjacent to fenced off inlet
4	Initial	16:24	0	0.0	0.0	20.8	
	Stable		0	0.0	0.0	20.8	
24	Initial	16:26	0	0.0	0.0	20.7	
	Stable		0	0.0	0.0	20.8	
26	Initial	16:27	0	0.0	0.0	20.6	
	Stable		0	0.0	0.0	20.7	
27	Initial	16:29	0	0.0	0.0	20.7	
	Stable		0	0.0	0.0	20.8	
LF5B-LFG5	Initial	16:43	>	29.9	27.8	8.6	0.0" of water pull on
	Stable		>	45.3	41.3	2.5	manometer, purge 42 sec.
23	Initial	16:54	2	0.1	0.1	20.4	
	Stable		2	0.1	0.0	20.5	
22	Initial	16:56	0	0.0	0.0	20.6	
	Stable		0	0.0	0.0	20.7	
21	Initial	16:59	0	0.0	0.0	20.7	
	Stable		0	0.0	0.0	20.7	
20	Initial	17:02	0	0.0	0.0	20.8	
	Stable		0	0.0	0.0	20.7	
LF5B-LFG6	Initial	17:12	76	3.8	12.8	10.8	0.0" of water pull on
	Stable		>	6.2	22.4	3.9	manometer, purge 44 sec.
19	Initial	17:19	0	0.0	0.1	20.7	
	Stable		0	0.0	0.0	20.7	
LF5B-LFG4	Initial	17:26	>	33.7	14.9	10.0	Needs valve cap, 0.0" of water
	Stable		>	36.1	15.7	9.3	pull on manometer, purge 58 sec.
38	Initial	17:41	2	0.1	0.0	20.7	
	Stable		0	0.0	0.0	20.8	

Notes: Stable readings were taken after 60 seconds. Locations numbered as LF5X-LFGX are landfill gas probes, all others are ambient air samples. Two volumes were purged from the landfill gas probes prior to stable readings.

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Landfill Gas Measurements Field Worksheet

Name of Person Taking Readings: A. Saylor **Date:** 9/16/2009
Weather Conditions: Overcast Rainy **Ambient Temperature:** 70 °F
Gas Monitoring Equipment: GEM 2000 **Serial Number:** **Calibration Date:** GM07614104 9/15/2009
Atmospheric Pressure: 27.28" Hg

Gas Readings Field Worksheet

Location	Readings	Time	% LEL	% CH_4	% CO_2	% O_2	Notes
LF5C-LFG7	Initial	17:49	>	50.8	37.6	1.8	0.0" of water pull on
	Stable		>	53.3	38.9	0.9	manometer, purge 41 sec.
LF5C-LFG8	Initial	17:59	>	52.2	38.2	2.0	0.0" of water pull on
	Stable		>	54.6	38.3	1.1	manometer, purge 45 sec.
LF5C-LFG9	Initial	18:08	>	12.1	0.2	9.8	0.0" of water pull on
	Stable		>	13.1	0.2	8.8	manometer, purge 36 sec.
LF5C-LFG15	Initial	18:17	0	0.0	2.6	17.8	Temporary well, no valve cap
	Stable		0	0.0	3.3	17.0	purge 36 sec.
LF5C-LFG13	Initial	18:27	0	0.0	0.2	20.5	Temporary well, no valve cap
	Stable		0	0.0	0.7	20.2	purge 36 sec.
LF5C-LFG12	Initial	18:35	>	36.1	24.5	7.8	Temporary well, no valve cap
	Stable		>	58.1	39.0	0.7	purge 50 sec.
LF5C-LFG11	Initial	18:48	>	41.2	39.4	4.4	0.0" of water pull on
	Stable		>	47.1	39.7	2.5	manometer, purge 44 sec.
LF5C-LFG10	Initial	18:58	>	35.8	31.4	2.6	0.0" of water pull on
	Stable		>	39.1	34.5	1.4	manomter, purge 45 sec.
LF5C-LFG14	Initial	19:04	>	47.5	9.3	6.1	Temporary well, no valve cap
	Stable		>	61.4	11.6	1.8	purge 45 sec.
	Initial						
	Stable						
	Initial						
	Stable						
	Initial						
	Stable						
	Initial						
	Stable						
	Initial						
	Stable						
	Initial						
	Stable						

Notes: Stable readings were taken after 60 seconds. Locations numbered as LF5X-LFGX are landfill gas probes, all others are ambient air samples. Two volumes were purged from the landfill gas probes prior to stable readings. A change in atmospheric pressure was noted at beginning of data sheet.

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LEGEND

- Ambient Air-Methane Detection
- Ambient Air-No Methane Detection
- LFG Probe-Methane Exceedence
- LFG Probe-No Methane Exceedence
- LF 5 Parcel Boundary

SOURCE:

HAYWOOD COUNTY
2008 COLOR ORTHOPHOTO

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REV.	DATE	DESCRIPTION	BY	CHK	APV

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DRAWN BY: ANNA SAYLOR
PROJECT MANAGER: JOEL LENK
CLIENT: INTERNATIONAL PAPER CO.
DATE: 09/23/2009

SCALE
0 90 180 360 Feet

LANDFILL GAS INVESTIGATION
SEPTEMBER 14-16, 2009

LANDFILL 5 # 4401
CLOSED INTERNATIONAL PAPER LANDFILL
CANTON, NORTH CAROLINA

FIGURE
1

P:\IP\LF 5\Landfill Gas Investigation\Figures\LF5B landfill gas screening locations 11x17.mxd

North Carolina
Department of Environment and Natural Resources

Division of Waste Management

Michael F. Easley, Governor
William G. Ross Jr., Secretary
Dexter R. Matthews, Director

NCDENR

January 9, 2003

Bill Stamey, Manager
Town Of Canton
PO Box 987
Canton, North Carolina 28716

RE: Proposed International Paper Recreational Park in Canton, North Carolina

Dear Mr. Stamey:

The Solid Waste Section (the Section) has received the Preliminary Site Plan for the Proposed Athletic Facility on the closed International Paper Landfill Site (Landfill No. 5B) prepared on your behalf by McGill Associates (letters dated 5 September and 4 December 2002 with Site Plan drawing dated October 2002). Based on the preliminary plans, six softball fields, two tee ball fields, a Recreational Center, parking areas, and a walking trail appear to be atop the old Landfill No.5B. The four soccer fields, picnic area, restroom facility, additional parking area, and concession shelter on the east side of the property appear to be atop the old borrow area for Landfill No. 5B while the youth soccer field and additional picnic area to the south appear to be in the buffer area or flood plain of Beaverdam Creek.

Based on the submitted information, the concept of a proposed athletic facility appears feasible and constructable. However, certain details need to be addressed before the Section can approve the post-closure use of Landfill No. 5B as proposed. The Section would like to see a more detailed plan that would address the following:

- Any construction atop the old landfill must not adversely effect the landfill cap, including building foundations, light or other pole structures, fencing installation, bleachers, etc.

- Methane gas is a by-product of organic material decomposition that normally occurs in landfills. This gas is explosive in concentrations of 5% to 15% of ambient air. Therefore, strict monitoring of methane levels in buildings and structures on and adjacent to the site and at property boundaries is considered an integral part of landfill post closure care. Methane monitoring is especially important for a publically used facility.

- No proposed construction or facility feature should involve penetrations through the cap that would allow a pathway for methane to escape and accumulate.

- Development within the flood plain of Beaverdam Creek should not adversely effect any wetlands.

Please submit detailed plans of the proposed facility to the Section for review once they have been developed. Be sure to include considerations for monitoring methane in structures on properties adjacent to the landfill such as the ASL Acquisition Corporation property to the north and residential properties on the west side of the landfill.

If you have any questions about this letter or would like to discuss proposed details, please feel free to contact Tim Jewett, Western Area Engineer, at 336-771-4608, ext.204.

Sincerely,

James C. Coffey

James C. Coffey
Section Chief
Solid Waste Section

cc: Brent Rockett, SWS
Jim Patterson, SWS
Tim Jewett, SWS
Cheryl Marks, SWS
LuAnn Bryan, ARO Parks and Recreation
Joel Storrow, McGill Associates

WELL NUMBER LF5B-LFG1

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/11/09 **COMPLETED** 9/11/09
GROUND ELEVATION 2695 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

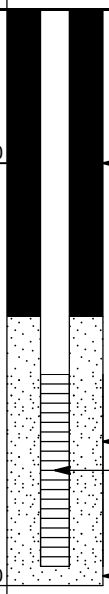
DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				CAP MATERIAL-Lt brown, sandy, silty clay, dry	
		Probe completed with 8 inch diameter flush manhole.			
5					Bentonite Seal
		3/8 inch hole plug installed from 8.5 feet bgs to ground surface.		8.0 / 2687.0	
				LANDFILL MATERIAL-Dk gray to black	
10		Screened Interval is located from 15.0 feet to 10.0 feet bgs.			Sand #3
					2" PVC Sch. 40 0.020" slot
15		Boring drilled to a depth of 16 feet bgs, backfilled with bentonite to 15.5 feet bgs. Number three sand installed from 15.5 feet to 8.5 feet bgs.		16.0 / 2679.0	Sand #3 / Bentonite
				Bottom of hole at 16.0 feet.	
		NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			

WELL NUMBER LF5B-LFG2

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/11/09 **COMPLETED** 9/11/09
GROUND ELEVATION 2685 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		Probe completed with 8 inch diameter flush manhole.		CAP MATERIAL- Lt brown, sandy, silty clay, dry	
				4.0 / 2681.0	Bentonite Seal
5		3/8 inch hole plug installed from 8.0 feet bgs to ground surface. Screened Interval is located from 14.5 feet to 9.5 feet bgs.		LANDFILL MATERIAL- Dk gray to black	
10					Sand #3
					2" PVC Sch. 40 0.020" slot
15		Boring drilled to a depth of 15.0 feet bgs, number three sand installed from 15.0 feet to 8.0 feet bgs.		15.0 / 2670.0	Sand #3
				Bottom of hole at 15.0 feet.	
		NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			



WELL NUMBER LF5B-LFG3

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/11/09 **COMPLETED** 9/11/09
GROUND ELEVATION 2655 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

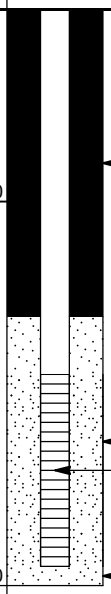
DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		Probe completed with 8 inch diameter flush manhole.		1.0 CAP MATERIAL-Lt brown, sandy, silty clay, dry 2654.0	Bentonite Seal
				LANDFILL MATERIAL- Dk gray to black	
5		3/8 inch hole plug installed from 5.3 feet bgs to ground surface. Screened Interval is located from 10.3 feet to 5.3 feet bgs.			Sand #3; 2" PVC Sch. 40 0.020" slot
10		Boring drilled to a depth of 13.0 feet bgs, hole infilled to 10.8 when augers were pulled out of the hole. Number three sand installed from 10.8 feet to 3.5 feet bgs.		13.0 2642.0	Sand #3
				Bottom of hole at 13.0 feet.	
		NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			

WELL NUMBER LF5B-LFG4

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/11/09 **COMPLETED** 9/11/09
GROUND ELEVATION 2665 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

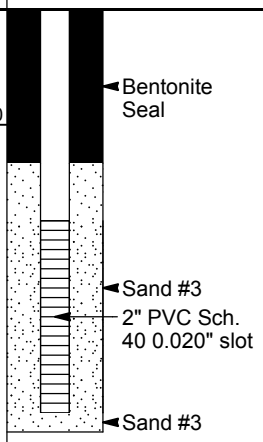
DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				CAP MATERIAL-Lt brown, sandy, silty clay, dry	
		Probe completed with 8 inch diameter flush manhole.			
5		3/8 inch hole plug installed from 8.0 feet bgs to ground surface.		5.0 — 2660.0 LANDFILL MATERIAL- Dk gray to black	Bentonite Seal
10		Screened Interval is located from 14.5 feet to 9.5 feet bgs.			Sand #3 2" PVC Sch. 40 0.020" slot
15		Boring drilled to 15.0 feet bgs, number three sand installed from 15.0 feet to 8.0 feet bgs.		15.0 — 2650.0 Bottom of hole at 15.0 feet.	Sand #3
		NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			



WELL NUMBER LF5B-LFG5

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/11/09 **COMPLETED** 9/11/09
GROUND ELEVATION 2645 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		Probe completed with 3 foot by 4 inch by 5 inch stick-up surface completion. 3/8 inch hole plug installed from 4.0 feet bgs to ground surface. Screened Interval is located from 10.5 feet to 5.5 feet bgs. Boring drilled to 12.0 feet bgs, hole fill in to a depth of 11.0 feet bgs when augers were pulled. Number three installed from 11.0 feet to 4.0 feet bgs. NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.		CAP MATERIAL-Lt brown, sandy, silty clay, dry 3.0 2642.0 LANDFILL MATERIAL- Dk gray to black 12.0 2633.0 Bottom of hole at 12.0 feet.	
5					
10					

WELL NUMBER LF5B-LFG6

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/11/09 **COMPLETED** 9/11/09
GROUND ELEVATION 2675 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		Probe completed with 3 foot by 4 inch by 5 inch stick-up surface completion. 3/8 inch hole plug installed from 4.5 feet bgs to ground surface. Screened Interval is located from 11.0 feet to 6.0 feet bgs. Boring drilled to 12.0 feet bgs, hole fell in to a depth of 11.5 feet bgs when augers were pulled. Number three sand installed from 11.5 feet to 4.5 feet bgs. NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.		CAP MATERIAL-Lt brown, sandy, silty clay, dry	Bentonite Seal
4.0				2671.0	
5				LANDFILL MATERIAL-Dk gray to black	Sand #3; 2" PVC Sch. 40 0.020" slot
10					
12.0				2663.0	Sand #3
				Bottom of hole at 12.0 feet.	

WELL NUMBER LF5C-LFG7

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/9/09 **COMPLETED** 9/9/09
GROUND ELEVATION 2645 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		Probe completed with 3 foot by 4 inch by 5 inch stick-up surface completion.		CAP MATERIAL- Lt brown, sandy, silty clay, dry	Bentonite Seal
				4.0 / 2641.0	
5		3/8 inch hole plug installed from 5.0 feet bgs to ground surface. Screened Interval is located from 10.5 feet to 5.5 feet bgs.		LANDFILL MATERIAL-Dk gray to black	Sand #3; 2" PVC Sch. 40 0.020" slot
10		Boring drilled to 12.0 feet bgs, number three sand installed from 12.0 feet to 5.0 feet bgs.		12.0 / 2633.0	Sand #3
				Bottom of hole at 12.0 feet.	

NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.

WELL NUMBER LF5C-LFG8

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/9/09 **COMPLETED** 9/9/09
GROUND ELEVATION 2640 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		Probe completed with 3 foot by 4 inch by 5 inch stick-up surface completion.		CAP MATERIAL- Lt brown, sandy, silty clay, dry	Bentonite Seal
5		3/8 inch hole plug installed from 5.0 feet bgs to ground surface.		4.0 2636.0 LANDFILL MATERIAL-dk gray to black	
10		Screened Interval is located from 11.5 feet to 6.5 feet bgs. Boring drilled to 12.0 feet bgs, number three sand installed from 12.0 feet to 5.0 feet bgs.		12.0 2628.0 Bottom of hole at 12.0 feet.	Sand #3; 2" PVC Sch. 40 0.020" slot; Sand #3
		NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			

WELL NUMBER LF5C-LFG9

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/9/09 **COMPLETED** 9/9/09
GROUND ELEVATION 2640 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		Probe completed with 3 foot by 4 inch by 5 inch stick-up surface completion. 3/8 inch hole plug installed from 2.5 feet bgs to ground surface.		CAP MATERIAL-Lt brown, sandy, silty clay dry	Bentonite Seal
2.0				2638.0	
				LANDFILL MATERIAL-dk gray to black	
5					Sand #3
		Screened Interval is located from 9.0 feet to 4.0 feet bgs. Boring drilled to 10 feet bgs, number three sand installed from 10.0 feet to 2.5 feet bgs.			2" PVC Sch. 40 0.020" slot
10				10.0	Sand #3
				2630.0	
				Bottom of hole at 10.0 feet.	
		NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			

WELL NUMBER LF5C-LFG10

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/11/09 **COMPLETED** 9/11/09
GROUND ELEVATION 2690 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		Probe completed with 3 foot by 4 inch by 5 inch stick-up surface completion.		CAP MATERIAL- Lt brown, sandy, silty clay, dry	Bentonite Seal
				4.0 / 2686.0	
5		3/8 inch hole plug installed from 5.0 feet bgs to ground surface. Screened Interval is located from 11.5 feet to 6.5 feet bgs.		LANDFILL MATERIAL- Dk gray to black	Sand #3
					2" PVC Sch. 40 0.020" slot
10		Boring drilled to 12.0 feet bgs, number three sand installed from 12.0 feet to 5.0 feet bgs.		12.0 / 2678.0	Sand #3
				Bottom of hole at 12.0 feet.	
		NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			

WELL NUMBER LF5C-LFG11

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/10/09 **COMPLETED** 9/10/09
GROUND ELEVATION 2675 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and misty; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		Probe completed with 3 foot by 4 inch by 5 inch stick-up surface completion.		CAP MATERIAL-Lt brown, sandy, silty clay, dry	Bentonite Seal
5		3/8 inch hole plug installed from 5.0 feet bgs to ground surface.		4.0 — 2671.0 LANDFILL MATERIAL- Dk gray to black	
10		Screened Interval is located from 11.5 feet to 6.5 feet bgs.			Sand #3 2" PVC Sch. 40 0.020" slot
		Boring drilled to 12.0 feet bgs, number three sand installed from 12.0 feet to 5.0 feet bgs.		12.0 — 2663.0 Bottom of hole at 12.0 feet.	Sand #3
		NOTE: Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			

WELL NUMBER LF5C-LFG12

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/10/09 **COMPLETED** 9/10/09
GROUND ELEVATION 2685 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and misty; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				CAP MATERIAL-Lt brown, sandy, silty clay, dry	Bentonite Seal
		No surface completion. 3/8 inch hole plug installed from 5.0 feet bgs to ground surface. Screened Interval is located from 12.5 feet to 7.5 feet bgs.		4.5 — 2680.5	
5				LANDFILL MATERIAL- Dk gray to black	
10		Numbered three sand installed from 13.0 feet to 5.0 feet bgs.			Sand #3; 2" PVC Sch. 40 0.020" slot
				13.0 — 2672.0	Sand #3
15		Abandon hole to a depth of 13.0 feet with bentonite.			
20					
25		Boring drilled to a depth of 40 feet bgs for geotechnical purposes, encountered leachate water at 27.0 feet bgs.			Bentonite
30					
35					

(Continued Next Page)

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company **PROJECT NAME** Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL **PROJECT LOCATION** Beaverdam Road, Canton, NC

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
35					
40		NOTE: Geotechnical information provided in Foundation Systems Engineering report dated October 13 and 23, 2009. Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.		40.0 2645.0	
				Bottom of hole at 40.0 feet.	

WELL NUMBER LF5C-LFG13

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/9/09 **COMPLETED** 9/9/09
GROUND ELEVATION 2695 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		No surface completion. 3/8 inch hole plug installed from 2.5 feet bgs to ground surface.			TOPSOIL-lt brown sandy silt	Bentonite Seal
4.5						2690.5
5		Screened Interval is located from 9.0 feet to 4.0 feet bgs. Boring drilled to 11.0 feet bgs and abandoned with bentonite to a depth of 9.0 feet bgs to set gas well. Number three sand installed from 9.0 feet to 2.5 feet bgs. NOTE: Well located on un-capped area. Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.	SP-SM		SAPROLITE-lt brown to brown, silty fine sand with few gravels, dry, slighty micaceous	Sand #3; 2" PVC Sch. 40 0.020" slot
10						Sand #3; Bentonite
11.0						2684.0
					Bottom of hole at 11.0 feet.	

WELL NUMBER LF5C-LFG14

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/10/09 **COMPLETED** 9/10/09
GROUND ELEVATION 2725 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				CAP MATERIAL-Lt brown, sandy, silty clay, dry	Bentonite Seal
		No surface completion. 3/8 inch hole plug installed from 5.0 feet bgs to ground surface.		4.0 / 2721.0	
5				LANDFILL MATERIAL-Dk gray to black	
		Screened Interval is located from 11.5 feet to 6.5 feet bgs.			Sand #3; 2" PVC Sch. 40 0.020" slot
10		Abandoned hole to a depth of 12.0 feet with bentonite and installed number three sand from 12.0 feet to 5.0 feet bgs.			Sand #3
15					
20		Boring drilled to a depth of 30 feet bgs for geotechnical purposes.			Bentonite
25		NOTE: Geotechnical information provided in Foundation Systems Engineering report dated October 13 and 23, 2009. Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			
30				30.0 / 2695.0	
				Bottom of hole at 30.0 feet.	

WELL NUMBER LF5C-LFG15

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT International Paper Company
PROJECT NAME Landfill 5, Permit #44-01-Gas Probe Installation
PROJECT NUMBER 2055.0501-GLOBAL
PROJECT LOCATION Beaverdam Road, Canton, NC
DATE STARTED 9/9/09 **COMPLETED** 9/9/09
GROUND ELEVATION 2755 ft **HOLE SIZE** 6-inch diameter
DRILLING CONTRACTOR CML
GROUND WATER LEVELS:
DRILLING METHOD CME 55 Drill Rig-Auger 3.25 ID
AT TIME OF DRILLING NA
LOGGED BY Amy Bondurant **CHECKED BY** Joel Lenk
AT END OF DRILLING NA
NOTES cloudy and mild; No gas probes were installed below the water table
AFTER DRILLING NA

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0		No surface completion. 3/8 inch hole plug installed from 2.0 feet bgs to ground surface. Screened Interval is located from 7.5 feet to 2.5 feet bgs. Abandoned hole to a depth of 8.0 feet bgs with bentonite and installed number three sand from 8.0 feet to 2.0 feet bgs.			TOPSOIL-lt brown sandy silt	Bentonite Seal
					2.5 / 2752.5	
			SP		SAPROLITE-light brown to brown silty sand with gravels, micaceous	Sand #3; 2" PVC Sch. 40 0.020" slot; Sand #3
5						
10						
15						Bentonite
20		Boring drilled to a depth of 23.0 feet bgs for geotechnical purposes. NOTE: Well located on un-capped area. Landfill gas probe ground elevations measured using Trimble GEO XH gps unit.			23.0 / 2732.0	
					Bottom of hole at 23.0 feet.	

APPENDIX D

LANDFILL GAS INVESTIGATION PLAN AND DENR APPROVAL LETTER

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY
231 HAYWOOD STREET, ASHEVILLE, NC 28801
TEL.828.281.3350 FAC.828.281.3351
WWW.ALTAMONTENVIRONMENTAL.COM

Transmitted via email to:
allen.gaither@ncdenr.gov

July 9, 2009

Mr. Allen Gaither
Division of Waste Management
Solid Waste Section
Asheville Regional Office
2090 US Highway 70
Swannanoa, NC 28778

Subject: Environmental and Geotechnical Investigation
Proposed Livestock Market and Events Center
Closed International Paper Company Landfill 5C
Permit #44-01, Canton, NC

Dear Mr. Gaither,

Thank you for speaking with Altamont Environmental, Inc. (Altamont) recently regarding the feasibility investigation of the closed International Paper Company Landfill 5C (landfill). On behalf of International Paper Company and Western North Carolina Communities, LLC, we would like to conduct an investigation to determine the suitability of the construction and operation of a livestock market and events center at the referenced landfill. The landfill is apparently lined with three-inch diameter washed stone and is capped with approximately two feet of clayey soil material. The investigation will include penetrating the existing clay cap and waste in order to collect samples of the waste for health and safety concerns and geotechnical evaluations, explore the depth of waste, and install landfill gas probes. This letter includes a description of the proposed work and requests approval from the North Carolina Department of Environment and Natural Resources (DENR), Division of Waste Management (DWM), Solid Waste Section to conduct the investigation.

The investigation will be conducted in the two easternmost landfill cells, the earthen dikes that surround those cells, the borrow area for the landfill cover (east of the landfill), and other areas outside the eastern waste boundary. The attached Figure 1 identifies the area of the landfill where the investigation will take place.

GEOTECHNICAL EVALUATION

Initial Investigation

Prior to conducting the geotechnical evaluation, Altamont and its subcontractors are currently locating aboveground and belowground utilities, waste boundaries, leachate lines, waste thicknesses, and buffers in potential development areas and obtaining a current topographical and boundary survey of the relevant portions of the property. The aforementioned work is being completed with a variety of standard locating and surveying equipment as well as ground-penetrating radar and electromagnetic profiler equipment.

Altamont will also collect one representative sample of the waste below the existing cover in order to address health and safety concerns for the proposed investigation plan. The sample of waste will be collected using a hand auger by a technician wearing Tyvek sleeves, safety glasses, and Nitrile gloves. Sampling equipment and the waste will be kept in a downwind direction from the sampler before being placed in laboratory-supplied sample containers and shipped to the laboratory. Waste will be analyzed for various constituents including but not limited to dioxins, metals, pH, semivolatile organic compounds, volatile organic compounds, coliforms, and total organic halides. The analyses will determine the exposure risk to drillers and geotechnical laboratory technicians should they ingest, inhale, or come into dermal contact with the landfill waste. Before the geotechnical evaluation is conducted, the utilities will be located, the appropriate risk will be measured, and personal protective equipment will be prescribed for this proposed investigation.

Landfill Cells for Building and Parking Areas

The geotechnical evaluation proposed within and surrounding the referenced landfill cells will consist of approximately 20 soil test borings. Standard Penetration Testing will be used to investigate the subsurface conditions at the two landfill cells (approximately 10 borings will be placed within or just outside each cell). Within landfill cells, borings will be extended through the landfill waste to the underlying material.

The borings will be monitored for groundwater. Standard Penetration Testing will be performed at two-and-a-half-foot intervals to a depth of 10 feet below the existing grade. Thereafter, Standard Penetration Testing will be performed at five-foot intervals. Upon conclusion, the borings will be backfilled with a combination of bentonite and soil auger cuttings. The bentonite will be placed in the bottom and top of each borehole upon completion. We propose that six boreholes remain open to allow for immediate conversion into landfill gas probes.

Eight three-inch-diameter, undisturbed, samples of the in-place soils will be obtained from the borings. The undisturbed samples will be returned to the laboratory for visual classification. Four laboratory consolidation tests will be performed on selected samples of the soils obtained from the undisturbed sampling. The consolidation tests will be used to estimate both total and differential settlement for the proposed buildings.

Two Atterberg limits and 20 natural-moisture-content determination tests will be performed on selected samples of soil obtained from the penetrometer testing intervals. The results of this testing will be used to determine soil plasticity characteristics.

Borrow Area

The portion of the borrow area that lies outside of the waste boundary will be investigated using a trackhoe to excavate observation pits. The observation pits will be excavated to refusal on the underlying bedrock unit, or to the length of the trackhoe arm (typically 12 feet to 15 feet), whichever occurs first. The observation pits will be backfilled with the excavated material upon completion.

Two Atterberg limits and 20 natural-moisture-content determination tests will be performed on selected samples of soil obtained from the penetrometer testing intervals. The results of the Atterberg limits and natural-moisture-content testing will be used to determine soil plasticity characteristics.

Two Standard Proctor and natural-moisture-content determination tests will be performed on composite soil samples collected at the site from the observation pits. The Standard Proctor test will be used to determine soil compaction characteristics including maximum dry density and optimum moisture content.

A geotechnical engineering report will be prepared to present the results of the field and laboratory testing. The report will include a discussion of the subsurface soils encountered, site geology, and the results of the settlement analysis. The report will provide geotechnical engineering recommendations regarding site preparation for proposed buildings (two) and parking areas, foundation type, and allowable foundation bearing capacity, and will include a cross-section through the borings illustrating the findings at the boring locations.

LANDFILL GAS MONITORING

Six landfill gas (LFG) monitoring probes are proposed to be installed following the conclusion of the geotechnical evaluation for this investigation plan. The LFG probes will be constructed with one-inch diameter schedule 40 PVC riser pipe, with one-inch diameter slotted screen at the bottom. The slotted section will be surrounded by a filter material. The casing will be sealed above the filter material and slotted screen with a fine-grained sand pack, bentonite, grout, and concrete seal as shown in the attached Figure 2.

For your reference, a previous LFG evaluation was performed by the Town of Canton when developing the nearby Landfill 5B cell as a baseball park. Landfill 5B and Landfill 5C contain similar waste. The evaluation by the Town of Canton found 0.1% methane over a one-week long passive LFG monitoring event in one of four sampling locations on the Landfill 5B cell. If LFG is found at similar low concentrations during the proposed monitoring at Landfill 5C, ongoing LFG monitoring may not be necessary.

Additionally, a second phase of LFG monitoring may be proposed during the post-closure permit modification that will be submitted after (1) this investigation is completed, (2) feasibility of the project is further assessed, and (3) plans and specifications for the project are finalized. Two 1979 photos taken of the Landfill 5C during the late stages of construction, as well as an image of the 1980 as-built drawing of the landfill, are attached for your reference.

The goals of this investigation plan are to determine if the landfill is a feasible site for the proposed livestock market and events center, and to:

- Protect the health and safety of the public and livestock that will use the proposed facility
- Avoid negative environmental impacts from development at the landfill site
- Protect the integrity of the landfill from impact from the proposed facility

Altamont appreciates your time and consideration of this investigation plan, and we look forward to your comments and approval. Please feel free to call or respond with any questions or comments related to this project.

Sincerely,

ALTAMONT ENVIRONMENTAL, INC.

Paul Dow, P.E.

Enclosures: Figure 1–Investigation Plan Area
Figure 2–Landfill Gas Probe
1979 Photos of Landfill 5 Construction
As-Built Drawing of Landfill 5C

LEGEND:

UTILITY LOCATION AND TOPOGRAPHIC/BOUNDARY AREA

NOTE:

BOUNDARY AREA = APPROXIMATELY 30.4 ACRES

SOURCE:

TOPOGRAPHIC SURVEY FROM LAW ENGINEERING TESTING CO., CHARLOTTE, NC
AERIAL PHOTOGRAPH FROM HAYWOOD COUNTY GIS

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY
231 HAYWOOD STREET, ASHEVILLE, NC 28801
TEL.828.281.3350 FAC.828.281.3351
WWW.ALTAMONTENVIRONMENTAL.COM

DRAWN BY: ANNA SAYLOR
PROJECT MANAGER: JOEL LENK
CLIENT: INTERNATIONAL PAPER/WNC, LLC
DATE: 07/01/2009

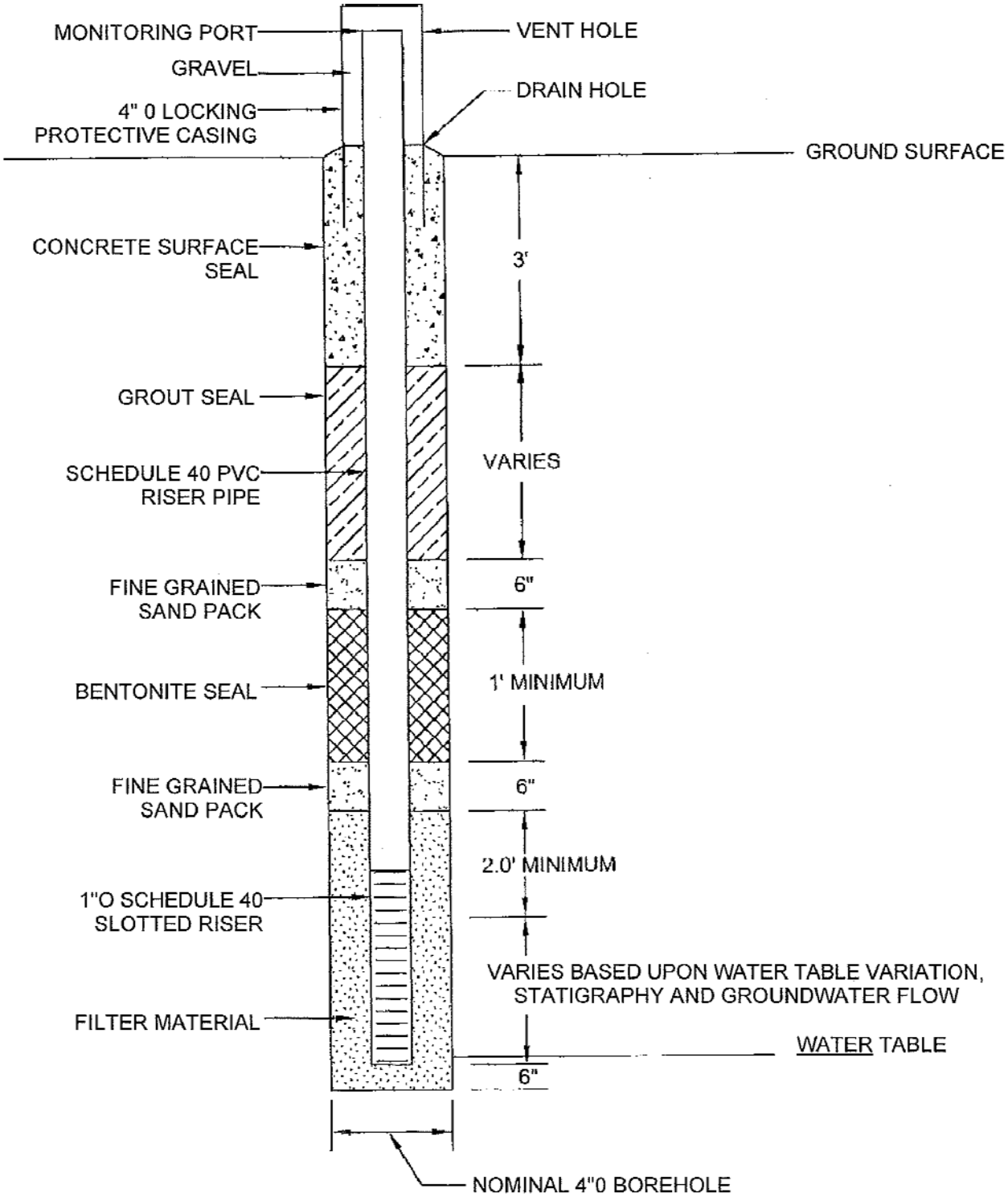
SCALE (FEET)
100 0 100 200

INVESTIGATION PLAN AREA

LIVESTOCK MARKET AND
EVENTS CENTER
HAYWOOD COUNTY, NORTH CAROLINA

FIGURE
1

P:\IP\LF 5\LIVESTOCK MARKET AND EVENTS CENTER\MAPPING\SCANNED TOPO.DWG



Source: Waste Management, Inc. - Landfill Gas Probe Construction - High Acres Landfill and Recycling

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LANDFILL GAS PROBE (TYPICAL)

INTERNATIONAL PAPER LANDFILL 5C
PERMIT# 44-01
HAYWOOD COUNTY, NORTH CAROLINA

FIGURE 2

DRAWN BY: PAUL DOW
PROJECT MANAGER: JOEL LENK
CLIENT: IP / WNCC, LLC
DATE: 07/08/09

NOT TO SCALE

P:\IP\LF 5\LIVESTOCK..\DENR...\FIGURE 2-INVESTIGATION LTR.DWG

Photograph 1. Landfill 5C cell construction from September 13, 1979

Photograph 2. Landfill 5B cell construction from September 13, 1979

NOTES:

1) ONLY THE TWO WESTERNMOST COMPARTMENTS ARE TO BE CONSTRUCTED INITIALLY. POSSIBLE LOCATION OF FUTURE COMPARTMENTS IS ILLUSTRATED BY DASHED LINES.

2) THE LEACHATE COLLECTION SYSTEM IS ILLUSTRATED FOR ONLY THE SOUTHWEST COMPARTMENT. ALL OTHER COMPARTMENTS WILL BE SIMILAR.

3) ALL EROSION DAMAGE SHOULD BE REPAIRED PRIOR TO GRASSING AND ROAD BASE PLACEMENT.

4) ENTIRE LANDFILL SHOULD BE GRASSED AND THE CRUSHED STONE ROAD BASE PLACED PRIOR TO ANY LANDFILLING. TEMPORARY SEDIMENTATION CONTROL WILL BE REQUIRED UNTIL A SUFFICIENT STAND OF GRASS IS DEVELOPED.

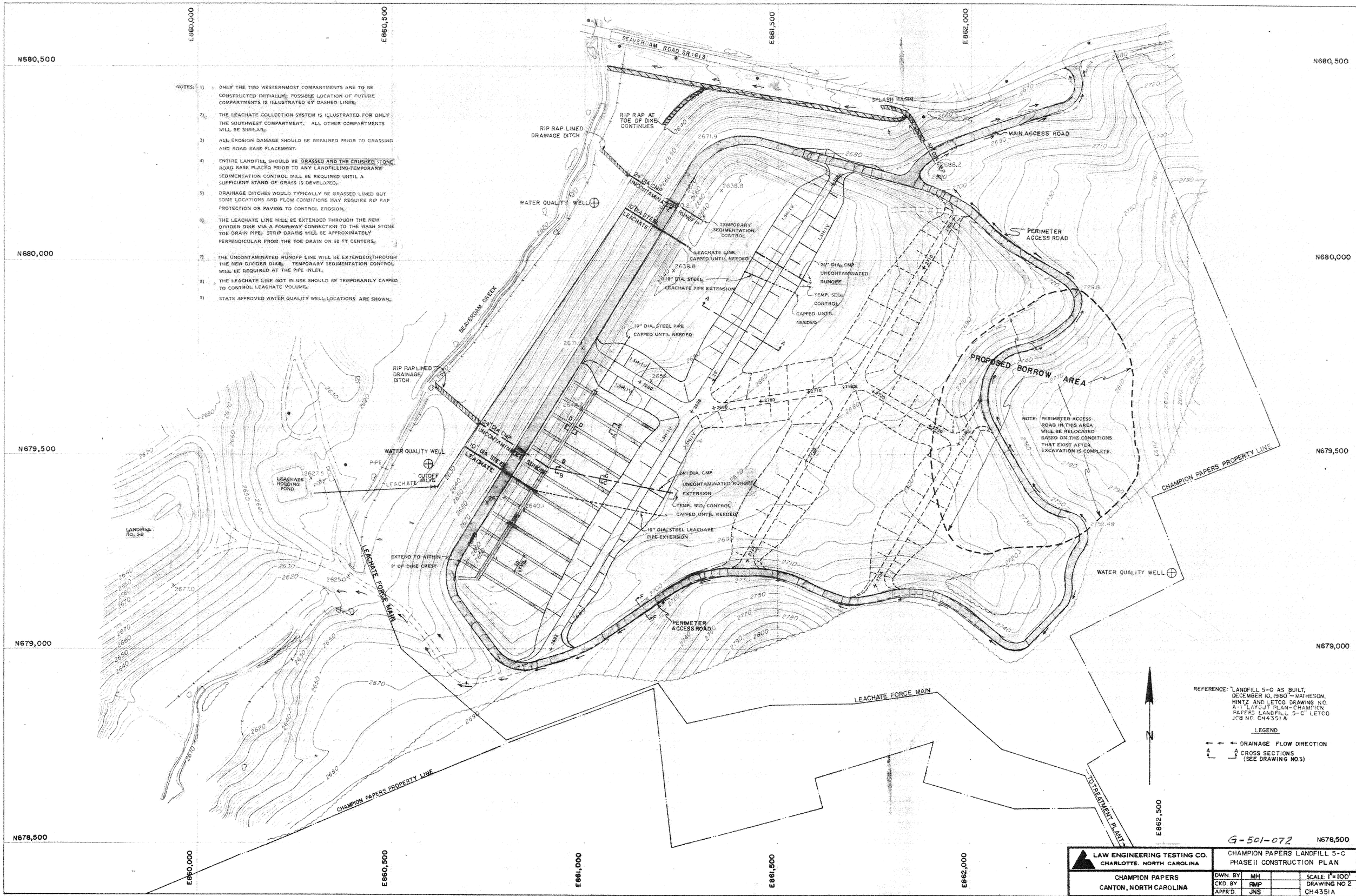
5) DRAINAGE DITCHES WOULD TYPICALLY BE GRASSED LINED BUT SOME LOCATIONS AND FLOW CONDITIONS MAY REQUIRE RIP RAP PROTECTION OR PAVING TO CONTROL EROSION.

6) THE LEACHATE LINE WILL BE EXTENDED THROUGH THE NEW DIVIDER DIKE VIA A FOUR-WAY CONNECTION TO THE WASH STONE TOE DRAIN PIPE. STRIP DRAINS WILL BE APPROXIMATELY PERPENDICULAR FROM THE TOE DRAIN ON 50 FT CENTERS.

7) THE UNCONTAMINATED RUNOFF LINE WILL BE EXTENDED THROUGH THE NEW DIVIDER DIKE. TEMPORARY SEDIMENTATION CONTROL WILL BE REQUIRED AT THE PIPE INLET.

8) THE LEACHATE LINE NOT IN USE SHOULD BE TEMPORARILY CAPPED TO CONTROL LEACHATE VOLUME.

9) STATE APPROVED WATER QUALITY WELL LOCATIONS ARE SHOWN.



REFERENCE: "LANDFILL 5-C AS BUILT, DECEMBER 10, 1980" — MATHESON, HINTZ AND LETCO DRAWING NO. A-1 "LAYOUT PLAN-CHAMPION PAPERS LANDFILL 5-C" LETCO JOB NO. CH4351A

LEGEND

← ← DRAINAGE FLOW DIRECTION

A A CROSS SECTIONS (SEE DRAWING NO.3)

G-501-072

LAW ENGINEERING TESTING CO. CHARLOTTE, NORTH CAROLINA	CHAMPION PAPERS LANDFILL 5-C PHASE II CONSTRUCTION PLAN			
CHAMPION PAPERS CANTON, NORTH CAROLINA	DWN. BY	MH		SCALE: 1"=100'
	CKD. BY	RMP		DRAWING NO 2
	APPR'D	JNS		CH4351A

2

North Carolina Department of Environment and Natural Resources
Division of Waste Management

Beverly Eaves Perdue
Governor

Dexter R. Matthews
Director

Dee Freeman
Secretary

August 17, 2009

Mr. Paul Dow
Altamont Environmental, Inc.
231 Haywood Street
Asheville, North Carolina 28801

Subject: Authorization – Geotechnical & Environmental Investigation
Champion International Landfill #5C
Haywood County, Permit #44-01, Document ID No. 8407

Mr. Dow:

The Division of Waste Management, Solid Waste Section (Section) has completed a review of the Environmental and Geotechnical Investigation submittal (DIN8006) and the Response to Request for Additional Information (DIN8265) for the closed International Paper Company Landfill 5C.

Based on this review, the Section authorizes the proposed activities in accordance with the documents referenced above. Please note, landfill gas monitoring data collected from groundwater monitoring wells cannot be used to satisfy the requirements of 15A NCAC 13B.0503(2)(a) since these wells intersect the water table.

If you should have any questions regarding this matter please contact me at (828) 296-4703, or by email at allen.gaither@ncdenr.gov .

Sincerely,

Allen Gaither
Environmental Engineer

Cc: Tom Richardson – International Paper
Christine Ritter – SWS/RCO
Andrea Keller – SWS/ACO

APPENDIX E

GEOTECHNICAL EXPLORATION AND ADDENDUM

FOUNDATION SYSTEMS ENGINEERING, P.C.
Geotechnical Engineering and Consulting

October 13, 2009

Mr. Joel D. Lenk, P.G.
Altamont Environmental, Inc.
231 Haywood Street
Asheville, North Carolina 28801

RE: Geotechnical Exploration
Livestock Market & Events Center
International Paper Landfill 5C
Canton, North Carolina
FSE Project No. 39142

Dear Mr. Lenk:

As authorized by your purchase order number 22600314-09-03, we have completed a geotechnical exploration for the above referenced project. The purpose of the exploration was to gather subsurface data in order to make engineering recommendations regarding site preparation, foundation type, foundation bearing capacity and pavement section for the proposed Livestock Market and Events Center at the Closed International Paper Landfill 5C. The firms of Foundation Systems Engineering, P. C. and Construction Materials Laboratory completed this work.

SCOPE OF SERVICES

Twenty six (26) soil auger borings, and nine (9) soil test borings with Standard Penetration testing were used to investigate the proposed Livestock Market & Events Center. The borings were drilled at locations selected by our firm, with your firm's concurrence. The borings were located in the field by our firm. Ground surface elevations were extrapolated from topographic mapping provided by your firm. The elevations were recorded on the *Test Boring Records and Auger Boring Records*. The borings were monitored for groundwater. Upon completion, the borings were backfilled with soil auger cuttings. Borings placed within the landfill were backfill with bentonite. Boring depths and ground surface elevations at the boring locations may be seen in Tables I, II and III of this report.

P.O. Box 9449
Knoxville, TN 37940-0449
(865) 577-3361 fax (865) 573-1817

P.O. Box 5267
Kingsport, TN 37663
(423) 239-9226 fax (423) 239-8677

Standard Penetration testing was performed in the soil test borings, and Dynamic Cone Penetrometer testing was performed at soil auger borings placed within the proposed building area. Both Standard Penetration testing and Dynamic Cone Penetrometer testing was performed at 2.5-foot intervals to a depth of 10 feet below existing grade. Thereafter, testing was performed at 5-foot intervals to predetermined drilling depths and/or auger refusal.

The underlying bedrock was core drilled at one boring location. NX sized rock core drilling was performed. The results of the rock core drilling may be seen on the attached *Test Boring Records.*

A drilling log was prepared for each of the borings. The log includes the results of the Standard Penetration testing and/or Dynamic Cone Penetrometer testing, and soil/rock stratification with description.

Upon conclusion of the soil test borings, three (3) of the boring locations were converted to gas probes. One (1) additional gas probe was installed within proposed building area. Eleven (11) additional gas probes were installed throughout Landfill 5C and the adjacent Landfill 5B, under a separate contract. Gas probes were constructed as per direction by your firm. Gas probe materials (riser pipes, sand, bentonite, etc.) were provided by your firm.

Three (3) Atterberg Limits tests and natural moisture content determination tests were performed on selected samples of the soil obtained from the borings. The Atterberg Limits testing was used to determine soil plasticity characteristics. The results of the Atterberg limits testing may be seen in Table IV of the report, and in the Appendix of the report.

Three (3) Standard Proctor compaction tests were performed on representative samples of soil encountered at the site to determine soil compaction characteristics, including maximum dry density and optimum moisture content. The results of the Proctor tests were used to determine material suitability for use as structural backfill material. The results of the Standard Proctor compaction tests may be seen in Table V of this report, and in the Appendix of this report.

One (1) consolidated, undrained, effective stress, triaxial shear test was performed on a remolded sample of the proposed borrow soils. The results of the triaxial shear testing

were used for slope stability analysis of the proposed fill slope. The results of the triaxial shear test may be seen in Table VI of this report, and in the Appendix of this report.

One (1) consolidated, undrained, effective stress, triaxial shear test was performed on an undisturbed sample of the landfill waste. The triaxial shear test was performed in order to determine the strength parameters for the landfill waste. The results of the triaxial shear test may be seen in Table VI of this report, and in the Appendix of this report.

One (1) laboratory consolidation test was performed on a selected sample of the landfill waste obtained from the undisturbed sampling. The results of the consolidation test were used to estimate settlement of the proposed parking and drive areas overlying the landfill cells. The results of the consolidation test may be seen in Table VII of this report, and in the Appendix of this report.

A brief summary of the test procedures utilized on this project are located in the appendix of this report.

SITE LOCATION AND CONDITIONS

The International Paper Landfill 5C is located on the southwest side of Beaverdam Road, south of Interstate I-40, in Canton, North Carolina. The landfill is accessed via a concrete drive that extends approximately 250 feet to the west from the Beaverdam Road. From the west end of the concrete drive, a gravel road extends to the northwest and southeast, making a loop around the perimeter landfill.

Topographically, the International Paper Landfill 5C is located at the base of the northern flank of a small ridge. In general, the landfill property and surrounding properties slope downward in elevation to the north, towards a small stream that runs along the northwest side of the landfill. Locally, the stream flows from the northeast to the southwest. In general, the landfill cells are relatively level with embankments sloping downward in elevation to the northwest between landfill cells. The landfill cells have an undulating ground surface with numerous dips due to settlement of the landfill waste during and after construction.

The landfill appears to be periodically mowed. At the time of our exploration, the landfill was covered with short to tall weeds. The ridge located to the south of the landfill is heavily wooded. Residential properties are located at the crest of the ridge. The base of

the ridge, located at the east corner of the landfill, appears to have been stripped for borrow material at the time of landfill construction. The borrow area has since overgrown with thick brush. Numerous rock outcroppings were observed within the borrow area.

Based on review of preliminary site and grading plans prepared by Ambient Design Group, we understand that the proposed Livestock Market and Events Center buildings are to be located off and to the east of the landfill, at the north end of the borrow area. This area contains moderate to steep slopes. The grading plans indicate that up to approximately 40 feet of cut will be required at the southeast corner of the Livestock Market and Events Center site pad, and up to approximately 45 feet of fill along the north end of the site pad. Proposed cut and fill slopes are indicated to be approximately 2H:1V.

Parking and drive areas will be located to the south and west of the Livestock Market and Events Center. The parking and drive areas located to the west of the building area will extend over an existing landfill cell. The grading plans indicate that fill, ranging in thickness from approximately 2 feet to approximately 15 feet, will be placed over the landfill cell.

SUBSURFACE STRATIFICATION

Ten soil auger borings and two soil test borings (B-1 through B-8 & RC-1) were utilized to investigate subsurface conditions beneath the proposed building area, east of the existing landfill. Two soil auger borings (B-9 & B-10) were utilized to investigate the subsurface conditions within the cut and fill slopes. The soil auger borings were placed using a Bobcat T-200 Skid Steer loader with hollow stem auger attachments and Dynamic Cone Penetrometer testing; the soil test borings were placed using a CME 55 truck-mounted drill rig with Standard Penetration testing. The underlying bedrock unit was core drilled at one location (RC-1) using NX size, diamond impregnated core.

Fourteen soil auger borings (A-1 through A-7, A-E4, A-E6, A-E7, A-E10 & A-E11 through A-E11B) were utilized to investigate the subsurface conditions within the proposed cut areas of the proposed building pad and the soil borrow area. The soil auger borings supplemented observation excavation pits (with the letter designation "E") performed by your firm. The soil auger borings were placed using a Bobcat T-200 Skid Steer loader with hollow stem auger attachments.

Two soil test borings (B-11 & B-12) were utilized to investigate the subsurface conditions within the landfill cells. Five soil test borings (B-13 through B-15) were utilized to investigate the subsurface conditions within the landfill berms. The soil test

borings were placed using a CME 55 truck-mounted drill rig with Standard Penetration testing.

Following is a brief summary of the soils encountered at the boring locations. Additional subsurface details may be seen on the attached *Auger Boring Records* and *Test Boring Records*. Subsurface stratification indicated on the boring logs is approximate, and represents our interpretation of the soils encountered at the Dynamic Cone Penetrometer and Standard Penetration testing intervals. Ground surface elevations indicated on the boring logs were interpolated from site topographic mapping and approximate boring locations. Ground surface elevations and boring locations are approximate.

The boring depths and approximate ground surface elevation at each of the boring locations may be seen in the following tables.

Table I – Boring Data Summary – Building & Slope Areas

Boring Number	Ground Elevation*	Drill Depth, Ft.	Terminated/ Refusal	Location
B-1	2744	2.0	Auger Refusal	Building
B-1A	2744	2.5	Auger Refusal	Building
B-1B	2744	3.5	Auger Refusal	Building
B-2	2730	3.0	Boring Terminated	Building
B-2A	2730	22.0	Auger Refusal	Building
B-3	2727.5	8.0	Auger Refusal	Building
B-4	2733	3.0	Auger Refusal	Building
B-5	2722.5	10.0	Boring Terminated	Building
B-6	2717	2.0	Auger Refusal	Building
B-7	2692	6.5	Auger Refusal	Building
B-8	2703	3.0	Auger Refusal	Building
B-9	2767	30.0	Boring Terminated	Cut Slope
B-10	2680.5	15.0	Boring Terminated	Fill Slope
RC-1	2729	23.0	Auger Refusal	Building

* Ground Surface Elevations Are Approximate.

Table II – Boring Data Summary – Building & Borrow Area

Boring Number	Ground Elevation*	Drill Depth, Ft.	Terminated/ Refusal	Location
A-1	2763	25.0	Boring Terminated	Borrow Area
A-2	2746	7.5	Auger Refusal	Borrow Area
A-3	2744	25.0	Boring Terminated	Borrow Area
A-4	2730	15.0	Boring Terminated	Building
A-5	2733.5	15.0	Boring Terminated	Building
A-6	2728	4.5	Boring Terminated	Building
A-7	2723	3.5	Auger Refusal	Building
A-E4	2757	25.0	Boring Terminated	Borrow Area
A-E6	2788	25.0	Boring Terminated	Borrow Area
A-E7	2747	16.0	Auger Refusal	Borrow Area
A-E10	2830	25.0	Boring Terminated	Borrow Area
A-E11	2800	4.5	Auger Refusal	Borrow Area
A-E11A	2800	4.0	Auger Refusal	Borrow Area
A-E11B	2800	13.0	Auger Refusal	Borrow Area

* Ground Surface Elevations Are Approximate.

Table III – Boring Data Summary – Landfill

Boring Number	Ground Elevation*	Drill Depth, Ft.	Terminated/ Refusal	Location
B-11	2720	40.0	Boring Terminated	Landfill Cell
B-12	2745	30.0	Boring Terminated	Landfill Cell
B-13	2735	11.0	Auger Refusal	Landfill Berm
B-14	2715	2.0	Boring Terminated	Landfill Berm
B-14A	2715	6.0	Auger Refusal	Landfill Berm
B-14B	2715	31.0	Auger Refusal	Landfill Berm
B-15	2715	6.0	Auger Refusal	Landfill Berm

* Ground Surface Elevations Are Approximate.

Based on the results of the borings, a thin layer of topsoil was observed at existing grade across the majority of the site. The thickness of the topsoil veneer typically varied from approximately 2 inches to approximately 6 inches. Outside of the perimeter of the landfill cells, residual soils were encountered beneath the topsoil veneer. Residual soils were encountered at existing grade (no topsoil veneer) at several locations within the

borrow area. In general, the residual soils consisted of very stiff to hard, micaceous silt, which transitioned quickly to soft, partially weathered gneiss. The partially weathered gneiss was saprolitic and was easily penetrated by our augers. The results of the Dynamic Cone Penetrometer tests within the partially weathered gneiss was typically 50 blow in approximately 1 inch. As indicated in Tables I and II, fifteen of the borings placed within the building, slope and borrow areas refused on the moderately hard to hard, underlying bedrock unit. The remaining borings (exclusive of B-2 and A-6) were terminated in partially weathered gneiss at their predetermined termination depths. No groundwater was encountered at the time of drilling.

Boring RC-1 refused on the underlying bedrock unit at a depth of 23 feet below existing grade. The gneiss bedrock at RC-1 was then core drilled to a depth of 33 feet below existing grade. From a depth of approximately 23 feet to a depth of approximately 33 feet, hard, dark gray, gneiss with several weathered/saprolitic seams and fractures was encountered. Rock core recovery was approximately 89 percent and the rock quality designation value was approximately 48 percent.

Borings B-2, B-2A and A-6 encountered fill soils beneath the topsoil veneer. In general, the fill soils consisted of slightly moist, micaceous silt. The thickness of the fill soils varied from approximately 1 foot to approximately 4.5 feet. The landfill waste (paper sludge/ash) was encountered beneath the fill soil cap. Borings B-2 and A-2 were immediately terminated when the landfill waste was encountered. Boring B-2A was extended through the landfill waste. The landfill waste was encountered to a depth of approximately 16 feet below existing grade. The bottom 3 feet of the landfill waste was mixed with gravels. Standard Penetration testing within the waste resulted in N Values varying from 1 to 4. Residual, partially weathered gneiss was encountered beneath the landfill waste at a depth of approximately 16 feet. B-2A refused on the hard, underlying bedrock unit at a depth of 22 feet below existing grade. No groundwater was encountered at the time of drilling.

Borings B-11 and B-12 were placed within the landfill cells. Fill soils were encountered beneath the topsoil veneer. The fill soil cap typically consisted of stiff, micaceous clayey silt. The fill soil was encountered to a depth of approximately 4 feet at B-11 and approximately 8.5 feet at B-12. The landfill waste (paper sludge/ash) was encountered beneath the fill soil cap. Standard Penetration testing within the waste resulted in N Values varying from 11 to Weight of Hammer (WOH). Both borings were terminated in the landfill waste at their predetermined termination depths. Groundwater was

encountered at B-11 at a depth of 27 feet at the time of drilling. No groundwater was encountered at B-12 at the time of drilling.

Borings B-13 through B-15 were placed within the landfill berms. Borings B-13, B-14, B-14A and B-14B encountered fill soils beneath the topsoil veneer. In general, the fill soils consisted of very stiff, micaceous clayey silt mixed with partially weathered gneiss. B-13 encountered soft, residual partially weathered gneiss at a depth of approximately 6 feet, and refused at a depth of approximately 11 feet below existing grade. B-14 encountered landfill waste at approximately 2 feet and was immediately terminated. B-14A refused in the fill at a depth of approximately 6 feet. B-14A encountered very stiff, residual micaceous silt to soft, partially weathered gneiss at a depth of approximately 28 feet, and refused at a depth of approximately 31 feet below existing grade. B-15 encountered residual, soft, partially weathered gneiss beneath the topsoil veneer, and refused at a depth of approximately 6 feet below existing grade. No groundwater was encountered at the time of drilling.

Upon conclusion, borings B-11, B-12, and RC-1 were converted to gas probes G-12, G-14, and G-15, respectively. An additional gas probe, G-13 was placed within the proposed building area. Eleven additional gas probes (G-1 through G-11) were installed throughout Landfills 5B and 5C under a separate contract.

GEOLOGY

Physiographically the project site is located in the Blue Ridge Belt. This is a region of sedimentary and metamorphic rock formations of Cambrian to Precambrian age. The project site is located on the Geologic Map of North Carolina. The Geologic mapping was compiled by Phillip M. Brown, Chief Geologist of the North Carolina Gelogical Survey in 1985. Published mapping indicates that the site is underlain by the Biotite Gneiss. The Biotite Gneiss is described as migmatic; interlayered and gradational with biotite-garnet gneiss and amphibolite; locally abundant quartz and alumino-silicates.

LABORATORY TESTING

Atterberg Limits & Natural Moisture Content

Three (3) composite, bulk, samples of soil obtained from the borings were selected for Atterberg Limits and natural moisture content testing. Samples were selected for testing from borings A-E6, A-2, and a combined sample from borings B-9, A-E4, A-E7 and A-

E10. Standard Proctor compaction tests were also performed on each of the above three samples. The samples are designated as P-1, P-2, and P-3, respectively, in Table IV below.

The soil liquid limit is the moisture content at which the soil passes from a plastic to a liquid state. Since soil cohesion retards flow, the liquid limit test is an index of soil cohesion. Soil cohesion is negligible at the liquid limit. High liquid limit values (greater than 50) indicate soils of high clay content and low load carrying characteristics.

The soil plastic limit is the moisture content at which the soil changes from a semisolid to a plastic state. Some silts and sands are non-plastic; however, most soils composed of silts and clays do have a plastic limit. The moisture content of silts and clays does have a direct bearing on their load carrying characteristics. A very important change in load carrying capacity of soil occurs at the plastic limit. Load carrying capacity decreases rapidly as the soil moisture content increases above the plastic limit.

The results of the Atterberg Limits and natural moisture content testing may be seen in the following table.

Table IV - Atterberg Limits Data Summary

Sample Number	Liquid Limit, %	Plastic Limit, %	Plasticity Index	Natural Moisture Content, %	USCS Soil Class.
Proctor 1 A-E6	34	32	2	17.5	ML
Proctor 2 A-2	25	27	NP	8.2	NP
Proctor 3 B-9, A-E4, A-E7 & A-E10	27	24	3	30.6	ML

The soil samples selected for testing are classified under the Unified Soil Classification System (USCS) as inorganic silts, very fine sands, rock flour, silty or clayey fine sands (ML), and non-plastic (NP).

The inorganic silts (ML) typically have good to poor compaction characteristics, with compaction typically achieved using a sheepsfoot or rubber tired roller. In general, the required compaction (percentage of Standard Proctor maximum dry density) for the upper 8 feet of fill beneath modestly loaded structures is 100 percent. Such soils have slight to medium compressibility and expansion characteristics, and poor drainage characteristics.

Standard Proctor Compaction Test

Bulk soil samples were obtained from each of the boring locations. The bulk samples were returned to the laboratory for visual classification by a member of our engineering staff. Based on visual classification using the *Guidelines For Systematic Classification Of Soil And Rock Based Upon Physical Inspection,* the bulk samples were combined into three composite samples. Standard Proctor compaction testing was performed on each of the three composite samples.

The Standard Proctor compaction test is used to determine soil compaction characteristics, including maximum dry density and optimum moisture content, under a given compactive effort. The compactive effort applied in conducting the Standard Proctor test has been established as simulating the full-sized equipment used in soil fill construction. A basic principle in soil analysis is that for a given force of compaction and given moisture content, a soil will have a corresponding density. A soil's structural properties vary with soil moisture content and density. As an example, soil strength values decrease rapidly as the soil moisture content increases above the soil plastic limit. Also, soil consolidation (settlement) is a function of soil compaction and soil moisture content. The results of the Standard Proctor compaction testing may be seen in the following table.

Table V – Moisture/Density Relationship (Proctor)

Proctor No.	Maximum Dry Density, PCF	Optimum Moisture Content - %	Natural Moisture Content - %	Plastic Limit - %
Proctor 1	110.8	15.9	17.5	32
Proctor 2	112.6	13.5	8.2	NP
Proctor 3	118.9	11.8	10.3	24

The results of the testing performed indicate that the soils are suitable for use as structural fill beneath building, slope and parking/drive areas.

Triaxial Shear Testing

One (1) consolidated, undrained, effective stress, triaxial shear test was performed on a remolded sample of the proposed borrow soils. The sample was selected from Proctor 3 and remolded to 98% of its Standard Proctor maximum dry density. The results of the triaxial shear testing were used for slope stability analysis of the proposed fill slope

One (1) consolidated, undrained, effective stress, triaxial shear test was perfomed on a relatively undisturbed sample of waste. The undisturbed sample was obtained from boring B-11 at an interval of approximately 18 to 20 feet below existing grade. The triaxial shear test was performed in order to determine the strength parameters for the landfill waste.

The results of the triaxial shear testing may be seen in the following table.

Table VI – Triaxial Shear Test Data Summary

Boring/ Sample Number	Sample Depth, Ft.	Wet Density, PCF	Water Content - %	Effective Cohesion – PSF	Effective Phi Angle – Degrees
P-3	-	136.1	16.8	336	32.7
B-11	18' – 20'	93.5	41.5	0	31.5

The results of the remolded, effective stress, triaxial shear testing were used for slope stability analysis of the proposed fill slope. The results of the slope stability analysis for the proposed fill slopes are discussed in the Slope Stability Analysis section below. Recommendations as to fill slope and cut slope construction are discussed in the Recommendations section below.

Laboratory Consolidation Testing

One laboratory consolidation test was performed on a selected sample of waste obtained from the undisturbed sampling. The sample selected for consolidation testing was obtained from boring B-12 (interval of 24 feet to 26 feet).

Any soil that is subjected to an increase in pressure (or load) experiences a readjustment in the soil structure. This readjustment consists primarily of plastic deformation with a corresponding reduction in void ratio. With regard to the consolidation testing performed for this project, a sample of undisturbed soil was subjected to incrementally increasing and then decreasing loads. The amount that the sample compresses over an interval of time is recorded. The results of the loading and sample deformation are presented in the form of three curves. These are void ratio versus applied pressure, coefficient of consolidation versus applied pressure, and sample compression versus elapsed time. These curves may be found in the appendix of this report.

A summary of the results of the consolidation testing may be seen in the following table.

Table VII – Consolidation Test Data Summary

Boring Number	Sample Depth, Ft.	Wet Unit Wt., PCF	Specific Gravity	Compression Index	Initial Void Ratio
B-12	24' – 26'	134.2	2.664	0.04	.456

The results of this data, in conjunction with the estimated loading, were used to estimate total and differential settlement of the landfill cells. The results of the settlement analysis are discussed in the Recommendations section below.

SLOPE STABILTY ANALYSIS

Our stability analysis was completed using PCSTABL6/si (version 6.0) for DOS software, in conjunction with STEDwin 2.5 editor for PCSTABL. Cross sections of the proposed slopes were obtained from proposed site grading plans and soil stratification obtained from the borings.

The result of the triaxial shear testing was used for slope stability analysis. Slope stability analysis factors of safety as referenced in this report are the ratio of the driving force (force causing the slope to move) to the resisting force (force tending to hold the

soil mass in-place). With regard to factor of safety values, a safety factor of 1 would indicate that the driving force is equivalent to the resisting force. A slope failure would be predicted to occur. As the factor of safety increases above 1, the risk of a slope failure decreases.

Based on our past experience and data from published engineering texts, we offer the following general guidelines for evaluation of slope stability factor of safety values. At a factor of safety of less than 1, a slope failure can be expected. At a factor of safety of between 1 and 1.5, slope failures do occur. At a factor of safety of between 1.5 and 2.0, slope failures are unlikely to occur. At a factor of safety of greater than 2, slope failures almost never occur. The greater the factor of safety value, the less likely that a failure will occur.

Fill Slope over Residual Soil

Based on our review of the site grading plans, we understand that up to approximately 45 feet of soil fill will be placed along the north side of the proposed Livestock Market and Events Center. The grading plans indicate that this will result in an approximate 60-foot tall, 2H:1V fill slope. The result of our analysis indicates a factor of safety value of approximately 1.74 for the proposed fill slope as indicated on the proposed site grading plans. Slope construction should be performed as outlined in the Recommendations section of this report.

Fill Slope over Landfill Cell

Based on our review of the site grading plans, we understand that up to approximately 15 feet of soil fill will be placed along the west side of the proposed Livestock Market and Events Center, over the existing landfill cell. The grading plans indicate a 2H:1V fill slope. The result of our analysis indicates a factor of safety value of approximately 1.34 for the proposed fill slope as indicated on the proposed site grading plans. We recommend that the fill slopes located over the existing landfill cell be reconfigured to 4H:1V, and use geogrid-reinforcement at the base of the fill slope. Constructed as outlined in the Recommendations section of this report, we estimate that the factor of safety value will increase to approximately 1.5. Slope construction should be performed as outlined in the Recommendations section of this report.

RECOMMENDATIONS

We offer the following engineering recommendations based on the geotechnical data gathered during our subsurface exploration and the proposed site and grading plans provided by Ambient Design Group.

Site Preparation

Building Area & Parking/Drive Areas beyond the Perimeter of the Landfill

We recommend that the proposed building area, plus a distance of 10 feet beyond the building perimeter, proposed parking and drive areas, and all areas scheduled for support of slopes, be stripped of all topsoil and roots and all soft, wet, or deleterious material. Clearing and grubbing should include all existing fill, stumps and roots from the existing tree cover. Topsoil and root thickness typically varied from approximately 2 inches to approximately 6 inches. More or less topsoil may be encountered between boring locations. Borings B-2, B-2A and A-6 encountered landfill waste. It is our understanding that the proposed building area will be shifted to the east in order to avoid the landfill cells.

Tables I & II located within the Subsurface Stratification section of this report, detail the depth of auger refusal and boring termination depths at the boring locations. The majority of the borings encountered partially weathered gneiss above the actual refusal depth. Partially weathered gneiss that was penetrated by our augers can typically be removed using large sized dozers (Cat. D-9 or equivalent) with rock rippers (not soil scarifiers). Note, the contractor may elect to use blasting techniques for removal of this material as a convenience to allow easier removal, or may elect to use blasting to allow use of smaller sized dozers, etc. Excavation below our refusal depths will typically require blasting, hoe ram, or other hard rock excavation technique.

Once site stripping/clearing/grubbing operations are completed, areas requiring fill should be proofrolled prior to fill placement. Cut areas should be proofrolled after having been excavated to finished subgrade elevation. Proofrolling should be performed utilizing a heavily loaded vehicle, such as a loaded dump truck, and a criss cross proofrolling pattern. Areas that deflect excessively in the opinion of the geotechnical engineer should be undercut to firm soil or otherwise stabilized. Proofrolling should be performed under the direction of a geotechnical engineer. The

most effective method of stabilizing soft areas can best be determined in the field at the time of proofrolling. We do not anticipate that undercutting will be required. Soils that have been exposed to inclement weather (freezing, wetting, etc.) may require undercutting of the upper surface disturbed material.

Once clearing/stripping/proofrolling etc. (as outlined above) are successfully completed, areas of the site requiring fill may be backfilled and compacted to finished subgrade elevation with soil fill. Up to the level of 2 feet below finished subgrade elevation the fill should be compacted to a minimum of 98 percent of its maximum dry density as determined by the Standard Proctor test, ASTM D 698. The top 24 inches of fill should be compacted to 100 percent Standard proctor density. The moisture content of the soil fill should be maintained within the range of +/- 2 percent of Standard Proctor Optimum moisture content during compaction.

All fill should be placed and compacted in horizontal lifts. Backfill lift thickness should be limited to a maximum of 8 inches, loose. No fill should be placed on a sloping surface. A series of benches or terraces should be used to tie the sloping hillside and fill together. The benching should begin at the toe of the fill slope. In-place density testing should be performed concurrent with placement of all fill to ensure the desired density is achieved.

Soil fill placed beneath the proposed building and paved area should consist of lean, silty clay, free of organics, and rock fragments larger than 4 inches in greatest dimension. The soil fill should have a liquid limit of less than 50 percent, a plasticity index of less than 30, a plastic limit below the Standard Proctor optimum moisture content, and a minimum Standard Proctor maximum dry density of 92 PCF.

All slopes should be protected from erosion as soon after construction as possible. An erosion control blanket or other method should be used to prevent washing of the fill soils. Both cut slopes and fill slopes should be constructed no steeper than 2H:1V. The moderately hard to hard, relatively sound gneiss may be laid back at a slope of approximately 1H:1V. Any loose material should be removed from the slope face at the time of slope construction.

Site grading should be performed to ensure that positive drainage is maintained away from the building, parking/drive and slope areas during and after construction. Ponding water around the building foundations can induce softening of the foundation bearing

material, which may cause long-term foundation settlement problems. Ponding water at the toe of cut or fill slopes can result in slope instability.

Parking/Drive Areas located over the Existing Landfill

We recommend that a geogrid-reinforced earth raft be utilized to support all parking/drive and slope areas located over the existing landfill cells. We recommend that the proposed parking/drive and slope areas be undercut to the level of 3 feet below proposed finished subgrade elevation. Areas that are currently at or below these elevations would only require stripping of the existing topsoil and root veneer. Extreme care should be taken to avoid excavation into the landfill waste. We recommend that proposed grades be adjusted to avoid undercutting into the landfill or cap.

Once undercutting is completed (if any is required), the upper 6 inches of the in-place material at the undercut level should be reworked and recompacted to a minimum of 95% Standard Proctor density.

Once reworked and recompacted, the upper surface of the in-place material at the undercut level should be smoothed to remove all ruts, clods, boulders, etc. Once smoothed, these areas should be covered with a geogrid. We recommend that Tensar TriAx TX 170, or engineer approved equal, be utilized. The geogrid should use a minimum lap width of 1.5 feet between successive roll widths and at the ends of the rolls of geogrid. The geogrid should be hand tensioned to remove wrinkles and grabs. Landscape staples or other method should be used to maintain tensioning until the first lift of fill is placed over the geogrid. Zip ties may be used to ensure the overlap is maintained during placement of the first lift of fill over the geogrid.

Once the geogrid is in place, the proposed parking/drive and slope areas may be backfilled and compacted to finished subgrade elevation with soil fill. Up to the level of 2 feet below finished subgrade elevation the fill should be compacted to a minimum of 98 percent of its maximum dry density as determined by the Standard Proctor test, ASTM D 698. The top 24 inches of fill should be compacted to 100 percent Standard Proctor density. The moisture content of the fill should be controlled to within the range of +/- 2 percent of Optimum moisture content during compaction

All fill should be placed and compacted in horizontal lifts. Backfill lift thickness should be limited to a maximum of 8 inches, loose. No fill should be placed on a sloping surface. A series of benches or terraces should be used to tie the sloping hillside and fill together. The

benching should begin at the toe of the fill slope. In-place density testing should be performed concurrent with placement of all fill to ensure the desired density is achieved.

Care should be taken during placement of the fill over the geogrid. Equipment should not operate directly on the geogrid. Fill should be placed at the edge of the geogrid, and spread across the geogrid using a low contact pressure loader, dozer, or other similar equipment. Care should be taken when placing the initial lifts of fill over the first layer of geotextile to prevent overloading the underlying weak soils. Areas where pumping of the subgrade occurs should be repaired.

Soil fill placed beneath the proposed building and paved area should consist of lean, silty clay, free of organics, and rock fragments larger than 4 inches in greatest dimension. The soil fill should have a liquid limit of less than 50 percent, a plasticity index of less than 30, a plastic limit below the Standard Proctor optimum moisture content, and a minimum Standard Proctor maximum dry density of 92 PCF.

All slopes should be protected from erosion as soon after construction as possible. An erosion control blanket or other method should be used to prevent washing of the fill soils. Fill slopes located over the landfill should be constructed no steeper than 4H:1V.

Site grading should be performed to ensure that positive drainage is maintained away from the parking/drive and slope areas during and after construction. Ponding water at the toe of fill slopes can result in slope instability.

Based on the results of the geotechnical exploration, we estimate that the proposed parking/drive areas bearing over the landfill waste could experience up to approximately 8 inches of total and differential settlement. This amount of settlement is estimated to occur under the largest loading of approximately 15 feet of new fill. As the amount of new fill decreases, and the thickness of the underlying waste decreases, the estimated settlement will also decrease. As such, minimal settlement is anticipated at the edge of the landfill cell.

Foundation Bearing Capacity

We recommend that a shallow foundation system consisting of continuous wall footings and spread footings be utilized for design. Bearing on compacted structural fill or very stiff residual soil, the footing may be sized, utilizing an allowable bearing capacity of 2500 PSF. Continuous footings should be sized a minimum of 24 inches in width and should utilize both top and bottom steel reinforcement. Spread footings should be sized a minimum of 3' X 3', or equivalent. Exterior footings should bear a minimum of 2 feet below outside grade for frost protection.

If rock is encountered in footings it should be excavated a minimum of 12 inches below design footing grade, and a minimum of 6 inches on either side of the footing. The footing should be backfilled to design footing grade with soil fill. The soil fill should be placed and compacted as outlined in the *Site Preparation* section above.

All footings should be inspected and have Dynamic Cone Penetrometer testing performed to confirm the assigned allowable bearing capacity. Footings should be poured with concrete as soon after excavation as possible. Foundation bearing soils exposed to inclement weather should be cleaned out down to undisturbed soil. Footings requiring undercutting may be backfilled with flowable fill. Positive drainage should be maintained away from the building areas during construction such that no ponding of water around building foundations is allowed.

We recommend that the slab-on-grade bear on a minimum of 4 inches of ASTM C-33 size No. 57 crushed, graded, limestone gravel. The No. 57 stone should be compacted to a minimum of 95% relative density. Bearing on the compacted stone, the slab may be sized using a modulus of subgrade reaction, K, value of 125 PCI. A vapor barrier should be placed between the soil subgrade and concrete slab for moisture control.

The slab should be jointed around columns and along footing supported walls to reduce differential settlement cracking between slab and foundations. Control joints should be used to reduce random stress relief cracking. As a minimum, the slab should be reinforced with wire mesh reinforcement. The wire mesh should be positioned at mid height, or slightly above, of the slab thickness. If rock is encountered at finished subgrade elevation beneath the slab it should be excavated a minimum of 1 foot below finished subgrade elevation. The undercut area should be backfilled and compacted to finished subgrade with soil fill as outlined in the *Site Preparation* section above.

Utilizing the above outlined recommendations, we estimate that the building will experience 1 1/2 inch or less of total settlement, and 1 inch or less of differential settlement.

Pavement Section

As indicated above, we estimate that up to approximately 8 inches of differential settlement may occur across the proposed parking and drive areas located over the landfill cell. In our opinion, such movement could significantly damage asphalt and concrete pavements. As such, we recommend that the parking and drive areas consist of a crushed aggregate base.

In our opinion, the use of the geogrid will reduce the potential for pits and dips to develop within the proposed parking and drive areas. However some maintenance will likely be required to relevel low areas that develop. Any pavement composed solely of crushed stone will also require some periodic maintenance. The aggregate base will experience freeze/thaw deterioration. At a minimum this will typically require yearly maintenance. Maintenance will typically consist of clipping/smoothing to fill shallow ruts or potholes and recompacting the surface with a smooth drum or rubber tired roller (the surface should be watered before compacting, and vibratory compaction equipment should not be used). Periodic addition of aggregate base may be required as the original stone course is pushed into the surface of the subgrade over time.

It is not uncommon for site grading to be completed for some time prior to placing aggregate base. During this period, it is possible to have softening of the upper surface subgrade material due to inclement weather as well as other construction related activities. We strongly recommend that just prior to placement of the aggregate base course, the subgrade be proofrolled as outlined above. This will allow any softened and/or disturbed areas to be identified and properly reworked and recompacted.

With the subgrade prepared as outlined above, we recommend a California Bearing Ratio (CBR) value of 5% be utilized for design of parking and drive area pavements. Utilizing a CBR value of 5% and assumed traffic intensities, we recommend that the pavement section consist of a minimum of 8 inches of aggregate base.

The aggregate base should consist of a crushed limestone meeting the requirement of the North Carolina Department of Transportation (NCDOT) Aggregate Base Course (ABC Stone). The stone should meet the requirements of NCDOT Section 520 for ABC

Stone, Type A, Grading from Column B. The ABC stone fill should be compacted to a minimum of 100 percent of its Standard Proctor maximum dry density, ASTM D698.

Job Site Safety

Foundation excavation, construction, and inspection should meet all applicable rules and regulations of the Occupational Safety and Health Administration. Excavations should be sloped or shored in accordance with local, state and federal regulations including OSHA (29 CFR Part 1926) excavation and trench safety. The Contractor is solely responsible for site safety. The above information is provided only as a service and under no circumstances should we be assumed to be responsible for construction site safety.

GENERAL QUALIFICATIONS

This report has been prepared for the exclusive use of Altamont Environmental, Inc. This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to the geotechnical design elements of this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made. Foundation Systems Engineering, P.C is not responsible for any claims, damages, or liability associated with any other party's interpretation of this report's subsurface data or reuse of this report's subsurface data or engineering analysis without our express written authorization.

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the borings will not become evident until construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the structures are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing.

This report should not be made a part of project plans and specifications; but may be included with bidding documents for the convenience of the bidders.

It has been a pleasure to be of service to you on this project. If you have any questions, please contact us at your convenience.

We would welcome the opportunity to work with Altamont Environmental, Inc. during project construction. Given the familiarity of our firm with the subsurface conditions at the site, we feel we are uniquely qualified to provide quality control testing and observations services on this project.

Sincerely,
Foundation Systems Engineering, P.C.

Eric M. Peterson, P.E.
Project Engineer
Tennessee No. 109536

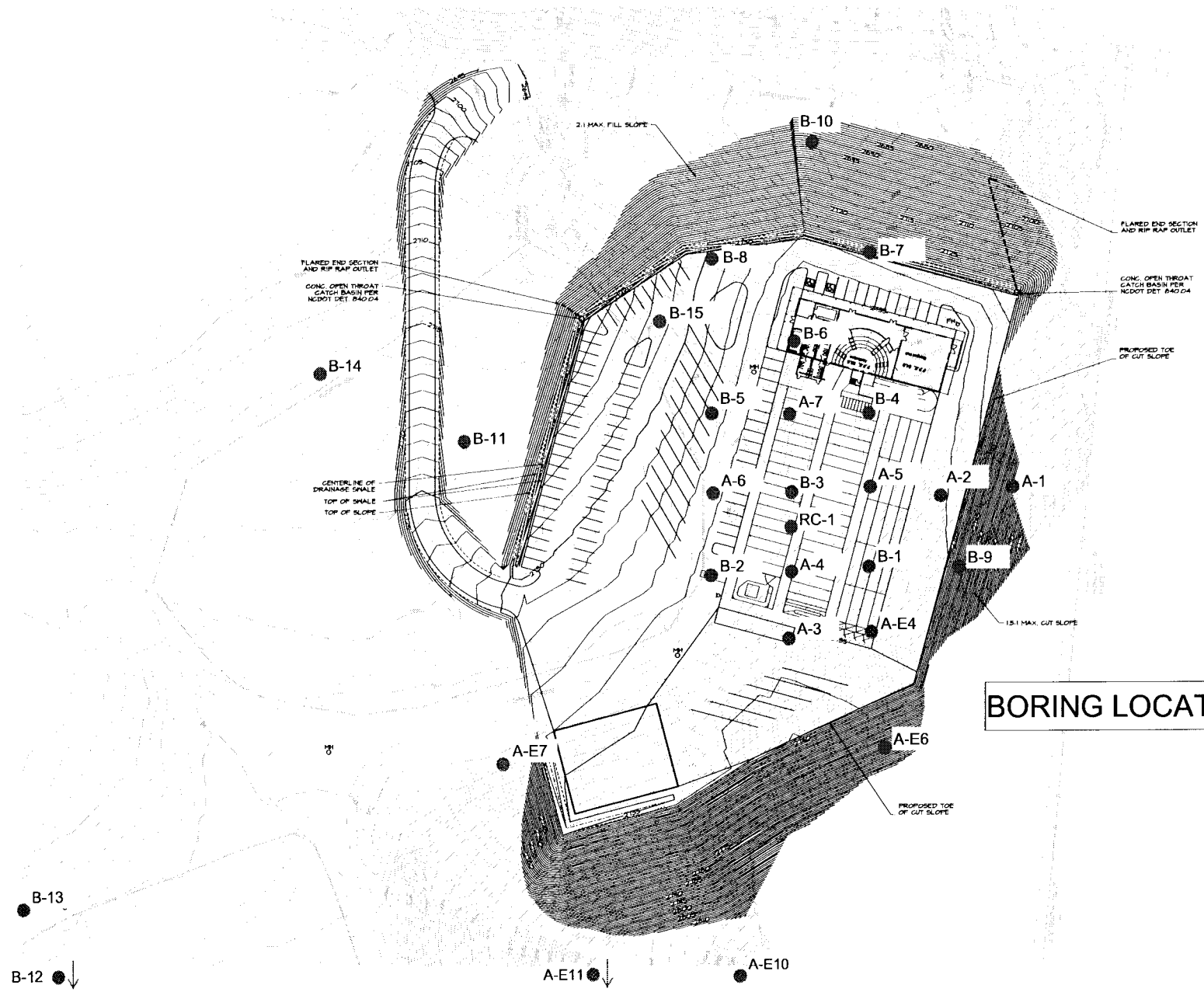
George R. Cross, P.E.
Senior Geotechnical Engineer
North Carolina No. 025310

NORTH CAROLINA PROFESSIONAL SEAL 025310 ENGINEER GEORGE R. CROSS

10-13-2009

EMP/GRC/sf

Enclosures
- Boring Location Plan
- Test Boring & Auger Boring Records
- Liquid & Plastic Limit Test Report
- Standard Proctors (Compaction Test Report)
- Triaxial Shear Test Reports
- Consolidation Test Report



BORING LOCATION PLAN

BEFORE YOU DIG
CALL 1-800-632-4949
N.C. ONE CALL CENTER
IT'S THE LAW

SCALE 1" = 40'

PRELIMINARY NOT FOR CONSTRUCTION

AMBIENT DESIGN GROUP
LANDSCAPE ARCHITECTS • CIVIL ENGINEERS
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Ph. 828-232-9550 F. 828-232-9551
E-mail: info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

LIVESTOCK MKT. & EVENTS CTR.
GRADING & DRAINAGE PLAN
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS

DATE: 10/29/07
DRAWN BY: DMC
PROJECT NO. 9908.00
SHEET NO. C-3

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2744	0.0	TOPSOIL & ROOTS.					
2743.83	0.17	SOFT, SLIGHTLY MOIST, LIGHT BROWN, SILTY, PARTIALLY WEATHERED GNEISS (RESIDUAL).					
2742	2.0	AUGER REFUSAL AT 2.0 FEET. NO GROUNDAWATER ENCOUNTERED AT TIME OF DRILLING.					BORING B-1 WAS OFFSET AT TWO LOCATIONS (B-1A & B 1B), WHERE SIMILAR MATERIAL WAS ENCOUNTERED. B-1A REFUSED AT 2.5 FEET. B-2A REFUSED AT 3.5 FEET.

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-1
DATE DRILLED: 8-31-09
LAB. NO.: K-091844

PAGE 1 OF 1

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR --- RQD	S	REMARKS
2730	0.0	TOPSOIL & ROOTS.					
2729.75	0.25	SLIGHTLY MOIST, LIGHT BROWN, MICACEOUS SILT (FILL).					
2727	3.0	BORING TERMINATED AT 3.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					BORING ENCOUNTERED LANDFILL WASTE AT A DEPTH OF APPROXIMATELY 3 FEET. B-2 WAS THEN TERMINATED AND OFFSET TO BORING B-2A.

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-2
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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TEST BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2730	0.0	TOPSOIL & ROOTS.					
2729.75	0.25	LIGHT BROWN, MICACEOUS SILT (FILL).					
2729	1.0	LANDFILL WASTE.	2.5	12			
			5.0	4			
			7.5	1			
			10.0	2			
2717	13.0	LANDFILL WASTE MIXED WITH GRAVEL.	15.0	16			
2714	16.0	SOFT, SLIGHTLY MOIST, TAN, TANNISH GRAY, GRAY, BROWN AND BLACK, PARTIALLY WEATHERED GNEISS (RESIDUAL).	20.0	48			
2708	22.0	AUGER REFUSAL AT 22.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-2A
DATE DRILLED: 9-10-09
LAB. NO.: K-091844

PAGE 1 OF 1

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2727.5	0.0	TOPSOIL & ROOTS.					N VALUES FROM DYNAMIC CONE PENETROMETER TEST, ASTM STP 399.
2727.17	0.33	SOFT, SLIGHTLY MOIST, BROWN, SILTY PARTIALLY WEATHERED, GNEISS (RESIDUAL).					
			5.0	8-35-50			
			7.5	50=0"			
2719.5	8.0	AUGER REFUSAL AT 8.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-3
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

PAGE 1 OF 1

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AUGER BORING RECORD

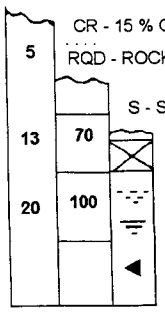
ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2733	0.0	TOPSOIL & ROOTS.					
2732.5	0.5	SOFT, SLIGHTLY MOIST, BROWN, SILTY, PARTIALLY WEATHERED GNEISS (RESIDUAL).					
2730	3.0	AUGER REFUSAL AT 3.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:



UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-4
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

PAGE 1 OF 1

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2722.5	0.0	TOPSOIL & ROOTS.					N VALUES FROM DYNAMIC CONE PENETROMETER TEST, ASTM STP 399.
2722.08	0.42	SOFT, SLIGHTLY MOIST, BROWN, SILTY PARTIALLY WEATHERED GNEISS (RESIDUAL).	5.0	50=0"			
2712.5	10.0	BORING TERMINATED AT 10.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.	10.0	50=0"			

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-5
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2717	0.0	TOPSOIL & ROOTS.					
2716.83	0.17	SOFT, SLIGHTLY MOIST, BROWN, SILTY, PARTIALLY WEATHERED GNEISS (RESIDUAL).					
2715	2.0	AUGER REFUSAL AT 2.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-6
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2692	0.0	TOPSOIL & ROOTS.					N VALUES FROM DYNAMIC CONE PENETROMETER TEST, ASTM STP 399.
2691.83	0.17	SOFT, SLIGHTLY MOIST, BROWN, SILTY, PARTIALLY WEATHERED GNEISS (RESIDUAL).	2.5	50=1"			
			5.0	50=0"			
2685.5	6.5	AUGER REFUSAL AT 6.5 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5 13 20 70 100

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-7
DATE DRILLED: 8-31-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2703	0.0	TOPSOIL & ROOTS.					
2702.75	0.25	SOFT, SLIGHTLY MOIST, BROWN, SILTY, PARTIALLY WEATHERED GNEISS (RESIDUAL).					
2700	3.0	AUGER REFUSAL AT 3.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-8
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2767	0.0	TOPSOIL & ROOTS.					N VALUES FROM DYNAMIC CONE PENETROMETER TEST, ASTM STP 399.
2766.67	0.33	SOFT, SLIGHTLY MOIST, BROWN, SILTY, PARTIALLY WEATHERED GNEISS (RESIDUAL).	2.5	30-32-35		☒	
			5.0	50=0"			
			7.5	50=1"			
			10.0	50=1"		☒	
			15.0	50=0"			
			20.0	50=1"			
			25.0	50=0"			
2737	30.0	BORING TERMINATED AT 30.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.	30.0	50=0"			

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-9
DATE DRILLED: 8-31-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2680.5	0.0	TOPSOIL & ROOTS.					N VALUES FROM DYNAMIC CONE PENETROMETER TEST, ASTM STP 399.
2680.17	0.33	SOFT, SLIGHTLY MOIST, BROWN, SILTY, PARTIALLY WEATHERED GNEISS (RESIDUAL).	5.0	50=1"		X	
			10.0	50=0"			
2665.5	15.0	BORING TERMINATED AT 15.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.	15.0	50=0"			

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5		
13	70	UNDISTURBED SAMPLE (ASTM D-1587)
20	100	WATER TABLE, TIME OF BORING
		WATER TABLE, 24 HOUR READING
		LOSS OF DRILLING FLUID

BORING NUMBER: B-10
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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TEST BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR -- RQD	S	REMARKS
2720	0.0	TOPSOIL & ROOTS.					BORING B-11 CONVERTED TO GAS PROBE G-12.
2719.5	0.5	STIFF, MOIST, DARK REDDISH BROWN AND BROWN, MICACEOUS CLAYEY SILT (FILL).	2.5	11			
2716	4.0	LANDFILL WASTE.	5.0	2			
			7.5	4			
			15.0	11			
			25.0	WOH			WOH = WEIGHT OF HAMMER.
			35.0	WOH			
2680	40.0	BORING TERMINATED AT 40.0 FEET. GROUNDWATER ENCOUNTERED AT 27.0 FEET.	40.0	WOH			

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-11
DATE DRILLED: 9-10-09
LAB. NO.: K-091844

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TEST BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2745	0.0	TOPSOIL & ROOTS.					BORING B-12 CONVERTED TO GAS PROBE G-14.
2744.67	0.33	STIFF, MOIST, DARK REDDISH BROWN, DARK BROWN, TANNISH GRAY AND GRAY, MICACEOUS CLAYEY SILT (FILL).	2.5	11			
			5.0	11		X	
2736.5	8.5	LANDFILL WASTE.	10.0	4			
						X	
			20.0	1			
						X	
2715	30.0	BORING TERMINATED AT 30.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.	30.0	WOH			WOH = WEIGHT OF HAMMER.

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-12
DATE DRILLED: 9-10-09
LAB. NO.: K-091844

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TEST BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2735	0.0	TOPSOIL & ROOTS.					
2734.33	0.67	VERY STIFF, SLIGHTLY MOIST, LIGHT GRAY, DARK BROWN & GRAY, MICACEOUS CLAYEY SILT MIXED WITH PARTIALLY WEATHERED GNEISS (FILL).	2.5	20			
			5.0	26			
2729	6.0	SOFT, SLIGHTLY MOIST, REDDISH BROWN, BROWN AND GRAY, PARTIALLY WEATHERED GNIESS (RESIDUAL).					
			10.0	59			
2724	11.0	AUGER REFUSAL AT 11.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5 — 13 — 70 — 20 — 100

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-13
DATE DRILLED: 9-9-09
LAB. NO.: K-091844

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TEST BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2715	0.0	TOPSOIL & ROOTS.					
2714.58	0.42	SLIGHTLY MOIST, BROWN, MICACEOUS SILT (FILL).					
2713	2.0	BORING TERMINATED AT 2.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					BORING ENCOUNTERED LANDFILL WASTE AT A DEPTH OF APPROXIMATELY 2 FEET. B-14 WAS THEN TERMINATED AND OFFSET TO BORING B-14A.

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-14
DATE DRILLED: 9-9-09
LAB. NO.: K-091844

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TEST BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2715	0.0	TOPSOIL & ROOTS.					
2714.58	0.42	SLIGHTLY MOIST, BROWN, MICACEOUS SILT (FILL).					
2709	6.0	AUGER REFUSAL AT 6.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					BORING REFUSED ON COBBLE-SIZED ROCK FILL AT A DEPTH OF APPROXIMATELY 6.0 FEET. B-14A WAS THEN OFFSET TO BORING B-14B.

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5 13 20 70 100

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-14A
DATE DRILLED: 9-9-09
LAB. NO.: K-091844

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TEST BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2715	0.0	TOPSOIL & ROOTS.					
2714.58	0.42	VERY STIFF, SLIGHTLY MOIST, BROWN, DARK REDDISH BROWN AND GRAY, MICACEOUS CLAYEY SILT MIXED WITH PARTIALLY WEATHERED GNEISS (FILL).	2.5	41			
			5.0	26			
			7.5	50=0"			
			15.0	40			
2699	16.0	VERY STIFF, SLIGHTLY MOIST TO MOIST, TANNISH GRAY AND GRAY, SILTY MICACEOUS SILT MIXED WITH PARTIALLY WEATHERED GNIESS (FILL).	20.0	42			
			25.0	23			
2687	28.0	VERY STIFF, SLIGHTLY MOIST, TANNISH GRAY AND GRAY, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS (RESIDUAL).	30.0	32			
2684	31.0	AUGER REFUSAL AT 31.0 FEET.					
		NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-14B
DATE DRILLED: 9-9-09
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TEST BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2715	0.0	TOPSOIL & ROOTS.					
2714.92	0.08	SOFT, SLIGHTLY MOIST, LIGHT GRAY AND BROWN, MICACEOUS SILTY PARTIALLY WEATHERED GNEISS (RESIDUAL).	2.5	67			
2709	6.0	AUGER REFUSAL AT 6.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: B-15
DATE DRILLED: 9-9-09
LAB. NO.: K-091844

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TEST BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2729	0.0	TOPSOIL & ROOTS.					BORING RC-1 CONVERTED TO GAS PROBE G-15.
2728.5	0.5	SOFT, SLIGHTLY MOIST, LIGHT GRAY AND BROWN, MICACEOUS SILTY PARTIALLY WEATHERED GNEISS (RESIDUAL).	2.5	44			
			5.0	61			
			7.5	50=1"			
			10.0	50=2"			
			15.0	50=1"			
2706	23.0	HARD, DARK GRAY, GNEISS WITH SEVERAL WEATHERED/ SAPROLITIC SEAMS AND FRACTURES.			89 / 48		AUGER REFUSAL AT 23.0 FEET. BEGAN NX SIZED ROCK CORE.
2696	33.0	ROCK CORING TERMINATED AT 33.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5

13 70 UNDISTURBED SAMPLE (ASTM D-1587)

20 100 WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: RC-1
DATE DRILLED: 9-8-09
LAB. NO.: K-091844

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AUGER BORING RECORD

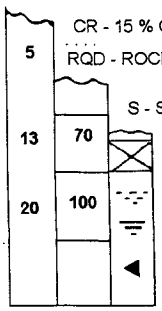
ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2763	0.0	TOPSOIL & ROOTS.					
2762.83	0.17	LIGHT REDDISH BROWN MICACEOUS SILT.					
2758.5	4.5	LIGHT TO MEDIUM GRAY, MICACEOUS SILTY PARTIALLY WEATHERED GNEISS.					
2738	25.0	BORING TERMINATED AT 25.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:



UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-1
DATE DRILLED: 8-31-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2746	0.0	LIGHT GRAY AND LIGHT BROWN, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS.					
2738.5	7.5	AUGER REFUSAL AT 7.5 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-2
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

PAGE 1 OF 1

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2744	0.0	LIGHT BROWN, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS.					
2719	25.0	BORING TERMINATED AT 25.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-3
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2730	0.0	TOPSOIL & ROOTS.					
2729.67	0.33	LIGHT BROWN, MICACEOUS SILT.					
2723	7.0	LIGHT TO DARK GRAY, MICACEOUS SILTY PARTIALLY WEATHERED GNEISS.					
2715	15.0	BORING TERMINATED AT 15.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-4
DATE DRILLED: 8-31-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2733.5	0.0	TOPSOIL & ROOTS.					
2733.17	0.33	LIGHT BROWN, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS.					
2718.5	15.0	BORING TERMINATED AT 15.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-5
DATE DRILLED: 8-31-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2728	0.0	TOPSOIL & ROOTS.					
2727.67	0.33	LIGHT BROWN, MICACEOUS SILT (FILL).					
2723.5	4.5	BORING TERMINATED AT 4.5 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					BORING B-6 ENCOUNTERED LANDFILL WASTE AT APPROXIMATELY 4.5 FEET AND WAS TERMINATED.

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-6
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR --- RQD	S	REMARKS
2723	0.0	TOPSOIL & ROOTS.					
2722.67	0.33	LIGHT BROWN, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS.					
2719.5	3.5	AUGER REFUSAL AT 3.5 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5 13 20 70 100

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-7
DATE DRILLED: 8-31-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2757	0.0	LIGHT BROWN, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS.					
2732	25.0	BORING TERMINATED AT 25.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5 — 13 — 70 — 20 — 100

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-E4
DATE DRILLED: 8-31-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2788	0.0	LIGHT BROWN, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS.					
2763	25.0	BORING TERMINATED AT 25.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5 — 13 — 70 — UNDISTURBED SAMPLE (ASTM D-1587)

20 — 100 — WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-E6
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2747	0.0	TOPSOIL & ROOTS.					
2746.5	0.5	LIGHT BROWN, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS.					
2731	16.0	AUGER REFUSAL AT 16.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-E7
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2830	0.0	TOPSOIL & ROOTS.					
2829.67	0.33	LIGHT BROWN, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS.					
2805	25.0	BORING TERMINATED AT 25.0 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5

13 70 UNDISTURBED SAMPLE (ASTM D-1587)

20 100 WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

LOSS OF DRILLING FLUID

BORING NUMBER: A-E10
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

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AUGER BORING RECORD

ELEV.	DEPTH	DESCRIPTION	DEPTH	N	CR — RQD	S	REMARKS
2800	0.0	TOPSOIL & ROOTS.					
2799.67	0.33	LIGHT BROWN, MICACEOUS SILT TO PARTIALLY WEATHERED GNEISS.					
2795.5	4.5	AUGER REFUSAL AT 4.5 FEET. NO GROUNDWATER ENCOUNTERED AT TIME OF DRILLING.					BORING A-E11 WAS OFFSET TO A-E11A AND A-E11B WHERE SIMILAR MATERIAL WAS ENCOUNTERED. A-E11A REFUSED AT 4.0 FEET. A-E11B REFUSED AT 13.0 FEET.

N - IS THE PENETRATION IN BLOWS PER FOOT (ASTM D-1586)

CR - 15 % CORE RECOVERY, NX OR BX DESIGNATES BIT SIZE (ASTM D-2113)

RQD - ROCK QUALITY

S - SYMBOLS DESCRIBED BELOW:

5 13 20 70 100

UNDISTURBED SAMPLE (ASTM D-1587)

WATER TABLE, TIME OF BORING

WATER TABLE, 24 HOUR READING

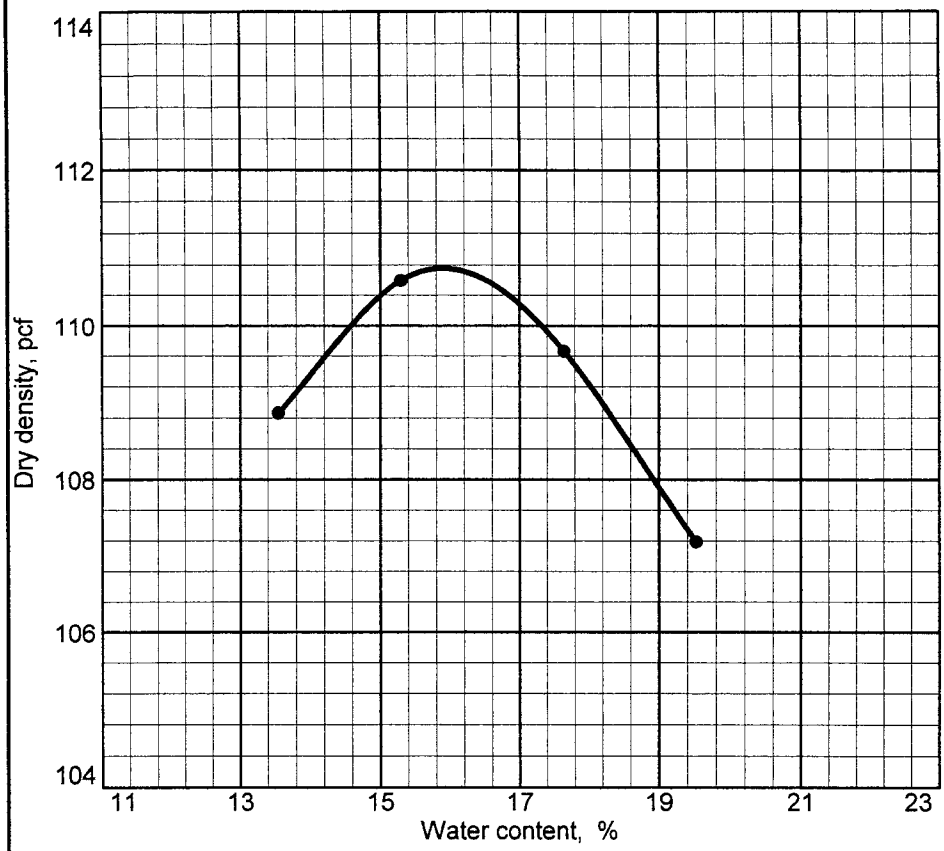
LOSS OF DRILLING FLUID

BORING NUMBER: A-E11
DATE DRILLED: 9-1-09
LAB. NO.: K-091844

PAGE 1 OF 1

INTERNATIONAL PAPER LANDFILL
CANTON, NORTH CAROLINA

Moisture/Density Relationship (Proctor)



Curve No.
P-1

Test Specification:
ASTM D 698-00a Method B Standard

Preparation Method _____
Hammer Wt. 5.5 lb.
Hammer Drop 12 in.
Number of Layers three
Blows per Layer 25
Mold Size .03333 cu.ft.
Test Performed on Material Passing 3/8 in. **Sieve**

NM 17.5 **LL** 34 **PI** 2
Sp.G. (ASTM D 854) _____
%>3/8 in. _____ **%<No.200** _____
USCS ML **AASHTO** _____
Date Sampled 9-1-09
Date Tested 9-2-09
Tested By AM,RQ

TESTING DATA

	1	2	3	4	5	6
WM + WS	13.47	13.60	13.65	13.62		
WM	9.35	9.35	9.35	9.35		
WW + T #1	150.00	150.00	150.00	150.00		
WD + T #1	132.10	130.10	127.50	125.50		
TARE #1	0.00	0.00	0.00	0.00		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	13.6	15.3	17.6	19.5		
DRY DENSITY	108.9	110.6	109.7	107.2		

TEST RESULTS

Maximum dry density = 110.8 pcf

Optimum moisture = 15.9 %

Material Description

Reddish Brown Micaceous Silt

Remarks:
Composite sample from AE-6 auger cuttings.

Project No. 39142 **Client:** FSE
Project: International Paper Landfill at Canton NC

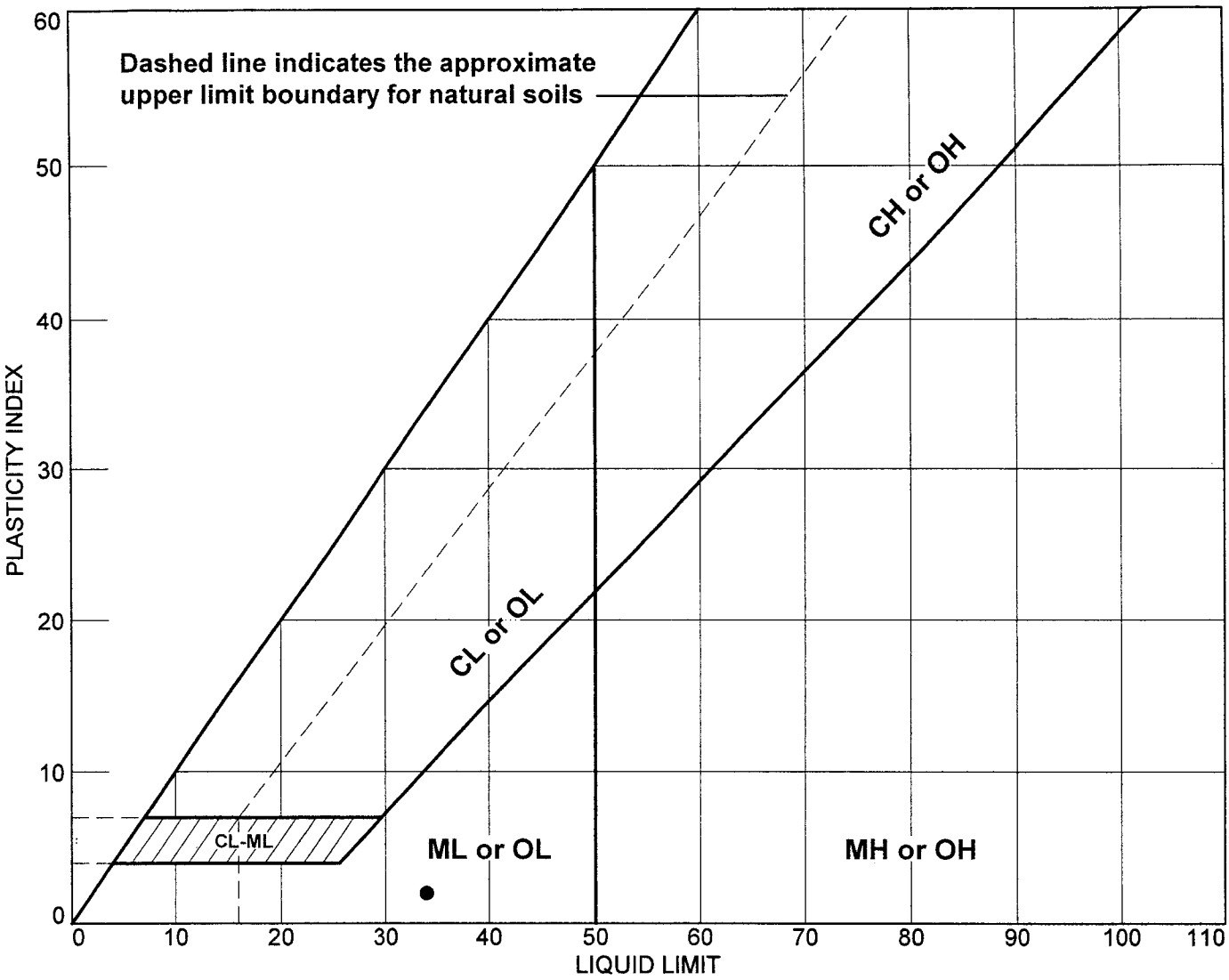
● **Source:** Proctor 1 Lab No. K-091845 **Elev./Depth:** 0-25'

Checked by: JQ
Title:

Foundation Systems Engineering
Knoxville, Tennessee

Figure

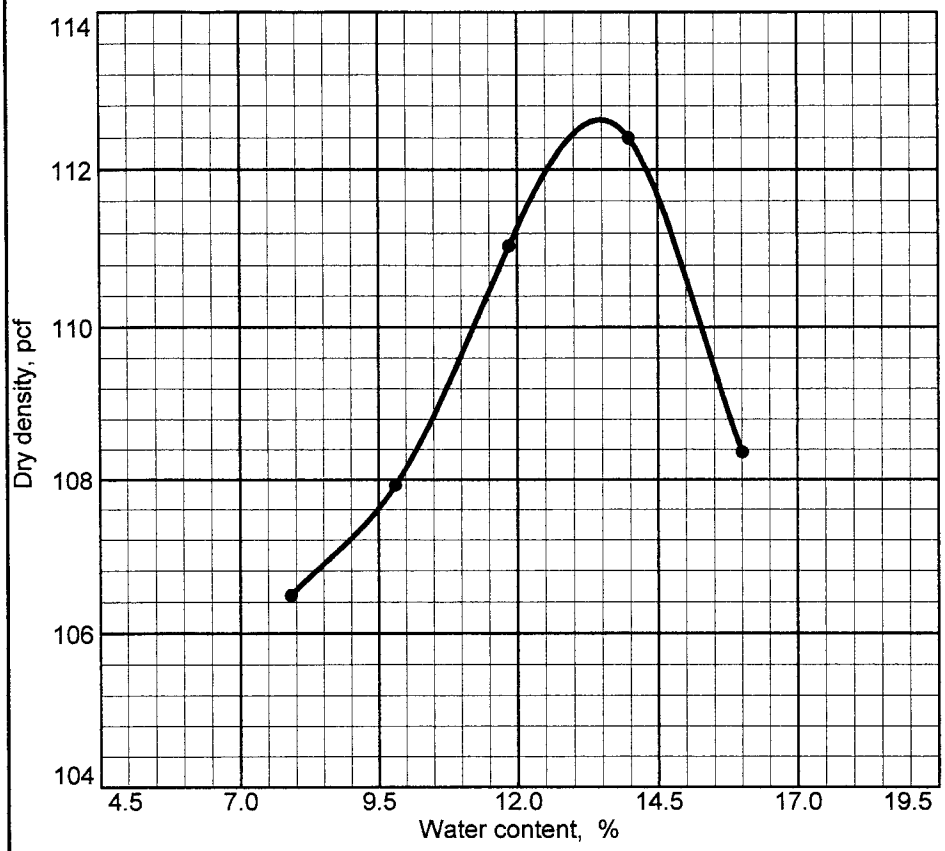
LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Proctor 1 Lab No. K-091845		0-25'	17.5	32	34	2	ML

Foundation Systems Engineering **Knoxville, Tennessee**	**Client:** FSE **Project:** International Paper Landfill at Canton NC **Project No.:** 39142 **Figure**

Moisture/Density Relationship (Proctor)



Curve No.
P-2

Test Specification:
ASTM D 698-00a Method A Standard

Preparation Method _____
Hammer Wt. 5.5 lb.
Hammer Drop 12 in.
Number of Layers three
Blows per Layer 25
Mold Size .03333 cu.ft.
Test Performed on Material Passing No.4 **Sieve**

NM 8.2 **LL** 25 **PI** NP
Sp.G. (ASTM D 854) _____
%>No.4 _____ **%<No.200** _____
USCS NP **AASHTO** _____
Date Sampled 9-1-09
Date Tested 9-2-09
Tested By AM,RQ

TESTING DATA

	1	2	3	4	5	6
WM + WS	13.18	13.30	13.49	13.62	13.54	
WM	9.35	9.35	9.35	9.35	9.35	
WW + T #1	150.00	150.00	150.00	150.00	150.00	
WD + T #1	139.00	136.60	134.10	131.60	129.30	
TARE #1	0.00	0.00	0.00	0.00	0.00	
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	7.9	9.8	11.9	14.0	16.0	
DRY DENSITY	106.5	107.9	111.0	112.4	108.4	

TEST RESULTS

Maximum dry density = 112.6 pcf

Optimum moisture = 13.5 %

Project No. 39142 **Client:** FSE
Project: International Paper Landfill at Canton NC

● **Source:** Proctor 2 Lab No. K-091846 **Elev./Depth:** 0-5.0'

Foundation Systems Engineering
Knoxville, Tennessee

Material Description

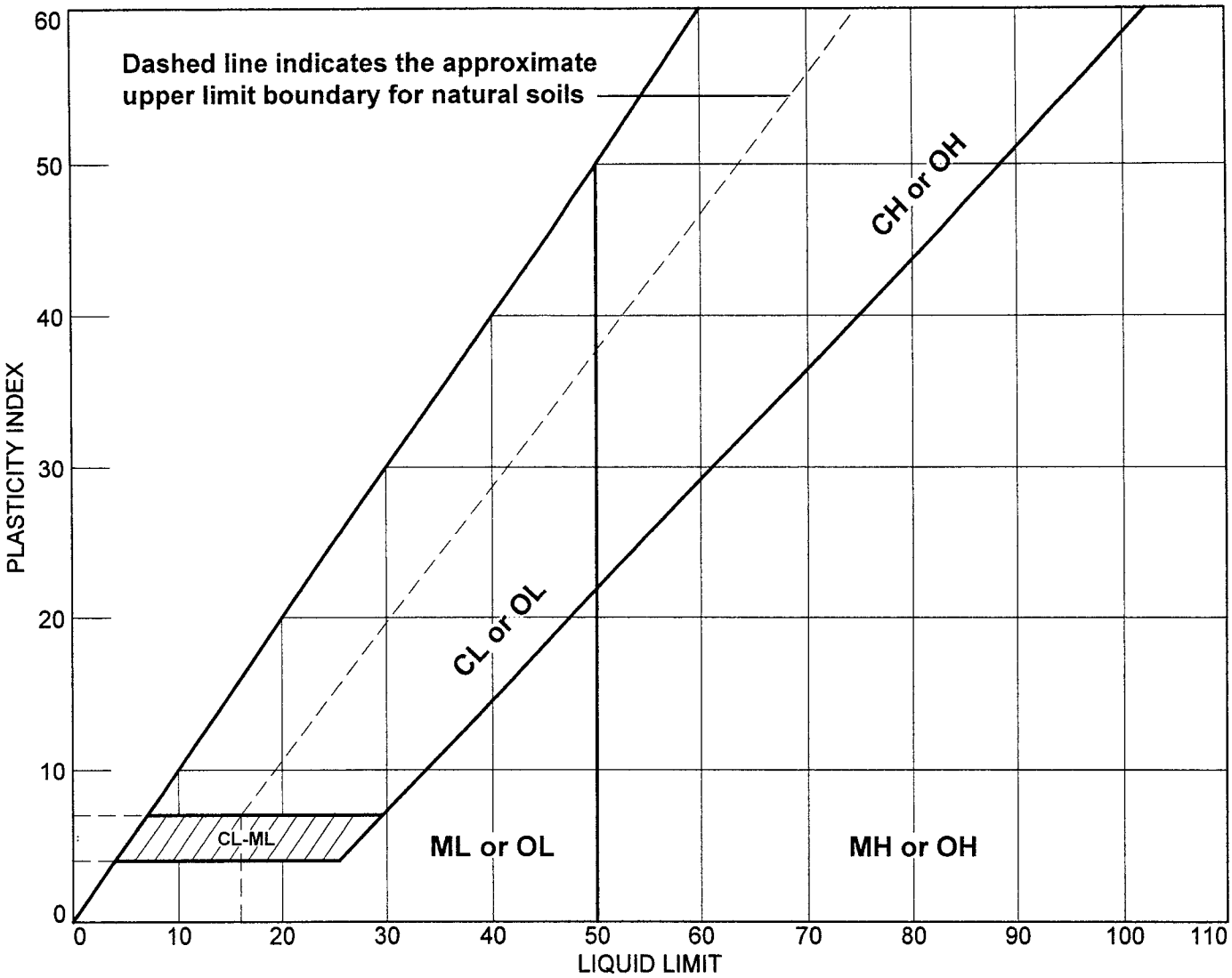
Light Grey Micaceous Silt

Remarks:
Composite sample from Boring A-2 auger cuttings.

Checked by: JQ
Title:

Figure

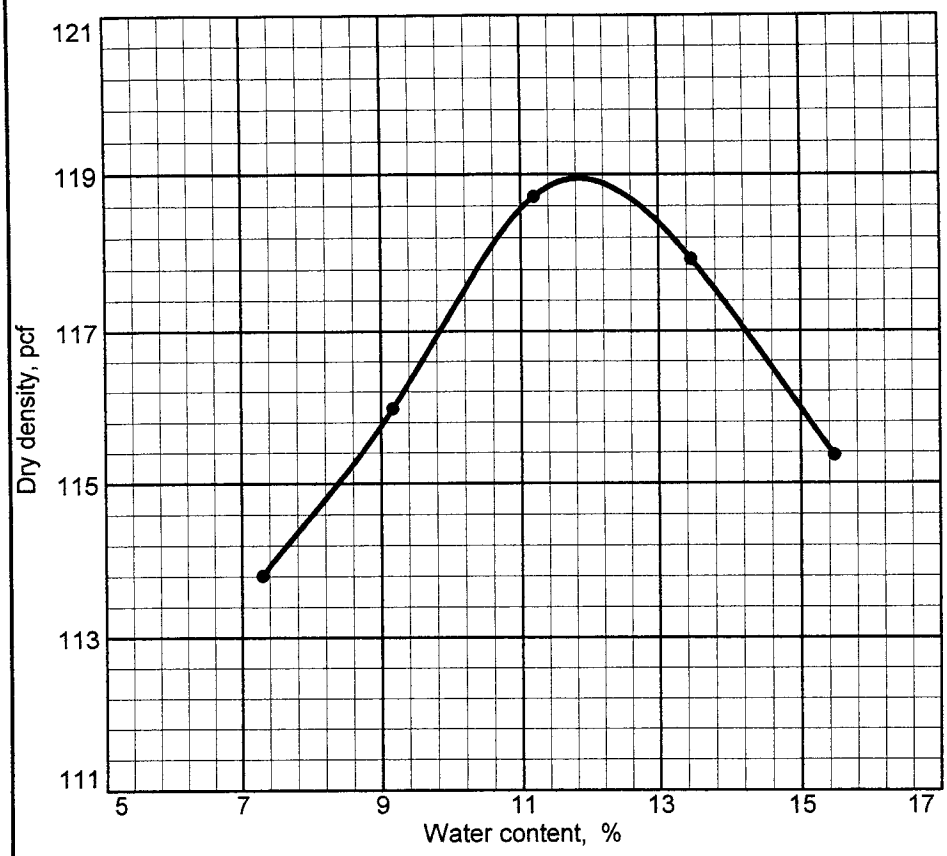
LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Proctor 2 Lab No. K-091846		0-5.0'	8.2	27	25	NP	NP

Foundation Systems Engineering **Knoxville, Tennessee**	**Client:** FSE **Project:** International Paper Landfill at Canton NC **Project No.:** 39142 **Figure**

Moisture/Density Relationship (Proctor)



Curve No.
P-3

Test Specification:
ASTM D 698-00a Method A Standard

Preparation Method _____
Hammer Wt. 5.5 lb.
Hammer Drop 12 in.
Number of Layers three
Blows per Layer 25
Mold Size .03333 cu.ft.
Test Performed on Material Passing No.4 **Sieve**

NM 10.3 **LL** 27 **PI** 3
Sp.G. (ASTM D 854) _____
%>No.4 _____ **%<No.200** _____
USCS ML **AASHTO** _____
Date Sampled 9-1-09
Date Tested 9-2-09
Tested By Am,EW

TESTING DATA

	1	2	3	4	5	6
WM + WS	13.42	13.57	13.75	13.81	13.79	
WM	9.35	9.35	9.35	9.35	9.35	
WW + T #1	150.00	150.00	150.00	150.00	150.00	
WD + T #1	139.80	137.40	134.90	132.20	129.90	
TARE #1	0.00	0.00	0.00	0.00	0.00	
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	7.3	9.2	11.2	13.5	15.5	
DRY DENSITY	113.8	116.0	118.7	117.9	115.4	

TEST RESULTS

Maximum dry density = 118.9 pcf

Optimum moisture = 11.8 %

Material Description

Light Brown Micaceous Silt

Remarks:
Composite sample from B-9, 4"-8.0'; AE-4, 0-20.0'; E-7, 0-15.0';E-10,4"-10.0 auger cuttings.

Project No. 39142 **Client:** FSE
Project: International Paper Landfill at Canton NC

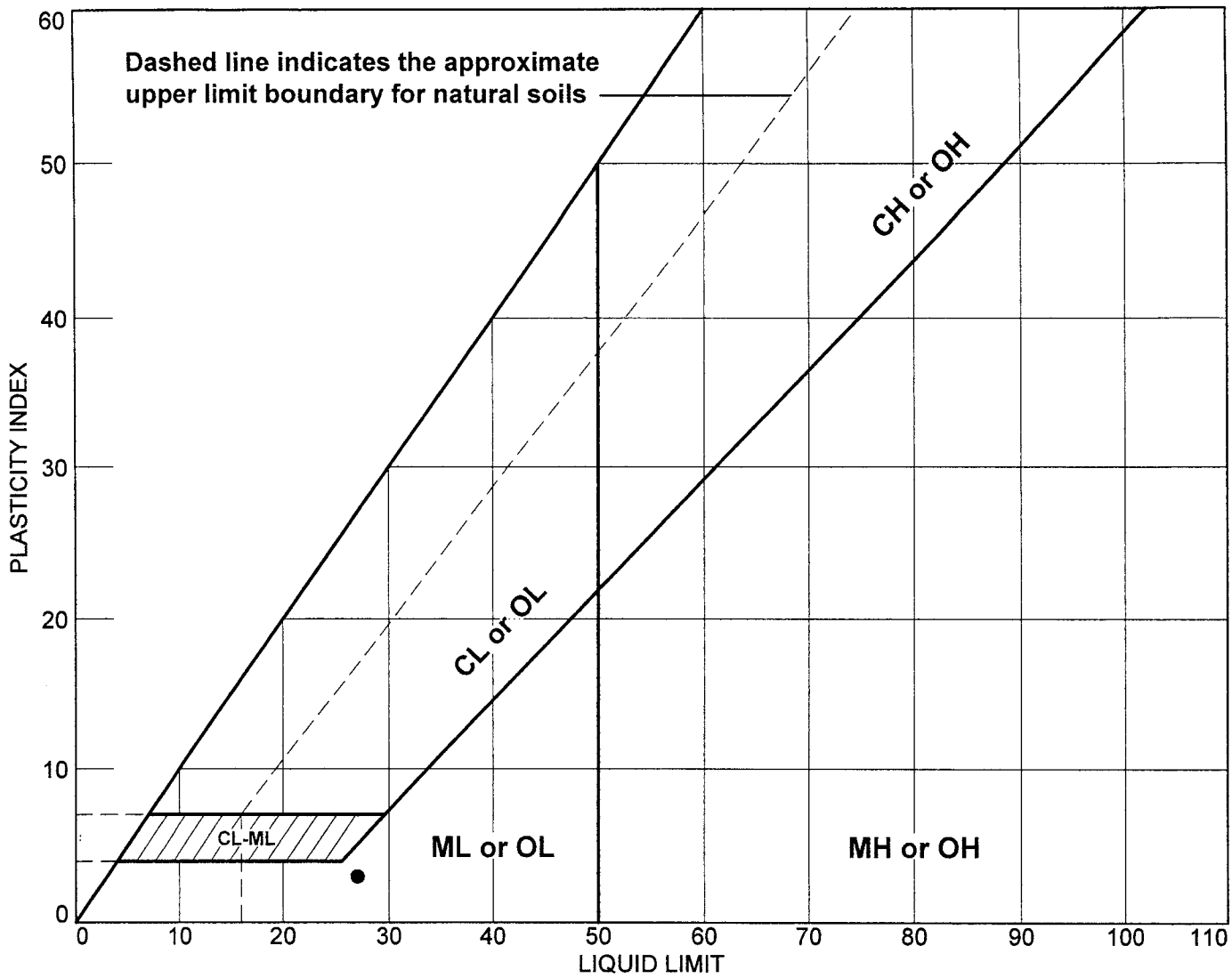
● **Source:** Proctor 3 Lab No. K-091847

Checked by: JQ
Title:

Foundation Systems Engineering
Knoxville, Tennessee

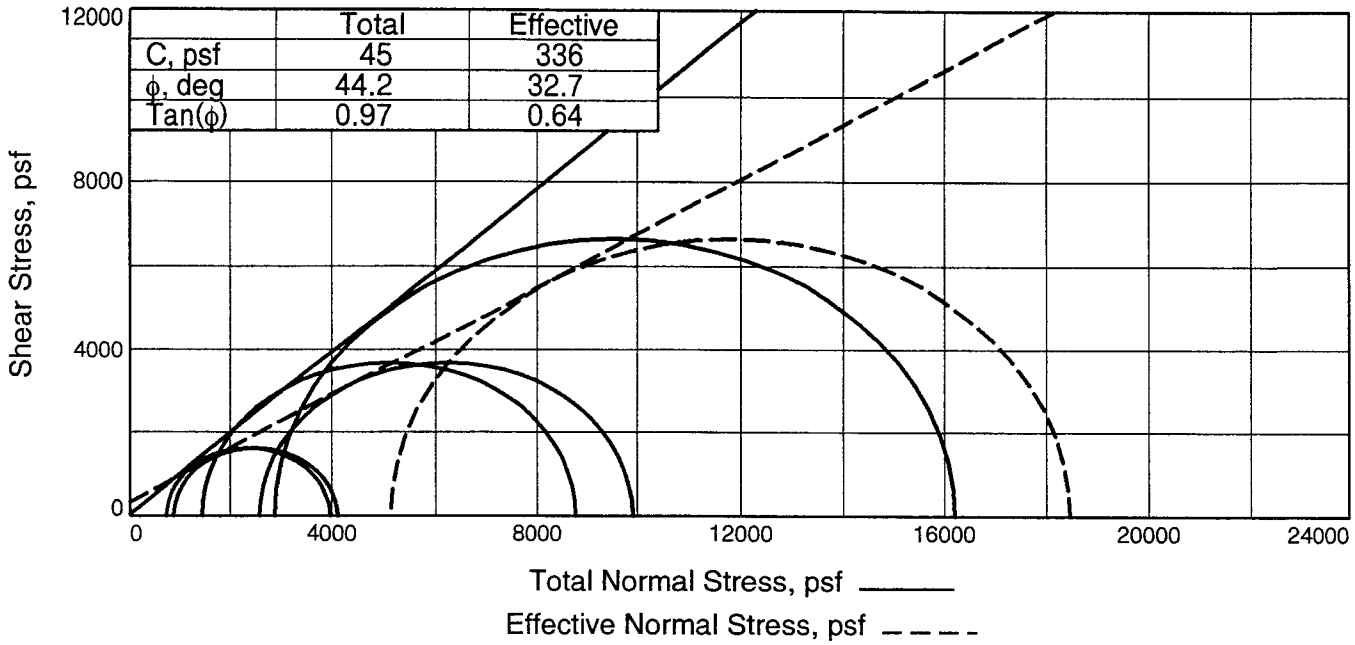
Figure

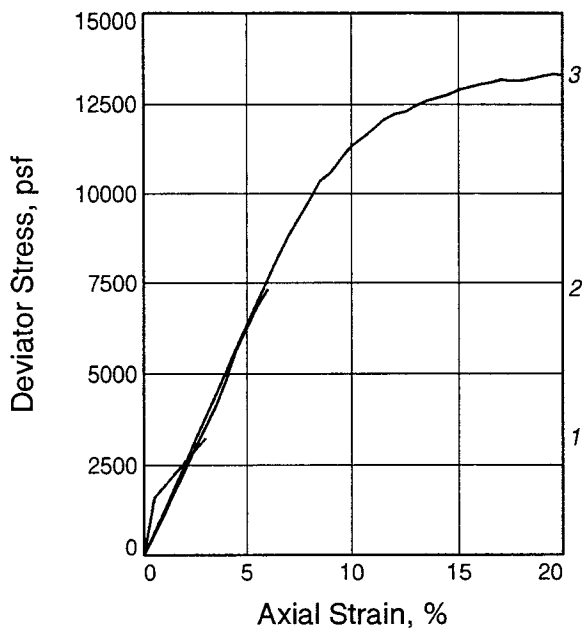
LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Proctor 3 Lab No. K-091847			10.3	24	27	3	ML

Foundation Systems Engineering **Knoxville, Tennessee**	**Client:** FSE **Project:** International Paper Landfill at Canton NC **Project No.:** 39142 **Figure**





Sample No.		1	2	3
Initial	Water Content, %	13.8	13.8	13.8
	Dry Density, pcf	116.5	116.5	116.5
	Saturation, %	82.1	82.1	82.1
	Void Ratio	0.4577	0.4577	0.4577
	Diameter, in.	1.85	1.85	1.85
	Height, in.	3.70	3.70	3.70
At Test	Water Content, %	16.8	16.8	16.8
	Dry Density, pcf	116.5	116.5	116.5
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.4577	0.4577	0.4577
	Diameter, in.	1.85	1.85	1.85
	Height, in.	3.70	3.70	3.70
Strain rate, in./min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		5.00	10.00	20.00
Fail. Stress, psf		3243	7332	13317
Total Pore Pr., psf		-144	-1138	-2261
Ult. Stress, psf				
Total Pore Pr., psf				
$\bar{\sigma}_1$ Failure, psf		4107	9910	18458
$\bar{\sigma}_3$ Failure, psf		864	2578	5141

Type of Test:
CU with Pore Pressures
Sample Type: REMOLDED
Description: LIGHT BROWN MICACEOUS SILT.

Assumed Specific Gravity= 2.72
Remarks: CML LAB NO. K-091852

Client: ALTAMONT ENVIRONMENTAL, INC.

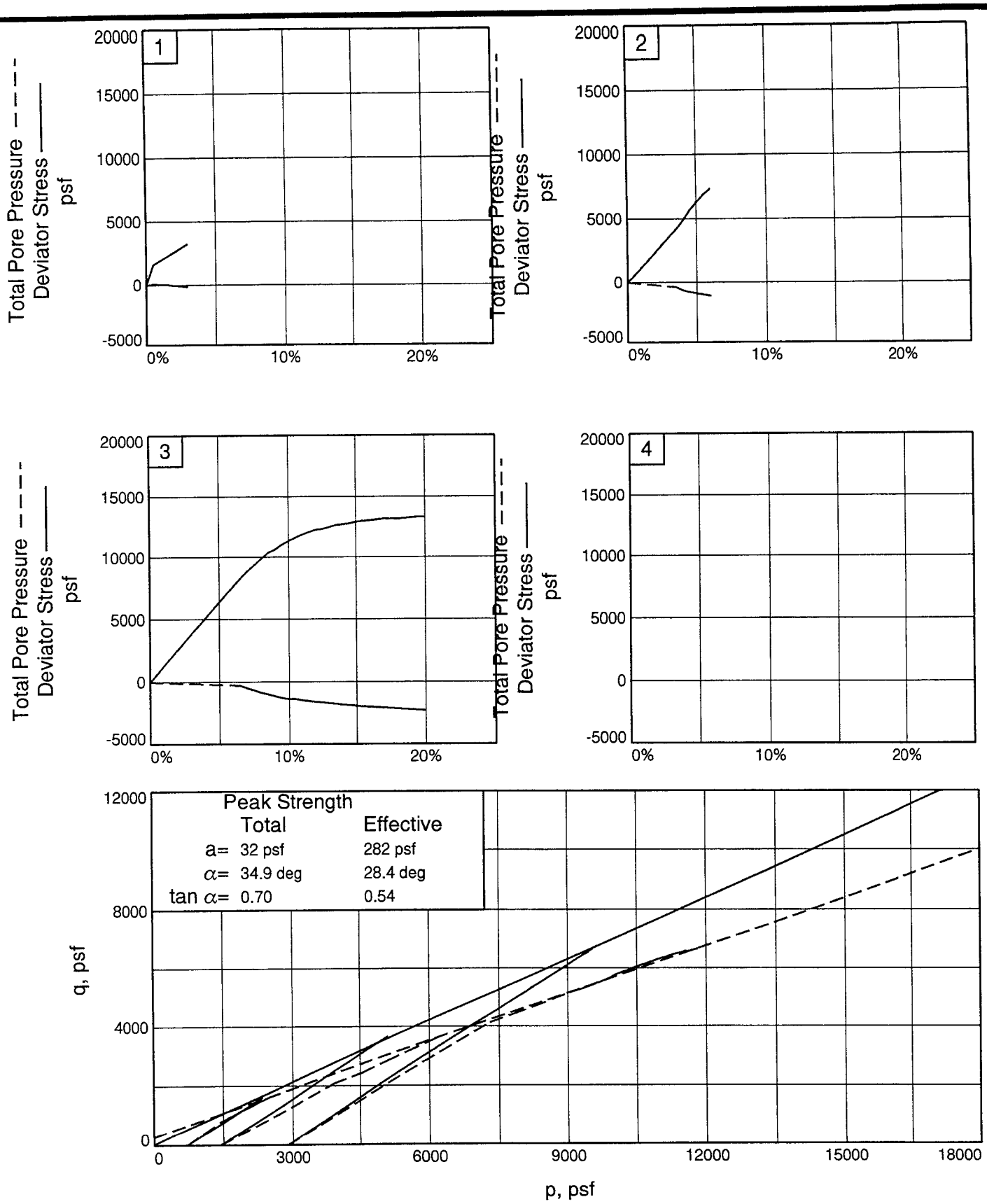
Project: INTERNATIONAL PAPER LANDFILL
CANTON, NORTH CAROLINA
Location: PROCTOR #3

Proj. No.: 39142 **Date Sampled:** 9-23-09

TRIAXIAL SHEAR TEST REPORT

Foundation Systems Engineering

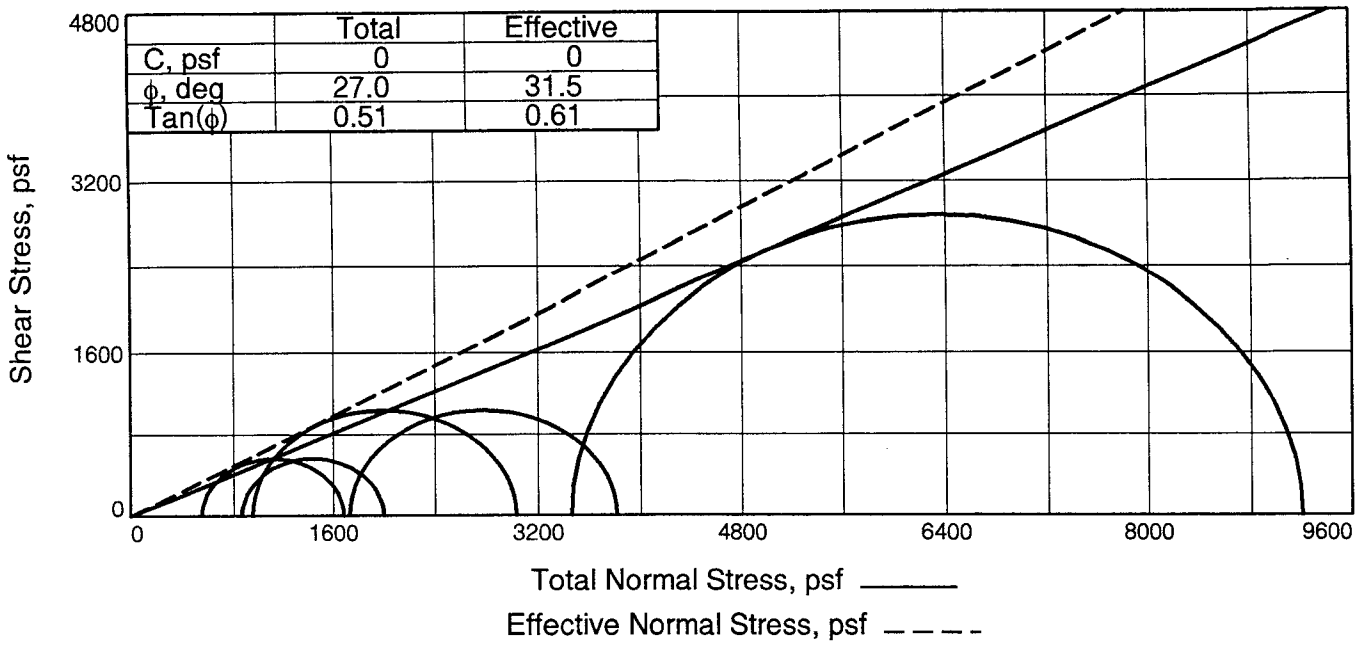
Figure T-1

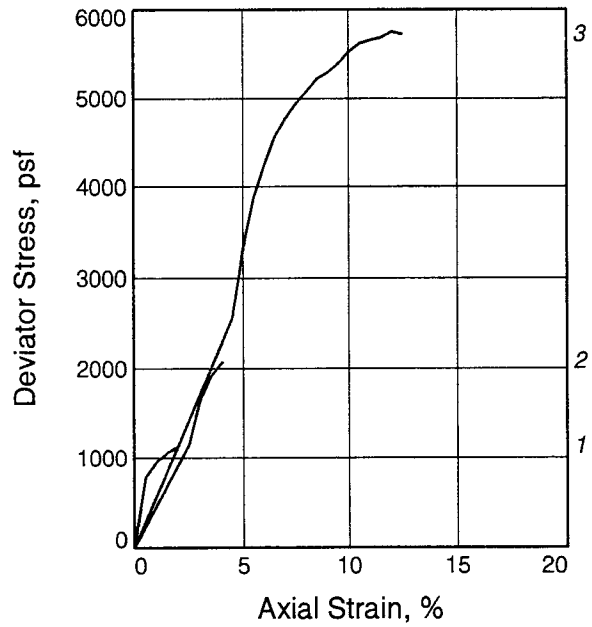


Client: ALTAMONT ENVIRONMENTAL, INC.
Project: INTERNATIONAL PAPER LANDFILL
Location: PROCTOR #3
Project No.: 39142

Figure T-1(2)

Foundation Systems Engineering





Sample No.		1	2	3
Initial	Water Content, %	41.5	41.5	41.5
	Dry Density, pcf	66.1	66.1	66.1
	Saturation, %	84.8	84.8	84.8
	Void Ratio	1.0783	1.0783	1.0783
	Diameter, in.	2.85	2.85	2.85
	Height, in.	5.60	5.60	5.60
At Test	Water Content, %	49.0	49.0	49.0
	Dry Density, pcf	66.1	66.1	66.1
	Saturation, %	100.0	100.0	100.0
	Void Ratio	1.0783	1.0783	1.0783
	Diameter, in.	2.85	2.85	2.85
	Height, in.	5.60	5.60	5.60
Strain rate, in./min.		0.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.00	12.00	24.00
Fail. Stress, psf		1133	2080	5753
Total Pore Pr., psf		317	778	0
Ult. Stress, psf				
Total Pore Pr., psf				
$\bar{\sigma}_1$ Failure, psf		1680	3031	9209
$\bar{\sigma}_3$ Failure, psf		547	950	3456

Type of Test:
CU with Pore Pressures
Sample Type: UNDISTURBED
Description: LANDFILL WASTE.

Assumed Specific Gravity= 2.2
Remarks: CML LAB NO. K-091853

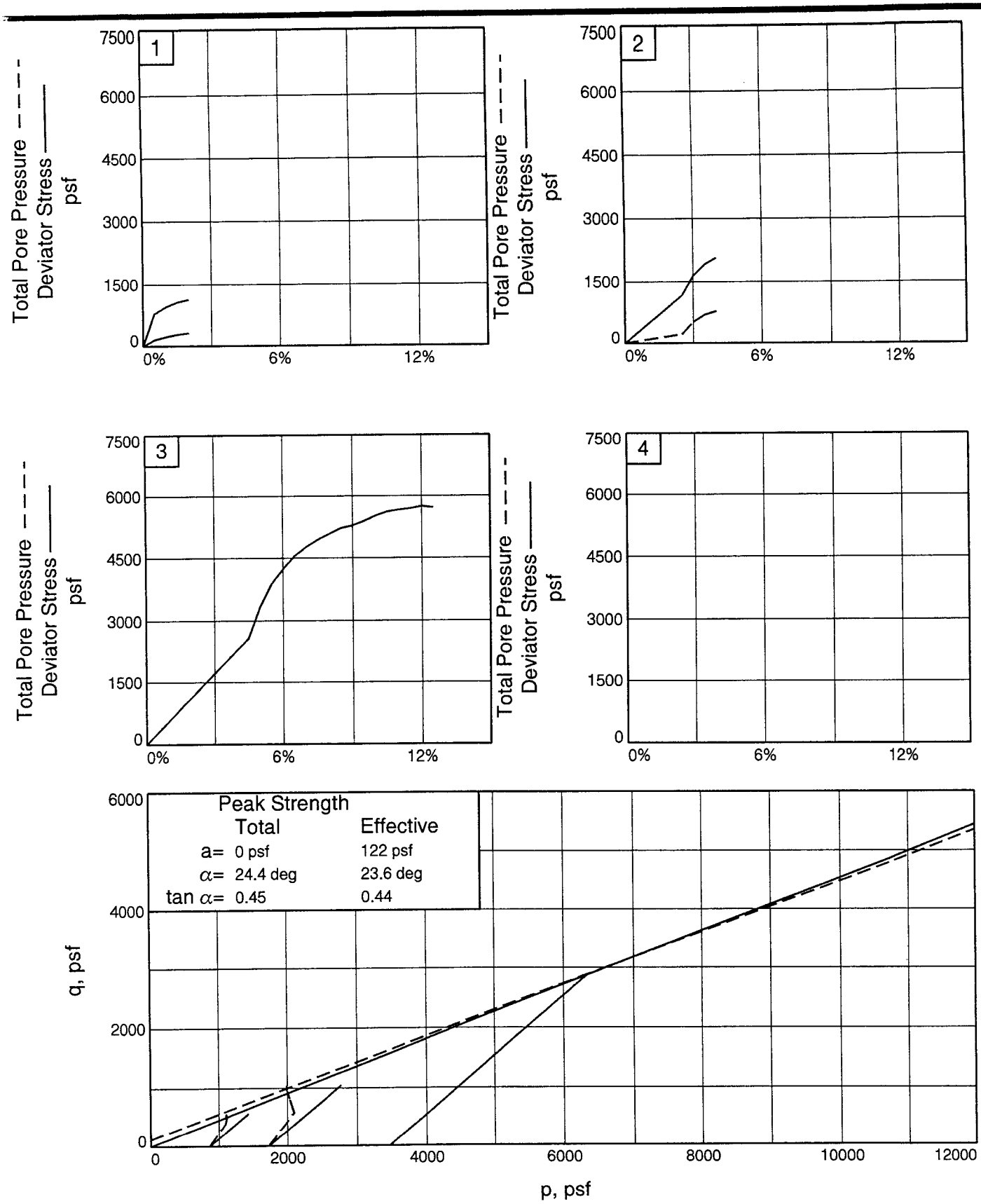
Client: ALTAMONT ENVIRONMENTAL, INC.

Project: INTERNATIONAL PAPER LANDFILL
CANTON, NORTH CAROLINA
Location: B-11
Depth: 18.0
Proj. No.: 39142 **Date Sampled:** 9-17-09

TRIAXIAL SHEAR TEST REPORT

Foundation Systems Engineering

Figure T-2

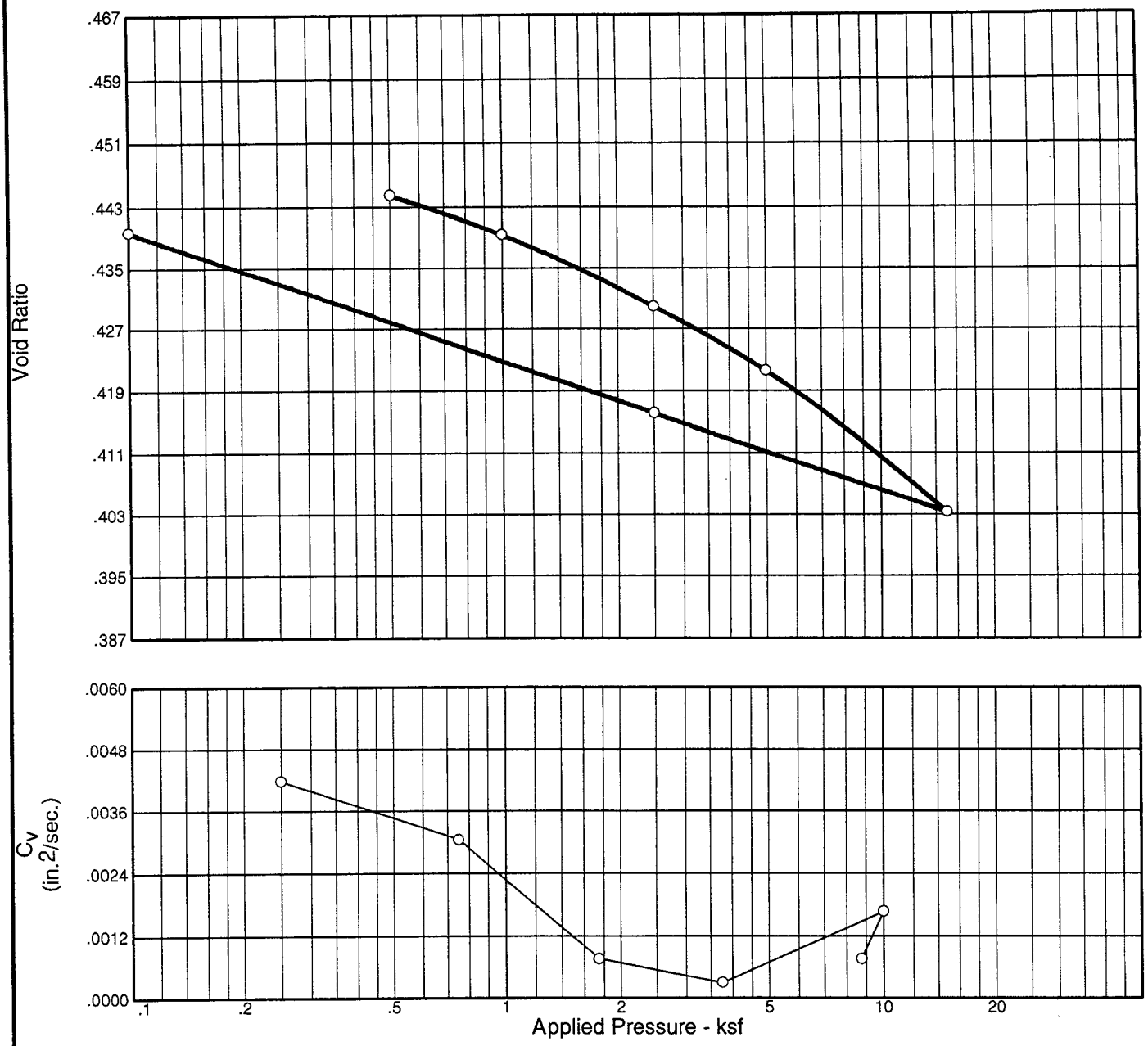


Client: ALTAMONT ENVIRONMENTAL, INC.
Project: INTERNATIONAL PAPER LANDFILL
Location: B-11 **Depth:** 18.0
Project No.: 39142

Figure T-2(2)

Foundation Systems Engineering

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
102.4 %	17.5 %	114.2			2.664	1.80	5.40	0.04	0.02			0.456

MATERIAL DESCRIPTION	USCS	AASHTO
LANDFILL WASTE.		

Project No. 39142 **Client:** ALTAMONT ENVIRONMENTAL, INC.

Project: INTERNATIONAL PAPER LANDFILL
CANTON, NORTH CAROLINA

Location: B-12

Remarks:
UNDISTURBED SAMPLE

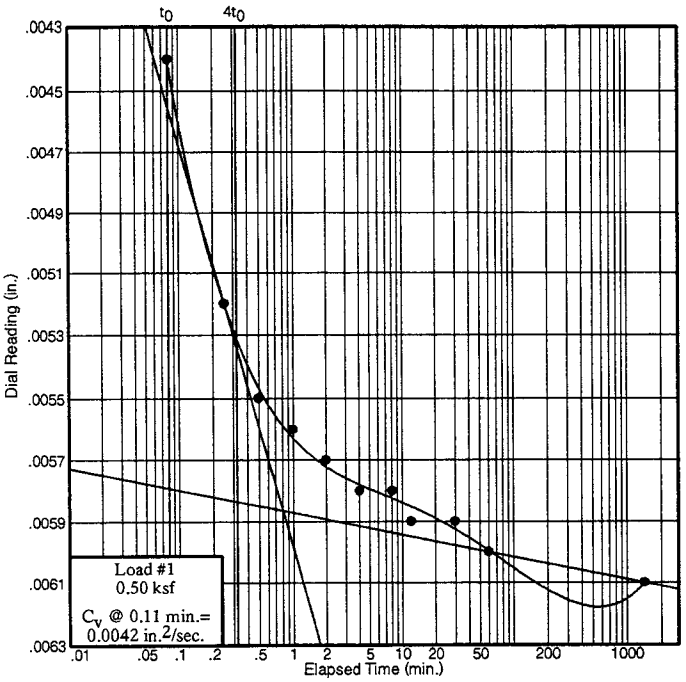
Foundation Systems Engineering

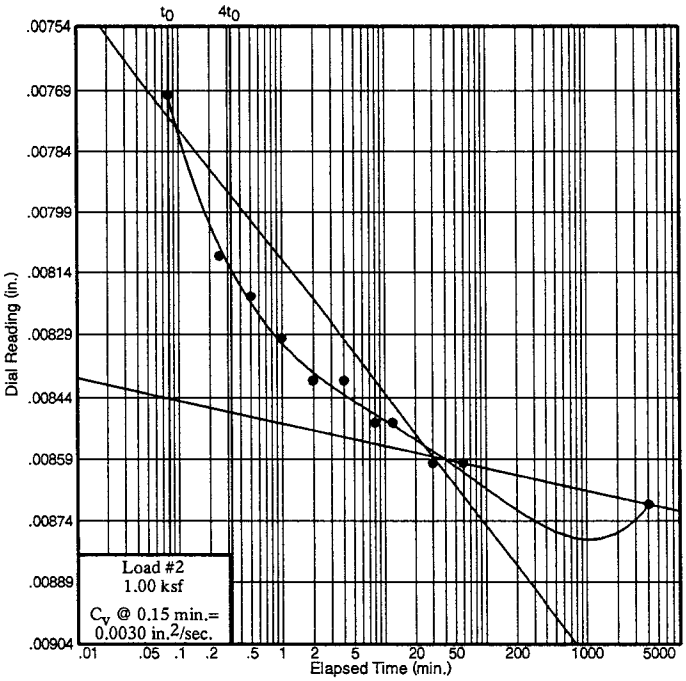
Knoxville, Tennessee

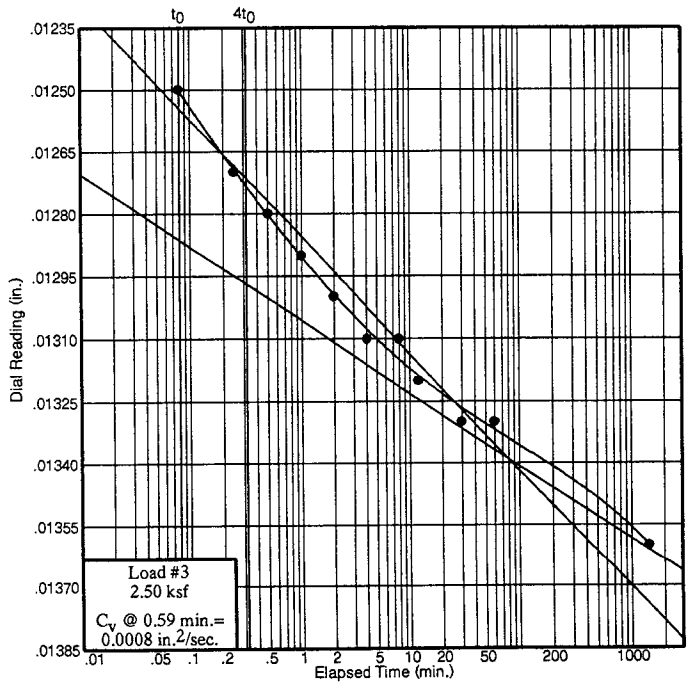
Figure C-1

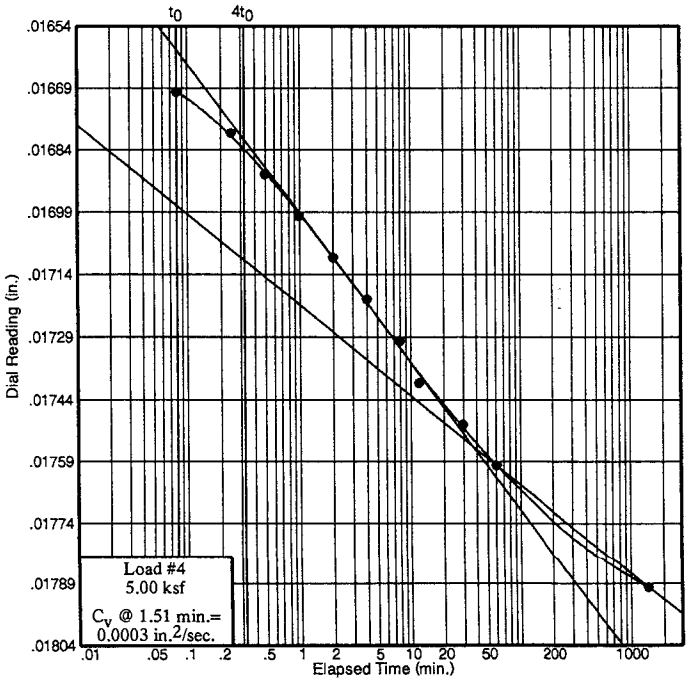
Dial Reading vs. Time

Project No.: 39142
Project: INTERNATIONAL PAPER LANDFILL
CANTON, NORTH CAROLINA
Location: B-12









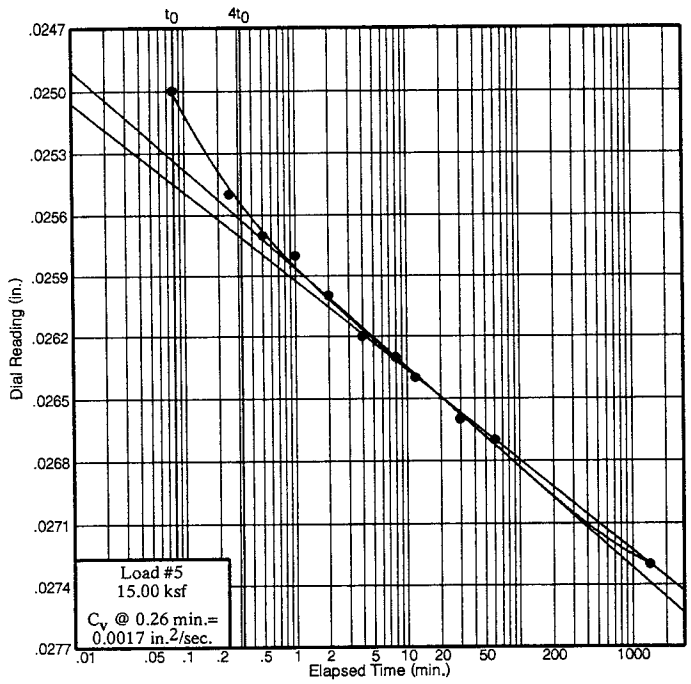
Foundation Systems Engineering

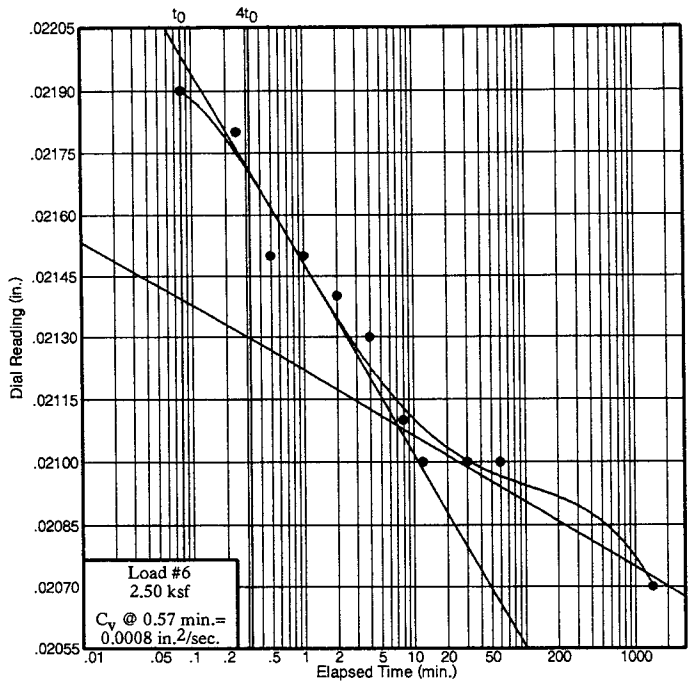
Knoxville, Tennessee

Figure C2

Dial Reading vs. Time

Project No.: 39142
Project: INTERNATIONAL PAPER LANDFILL
CANTON, NORTH CAROLINA
Location: B-12





Foundation Systems Engineering

Knoxville, Tennessee

Figure 3

FOUNDATION SYSTEMS ENGINEERING, P.C.
Geotechnical Engineering and Consulting

October 23, 2009

Mr. Joel D. Lenk, P.G.
Altamont Environmental, Inc.
231 Haywood Street
Asheville, North Carolina 28801

RE: Geotechnical Exploration - Addendum
Livestock Market & Events Center
International Paper Landfill 5C
Canton, North Carolina
FSE Project No. 39142

Dear Mr. Lenk:

We have received your questions with regard to our Geotechnical Exploration report (FSE Project No. 39142) dated October 13, 2009. The following is our response.

1. Use of granite as an alternate to limestone:

Recommendations outlined within our report include the use of crushed limestone as slab-on-grade bearing material, as well as aggregate base for the proposed parking and drive areas. In our professional opinion, granite or other durable crushed stone may be used as slab-on-grade bearing material and aggregate base. The granite or other durable crushed stone should meet the same requirements (size, grading, durability, compaction, etc.) as the limestone as outlined in the report.

2. Discussion of impact to landfill cap as a result of estimated truck loads:

Based on our discussion with you, we understand that approximately 80,000 lb cattle trucks (loaded) will be accessing the proposed parking and drive areas located above the existing landfill cap. Cattle trucks typically distribute the load across four axles (two at the front of the truck trailer, two at the rear), resulting in an axle load of approximately 20,000 lbs (10,000 lbs per wheel). Tire pressures for standard highway trucks are typically 80 to 100 psi. These loads equate to a pressure 80 psi (11,520 psf) spread over an area of approximately 0.85 sf, or 100 psi (14,400 psf) over an area of approximately 0.70 sf.

P.O. Box 9449
Knoxville, TN 37940-0449
(865) 577-3361 fax (865) 573-1817

P.O. Box 5267
Kingsport, TN 37663
(423) 239-9226 fax (423) 239-8677

As outlined within the Recommendations section of our report, we recommended that all parking and drive areas be stripped of topsoil, be lined with geogrid, and utilize a minimum of 3 feet of compacted soil fill to reach proposed finished subgrade. Furthermore, we recommended a base stone thickness of 8 inches for the roadway.

Stresses in soils distribute/spread laterally with depth. A typical distribution of a load will spread approximately 1 foot (along the base and length of the loaded area) with each foot of depth. As such, based on the aforementioned cattle truck loading, we estimate the stress increase at 3 feet beneath finished subgrade to be less than 1000 psf per wheel load. This load is similar to the wheel load of an average car. The stresses will also distribute laterally through the geogrid, reducing the increase of stress on the landfill cap even more.

Non-paved haul roads are typically designed for rut depths of 1.5 inches or 3 inches at the surface of the base stone. Our recommendations were intended to reduce the rut depth to less than 1.5 inches at the surface of the base stone. Rutting is typically translated through the base stone and into the subsoil. Product testing performed by Tensar International Corporation indicates that the rut depths into the soil subgrade are significantly reduced with the use of geogrid, including the Tensar TriAx TX 170 as recommended within our report. Based on this information, we estimate that rutting at the top of the landfill cap will be less than 1 inch.

Based on this information, prepared as outlined in our previously submitted *Geotechnical Exploration* report, we believe that the 80,000 lb cattle trucks will have little impact on the landfill cap.

3. Reduction of soil fill thickness:

Based on our discussion with Mr. Paul Dow, Altamont Environmental, we understand that the preliminary grading plans indicate that 2 feet of fill will be required to reach proposed finish subgrade elevation in several locations along the entry drive. In our opinion, the risk of subgrade failures, slope failures, etc. will increase with the reduction of the new compacted structural fill. As discussed within our previously submitted report, we recommend that the proposed grades be adjusted to allow for construction of the 3 feet of newly compacted structural fill without undercutting into the landfill cap.

4. Cut slope behind building:

In an email received from Mr. Mike Dale, Ambient Design Group, on October 22, 2009, Mr. Dale indicated that the location where the cut slope ties into the existing grade behind the proposed building may extend beyond the property line. Mr. Dale indicates that the toe of the slope at the proposed parking lot is in an area that is scheduled to be cut approximately 25 feet to 35+ feet. Relatively sound rock may be encountered prior to reaching these cut depth, therefore reducing the length of the slope. As per the recommendations outlined within our report, moderately hard to hard, relatively sound gneiss may be laid back at a 1H:1V slope. Should rock not be encountered within the proposed cut depth, we recommend the use of a retaining wall at the toe of the slope in order to maintain 2H:1V fill and cut slopes within the constraints of the property. At your request, we will be happy to provide recommendations for retaining wall design, as well as assist with retaining wall design services.

Also of note, we recommended that site grading be performed to ensure that positive drainage is maintained from building, parking/drive and slope areas. We recommend the use of a v-ditch, or similar method, at the crest of the cut slope in order to reduce the risk of erosion across the cut slope face.

GENERAL QUALIFICATIONS

This report has been prepared for the exclusive use of Altamont Environmental, Inc. This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to the geotechnical design elements of this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made. Foundation Systems Engineering, P.C is not responsible for any claims, damages, or liability associated with any other party's interpretation of this report's subsurface data or reuse of this report's subsurface data or engineering analysis without our express written authorization.

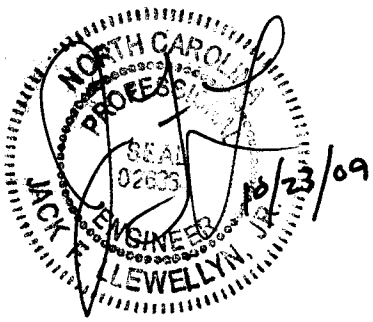
The analyses and recommendations submitted herein are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the borings will not become evident until construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the structures are planned, the conclusions and

recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing.

This report should not be made a part of project plans and specifications; but may be included with bidding documents for the convenience of the bidders.

It has been a pleasure to be of service to you on this project. If you have any questions, please contact us at your convenience.

Sincerely,
Foundation Systems Engineering, P.C.



Eric M. Peterson, P.E.
Project Engineer
Tennessee No. 109536

Jack F. Llewellyn Jr., P.E.
Senior Geotechnical Engineer
North Carolina No. 026364

EMP/JFL/sf

APPENDIX F

HEALTH AND SAFETY PLAN

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY
231 HAYWOOD STREET, ASHEVILLE, NC 28801
TEL.828.281.3350 FAC.828.281.3351
WWW.ALTAMONTENVIRONMENTAL.COM

HEALTH AND SAFETY PLAN
ENVIRONMENTAL AND GEOTECHNICAL INVESTIGATION
GRADING AND CONSTRUCTION

IP CLOSED LANDFILL 5C
CANTON, NORTH CAROLINA

Prepared for
International Paper Co.
North Carolina Regional Livestock Center

August 11, 2009

Prepared by
Altamont Environmental, Inc.
231 Haywood Street
Asheville, NC 28801
(828) 281-3350

SITE INFORMATION

Site Address:	Beaverdam Road between I-40 and Newfound Road Canton, North Carolina	
Call Before You Dig:		(800) 632-4949
Altamont Phone Number:	Office	(828) 281-3350
Project Manager:	Joel Lenk	(828) 280-8375 (cellular)
HSO:	Evan Yurkovich	(828) 545-3219 (cellular)
Emergency Phone Numbers:		911
	Police	(828) 648-2376
	Poison Control	(800) 848-6946
	Fire Dept	(828) 648-2351
	Haywood Regional Medical Center	(828) 452-8060
Site Owner Representative:	Tom Richardson, International Paper Company	
		(901) 419-3878

APPROVALS

Altamont Project Manager, Joel D. Lenk, P.G. Date 8/27/09

Altamont Health and Safety Officer, Evan Yurkovich Date 8/27/09

SIGNATURE PAGE

NAME	COMPANY	DATE
[illegible]	Const. Materials Laboratory	9-8-09
Eric West	CML/FSE	9-8-09
[illegible]	FSE	9/8/09
[illegible]	Altamont	9/8/09
Anna Saylor	Altamont	9/8/09

The individuals identified above have reviewed and agree to abide by the attached Site Health and Safety Plan.

This Health and Safety Plan has been prepared by Altamont Environmental, Inc. (Altamont), and incorporates elements of the Altamont Corporate Health and Safety Manual. This health and safety plan has been prepared to address safety issues associated with the **IP Closed Landfill 5C (Site) and the construction of the Western North Carolina Regional Livestock Center.** This Health and Safety Plan was prepared for and applies to Altamont staff, drilling contractors, geotechnical lab technicians, grading contractors, construction contractors, utility contractors and anyone who is working on Site. Sites meeting the criteria of types 2 or 3 of the screening matrix included below require the preparation of a site health and safety plan.

GUIDELINES FOR SITE CLASSIFICATION

TYPE	DESCRIPTION	REPRESENTATIVE EXAMPLES
1	Activities in which health and safety hazards are known, and are adequately controlled.	• Most on-site work in industrial manufacturing workplaces • Surveying • Wastewater flow/flume measurement • Environmental auditing • Landfill construction • Most structural, electrical, civil, and mechanical engineering tasks on-site • Industrial hygiene surveys
2	Activities conducted on sites where the major health and safety hazards are either unknown, not fully defined, or inadequately controlled, excluding any Type 3 sites.	• Stack sampling • Tank Testing • Barrel or drum sampling • Excavations at barrel burial sites • Contaminated soil removal/treatment or sampling • Drilling/boring in disposal areas • Asbestos abatement projects • Hazardous waste sampling (certain types)
3	Activities that are part of: • Hazardous substance response operations under CERCLA, including initial investigations at CERCLA sites • Major RCRA corrective actions • Hazardous waste sites designated for cleanup by state or local governmental authorities • Emergency and post-emergency response operations	• RI/FS studies • Most Type 2 activities when conducted at a hazardous waste cleanup operation site as described on the left, including: – ground water sampling – soil sampling – waste sampling – surface water sampling – worker exposure and ambient air sampling

PROJECT DESCRIPTION

Project Name: Closed IP Landfill 5C, Environmental and Geotechnical Investigation, Grading and Construction for the Western North Carolina Regional Livestock Center

Location: Canton, North Carolina

Project Number: 2055.0502

The objective of this investigation is to determine the geotechnical properties of the soils and landfill waste beneath the locations proposed for construction of the new Western North Carolina Regional Livestock Center (WNCRLC) and to install soil gas probes on the landfill.

PROJECT ORGANIZATION:

Altamont Project Manager: Joel Lenk

Client Representative: Tom Richardson **Phone Number:** (901) 419-3878

Altamont Field Staff: Joel Lenk, Stu Ryman, Paul Dow, Anna Saylor, Alec Macbeth, Amy Bondurant, Parker Brooks

Subcontractors:	**Phone Numbers:**
Ambient Design Group	828-232-4330
Foundation Systems Engineering	865-577-3361
Wes Cole Land Surveying	828-299-7020
WNCRLC	828-713-0511
Unknown Grading Contractor	
Unknown Construction Contractor	
Unknown Utility Contractor(s)	

HAZARD ASSESSMENT

Chemicals of Concern and Worker Exposure

Site history and previous environmental work at the site indicate the possibility for exposure to dioxin compounds. A material safety data sheet (MSDS) for 2, 3, 7, 8-Tetrachloro-dibenzo-p-dioxin is summarized below and included in Appendix A.

Chemical Name (CAS RN)	Exposure Criteria	Characteristics	Route of Exposure	Symptoms of Exposure
2,37,8-Tetrachloro-dibenzo-p-dioxin (dioxin) (1746-01-6)	OSHA PEL-None NIOSH IDLH-None NIOSH-REL is lowest feasible concentration	A colorless to white, crystalline solid	Inhalation, skin adsorption, ingestion, skin and eye contact	Exposure can cause damage to eyes, skin, liver, kidneys, and the reproductive system.

Media which have been determined to be potentially impacted by these constituents include solid waste material buried beneath the landfill cap that extends to maximum depths of approximately 35 feet in depth. The landfill cap consists of a minimum two foot layer of clayey soil material that covers all waste on the entire site. Appropriate monitoring requirements and personal protective equipment (PPE) for the environmental/geotechnical investigation activities are described below.

Exposure Monitoring

Due to the potential for chemical exposure, personal air/dust monitoring is required for this project. If conditions change, all work will be stopped and the HSO will notify the Project Manager who will prepare and implement an exposure monitoring/air sampling program to identify and quantify safety and health hazards and airborne levels of hazardous substances. This process will assure proper selection of engineering controls, work practices, and personal protective equipment for site personnel. Available site information should be reviewed and the exposure monitoring/air sampling program shall be expanded and/or revised, as necessary.

If visible dust is observed while drilling, workers onsite will then leave the work area for 15 minutes until the dust subsides. If the dust continues and dust monitoring indicates an assigned protection factor (APF) over 50 then site workers will don any air-purifying full-facepiece respirator with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter until dust monitoring indicates it is safe to remove the respirators as recommended by NIOSH on the MSDS included in Appendix A.

Based upon previous environmental work, Site history, and analytical results obtained from samples collected from composite H&S sampling of landfill waste, it is required that when workers drill in locations were encountering waste is likely or if waste is encountered accidentally that work stop and workers take the following actions before resuming work:

- Don long-sleeved and long-legged Tyvec© coveralls, eye protection, nitrile gloves, and work gloves
- Observe whether waste is moist and to pay close attention to determine if dust is being produced by disturbance of landfill cap soils or waste
- Stop work immediately for a minimum of 15 minutes, mover upwind and away from any dust emanating from cap soils or landfill waste
- Allow sufficient time for dust to settle and wait until dust is not visible
- Wet landfill cap soils with a dust suppression devise capable of producing a gentle spray or mist and wet cap soils and waste to the extent that they are wet but not to the extent that there is runoff
- Maintain waste in a wetted condition while handling and in temporary storage such that dust is not produced
- Stop and call a person qualified professional experienced in dealing with the waste for assistance if waste is encountered accidentally and do not resume work until direction or oversight is obtained
- Obtain dust monitoring equipment capable of producing an Assigned Protection Factor (APF) and calibrate per the manufacturer's specifications if dust cannot be suppressed using engineering controls
- If dust monitoring becomes necessary create calibration records and store them with the project safety records
- Continue work only after being released by a qualified health and safety professional
- Continue to monitor dust visually and with appropriate monitoring equipment
- If dust cannot be controlled by wetting soils and waste, and if and APF over 50 is observed all workers are required to done an air-purifying full-facepiece respirators with a chin-style, front- or back-mounted organic vapor canisters having an N100, R100, or P100 filter until dust monitoring indicates it is safe to remove the respirators as recommended by NIOSH published MSDS and work involved with waste handling is complete.

Monitoring equipment will be calibrated per manufacturer's specifications. Calibration records will be kept with the project safety records. Manufacturer recommendations on equipment maintenance and storage will be followed.

Impacted Media:

____ Groundwater
_X_ Solid Waste
____ Vapor
____ Other List: _____

Hazardous Characteristics:

____ Toxic
_X_ Carcinogen
____ Flammable
____ Corrosive/Reactive

Other Types of Hazards:

_X_ Heat/Cold Stress
_X_ Bites, Stings etc
_X_ Slips, Trips, and Falls
____ Confined Spaces
_X_ Working at Heights
____ Other List: _____

Heat Exposure

Site work may subject workers to hot and cold-weather working conditions. Site workers are required to exercise care to prevent heat and cold-related injuries. When the body temperature rises, the body seeks to dissipate the excess heat. The disorders due to heat stress are heat cramps, heat exhaustion, and heat stroke:

The following steps shall be taken as required to reduce heat stress:

1. Acclimate the body prior to conducting work.
2. Drink liquids to replace body water lost during perspiration.
3. Increase salt consumption beyond the individual's typical daily intake (salt tablets are not recommended).
4. Wear a personal cooling device (e.g. wide-brimmed hat).
5. Wear a supplied air suit or respirator equipped with a vortex tube that cools the air being supplied.

6. Count pulse rate during a 30-second period as early as possible in the rest break. If the heart rate exceeds 110 beats per minute at the beginning of the rest break, shorten the next work cycle by one-third and keep the rest break the same. If the heart rate still exceeds 110 beats per minute at the next rest break, shorten the following work cycle by one-third.

Cold Exposure

Although unlikely based on the work schedule, site work may subject workers to cold working conditions. Site workers are required to exercise care to prevent cold-related injuries.

Prior to initiating work in cold environments, warm-up periods of 10 minutes in a warm location are required. Rest breaks from work in a warm area should be scheduled within every four-hour work period with moderate to heavy work activity. For light to moderate work, more frequent work breaks in a warm area should be scheduled within a four-hour work period.

JOB ACTIVITIES

Sampling: ____ Soil
____ Groundwater
____ Surface Water
____ Waste
____ Other List: _____

Drilling: _X_ Method List: Hollow Stem Auger_____

Excavation _X_ Excavation other than drilling will not be conducted beneath the elevation of the existing clay cap.

Equipment Operation ____ List Equipment ***i.e. chainsaw:*** Drilling, Vehicles, Earth Moving Equipment, Construction Equipment

Other ____ List: _____

Drilling rigs and other referenced equipment may be operated near onsite personnel. The following guidelines shall be used when working on or around such equipment:

1. Complete daily safety inspection checklist. Checklists will be maintained in project safety files.
2. Use safety cones or safety barrier tape to alert equipment operators of the location of work near heavy equipment traffic areas. The drill rig and work area shall be delineated as an exclusion zone with yellow caution tape. The exclusion zone shall be defined as a circle centered on the drill rig. The radius of the circle shall be equal to 1.5 times the distance between the base and the top of the mast of the drilling rig. No unauthorized personnel shall enter the exclusion zone.
3. Raising drilling rig masts must be done in compliance with 29 CFR 1910.333(c) (3) with regard to clearance for overhead power lines.
4. All personnel shall discuss the location and duration of project work near heavy equipment with the designated HSO or Project Manager.
5. Portable phones shall be used as a means of communication during drilling, excavating, or other activities on the site.

The designated HSO will advise the operator of any drilling rig of the following:

6. Drilling shall not commence without first contacting the North Carolina One-Call Center ("Call Before You Dig") and waiting the required amount of time.
7. Before raising the drill rig mast in the vicinity of electrical power lines, the operator shall walk completely around the drill rig to determine the distance from the rig to the nearest power line. The minimum distance should be greater than 20 feet. Any questions regarding the appropriateness of a drilling location should be brought to the attention of the HSO.
8. Before drilling, the location must be adequately cleared and leveled to accommodate the drill rig.
9. The driller shall demonstrate that a suitable storage area exists for all tools, materials, and supplies required. Pipe, drill rods, casings, augers, and similar drilling tools shall be stacked in an orderly manner to prevent rolling, spreading, or sliding.
10. All drilling personnel shall be aware of slippery surfaces on the drill rig and caution shall be exercised when working on the drill rig or climbing the mast.
11. Work areas and drilling platforms shall be kept free of materials, obstructions, and substances that could cause a surface to become excessively slick or otherwise hazardous.
12. After stabilizing and leveling the drill rig, all unnecessary personnel should be cleared from the area immediately to the rear and the sides of the drill mast, before it is raised.
13. Augers shall be used in accordance with manufacturer's recommended methods of securing the auger to the power coupling.
14. Augers shall only be cleaned when the drill rig is in neutral and the auger has ceased to rotate.
15. Unattended boreholes must be properly covered, or otherwise protected.
16. Cables shall be checked frequently for any damage and replaced if needed.
17. The driller should inform the geologist/engineer or any other sampling personnel of the safest way to collect drill-cutting samples.
18. Augers, drill stems, drive casings, inflatable packers, and all other drilling equipment shall be used in accordance with manufacturer's recommended methods.
19. The operator and helper shall establish a safe system of responsibilities for the drilling rod and auger connecting and disconnecting, auger fork insert/removal, welding, cutting, and moving drive casing and other heavy equipment. The process should be reviewed with the HSO before beginning work.

In general, the drilling personnel, and geologist/engineer shall establish a safe working environment by creating a good system of communication and being aware of potential hazards.

PERSONAL PROTECTION REQUIREMENTS

Job Activity: Drilling List Media: Soil, Solid Landfill Waste

PPE Level: D

Required Equipment:

X	Gloves	Type:	
X	Hearing Protection	Type:	
X	Eye Protection	Type:	
X	Hard Hat		
X	Safety Shoes (ANSI Z41)		
X	Monitoring Equipment	Type:	Dust Monitor
X	Other: Tyvek coveralls		

Job Activity: Construction and Grading

PPE Level: D

Required Equipment:

X	Gloves	Type:	
X	Hearing Protection	Type:	
X	Eye Protection	Type:	
X	Hard Hat		
X	Safety Shoes (ANSI Z41)		
	Monitoring Equipment	Type:	
	Other		

At a minimum, steel-toed shoes and long pants will be worn on-site. Depending on the specific work activity, steel-toed safety shoes, hard hats, safety glasses, and hearing protection may also be required. PPE for chemical exposure may consist of full-face or half-face respiratory protection, impermeable protective clothing, splash protection, and gloves. In the event that respiratory protection is required, workers must be in an approved respiratory protection monitoring program, including baseline physicals.

Site workers are recommended to wash their face, neck, and hands periodically during work onsite. If no dust is observed, site workers should still wash every two hours.

First aid

First-aid kits shall be maintained in all company vehicles onsite. First-aid kits shall be inspected and inventoried on a weekly basis during field work. In case of injury, apply Check, Call, and Care procedures and move the victim from the contaminated area. If a victim cannot be safely moved from the contaminated area, apply first aid necessary to stabilize the victim for safe transport from the accident location. Appropriate decontamination of all clothing and equipment shall be conducted upon leaving the contaminated area. The designated HSO is responsible for documenting all incidents requiring first aid.

Emergency Response

The designated HSO for the work area has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the site area. The HSO is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. All project personnel are responsible for assisting the HSO in responding to emergency situations within the capabilities of their skills, equipment, and training.

All individuals shall be able to identify the locations of the following:

- First-Aid Kit(s)
- Fire Extinguisher(s), Type ABC
- Eye Wash
- Telephone
- PPE
- Emergency Pick Up Location

APPENDIX G

BOUNDARY AND TOPOGRAPHICAL SURVEY

SHEET 1 & 2 MATCHLINE

SHEET 1 & 3 MATCHLINE

TBM 19 - MAG NAIL SET IN ALLTEC DRIVEWAY, NORTH OF I-40
NC GRID COORDINATES:
N: 679,904.21' (NAD 83/07)
E: 860,359.49' (NAD 83/07)
Z: 2,689.74' (NAVD 88)

TIE LINE ONLY
N 23°37'12" W
2484.28' (GRID)

TBM 3 - REBAR SET WITH CAP
NC GRID COORDINATES:
N: 677,628.06' (NAD 83/07)
E: 861,354.87' (NAD 83/07)
Z: 2,734.66' (NAVD 88)

INTERNATIONAL PAPER CO.
DB 315 PG 746
PIN 8667-07-7082
ZONED I-2

INTERIOR TRACT LINE

SOIL ROAD

EDGE OF WASTE

INTERNATIONAL PAPER CO.
DB 315 PG 742
PIN 8667-16-3957
ZONED I-2 & R-2

INTERNATIONAL PAPER CO.
DB 253 PG 249
PIN 8667-17-0983
ZONED I-2

LOCUST HUB FOUND (1+91.91)

MONITORING WELL

PINCHED TOP PIPE @ 1+68.97', 5.48' RIGHT OF LINE (NOT HELD)

N 88°03'01" W 332.00' (TOTAL)

191.91'

140.09'

1" EIP (0+00)

LLOYD J. BURNS
DB 407 PG 0057
PIN 8667-15-5739

TIE LINE ONLY
N 43°20'48" W
604.53' (GROUND)
604.38' (GRID)

ROCK OUTCROPPING

GRAVEL DRIVE

GROUND OBSCURED BY DENSE VEGETATION

SETBACK LINE (TYPICAL)

10'

1" EIP

S 06°41'31" W 225.14'

CONCRETE MONUMENT
NC GRID COORDS.:
N: 677,188.55' (NAD 83/07)
E: 861,769.72' (NAD 83/07)

PATRICK U. & SHERRY SMATHERS
DB 668 PG 1523
PIN 8667-26-1854

N 83°19'05" W 356.67'

EIP 1" @ FENCE INTERSECTION

S 06°30'37" W 610.03'

PATRICK U. & SHERRY SMATHERS
DB 352 PG 181
PIN 8667-27-3821 & 8667-27-2272

CONCRETE MONUMENT IN FENCE LINE

S 06°31'12" W 502.86'

DI
TOP: 2,700.6'
INV.: 2,697.6'

INV.: 2,687.1'
TOP OF HW: 2,691.4

INV.: 2,692.6'

18" CMP

42" CMP

INV.: 2,675.1'

CONCRETE DRIVE

INV.: 2,663.7'

INV.: 2,663.1'

24" CMP

COLUMN

GATE

COLUMN

SOIL ROAD

SETBACK LINE (TYPICAL)

35'

BOUNDARY LINE FOLLOWS THE CENTER OF BEAVERDAM ROAD PER DB 253 PG 249

NOTES

1. THIS PROPERTY IS SUBJECT TO ANY EASEMENTS (WRITTEN OR UNWRITTEN).
2. THE RIGHT OF WAY OF BEAVERDAM ROAD IS BASED ON INFORMATION OBTAINED FROM THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RIGHT OF WAY OFFICE.
3. THIS PROPERTY WAS SURVEYED WITHOUT THE BENEFIT OF A TITLE SEARCH AND THEREFORE MAY NOT SHOW ALL ENCUMBRANCES.
4. ALL CORNERS ARE MARKED AS SHOWN IN THE LEGEND UNLESS OTHERWISE NOTED.
5. DEED REFERENCES: AS SHOWN.
6. ALL DISTANCES SHOWN HEREON ARE HORIZONTAL GROUND DISTANCES UNLESS OTHERWISE NOTED.
7. CONTOUR INTERVAL: 1 FOOT.
8. THE LOCALIZED GROUND COORDINATE SYSTEM IS BASED ON USING TBM 3 AS THE LOCALIZATION POINT AND TBM 19 AS THE AZIMUTH MARK.
9. EDGE OF WASTE SHOWN IS BASED ON AREA FLAGGED BY REED TECH, INC. AND IS SUBJECT TO THE ACCURACY THEREOF. THIS SURVEYOR ONLY CERTIFIES TO THE HORIZONTAL ACCURACY OF THE FLAGS WITHIN THE LIMITS OF THE SURVEY AREA.
10. THIS SURVEY IS SUBJECT TO ANY AND ALL UNDERGROUND UTILITIES THAT MAY EXIST. UNDERGROUND UTILITIES SHOWN ARE BASED ON ABOVE-GROUND FIELD EVIDENCE ONLY.
11. THIS PLAT IS NOT PREPARED FOR RECORDING IN ACCORDANCE WITH G.S. 47-30.
12. THIS PROPERTY IS ZONED HEAVY INDUSTRIAL DISTRICT "I-2" AND GENERAL RESIDENCE "R-2" PER THE TOWN OF CANTON, NC CODE OF ORDINANCES. REFER TO THIS ORDINANCE FOR REGULATIONS APPLICABLE TO THE SUBJECT PROPERTY.
   "I-2" MINIMUM SETBACK REQUIREMENTS: FRONT = 35', REAR = NONE, SIDE = 10' (FROM PROPERTY LINE).
   "R-2" MINIMUM SETBACK REQUIREMENTS: FRONT = 25', REAR = 10', SIDE = 10' (FROM PROPERTY LINE).

NC GRID NORTH NAD 83 (2007)

VICINITY MAP
(N.T.S.)

TO WAYNESVILLE
BEAVERDAM ROAD
FREEDOM DR.
I-40
*SITE
HY VU DR.
NEWPOUND ROAD
THOMPSON ST.
TO ASHEVILLE

LEGEND:

- UNMARKED POINT
- LOCUST HUB FOUND
- EXISTING IRON PIPE (EIP)
- CONCRETE MONUMENT FOUND
- TEMPORARY BENCH MARK (TBM)
- MONITORING WELL
- FIRE HYDRANT
- DROP INLET (DI)
- POWER POLE
- BOUNDARY LINE
- INDEX CONTOUR
- INTERIM CONTOUR
- WATERLINE (APPROX.)
- TIE LINE
- EDGE OF WASTE
- OVERHEAD UTILITY LINE
- CENTERLINE OF DITCH
- BARBED WIRE FENCE LINE
- TREE LINE
- SETBACK LINE

BEAVERDAM ROAD - S.R. 1613

PUBLIC RIGHT OF WAY IS TO MAINTENANCE LIMITS PER NCDOT RIGHT OF WAY OFFICE (ASPHALT)

THIS PLAT REPRESENTS AN ACTUAL FIELD SURVEY THAT MEETS OR EXCEEDS THE REQUIREMENTS OF A CLASS "S" SURVEY IN ACCORDANCE WITH THE STANDARDS OF PRACTICE FOR LAND SURVEYING IN THE STATE OF NORTH CAROLINA FOR BOUNDARY SURVEYS AND A CLASS "C" FOR VERTICAL CONTROL SURVEYS.

JOHN WESLEY COLE, P.L.S. L-4561

GLOBAL POSITIONING SYSTEM CERTIFICATION (RTK)

THE NETWORK POSITIONAL ACCURACY OF THE RTK DERIVED POSITIONAL INFORMATION IS 0.05' HORIZONTAL & 0.10' VERTICAL.

HORIZONTAL POSITIONS ARE REFERENCED TO NAD 83 (NSRS 07)
VERTICAL POSITIONS ARE REFERENCED TO NAVD 88
COMBINED FACTOR 0.999760 (AVERAGE)

WES COLE LAND SURVEYING, PA
204 CHARLOTTE HIGHWAY, SUITE F • ASHEVILLE, NC 28803
OFFICE: 828.299.7020 • WWW.WESCOLESURVEYING.COM
NC FIRM LICENSE #C-3106 • NC L-4561 • TN 2432

0' 50' 100' 150'

SURVEY FOR:

INTERNATIONAL PAPER CO. & WNC REGIONAL LIVESTOCK CENTER, LLC

(SHEET 1 OF 3)

TOWN OF CANTON, HAYWOOD COUNTY, NC

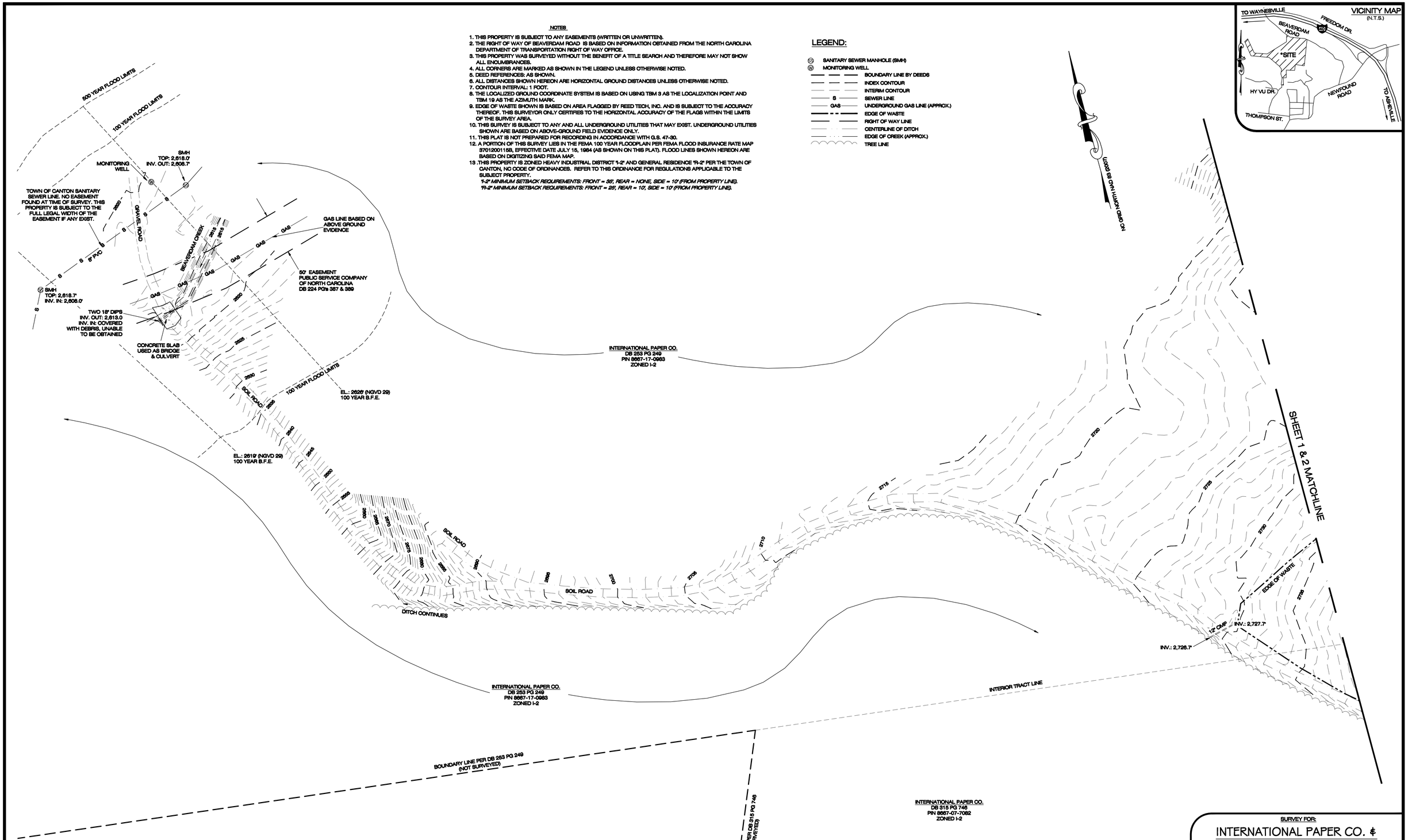
DATE: JULY 31, 2009	REVISIONS			
PROJECT NO.: 09-025	NO.	DATE	DESC.	BY
FIELD WORK: JWC/VKW				
DRAWN BY: JWC				
SCALE: 1" = 50'				

NOTES

1. THIS PROPERTY IS SUBJECT TO ANY EASEMENTS (WRITTEN OR UNWRITTEN).
2. THE RIGHT OF WAY OF BEAVERDAM ROAD IS BASED ON INFORMATION OBTAINED FROM THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RIGHT OF WAY OFFICE.
3. THIS PROPERTY WAS SURVEYED WITHOUT THE BENEFIT OF A TITLE SEARCH AND THEREFORE MAY NOT SHOW ALL ENCUMBRANCES.
4. ALL CORNERS ARE MARKED AS SHOWN IN THE LEGEND UNLESS OTHERWISE NOTED.
5. DEED REFERENCES: AS SHOWN.
6. ALL DISTANCES SHOWN HEREON ARE HORIZONTAL GROUND DISTANCES UNLESS OTHERWISE NOTED.
7. CONTOUR INTERVAL: 1 FOOT.
8. THE LOCALIZED GROUND COORDINATE SYSTEM IS BASED ON USING TBM 9 AS THE LOCALIZATION POINT AND TBM 19 AS THE AZIMUTH MARK.
9. EDGE OF WASTE SHOWN IS BASED ON AREA FLAGGED BY REED TECH, INC. AND IS SUBJECT TO THE ACCURACY THEREOF. THIS SURVEYOR ONLY CERTIFIES TO THE HORIZONTAL ACCURACY OF THE FLAGS WITHIN THE LIMITS OF THE SURVEY AREA.
10. THIS SURVEY IS SUBJECT TO ANY AND ALL UNDERGROUND UTILITIES THAT MAY EXIST. UNDERGROUND UTILITIES SHOWN ARE BASED ON ABOVE-GROUND FIELD EVIDENCE ONLY.
11. THIS PLAT IS NOT PREPARED FOR RECORDING IN ACCORDANCE WITH G.S. 47-30.
12. A PORTION OF THIS SURVEY LIES IN THE FEMA 100 YEAR FLOODPLAIN PER FEMA FLOOD INSURANCE RATE MAP 3701200115B, EFFECTIVE DATE JULY 15, 1984 (AS SHOWN ON THIS PLAT). FLOOD LINES SHOWN HEREON ARE BASED ON DIGITIZING SAID FEMA MAP.
13. THIS PROPERTY IS ZONED HEAVY INDUSTRIAL DISTRICT 'I-2' AND GENERAL RESIDENCE 'R-2' PER THE TOWN OF CANTON, NC CODE OF ORDINANCES. REFER TO THIS ORDINANCE FOR REGULATIONS APPLICABLE TO THE SUBJECT PROPERTY.
    'I-2' MINIMUM SETBACK REQUIREMENTS: FRONT = 35', REAR = NONE, SIDE = 10' (FROM PROPERTY LINE).
    'R-2' MINIMUM SETBACK REQUIREMENTS: FRONT = 25', REAR = 10', SIDE = 10' (FROM PROPERTY LINE).

LEGEND:

- SANITARY SEWER MANHOLE (SMH)
- MONITORING WELL
- BOUNDARY LINE BY DEEDS
- INDEX CONTOUR
- INTERIM CONTOUR
- SEWER LINE
- UNDERGROUND GAS LINE (APPROX.)
- EDGE OF WASTE
- RIGHT OF WAY LINE
- CENTERLINE OF DITCH
- EDGE OF CREEK (APPROX.)
- TREE LINE



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NC FIRM LICENSE #C-3106 • NC L-4561 • TN 2432

0' 50' 100' 150'

THIS PLAT REPRESENTS AN ACTUAL FIELD SURVEY THAT MEETS OR EXCEEDS THE REQUIREMENTS OF A CLASS "B" SURVEY IN ACCORDANCE WITH THE STANDARDS OF PRACTICE FOR LAND SURVEYING IN THE STATE OF NORTH CAROLINA FOR BOUNDARY SURVEYS AND A CLASS "C" FOR VERTICAL CONTROL SURVEYS.

JOHN WESLEY COLE, P.L.S. L-4561

GLOBAL POSITIONING SYSTEM CERTIFICATION (RTK)

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HORIZONTAL POSITIONS ARE REFERENCED TO NAD 83 (NSRS 07)
VERTICAL POSITIONS ARE REFERENCED TO NAVD 88
COMBINED FACTOR 0.999760 (AVERAGE)

SURVEY FOR:

INTERNATIONAL PAPER CO. & WNC REGIONAL LIVESTOCK CENTER, LLC

(SHEET 2 OF 3)

TOWN OF CANTON, HAYWOOD COUNTY, NC

DATE: JULY 31, 2009	REVISIONS			
PROJECT NO.: 09-025	NO.	DATE	DESC.	BY
FIELD WORK: JWC/VKW				
DRAWN BY: JWC				
SCALE: 1" = 50'				

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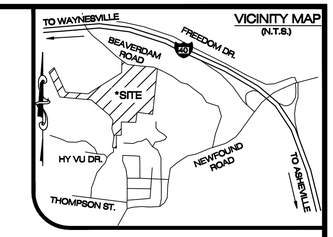

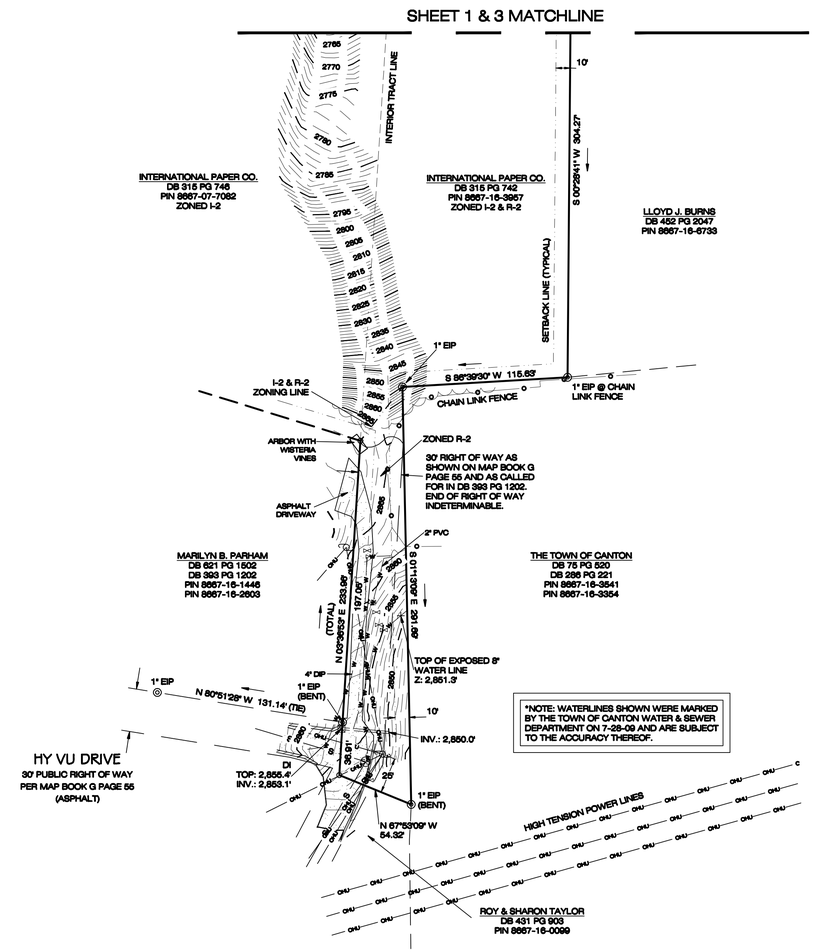

NC GRID NORTH NAD 83 (2007)

LEGEND:

- UNMARKED POINT
- EXISTING IRON PIPE (EIP)
- WATER VALVE
- DROP INLET (DI)
- POWER POLE
- SANITARY SEWER MAHOLE (SMH)
- S — SANITARY SEWER LINE
- BOUNDARY LINE
- BOUNDARY LINE BY DEEDS
- INDEX CONTOUR
- INTERIM CONTOUR
- W — WATERLINE (APPROX.)
- OHU — OVERHEAD UTILITY LINE
- CHAIN LINK FENCE LINE
- TREE LINE
- RIGHT OF WAY LINE
- SETBACK LINE

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0' 50' 100' 150'

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SURVEY FOR:

INTERNATIONAL PAPER CO. & WNC REGIONAL LIVESTOCK CENTER, LLC

(SHEET 3 OF 3)

TOWN OF CANTON, HAYWOOD COUNTY, NC

	REVISIONS			
DATE: JULY 31, 2009				
PROJECT NO.: 09-025	NO.	DATE	DESC.	BY
FIELD WORK: JWC/VKW				
DRAWN BY: JWC				
SCALE: 1" = 50'				

APPENDIX H

GEOPHYSICAL INVESTIGATION

Reed Tech, Inc.

P.O. Box 212684, Columbia, SC 29221-2684

July 14, 2009

Joel D. Lenk, P.G.
Altamont Environmental, Inc.
231 Haywood Street
Asheville, North Carolina 28801

Re: Geophysical Investigation – Champion Site, Canton, North Carolina

Reed Tech, Inc. (Reed Tech) is pleased submit to Altamont Environmental, Inc. (Altamont) the results of a geophysical survey at the former Champion Paper fly ash disposal pond site located in Canton, North Carolina.

Background

According to our conversation, Altamont is concerned with the location of underground utilities associated with the former (and now closed and capped) fly ash lagoons located north of Canton, North Carolina. Presently these lagoon features have been capped with a low-permeability material of varying thickness. Of greatest interest are the two most eastern lagoons, and the presence or absence of reported leachate lines that may have been utilized to distribute the fly ash material. In addition, Altamont wishes to evaluate the depth/thickness (if possible) of the existing lagoons (depth from top to natural ground). Other information concerning variances in soil composition is also desired as the site is being considered for possible building construction. Reed Tech was hired to evaluate the site area that is suspected to contain possible buried leachate distribution lines, and fly ash material.

Field Investigations

The use of geophysical investigations to enhance the understanding of shallow soil and fill material in a capped landfill is well established. Early geophysical applications were

primarily focused on the mining industry but have most recently been widely utilized in the highway and building construction industry, and in this case, the completed landfill. The primary value of geophysical application is that it measures directly and indirectly physical parameters of the shallow earth, and to some degree the composition and status of buried debris.

Reed Tech completed three geophysical measurement techniques at the site:

1. A mid-frequency ground-penetrating radar (GPR) evaluation along the suspected outline of two former lagoon features. Here, Reed Tech utilized a Mala hand cart GPR unit.
2. A low-frequency GPR unit. Here, Reed Tech utilized a GSSI Model 3000 equipped with a 200 MHz antenna in tow behind an AWD Polaris Ranger.
3. A high-resolution GEM-2 Multifrequency electromagnetic evaluation was completed over the lagoon structures.

The field activities were completed over a two-day period (July 8 and 9, 2009) where ambient air temperature varied from 65 degrees in the morning to 80 degrees in the afternoon. No rainfall event occurred during the first day of the geophysical survey. However a light rainfall event occurred during the morning of the second day (July 9, 2009). Upon review of the field data, these conditions did not appear to adversely affect the data (only EM data was collected at this time).

Field Methods

Ground-Penetrating Radar (GPR)

The GPR method is a coupled geophysical technique that essentially produces a continuous horizontal and vertical record of subsurface ground conditions at a site. These ground conditions generally correspond to changes in conductivity and the electrical dielectric properties of the soil. This is essentially equivalent to changes in ground composition. As such, the purpose of the GPR investigation is to assist in evaluating the

vertical and horizontal extent of identified subsurface features. The GPR data was collected across anomalous areas identified in the EM geophysical survey and included:

1. 53-short profiles shown in Figure 2 approximately normal to the partitions (or dikes).
2. 9-longer GPR profiles that were completed across and around each of the lagoons (shown in Figure 3).

Figure 4 illustrates four typical GPR profiles that cross through the center of each lagoon. The profiles were selected because they exhibit the containing partitions/dikes, and the center of each of the lagoons evaluated. Here, we have identified the location of the partitions, and the approximate depth of the lagoons (if possible).

Multifrequency Electromagnetic Survey (In-phase and Soil Conductivity)

The Electromagnetic Method (EM) is a non-contact (uncoupled) geophysical method that utilizes a multiple frequency electromagnetic detector (Models GEM-300 or GEM-2). Both of these EM instruments collect electromagnetic responses in the in-phase (metal detection or magnetic susceptibility mode) and quadrature (conductivity) mode.

The EM in-phase and conductivity data was collected simultaneously at four varying frequencies (1470 Hz, 5130 Hz, 18030 Hz, and 63030 Hz). By varying the collection frequencies, Reed Tech Solutions is able to better characterize the makeup of buried material.

The GEM-2 was operated in remote control configuration. In this mode the GEM-2 unit is mounted on a plastic sled positioned approximately .75 meters from the ground surface. The receiving coil (detector coil) is situated directly above the exposed ground surface. Data is collected at the rate of 10 samples per second. The position of each sample point is measured utilizing a CSI Wireless SERES GPS with a data update rate of 6 Hz. These data are transferred from the GEM-2 unit to a portable laptop computer that is carried on board a 4WD vehicle (Polaris Ranger with covered cab area). The sample spacing is thus a function of rate of travel of the sled and rate of data sampling. Here, Reed Tech collected data along straight survey lines at 1.5 to 2 ft. intervals. The site was

surveyed in a single parallel path pattern. The location of the EM data points is presented in Figure 5.

Methods

The methods of the GPR and EM evaluations are summarized here.

GPR Investigation

The GPR data was collected in two phases using a Mala GPR Cart, and a SIR 3000 data collection unit using a 200 MHz antenna. The data was reviewed in the field for completeness and reliability. The SIR 3000 unit uses a digital survey wheel that demarks the length of survey in feet as each profile is collected. These data are also collected along with the time domain records of the GPR. These data were post-processed using GSSI Radar Vs. 6 software. In general, the GPR records are good with an average depth of detection of up to 16 -feet. This depth of detection is more than Reed Tech anticipated given the presence of a clay cap on the landfill. The presence of clay caps generally reduces the depth of penetration for GPR.

EM Investigation

The EM data was reviewed across all frequencies for both the in-phase (metal detection) and quadrature (conductivity) modes. Based on this review, the 5130 Hz frequency in-phase data was selected to identify the location of potentially buried lines and affected soils (Figure 6). The largest accumulation of potentially affected material is confined to the edges of each lagoon with the up-slope side being least affected (as evidence in Figures 6 and seven by red hues as most affected and green hues as normal.

Summary of Results

An EM and GPR evaluation was completed at Champion Mill Landfill site located near Canton, North Carolina. The area of the investigation represented approximately 13 acres in area. EM profiles were completed over the entire area of interest and illustrated the following:

1. Presence of high in-phase and quadrature (soil conductivity) over regions of each disposal cell that was highest along the partitions/dikes, and lowest in the center.
2. The eastern most disposal cell spatially contained the least amount of affected fill material. This may be due to the fact that less the fill material appears to be thinner than the adjacent and more northerly disposal cell.
3. The partitions/dikes appear to be the least affected of all the constructed units. Here, the in-phase and quadrature EM values closely match the observed values over areas of relatively undisturbed ground (locations where bedrock is exposed).

The GPR evaluation was completed in two phases over portions of the fill area. The interpreted edge of each disposal cell was located in the field and marked with white and pink pin flags. These locations were subsequently surveyed using a GPR unit with sub meter resolution. A comparison of these data with the results of the EM survey indicated generally good agreement with the exception of portions of the cells where soil conductivity is highest (red hues) in Figures 6 and 7.

Here, Reed Tech found:

1. The partitions/dikes did not contain evidence of buried pipes (metal or non-metal).
2. The northern most disposal cell appears to contain thicker deposits of material, averaging approximately 13 feet. Whereas the eastern cell averaged only 10 feet.
3. Both of the disposal cell's deposits generally thinned towards the east (in the direction of exposed bedrock.

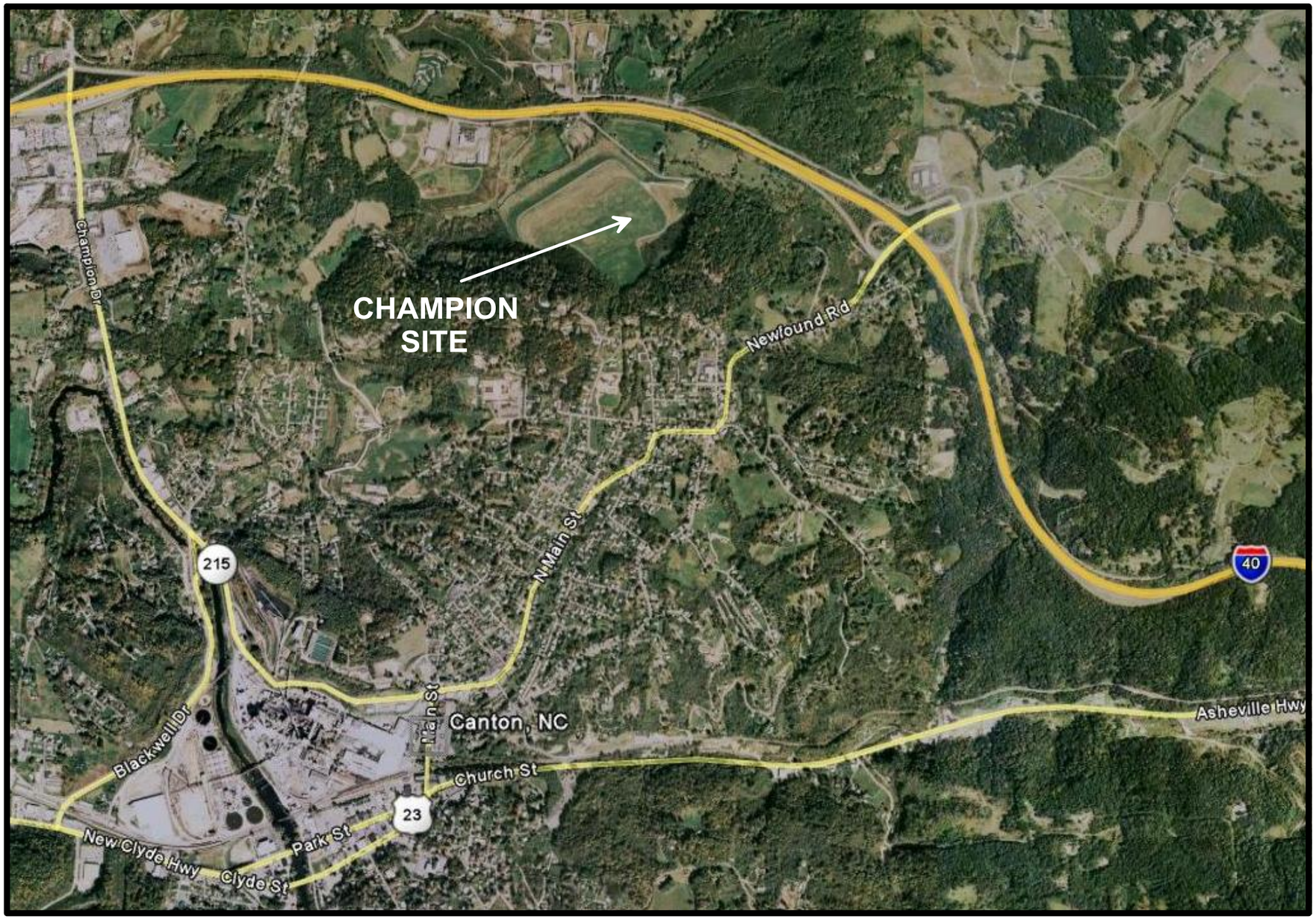
Please give us a call should you have any questions concerning the above information.

Very truly yours,

REED TECH, INC.

Mr. Jeff Garnto, President

FIGURE 1



SITE LOCATION MAP

GEOPHYSICAL EVALUATION OF UNDERGROUND UTILITIES AND FLY ASH WASTE LAGOONS CHAMPION PAPER MILL CANTON, NORTH CAROLINA

JULY 2009

Reed Tech, Inc.

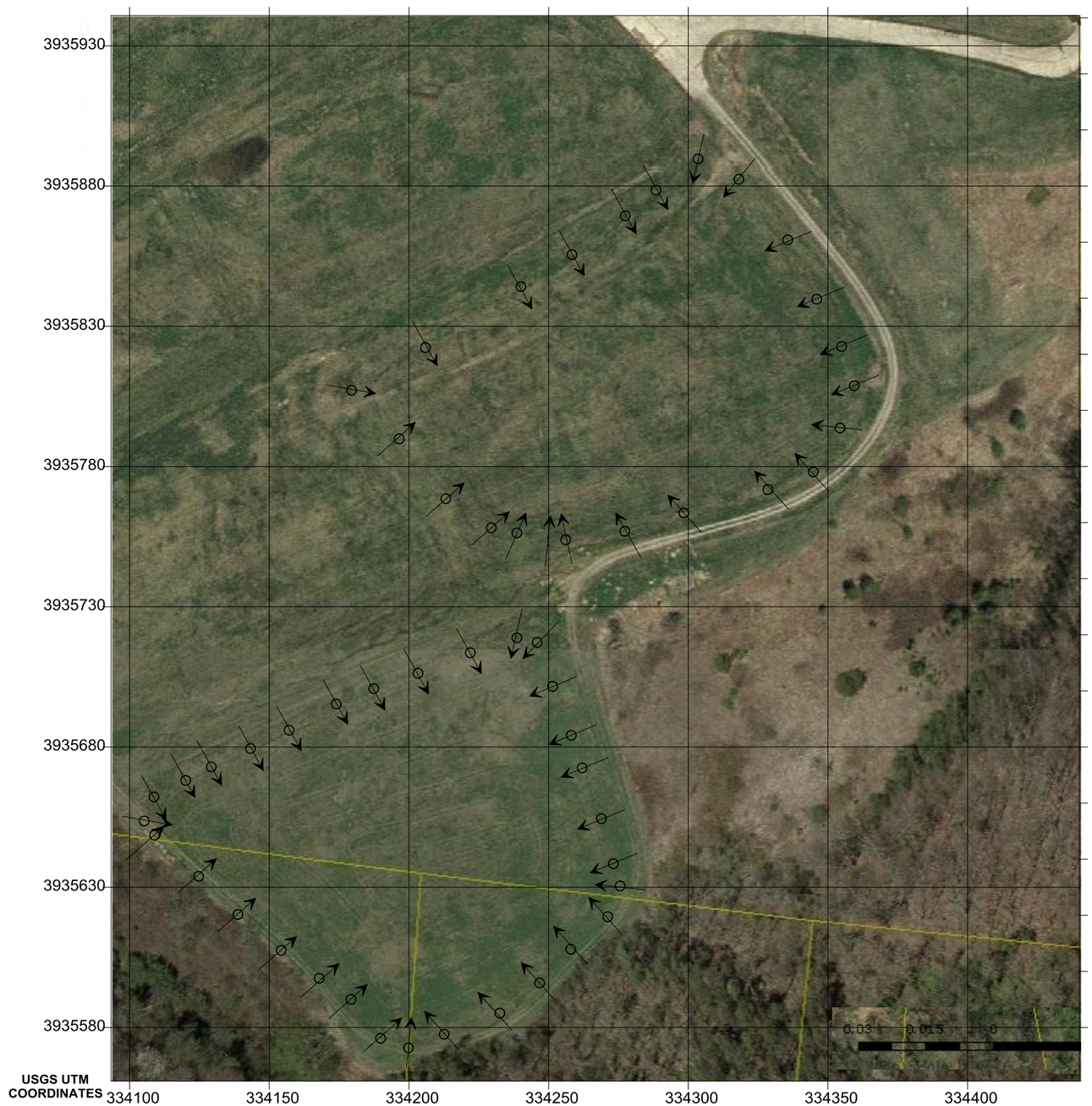


FIGURE 2

LEGEND

LOCATION OF MALA GPR PROFILE LINES AND PIN FLAGS IDENTIFYING EDGE OF LAGOON BASED ON GPR RESULTS

GEOPHYSICAL EVALUATION O
UNDERGROUND UTILITIES ANI
FLY ASH WASTE LAGOONS
CHAMPION PAPER MILL
CANTON, NORTH CAROLINA

SITE PLAN

0 150
SCALE IN FEET

JULY 2009

Reed Tech, Inc.

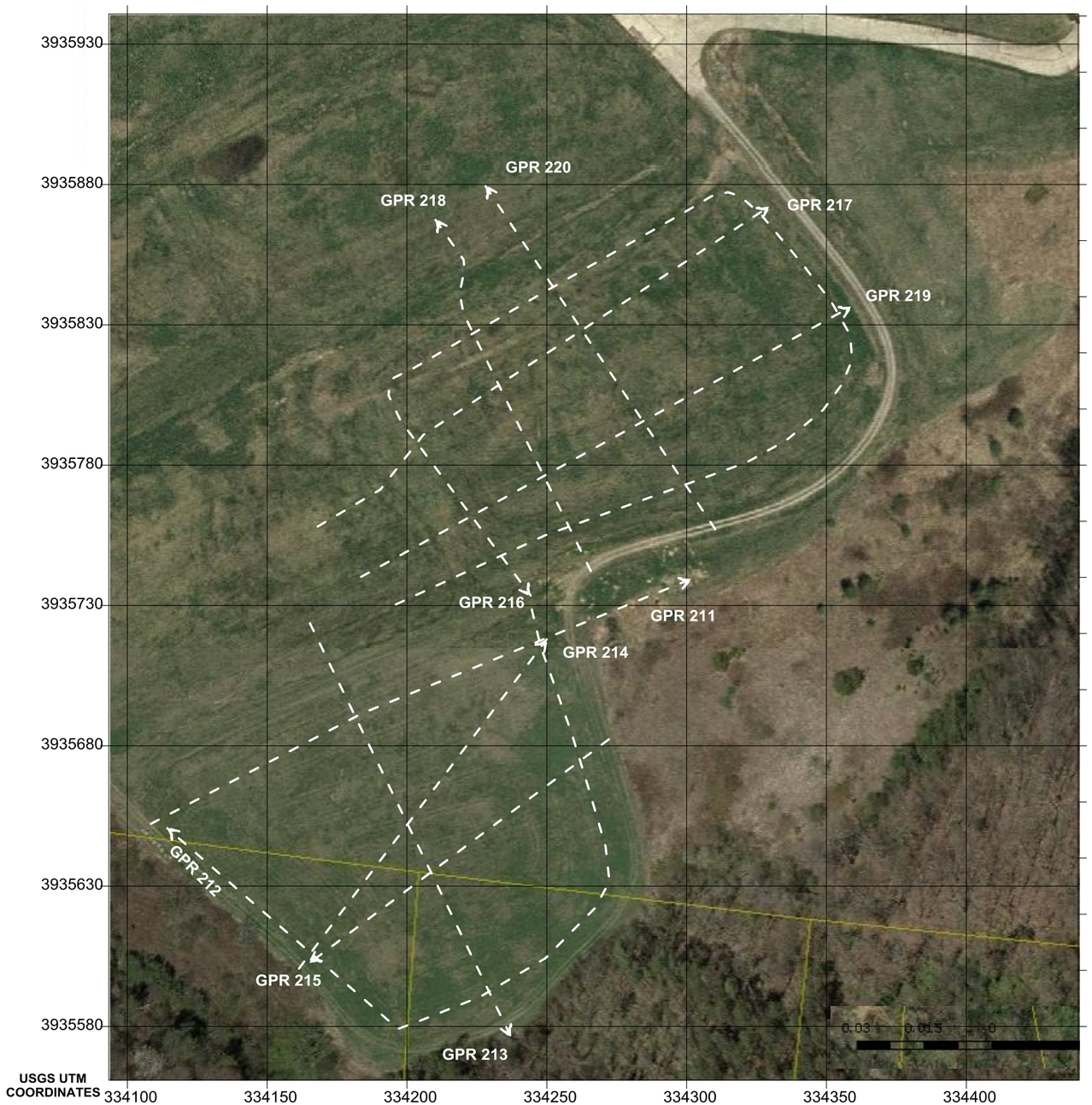


FIGURE 3

LEGEND

+ INDICATES LOCATION OF MFE DATA POINT

GPR 219

LOCATION OF GSSI GPR 200 MHz PROFILE LINES

GEOPHYSICAL EVALUATION OI UNDERGROUND UTILITIES ANI FLY ASH WASTE LAGOONS CHAMPION PAPER MILL CANTON, NORTH CAROLINA

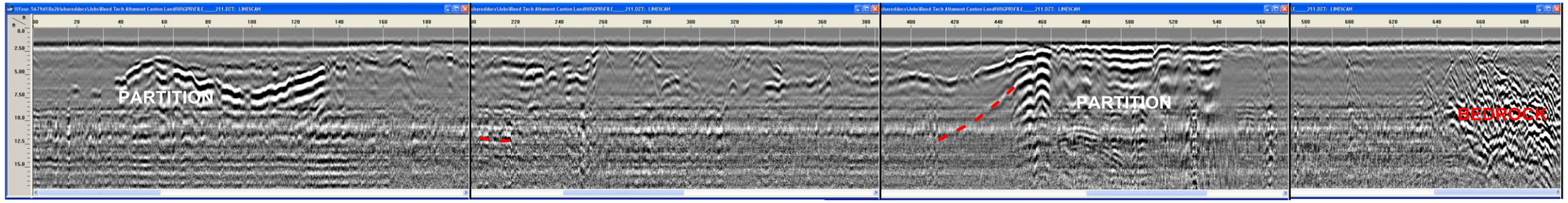
SITE PLAN

0 150

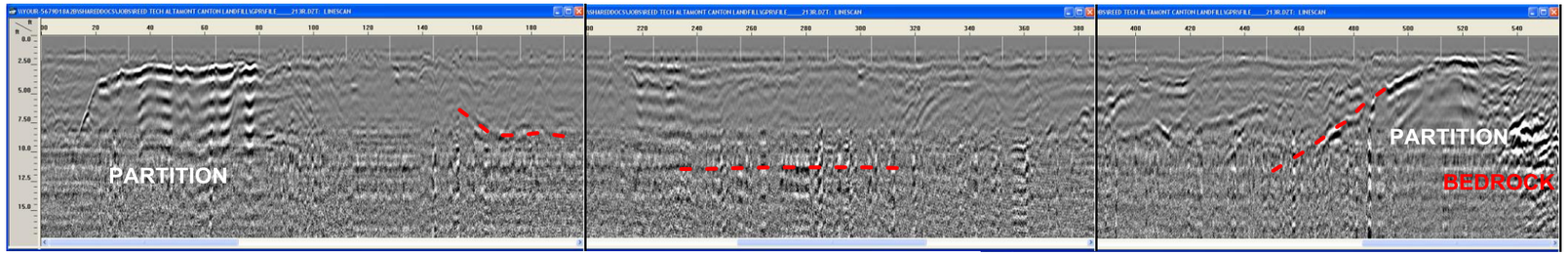
SCALE IN FEET

JULY 2009

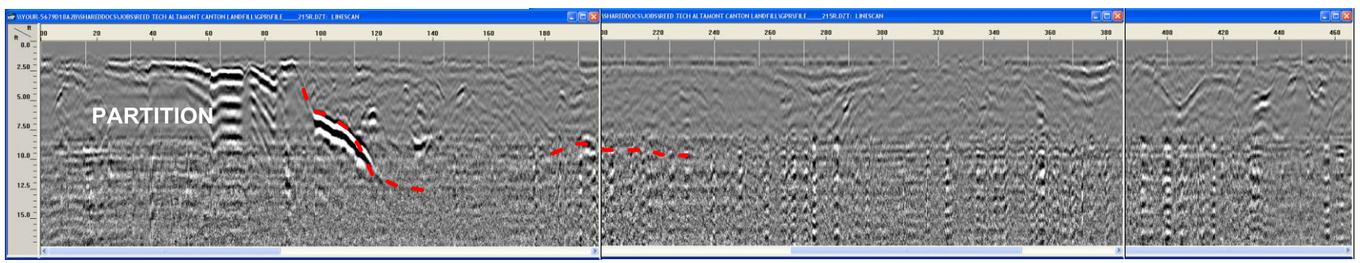
Reed Tech, Inc.



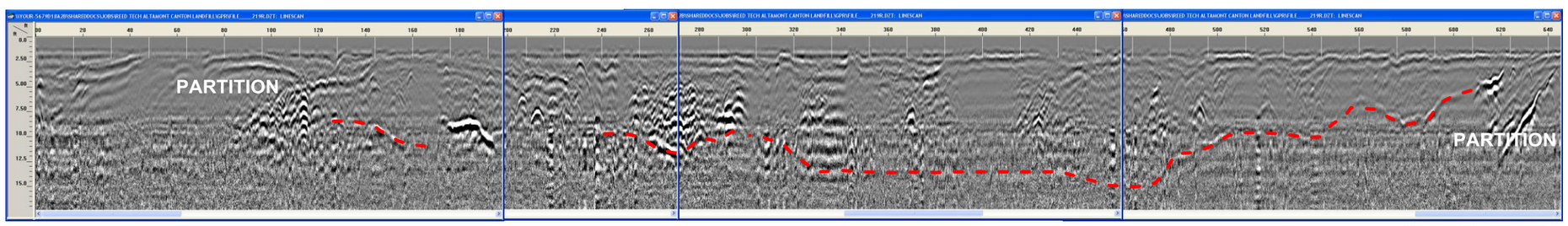
GPR PROFILE 211



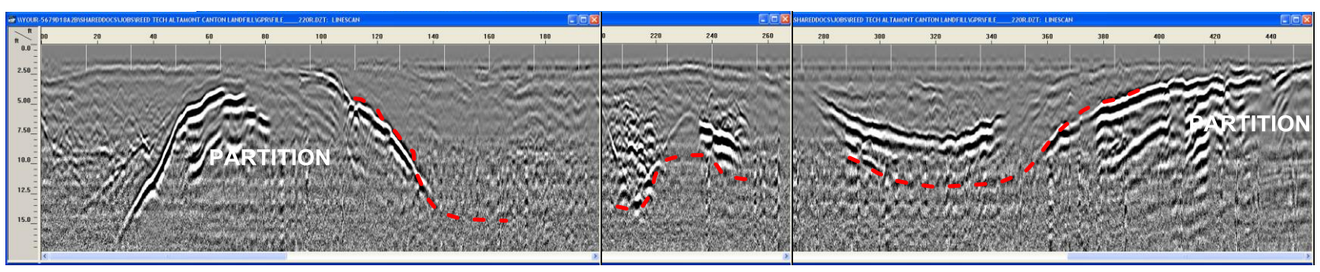
GPR PROFILE 213



GPR PROFILE 215



GPR PROFILE 219



GPR PROFILE 220

TYPICAL GPR PROFILE THROUGH TWO FLY ASH LAGOONS (200MHz)

CHAMPION SITE, CAMDEN, NC

(SEE FIGURE 3 FOR LOCATIONS OF EACH PROFILE LINE)

ESTIMATED DEPTH TO BOTTOM OF LAGOON

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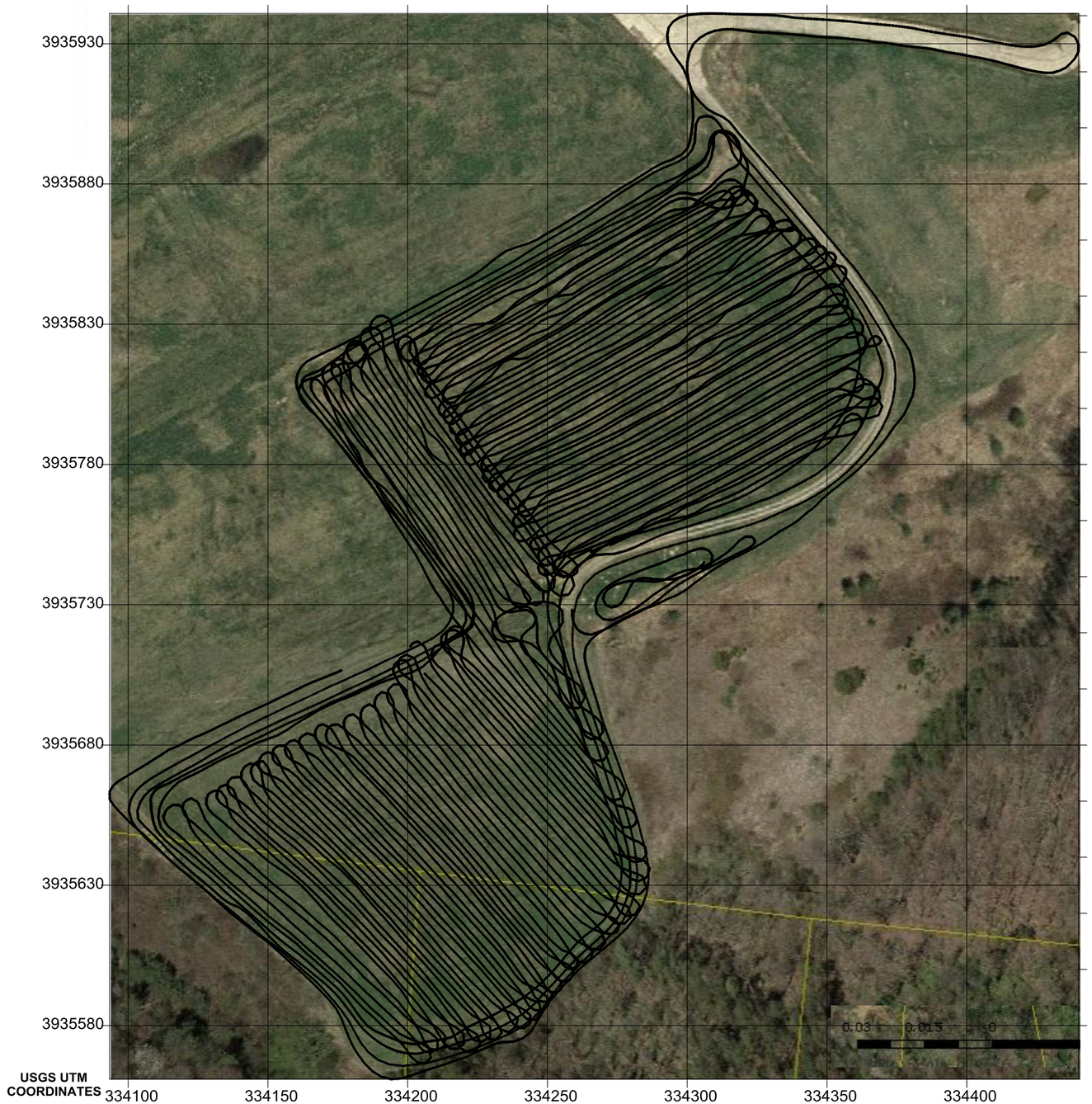


FIGURE 5

LEGEND

+ INDICATES LOCATION OF MFEM DATA POINT

LOCATION OF GEM-2 MULTI-FREQUENCY ELECTROMAGNETIC PROFILE LINES

GEOPHYSICAL EVALUATION OF UNDERGROUND UTILITIES AND FLY ASH WASTE LAGOONS CHAMPION PAPER MILL CANTON, NORTH CAROLINA

SITE PLAN

0 150

SCALE IN FEET

JULY 2009

Reed Tech, Inc.

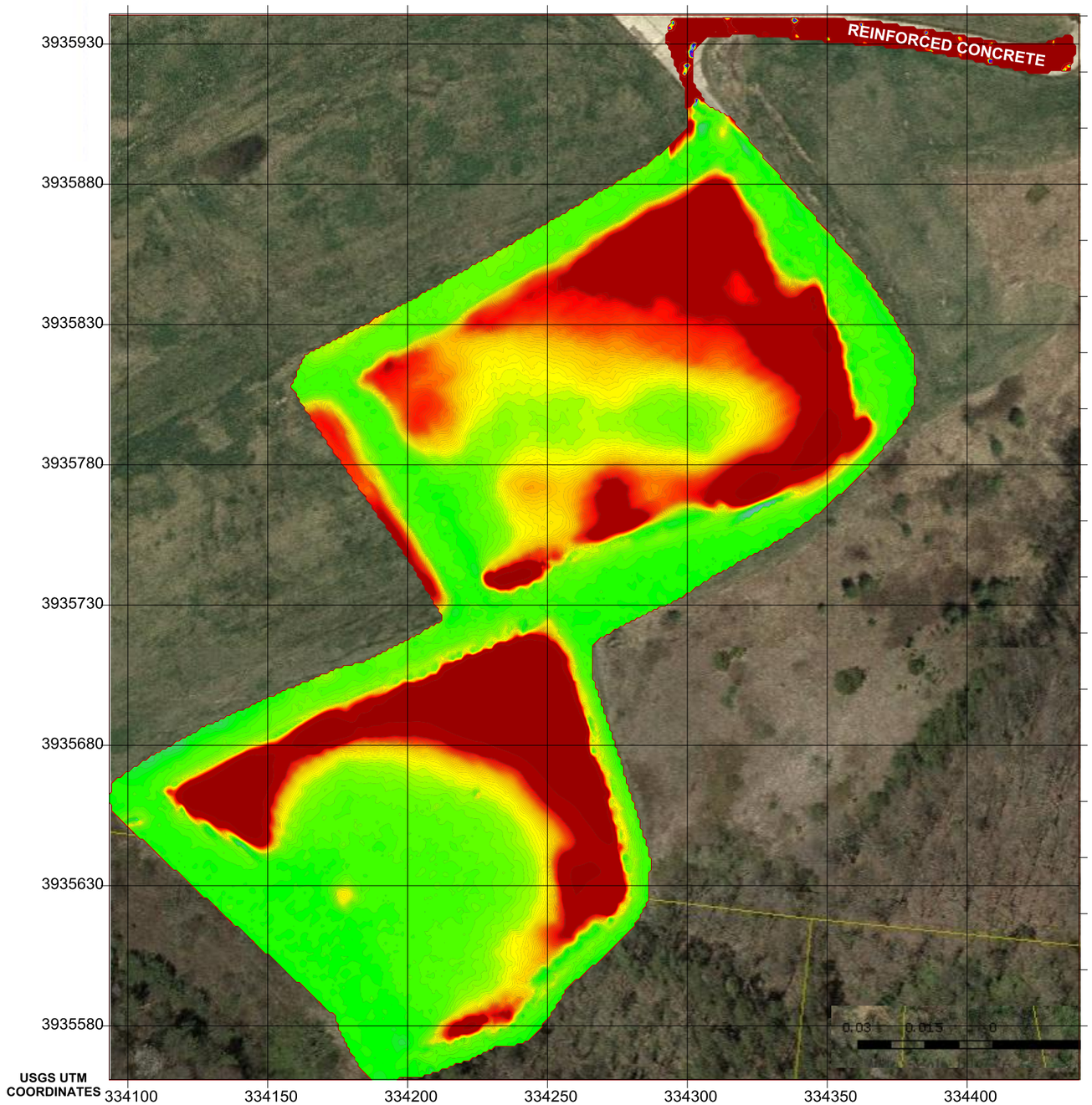


FIGURE 6

LEGEND

HIGH IN-PHASE

NORMAL IN-PHASE

4000
3100
2200
1300
400
-500
-1400
-2300
-3200
-10000

IN-PHASE DATA (PPM)

GEM-2 MULTIFREQUENCY ELECTROMAGNETIC PROFILE LINES
5130 Hz IN-PHASE MODE

GEOPHYSICAL EVALUATION OF UNDERGROUND UTILITIES AND FLY ASH WASTE LAGOONS CHAMPION PAPER MILL CANTON, NORTH CAROLINA

SITE PLAN

0 150

SCALE IN FEET

JULY 2009

Reed Tech, Inc.

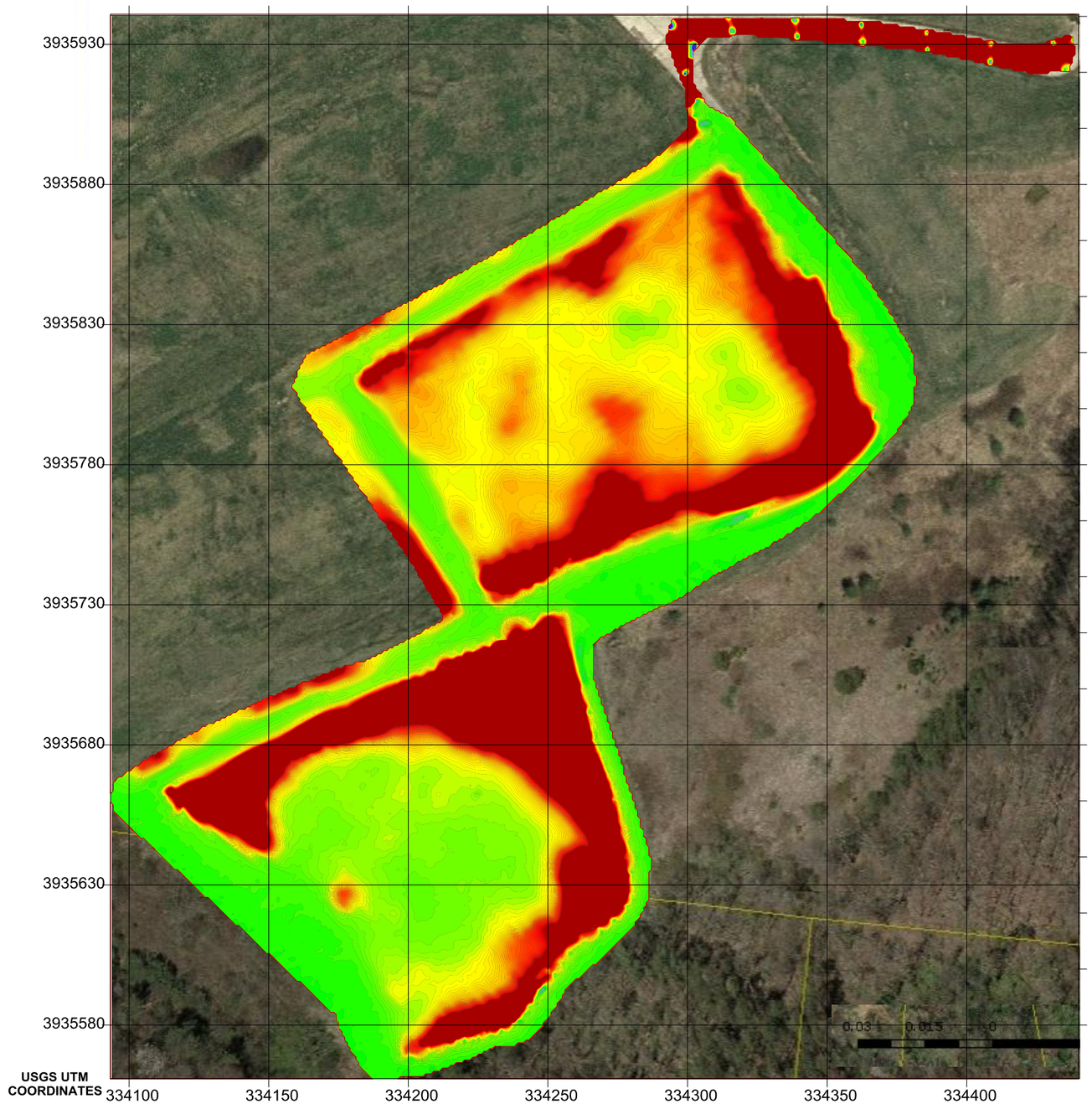


FIGURE 7

LEGEND

HIGH CONDUCTIVITY

NORMAL CONDUCTIVITY

4000
3100
2200
1300
400
-500
-1400
-2300
-3200
-10000

APPARENT CONDUCTIVITY (PPM)

GEM-2 MULTIFREQUENCY ELECTROMAGNETIC PROFILE LINES
5130 Hz QUADRATURE MODE

GEOPHYSICAL EVALUATION OF UNDERGROUND UTILITIES AND FLY ASH WASTE LAGOONS CHAMPION PAPER MILL CANTON, NORTH CAROLINA

SITE PLAN

0 150

SCALE IN FEET

JULY 2009

Reed Tech, Inc.

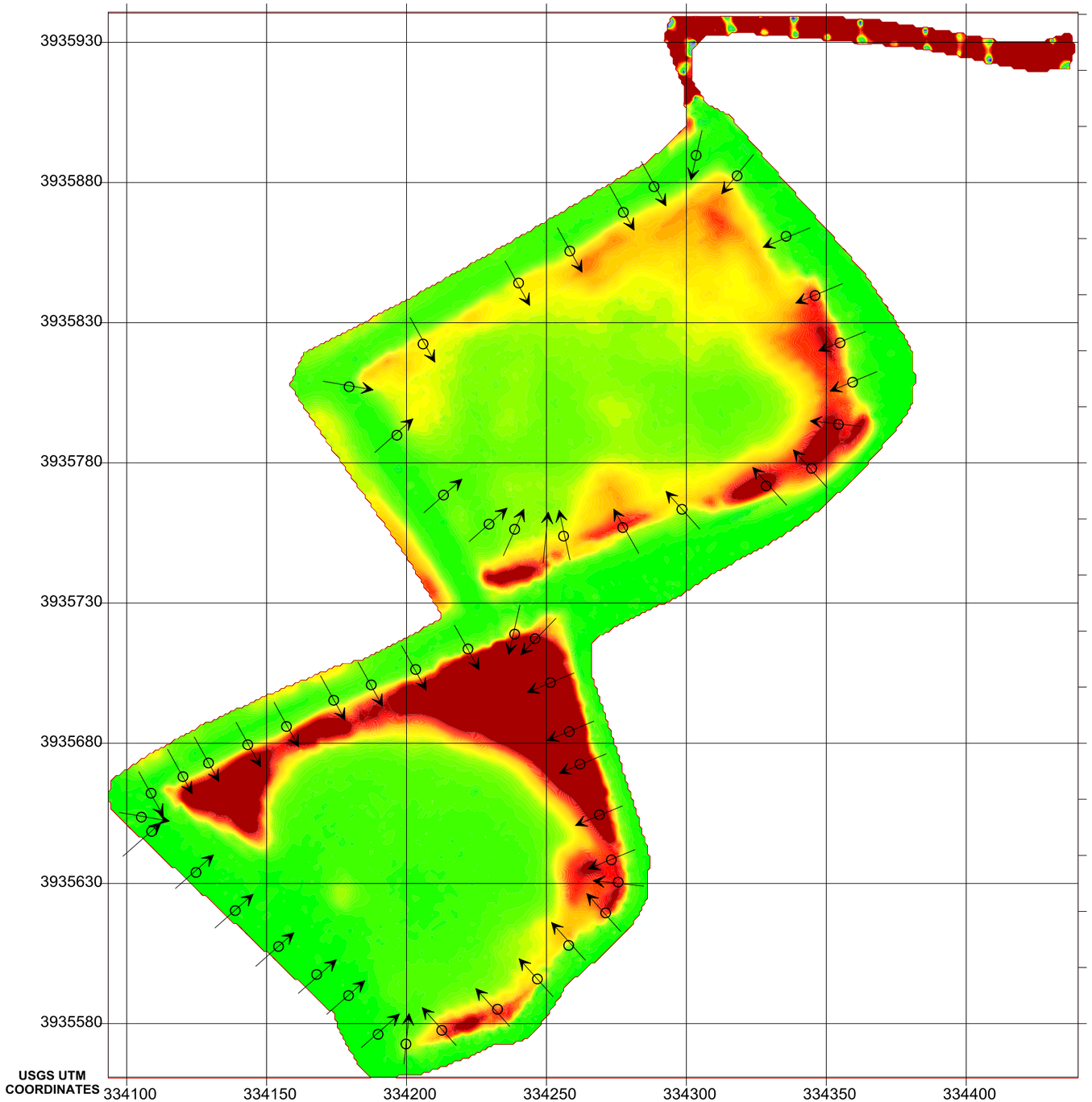


FIGURE 8

LEGEND

LOCATION OF MALA GPR PROFILE LINES AND PIN FLAGS IDENTIFYING EDGE OF LAGOON BASED ON GPR RESULTS

COMPARISON OF GPR AND EM DATA IN IDENTIFICATION OF THE EXTENT OF EACH DISPOSAL CELL

GEOPHYSICAL EVALUATION OF UNDERGROUND UTILITIES AND FLY ASH WASTE LAGOONS CHAMPION PAPER MILL CANTON, NORTH CAROLINA

SITE PLAN

0 150

SCALE IN FEET

JULY 2009

Reed Tech, Inc.

APPENDIX I

CIVIL DESIGN PLAN SHEETS

LIVESTOCK & EVENTS CENTER

BEAVERDAM ROAD
HAYWOOD COUNTY, NORTH CAROLINA

DRAWING SET CONTENT

SHEET NO.	SHEET TITLE	SUBMITTAL DATE	REVISION DATE
C-0	COVER SHEET		
C-1a-c	SURVEY SHEETS		
C-2	SITE PLAN		
C-3	GRADING & DRAINAGE PLAN		
C-4	WATER & SEWER PLAN		
C-5	WATER & SEWER PLAN		
C-6	SEWER PROFILES		
C-7	SEWER PROFILE		
C-8	EROSION CONTROL PLAN		
C-9	SITE DETAILS		
C-10	DRAINAGE DETAILS		
C-11	EROSION CONTROL DETAILS		
C-12	UTILITY DETAILS		
C-13	UTILITY DETAILS		
C-14	UTILITY DETAILS		

OWNER/DEVELOPER

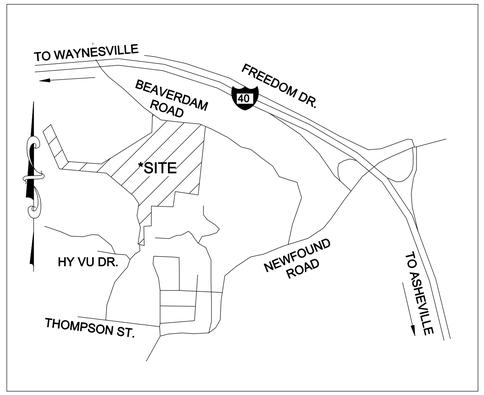
WNC REGIONAL LIVESTOCK CENTER, LLC
594 BREVARD ROAD
ASHEVILLE, NC 28806
PHONE: (828) 252-4783
CONTACT: Jim Erickson

LANDSCAPE ARCHITECT/ CIVIL ENGINEER

AMBIENT DESIGN GROUP
28 N. ANN SUITE 100
ASHEVILLE, NC. 28801
828-232-4330
CONTACT: Tony Hauser, RLA, PE

LAND SURVEYOR

WES COLE LAND SURVEYING, PA
204 CHARLOTTE HWY, STE. F
ASHEVILLE, NC 28803
PHONE: (828) 299-7020
CONTACT: WES COLE, PLS



VICINITY MAP

NOT TO SCALE

DEVELOPMENT SUMMARY

TOTAL TRACT AREA: 129.2 AC. +/-
TOTAL DEVELOPED AREA: ~4.5 AC.

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GENERAL NOTES: (APPLICABLE TO ALL SHEETS)

1. BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY WES COLE LAND SURVEYING, PA.
2. CONTOUR ELEVATIONS BASED ON FIELD VERIFIED SURVEY DATA.
3. PROJECT TO BE CONSTRUCTED IN ONE PHASE.
4. NUMBER OF PROPOSED LOTS: NA
5. PROPERTY PIN NO: 8667-17-0983, 8667-07-7082, 8667-16-3957
6. DEED BOOK/PAGE: 253/249, 315/746, 315/742
7. TOTAL SITE AREA: 129.2 ACRES +/-
8. ALL IMPROVEMENTS SHALL CONFORM TO THE TOWN OF CANTON DEVELOPMENT ORDINANCE.
9. ALL ROADS WILL BE PRIVATE.
10. COMMON OPEN SPACES, PARK AREAS AND LANDSCAPED ISLANDS WILL BE OWNED AND MAINTAINED BY THE WNC REGIONAL LIVESTOCK CENTER, LLC.
11. ALL CREEKS, STREAMS AND STORM DRAINAGE CULVERTS ARE SUBJECT TO A 20' PERMANENT DRAINAGE EASEMENT.
12. SANITARY SEWER SERVICE WILL BE PUBLIC AND CONSTRUCTED TO TOWN OF CANTON PUBLIC WORKS AND STATE OF NORTH CAROLINA STANDARDS.
13. WATER SUPPLY WILL BE BY EXTENSION OF A PUBLIC WATER SYSTEM OR THE INSTALLATION OF A COMMUNITY WATER SYSTEM IN ACCORDANCE WITH THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES.
14. THIS PROPERTY IS NOT LOCATED WITHIN A SPECIAL FLOOD HAZARD AREA AS DETERMINED BY FEMA. THE DESIGNATED PROPERTY LIES IN ZONE X ON FIRM COMMUNITY PANEL 370120 0115b, 115 out of 250 DATED: July 15 1984.
15. ALL PAVEMENT MARKINGS SHALL CONFORM TO N.C.D.O.T. STANDARDS.
16. ALL TRAFFIC CONTROL SIGNS SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES STANDARDS.
17. SUBJECT PROPERTY IS SUBJECT TO I-2 HEAVY INDUSTRIAL & R-2 GENERAL RESIDENTIAL ZONING.
18. OMITTED
19. OMITTED
20. ALL ROADS AND PAVEMENT SHALL BE COMPACTED AGGREGATE BASE CONSTRUCTED IN ACCORDANCE WITH NCDOT STANDARD SPECS.
21. INSTALLATION OF STREET/SITE LIGHTING, IF DESIRED, SHALL BE COORDINATED BY THE DEVELOPER.
22. PROVISION OF ELECTRICAL SERVICE SHALL BE COORDINATED BY THE DEVELOPER.
23. THE CONTRACTOR SHALL PROTECT EXISTING PROPERTY MONUMENTATION AND PRIMARY CONTROL. ANY SUCH POINTS WHICH THE CONTRACTOR BELIEVES WILL BE DESTROYED SHALL HAVE OFFSET POINTS ESTABLISHED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY MONUMENTATION DESTROYED BY THE CONTRACTOR SHALL BE REESTABLISHED AT HIS EXPENSE.
24. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO: A.) PREVENT ANY DAMAGE TO PRIVATE PROPERTY AND PROPERTY OWNER'S POLES, FENCES, SHRUBS, ETC. B.) PROTECT ALL UNDERGROUND UTILITIES. C.) NOTIFY ALL UTILITY COMPANIES AND FIELD VERIFY HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES PRIOR TO START OF CONSTRUCTION. NOTIFY OWNER OF ANY POTENTIAL CONFLICTS WHICH MAY EXIST BETWEEN THE EXISTING UTILITIES AND CONSTRUCTION PLANS.
25. BARRICADING AND TRAFFIC CONTROL DURING CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL CONFORM TO THE NCDOT STANDARD SPECIFICATIONS AND DRAWINGS. TRAFFIC FLOW AND ACCESS SHALL BE MAINTAINED DURING ALL PHASES OF THE CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING TRAFFIC SAFETY MEASURES FOR WORK ON PROJECT.
26. CONTRACTOR SHALL MAINTAIN DRAINAGE AT ALL TIMES DURING CONSTRUCTION. PONDING OF WATER IN STREETS, DRIVES, TRUCK COURTS, TRENCHES, ETC. WILL NOT BE ACCEPTABLE.
27. ANY DAMAGES THAT MAY OCCUR TO REAL PROPERTY OR EXISTING IMPROVEMENTS SHALL BE RESTORED BY THE CONTRACTOR TO AT LEAST THE SAME CONDITION THAT THE REAL PROPERTY OR EXISTING IMPROVEMENTS WERE IN PRIOR TO THE DAMAGES. THIS RESTORATION SHALL BE SUBJECT TO THE OWNER'S APPROVAL; MOREOVER, THIS RESTORATION SHALL NOT BE A BASIS FOR ADDITIONAL COMPENSATION TO THE CONTRACTOR. RESTORATION SHALL INCLUDE, BUT NOT BE LIMITED TO, REGRASSING, REVEGETATION, REPLACING FENCES, REPLACING TREES, ETC.
28. WHERE PRESENT, CONTRACTOR SHALL MAINTAIN EXISTING SANITARY SEWER AND WATER SERVICE AT ALL TIMES DURING CONSTRUCTION.
29. CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH UTILITY COMPANIES AND ADJUSTMENT OF EXISTING SANITARY SEWER CLEANOUTS, WATER METERS AND ANY OTHER APPURTENANCES TO NEW GRADE AS REQUIRED.
30. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL STORM WATER POLLUTION PREVENTION LAWS AND ORDINANCES.
31. PAVEMENT REMOVAL AND REPAIR SHALL CONFORM TO NCDOT REQUIREMENTS. ALL SAWCUTS SHALL BE FULL DEPTH CUTS. CONTRACTOR SHALL MAKE EFFORTS TO PROTECT CONCRETE EDGES. ANY LARGE SPALLED OR BROKEN EDGES SHALL BE REMOVED BY SAWCUTTING PAVEMENT PRIOR TO REPLACEMENT.
32. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION CONTROL MEASURES THROUGH THE COMPLETION OF THE PROJECT AND THROUGH THE ESTABLISHMENT OF VEGETATION SUFFICIENT TO PROVIDE EROSION PROTECTION. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURES PRIOR TO PROJECT CLOSE-OUT.
33. CERTIFICATION OF CUT AND FILL SLOPES SHALL BE THE RESPONSIBILITY OF THE OWNER/DEVELOPER AND SHALL BE MADE BY A GEOTECHNICAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF NORTH CAROLINA.
34. CUT AND FILL SLOPES (EMBANKMENTS) SHALL BE CONSTRUCTED IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATION SECTION 235 OR THE GEOTECHNICAL (SOILS) REPORT RECOMMENDATIONS, WHICHEVER ARE MORE RESTRICTIVE. AT A MINIMUM, ALL FILL SLOPES SHALL BE PLACED IN 10 INCH MAXIMUM LIFTS COMPACTED TO NOT LESS THAN 95 PERCENT DENSITY (STANDARD PROCTOR). CONTRACTOR SHALL ARRANGE FOR INDEPENDENT COMPACTION TESTING RESULTS TO BE PAID FOR BY THE OWNER/DEVELOPER.
35. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.
36. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY THAT ALL REQUIRED PERMITS AND APPROVALS HAVE BEEN OBTAINED FROM ALL REGULATORY AUTHORITIES.
37. ALL DISTURBED AREAS ARE TO BE STABILIZED AND SEEDED WITHIN 15 DAYS OF DISTURBANCE UNLESS OTHERWISE NOTED.

PRELIMINARY NOT FOR CONSTRUCTION

AMBIENT DESIGN GROUP
LANDSCAPE ARCHITECTS & CIVIL ENGINEERS
28 North Ann Street, suite 100 Asheville, NC 28801
Ph: 828-232-4330 Fx: 828-232-4331
E-mail: info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

LIVESTOCK MKT. & EVENTS CTR.
COVER SHEET
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS

DATE: 10-24-19
DRAWN BY: MP
CHKD BY: TH
PROJECT NO. 0906-002
SHEET NO. C-0

REFER TO APPENDIX G
FOR WES COLE LAND SURVEYING, PA
BOUNDARY AND TOPOGRAPHICAL SURVEY
SHEETS 1 THROUGH 3

SHEET NO.

C-1

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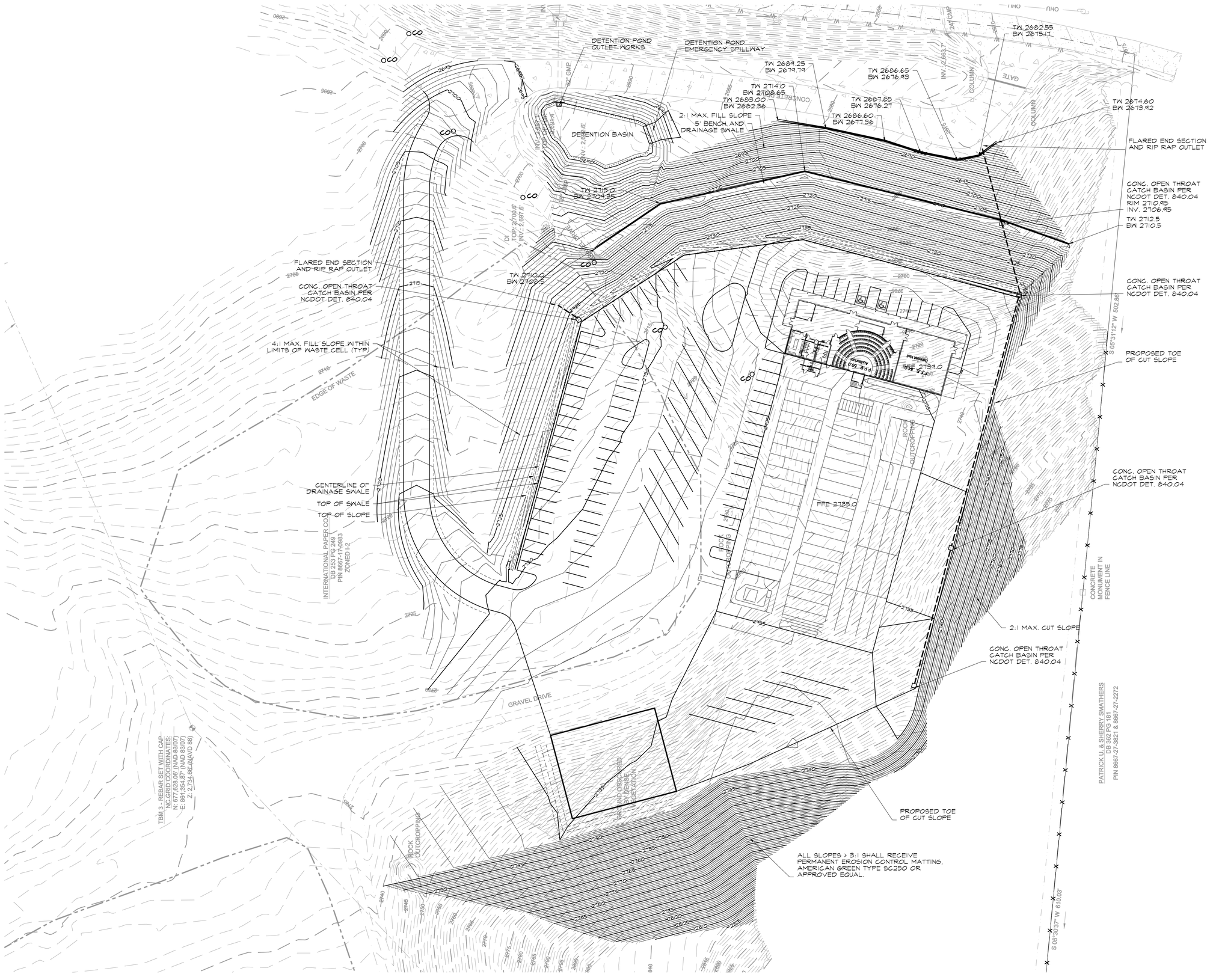
E-mail: info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

LIVESTOCK MKT. & EVENTS CTR. SITE PLAN

CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS
-

DATE: 08/30/09
DRAWN BY: ALH
CHK'D BY: MCD
PROJECT NO. 0906-002
SHEET NO. C-2



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NOT FOR
CONSTRUCTION

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LANDSCAPE ARCHITECTS & CIVIL ENGINEERS
28 North Ann Street, suite 100 Asheville, NC 28801
Ph: 828-232-4330 Fx: 828-232-4331
E-mail: info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

LIVESTOCK MKT. & EVENTS CTR.
GRADING & DRAINAGE PLAN
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

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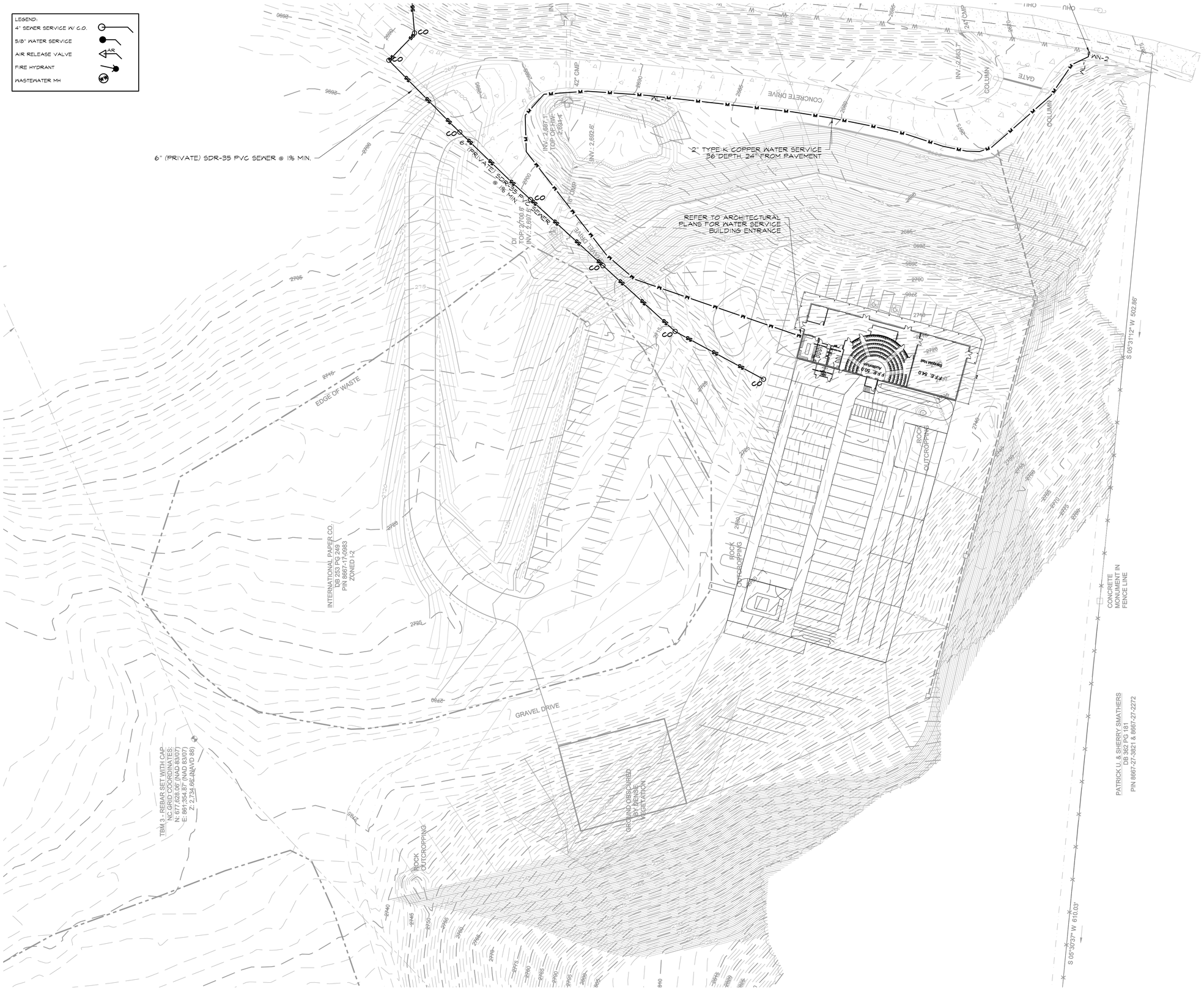
40' 20' 0 40' 80'
SCALE 1" = 40'

REVISIONS
1.

DATE: 08/30/08
DRAWN BY: AJH
CHK'D BY: MCD
PROJECT NO. 0956-002
SHEET NO. C-3



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40' 20' 0 40' 80'
SCALE 1" = 40'

PRELIMINARY
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CONSTRUCTION

NORTH CAROLINA
PROFESSIONAL SEAL
ENGINEERING
C-203
SEAL 27261
ANTHONY L. HAUSER

AMBIENT DESIGN GROUP
LANDSCAPE ARCHITECTS & CIVIL ENGINEERS
28 North Ann Street, suite 100 Asheville, NC 28801
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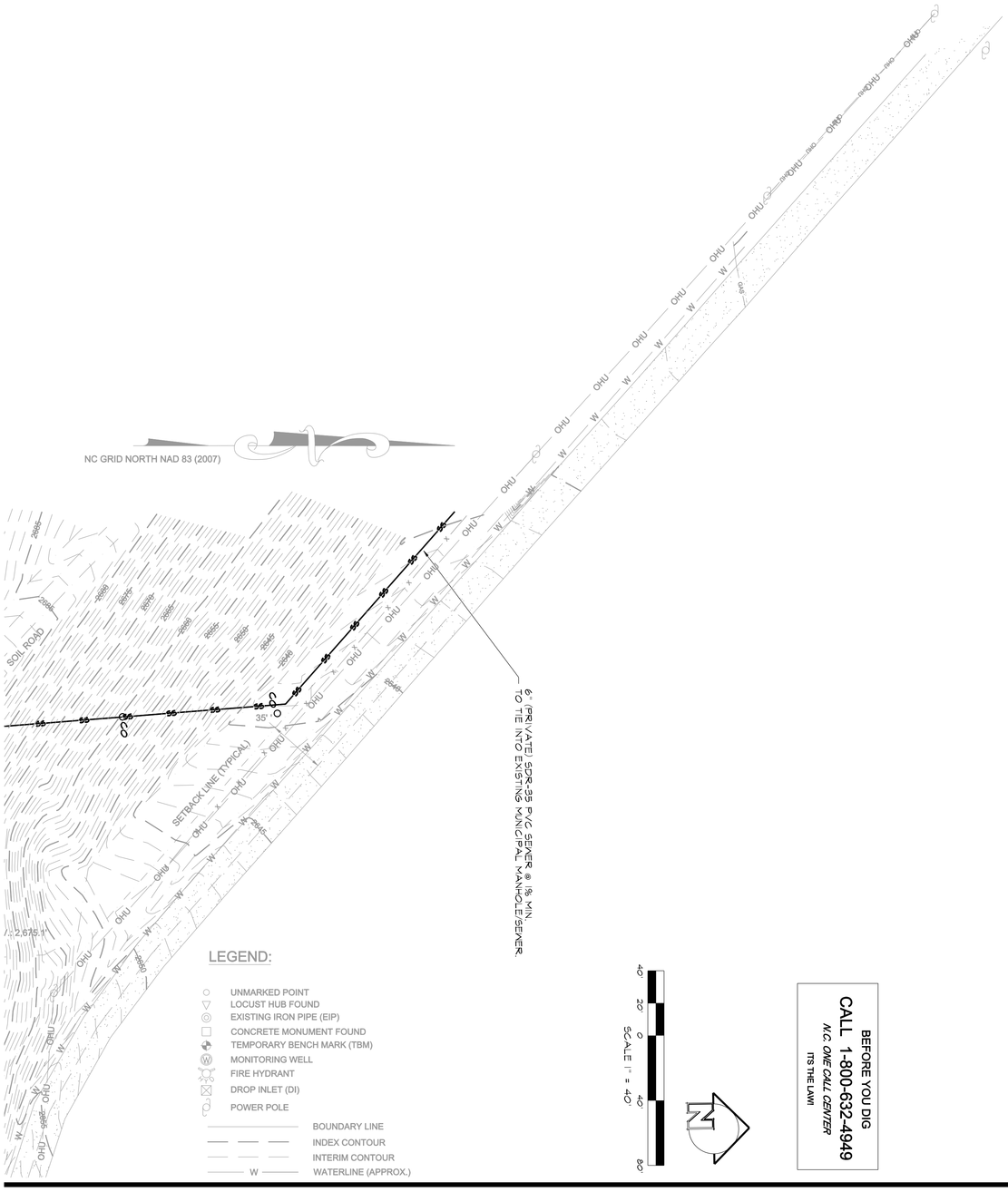
E-mail: Info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

LIVESTOCK MKT. & EVENTS CTR.
WATER & SEWER PLAN
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS
-

DATE: 09/26/09
DRAWN BY: ALH
CHKD BY: MCD
PROJECT NO. 0906-002
SHEET NO. C-4



DATE: 09/30/09
DRAWN BY: ALH
CHKD BY: MCD
PROJECT NO. 0906-002

SHEET NO.
C-5

REVISIONS
-

LIVESTOCK MKT. & EVENTS CTR.
WATER & SEWER PLAN - B

CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

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UTILITY PROFILE DRAWING
PROPOSED CONSTRUCTION ELEVATIONS
FOR SEWER AND WATERLINE.

FIGURE NOT COMPLETE.
ADDITIONAL TOPOGRAPHIC INFORMATION IS NEEDED

SHEET NO.

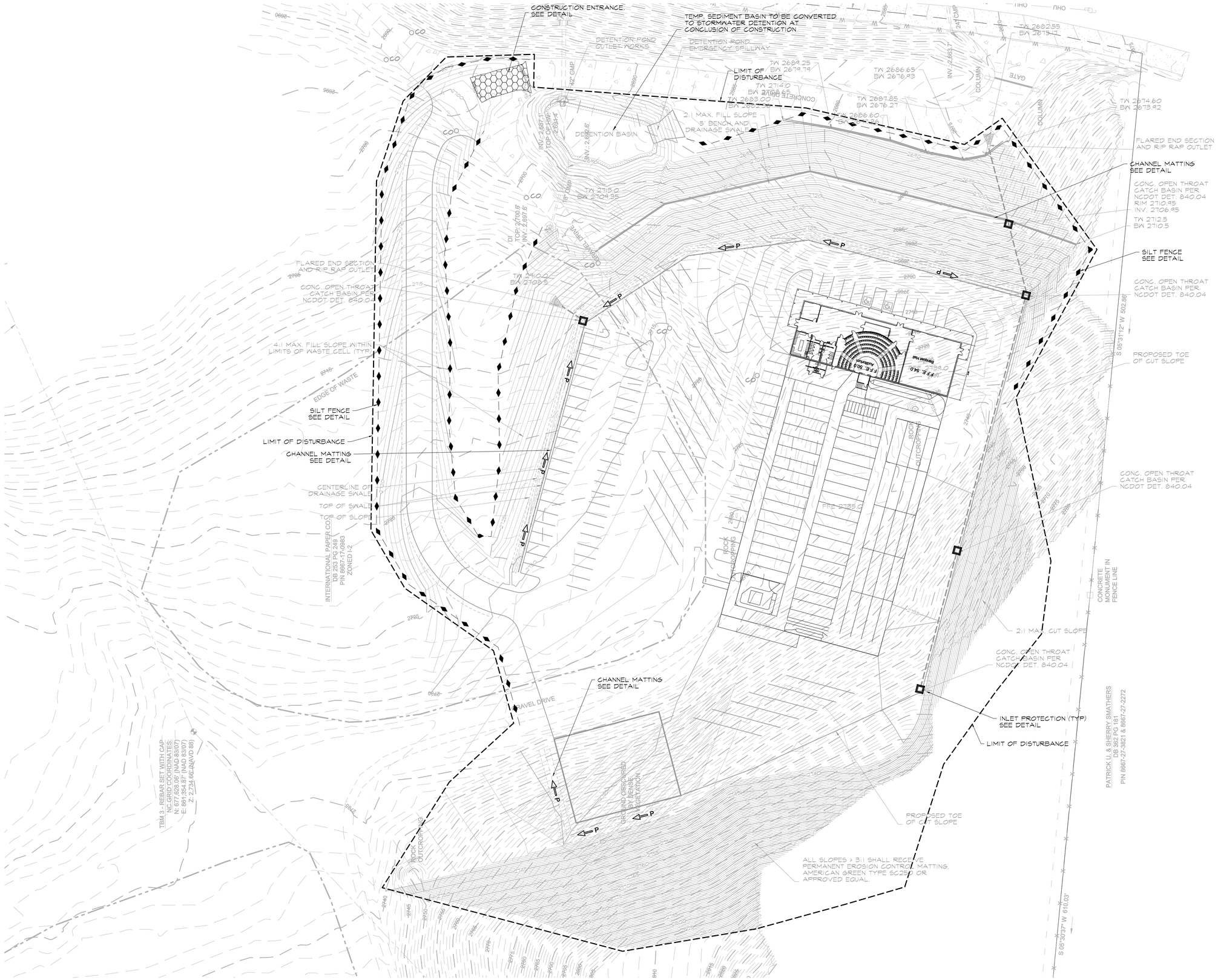
C-6

UTILITY PROFILE DRAWING
PROPOSED CONSTRUCTION ELEVATIONS
FOR SEWER AND WATERLINE.

FIGURE NOT COMPLETE.
ADDITIONAL TOPOGRAPHIC INFORMATION IS NEEDED

SHEET NO.

C-7



LEGEND

LIMITS OF DISTURBANCE	
SILT FENCE	
TEMPORARY SEDIMENT TRAP	
RIPRAP OUTLET PROTECTION	
TEMPORARY DIVERSION DITCH	T
PERMANENT DIVERSION DITCH	P
INLET PROTECTION	

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40' 20' 0 40' 80'
SCALE 1" = 40'

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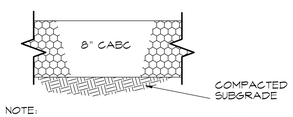
NORTH CAROLINA LICENSED LANDSCAPE ARCHITECT C-203 SEAL 27261 ANTHONY L. HAUSER ENGINEER

AMBIENT DESIGN GROUP
LANDSCAPE ARCHITECTS & CIVIL ENGINEERS
28 North Ann Street, suite 100 Asheville, NC 28801
Ph: 828-252-4330 Fx: 828-252-4331
E-mail: info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

LIVESTOCK MKT. & EVENTS CTR.
Erosion & Sediment Control Plan
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS
-

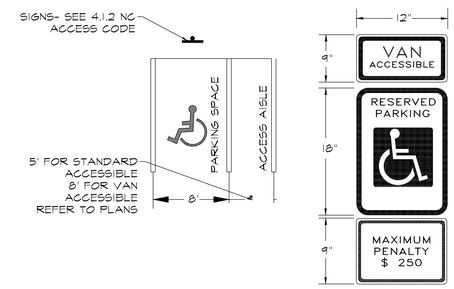
DATE: 10-23-09
DRAWN BY: MN
CHK'D BY: MD
PROJECT NO. 0908-002
SHEET NO. C-8



NOTE:
MATERIALS AND INSTALLATION SHALL BE IN ACCORDANCE WITH NC. D.O.T. SPECIFICATIONS.

GRAVEL PARKING & DRIVE

NOT TO SCALE



ACCESSIBLE PARKING SIGN

NOTES:
1. GRADES IN ACCESSIBLE PARKING AREA SHALL NOT EXCEED 2% IN ANY DIRECTION
2. HANDICAP PARKING AREA AND SIGNAGE SHALL CONFORM WITH THE NORTH CAROLINA ACCESSIBILITY CODE

NOTE:
SIGNS SHALL BE PLACED AND MOUNTED IN ACCORDANCE WITH THE NORTH CAROLINA STATE BUILDING CODE AND NC D.O.T. DETAILS.

ACCESSIBLE PARKING

NOT TO SCALE

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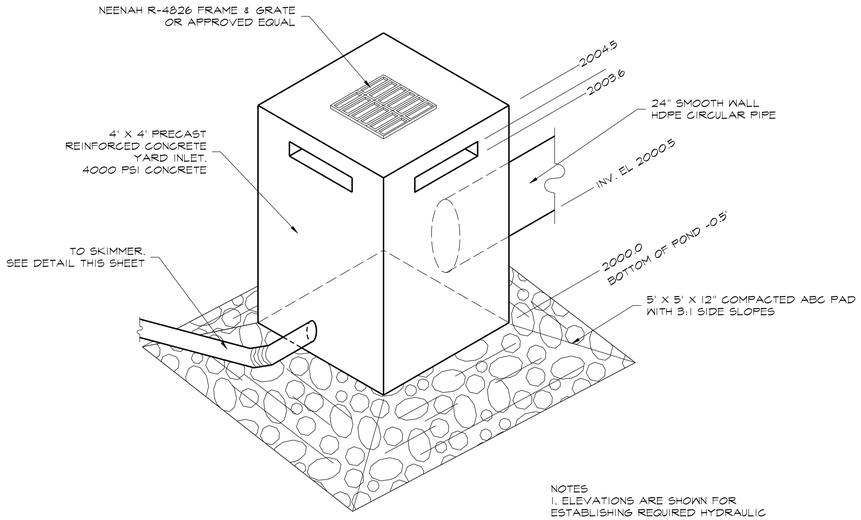
LIVESTOCK MKT. & EVENTS CTR.
SITE - ESC DETAILS
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS

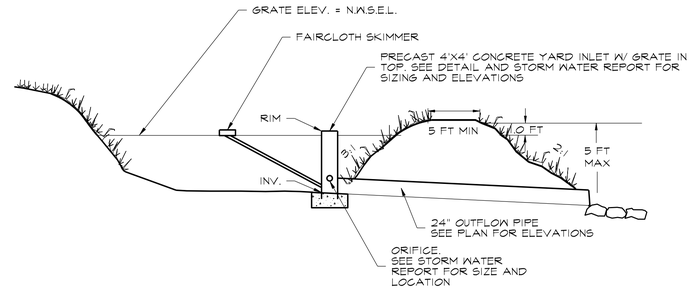
DATE: 10-23-09
DRAWN BY: MN
CHK'D BY: MD
PROJECT NO. 0906-002
SHEET NO.
C-9



NOTES
1. ELEVATIONS ARE SHOWN FOR ESTABLISHING REQUIRED HYDRAULIC CONDITIONS FOR PROPER OPERATION.
2. PROVIDE STANDARD STEPS @16" O.C.

DETENTION BOX DETAIL

NOT TO SCALE



CROSS SECTION GENERAL

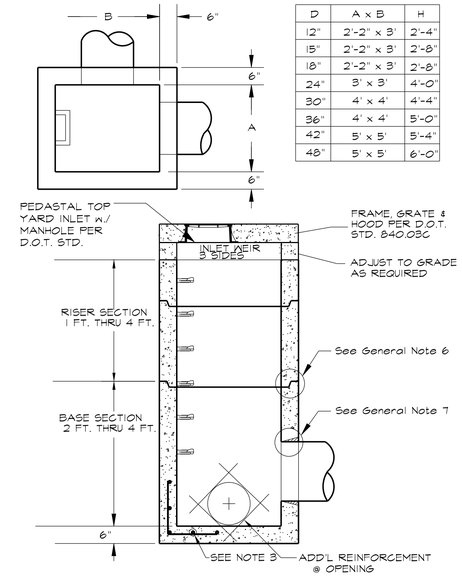
NOTES:
1. EARTH BERM SHALL BE STABILIZED W/ SEEDING ACCORDING TO NCDOT SPECIFICATIONS.
2. USE CLEAN COMPACTED FILL MATERIAL FOR EARTH BERM.
3. AREA LENGTH AND WIDTH ARE MEASURED AT THE CREST OF THE SPILLWAY.

MAINTENANCE
INSPECT THE BASIN PERIODICALLY AFTER OF RAINFALL. REMOVE SEDIMENT AND RESTORE BASIN TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO ONE-HALF THE DESIGN DEPTH OF THE TRAP.

STABILIZE THE EMBANKMENT AND ALL DISTURBED AREAS ABOVE THE BASIN AND DOWNSTREAM IMMEDIATELY AFTER CONSTRUCTION WITH SEEDING.

DETENTION BASIN

NOT TO SCALE

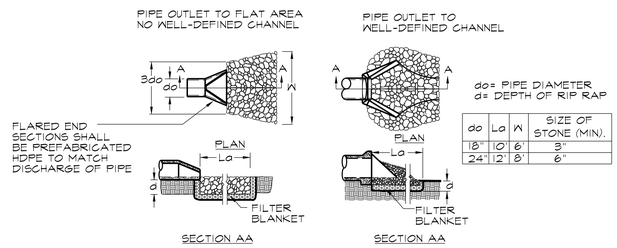


D	A x B	H
12"	2'-2" x 3'	2'-4"
15"	2'-2" x 3'	2'-8"
18"	2'-2" x 3'	2'-8"
24"	3' x 3'	4'-0"
30"	4' x 4'	4'-4"
36"	4' x 4'	5'-0"
42"	5' x 5'	5'-4"
48"	5' x 5'	6'-0"

REINFORCEMENT: #4 @ 6" OCEW (Min)
CONCRETE: 4000 PSI @ 28 DAYS
MANUFACTURER: STAYRIGHT PRECAST INC.
OR APPROVED EQUAL.

YARD INLET

NOT TO SCALE



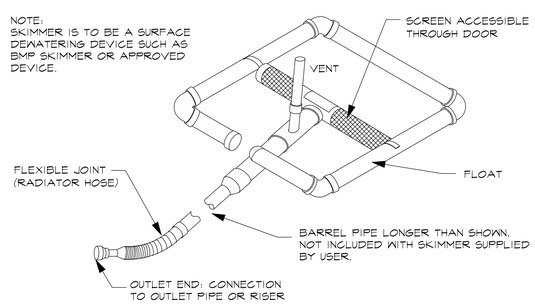
do= PIPE DIAMETER
d= DEPTH OF RIP RAP

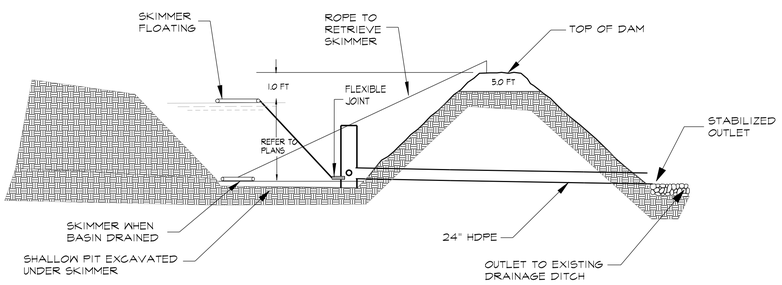
do	Lo	W	SIZE OF STONE (MIN).
18"	10'	6'	3"
24"	12'	8'	6"

GENERAL NOTES:
1. Lo IS THE LENGTH OF THE RIP RAP APRON.
2. d = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESS THAN 18"
3. IN A WELL-DEFINED CHANNEL EXTEND THE APRON UP THE CHANNEL BANKS TO AN ELEVATION OF 6" ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK, WHICHEVER IS LESS.
4. A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIP RAP AND SOIL FOUNDATION.
5. COMPACT ANY REQUIRED FILL TO DENSITY OF SURROUNDING UNDISTURBED MATERIAL.
6. RIP RAP MAY BE FIELDSTONE OR ROUGH QUARRY STONE AND SHALL BE HARD, ANGULAR AND WELL-GRADED.
7. CONSTRUCT APRON AT ZERO GRADE. TOP OF RIP RAP SHALL BE LEVEL WITH THE RECEIVING CHANNEL OR SLIGHTLY LOWER.
8. ALIGN APRON WITH RECEIVING CHANNEL OR STREAM. ASSURE APRON IS STRAIGHT THROUGHOUT ITS LENGTH.
9. END WIDTH OF APRON TO BE EQUAL TO WIDTH OF RECEIVING CHANNEL.

RIP RAP APRON

NOT TO SCALE

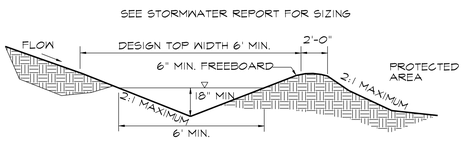




SECTION THRU SKIMMER BASIN

SKIMMER DETAIL

NOT TO SCALE



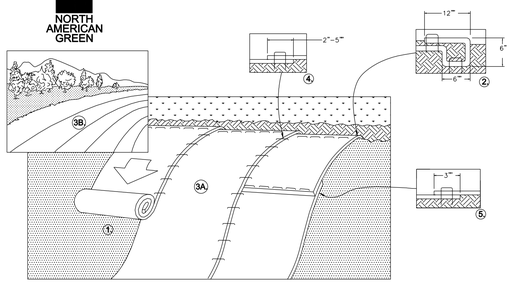
NOTES:
BUILD RIDGE HIGHER THAN DESIGN AND COMPACT WITH WHEELS OF CONSTRUCTION EQUIPMENT. COMPACTED RIDGE MUST AT OR ABOVE DESIGN GRADE AT ALL POINTS.
CHANNEL MUST BE CONSTRUCTED ON DESIGN GRADE.
LEAVE SUFFICIENT AREA ALONG DIVERSION TO PERMIT CLEANOUT AND REGRADING.

PERMANENT DIVERSION DITCH

NOT TO SCALE

NORTH AMERICAN GREEN

SLOPE INSTALLATION



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM™, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" – 5" (5 CM – 12.5 CM) OVERLAP DEPENDING ON BLANKET TYPE.
5. CONSECUTIVE BLANKETS SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE BLANKET WIDTH.
NOTE:
*IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE BLANKETS.

SLOPE PROTECTION

NOT TO SCALE

BEFORE YOU DIG
CALL 1-800-632-4949
N.C. ONE CALL CENTER
ITS THE LAW!

NORTH CAROLINA LICENSED LANDSCAPE ARCHITECT C-203
PRELIMINARY NOT FOR CONSTRUCTION
SEAL 27261
ANTHONY L. HAUSER
ENGINEER

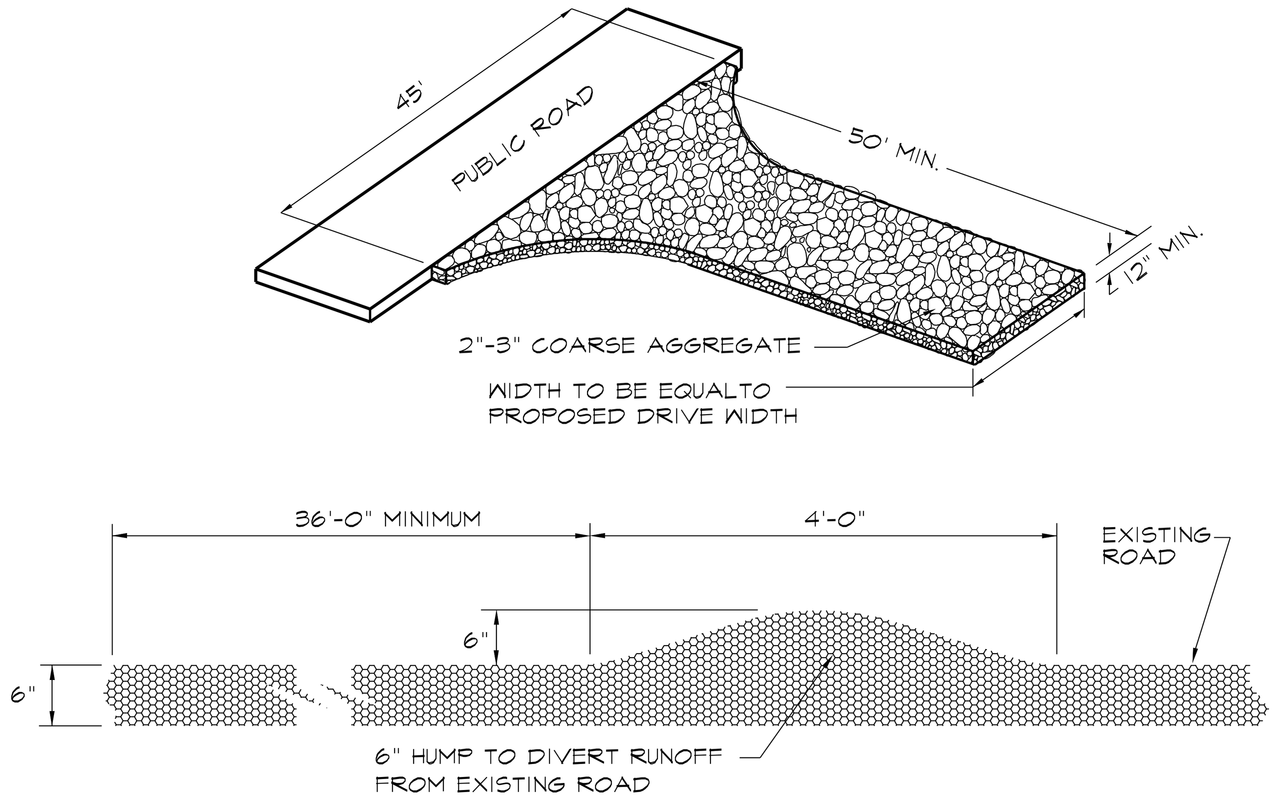
AMBIENT DESIGN GROUP
LANDSCAPE ARCHITECTS & CIVIL ENGINEERS
28 North Ann Street, suite 100 Asheville, NC 28801
Ph: 828-252-4330 Fx: 828-252-4331
E-mail: info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

LIVESTOCK MKT. & EVENTS CTR. DRAINAGE DETAILS

CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS

DATE: 10/23/09
DRAWN BY: MN
CHK'D BY: MD
PROJECT NO. 0906-002
SHEET NO. C-10



GENERAL NOTES:

1. A STABILIZED PAD OF CRUSHED STONE SHALL BE LOCATED WHERE TRAFFIC WILL BE ENTERING OR LEAVING A CONSTRUCTION SITE TO OR FROM A PUBLIC STREET.

2. STONE TO BE 2 - 3 INCH WASHED STONE.

3. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC STREETS OR EXISTING PAVEMENT. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

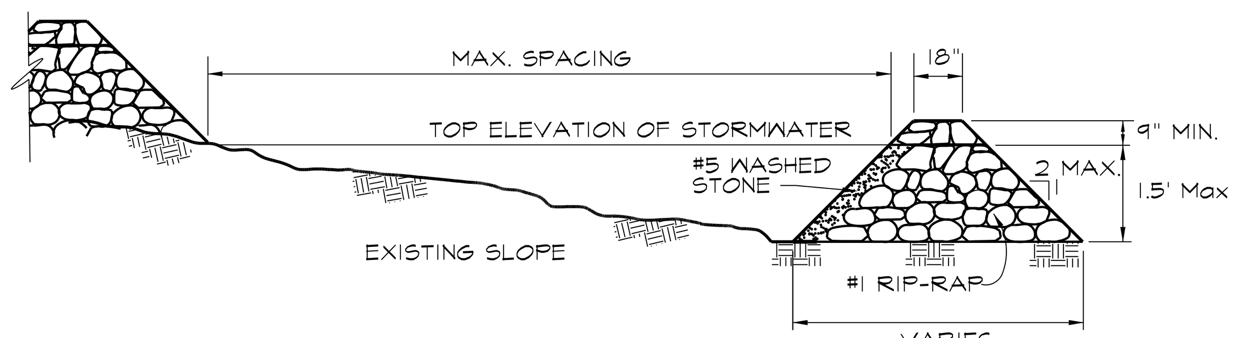
4. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC STREETS MUST BE REMOVED IMMEDIATELY.

5. WHEN NECESSARY WHEELS MUST BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTERING A PUBLIC STREET, WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT BASIN.

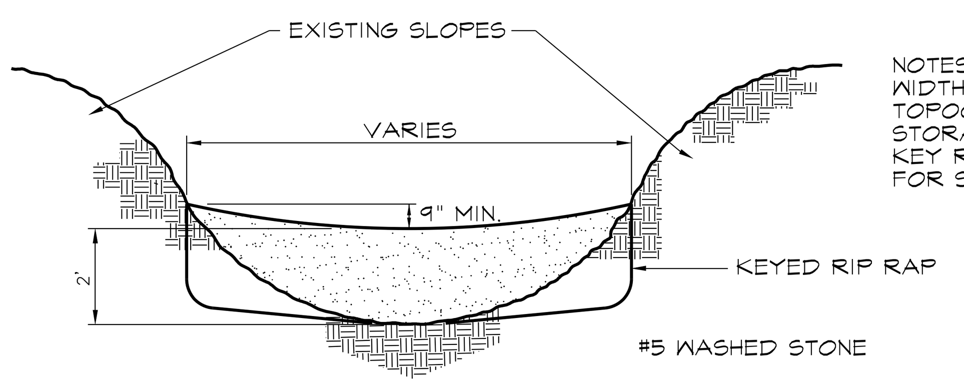
6. FILTER FABRIC SHALL BE PLACED UNDER THE ENTRANCE/EXIT AND SHALL BE MIRAFI 500 OR EQUAL.

STABILIZED CONSTRUCTION ENTRANCE

NOT TO SCALE



SIDE VIEW

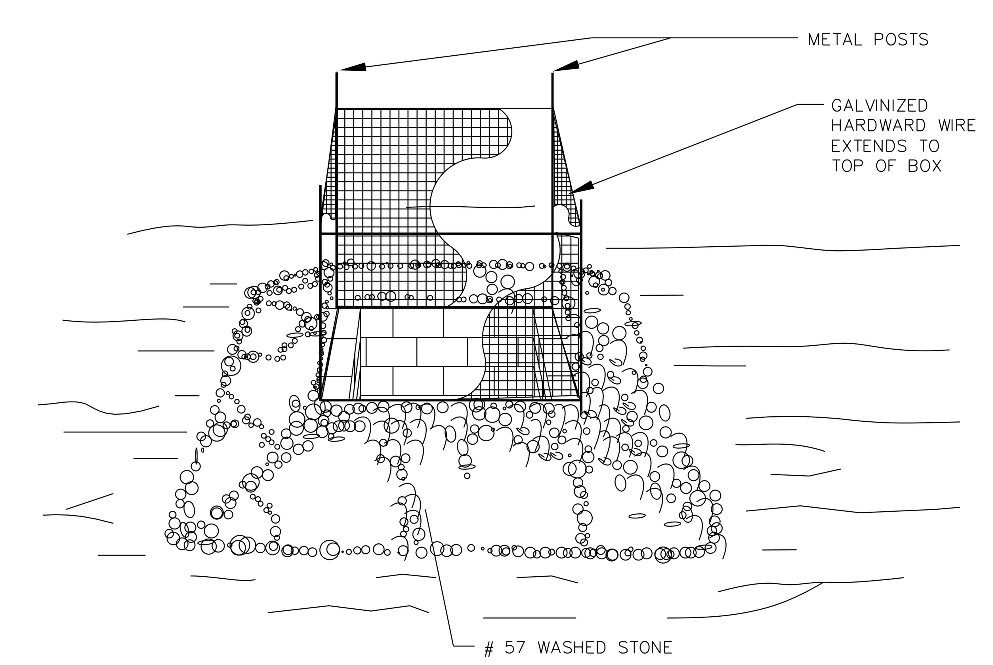


NOTES:
WIDTH DETERMINED BY EXISTING TOPOGRAPHY AND SEDIMENT STORAGE REQUIRED.
KEY RIP RAP INTO THE DAM FOR STABILIZATION.

FRONT VIEW

CHECK DAM

NOT TO SCALE



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ITS THE LAW!

STANDARD INLET PROTECTION

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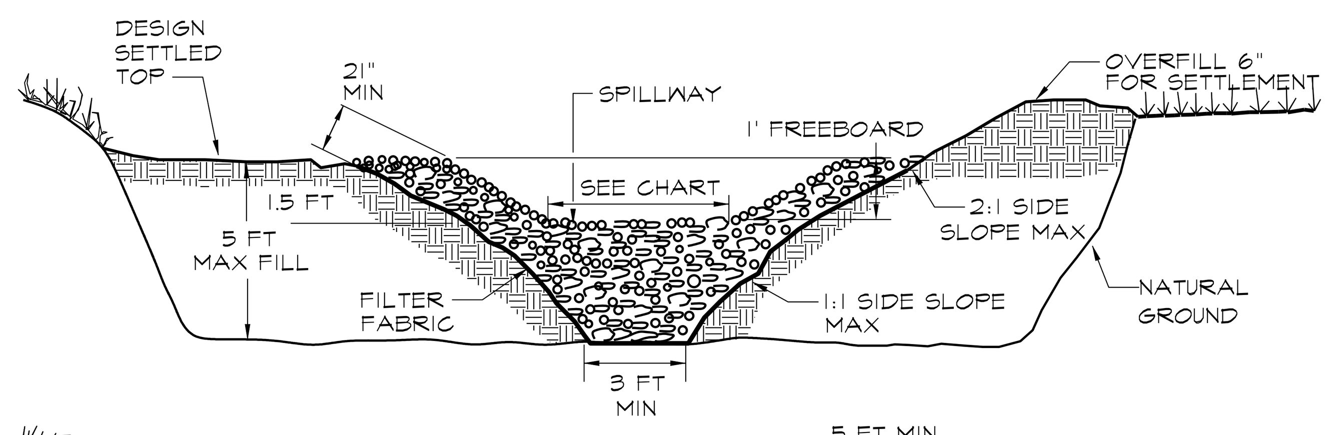
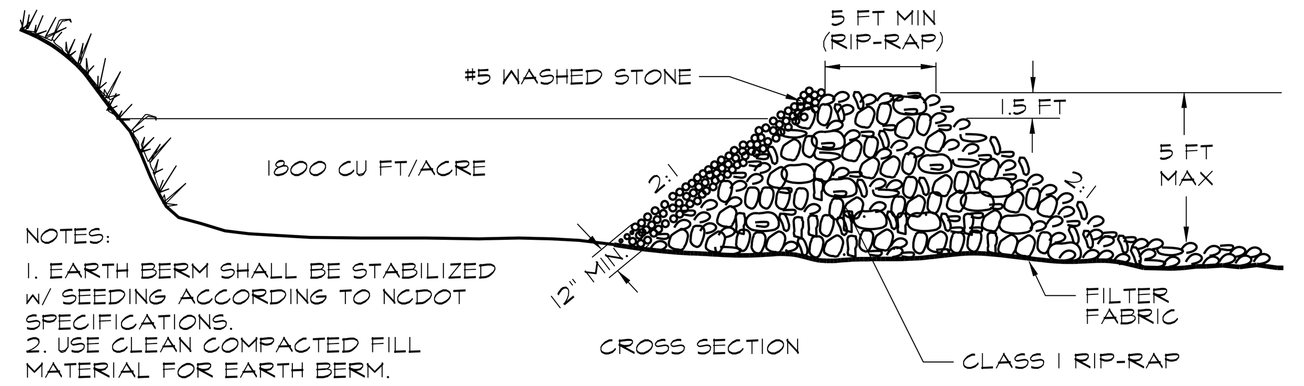




CROSS SECTION

NOTES:
1. EARTH BERM SHALL BE STABILIZED w/ SEEDING ACCORDING TO NCDOT SPECIFICATIONS.
2. USE CLEAN COMPACTED FILL MATERIAL FOR EARTH BERM.
3. AREA LENGTH AND WIDTH ARE MEASURED AT THE CREST OF THE SPILLWAY.

MAINTENANCE

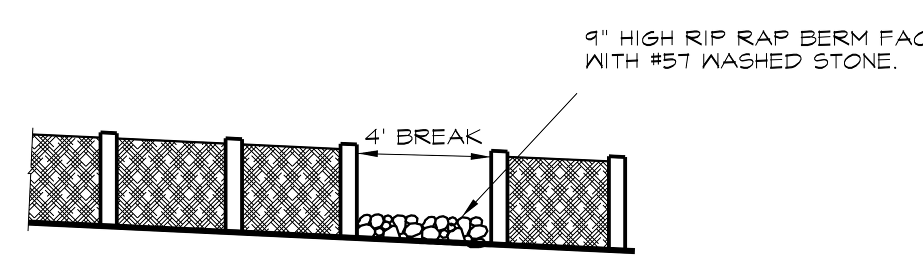
INSPECT TEMPORARY SEDIMENT TRAPS AFTER EACH PERIOD OF RAINFALL. REMOVE SEDIMENT AND RESTORE TRAP TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-HALF THE DESIGN DEPTH OF THE TRAP. PLACE THE SEDIMENT THAT IS REMOVED IN A DESIGNATED DISPOSAL AREA AND REPLACE THE CONTAMINATED PART OF THE GRAVEL FACING.

CHECK THE STRUCTURE FOR DAMAGE FROM EROSION OR PIPING. PERIODICALLY CHECK THE DEPTH OF THE SPILLWAY TO ENSURE IT IS A MINIMUM OF 1.5 FT BELOW THE LOW POINT OF THE EMBANKMENT. IMMEDIATELY FILL ANY SETTLEMENT OF THE EMBANKMENT TO SLIGHTLY ABOVE DESIGN GRADE. ANY RIP RAP DISPLACED FROM THE SPILLWAY MUST BE REPLACED IMMEDIATELY.

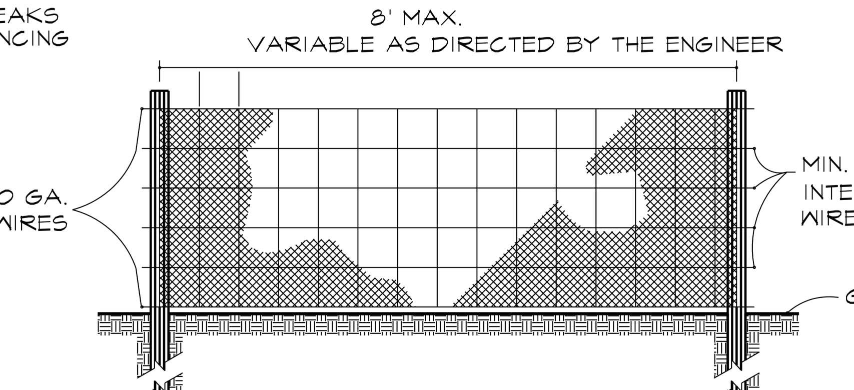
STABILIZE THE EMBANKMENT AND ALL DISTURBED AREAS ABOVE THE SEDIMENT POOL AND DOWNSTREAM FROM THE TRAP IMMEDIATELY AFTER CONSTRUCTION WITH SEEDING.

TEMPORARY SEDIMENT TRAP

NOT TO SCALE



PROVIDE SILT FENCE BREAKS EVERY 200 FEET OF FENCING OR AT LOW POINTS.



FRONT VIEW

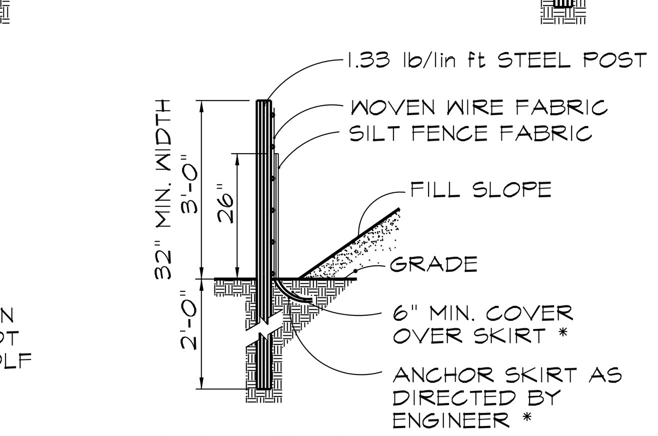
STEEL POSTS:
- 5' LONG W/ANCHOR PLT.
- ~1 3/8" WIDE
- MIN. WT. 1.25LB/FT
- ANCHOR PLATE MIN AREA= 14SQ"

WOVEN WIRE:
- TOP & BOTTOM WIRES: 10 GAGE MIN.
- INTERMEDIATE WIRES: 12 1/2 GAGE MIN.

WIRE STAPLES:
- 1 1/2" LENGTH MIN.
- NO. 9 STAPLE

SILTFENCE FABRIC:
- NCDOT CLASS B

NOTE:
USE SILT FENCE ONLY WHEN DRAINAGE AREA DOES NOT EXCEED 1/4 ACRE per 100LF AND NEVER IN AREAS OF CONCENTRATED FLOW.



SIDE VIEW

* FOR REPAIR OF SILT FENCE FAILURES, USE No. 57 WASHED STONE. AS AN ANCHOR WHEN SILT FENCE IS PROTECTING CATCH BASIN.

SILT FENCE

NOT TO SCALE

CONSTRUCTION SEQUENCE

1. OBTAIN LAND DISTURBING PERMIT FROM NCDENR AFTER APPROVAL, AND ATTEND PRECONSTRUCTION MEETING IF REQUIRED.
2. PRIOR TO ANY GRADING ACTIVITY, CONSTRUCT A STABILIZED CONSTRUCTION ENTRANCE AT EACH POINT OF ACCESS.
3. AFTER INSTALLING THE CONSTRUCTION ENTRANCE, AND PRIOR TO ANY OTHER CONSTRUCTION OR CLEARING, INSTALL ALL PERIMETER EROSION CONTROL DEVICES INCLUDING SILT FENCE.
4. INSTALL SEDIMENT TRAPS, SEDIMENT BASINS, TEMPORARY DIVERSION DITCHES AND OUTLET PROTECTIONS AS SHOWN ON THE PLANS.
5. INITIATE THE CLEARING AND GRADING OPERATION. MAINTAIN ALL SEDIMENT CONTROL DEVICES THROUGHOUT THE CONSTRUCTION PHASE AND UNTIL ALL DISTURBED AREAS HAVE BEEN STABILIZED.
6. INSTALL PRINCIPAL STORM DRAINAGE, INCLUDING INLET AND OUTLET PROTECTION, DIRECT TEMPORARY DITCHING TO YARD INLETS WITH STONE INLET PROTECTION IN PLACE. GRADE PERMANENT DIVERSION DITCHES TO DIRECT UPSLOPE RUNOFF TO BYPASS THE DISTURBED AREAS WITHIN THE CONSTRUCTION AREAS. THESE PERMANENT DIVERSION DITCHES SHALL INCORPORATE STONE CHECK DAMS AS INDICATED ON PLAN. THE DITCHES ARE TO BE SEEDED OR OTHERWISE STABILIZED WITHIN 20 CALENDAR DAYS OF GRADING.
7. STABILIZE CUT AND FILL SLOPES WITHIN 14 CALENDAR DAYS. INSTALL TEMPORARY SEEDING ON ALL AREAS THAT WILL BE LEFT IDLE FOR MORE THAN 20 CALENDAR DAYS.
8. NO GRADING SHALL OCCUR WITHIN 10' OF A PROPERTY LINE WITHOUT PRIOR NOTIFICATION OF THE ADJOINING NEIGHBOR.
9 . AFTER CONSTRUCTION AND ALL DISTURBED AREA HAVE BEEN STABILIZED, CONTRACTOR SHALL REMOVE ALL TEMPORARY SEDIMENT CONTROL MEASURES.
10 . REQUEST FINAL APPROVAL FROM CITY OF WOODFIN.

NOTE: EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED DAILY AND AFTER ANY RAINFALL. DEFICIENCIES SHALL BE CORRECTED IMMEDIATELY. A DAILY RECORD SHALL BE MAINTAINED ON THE SITE BY THE CONTRACTOR. PROJECT SITE CONDITIONS MAY REQUIRE INSTALLATION OF ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES. EROSION CONTROL MEASURES AND MAINTAINANCE SHALL BE IN ACCORDANCE WITH THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL MANUAL.

GENERAL EROSION CONTROL NOTES:

1. STRAW MULCH AND TALL FESCUE SHOULD NOT BE USED IN RIPARIAN AREAS.
2. IF CONCRETE IS USED (EG. HEADWALLS), A DRY WORK AREA MUST BE MAINTAINED TO PREVENT DIRECT CONTACT BETWEEN CURING CONCRETE AND STREAM WATER. WATER THAT INADVERTENTLY CONTACTS LIVE CONCRETE MUST NOT BE DISCHARGED TO SURFACE WATERS DUE TO THE POTENTIAL FOR WATER CHEMISTRY CHANGE AND FISH KILLS.
3. ROCK, SAND OR OTHER MATERIALS MUST NOT BE EXCAVATED FROM THE STREAM CHANNELS EXCEPT IN THE IMMEDIATE VICINITY OF THE CULVERT LOCATIONS. THE NATURAL DIMENSION, PATTERN, AND PROFILE OF THE CHANNEL UPSTREAM AND DOWNSTREAM OF THE CULVERT MUST NOT BE MODIFIED.
4. SANDBAGS, FLEXIBLE PIPE, OR OTHER DIVERSION STRUCTURES SHOULD BE USED TO AVOID EXCAVATING IN FLOWING WATER. MATERIALS USED FOR FLOW DIVERSION SHOULD BE REMOVED FROM THE STREAM BED AFTER COMPLETING THE CONSTRUCTION WORK. ANY DIVERSION CHANNELS MUST BE LINED WITH FILTER FABRIC AND/OR ROCK.
5. ROCK AND OTHER MATERIALS PLACED TEMPORARILY IN STREAMS FOR FORDS MUST BE REMOVED AND THE STREAM CHANNELS RESTORED TO EXISTING CONDITIONS AFTER THE FORDS ARE NO LONGER NEEDED.
6. RIPARIAN VEGETATION ESPECIALLY TREES AND SHRUBS, SHOULD BE PRESERVED AS MUCH AS POSSIBLE. NATIVE WOODY VEGETATION (EG. RHODODENDRON, DOG HOBBLE, SILKY DOGWOOD, SYCAMORE, RIVER BIRCH, RED MAPLE) SHOULD BE REESTABLISHED DOWNSTREAM OF THE CULVERTS AND FORD IF IT IS REMOVED DURING CONSTRUCTION TO PROVIDE BANK STABILITY AND SHADING. THE USE OF NATIVE PLANTS THAT MUST BE REMOVED FROM PERMANENTLY DISTURBED AREAS IS ENCOURAGED.
7. ALL MECHANIZED EQUIPMENT OPERATED NEAR SURFACE WATERS SHOULD BE INSPECTED AND MAINTAINED REGULARLY TO PREVENT CONTAMINATION OF STREAM WATERS FROM FUELS, LUBRICANTS, HYDRAULIC FLUIDS OF OTHER TOXIC MATERIALS.
8. DISCHARGING HYDROSEED MIXTURES AND WASHING OUT HYDROSEEDERS AND OTHER EQUIPMENT IN OR ADJACENT TO SURFACE WATERS IS PROHIBITED.

SEEDING/PLANTING NOTES:

SEEDBED PREPARATION NOTES

1. CONTRACTOR SHALL OBTAIN SOIL ANALYSIS FOR PROPOSED PLANTING AREA IN ORDER TO DETERMINE REQUIRED SOIL AMMENDMENTS. SPECIFIC RECOMENDATIONS SHALL BE OBTAINED FOR LAWNS AND PLANTING BEDS. REFER TO GRADING PLAN FOR MINIMUM REQUIRED SOIL TEST LOCATIONS. OBTAIN SOIL SAMPLE BOXES AND TESTS THROUGH THE HAYWOOD COUNTY COOPERATIVE EXTENSION.
UPON RECEPTION, PROVIDE COPY OF SOIL REPORT TO OWNER.

2. SURFACE WATER CONTROL MEASURES TO BE INSTALLED ACCORDING TO PLAN. COMPLETE GRADING BEFORE PREPARING SEEDBED.
3. AREAS TO BE SEEDED SHALL BE RIPPED AND SPREAD WITH AVAILABLE TOPSOIL 3" DEEP ON SLOPES 2:1 OR FLATTER. TOTAL SEEDBED PREPARED DEPTH SHALL BE 4" TO 6" DEEP. IF SOILS ARE COMPACTED DURING GRADING LOOSEN TO A DEPTH OF 6" TO 8".
4. LOOSE ROCKS, ROOTS AND OTHER OBSTRUCTIONS SHALL BE REMOVED FROM THE SURFACE TO PREVENT INTERFERENCE WITH ESTABLISHMENT AND MAINTENANCE OF VEGETATION.
5. APPLY LIME ACCORDING TO SOIL TEST RECOMMENDATIONS. SOILS WITH pH HIGHER THAN 6 NEED NOT BE LIMED.
6. APPLY FERTILIZER ACCORDING TO SOIL TEST RECOMMENDATIONS.
7. ROUGHEN SEEDBED SURFACE PRIOR TO APPLICATION. GROOVE OR FURROW SLOPES STEEPER THAN 3:1.
8. SEEDING SHALL BE IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATION SECTIONS 1620- TEMPORARY SEEDING, AND 1660. SEEDING AND MULCHING. SEED, FERTILIZER, MULCH AND LIMESTONE MATERIALS SHALL MEET THE REQUIREMENTS OF NCDOT STANDARD SPECIFICATIONS DIVISION 10.
AMENDMENTS SHALL BE APPLIED AT THE RATE DETERMINED BY THE SOILS TEST. WHEN NOT SPECIFIED APPLY AT THE FOLLOWING RATES: 4000 LB/ACRE OF GROUND AGRICULTURAL LIMESTONE AND 1000 LB/ACRE OF 10-10-10 FERTILIZER. DRY SOIL, GRASS-LINED CHANNELS SHALL USE 3000 LB/ACRE OF GROUND AGRICULTURAL LIMESTONE AND 500 LB/ACRE OF 10-10-10 FERTILIZER. MULCH SHALL BE APPLIED AT THE RATE OF 4000 LB/ACRE (60-80 BALES/ACRE) OF STRAW. STRAW SHALL BE ANCHORED BY TACKING WITH A TACKIFIER TO BE PROVIDED BY THE OWNER, NETTING, OR MULCH ANCHORING TOOL. PERMANENT TURF MATTING, JUTE OR EXCELSIOR MATTING SHALL BE USED IN GRASS LINED CHANNELS TO TOP OF BANK.

GRADED SLOPES AND FILLS - THE ANGLE FOR GRADED SLOPES AND FILLS SHALL BE NO GREATER THAN THE ANGLE WHICH CAN BE RETAINED BY VEGETATIVE COVER. SLOPES LEFT EXPOSED SHALL BE PLANTED WITHIN 20 CALENDAR DAYS OF COMPLETION OF ANY PHASE OF GRADING.

GROUND COVER - ALL DISTURBED AREAS SHALL BE PLANTED WITH AN APPROVED GROUNDCOVER WITHIN 20 CALENDAR DAYS. THIS SHALL NOT APPLY TO CLEARED LAND FORMING THE BASIN OF A RESERVOIR LATER TO BE INUNDATED.

PRELIMINARY NOT FOR CONSTRUCTION

NORTH CAROLINA LANDSCAPE ARCHITECT C-203 AMBIENT DESIGN GROUP, PLLC
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 27261 ANTHONY L. HAUSER

AMBIENT DESIGN GROUP
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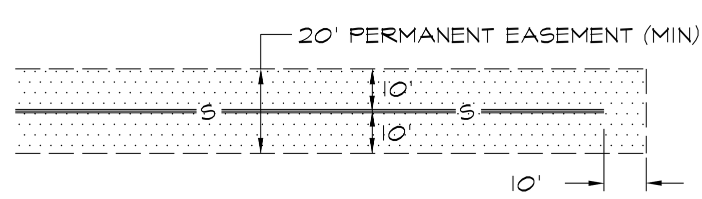
LIVESTOCK MKT. & EVENTS CTR.
EROSION CONTROL DETAILS
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS

DATE: 10/23/09
DRAWN BY: MN
CHK'D BY: MD
PROJECT NO. 0906-002
SHEET NO.
C-11

GENERAL NOTES FOR SEWER

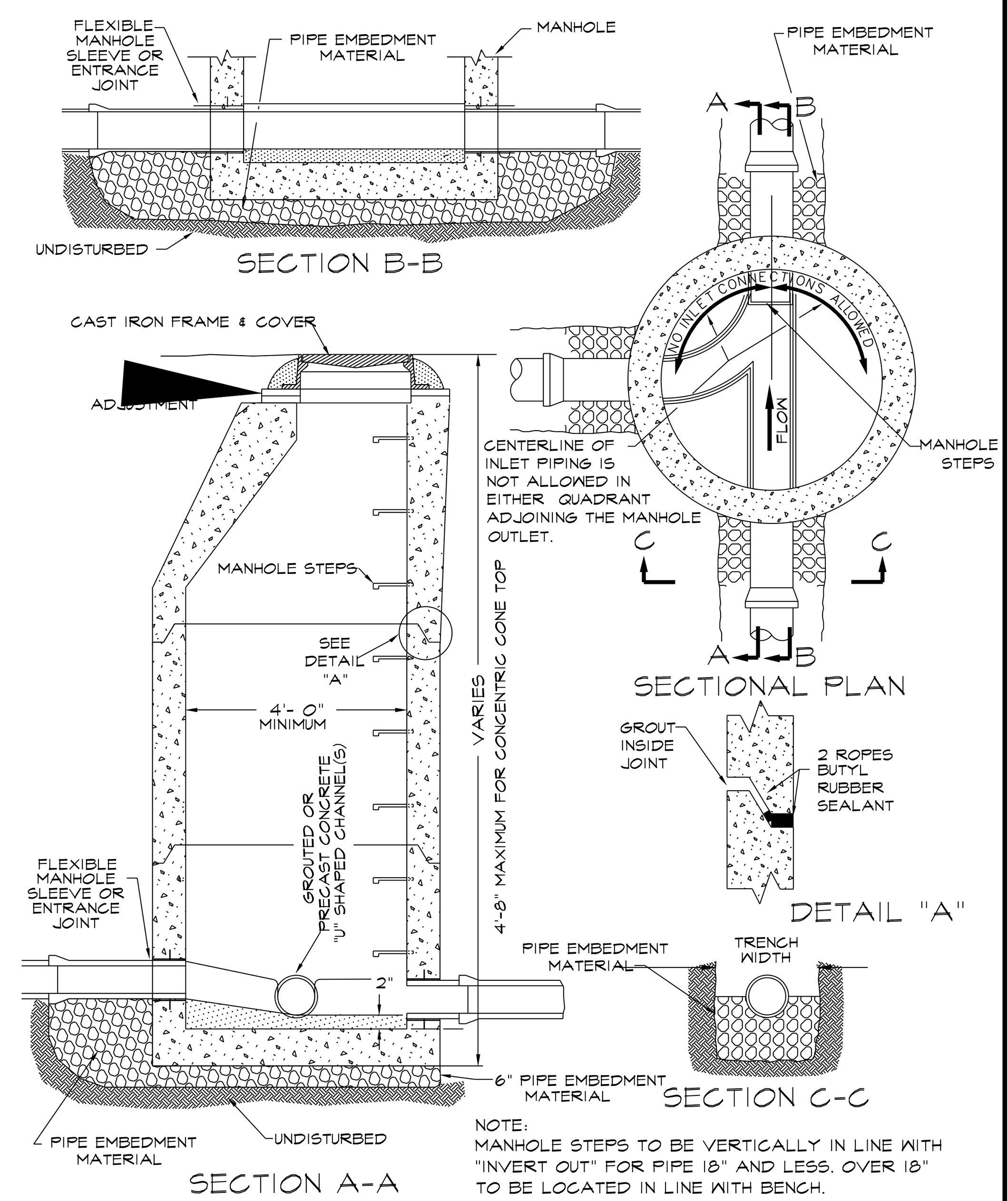
1. SEWER CONSTRUCTION ON THIS SITE IS AUTHORIZED BY PERMITS ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES (NCDEHNER). THE WORK IS SUBJECT TO INSPECTIONS AT ALL TIMES BY REPRESENTATIVES OF NCDEHNR, THE OWNER, AND THE ENGINEER. THE PERMITS REQUIRE CERTIFICATION OF COMPLETION BY THE ENGINEER OF THE SEWER SYSTEMS PRIOR TO ISSUANCE OF FINAL OPERATION APPROVAL BY NCDEHNR.
2. SEWER EXTENSION SHALL BE PERFORMED BY A LICENSED NC UTILITY CONTRACTOR.
3. CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND ELEVATION FOR ALL UTILITIES, DRAINAGE AND OTHER UNDERGROUND FACILITIES BOTH EXISTING AND PROPOSED, AND SHALL NOTIFY THE ENGINEER OF ANY DISCREPENCIES OR CONFLICTS PRIOR TO CONSTRUCTION.
4. INSTALL FERROUS PIPING FOR BOTH WATER AND SEWER WITHIN 10 FT. OF A CROSSING IF:
   A. SEWER LINE CROSSES OVER WATER, OR
   B. VERTICAL CLEARANCE BETWEEN WATER AND SEWER IS LESS THAN 18 INCHES.
5. MAINTAIN 10 FEET HORIZONTAL SEPARATION BETWEEN SEWER AND WATER MAINS UNLESS LAID IN SEPARATE TRENCHES WITH THE BOTTOM OF THE WATER LINE AT LEAST 18 INCHES ABOVE THE TOP OF SEWER OR USE FERROUS MATERIAL FOR BOTH WATER AND SANITARY SEWER.
   MAINTAIN 12 INCHES VERTICAL SEPARATION BETWEEN STORM DRAIN AND SANITARY SEWER, OR INSTALL FERROUS MATERIAL ON THE SANITARY SEWER WITHIN 10 FEET EACH SIDE OF THE CROSSING.
6. COORDINATE EXACT LOCATIONS OF SERVICE LINES WITH THE DETAILED ARCHITECTURAL, PLUMBING, AND LANDSCAPING PLANS.
7. SEWER LINES AND APPURTENANCES SHALL BE INSTALLED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND DETAILS OF THE METROPOLITAN SEWERAGE DISTRICT. THE METROPOLITAN SEWERAGE DISTRICT SPECIFICATIONS AND DETAILS SHALL SUPERSEDE ALL OTHER REFERENCES. THE INSTALLATION SHALL BE MADE UNDER THE INSPECTION OF NCDENR AND BY A NORTH CAROLINA LICENSED UTILITY CONTRACTOR. UPON COMPLETION AND ACCEPTANCE, SEWER LINES SHALL BE MAINTAINED BY THE WNC REGIONAL LIVESTOCK CENTER, LLC.
8. CONTRACTOR SHALL PROTECT EXISTING UTILITIES DURING CONSTRUCTION. REPAIRS SHALL BE MADE IN ACCORDANCE WITH APPLICABLE STANDARDS OF APPROPRIATE AGENCIES AT THE CONTRACTORS EXPENSE.
9. CONTRACTOR SHALL NOTIFY NC ONE CALL & APPROPRIATE UTILITY AGENCIES PRIOR TO PERFORMING ANY WORK.
10. TYPICAL EASEMENTS FOR SANITARY SEWER LINES LOCATED OUTSIDE ESTABLISHED UTILITY EASEMENTS OR PUBLIC ROAD RIGHT-OF-WAYS SHALL BE A MINIMUM OF 20 FEET IN WIDTH AND LOCATED IN EASEMENT PER SKETCH.



11. MANHOLE TAP SHALL BE CORE DRILLED AND BOOTED TO ACCOMMODATE THE PROPOSED 8" CONNECTION. THE MANHOLE INVERT(S) SHALL BE CONSTRUCTED/RECONSTRUCTED TO PROVIDE A SWEEPING "U"-SHAPED CHANNEL FOR EACH LATERAL. REFER TO DETAIL #6, THIS SHEET.
12. NO PORTION OF PROJECT TRACT LIES WITHIN A 100-YEAR FLOOD PLAIN ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP NUMBERS: 370120115 B, DATED JULY 15, 1984.
13. THE PERMANENT SEWER EASEMENT SHALL BE CLEARED OF ALL OBSTRUCTIONS INCLUDING PERMANENT STRUCTURES AND TREES. PROPOSED TREES, WALLS, AND OTHER PERMANENT STRUCTURES SHALL NOT BE LOCATED WITHIN THE SEWER EASEMENT.
14. NO "DOG-HOUSE" TYPE MANHOLES ARE PERMITTED.

TESTING AND INSPECTION

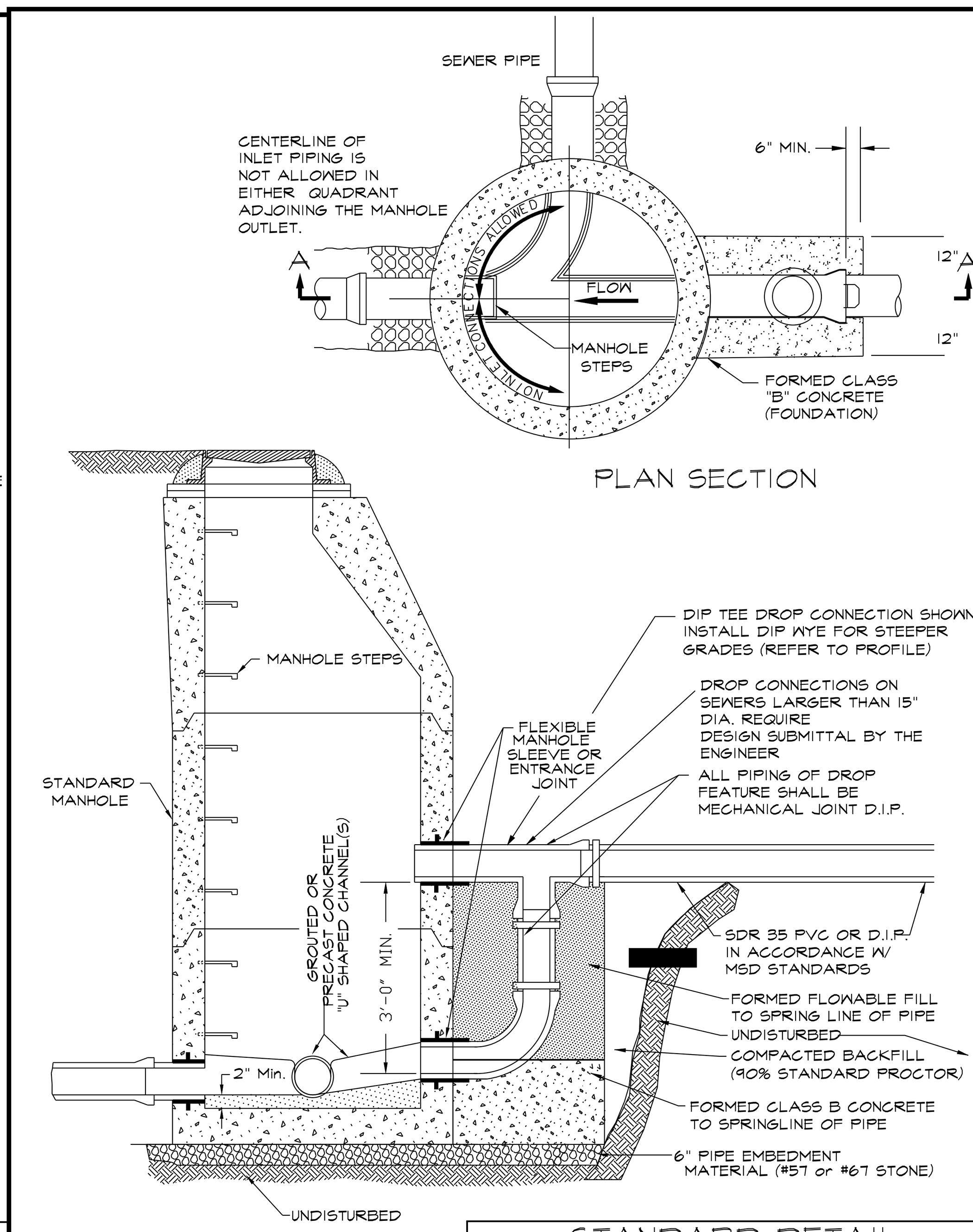
1. NOTIFY THE ENGINEER AT LEAST 48 HOURS BEFORE STARTING CONSTRUCTION OF SEWER AND WATER FACILITIES. THE ENGINEER SHALL PERIODICALLY INSPECT THE PROGRESS OF INSTALLATION AND SHALL COMPLETE A FINAL WATER AND SEWER INSPECTION. THE CONTRACTOR SHALL FURNISH, SECURE, AND PROVIDE ALL NECESSARY TESTING MATERIALS, EQUIPMENT, PROCEDURES, AND CERTIFIED LABORATORY TEST RESULTS FOR USE WITH ENGINEERS FINAL CERTIFICATION OF COMPLETION.
2. SECURE FINAL OPERATIONAL APPROVAL FROM NCDENR PRIOR TO ACTIVATION OF THE SYSTEM.
3. TRENCH BACKFILL AND COMPACTION TESTING SHALL BE PERFORMED BY A CERTIFIED SOILS LABORATORY UNDER ALL PAVED AREAS. BACKFILL MATERIAL FROM THE BOTTOM OF TRENCH TO WITHIN SIX (6) INCHES OF THE SUBGRADE SHALL HAVE A MINIMUM DRY DENSITY OF 95% AS DEFINED BY THE STANDARD PROCTOR TEST. ALL MATERIAL WITHIN THE TOP 6 INCHES OF THE SUBGRADE LEVEL SHALL HAVE AN IN PLACE DENSITY OF 100%.
4. THE CONTRACTOR SHALL SUPPLY THE ENGINEER WITH SEWER RECORD DRAWINGS (LOCATION, ELEVATION, LENGTH, AND SLOPE) PREPARED BY A REGISTERED LAND SURVEYOR SUITABLE FOR PREPARATION OF FINAL RECORD DRAWINGS.



NOTE:
MANHOLE STEPS TO BE VERTICALLY IN LINE WITH "INVERT OUT" FOR PIPE 18" AND LESS. OVER 18" TO BE LOCATED IN LINE WITH BENCH.

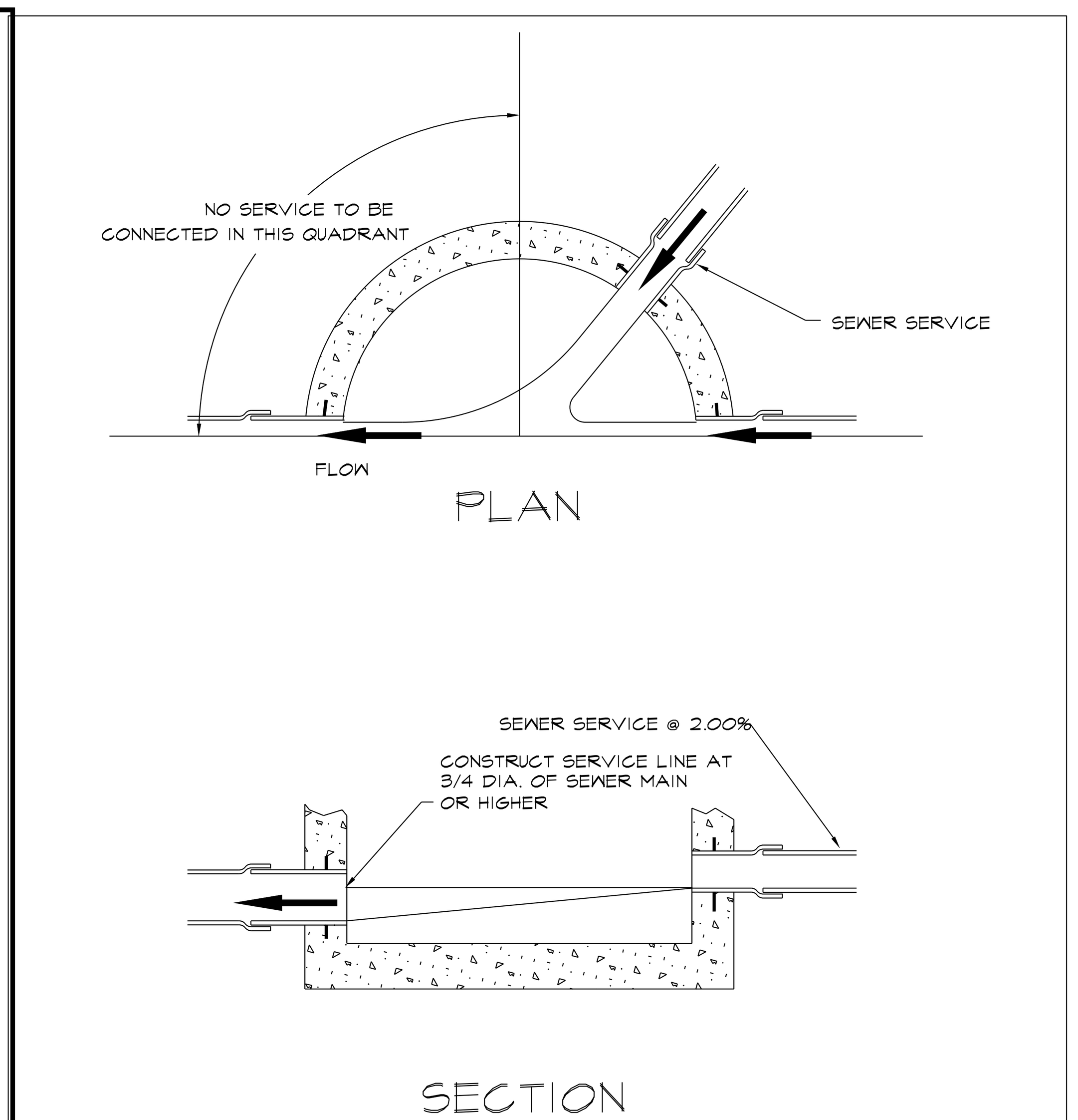
NOT TO SCALE

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
STANDARD MANHOLE
APPROVED: MAY 6, 1998 | # MSD-1



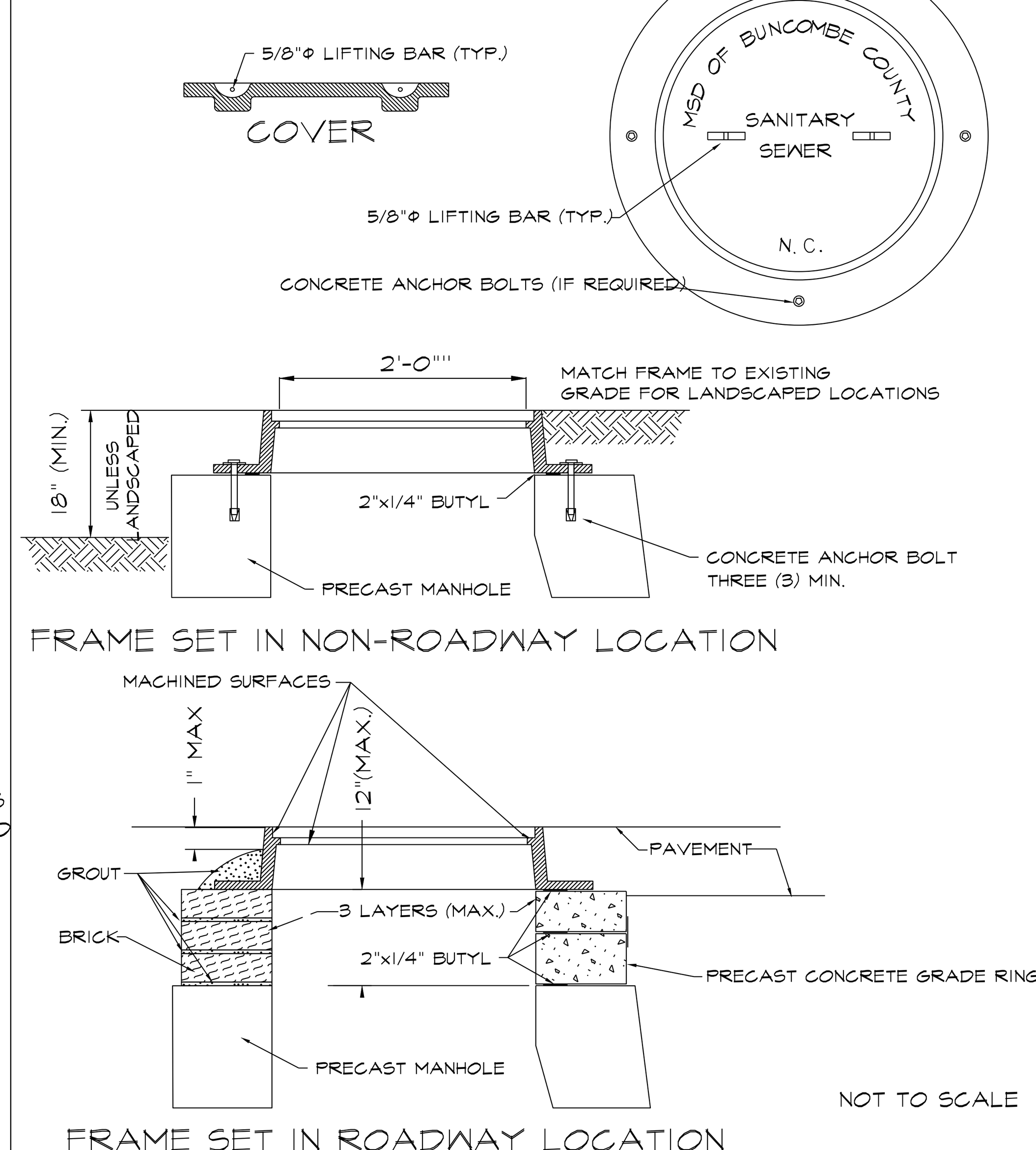
NOTES:
MANHOLE STEPS TO BE VERTICALLY IN LINE WITH "INVERT OUT" FOR PIPE 18" AND LESS. OVER 18" TO BE LOCATED IN LINE WITH BENCH. USE TYPE I AND TYPE II DROPS FOR SEWER GRADES UP TO (AND INCLUDING) 5% ONLY.
REVISED 12/4/03

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
TYPE I DROP CONNECTION
APPROVED: MAY 6, 1998 | # MSD-4a



NOT TO SCALE

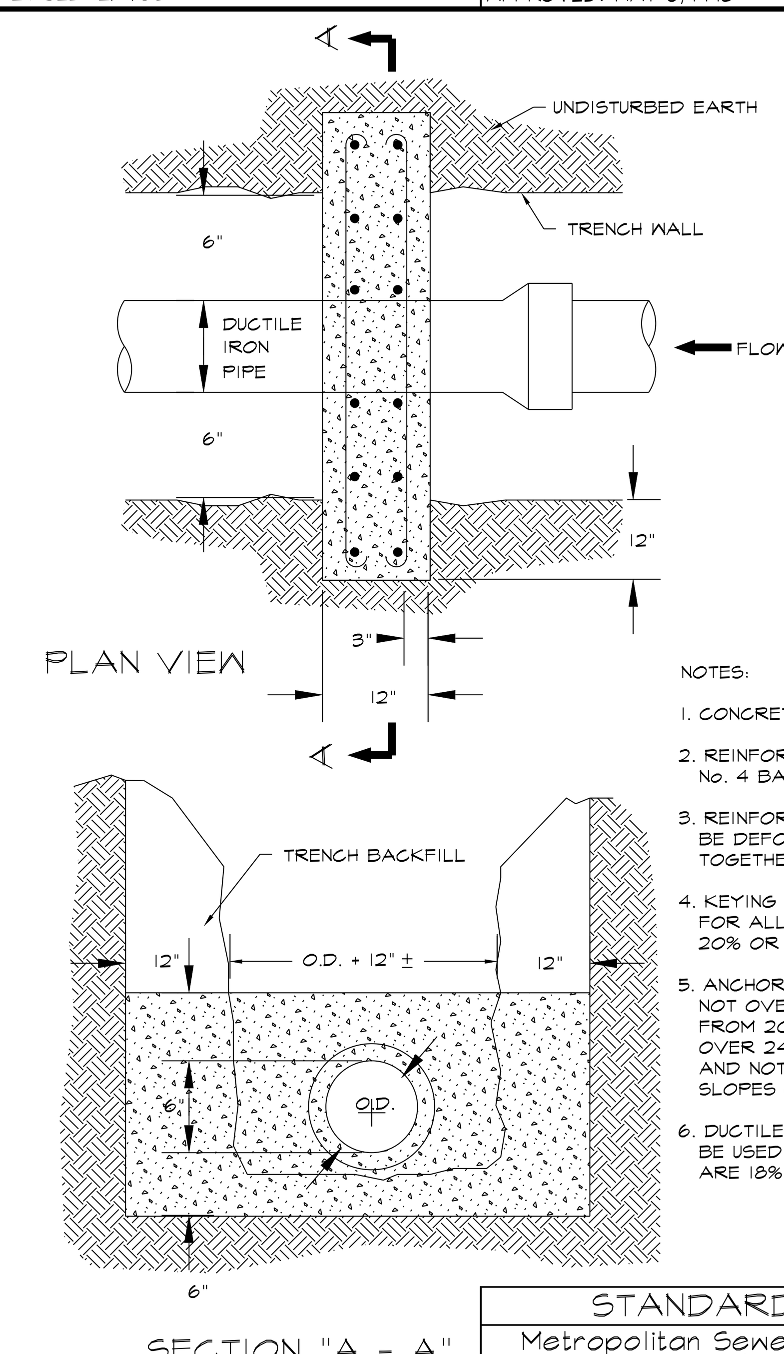
STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
SERVICE CONNECTIONS AT MANHOLES
APPROVED: MAY 6, 1998 | # MSD-6



NOT TO SCALE

NOTE: "MSD OF BUNCOMBE COUNTY" TO APPEAR ON COVERS ONLY WHEN THE SEWER SYSTEM IS TO BE MAINTAINED BY MSD

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
STANDARD MANHOLE FRAME & COVER
APPROVED: MAY 6, 1998 | DMSD-7A



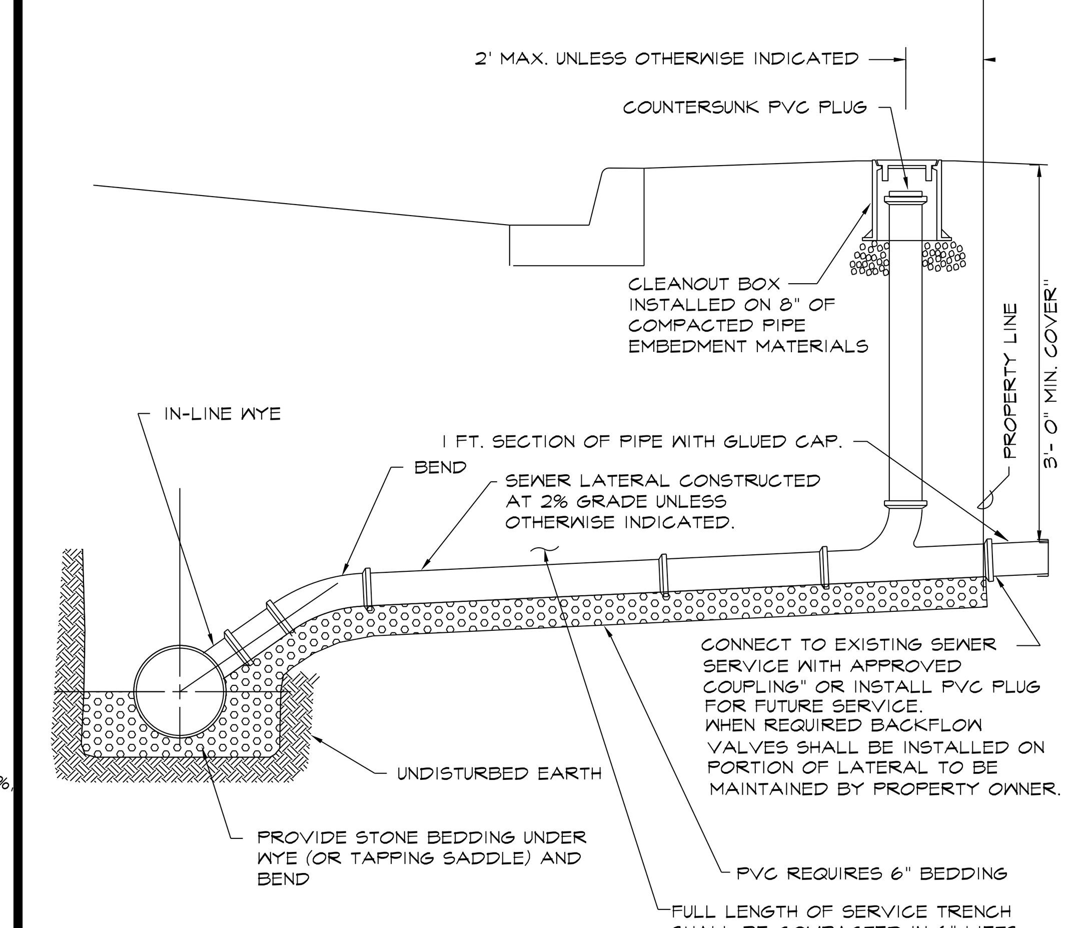
NOTES:

1. CONCRETE SHALL BE 3000 P.S.I.
2. REINFORCING SHALL BE No. 4 BARS @ 12" E.W.
3. REINFORCING BARS SHALL BE DEFORMED AND TIED TOGETHER.
4. KEYING PIPES IS REQUIRED FOR ALL DIP INSTALLED @ 20% OR GREATER GRADE.
5. ANCHOR SPACING SHALL BE NOT OVER 36' FOR SLOPES FROM 20% TO 35%, NOT OVER 24' FOR OVER 35% TO 50%, AND NOT OVER 16' FOR SLOPES OVER 50%.
6. DUCTILE IRON PIPE MUST BE USED WHEN SLOPES ARE 18% OR GREATER

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
KEYING PIPES ON SLOPES
APPROVED: MAY 6, 1998 | # DMSD-10
Rev. 10/31/02 – Change verbiage re: spacing @ slope 35%+

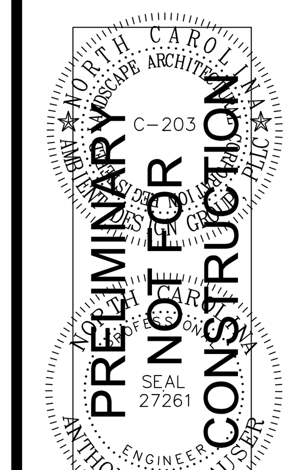
NOTES:

1. WYE CONNECTIONS ARE STANDARD FOR NEW SEWER MAIN CONSTRUCTION.
2. FORCE MAINS CARRING DOMESTIC WASTEWATER FROM SANITARY CONVENIENCES WITHIN A SINGLE BUILDING, MAY BE CONNECTED TO A 4" MSD GRAVITY SERVICE LINE PROVIDED THAT GRAVITY FLOW WILL BE MAINTAINED DURING PROPOSED MAXIMUM DISCHARGE RATE FOR THE GRINDER OR EFFLUENT PUMP(S).
3. WHERE COVER IS LESS THAN 3 FT. DUCTILE IRON MUST BE USED.
4. WHERE DUCTILE IRON IS REQUIRED RISER MAY BE CONSTRUCTED WITH SCH. 40 PVC



NOT TO SCALE

STANDARD DETAIL
Metropolitan Sewerage District of Buncombe County, North Carolina
SANITARY SEWER SERVICE LESS THAN 5' DEEP
REVISED 2-5-04 FOR DEPTH (SEE 11b) DN
APPROVED: MAY 6, 1998 | # MSD-11a

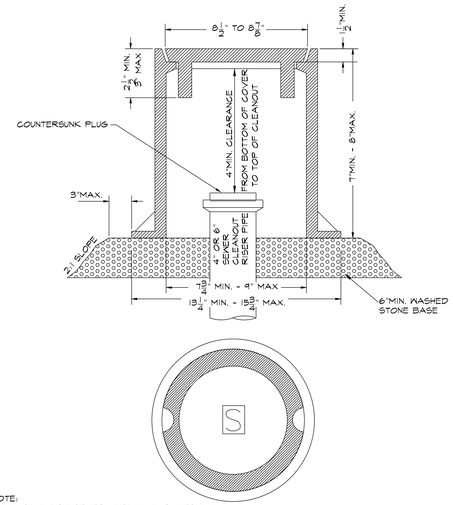


AMBIENT DESIGN GROUP
LANDSCAPE ARCHITECTS & CIVIL ENGINEERS
28 North Ann Street, suite 100 Asheville, NC 28801
Ph: 828-232-4330 Fx: 828-232-4331
Email: Info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

LIVESTOCK MKT. & EVENTS CTR.
UTILITY DETAILS-1
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS

DATE: 10/23/09
DRAWN BY: MN
CHK'D BY: TH
PROJECT NO. 0512-001
SHEET NO.
C-12



NOTE:
1. ALL SANITARY SEWER CLEAN OUT BOXES AND COVERS SHALL BE MANUFACTURED FROM GRAY IRON (CAST IRON) MEETING THE REQUIREMENTS OF AWWA C110 AND ASTM A536.
2. ALL SANITARY SEWER CLEAN OUT BOXES AND COVERS SHALL CONFORM TO PARAGRAPH 2.01(d) OF ITEM 11, SECTION V1 OF MSD'S TECHNICAL SPECIFICATIONS (MADE IN THE U.S.A).
3. SANITARY SEWER CLEAN OUT BOXES AND COVERS MANUFACTURED BY U.S FOUNDRY (HAND HOLE RING & FG COVER, MODEL #7610) EAST JORDEN IRON WORKS (HEAVY DUTY MONUMENT BOX, MODEL #15714) OR APPROVED EQUAL. U.S FOUNDRY (HAND HOLE RING & FG COVER, MODEL #7630) MAY BE USED WHERE CLEAN OUT IS WITHIN AN ASPHALT OR CONCRETE PAVED AREA.

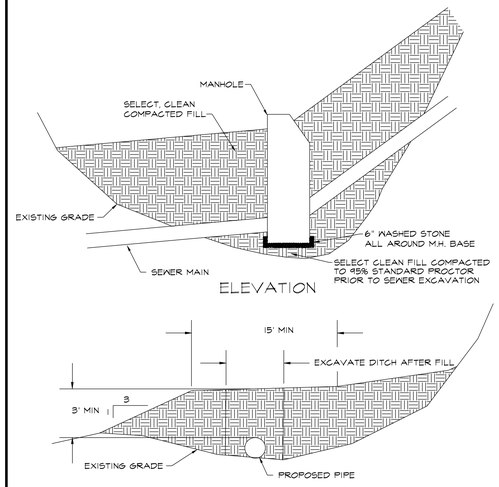
MINIMUM WEIGHT CHART	
	MIN. WEIGHT-LBS.
COVER	25
BASE	40
TOTAL UNIT	65

NOT TO SCALE

STANDARD DETAIL
Metropolitan Sewerage District
of
Buncombe County, North Carolina

CLEANOUT BOX

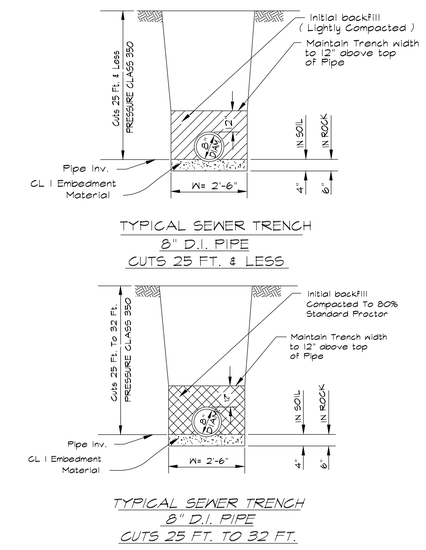
APPROVED: JULY 14,2003 | # MSD-12



STANDARD DETAIL
Metropolitan Sewerage District
of
Buncombe County, North Carolina

SEWER MAIN IN FILL

APPROVED: MAY 6, 1998 | # DMSD-13
Rev. 10/31/02 - Fill line to incl. M.H. base



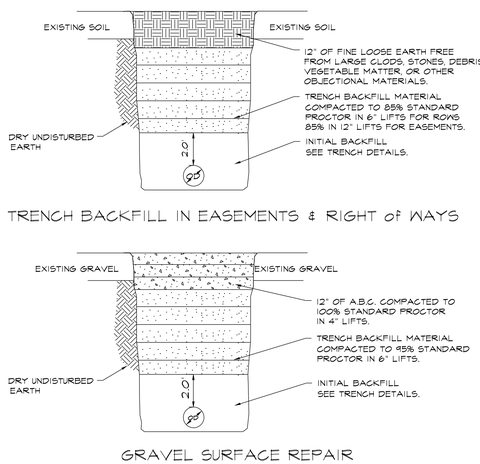
NOTE:
1) DEPTHS OF CUT OR PIPE SIZES GREATER THAN THOSE SHOWN ON THE TRENCH DETAILS REQUIRE SPECIAL DESIGN AND SUBMITTAL OF DESIGN DATA BY THE ENGINEER.
2) ABOVE TRENCH DETAILS ARE FOR TRENCH INSTALLATIONS ONLY. SEWERS INSTALLED IN POSITIVE OR NEGATIVE PROJECTING LAYING CONDITIONS REQUIRE SPECIAL DESIGN AND SUBMITTAL OF DESIGN DATA BY THE ENGINEER.

NOT TO SCALE

STANDARD DETAIL
Metropolitan Sewerage District
of
Buncombe County, North Carolina

TYPICAL TRENCH DETAIL FOR DUCTILE IRON PIPE (8")

APPROVED: MAY 6, 1998 | DMSD-25

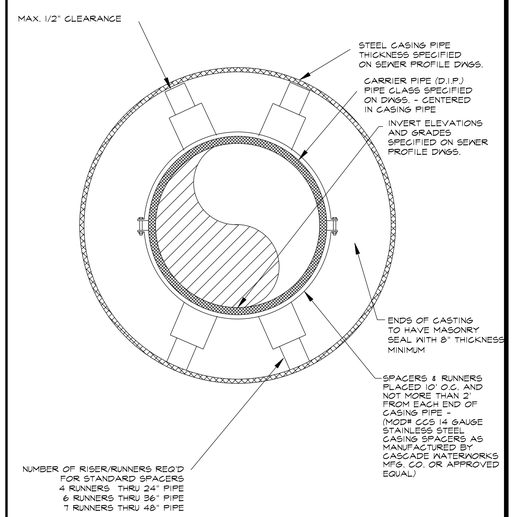


NOT TO SCALE

STANDARD DETAIL
Metropolitan Sewerage District
of
Buncombe County, North Carolina

TRENCH BACKFILL

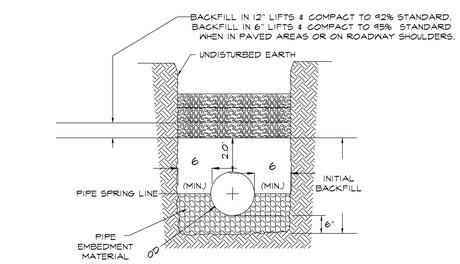
APPROVED: MAY 6, 1998 | # MSD-20



STANDARD DETAIL
Metropolitan Sewerage District
of
Buncombe County, North Carolina

BORE & ENCASEMENT DETAIL

APPROVED: MAY 6, 1998 | # MSD-21a



NOT TO SCALE

NOTES:
1. PVC PIPES REQUIRE CLASS 1 PIPE EMBEDMENT MATERIALS.
2. WHEN TRENCH IS SUBJECT TO INUNDATION, EMBEDMENT MATERIALS MUST EXTEND TO TOP OF PIPE.
3. NO BOULDERS OR STONES IN EXCESS OF 4" WILL BE USED IN INTIAL BACKFILL.
4. THIS DETAIL IS VALID FOR PVC SEWER PIPE INSTALLED AT DEPTHS OF UP TO 20 FEET.
5. PVC PIPE NOT ALLOWED WITH LESS THAN 3'-0" COVER.

NOT TO SCALE

STANDARD DETAIL
Metropolitan Sewerage District
of
Buncombe County, North Carolina

TRENCH FOR PVC PIPE

APPROVED: MAY 6, 1998 | # MSD-23

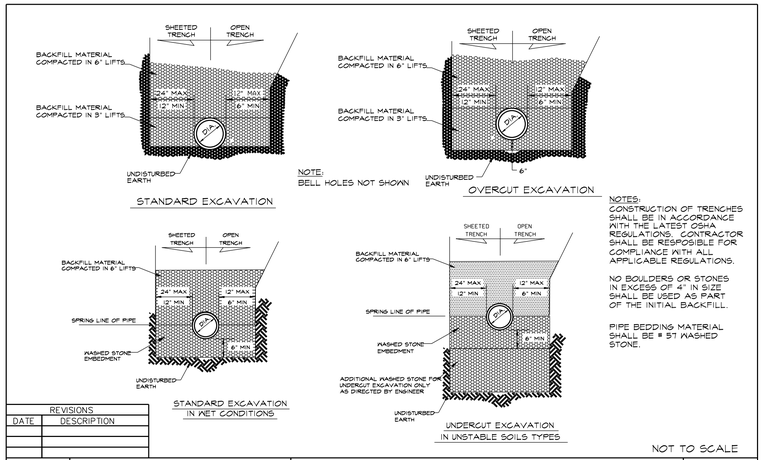
NORTH CAROLINA ARCHITECT C-203
PRELIMINARY NOT FOR CONSTRUCTION
SEAL 27261
ANTHONY L. HAUSER ENGINEER

AMBIENT DESIGN GROUP
LANDSCAPE ARCHITECTS & CIVIL ENGINEERS
28 North Ann Street, suite 100 Asheville, NC 28801
Ph: 828-252-4330 Fx: 828-252-4331
E-mail: info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

LIVESTOCK MKT. & EVENTS CTR.
UTILITY DETAILS - 2
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS

DATE: 10-23-09
DRAWN BY: MN
CHKD BY: TH
PROJECT NO. 0912-001
SHEET NO. C-13



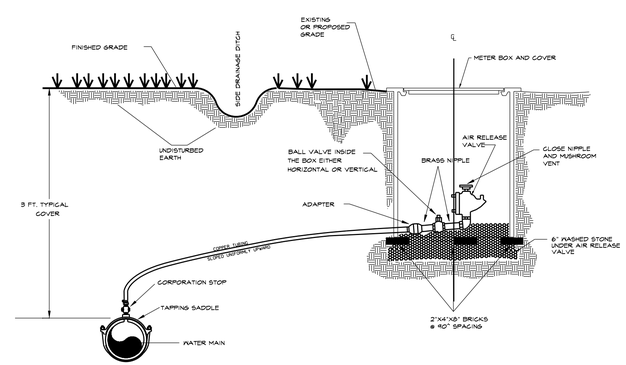
NOTES:
CONSTRUCTION OF TRENCHES SHALL BE IN ACCORDANCE WITH THE LATEST OSHA REGULATIONS. CONTRACTOR SHALL BE RESPOSIBLE FOR COMPLIANCE WITH ALL APPLICABLE REGULATIONS.

NO BOULDERS OR STONES IN EXCESS OF 4" IN SIZE SHALL BE USED AS PART OF THE INITIAL BACKFILL.

PIPE BEDDING MATERIAL SHALL BE # 57 WASHED STONE.

REVISIONS	
DATE	DESCRIPTION

TYPICAL TRENCH DETAIL



NOTES:
1. PIPE AND FITTINGS SIZE SHALL MATCH THE SIZE OF THE PROPOSED AIR RELEASE VALVE TO BE INSTALLED.

2. REFER TO 5/8" METER DETAIL FOR METER BOX SPECIFICATIONS.

REVISIONS	
DATE	DESCRIPTION

STANDARD AIR RELEASE VALVE INSTALLATION

GENERAL NOTES:

METER AND BYPASS ASSEMBLY TO BE DUCTILE IRON FLANGED PIPE

METER FACE TO BE A MAXIMUM OF 3.5' BELOW FINISHED GRADE

ADJUSTABLE CONNECTING PIECE TO BE GLOW F-1438 ADJUSTABLE CONNECTOR

ACCESS DOOR SHALL BE STEEL/ALUMINUM DOUBLE LEAF DOOR WITH A MINIMUM OPENING OF 42" X 36" AND CENTERED OVER METER DOOR SHALL BE REINFORCED FOR AASHTO H-20 LOADING IN AREAS SUBJECT TO VEHICULAR TRAFFIC.

VALVES INSIDE VAULT SHALL BE IRON BODY TYPE AND HAND WHEEL OPERATED

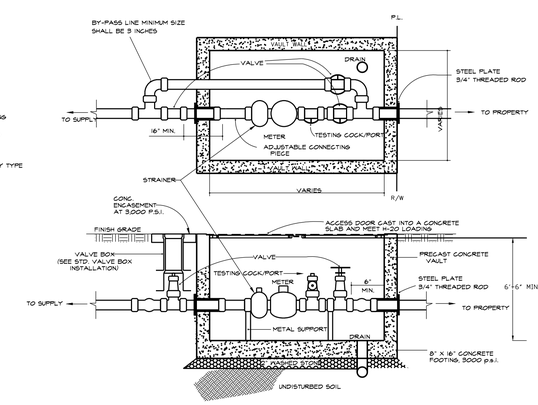
TO ENSURE POSITIVE DRAINAGE, THE VAULT SHOULD BE TIED INTO THE EXISTING STORM DRAINAGE SYSTEM WHEN POSSIBLE OR DRAINED TO DAYLIGHT.

METER TO BE FURNISHED BY THE CITY OF ASHEVILLE WATER RESOURCES DEPARTMENT.

STEEL PLATE THICKNESS TO BE CALCULATED BASED UPON SYSTEM OPERATING PRESSURE

ALL FITTINGS AND APPURTENANCES OUTSIDE THE VAULT SHALL BE RESTRAINED AS PER SECTION 6.02

ALL PIPING FOR 2" WATER METERS SHALL BE TYPE "L" COPPER WITH COMPRESSION FITTINGS AND BRONZE BODY BALL VALVES.



REVISIONS	
DATE	DESCRIPTION
12/08/98	
8/99	VAULT & NOTES

STANDARD 2" & ABOVE COMPOUND METER INSTALLATION AND VAULT

AMBIENT DESIGN GROUP
LANDSCAPE ARCHITECTS & CIVIL ENGINEERS
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E-mail: info@AmbientDesignGroup.com
Website: www.AmbientDesignGroup.com

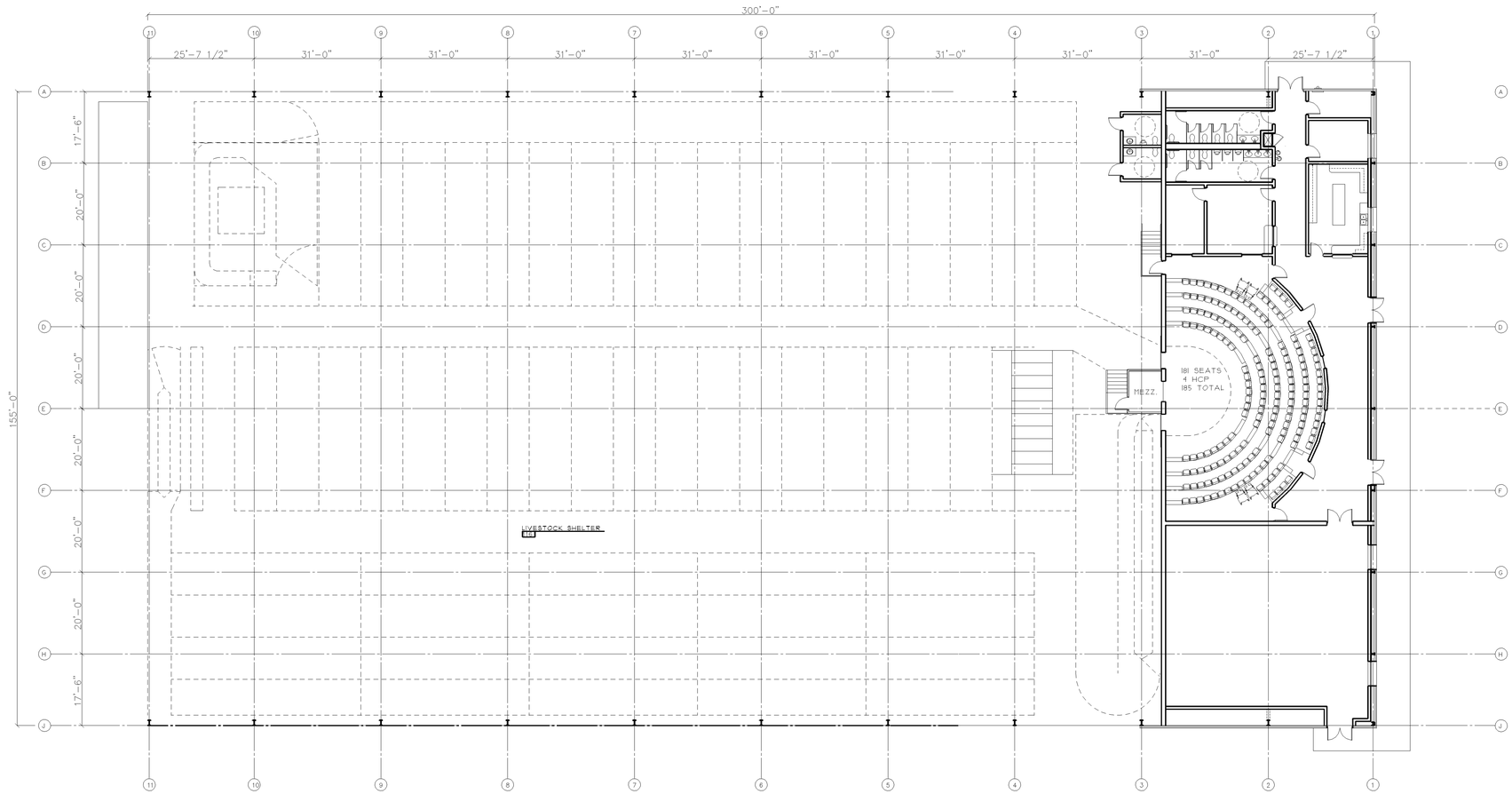
LIVESTOCK MKT. & EVENTS CTR.
UTILITY DETAILS - 3
CANTON, HAYWOOD COUNTY, NC
WESTERN NORTH CAROLINA COMMUNITIES

REVISIONS

DATE: 10-23-98
DRAWN BY: MN
CHK'D BY: TH
PROJECT NO. 0912-201
SHEET NO.
C-14

APPENDIX J

ARCHITECTURAL PLAN SHEETS



1	FLOOR PLAN SCALE: 1/16" = 1'-0"

ACTION/REVISION	DATE
PLAN REVIEW/ PRICING	

WNC REGIONAL LIVESTOCK CENTER

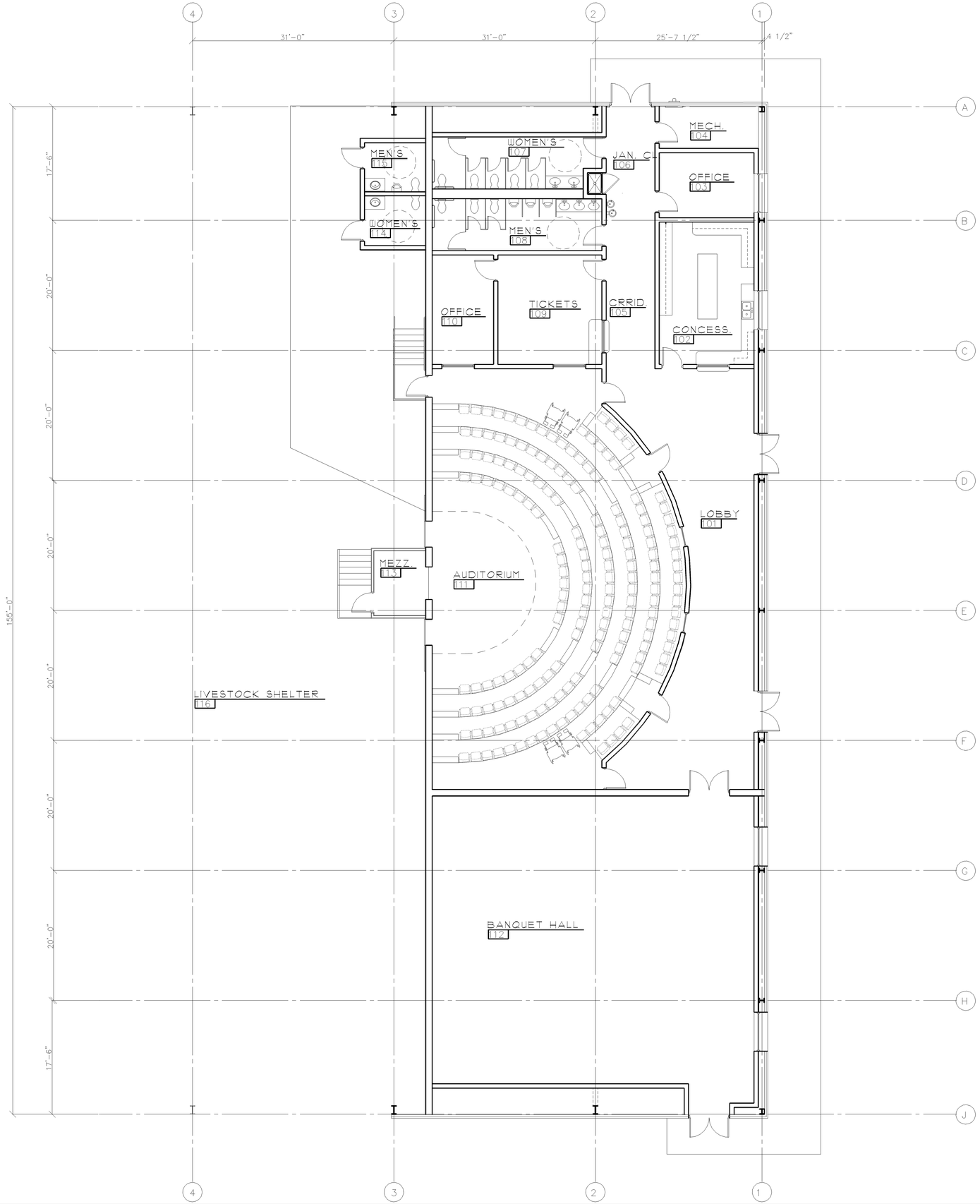
500 BEAVERDAM ROAD
CANTON, NORTH CAROLINA

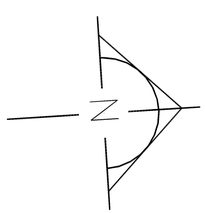
Acanthus Design Studio
architecture and landscape design
70A Kenilworth Road
Asheville, NC 28803
(828) 252-7640

Project #: 09-04
Designed by: CSG
Drawn by: CSG
Checked by: CSG

Sheet No.
A1.1

Contents:
FLOOR PLAN





1 FLOOR PLAN
SCALE: 1/8" = 1'-0"

ACTION/REVISION	DATE
PLAN REVIEW/ PRICING	

WNC REGIONAL LIVESTOCK CENTER

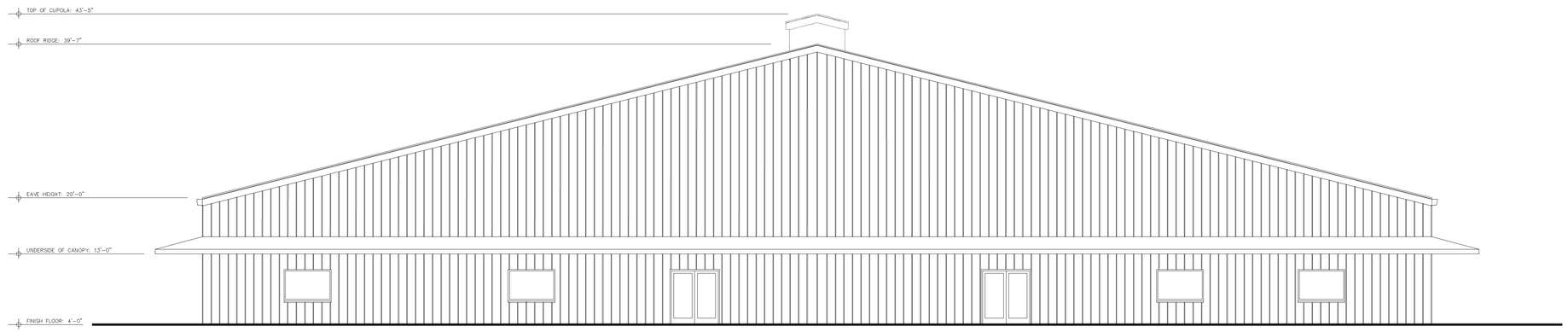
500 BEAVERDAM ROAD
CANTON, NORTH CAROLINA

Acanthus Design Studio
architecture and landscape design
70A Kenilworth Road
Asheville, NC 28803
(828) 252-7640

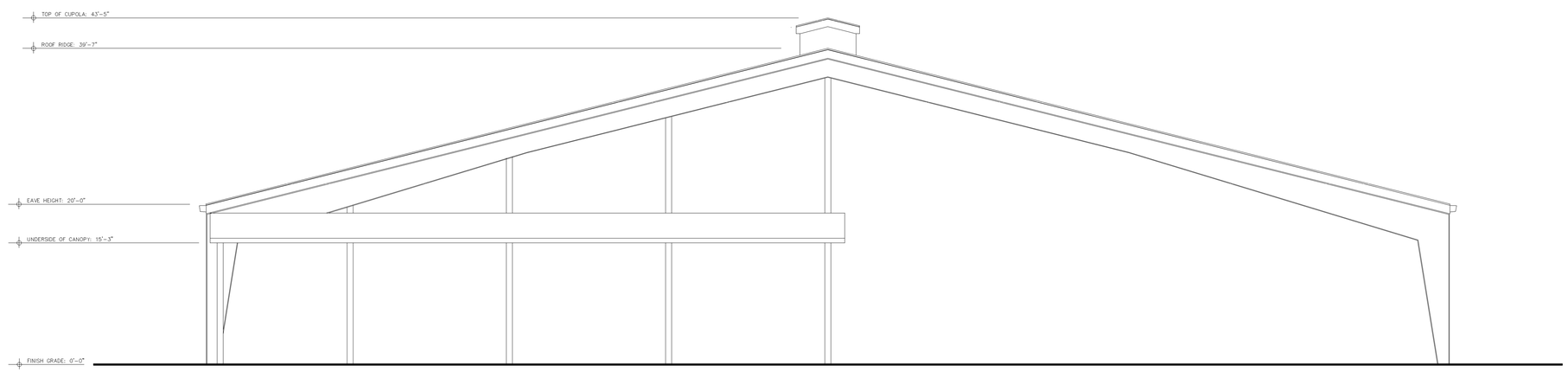
Project #: 09-04
Designed by: CSG
Drawn by: CSG
Checked by: CSG

Sheet No.
A1.2

Contents:
ASSEMBLY PLAN



1 NORTH ELEVATION
SCALE: 1/8"= 1'-0"



2 SOUTH ELEVATION
SCALE: 1/8"= 1'-0"

ACTION/REVISION	DATE
PLAN REVIEW/ PRICING	

WNC REGIONAL
LIVESTOCK CENTER

500 BEAVERDAM ROAD
CANTON, NORTH CAROLINA

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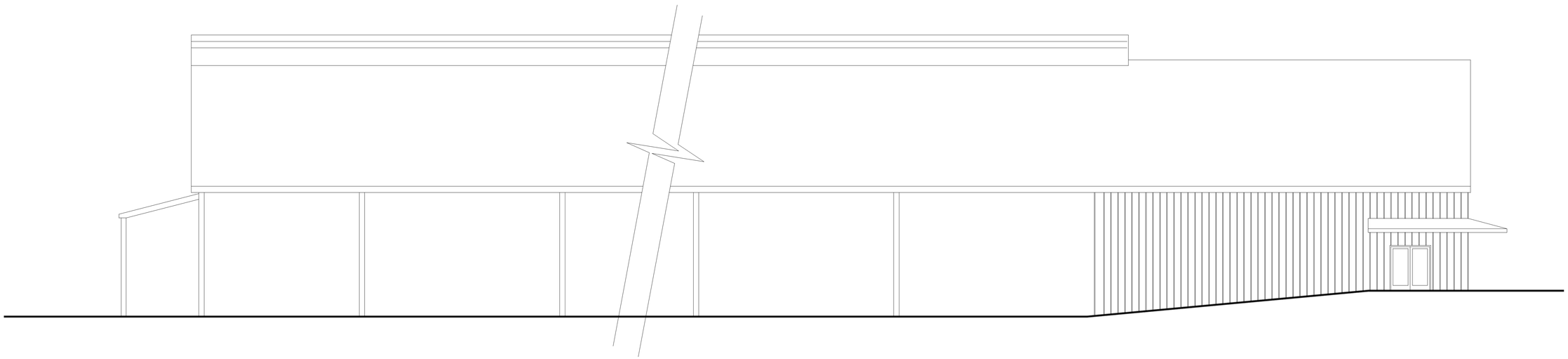
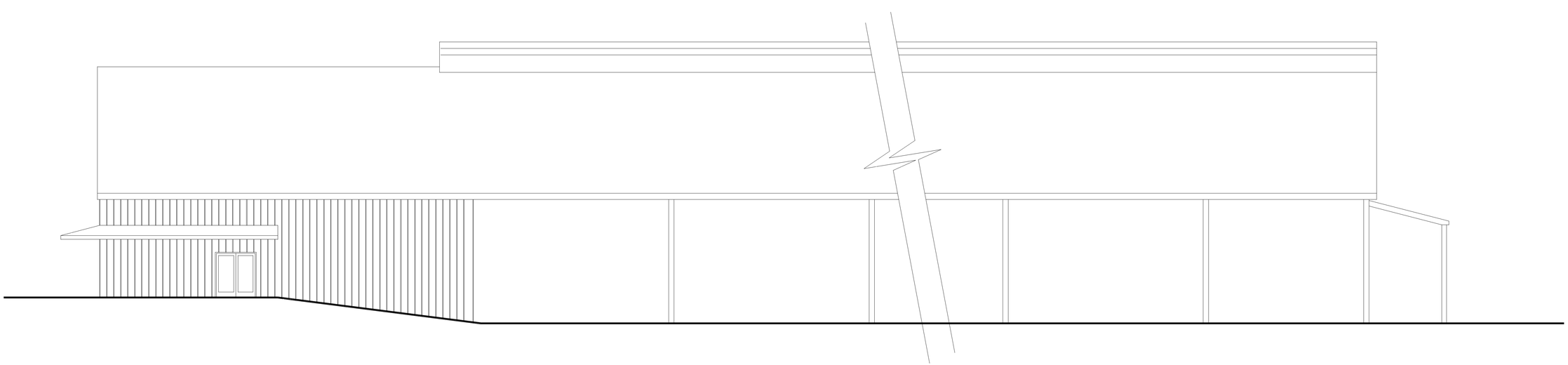
Project #: 09-04
Designed by: CSG
Drawn by: CSG
Checked by: CSG

Sheet No.
A2.1

Contents:
ELEVATIONS



1 EAST ELEVATION
SCALE: 1/8" = 1'-0"



2 EAST ELEVATION
SCALE: 1/8" = 1'-0"

ACTION/REVISION	DATE
PLAN REVIEW/ PRICING	

WNC REGIONAL
LIVESTOCK CENTER

500 BEAVERDAM ROAD
CANTON, NORTH CAROLINA

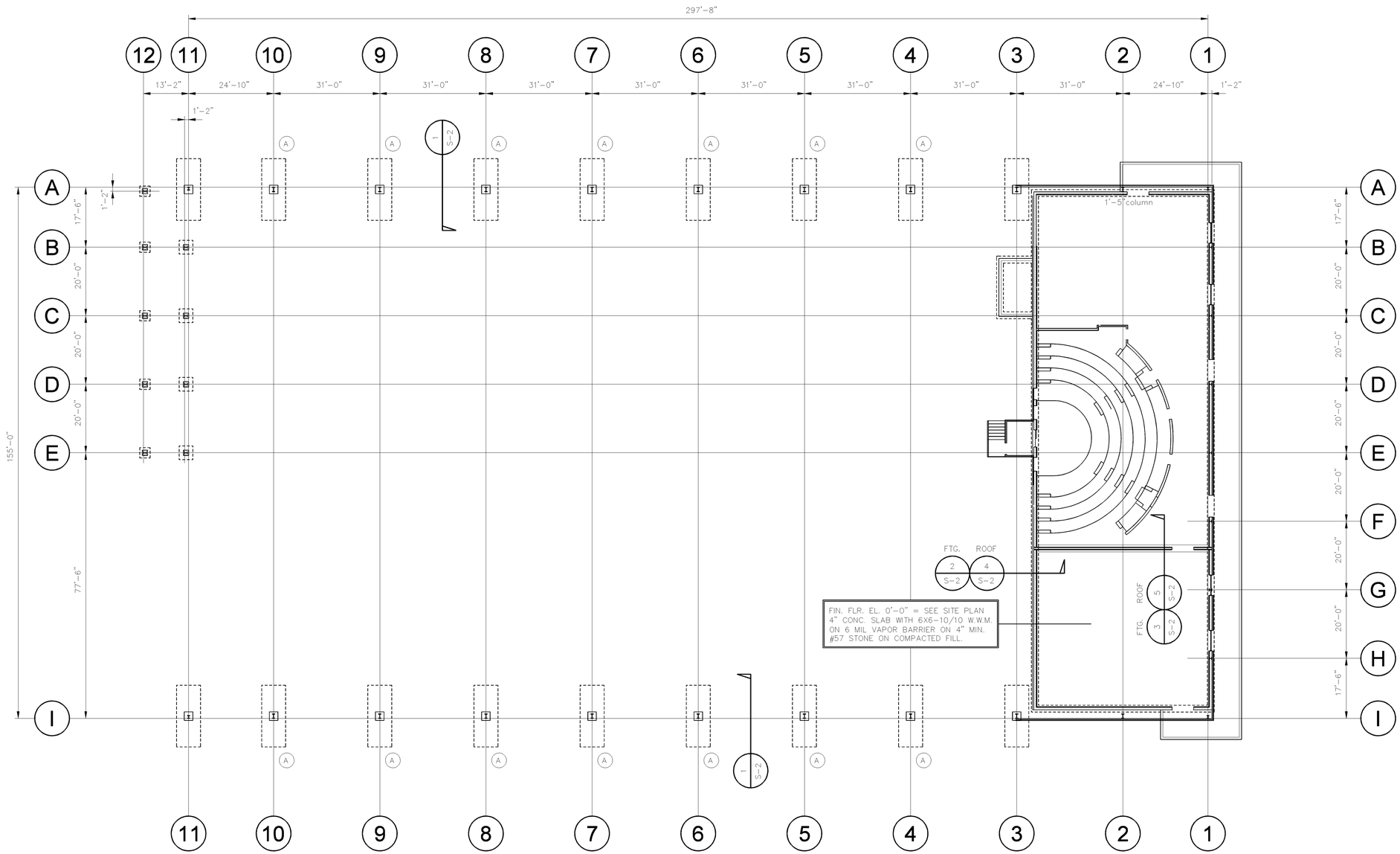
704 Kenilworth Road
Asheville, NC 28803
(828) 252-7640

Acanthus Design Studio
architecture and landscape design

Project #: 09-04
Designed by: CSG
Drawn by: CSG
Checked by: CSG

Sheet No.
A2.2

Contents:
ELEVATIONS



FIRST FLOOR AND FOUNDATION PLAN

SCALE 1/16"=1'-0"

NOTES:
1.) COORDINATE ALL COLUMN AND ANCHOR BOLT LOCATIONS WITH METAL BUILDING MANUFACTURER.
2.) VERIFY ANCHOR BOLT SIZE AND QUANTITY SHOWN WITH METAL BUILDING MANUFACTURER.
3.) COORDINATE ALL DIMENSIONS SHOWN WITH ARCH. DWGS.
4.) TOP OF FOOTINGS - EL. -6'-0"

1	FIRST FLOOR AND FOUNDATION PLAN SCALE: 1/16" = 1'-0"

1.) COORDINATE ALL DIMENSIONS SHOWN WITH ARCHITECTURAL DRAWINGS.
2.) SEE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS NOT SHOWN.

Mady Engineering
STRUCTURAL ENGINEERING
1357 Garren Creek Road
Fairview, NC 28730
828-628-2577

ACTION/REVISION	DATE
???	???

WNC REGIONAL
LIVESTOCK CENTER

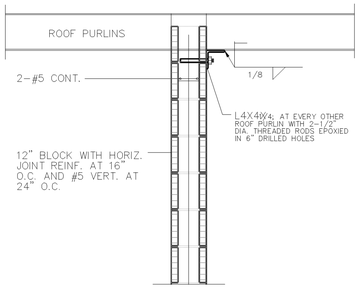
500 BEAVERDAM ROAD
CANTON, NORTH CAROLINA

Acanthus Design Studio
architecture and landscape design
70A Kenilworth Road
Asheville, NC 28803
(828) 252-7640

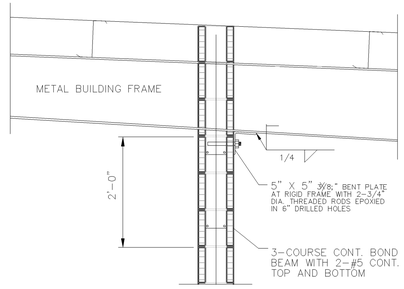
Project #: 09-04
Designed by: DJM
Drawn by: DJM
Checked by: DJM

Sheet No.
S-1

Contents:
FIRST FLOOR / FOUNDATION



SECTION 4 / S-2
SCALE: 3/4"=1'-0"



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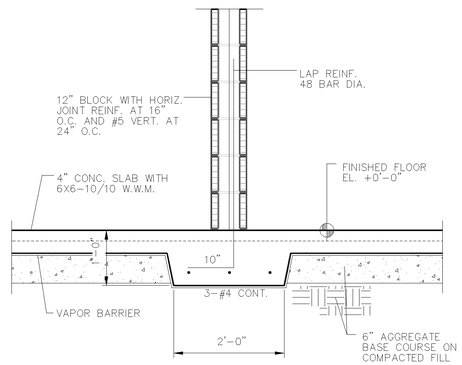

SECTION 3 / S-2
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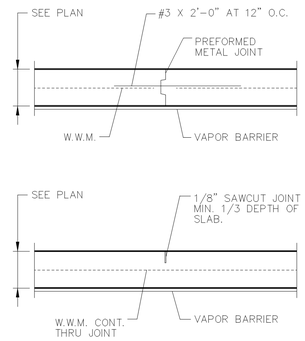
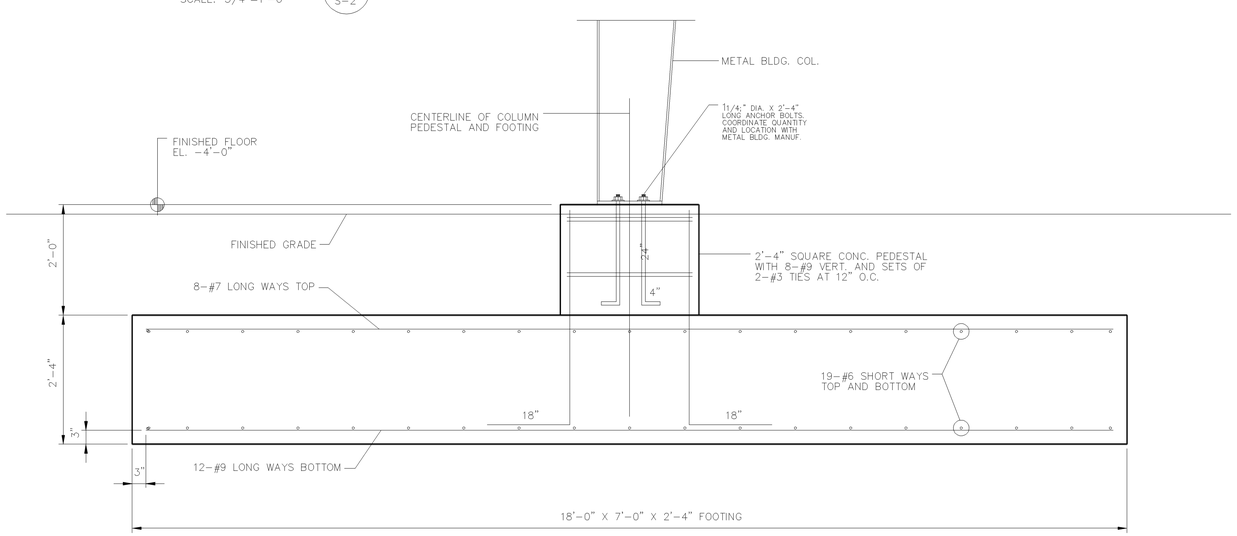


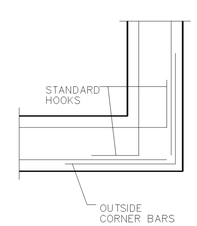
SLAB ON GRADE CONTROL JOINT
SCALE: 3/4"=1'-0" — A / S-2

EITHER OF THE ABOVE CONTROL JOINTS MAY BE USED AT THE CONTRACTOR'S OPTION.

SECTION 2 / S-2
SCALE: 3/4"=1'-0"



SECTION 1 / S-2
SCALE: 3/4"=1'-0"



REINF. DETAIL — B / S-2
SCALE: 3/4"=1'-0"

PEDESTAL AND FOOTING SCHEDULE

MARK	ANCHOR BOLTS	PEDESTAL SIZE	PEDESTAL REINFORCING	FOOTING SIZE	FOOTING REINFORCING
A	4-3/4" DIA. X 2'-4"	32" SQUARE	8-#9 VERT. AND SETS OF 2-#3 TIES AT 12" O.C.	7'-0" X 18'-0" X 2'-4"	----
B					
C					
D					
E					
F					
G					
H					
I					

GENERAL STRUCTURAL NOTES

1. ALL DESIGN PER THE NORTH CAROLINA STATE BUILDING CODE 2009.
   ROOF LIVE LOAD ---------- 20 PSF
2. SOIL PRESSURE ---------- 2500 PSF
3. IF FOOTING ELEVATIONS SHOWN OCCUR IN A DISTURBED, UNSTABLE, OR UNSUITABLE SOIL, THE ARCHITECT SHALL BE NOTIFIED.
4. CONCRETE: DESIGN PER CURRENT EDITION A.C.I.
   A. ALL REINFORCED MASONRY --- GROUT ---------- f'c = 2000 PSI
   B. ALL OTHER CONCRETE ---------- f'c = 3000 PSI
5. CONCRETE MASONRY UNITS---------- A.S.T.M. C-90
6. GROUTED MASONRY UNITS SHALL BE FILLED SOLID WITH 2000 PSI GROUT AT REINFORCING. GROUT SLUMP 8 TO 11 INCHES.
7. REINFORCEMENT: REINFORCING BARS (GRADE 60) ----- A.S.T.M. A-615
   WELDED WIRE MESH ---------- A.S.T.M. A-185
8. MINIMUM COVER FOR CAST-IN-PLACE CONCRETE REINF., UNLESS OTHERWISE SHOWN ON DRAWINGS, SHALL BE AS FOLLOWS:
   FOOTINGS ---------- 3"
   SLABS ---------- CENTERED
9. SPLICES IN REINFORCEMENT, WHERE PERMITTED, SHALL BE AS FOLLOWS:
   ALL POURED CONCRETE ---------- CLASS "C" TENSION SPLICE
   REINFORCED MASONRY ---------- 48 BAR DIAMETERS
   WELDED WIRE MESH ---------- 8"
10. CLASS "C" TENSION SPLICES, IN INCHES, SHALL BE AS FOLLOWS:

	TOP BARS	ALL OTHERS
# 3	21	15
# 4	29	20
# 5	36	26
# 6	46	33
# 7	62	45
# 8	82	59

11. ALL REINFORCING SHALL BE HELD SECURELY IN POSITION WITH STANDARD ACCESSORIES DURING PLACEMENT OF CONCRETE.
12. ANCHOR BOLTS (AB) ---------- A.S.T.M. A-307
    USE ONLY WHERE SPECIFICALLY CALLED FOR.
13. AT ANCHOR BOLTS, THE NUT SHALL BE DRAWN TIGHT AND PROJECTING THREADS UPSET.
14. STRUCTURAL STEEL: DESIGN PER CURRENT EDITION A.I.S.C. AS FOLLOWS WITH ONE SHOP COAT OF PAINT, EXCEPT EMBEDDED ITEMS.
    A. ROLLED SHAPES AND PLATES ---------- A.S.T.M. A-36
15. ALL WELDS SHALL BE MADE WITH E70XX ELECTRODES.
16. SEE ARCH., PLUMBING, LANDSCAPING, MECH., AND ELEC. DRAWINGS FOR DRIPS, REGLETS, CHAMFERS, RUSTICATIONS, SLOTS, SLEEVES, ANCHORS, INSERTS, AND OPENINGS REQUIRED.
17. ALL STRUCTURAL OPENINGS AROUND OR AFFECTED BY MECHANICAL, ELECTRICAL, AND PLUMBING EQUIPMENT SHALL BE VERIFIED WITH EQUIPMENT PURCHASED BEFORE PROCEEDING WITH STRUCTURAL WORK AFFECTED.

APPENDIX "B"

DESIGN LOADS:

IMPORTANCE FACTORS: WIND (Iw) 1.0; SNOW (Is) 1.0; SEISMIC (Ie) 1.0

LIVE LOADS: ROOF 20 PSF; FLOOR N.A.; SNOW 15 PSF

WIND LOAD: BASIC WIND SPEED 90 MPH; EXPOSURE CATEGORY B; WIND BASE SHEARS: PER METAL BLDG. MANUF.

SEISMIC DESIGN CATEGORY A: COMPLIANCE WITH SECTION 1616.4 only ? No

SEISMIC DESIGN CATEGORY B, C, & D:

SEISMIC USE GROUP I
SPECTRAL RESPONSE ACCELERATION PER M.B.M.

SITE CLASSIFICATION PER METAL BLDG. MANUF.
BASIC STRUCTURAL SYSTEM STEEL FRAME
SEISMIC BASE SHEAR PER METAL BLDG. MANUF.

ANALYSIS PROCEDURE SIMPLIFIED
ARCHITECTURAL, MECHANICAL, ETC. ? YES

LATERAL DESIGN CONTROL: PERMETAL BLDG. MANUF.

SOIL BEARING CAPACITIES:

FIELD TEST 2500 PSF
PRESUMPTIVE BEARING CAPACITY N.A.
PILE SIZE, TYPE AND CAPACITY N.A.

2 SECTIONS AND DETAILS
SCALE: 3/4" = 1'-0"

1.) COORDINATE ALL DIMENSIONS SHOWN WITH ARCHITECTURAL DRAWINGS.
2.) SEE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS NOT SHOWN.

Mady Engineering
STRUCTURAL ENGINEERING
1357 Garren Creek Road
Fairview, NC 28730
828-628-2577

ACTION/REVISION	DATE
???	???

WNC REGIONAL LIVESTOCK CENTER
500 BEAVERDAM ROAD
CANTON, NORTH CAROLINA

Acanthus Design Studio
architecture and landscape design
704 Kenilworth Road
Asheville, NC 28803
(828) 252-7640

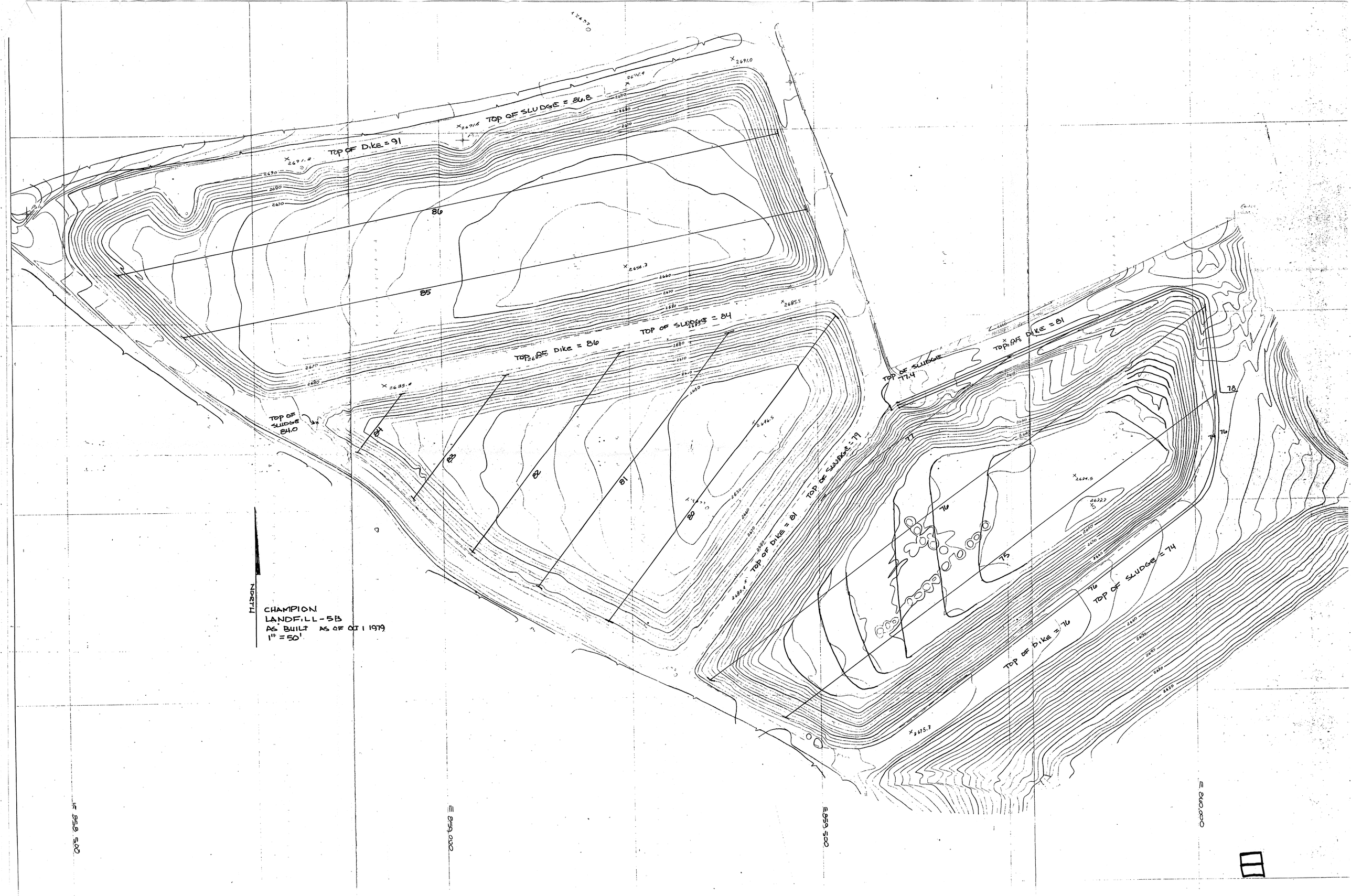
Project #: 09-04
Designed by: DJM
Drawn by: DJM
Checked by: DJM

Sheet No.
S-2

Contents:
SECTIONS / DETAILS

APPENDIX K

CHAMPION LANDFILL 5B AS BUILT AS OF OCTOBER 1, 1979


TOP OF DIKE = 91
TOP OF SLUDGE = 84.8
TOP OF DIKE = 86
TOP OF SLUDGE = 84
TOP OF SLUDGE 84.0
TOP OF DIKE = 81
TOP OF SLUDGE = 79
TOP OF SLUDGE 77.4
TOP OF DIKE = 81
TOP OF DIKE = 76
TOP OF SLUDGE = 74
86
85
84
83
82
81
80
79
78
77
76
75
74
NORTH
CHAMPION
LANDFILL-5B
AS BUILT AS OF OCT 1 1979
1" = 50'
N 858,500
E 859,000
N 859,500
E 860,000

APPENDIX L

MCGILL ASSOCIATES LETTER DATED NOVEMBER 20, 2003

COPY

McGill
ASSOCIATES

November 20, 2003

Mr. Tim Jewett
North Carolina Department of Environment
and Natural Resources
Division of Waste Management
585 Waughtown Street
Winston Salem, North Carolina 27107

RE: International Paper Landfill 5B
Proposed Recreation Park
Canton, North Carolina

Dear Mr. Jewett,

As you have discussed with Mark Cathey and Larry Lewison of our office, please find enclosed two (2) copies of the proposed plans to stockpile borrow material on top of the closed International Paper Landfill No. 5B located in Haywood County. In addition, we have enclosed two (2) copies of an as-built drawing dated October 1, 1979 of the original landfill with elevations of the sludge, berm, and cap shown thereon. These plans are submitted for your review and approval.

The proposed work is being done in preparation for the upcoming construction of a recreation park by the Town of Canton on this site, scheduled to begin in spring of 2004. As shown on enclosed Sheet C1, the athletic facility will consist of several baseball and soccer fields along with walking trails and related improvements. An existing storage building on the property will be remodeled into a recreation center in a later phase of the recreation park. This construction is being planned such that no penetration, under any circumstances, will be allowed into the existing ground. This is being accomplished by covering the closed landfill with additional fill material to allow for fine grading of ball fields and installation of underground utilities and light poles.

Haywood County (in which Canton is located) has an industrial park approximately two miles from this site, and needs a site graded in preparation for future building construction. The excess material from this industrial park would be sufficient to construct the entire recreation park, assuming an average of depth of fill of 4 foot across the closed landfill. We have prepared a site plan to grade one industrial pad and a portion of a second, generating approximately 76,000 cubic yards (CY) of excess

material. This is the amount of material needed to construct Phase 1A of the recreation park, and we are therefore requesting approval to stockpile this material on the closed landfill.

In order to control drainage and silt around the stockpiled material we have surrounded to downstream perimeter of the project area with an above-ground diversion berm which drains into an above-ground sediment trap, requiring no excavation or penetration into cap. In addition, the contractor will be responsible for compacting and shaping the stockpiled material in a way that resembles the proposed grades shown on sheets C2 and D1, but more importantly, to ensure that we obtain positive drainage towards the proposed berms and sediment traps until the actual recreation park project begins.

In addition, some existing features in the Phase 1A area, such as chain-link fencing and wooden light poles, are embedded in the existing ground (cap) and will need to be removed during this construction. The plan indicates that these poles are to be sawcut at ground level, leaving the existing portion of the poles blow grade, thereby not impacting any existing soil material. The new stockpile material will cover the existing grades and the remaining poles by 3 feet to 6 feet of depth, averaging approximately 4 feet.

As you review these proposed plans, please note the differences in elevations between the enclosed as-built drawing from October, 1979 and our sheet E1, which shows the topographic elevations and conditions that exist today. By comparing these two maps, it appears that additional fill material may have been placed over the upper two landfill cells sometime after October, 1979. Based on differences between the elevations on these maps, this additional fill material averages approximately 10 feet in depth. The original landfill owner built chain-link fencing, installed light poles, and constructed several buildings in the general area of the upper cells during the 1980's and/or 1990's. Could this additional material have been placed over the actual landfill cap in order to allow this construction without penetrating the cap? If so, could we interpret this as meaning that we can also penetrate the ground as it exists today, assuming that the cap is 10 feet or so under the existing ground? Your thoughts on this matter will be appreciated as it could impact our recreation park design, particularly regarding proposed building footings, poles for field lighting, utilities, and backstop fencing.

We hope this information will allow you to complete your review, and grant approval for the Town to stockpile this material according to these plans. If you need any additional information or have any questions, please do not hesitate to call either me or Larry Lewison.

Sincerely,
McGILL ASSOCIATES, P.A.

Dale Pennell

DALE PENNELL, P.E., P.L.S.

Enclosures

cc: Bill Stamey
Joel Storrow

03187/letters/TJ20nov03.doc

APPENDIX M

SHEET C-3 OF MCGILL ASSOCIATES RECORD DRAWING

PLAN

SCALE: 1"= 100'

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date _____

1" TYPE K COPPER WATER LINE

PORTABLE BLEACHER (TYP.)

STORAGE BUILDING

GATE

EXISTING ROW OF WHITE PINES, TO REMAIN

EXISTING ROW OF WHITE PINES

I-40 EAST

POWER POLE

HOSE BIB (TYP.)

RESTROOM & CONCESSIONS

PAVED HANDICAP PARKING (6 SPACES)

CONCRETE STEPS

GRAVEL PARKING AREA

EXISTING FIRE HYDRANT

ASPHALT WALKING TRAIL AND HANDICAP ACCESS

CHAIN-LINK FENCE WITH PADDED TOP (TYP.)

LIGHT POLE

12" C.P.P.

RECREATIONAL CENTER

ex. = 2694

METAL STORAGE BUILDING (FUTURE RECREATION BUILDING)

8' WIDE WALKING TRAIL (SAND-SURFACE)

ASL ACQUISITION CORP.

(NEO CORP.)

1

2

3

5% 5%

LEGEND

ELEMENTS OF PHASE ONE ARE SHOWN IN SHADES OF GREEN

LEASED LAND PHASE ONE

WALKING TRAIL

BLEACHER

PARK BOUNDARY

ELEMENTS OF PROPOSED PHASE TWO ARE SHOWN IN SHADES OF ORANGE

REVISION BY ALTAMONT ENVIRONMENTAL, INC. 10/22/2009

TOPOGRAPHIC SURVEY PREPARED BY:

WEBB A. MORGAN & ASSOCIATES, P.A.

*** PROFESSIONAL LAND SURVEYORS ***
95 CENTRAL AVENUE, ASHEVILLE, NORTH CAROLINA, 28801
PHONE (828)252-1530

100 0 100 200 300

SCALE : 1" = 100'

NO.	DATE	BY	REVISION DESCRIPTION
2	10-22-2009	APS	ALTAMONT ENVIRONMENTAL, INC. UPDATE OF RECORD DRAWING
1	03-30-07	CMM	RECORD DRAWING

McGill ASSOCIATES
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC PH. (828) 252-0575

RECREATION COMPLEX-PHASE 1A
INTERNATIONAL PAPER RECREATION PARK
TOWN OF CANTON
HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 00122
DATE: DEC. 2003
SCALE: 1"=200'
DESIGNED BY: LJL
CADD BY: LJL, LJL, BAS
DESIGN REVIEW: ____
CONST. REVIEW: ____

RECREATION PARK
GRADING PLAN

SHEET
C3

Q:\2000\00122\00122\phase1a\RECORD DRAWING SET\RD-L1-00122-1A.dwg, C3 11x17, 10/21/2009 11:15:37 AM

APPENDIX N

ZONING LETTER FROM TOWN OF CANTON DATED OCTOBER 26, 2009

The Town of Canton, N.C.

Office of Mayor and Board of Aldermen

PATRICK U. SMATHERS, Mayor
ERIC G. DILLS, Alderman
MICHAEL B. RAY, Alderman
ERNEST H. STINES, Alderman
TROY W. MANN, Alderman

October 26, 2009

Mr. L. T. Ward
Project Manager
WNC Regional Livestock Center, LLC
594 Brevard Road
Asheville, NC 28806

Dear Mr. Ward:

RE: Zoning Issue – Proposed Livestock Market
Canton, NC

This letter is to inform you that the Proposed Livestock Market Complex, to be located off Beaverdam Road, does not conflict with the Town of Canton's zoning classifications. If you need additional information please do not hesitate to contact me or Rosemary Green.

Sincerely,

TOWN OF CANTON

Phil Smathers

Phillip Smathers
Zoning Officer

PS/rg