CERTIFICATION OF LAGOON CLOSURE REPORT

GENERAL MOTORS
HARRISON RADIATOR DIVISION FACILITY
MORAINE, OHIO

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General Motors
Worldwide Facilities Group
Environmental and Regulatory Support
Remediation Team

August 10, 2001

Federal Express

Ohio EPA
Lazarus Government Center
122 South Front Street
Columbus, Ohio 43215-1049
Attn: Director

RE: Certification of Lagoon Closure Report, Harrison Radiator Division Facility, Moraine, Ohio

Dear Sirs:

Enclosed is one copy of the Certification of Lagoon Closure Report for the North and South Lagoons at the former General Motors Corporation (GM) Harrison Radiator Division (Harrison Facility) in Moraine, Ohio. This report was prepared for GM and Remediation and Liablity Management Company, Inc. (REALM) by Conestoga-Rovers & Associates and satisfies the closure certification requirements specified in Ohio Administrative Code 3745-66-15. This report outlines the activities completed which are described in the Ohio EPA approved June 2000 Lagoon Closure Plan as modified.

Again, GM appreciates this opportunity to work with Ohio EPA on completing closure of these units. Please call (937) 395-5092 if you have any questions or require additional information.

Sincerely,

Pamela L. Stubbs
Project Manager

Enclosure
cc: J. Caufield, GM
M. Capiro, USEPA
C. Cotton, OEPA

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1.0 INTRODUCTION

This report entitled "Certification of Lagoon Closure Report" (Report) has been prepared by Conestoga-Rovers & Associates (CRA) to present the Certification of Closure for the wastewater settling lagoons (North and South Lagoons), at the former General Motors (GM) Harrison Radiator Division Facility (Harrison Facility). The Harrison Facility is located at 3600 Dryden Road in Moraine, Ohio. Figure 1.1 presents the Site Location Plan. Figure 1.2 presents the Site Plan. The lagoons are RCRA Interim Status Units (U.S. EPA ID #OHD 000 817 577).

The North and South Lagoons were closed in accordance with the Lagoon Closure Plan approved by the Ohio Environmental Protection Agency (Ohio EPA) on August 24, 2000 with modifications as noted in this Report. The closure activities outlined in the approved Lagoon Closure Plan include solidifying sludge in situ, backfilling the lagoons with material from existing on-Site soil stockpiles and/or imported material, and constructing a vegetated soil cover on the South Lagoon and an asphalt pavement cover on the North Lagoon. This Report is being submitted to Ohio EPA in accordance with OAC 3745-66-15.

This Report is organized as follows:

Section 1.0 - Provides background information and a summary of Lagoon Closure Plan requirements;

Section 2.0 - Presents a description of North and South Lagoons and the sludges solidified;

Section 3.0 - Presents a description of the closure administration;

Section 4.0 - Presents a chronology of closure activities; and

Section 5.0 - Presents a description of closure activities, arranged by activity.

The Certification of Closure Statement, signed by the Owner and an independent Professional Engineer, as required by OAC 3745-66-15, can be found in Appendix A to this report. In accordance with OAC 3745-66-16, a certified survey plat of the closed wastewater settling lagoons will be filed with the Montgomery County Land Registry Office. In accordance with OAC 3745-66-19, a restrictive land use covenant will be registered on the deed to the North and South Lagoon properties.

1.1 BACKGROUND INFORMATION

The Harrison Facility originally submitted closure plans for the North and South Lagoons on November 8, 1985. The Ohio EPA disapproved these closure plans on November 14 and 15, 1988. The Harrison Facility filed a request for an adjudication hearing on December 13, 1988. The Harrison Facility and Ohio EPA commenced negotiations to discuss settlement of the filed appeal and approval of closure plans for the units. As part of ongoing settlement discussions, GM submitted revised closure plans in November 1989. The negotiations continued into 1991, when the United States Environmental Protection Agency (USEPA) issued a RCRA Corrective Action Order for the Harrison Facility. At that point, the Harrison Facility and Ohio EPA agreed to further negotiate the closure of the lagoons after the implementation of the Corrective Action Order at the Site. The Harrison Facility then focused its attention to the implementation of the Corrective Action Order. In the summer of 1999, Ohio EPA and GM resumed negotiations concerning the development of the closure plan for the lagoons.

The RCRA Facility Investigation (RFI) conducted as part of the USEPA Corrective Action at the Harrison Facility, which included an evaluation of the lagoons, was completed in 1996 and a Supplemental RFI for the adjacent GM Powertrain Group, Moraine Engine Plant (Moraine Engine) and the GM Truck Group, Moraine Assembly Plant (Moraine Assembly) was completed in 1999. The 1996 RFI Baseline Risk Assessment evaluated both groundwater and non-groundwater exposure pathways and the 1999 Supplemental RFI Baseline Risk Assessment re-evaluated the groundwater pathway for the lagoons in combination with potential effects from the Areas of Interest (AOIs) investigated in the Supplemental RFI (ENVIRON 2000).

On June 3 and August 11, 1999, GM met with Ohio EPA to present and discuss a revised approach for closure of the lagoons. The revised approach was agreed upon. A Closure Plan was prepared that detailed the agreed upon closure approach and was submitted to Ohio EPA on June 14, 2000. Ohio EPA approved the revised Lagoon Closure Plan on August 24, 2000, and GM implemented the Lagoon Closure Plan. Ohio EPA's approval, responses to Ohio EPA's approval conditions, along with other select correspondence with Ohio EPA are presented in Appendix B to this Report.

1.2 CLOSURE REQUIREMENTS

The essential elements of the Lagoon Closure Plan can be summarized as follows:

- clear remaining vegetation;
- solidify sludge in situ utilizing a mixture of soil and reagent to achieve a minimum compressive strength of 25 psi;
- demolish and/or abandon existing underground pipes and facilities;
- backfill overtop of solidified sludge to provide positive drainage away from the former lagoons;
- install surface drainage features to control stormwater runoff;
- install a compacted clay soil with vegetated topsoil soil cover system for the South Lagoon; and
- install an asphalt pavement cover for the North Lagoon.

These elements together with the additional information provided in Section 5.0 of this report collectively satisfy the closure requirements specified in the approved Lagoon Closure Plan.

2.0 SITE DESCRIPTION- PRE-CLOSURE CONDITIONS

2.1 PRE-CLOSURE CONDITIONS IN THE LAGOONS

2.1.1 NORTH LAGOON

The existing conditions in the North Lagoon, at the start of closure activities, were surveyed, with the as-found survey information presented in Plan 1. The lagoon area is approximately 4.6 acres in size and consists of a primary and secondary basin separated by an earthen berm. The secondary basin is also partially divided by an earthen berm, which was used to increase residence time in the basin. During the active life of the lagoon, flow entered the system through the primary basin, was diverted to the secondary basin after initial settling of solids, discharged under a National Pollutant Discharge Elimination System (NPDES) permit to a ditch, which crosses the Site, and eventually discharged to the Great Miami River.

The North Lagoon operated between 1972 and October 1989, when the lagoon was taken out of service. Between 1972 and 1979, the lagoon received industrial wastewater including metal plating wastes (zinc, nickel, and chrome), cutting fluids, pickling wastes, oils, porcelain sludge, and electrodeposition paint rinse waters. Between May 1980 and September 1984, the lagoon received only dilute process rinse wastewater, non-contact cooling water, and stormwater runoff. Beginning in September 1984, all process wastewater was diverted to the on-Site pretreatment facility. All stormwater and non-contact cooling water was diverted into a new concrete stormwater retention facility when the lagoon was taken out of service in October 1989.

2.1.2 SOUTH LAGOON

The existing conditions in the South Lagoon, at the start of closure activities, were surveyed, with the as-found survey information presented in Plan 2. The lagoon area is approximately 7.9 acres in size and consists of a primary basin, secondary basin, and sludge drying basin that had been individually excavated at different times. During the active life of the lagoon, flow entered the system through the primary basin, was diverted to the secondary basin after initial settling of solids, discharged under a NPDES permit to a ditch, and eventually discharged to the Great Miami River. The sludge drying basin was previously used for the dewatering of sludge removed from the primary and secondary basins.

The South Lagoon originally consisted of a single basin occupying the footprint of the secondary basin, which was constructed in 1965. The sludge drying basin was added in 1967 and the primary basin was added in 1974. Between 1965 and 1979, the lagoon received industrial wastewater including zinc plating wastes, anodizing wastes, pickling wastes, oils, and porcelain sludge. Between 1980 and November 1985, the lagoon received process wastewater (consisting of dilute acid and alkali rinses from small parts cleaning and non-cyanodic electroplating processes and fly ash dewatering filtrate), water softening sludge, non-contact cooling water, and stormwater runoff. Beginning in November 1985, all process wastewater was diverted to the on-Site pretreatment facility. All stormwater and non-contact cooling water was diverted into a new concrete stormwater retention facility when the lagoon was taken out of service in October 1989.

2.2 SLUDGE CHARACTERIZATION

The RCRA Part A permit application dated June 13, 1988 indicated that the sludge in the North Lagoon was generated in part by mixed wastewater streams from the following listed hazardous wastes.

1. F006 - wastewater treatment sludges from electroplating operations;
2. F007 - spent cyanide plating bath solutions from electroplating operations;
3. F009 - spent stripping and cleaning bath solutions from electroplating operations;
4. F012 - quenching wastewater treatment sludges from metal heat treating operations; and
5. F019 - wastewater treatment sludges from the chemical conversion coating of aluminum.

F001 and F005 were identified on the Part A Permit Application. However, both F001 and F005 were not included in the mixed wastewater streams for the lagoons. The mixed wastewater stream included non-hazardous process waste, non-contact cooling water and stormwater.

The November 3, 1989, "Draft North Settling Lagoon Revised Closure/Post-Closure Plan" characterized the lagoon sludge and underlying soil. Samples were analyzed for total priority pollutants, VOC priority pollutants, selected metals and cyanide, full RCRA Appendix IX, oil and grease, percent solids and bulk density in 1988. The sludge was found to be not characteristically hazardous. VOCs were not detected in the underlying soils. In addition, levels of metal concentrations in soils do not exceed Site-specific background levels developed for the RFI Baseline Risk Assessment.

Similarly, the RCRA Part A permit application dated June 13, 1988 indicated that the sludge in the South Lagoon was generated in part by mixed wastewater streams from the following listed hazardous wastes.

1. F006 - wastewater treatment sludge from electroplating operations;
2. F007 - spent cyanide plating bath solutions from electroplating operations;
3. F009 - spent stripping and cleaning bath solutions from electroplating operations;
4. F012 - quenching wastewater treatment sludge from metal heat treating operations; and
5. F019 - wastewater treatment sludge from the chemical conversion coating of aluminum.

F001 and F005 were identified on the Part A Permit Application. However both F001 and F005 were not included in the mixed wastewater streams for the lagoons. In addition, the mixed wastewater stream included non-hazardous process waste, non-contact cooling water, and stormwater.

The November 3, 1989, "Draft South Settling Lagoon Revised Closure/Post-Closure Plan" characterized the lagoon sludge and underlying soil. Samples were analyzed for total priority pollutants, VOC priority pollutants, selected metals and cyanide, full RCRA Appendix IX parameters, oil and grease, percent solids, and bulk density. The sludge was found to be not characteristically hazardous. VOCs were not detected in the underlying soils. In addition, levels of metal concentrations in the soil do not exceed Site-specific background levels developed for the RFI Baseline Risk Assessment.

2.3 SLUDGE VOLUMES

At the start of closure activities in 2000, the sludge thickness in the primary and secondary basins of the North and South Lagoons was measured in situ utilizing a steel probe that was pushed through the sludge until resistance to the probe was found. This probe was advanced utilizing hand pressure until refusal, and was then given two blows with a small sledge hammer to confirm the refusal. The top of the probe was then surveyed, with the length of the probe subtracted to obtain a survey of the bottoms of the lagoons.

The sludge volume was then calculated utilizing an average-end method comparison of the top of sludge and bottom of lagoon surfaces for each lagoon. A summary of this determination is presented in Appendix C. The actual sludge volume for the sludge drying basin located at the South Lagoon was calculated during the relocation of sludge

to the secondary basin of the South Lagoon. The North Lagoon was found to have a sludge volume of 7,074 cubic yards, whereas the South Lagoon was found to have a sludge volume of 47,614 cubic yards.

3.0 CLOSURE ADMINISTRATION

General Motors Corporation formed a subsidiary corporation, Remediation and Liability Management (REALM), to manage and bring to closure several sites, including the North and South Lagoons. REALM, in turn, retained CRA to adminster and provide oversight of the closure of the lagoons. REALM also retained Sevenson Environmental Services (SES) of Niagara Falls, NY to perform the lagoon closure.

CRA retained H. C. Nutting & Co. (Nutting), of Cincinnati, Ohio to provide geotechnical testing services and Datachem Analytical Services (DataChem) of Cincinnati, Ohio to provide chemical analytical services.

Major subcontractors and suppliers retained by Sevenson included:

Trade or Material Supplied	*Subcontractor/Supplier*
Surveying services	Judge Engineering, Dayton, OH
Cartage of soil	Cornett Trucking, Dayton, OH
Supply of aggregate	Martin Marietta Mineral Resources, Dayton, OH
Supply of CKD	Mintek Resources, Kettering, OH
Supply of Portland cement	Lafarge Cement, Columbus, OH
Precast Concrete Products	CSR Durocrete, Dayton, OH
Heavy equipment rental	Holt Equipment, Troy, OH
Heavy equipment rental	Columbus Equipment, Dayton OH
Fuel for equipment	Creech Oil Services, Dayton, OH
Office Trailer rentals	Williams - Scottsman Rental,
Clay and Topsoil	Miller Brothers Excavating, Tipp City, OH
Ready mix concrete, flowable fill	Ernst Ready Mix, Springboro, OH
Paving	Barrett Construction Inc., Dayton, OH

4.0 CHRONOLOGY OF EVENTS

SES mobilized to the Site on August 21, 2000. Initial closure activities included the set up of Site support facilities such as field offices, improvement of existing access roads, installation of new access gates and surveying of existing conditions. Milestones for significant closure activities at the Site are summarized below.

Event	*Date*
Closure Plan Submitted to Ohio EPA	June 14, 2000
SES mobilization to the Site	August 21, 2000
Closure Plan approved by Ohio EPA	August 24, 2000
Commenced waste transfer in South Lagoon from sludge drying basin to secondary basin	September 8, 2000
Completed waste transfer in South Lagoon from sludge drying basin to secondary basin	September 13, 2000
Commenced solidification in South Lagoon	September 14, 2000
Commenced backfill of South Lagoon	September 19, 2000
Completed solidification in South Lagoon	October 20, 2000
Completed backfill of South Lagoon	December 13, 2000
Commenced solidification in North Lagoon	October 23, 2000
Commenced backfill of North Lagoon (sludge had previously been transferred from one side of the secondary basin to the other)	October 23, 2000
Completed solidification in North Lagoon	November 27, 2000
Completed backfill of North Lagoon	March 5, 2001
Commenced South Lagoon cover system installation	March 26, 2001
Completed South Lagoon cover system installation	May 8, 2001
Commenced North Lagoon cover system installation	June 5, 2001
Completed North Lagoon cover system installation	June 13, 2001
SES demobilized from Site	June 15, 2001

5.0 DESCRIPTION OF CLOSURE ACTIVITIES

Closure activities included removal, demolition, and/or abandonment of certain subsurface structures; mixing all sludge with soil and either Cement Kiln Dust (CKD) or Portland cement; placing and compacting soil for backfill up to subgrade elevations; installing stormwater drainage features; installing a compacted clay cover system with a vegetated topsoil layer over the former South Lagoon; and installing an asphalt paving system over the former North Lagoon. Quality Assurance (QA) and Quality Control (QC) measures formed an integral part of the closure activities and are discussed in the appropriate following subsections of this report. A set of 'As-Built' Plans is included with this report to provide surveyed locations and elevations of the closure work. These Plans will provide a useful reference for locating the installed features of the cover systems.

In addition to the Plans, select photos taken during the closure activities have also been included as an attachment to this report.

5.1 SITE PREPARATION AND MOBILIZATION

The initial activity conducted as part of the closure was to install new access gates at both the North and South Lagoons. These new larger gates allowed for separate entrances for vehicles arriving at and leaving the site. For additional privacy and wind protection, a geotextile fabric was attached to the northern and eastern section of the fence surrounding the South Lagoon. A screen was also installed along the western side of the South Lagoon fence where a break in the tree line occurs.

Once the new gates were installed at the South Lagoon, mobile office equipment for CRA and SES was set up in the northwest corner of the Site. Electrical service was connected to the office trailers from an existing power line that was located in the northwest corner of the Site. A telephone line was installed under Dryden Road and aboveground along the northern fence line. Within each trailer data lines and a facsimile service were also provided.

Existing access roads on the Site were upgraded or were constructed by placing a woven geotextile fabric directly on the ground topped with 6 to 8 inches of crushed limestone. The upgraded access roads on the Site allowed for continuous Site operations following periods of rain.

A temporary vehicle decontamination facility was set up adjacent to the northeast corner of the south secondary basin. This facility included a large metal pan that was equipped with grating to keep equipment tracks above the bottom of the pan. Side wall spray shields and a temporary water supply line were installed. The water supply line was partially buried so as to be protected from construction traffic. Water was obtained under permit from Montgomery County, and was metered through a flow meter provided by Montgomery County. The flow meter was connected to a fire hydrant located along Dryden Road. Water for filling the water truck and street sweepers was also obtained from this fire hydrant through the flow meter.

An erosion control silt fence and straw bales were installed in the two on-property soil borrow areas. Runoff controls for stormwater in contact with sludge material were not required, as all sludge material was located and contained within the base of the lagoons below the surrounding ground surface.

Although the lagoons were cleared of substantial vegetative growth during the summer of 1999, additional growth occurred prior to closure activities, which required removal. In addition to the re-growth, stumps and roots that were not cleared in 1999 were also removed from lagoon surfaces and from the sidewalls. Nothing was removed that was in contact with the sludge. These stumps, logs and previously chipped wood piles were consolidated at the northwest corner of the south secondary basin. Prior to consolidation, a composite sample of the wood, obtained by drilling into the logs, stumps and chips, was analyzed for presence of PCBs and for waste characterization parameters utilizing the Toxicity Characteristic Leaching Procedure (TCLP) method. The wood was found to be non-hazardous and did not contain PCBs. All remaining wood was chipped in a mobile grinder, combined with other wood chips and spread as mulch around the base of trees that form the perimeter of the South Lagoon.

5.2 DEMOLITION AND UNDERGROUND ABANDONMENT

Pipes, inlet sewers, outlet structures, utility poles, vaults, and other structures located within the surface impoundment system were either plugged in place with concrete, removed, partially demolished and removed, or filled with a flowable cement fill. Plans 3 and 4 show the locations of the features that were modified.

Underground pipes left in place were filled with flowable fill. A suitable location was selected for filling the pipes to be abandoned. Flowable fill was poured into the suitable opening at a rapid rate until such time that the pipe appeared to be full, as indicated by standing flowable fill in the fill opening. The flowable fill had a design mix compressive

strength of 100 psi. Pipes that were only to be sealed were sealed by placement of a mass of stiff, fresh concrete, which had a design mix compressive strength of 3,000 psi, at the pipe opening. The inside surface was formed utilizing sandbags that were placed prior to the concrete.

Metal debris removed from the lagoons was size reduced and then power washed at the vehicle decontamination facility. The metal debris was then transferred from the Site to a metal recycling facility.

A tank with an approximate capacity of 2,000 gallons was located to the south of the primary basin of the North Lagoon. The underground flow-through tank was part of the lagoon system. An investigation of the tank found that it was completely empty and appeared to have been previously closed or was not used. The soils surrounding the tank were carefully removed to fully expose the tank. No evidence of staining was observed. The tank was then removed, size reduced and transferred to an off-Site metal recycling facility. The resulting excavation was filled with crushed limestone to subgrade elevation.

5.3 WASTE SOLIDIFICATION

One of the main activities of the lagoon closure was the in situ physical solidification of the waste. Solidification was conducted by adding soil and a pozzolanic material (CKD or Portland cement) to the sludge. Sludge solidification was conducted to achieve a minimum physical strength criterion of 25 pounds per square inch (psi) (closure criteria). In accordance with the approved Lagoon Closure Plan, this strength and method was selected as it meets the four criteria listed in the Ohio EPA, March 1999 document entitled "Closure Plan Review Guidance for RCRA Facilities". Specifically, the following requirements were met:

1. Increasing strength over time: Pozzolanic materials such as CKD and Portland cement are known to increase the strength of soil or sludge material over time, as the cement hydrates.
2. Capable of supporting a final cap plus a safety factor of two (2): Calculations provided in Appendix F of approved Lagoon Closure Plan.
3. Capable of supporting a load-bearing capacity plus a safety factor of two (2): Calculations provided in Appendix F of approved Lagoon Closure Plan.
4. Proof of chemical stabilization: TCLP analysis of samples of sludge material from the North and South Lagoons, conducted in 1989 demonstrated that the

existing sludge material was not characteristically hazardous. The addition of CKD and/or Portland cement would further reduce the mobility of any organic or inorganic constituents contained in the sludge material.

Solidifying reagents and soil were added to the waste and thoroughly mixed in place. The mixture was then leveled and the process was repeated adjacent to the previous mix area. Up to five mixing operations were conducted simultaneously, with backfill commencing upon receipt of confirmation that the minimum compressive strengths were being achieved.

The following subsections describe the solidification methods used along with the testing that was performed.

5.3.1 GENERAL SOLIDIFICATION PROCEDURES

Deployment of solidification reagents and soil occurred in two steps: (1) a layer of soil was spread over the sludge to be solidified, and (2) either CKD or Portland cement was then unloaded within a covered trench excavated into the sludge. Soil was end dumped directly onto the unsolidified sludge from the banks working progressively towards the middle of each lagoon. The soil was spread to a uniform thickness utilizing a low-ground pressure bulldozer. Soil was placed to provide a mix ratio up to 1 to 1 on a weight basis with the sludge. Given that the soil has a dry density three to four times that of the sludge, the added soil thickness necessary to achieve the desired mix ratio varied between 1 and 2 feet.

After the layer of soil was spread over a given area, a trench with a width of 4 feet was excavated through the soil and into the sludge. The trench was typically excavated to a depth of about 6 feet or to full depth of sludge in areas where the sludge thickness was less than 6 feet. A single sheet of 6-mil visqueen with a width of 20 feet was then placed within the trench. The sides and ends were anchored along the top of the trench utilizing soil to seal the visqueen to the ground surface. Stabilizing agent was delivered to the Site in bulk tankers that had pneumatic unloading capacity. A flexible hose was connected to a tanker and then inserted into the visqueen pocket. The tanker then applied air pressure to the tank to expel the reagent from the tank into the hose and then into the visqueen pocket. Up to five tankers of reagent were dispensed in this manner into each visqueen pocket. Once sufficient reagent was unloaded into the pocket, an excavator would commence the mixing process. Trenches with visqueen pockets were installed in parallel with spacing that varied from 10 to 25 feet, depending on the nature and thickness of the sludge. An overall target concentration of 20 to 30 percent reagent

to sludge was desired to achieve the required compressive strength, as determined during a bench scale study. The results of this bench scale study were reported in the Lagoon Closure Plan.

Mixing was accomplished utilizing a track-hoe. The track-hoe would excavate a small pit into the soil-sludge, casting the spoils adjacent to this small pit. A bucket of reagent was then placed into the mix pit, with the spoils from the pit added and blended utilizing a back-and-forth hoeing action. Once the reagent was initially added, the pit was excavated again, with the blending action continuing. This blending was repeated until such time that the soil-sludge reagent mix had a uniform appearance. At that point, another mix pit was excavated and the process was repeated.

Prior to mixing any sludge with reagents, the bottom of the lagoons were surveyed as described in Section 2.3. Utilizing the thickness information of the sludge layer, the contractor was able to determine and control the placement of the reagent filled visqueen pockets to ensure that adequate reagent was placed into the sludge to meet the 20 to 30 percent target concentration after mixing. All of the basins within the lagoons had relatively solid bottoms. During mixing activities, the equipment operators were readily able to ascertain the bottom of each basin through resistance of the equipment with the bottom soil. Sludge and solidifying agents were mixed to full depth of the in situ sludge.

5.3.2 NORTH LAGOON SLUDGE SOLIDIFICATION

Sludge in the North Lagoon was generally solidified as described above, with the exception of the two areas further described below.

Surveying of the sludge thickness in the secondary basin confirmed that the sludge layer on the western half was only a few inches thick. Utilizing a bulldozer, SES scraped the thin layer of sludge from the bottom of the western half towards the center berm. Utilizing an excavator, SES then transferred the dry sludge from the western side of the berm to the eastern side where it was then solidified with the sludge present in the eastern half. As no sludge was present in the western half, backfilling was able to commence without solidification. This modification to the Lagoon Closure Plan was communicated to Ohio EPA in correspondence dated October 20, 2000 (Appendix B).

The northern end of the secondary basin contained a ponded area with a water depth of approximately 6 to 8 feet. In this area only a small amount of sludge was present, approximately 1 foot in depth. Starting at the west side of the pond, 3-inch size riprap

rock was pushed into the water. As rock was added to the west side, the rock was able to mobilize the sludge at the bottom, and displaced the sludge towards the east bank of the ponded area. The rock was added by an excavator that was able to directly place the rock where needed to keep the surge wall of sludge advancing across the bottom of the pond. This continued until the surface of the rock was above the elevation of the standing water. Once the ponded area was filled with rock, the displaced sludge on the east side was then solidified in place with Portland cement utilizing the trench method as described above.

The primary basin was solidified with Portland cement starting at the west end and working eastwards. The secondary basin was solidified with Portland cement starting at the southern end and working northwards to the aforementioned ponded area.

5.3.3 SOUTH LAGOON SLUDGE SOLIDIFICATION

While the sludge in the primary and secondary basins of the South Lagoon was solidified using the previously described general methods, the dry sludge found in the sludge drying basin was handled in a different manner, as communicated to Ohio EPA in correspondence dated September 13 and October 11, 2000 (Appendix B).

Prior to commencing any of the solidification activities, the dry sludge that was present in the sludge drying basin was transferred to the secondary basin of the South Lagoon. The sludge transfer allowed a more uniform stabilized sludge elevation, facilitating final grading of the cover to a uniform slope. This transfer was accomplished through the use of an excavator to initially create a longitudinal stockpile of dry sludge along the middle of the sludge drying basin. This stockpiled dry sludge was then loaded into off-road trucks which then carried the dry sludge to the southwest corner of the secondary basin where it was end dumped into the basin. Once transferred, the dry sludge was spread in a thin layer across the unsolidified sludge in the secondary basin. The haul road between the sludge drying basin and the secondary basin was scraped and the soil was placed into the secondary basin as well. Once all of the sludge was transferred out of the sludge drying basin, backfilling of the sludge drying basin was commenced.

Solidification generally commenced in the northern end of the primary basin and progressed southwards. Additional solidification in the primary basin was conducted as necessary. Solidification in the secondary basin commenced in the southeast corner and progressed northwards along the east bank. After the easternmost portion was initially stabilized, stabilization then proceeded from the southeast corner westwards

along the south bank, then northwards along the west bank to the northwest corner and then eastwards along the northern bank to the northeast corner.

Solidification was initially conducted utilizing CKD as the solidification reagent, but was changed to Portland cement after supply problems limited the amount of CKD that was available for solidification. In addition to supply problems with CKD, several areas required remixing with additional CKD to achieve the required design strength due to strength and performance concerns. Therefore, the reagent was switched to Portland cement approximately two thirds of the way through solidifying the secondary basin. The Portland cement was delivered in a reliable fashion resulting in a consistent schedule, and the high early strength of the solidified sludge allowed backfilling operations to commence sooner, resulting in additional schedule savings.

5.3.4 SOLIDIFICATION QUALITY ASSURANCE TESTING

After solidification, representative samples of the sludge were sampled and tested to ensure that the minimum unconfined compressive strength at 28 days met the specified unconfined strength criterion of 25 psi. Representative samples were collected from the recently solidified sludge and formed into several identical molds. A representative sample was collected approximately every 2,500 cubic yards of solidified sludge.

All samples were collected by personnel from H. C. Nutting Company from the Site and were brought to their facility for curing and testing. Solidification testing of the solidified sludge for unconfined compressive strength was in accordance with American Society for Testing Materials (ASTM) method number D 2166. Generally speaking, a compressive strength test was conducted the next day, and if the one day strength did not achieve the required 28-day strength, then another sample was tested within 2 or 3 days later. A summary of the locations of the representative samples along with the compressive strength achieved is presented in Table 5.1. The locations of the samples in the North and South Lagoons are presented on Figures 5.1 and 5.2, respectively.

If the required 28-day strength was not achieved after approximately 1 week, then the area impacted by the low test strength was resolidified utilizing the procedures described above for adding solidification agents. New representative samples were then collected and tested as before. In areas of initial under-strength, testing following resolidification indicated that the minimum strength was being achieved.

After a representative sample had achieved the required minimum strength, which in some cases was the next day after sampling, backfill of the solidified sludge was allowed

to proceed. All compressive strength criteria was met in each lagoon, as presented in Table 5.1.

The laboratory reports for the compressive strength tests are included in Appendix D of this report.

5.4 BACKFILL OF LAGOONS

Following successful solidification, the lagoons were backfilled with soil material from existing on-property soil stockpiles. As per the approved Lagoon Closure Plan, a minimum of 10 feet of soil barrier was placed between the solidified sludge and the cover. Although not needed for the 10-foot buffer, additional crushed limestone was used for topping the subgrade of the North Lagoon to provide additional bearing capacity for the asphalt pavement cover. The North Lagoon area may be used for either new vehicle or employee parking or other similar uses in the future. The backfill operations and QA testing is described in the following subsections.

5.4.1 BACKFILL OPERATIONS

Two on-property soil stockpiles were available for backfilling the lagoons. Due to the location of both stockpiles relative to the South Lagoon, all fill material for the South Lagoon was trucked in licensed dump trucks. As the North Lagoon was located adjacent to the larger of the two soil stockpiles, transfer of soil to the North Lagoon was accomplished utilizing off-road trucks. Loading of the trucks and stockpile maintenance activities were the same at both stockpiles and for both truck types. Bulldozers were used to maintain the piles and roadways, allowing track-hoe excavators to fully maximize their ability to load trucks with the stockpiled soils.

The backfill soil was end-dumped overtop of the solidified sludge. Bulldozers were used to maintain constant lift thickness, while sheep's foot compactors were used to compact the in place soil. At the end of each day, a smooth drum roller was used to seal the surface of the backfilled soil, preventing penetration of rainwater into the upper layer of backfilled soil. Compaction testing was performed a minimum of every 2,500 cubic yards to ensure that the backfilled soils were achieving sufficient compaction. Soils that were too wet were dried out using a wind-row technique where the bulldozer would create troughs or wind rows of soil that could air dry. Once sufficiently dried, the soil was then leveled and compacted. The next 1-foot thick lift of

soil would be placed after compaction testing confirmed that the soil did indeed dry sufficiently.

The soil in the stockpiles, while generally gravel like in consistency, also contained a fair amount of silt soil. This caused the soil to be generally unworkable following rain events. While the backfill soil was delivered and roughly placed in the South Lagoon prior to the start of the rainy winter, final grading was not conducted until the spring of 2001. However, for the North Lagoon, backfill operations were halted due to wet and freezing winter weather conditions in early December 2000, and were not completed until early March 2001.

Final grades were adjusted to match the volume of soil available in the on-property soil stockpiles. Ohio EPA approved the revised grades that were presented in a letter dated March 9, 2001 (Appendix B). The minimum 10-foot barrier between the solidified sludge and the cover system was maintained. This adjustment to the final grading plan resulted in reducing the amount of fill to be transferred to the South Lagoon by over 50,000 cubic yards, while a similar reduction in fill volume was realized for the North Lagoon. Stormwater drainage structures were adjusted accordingly. Completed surveys of the subgrade elevations for the North and South Lagoons are presented in Plans 5 and 6, respectively.

5.4.2 BACKFILL QUALITY ASSURANCE

Backfill material was placed continuously in uniform layers approximately 1 foot thick. Backfill material was placed in lifts and was compacted to achieve the modified proctor density of 95 percent minimum for the lagoons. Compaction testing of backfill material was performed periodically, with an in situ moisture and an in situ density determination made for each 2,500 cubic yards of fill. The compaction testing was performed by Nutting. The results of the compaction testing are included in Appendix E. Nutting also performed the maximum dry density and optimum soil moisture content analyses for the backfill soil.

Table 5.2 presents a summary of the soil compaction inspection results. Figures 5.3 and 5.4 present the locations of the inspections for the North and South Lagoons, respectively.

5.5 STORMWATER DRAINAGE SYSTEMS

Surface water drainage for each lagoon was installed. As part of the cover construction activities, a Notice of Intent was submitted to the Ohio EPA (Appendix F). Surface water is collected in a network of swales, catchbasins, and underground pipes. Collected stormwater is discharged to the existing underground 84-inch diameter storm sewer present along the north perimeter of the South Lagoon. Stormwater drainage from the North Lagoon is collected in a network of catchbasins and underground pipes. Collected stormwater is discharged to the GM stormwater retention basins located adjacent to the southwest side of the North Lagoon. No modification to the NPDES permit was required because the system discharges to existing drainage points.

5.5.1 NORTH LAGOON DRAINAGE SYSTEM

Pre-cast catchbasins have been located along the center drainage swale of the asphalt paved cover system. The catchbasins are connected in series with a buried HDPE pipe that varies from 24 inches to 30 inches in diameter. The locations of the catchbasins along with the sizing of the pipes is provided in Plan 7. There are five catchbasins connected to the pipe. The pipe drains from the North Lagoon towards the south, where a previously abandoned 36-inch diameter concrete pipe line was placed back into service. A transition manhole was installed at the intersection of the HDPE pipe and the concrete pipe. The concrete pipe flows to the existing underground storm drain line prior to discharge into the existing stormwater retention basin. Details of the installations are included in Plan 9.

5.5.2 SOUTH LAGOON DRAINAGE SYSTEM

The South Lagoon was graded such that the drainage focal point for the sludge drying basin and the secondary basin is to a catchbasin located just to the east of the northwest corner of the secondary basin in a naturally occurring low spot of the surrounding terrain. The catchbasin in turn is connected with a buried pipe to a new pre-cast concrete transition manhole that was installed in the previously abandoned drain line in the northwest corner of the Site. The previously abandoned drain line in turn flows to the existing concrete junction chamber in the far northwest corner of the Site. This chamber is located beneath the meter house.

The primary basin was graded such that all runoff travels eastwards to a drainage swale that runs parallel to Dryden Road. The drainage swale in turn drains into a new precast

catchbasin. This new catchbasin in turn drains through a newly installed pipe into the existing concrete junction chamber located directly on the existing 84-inch diameter storm sewer line. Both new catchbasins were of an underflow design, and were surrounded with a riprap apron. The locations of the catchbasins are provided in Plan 8. Details of the installations are included in Plan 9.

5.6 FINAL COVER SYSTEMS

In accordance with the approved Lagoon Closure Plan, the final cover systems could not be installed until a 90-day settlement period had passed for the subgrade. This settlement period was to allow the majority of anticipated settlement of the solidified sludge to occur prior to completing the final cover systems. As the cover systems for the North and South Lagoons are different, they are each described in the following subsections.

5.6.1 NORTH LAGOON COVER SYSTEM

The North Lagoon cover system consisted of a compacted 5-inch thick layer of granular material that was overlain with a 3-inch thick asphalt pavement. The pavement extends from fence to fence along each side, with a narrow soil transition between the completed pavement and the existing fence. The pavement was placed in two lifts: an inch and a half thick base coarse (HL-3) overlain by an inch and a half thick layer of surface coarse asphalt (HL-6). Although not a requirement of the approved Lagoon Closure Plan, the in-place density of the asphalt pavement was determined to ensure that sufficient compaction of asphalt had occurred.

The asphalt pavement was extended through a new gate on the west side of the lagoons to match the existing paved areas. To complete the paving, precast curb stops were installed along the southern boundary of the pavement area. Plan 7 provides the final surface elevations and limits of the completed paving system.

5.6.2 SOUTH LAGOON COVER SYSTEM

The cover system for the South Lagoon consisted of a foot thick compacted clay layer which was covered with a 6-inch thick vegetated top soil layer.

The clay soil was selected based on its ability to achieve a maximum hydraulic conductivity of 1×10^{-7} cm/sec. Hydraulic conductivity testing of the clay was conducted at a specified density of 95 percent of standard dry density and optimum moisture content. The test was repeated at a higher moisture content. These tests indicated that the clay achieved the permeability requirements, provided that at least 95 percent of the standard dry density was achieved. Soil geotechnical properties are presented in Appendix G.

The soil at the clay borrow was also tested for presence of USEPA's Target Compound List/Target Analyte List parameters. The borrow soils sample results were found to be non detect for all compounds, and within background levels for metals. Both clay and, soil were sourced from Barrett Minerals, located on Olive Road in northwest Dayton. Soil chemical properties are presented in Appendix H.

The clay soil at the borrow was overlain with a dark brown topsoil layer. The topsoil layer was removed and stockpiled, and the underlying clay layer was then extracted and loaded into dump trucks for transfer to the Site. At the Site, the clay was end-dumped, leveled and compacted utilizing a sheeps-foot compactor. Nutting conducted periodic testing of the compaction effort to verify that at least 95 percent of the standard dry density was being achieved. Soil compaction test results are presented in Appendix E.

SES maintained a surveyor on staff to conduct measurements of the clay thickness and to provide grading stakes for the bulldozer operators to utilize when establishing finished surfaces. In addition to these surveys, CRA also measured the thickness of the installed clay layer at several random locations to verify that a foot of compacted clay was installed.

On top of the completed clay layer was placed a nominal 6-inch thick layer of topsoil. The topsoil was fine graded to ensure positive drainage. The final grade elevations were surveyed, and are presented in Plan 8.

Due to a moist as-received condition, the topsoil required cultivating and extensive raking in preparation for grass seeding. The grass seed mix selected was a combination of perennial rye grass and red fescue. The grass seed was installed using two methods: a seed drill traversed the Site in orthogonal directions, followed by hydroseeding. The hydroseed mix contained a slurry of grass seed, 19-19-19 fertilizer, emulsified tackifier and mulch that was sprayed over the entire South Lagoon area.

5.7 HEALTH AND SAFETY

All Closure activities were conducted under the supervision of a qualified health and safety officer (HSO). Routine activities were carefully controlled and monitored, while non-routine activities (such as confined space entry, traffic lane reductions, tree felling, etc.) were thoroughly reviewed and planned, with proper safety gear obtained and other measures taken prior to activity implementation. Site workers were kept informed of planned daily activities through morning safety briefings during which time proper procedures for the daily activities were discussed and reviewed.

5.7.1 PERSONNEL PROTECTION

Personnel who came in contact, or who expected to come in contact, with sludge material wore personnel protective equipment. PPE selection was based on the equipment specified in the health and safety plan contained in Appendix E of the approved Lagoon Closure Plan. It included, as a minimum, overboots, gloves, disposable coveralls, glasses or goggles, and hard hats. Respirators were also worn by personnel mixing and handling solidification agents.

Personnel decontamination was conducted in the established decontamination area(s) utilizing the following procedures:

- brushing off heavily caked-on material from overboots and gloves, as necessary;
- washing overboots, gloves and hard hats and goggles, as necessary, with soapy water;
- removing respirators (if worn);
- placing overboots and gloves on plastic sheeting to dry if reusable or disposing in plastic bags if unusable; and
- disposing of disposable coveralls in plastic bags.

These procedures were repeated each time an individual left the closure area or before conducting a non-contaminated closure activity.

5.7.2 EQUIPMENT DECONTAMINATION

Equipment and structures that contacted sludge materials during closure activities were decontaminated prior to leaving the closure area. The majority of equipment that

contacted sludge materials was that used to apply and mix the solidification agents with the sludge. Other equipment cleaned included a bulldozer used to level and grade the solidified sludge.

Equipment that was used to haul soil material for backfill or to construct the final cover did not become contaminated as this equipment only operated on a clean layer of soil. The trucks hauling clean backfill material did not come in contact with the sludge and therefore were not decontaminated prior to leaving the Site. Backfilling was conducted such that clean soil material was pushed over solidified sludge material to eliminate contact of backfilling equipment with sludge material.

Equipment decontamination consisted of removal of heavily caked material from the equipment using wire brushes and shovels followed by three separate rinses using a high pressure, low volume water wash. As the decontamination was conducted within the confines of each lagoon on top of a thin layer of backfill soil, with the solids and rinse water allowed to freely drain to the solidified sludge, collection of solids and wash wastewater were not required.

All decontaminated equipment was visually inspected prior to being allowed to leave the Site or to further work on Site with clean materials.

5.8 FUGITIVE EMISSION CONTROLS

5.8.1 DUST CONTROLS AND MONITORING

Fugitive dust prevention measures were undertaken during construction activities. These measures included work inspection, watering and cleaning of haul roads, covering material stockpiles when not in use, and conducting solidification activities in a manner to minimize dust emissions.

Full time ambient air monitoring was conducted during periods of active solidification utilizing portable real-time instruments. In addition to the real-time instruments, time-weighted average (TWA) samples were also collected from four perimeter locations around both the North and South Lagoon Sites each day. These TWA samples were collected in accordance with OAC 3745-17-02.

Dust control was also conducted along Dryden Road. A street sweeper supplemented with a water truck spray was used to keep Dryden Road damp and free of mud and dirt during soil hauling operations. It should be noted that during peak soil transfer

operations, approximately 70 truck loads of soil were brought to the South Lagoon each hour during a 10-hour day.

5.8.2 VOLATILE EMISSIONS CONTROL

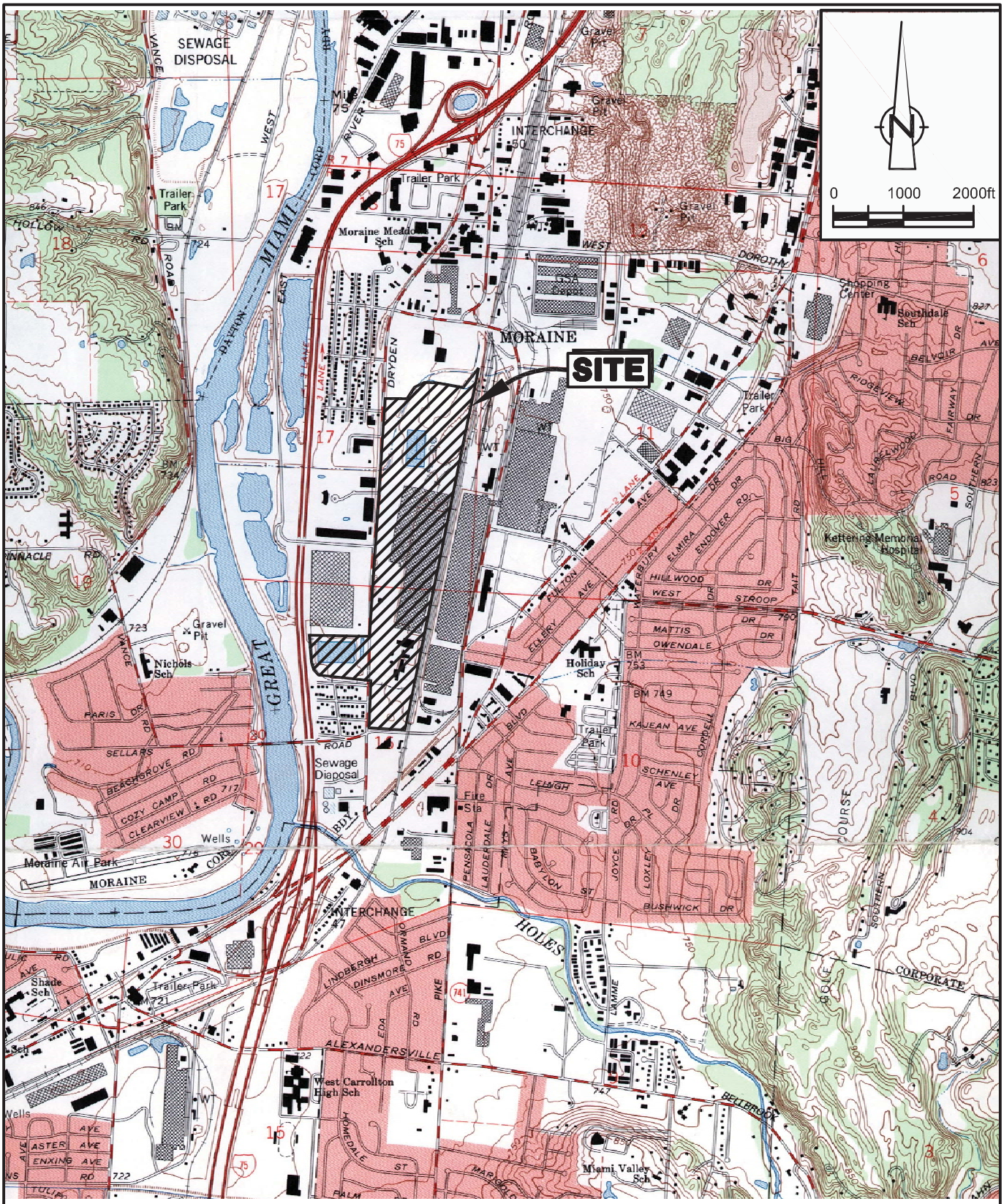
To verify that VOC emissions from the sludge were not an issue, total VOC monitoring was conducted using a photo ionization detector (PID) during the first 5 days of solidification activities in each lagoon. No VOCs were detected. Additional monitoring was conducted periodically to verify, for worker protection, that VOC emissions were not present from the sludge.

5.9 PROJECT CLOSEOUT AND DEMOBILIZATION

Following completion of the various activities, certain pieces of equipment were no longer required at the Site and were then demobilized. Once all Site activities were completed, the office and other support trailers were demobilized from the Site. Fencing was replaced where damaged or where access gates were no longer required.

6.0 LIST OF REFERENCES

1. "Draft North Settling Lagoon Revised Closure Plan"; Geraghty & Miller Consulting Engineers, Inc.; November 3, 1989.
2. "Draft South Settling Lagoon Revised Closure/Post-Closure Plan"; Geraghty & Miller Consulting Engineers, Inc.; November 3, 1989.
3. "RFI Report"; Volume I Geraghty & Miller Consulting Engineers, Inc. and Volume II ENVIRON; April 2000.
4. "Supplemental RFI Report"; Volume I Geraghty & Miller Consulting Engineers, Inc. and Volume II ENVIRON; April 2000.
5. "Lagoon Closure Plan"; Conestoga-Rovers & Associates; June 2000.



SOURCE: USGS QUADRANGLE MAP
DAYTON SOUTH, OHIO

MORAINE
OHIO

figure 1.1

SITE LOCATION PLAN
HARRISON RADIATOR DIVISION FACILITY
Moraine, Ohio

12611-02(005)GN-WA010 AUG 08/2001

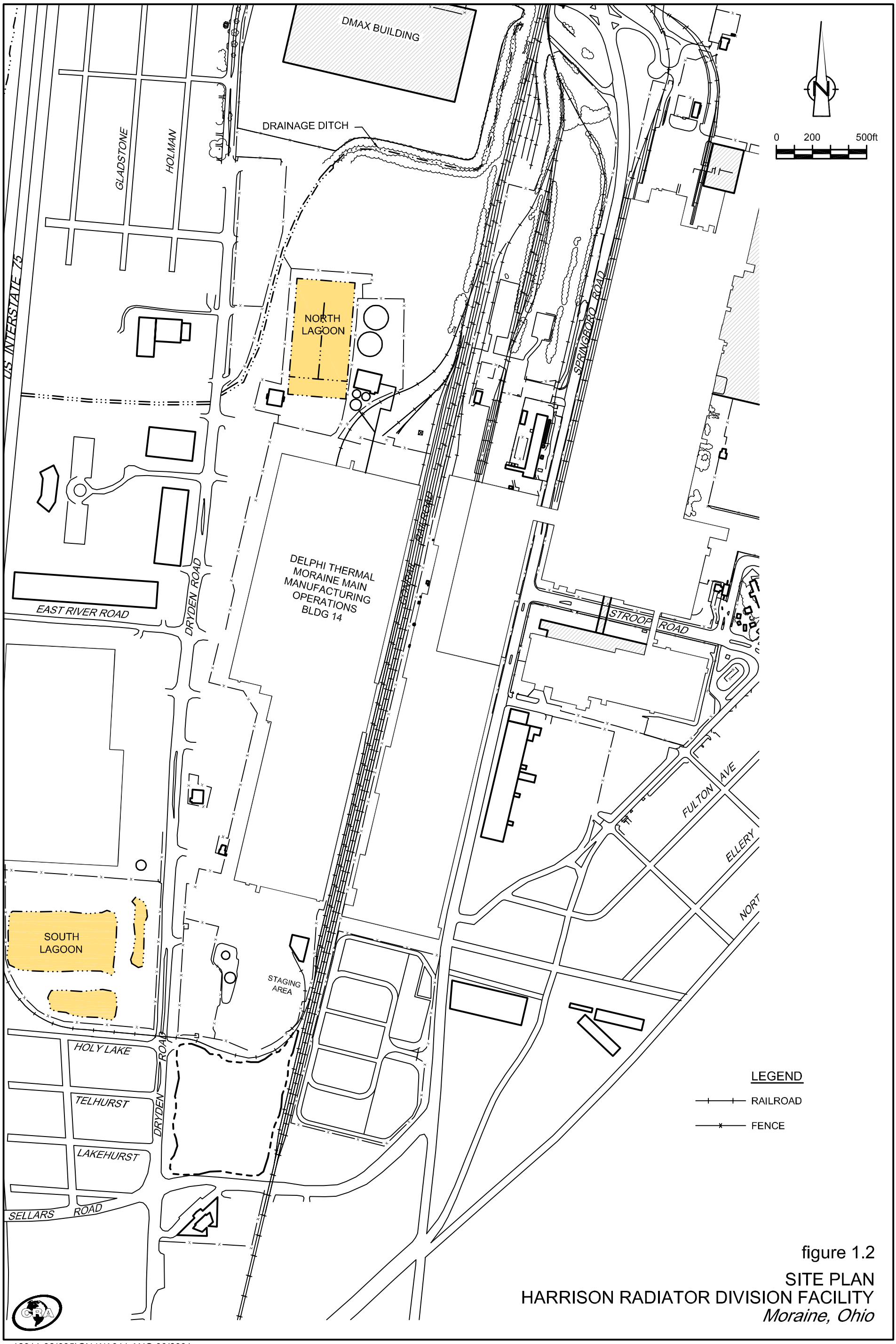
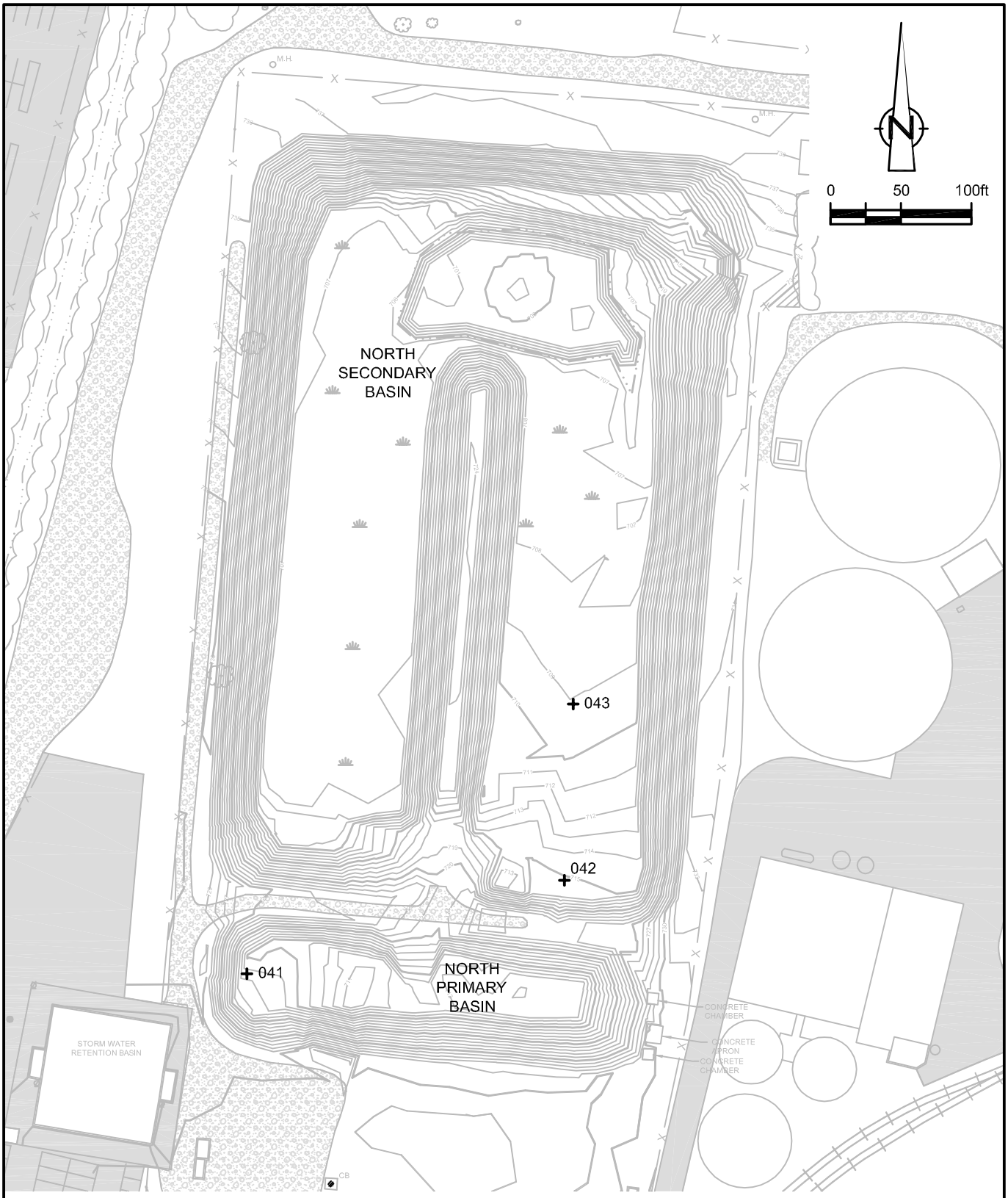


figure 1.2

SITE PLAN
HARRISON RADIATOR DIVISION FACILITY
Moraine, Ohio

12611-02(005)GN-WA011 AUG 08/2001



LEGEND

+ 041 SAMPLE NUMBER

figure 5.1

UNCONFINED COMPRESSIVE STRENGTH SAMPLE LOCATIONS
NORTH LAGOON
HARRISON RADIATOR DIVISION FACILITY
Moraine, Ohio

12611-02(005)GN-WA012 AUG 08/2001

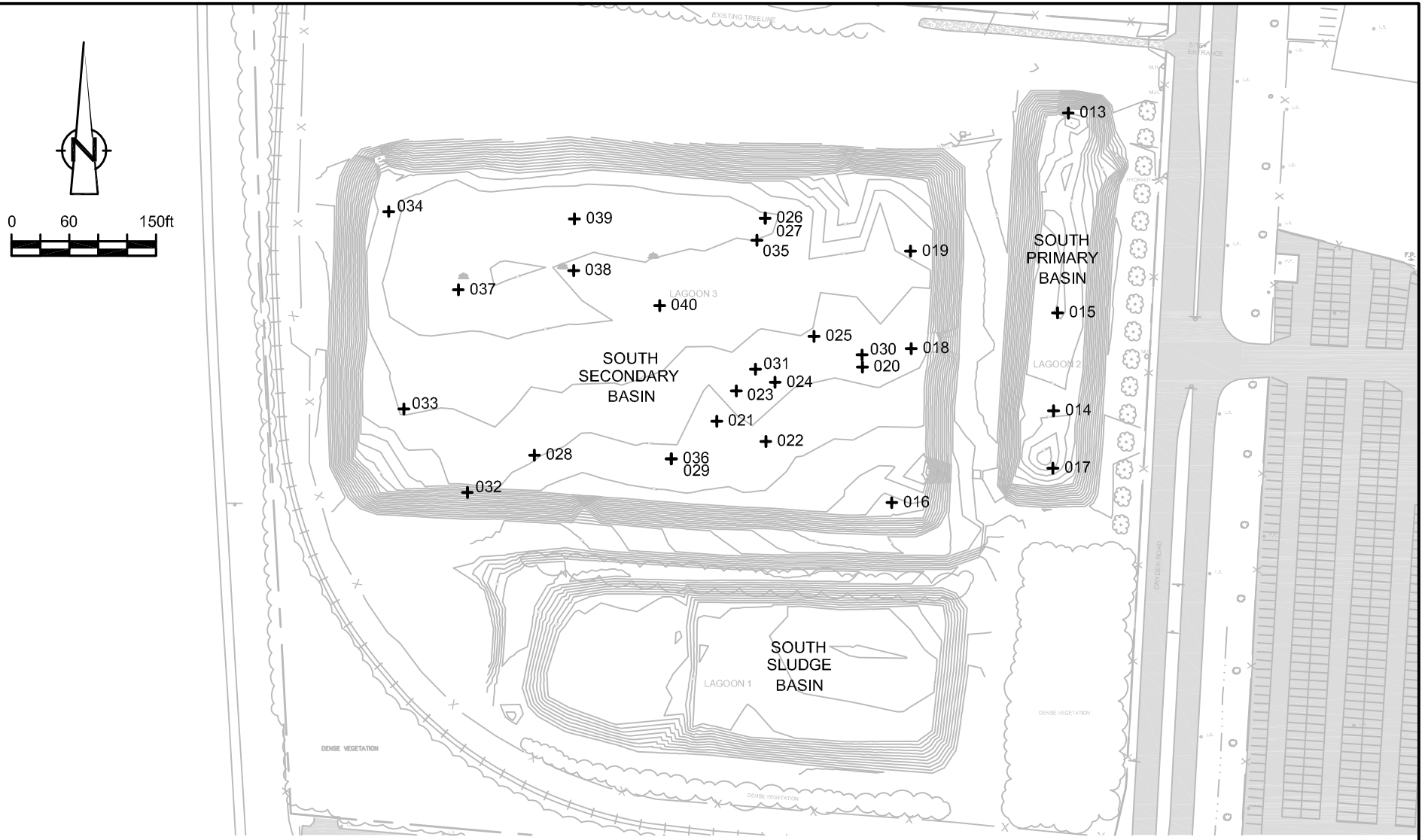


figure 5.2

UNCONFINED COMPRESSIVE STRENGTH SAMPLE LOCATIONS
SOUTH LAGOON
HARRISON RADIATOR DIVISION FACILITY
Moraine, Ohio

12611-02(005)GN-WA013 AUG 08/2001

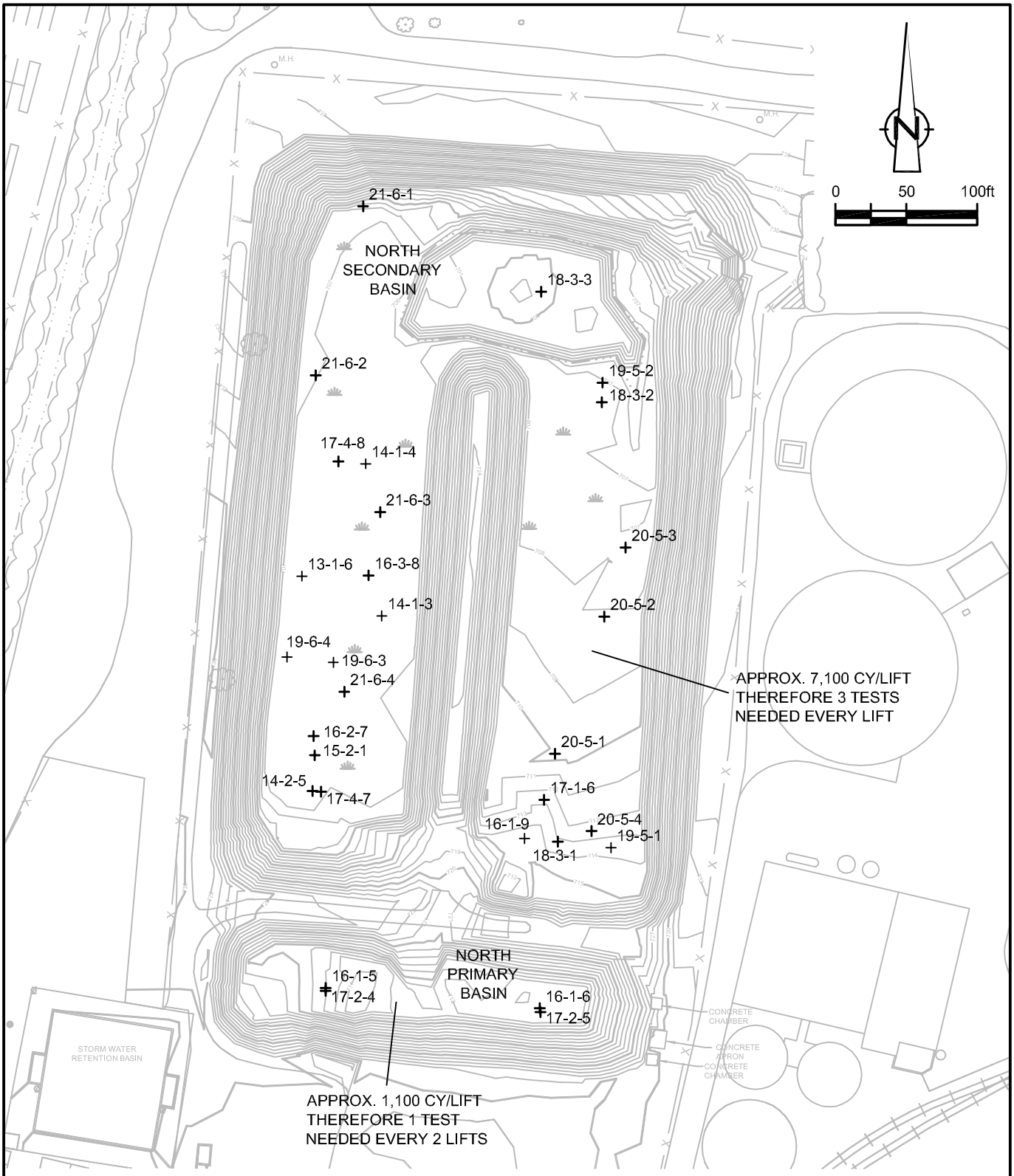
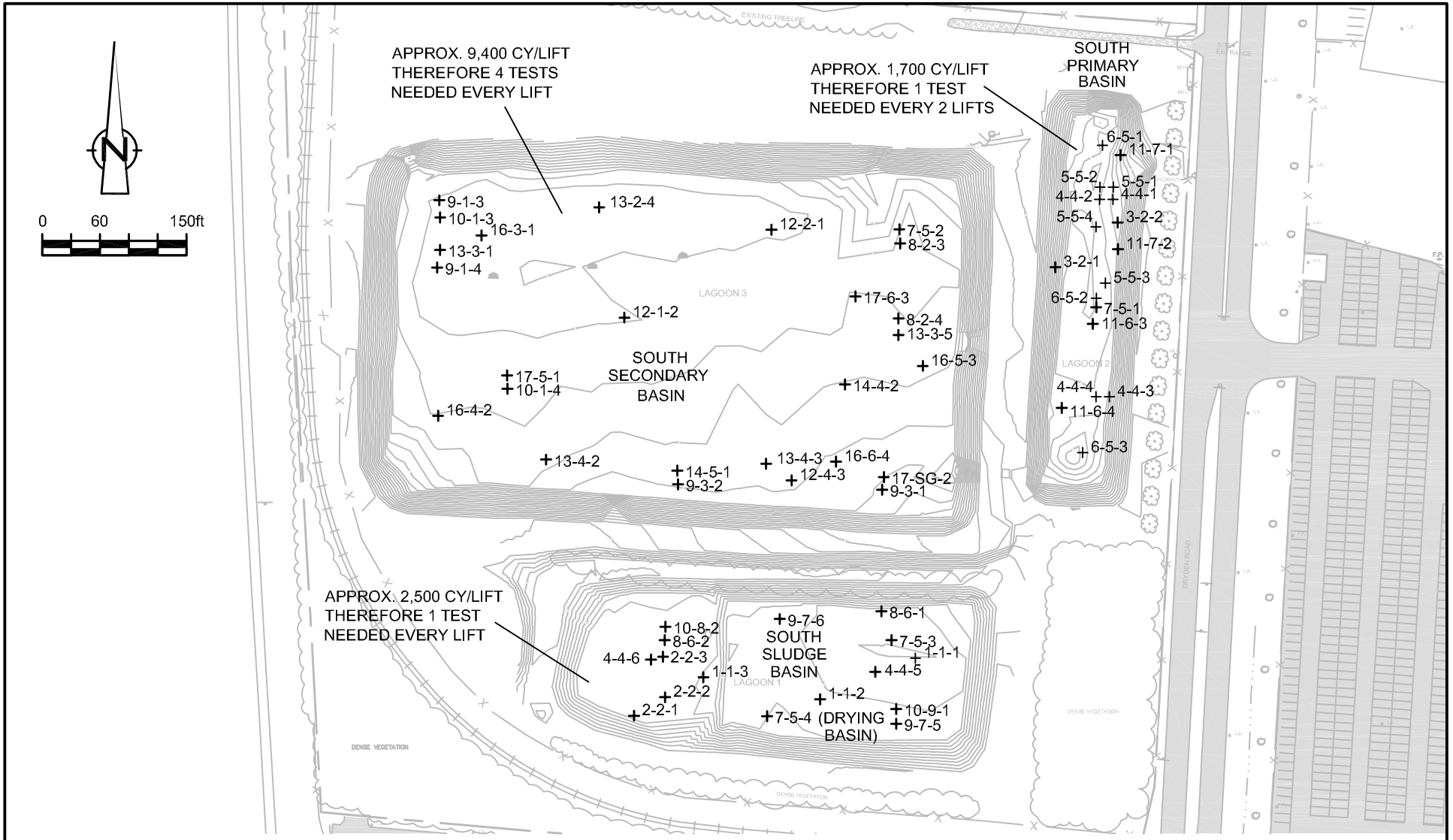


figure 5.3

SOIL COMPACTION INSPECTION SAMPLE LOCATIONS
NORTH LAGOON
HARRISON RADIATOR DIVISION FACILITY
Moraine, Ohio

12611-02(005)GN-WA014 AUG 08/2001



LEGEND

+ 9-1-3
- TEST NUMBER
- LIFT NUMBER
- INSPECTION NUMBER

SG SUBGRADE

figure 5.4

SOIL COMPACTION INSPECTION SAMPLE LOCATIONS
SOUTH LAGOON
HARRISON RADIATOR DIVISION FACILITY
Moraine, Ohio

TABLE 5.1

UNCONFINED COMPRESSIVE STRENGTH TESTING RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Sample No	*Date Mixed*	*Mix Location*	*Test #*	*Date tested*	*Age (days)*	*Result (psi)*	*Result (tsf)*	*Status (1)*
013	9/14/2000	South Primary	a	9/19/2000	5	26.1	1.88	ok
		25 feet from	b	9/19/2000	5	26.5	1.91	
		north end	c	9/22/2000	7	26.0	1.87	
014	9/19/2000	South Primary	0	9/19/2000	<1	20	1.44	
		100 feet from	a	9/20/2000	1	39.6	2.85	ok
		south end						
015	9/19/2000	South Primary	0	9/19/2000	<1	38.8	2.79	ok
		200 feet from						
		south end						
016	9/19/2000	South Secondary	0	9/19/2000	<1	45.8	3.3	ok
		south east corner						
		40'N, 580' E						
017	9/22/2000	South Primary	0	9/22/2000	<1	22.5	1.62	
		40 feet from	a	9/25/2000	3	41.4	2.98	ok
		south end						

TABLE 5.1

UNCONFINED COMPRESSIVE STRENGTH TESTING RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Sample No	*Date Mixed*	*Mix Location*	*Test #*	*Date tested*	*Age (days)*	*Result (psi)*	*Result (tsf)*	*Status (1)*
018	9/22/2000	South Secondary	0	9/22/2000	<1	19	1.37	
		east side	a	9/25/2000	3	33.9	2.44	
		200'N, 600' E	b	9/29/2000	7	35	2.52	ok
019	9/22/2000	South Secondary	0	9/22/2000	<1	20.8	1.5	
		east side	a	9/25/2000	3	27.2	1.96	
		300'N, 600' E	b	9/29/2000	7	30.7	2.21	ok
020	9/26/2000	South Secondary	0	9/26/2000	<1	6	0.72	Reworked
		se quadrant	a	9/29/2000	3	28.2	2.03	see 030
		180'N, 550 E	b	10/3/2000	7	24.3	1.75	
021	9/26/2000	South Secondary	0	9/26/2000	<1	3.5	0.25	Reworked
		se quadrant	a	9/29/2000	3	5.6	0.4	see 031
		120'N, 400 E	b	10/3/2000	7	6.3	0.45	
022	9/26/2000	South Secondary	0	9/26/2000	<1	4.3	0.31	reworked
		se quadrant	a	9/29/2000	3	5.6	0.4	see 031
		100'N, 450'E	b	10/3/2000	7	6.8	0.49	

TABLE 5.1

UNCONFINED COMPRESSIVE STRENGTH TESTING RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Sample No	*Date Mixed*	*Mix Location*	*Test #*	*Date tested*	*Age (days)*	*Result (psi)*	*Result (tsf)*	*Status (1)*
023	9/28/2000	South Secondary se quadrant 150'N, 420'E	0	10/2/2000	4	10.1	0.73	reworked see 031
024	9/28/2000	South Secondary se quadrant 160'N, 460'E	0	10/2/2000	4	10.4	0.75	reworked see 031
025	9/28/2000	South Secondary NE quadrant 210'N, 500'E	0	10/2/2000	4	7.8	0.56	reworked see 030
026	10/3/2000 *MIXED with soil and 25% CKD*	South Secondary NE quadrant 330'N, 450' E	0 a	10/6/2000 10/11/2000	2 8	1.9 2.6	0.14 0.19	reworked see 035
027	10/3/2000 *MIXED with soil and 50% CKD*	South Secondary NE quadrant 330'N, 450' E	0 a	10/6/2000 10/11/2000	2 8	6.9 9.6	0.5 0.69	reworked see 035

TABLE 5.1

UNCONFINED COMPRESSIVE STRENGTH TESTING RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Sample No	*Date Mixed*	*Mix Location*	*Test #*	*Date tested*	*Age (days)*	*Result (psi)*	*Result (tsf)*	*Status (1)*
028	10/3/2000	South Secondary	0	10/6/2000	2	23.6	1.7	
		SW quadrant	a	10/11/2000	8	33.2	2.39	ok
		80'N, 210'E						
029	10/3/2000	South Secondary	0	10/6/2000	2	8.9	0.64	reworked
		SE quadrant	a	10/11/2000	8	10.8	0.78	see 036
		80'N, 350'E						
030	10/4/2000	South Secondary	0	10/6/2000	1	33.9	2.44	ok
	*REMIXED with soil	SE quadrant	a	10/11/2000	7	46.1	3.32	
	and CKD*	190'N, 550'E						
031	10/4/2000	South Secondary	0	10/6/2000	1	35.6	2.56	ok
	*REMIXED with soil	SE Quadrant	a	10/11/2000	7	68.6	4.94	
	and CKD*	175'N, 440'E						
032	10/4/2000	South Secondary	0	10/6/2000	1	37.9	2.73	ok
		SW quadrant	a	10/11/2000	7	49.0	3.53	
		40'N, 140'E						

TABLE 5.1

UNCONFINED COMPRESSIVE STRENGTH TESTING RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Sample No	*Date Mixed*	*Mix Location*	*Test #*	*Date tested*	*Age (days)*	*Result (psi)*	*Result (tsf)*	*Status (1)*
033	10/9/2000	South Secondary SW quadrant 125'N, 75E	0	10/11/2000	1	36.4	2.62	ok
034	10/10/2000	South Secondary NW quadrant 330N, 60E	0	10/13/2000	2	102.5	7.38	ok
035	10/10/2000	South Secondary NE quadrant 310N, 440 E	0	10/13/2000	2	35.8	2.58	ok
036	10/11/2000	South Secondary SE quad 80'N, 350'E	0	10/13/2000	2	35.8	2.58	ok
037	10/11/2000	South Secondary NW quad 250'N, 130E	0	10/13/2000	2	45.4	3.27	ok

TABLE 5.1

UNCONFINED COMPRESSIVE STRENGTH TESTING RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Sample No	*Date Mixed*	*Mix Location*	*Test #*	*Date tested*	*Age (days)*	*Result (psi)*	*Result (tsf)*	*Status (1)*
038	10/17/2000	South Secondary NW quad 270'N, 250' E	0	10/20/2000	3	38.2	2.75	ok
039	10/19/2000	South Secondary NW quad 325N, 250'E	0	10/23/2000	4	90.1	6.49	ok
040	10/19/2000	South Secondary NW quad 240'N, 340' E	0	10/23/2000	4	135	9.72	ok
041	10/27/2000	North Primary 25 feet from west end along center	0	10/31/2000	4	90.7	6.53	ok
042	11/1/2000	North secondary east side 25 feet from south end along center	0	11/3/2000	2	175	12.6	ok

TABLE 5.1

UNCONFINED COMPRESSIVE STRENGTH TESTING RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Sample No	*Date Mixed*	*Mix Location*	*Test #*	*Date tested*	*Age (days)*	*Result (psi)*	*Result (tsf)*	*Status (1)*
043	11/3/2000	North secondary east side 150 feet from south end along	0	11/7/2000	4	72.5	5.22	ok

Note:

(1) - OK Status refers to no further action required for sludge represented by the sample.
Reworded Status refers to the sludge represented by sample as being remixed with additional reagent.

TABLE 5.2

SOIL COMPACTION INSPECTION RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Inspection Number	*Inspection Date*	*Location*	*Lift Number*	*Test Number*	*Percent Compaction*	*Status (1)*
North Primary (1,100 cy/lift; 1 test/2 lifts)						
16	11/6/2000	North Primary	1	5	96	ok
16	11/6/2000	North Primary	1	6	100	ok
17	11/15/2001	North Primary	2	4	95	ok
17	11/15/2001	North Primary	2	5	97	ok
North Secondary (7,100 cy/lift; 3 tests/1 lift)						
13	10/31/2000	North Secondary	1	6	93	reworked - see 14-1-3
14	11/1/2000	North Secondary	1	3	94	bridge lift - see 16-2-7
14	11/1/2000	North Secondary	1	4	93	bridge lift - see 16-2-7
16	11/6/2000	North Secondary	1	9	92	reworked - see 17-1-6
17	11/15/2001	North Secondary	1	6	97	ok
14	11/1/2000	North Secondary	2	5	98	ok
15	11/3/2001	North Secondary	2	1	97	ok
16	11/6/2000	North Secondary	2	7	100	ok
16	11/6/2000	North Secondary	3	8	101	ok
18	12/1/2000	North Secondary	3	1	99	ok
18	12/1/2000	North Secondary	3	2	98	ok
18	12/1/2000	North Secondary	3	3	99	ok
17	11/15/2001	North Secondary	4	7	100	ok
17	11/15/2001	North Secondary	4	8	95	ok
19	12/8/2000	North Secondary	5	1	88	reworked - see 20-5-4
19	12/8/2000	North Secondary	5	2	98	ok
20	3/1/2001	North Secondary	5	1	98	ok
20	3/1/2001	North Secondary	5	2	98	ok
20	3/1/2001	North Secondary	5	3	99	ok
20	3/1/2001	North Secondary	5	4	99	ok
19	12/8/2000	North Secondary	6	3	92	reworked - see 21-6-4
19	12/8/2000	North Secondary	6	4	92	reworked - see 21-6-4
21	3/7/2001	North Secondary	6	1	97	ok
21	3/7/2001	North Secondary	6	2	96	ok
21	3/7/2001	North Secondary	6	3	96	ok
21	3/7/2001	North Secondary	6	4	95	ok
22 (2)	6/8/2001	North Secondary	G	1	100	ok
22 (2)	6/8/2001	North Secondary	G	2	102	ok
22 (2)	6/8/2001	North Secondary	G	3	100	ok
22 (2)	6/8/2001	North Secondary	G	4	95	ok
22 (2)	6/8/2001	North Secondary	G	5	100	ok
22 (2)	6/8/2001	North Secondary	G	6	97	ok
22 (2)	6/8/2001	North Secondary	G	7	101	ok
22 (2)	6/8/2001	North Secondary	G	8	100	ok
22 (2)	6/8/2001	North Secondary	G	9	98	ok
South Drying (2,500 cy/lift; 1 test/1 lift)						
1	09/20/00	South Drying	1	1	94	reworked - see 1-1-2
1	09/20/00	South Drying	1	2	98	ok
1	09/20/00	South Drying	1	3	96	ok
2	9/22/2000	South Drying	2	1	98	ok
2	9/22/2000	South Drying	2	2	95	ok
2	9/22/2000	South Drying	2	3	95	ok

TABLE 5.2

SOIL COMPACTION INSPECTION RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Inspection Number	*Inspection Date*	*Location*	*Lift Number*	*Test Number*	*Percent Compaction*	*Status (1)*
4	10/2/2000	South Drying	4	5	97	ok
4	10/2/2000	South Drying	4	6	95	ok
7	10/9/2000	South Drying	5	3	99	ok
7	10/9/2000	South Drying	5	4	97	ok
8	10/12/2000	South Drying	6	1	101	ok
8	10/12/2000	South Drying	6	2	103	ok
9	10/16/2000	South Drying	7	5	104	ok
9	10/16/2000	South Drying	7	6	100	ok
10	10/20/2000	South Drying	8	2	96	ok
10	10/20/2000	South Drying	9	1	96	ok
South Primary (1,700 cy/lift; 1 test/2 lifts)						
3	9/28/2000	South Primary	2	1	97	ok
3	9/28/2000	South Primary	2	2	95	ok
4	10/2/2000	South Primary	4	1	92	reworked - see 4-4-2
4	10/2/2000	South Primary	4	2	94	bridge lift - see 7-5-1
4	10/2/2000	South Primary	4	3	92	reworked - see 4-4-4
4	10/2/2000	South Primary	4	4	92	bridge lift - see 7-5-1
5	10/3/2000	South Primary	5	1	89	reworked - see 5-5-2
5	10/3/2000	South Primary	5	2	92	reworked - see 5-5-3
5	10/3/2000	South Primary	5	3	89	reworked - see 5-5-4
5	10/3/2000	South Primary	5	4	89	reworked - see 6-5-1
6	10/4/2000	South Primary	5	1	92	reworked - see 6-5-2
6	10/4/2000	South Primary	5	2	93	reworked - see 6-5-3
6	10/4/2000	South Primary	5	3	93	reworked - see 7-5-1
7	10/9/2000	South Primary	5	1	97	ok
11	10/25/2000	South Primary	6	3	96	ok
11	10/25/2000	South Primary	6	4	98	ok
11	10/25/2000	South Primary	7	1	100	ok
11	10/25/2000	South Primary	7	2	100	ok
South Secondary (9,400 cy/lift; 4 tests/1 lift)						
9	10/16/2000	South Secondary	1	3	107	ok
9	10/16/2000	South Secondary	1	4	108	ok
10	10/20/2000	South Secondary	1	3	97	ok
10	10/20/2000	South Secondary	1	4	96	ok
12	10/27/2000	South Secondary	1	2	98	ok
8	10/12/2000	South Secondary	2	3	104	ok
8	10/12/2000	South Secondary	2	4	102	ok
12	10/27/2000	South Secondary	2	1	99	ok
13	10/31/2000	South Secondary	2	4	100	ok
9	10/16/2000	South Secondary	3	1	102	ok
9	10/16/2000	South Secondary	3	2	104	ok
13	10/31/2000	South Secondary	3	1	99	ok
13	10/31/2000	South Secondary	3	5	98	ok
16	11/6/2000	South Secondary	3	1	103	ok
12	10/27/2000	South Secondary	4	3	99	ok
13	10/31/2000	South Secondary	4	2	97	ok
13	10/31/2000	South Secondary	4	3	98	ok
14	11/1/2000	South Secondary	4	2	98	ok
16	11/6/2000	South Secondary	4	2	102	ok
7	10/9/2000	South Secondary	5	2	102	ok
14	11/1/2000	South Secondary	5	1	97	ok

TABLE 5.2

SOIL COMPACTION INSPECTION RESULTS
GM MORAINE LAGOON CLOSURE
MORAINE, OHIO

Inspection Number	*Inspection Date*	*Location*	*Lift Number*	*Test Number*	*Percent Compaction*	*Status (1)*
16	11/6/2000	South Secondary	5	3	96	ok
17	11/15/2001	South Secondary	5	1	95	ok
16	11/6/2000	South Secondary	6	4	104	ok
17	11/15/2001	South Secondary	6	3	95	ok
17	11/15/2001	South Secondary	SG	2	95	ok

Notes:

#-#-#	First number designates inspection number, second number designates lift number, third number designates test number.
(1)	OK Status refers to no further action required for backfill represented by the sample.
(2)	Random, locations unidentified.
bridge lift	Dry material was added to the compaction area, as maximum compaction appeared to have been reached with the reworked material. After adding dry material, the area was recompacted and inspected.
SG	subgrade
G	at grade

APPENDIX A

CLOSURE CERTIFICATION

CERTIFICATION STATEMENT
North Lagoon
Harrison Radiator Division Facility - Moraine, Ohio

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Licensed Professional Engineer

August 10, 2001
Date

Ian K. Richardson
CRA Engineering Inc.
Ohio P.E. No. E-61931

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Owner's representative

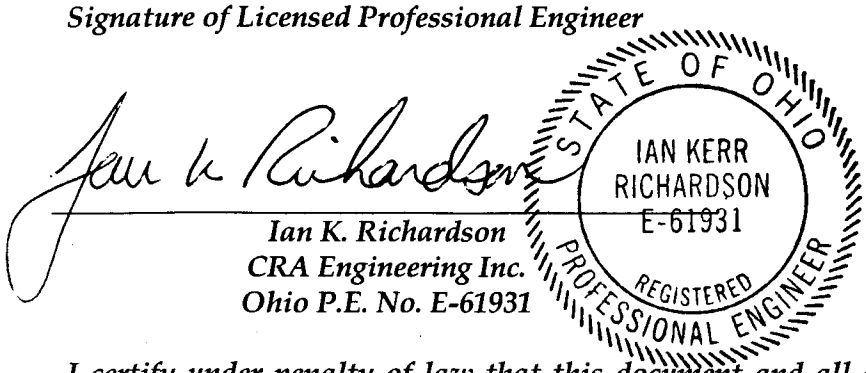
8-9-01
Date

William J. McFarland
President, Remediation and Liability Management (REALM)
Director, Remediation
Worldwide Facilities Group
General Motors Corporation

CERTIFICATION STATEMENT
South Lagoon
Harrison Radiator Division Facility - Moraine, Ohio

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Licensed Professional Engineer



Ian K. Richardson
CRA Engineering Inc.
Ohio P.E. No. E-61931

August 10, 2001
Date

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Owner's representative

William J. McFarland

William J. McFarland
President, Remediation and Liability Management (REALM)
Director, Remediation
Worldwide Facilities Group
General Motors Corporation

8-9-01
Date

APPENDIX B

SELECT CORRESPONDENCE WITH OHIO EPA

State of Ohio Environmental Protection Agency

STREET ADDRESS:
Lazarus Government Center
122 S. Front Street
Columbus, Ohio 43215

TELE: (614) 644-3020 FAX: (614) 644-2329

MAILING ADDRESS:
P.O. Box 1049
Columbus, OH 43216-1049

Certified Mail

AUG 24 2000

Ms. Pamela Stubbs
Project Manager
Delphi-Harrison Thermal Systems
3600 Dryden Road
Moraine, OH 45439

Re: Closure Plan Approval
Delphi Thermal Systems - Moraine
OHD 000 917 577

Dear Ms. Stubbs:

On June 14, 2000, Delphi Thermal Systems-Moraine submitted to Ohio EPA a closure plan for the north and south lagoons located at 3600 Dryden Road, Moraine, Ohio 45439. The closure plan was submitted pursuant to rule(s) 3745-66-11 and 3745-66-12 of the Ohio Administrative Code (OAC) in order to demonstrate that Delphi Thermal Systems-Moraine's proposal for closure complies with the requirements of these two rules.

The owner or operator and the public were given the opportunity to submit written comments regarding the closure plan in accordance with the hazardous waste rule requirements. No public comments were received by the Ohio EPA.

Based upon review of Delphi Thermal System-Moraine's submittal, I conclude that the closure plan for the site at 3600 Dryden Road, Moraine, OH, 45439, accompanied by the modifications included in Attachment A, meets the performance standard contained in OAC rule 3745-66-11 and complies with the pertinent parts of OAC rule 3745-66-12. The closure plan submitted to Ohio EPA on June 14, 2000 is hereby approved.

Compliance with the approved closure plan, including the modifications specified herein, is expected. Ohio EPA will monitor such compliance. The director expressly reserves the right to take action, pursuant to chapters 3734. and 6111. of the Ohio Revised Code, and other applicable law, to enforce such compliance and to seek appropriate remedies in the event of noncompliance with the provisions and modifications of this approved closure

plan. Please be advised that approval of this closure plan does not release Delphi Thermal Systems-Moraine from any responsibilities regarding corrective action for all releases of hazardous waste or constituents from any solid waste management unit, regardless of the time at which waste was placed in the unit.

You are hereby notified that this action of the Director of Environmental Protection is final and may be appealed to the Environmental Review Appeals Commission pursuant to Ohio Revised Code section 3745.04. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. The appeal must be filed with the commission within 30 days after notice of the director's action. Notice of the filing of the appeal shall be filed with the director within three days after the appeal is filed with the commission. An appeal may be filed with the commission at the following address:

Environmental Review Appeals Commission
236 East Town Street, Room 300
Columbus, Ohio 43215

When closure is completed, OAC rule 3745-66-15 requires the owner or operator of a facility to submit to the director of Ohio EPA, certification by the owner or operator and an independent, registered professional engineer, that the facility has been closed in accordance with the approved closure plan. The certification by the owner or operator shall include the statement found in OAC rule 3745-50-42(D). These certifications should be submitted to: Ohio Environmental Protection Agency, Division of Hazardous Waste Management, Attn: Thomas Crepeau, Data Management Section, P.O. Box 1049, Columbus, Ohio 43216-1049.

Sincerely,

Joseph P. Koncelik /FOR

Christopher Jones
Director

hrdaprov/closures/ao

cc: Tom Crepeau, DHWM Central File, Ohio EPA
DHWM Files, SWDO, Ohio EPA

ATTACHMENT A

CONDITIONS FOR CLOSURE PLAN APPROVAL
NORTH AND SOUTH LAGOONS
GENERAL MOTORS CORPORATION - HARRISON RADIATOR DIVISION
MORAINE, OHIO

1) General Motors Corporation - Moraine shall submit to OEPA within 60 days of the closure plan's approval all relevant pilot scale testing information to demonstrate that chemical stabilization/solidification efforts undertaken at the north and south lagoons will result in a solidified material which:

   a) Has increasing strength over time;
   b) Is capable of supporting a final cap plus a safety factor of 2;
   c) Is capable of supporting load bearing capacity plus a safety factor of 2;
   d) Proves adequate chemical stabilization.

2) General Motors Corporation - Moraine shall submit to the Ohio EPA within 30 days of final certification of closure, a post closure plan detailing 1) specific groundwater monitoring wells (adjacent to each lagoon) which will be sampled; 2) the frequency with which each well will be sampled, and 3) the chemical analytes which will be measured through lab analyses.

3) General Motors Corporation - Moraine shall submit to Ohio EPA within 14 days of the closure plan's approval a list of activities considered "critical", for which 5 days' notice will be given to OEPA prior to commencing.

4) General Motors Corporation - Moraine shall provide to Ohio EPA within 14 days of the closure plan approval the specific method which will be employed to mix cement kiln dust with sludges present in the north and south lagoons for the purpose of solidifying/stabilizing said sludges.

5) General Motors Corporation - Moraine shall provide to Ohio EPA within 30 days of closure plan approval laboratory analytical results data for wood waste created from clearing and grubbing activities which precede sludge stabilization/solidification activities.

General Motors
Worldwide Facilities Group
Environmental and Regulatory Support
Remediation Team

September 8, 2000

Ohio EPA
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911
Attn: Mr. Chris Cotton

RE: Lagoon Closure Conditions Submittal, General Motors Moraine Facilities, Moraine, Ohio

Dear Mr. Cotton:

General Motors Corporation (GM) is providing the following submission in accordance with the Conditions 3 and 4 of the August 24, 2000 Lagoon Closure Plan approval letter for the General Motors Moraine Facilities in Moraine, Ohio,

Condition 3) states:

General Motors Corporation- Moraine shall submit to Ohio EPA within 14 days of the closure plan's approval a list of activities considered "critical", for which 5 days' notice will be given to OEPA prior to commencing.

Response to OEPA Condition 3):

The following activities from the approved Closure Plan are considered critical, for which a minimum of 5 days advance notice will be provided to OEPA prior to commencing:

1. Initial mixing of Reagent(s) with sludge in South Lagoons;
2. Initial placement of backfill materials over stabilized South Lagoon sludge;
3. Initial placement of clay soil cover system for South lagoons;
4. Initial mixing of Reagent (s) with sludge in North Lagoons;
5. Initial placement of backfill materials over stabilized North Lagoon sludge;
6. Initial placement of asphalt cover system for North Lagoons;
7. Initial compressive strength sampling of stabilized sludge;
8. Compressive strength sampling of stabilized sludge at completion; and,
9. When the certifying Professional Engineer will be on-site.

Condition 4) states:

General Motors Corporation- Moraine shall provide to Ohio EPA within 14 days of the closure plan approval the specific method which will be employed to mix cement kiln dust with sludges present in the north and south lagoons for the purpose of solidifying/ stabilizing said sludges.

Response to OEPA Condition 4):

Prior to initiating the mixing of cement kiln dust (CKD) with sludge in a particular lagoon, field testing of anticipated design mix ratio(s) will be conducted to verify that the selected mix ratio of CKD and sludge will meet the solidification requirements. The exact procedures that will be followed to mix CKD with the sludge will vary by location within each lagoon as well as by lagoon. However, the specific methods will include the following steps:

- CKD will be unloaded from the delivery vehicle in a location near to the sludge that will be solidified;
- The volume of CKD added to the sludge will be predetermined based on measured sludge volume in a given area;
- The actual volume of CKD added to the sludge will be measured using the bucket of a track-hoe. For example, if a 20 percent CKD to sludge volume is desired, one track-hoe bucket of CKD will be mixed with five track-hoe buckets of sludge;
- Soils used as a reagent to the sludge will be mixed in a similar fashion prior to addition of CKD;
- Sludges that have a low moisture content will be blended with sludges that have a higher moisture content prior to mixing in reagent(s);
- Reagents will be mixed into the sludge using the bucket of a track-hoe that is being operated in a hoe like fashion. Sludge and reagent will be repeatedly picked up and placed back until the reagent has been thoroughly mixed into the sludge.

Please call (937) 455-4092 if you have any questions.

Sincerely,

Pamela L. Stubbs
Project Manager

Enclosure
cc: J. Caufield, GM
D. Lukavic, OEPA

A:\naon

GM MORAINE FACILITIES

3600 DRYDEN ROAD · MORAINE, OHIO 45439-1410 · (937) 455-4092 · FAX (937) 455-4036

FACSIMILE TRANSMITTAL COVER SHEET

To:	Chris Cotton	From:	Pam Stubbs
Fax:		Fax:	(937)455-4036
Phone:		Phone:	(937)455-4181
cc:			

Number of Pages 1 (including this cover sheet)

Original/Hard Copy ☐ will be mailed ☒ will not be mailed.

DATE: September 13, 2000

MESSAGE:

Please note that the sludge removal in sludge drying basin will be completed possible tomorrow and we will begin backfilling Tuesday of next week (9/19/00) . Call me with questions.
Thanks

REALM

GM MORAINE FACILITIES

3600 DRYDEN ROAD · MORAINE, OHIO 45439-1410 · (937) 455-4092 · FAX (937) 455-4036

FACSIMILE TRANSMITTAL COVER SHEET

To:	Chris Cotton	From:	Pam Stubbs
Fax:		Fax:	(937)455-4036
Phone:		Phone:	(937)455-4181
cc:			

Number of Pages 1 (including this cover sheet)

Original/Hard Copy ☐ will be mailed ☒ will not be mailed.

DATE: September 25, 2000

MESSAGE:

Please note that the backfilling of the primary basin at the south lagoon will begin later this week. Call me with questions.
Thanks

*Chris, I was unable to send this through open fax on 9/25/00

REALM

GM MORAINE FACILITIES

3600 DRYDEN ROAD · MORAINE, OHIO 45439-1410 · (937) 455-4092 · FAX (937) 455-4036

FACSIMILE TRANSMITTAL COVER SHEET

To:	Chris Cotton	From:	Pam Stubbs
Fax:		Fax:	(937)455-4181
Phone:		Phone:	(937)455-4092
cc:			

Number of Pages 1 (including this cover sheet)

Original/Hard Copy ☐ will be mailed ☒ will not be mailed.

DATE: October 11, 2000

MESSAGE:

Please note that the solidification at the north lagoon will begin no sooner than Monday of next week.

Additionally, as per your approval during your site visit of 9/6/00, we relocated the sludge from the South Drying Basin to the South Secondary Basin for solidification. This task was initiated on 9/11/00 and completed on 9/13/00. Approximately 7,609 cubic yards of sludge was relocated to the South Secondary Basin. As you are aware, solidification activities are under way in the South Secondary Basin and we are about 60 percent complete.

Call me with questions or drop by the site to see us.
Thanks

REALM

GM MORAINE FACILITIES

3600 DRYDEN ROAD · MORAINE, OHIO 45439-1410 · (937) 455-4092 · FAX (937) 455-4036

FACSIMILE TRANSMITTAL COVER SHEET

To: Chris Cotton

Fax:

Phone:

cc:

From: Pam Stubbs

Fax: (937)455-4181

Phone: (937)455-4092

Number of Pages 1 (including this cover sheet)

Original/Hard Copy ☐ will be mailed ☒ will not be mailed.

DATE: October 13, 2000

MESSAGE:

Please note that the certifying PE will be at the site on 10/18/00 at approximately 1000 hrs. I will be out of town that day. Please call Jeroen at (513)607-7447 with questions or drop by the site to see us.
Thanks!

REALM

GM MORAINE FACILITIES

3600 DRYDEN ROAD · MORAINE, OHIO 45439-1410 · (937) 455-4092 · FAX (937) 455-4036

FACSIMILE TRANSMITTAL COVER SHEET

To:	Chris Cotton	From:	Pam Stubbs
Fax:	285-6249	Fax:	(937)455-4181
Phone:		Phone:	(937)455-4092
cc:			

Number of Pages 1 (including this cover sheet)

Original/Hard Copy ☐ will be mailed ☒ will not be mailed.

DATE: October 20, 2000

MESSAGE:

Please note that we will begin backfilling the west side of the secondary basin of the North Lagoon next Monday. There were only a few inches of sludge along the west side (approximately 670 cubic yards/36,000 square feet) so we moved that small amount of sludge over the east side of the secondary basin of the North Lagoon for solidification. (This was an area that had a thicker amount of sludge). Please call me if you have any questions!

Thanks!

REALM **GM Moraine**

3600 DRYDEN ROAD · MORAINE, OHIO 45439-1410 · (937) 455-4092 · FAX (937) 455-4036

TRANSMITTAL COVER SHEET

To:	Chris Cotton	From:	Pam Stubbs
Fax:		Fax:	(937)455-4181
Phone:		Phone:	(937)455-4092
cc:			

DATE: November 29, 2000

MESSAGE:

Attached is the analytical report on the wood waste. Also, the solidification efforts were completed on 11/27/00. Call me with questions.
Thanks

CONESTOGA-ROVERS
& ASSOCIATES

2441 Crowne Point Drive, Cincinnati, Ohio 45241
Telephone: (513) 326-7600 Fax: (513) 326-7601
www.CRAworld.com

MEMORANDUM

TO: Pam Stubbs

REF. NO.: 12611

FROM: Jeroen Winterink

DATE: October 9, 2000

C.C.: Ian Richardson, Henry Cooke

RE: Wood Waste - Characterization Test Results
Harrison/ Delphi Lagoon Closure Project
Moraine, Ohio

On September 19, 2000, CRA collected a composite sample of the wood debris at the Lagoon Closure project at the GM Moraine Site in Moraine, Ohio. The wood debris consistes of the wood chips generated during site clearing activities in 1999, along with saw dust collected from the tree stumps and logs that were still present in the Lagoons. The sample was submitted to Data Chem Laboratories, under chain-of-custody protocols for analysis. TCLP characterization along with total PCBs were selected for analysis for the wood sample based on the knowledge of the waste stream that the sample represented. Attached is a summary table of the analytical results for the sample, along with the TCLP standards for the parameters. Also attached is a copy of the analytical report.

The analytical results indicate that the wood debris is characteristically non-hazardous and does not contain PCBs.

Should you require any additional information or clarifications, please call.

WOOD AND MULCH DEBRIS - ANALYTICAL RESULTS
LAGOON CLOSURE PROJECT
GM MORAINE
MORAINE, OHIO

TCLP Compound	Limit	Units	Wood From Chips And Stumps 12611 - 091900-JW-300 Results	Pass/Fail?
Arsenic	5.0	mg/L	<0.5	Pass
Barium	100	mg/L	<10.0	Pass
Cadmium	1.0	mg/L	<0.1	Pass
Total Chromium	5.0	mg/L	<0.5	Pass
Lead	5.0	mg/L	<0.5	Pass
Mercury	0.2	mg/L	<0.0005	Pass
Selenium	1.0	mg/L	<0.1	Pass
Silver	5.0	mg/L	<0.5	Pass
Benzene	0.5	mg/L	<0.005	Pass
Carbon Tetrachloride	0.5	mg/L	<0.005	Pass
Chlorobenzene	100	mg/L	<0.005	Pass
Chloroform	6.0	mg/L	<0.005	Pass
O-Cresol	200	mg/L	<0.1	Pass
M-Cresol	200	mg/L	<0.1	Pass
P-Cresol	200	mg/L	<0.1	Pass
Cresol	200	mg/L	<0.1	Pass
1,4-Dichlorobenzene	7.5	mg/L	<0.005	Pass
1,2-Dichloroethane	0.5	mg/L	<0.005	Pass
1,1-Dichloroethylene	0.7	mg/L	<0.005	Pass
2,4-Dinitrotoluene	0.13	mg/L	<0.1	Pass
Hexachlorobenzene	0.13	mg/L	<0.1	Pass
Hexachlorobutadiene	0.5	mg/L	<0.1	Pass
Hexachlorethane	3.0	mg/L	<0.1	Pass
Methyl ethyl ketone	200	mg/L	<0.05	Pass
Nitrobenzene	2.0	mg/L	<0.1	Pass
Pentachlorophenol	100	mg/L	<0.5	Pass
Pyridine	5.0	mg/L	<0.1	Pass
Tetrachlorethylene	0.7	mg/L	<0.005	Pass
Trichloroethylene	0.5	mg/L	<0.005	Pass
2,4,5-Trichlorophenol	400	mg/L	<0.1	Pass
2,4,6-Trichlorophenol	2.0	mg/L	<0.1	Pass
Vinyl Chloride	0.2	mg/L	<0.005	Pass

Notes:
A - Parameter not analyzed
'--' - Pass/Fail not applicable

WOOD AND MULCH DEBRIS - ANALYTICAL RESULTS
LAGOON CLOSURE PROJECT
GM MORAINE
MORAINE, OHIO

		Wood From Chips And Stumps 12611 - 091900-JW-300
PCBs		
	Units	Results
Aroclor 1016	mg/kg	ND (<0.25)
Aroclor 1221	mg/kg	ND (<0.5)
Aroclor 1232	mg/kg	ND (<0.25)
Aroclor 1242	mg/kg	ND (<0.25)
Aroclor 1248	mg/kg	ND (<0.25)
Aroclor 1254	mg/kg	ND (<0.25)
Aroclor 1260	mg/kg	ND (<0.25)

Notes:
NA - Parameter not analyzed
'–' - Pass/Fail not applicable

12611

DATA CHEM LABORATORIES
A SOOTENSON COMPANY

TEST REPORT
Page 1 of 3
9/22/00

Submitted To:
Jeroen Winterink
Conestoga-Rovers & Associates
2441 Crowne Point Dr.
Cincinnati, OH
45241

Wood Sample
Lagoon Closure
GM Moraine, OH

Reference Data:

TCLP Metals

Sample Location:	Reference No.: 12611
Sample Type:	Soil
Client Sample No.:	S-12611-091900-JW-300
PO #:	Not Available
Method Reference:	1311 / 3010 / 6010
Sample Set ID#:	00-S-5262
DATACHEM Lab No.:	00-30867
Date Received:	9/20/2000
Preparation Date:	9/22/2000
Analysis Date:	9/22/2000

The samples were extracted in accordance with EPA method 1311 and digested in accordance with EPA method 3010. The samples were then analyzed in accordance with EPA method 6010 using a Perkin Elmer 3000XL (ICP) purged spectrometer.

Results relate only to the items tested.

The results are provided in the enclosed data table.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Robert R. Liversage
Analyst

Reviewer

CINNATI OFFICE
388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9469

TCLP Metals Results
mg/L

Client #	DCL #	As	Ba	Cd	Cr	Pb	Se	Ag
S-12611-091900-JW-300	00-30867	ND	ND	ND	ND	ND	ND	ND
	Prep. Blank	ND	ND	ND	ND	ND	ND	ND
% Recovery	LCS	88.	83.	88.	86.	81.	98.	87.
% Recovery	00-31133MS	91.	83.	85.	86.	81.	97.	91.
% Recovery	00-31133MSD	95.	87.	87.	89.	84.	102.	94.
	RPL	0.5	10.	0.1	0.5	0.5	0.1	0.5

ND indicates value is below the Reporting Limit.
RPL stands for Reporting Limit.
LCS = laboratory control standard MS = matrix spike
MSD = matrix spike duplicate

Robert R. Liversage
Analyst

Reviewer

DATA CHEM LABORATORIES
A SORENSON COMPANY

TEST REPORT
Page 1 of 3
9/26/00

Submitted To: Jeroen Winterink
Conestoga-Rovers & Associates
2441 Crowne Point Dr.
Cincinnati, OH 45241

Reference Data:	**Mercury/TCLP**
Client Sample No.:	S-12611-091900-JW-300
P.O. No.:	Not Available
Reference No.:	12611
Sample Type:	Solid
Method Reference:	EPA 1311 / 7470
DCL Set ID No.:	00-S-5262
DCL Sample ID No.:	00-30867
Sample Receipt Date:	09/20/2000
Preparation Date:	09/25/2000
Analysis Date:	09/25/2000

The samples were extracted in accordance with EPA method 1311.
The samples were prepared and analyzed in accordance with EPA method 7470 using a Varian SpectrAA 300 (AAS).

The results are in the enclosed data table.

Results relate only to the items tested.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Stephanie Wilcox
Analyst

Reviewer

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9460

Mercury TCLP Results
ppm (mg/L)

Client #	DCL #	Hg
S-12611-091900-JW-300	00-30867	ND
LOD		**0.0005**

ND indicates the value is below the limit of detection (LOD)

QC Results

	% Recovery	RPD
Blank	ND	-
LCS	100.	-
00-30867 MS	98.	2
00-30867 MSD	96.	2

Stephanie Wilcox
Analyst

Reviewer

TEST REPORT
Page 1 of 3
9/27/00

DATA CHEM LABORATORIES
A SORENSON COMPANY

Submitted To: Jeroen Winterink
Conestoga-Rovers & Associates
2441 Crowne Point Dr.
Cincinnati, OH 45241

Reference Data:	**TCLP Semi-Volatile Organic Compounds**
Client Sample No.:	S-12611-091900-JW-300
P.O. No.:	Not Available
Sample Location:	Reference No.: 12611
Sample Type:	Soil
Method Reference:	8270 TCLP
DCL Set ID No.:	00-M-5262
DCL Sample ID No.:	00-30867
Sample Receipt Date:	9/20/2000
Preparation Date:	9/22/2000
Analysis Date:	9/26/2000

This sample was analyzed for TCLP compounds according to EPA method 8270B (SW-846; September, 1994).

For preparation of the sample, 100 ml of the sample TCLP extract was spiked with 1ml of surrogate spiking solution and extracted as prescribed in EPA Extraction Method 3510. The extract was then concentrated to 1.0ml and spiked with an internal standard solution prior to analysis.

Analysis of the sample was performed on a Hewlett Packard 6890/5973 GC/MS/DS. The instrument was tuned by analyzing 50ng of DFTPP and meeting the tuning criteria prescribed in the method. All SPCC and CCC quality control criteria prescribed in the method were met for the initial and continuing calibration curve.

The results for the 8270 analysis are reported in mg/L for TCLP leachate (PPM). Results relate only to the items tested.

Mark Johnson

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9459

Data Table
mg/L

Client #	S-12611-091900-JW-300		QC % Recovery		
DCL #	00-30867	Blank	MS30867		**EQL**
Pyridine	ND	ND	44		
1,4-Dichlorobenzene	ND	ND	46		
o-Cresol	ND	ND	70		
m & p-Cresol	ND	ND	43		
Hexachloroethane	ND	ND	45		
Nitrobenzene	ND	ND	56		
Hexachloro-1,3-butadiene	ND	ND	47		
2,4,6-Trichlorophenol	ND	ND	55		
2,4,5-Trichlorophenol	ND	ND	55		
2,4-Dinitrotoluene	ND	ND	58		
Hexachlorobenzene	ND	ND	66		
Pentachlorophenol	ND	ND	63		
Surrogate % Recovery					
2-Fluorophenol	40	41	40		
Phenol-D6	28	27	28		
Nitrobenzene-D5	56	61	58		
2-Fluorobiphenyl	56	60	54		
2,4,6-Tribromophenol	52	58	58		
Terphenyl-D14	58	66	63		

ND indicates not at or above the EQL.

Mark Johnson
Analyst

Reviewer

DATA CHEM LABORATORIES
A SORENSON COMPANY

TEST REPORT
Page 1 of 3
9/25/00

Submitted To:
Jeroen Winterink
Conestoga-Rovers & Associates
2441 Crowne Point Dr.
Cincinnati, OH
45241

Reference Data:	PCB's
Sample Location:	Reference No.: 12611
Sample Type:	Soil
Client Sample No.:	S-12611-091900-JW-300
PO #:	Not Available
Method Reference:	EPA 8081
Sample Set ID#:	00-C-5262
DATACHEM Lab No.:	00-30867
Sample Receipt Date:	09/20/2000
Preparation Date:	09/21/2000
Analysis Date:	09/21/2000 and 09/25/2000

The samples were prepared for analysis by E.P.A. method SW-846-3550 and analyzed using E.P.A. method SW-846-8081.

The analysis was performed using a Hewlett Packard 5890 gas chromatograph equipped with an electron capture detector and a DB-5 capillary column with temperature programming from 190°C to 300°C.

Results relate only to the items tested.

The results are provided in the enclosed data table.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Tami S. Anderson
Analyst

James R. Baxter
Laboratory Director

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9469

DATA CHEM LABORATORIES
A SORENSON COMPANY

Submitted To: Jeroen Winterink
Conestoga-Rovers & Associates
2441 Crowne Point Dr.
Cincinnati, OH 45241

Reference Data:	**TCLP Volatile Organic Compounds**
Client Sample No.:	S-12611-091900-JW-300
P.O. No.:	Not Available
Sample Location:	Reference No.: 12611
Sample Type:	Soil
Method Reference:	8260 TCLP
DCL Set ID No.:	00-M-5262
DCL Sample ID No.:	00-30867
Sample Receipt Date:	9/20/2000
Preparation Date:	9/25/2000
Analysis Date:	9/27/2000

This sample was analyzed for TCLP volatile organic compounds accordi to EPA method 8260 with modifications(SW-846; U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response).

Analysis was performed on a Hewlett-Packard 5973 GC/MS/DS. All tuning, SPCC and CCC quality control criteria for the initial calibration curve and daily calibration standard were met prior to sample analysis.

The results for the 8260 analysis are reported in mg/L for TCLP Leachate (PPM).

Results relate only to the items tested.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Leah Sherman

Leah Sherman

TEST REPORT
Page 2 of 3
00-M-5262

Data Table (PPM)

Client #	S-12611-091900-JW-300		QA/QC % Recovery	QA/QC % Recovery	EQL
DCL #	00-30867	Blank	LCS	30867MS	
Vinyl Chloride	ND	ND	**105**	**98**	
1,1-Dichloroethylene	ND	ND	**106**	**76**	
Methyl Ethyl Ketone	ND	ND	**92**	**98**	
Chloroform	ND	ND	**105**	**90**	
Carbon Tetrachloride	ND	ND	**103**	**99**	
Benzene	ND	ND	**107**	**101**	
1,2-Dichloroethane	ND	ND	**108**	**94**	
Trichloroethylene	ND	ND	**104**	**103**	
Tetrachloroethylene	ND	ND	**106**	**114**	
Chlorobenzene	ND	ND	**106**	**100**	
1,4-Dichlorobenzene	ND	ND	**104**	**97**	

ND indicates not detected at or above the EQL value.

Surrogate Recovery

Dibromofluoromethane	99	95	99	85	
Toluene-D8	99	99	98	97	
Br[illegible]pfluorobenzene	103	105	105	93	

Leah Sherman
Analyst

Reviewer

Cooler Receipt Worksheet (Revised 12/14/99) **Page 3 of 3**

Set I.D.: 5262 Date/Time of Receipt: 9/20/00 1000

Client Name: CRA

Cooler Temperature: 2.4 °C

Receipt Clerk: Ner

- ☐ pH Criteria not Met
- ☐ Missing Samples
- ☐ Broken/Leaking Samples
- ☐ Cooler Temperature Out of Range
- ☐ Insufficient Sample Volume
- ☐ Headspace in Volatile Bottles
- ☐ Other:
- ☐ Missing Paperwork
- ☐ Incorrect Preservation
- ☐ Chain of Custody Error
- ☐ Incorrect Bottle Type
- ☐ Tubes/Filters Broken
- ☐ Custody Seals Broken

PH Check:		Value
Metals	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Cyanide	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Ammonia	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Total Phenolics	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
TPH (418.1)	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Oil & Grease (413.1)	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
8260 /8021 /8015	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Other:	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12

Comments:

Client Contact: Company:

Date: Time:

REALM

GM Moraine

3600 DRYDEN ROAD · MORAINE, OHIO 45439-1410 · (937) 455-4092 · FAX (937) 455-4036

TRANSMITTAL COVER SHEET

To: Chris Cotton

From: Pam Stubbs

Fax:

Phone:

cc:

Fax: (937)455-4181

Phone: (937)455-4092

DATE: December 19, 2000

MESSAGE:

Attached is the response to Condition No. 1. Call me with questions.
Thanks

CONESTOGA-ROVERS & ASSOCIATES

2441 Crowne Point Drive, Cincinnati, Ohio 45241
Telephone: (513) 326-7600 Fax: (513) 326-7601
www.CRAworld.com

MEMORANDUM

TO: Pam Stubbs

REF. NO.: 12611

FROM: Jeroen Winterink

DATE: December 14, 2000

C.C.: Henry Cooke

RE: Response to Condition 1 of OEPA CLosure Plan Approval
North and South Lagoon Closure
GM Moraine Facility, Moraine, Ohio

Pam:

As requested, draft responses for OEPA's condition 1 for Closure Plan Approval are provided below. Please feel free to modify as appropriate. Call to discuss or if any questions.

OEPA Condition 1) states:
General Motors Corporation- Moraine shall submit to Ohio EPA within 60 days of the closure plan's approval all relevant pilot scale testing information to demonstrate that chemical stabilization/ solidification efforts undertaken at the north and south lagoons will result in a solidified material which:

a) Has increasing strength over time:
b) Is capable of supporting a final cap plus a safety factor of 2;
c) Is capable of supporting load bearing capacity plus a safety factor of 2;
d) Proves adequate chemical stabilization.

General Response to Condition 1):

The pilot scale test results that were obtained after solidifying the lagoon sludge were presented in Appendix F of the Closure Plan. Subsequent to the pilot scale testing and conditional approval of the Closure Plan, full scale sludge solidification commenced at the Site in mid September. The response to conditions 1a, 1b and 1c include the actual analytical data that was obtained during full-scale implementation .

Response to OEPA Condition 1 a):

The attached Table 1 provides a summary listing of unconfined compressive strength test results of the sludge after it was mixed with reagent during full-scale implementation. While the majority of the test specimens achieved the minimum required compressive strength of 25 psi on the first test for the specimen, subsequent testing of specimens that did not achieve the minimum strength initially were typically able to meet the strength after additional curing time. Several of

the test specimens did not achieve sufficient strength, and those areas of the lagoons that these specimens represented were mixed with additional reagent, and were tested again to ensure sufficient strength had been obtained.

Response to OEPA Condition 1 b):

Within Appendix F of the Closure Plan was a geotechnical analysis of the load bearing capacity of solidified sludge. A copy of this analysis is provided as an attachment to this letter response for reference. The analysis assumed two conditions as follows:

a) that the weakest solidified sludge would have a compressive strength of 25 psi; and,
b) that the maximum fill thickness would be 25 feet overtop of the solidified sludge.

Based on these two assumptions, the Factor of Safety for the final cap was greater than 2.

As all solidified sludge achieved a minimum strength of 25 psi, the first condition is easily met. The second condition is also met for most of the lagoons. The actual thickness of soil cover for the South Lagoons will vary between 13 and 18 feet, and for the North Lagoons varies between 13 and 28 feet. An additional analysis was performed using the actual minimum strength achieved and the maximum thickness of soil fill. This analysis (copy attached) indicates that an adequate factor of safety is achieved for the thicker soil volume.

Response to OEPA Condition 1 c):

Within Appendix F of the Closure Plan was a geotechnical analysis of additional loads due to future buildings. A copy of this analysis is attached for reference. Similar to the response to condition 1b) above, the stabilized sludge will provide adequate bearing for potential future buildings at the Site. The future buildings will however be limited in actual loading so as to not exceed the bearing capacity of the solidified sludge and compacted fill material placed overtop by a factor of safety of 2.

It should be noted that prior to designing a future building at the Site, a detailed geotechnical evaluation of the soil bearing conditions should be carried out. This evaluation, at a minimum, would include an investigation as to the bearing capacity of the soil and solidifed sludge mass, along with a settlement analysis of the consolidated sludge.

Response to OEPA Condition 1d):

Tables 4.1 and 4.2 of the Closure Plan provided analytical TCLP data for samples of the sludge that were collected and analyzed in 1988 as part of the draft Closure Plan that was prepared at that time for the North and South Lagoons. As this data is over 11 years old, some reduction of the contaminants will have occurred.

The TCLP analysis of samples of sludge material from the North and South Lagoon , conducted in 1988 demonstrated that the existing sludge material was not characteristically hazardous. The

addition of Pozzolonic materials such as CKD and Portland Cement will further reduce the mobility of any organic or inorganic constituents contained in the sludge material.

CONESTOGA-ROVERS & ASSOCIATES

TABLE 1
Unconfined Compressive Strength Testing Results
Results updated on November 30, 2000
GM Moraine Lagoon Closure
Moraine, Ohio

Sample No	Date Mixed	Mix Location	test #	Date tested	Age (days)	Result (psi)
014	9/19/00	South Primary 100 feet from south end	0	9/19/00	<1	19
			a	9/20/00	1	35
015	9/19/00	South Primary 200 feet from south end	0	9/19/00	<1	33
016	9/19/00	South Secondary south east corner 40'N, 580' E	0	9/19/00	<1	38
017	9/22/00	South Primary 40 feet from south end	0	9/22/00	<1	21
			a	9/25/00	3	35
018	9/22/00	South Secondary east side 200'N, 600' E	0	9/22/00	<1	20
			a	9/25/00	3	29.3
			b	9/29/00	7	29.6
019	9/22/00	South Secondary east side 300'N, 600' E	0	9/22/00	<1	20
			a	9/25/00	3	24
			b	9/29/00	7	26.4
028	10/3/00	South Secondary SW quadrant 80'N, 210'E	0	10/5/00	2	21
			a	10/10/00	7	28.3
030	10/4/00 *REMIXED with soil and CKD*	South Secondary SE quadrant 190'N, 550'E	0	10/5/00	1	28.5
			a	10/10/00	6	38.5
031	10/4/00 *REMIXED with soil and CKD*	South Secondary SE Quadrant 175'N, 440'E	0	10/5/00	1	30.2
			a	10/10/00	6	55.4
032	10/4/00	South Secondary SW quadrant 40'N, 140'E	0	10/5/00	1	32.2
			a	10/10/00	6	40.4
033	10/9/00	South Secondary SW quadrant 125'N, 75E	0	10/10/00	1	30.9

CONESTOGA-ROVERS & ASSOCIATES

Unconfined Compressive Strength Testing Results
Results updated on November 30, 2000
GM Moraine Lagoon Closure
Moraine, Ohio

Sample No	Date Mixed	Mix Location	test #	Date tested	Age (days)	Result (psi)
034	10/10/00	South Secondary NW quadrant 330N, 60E	0	10/12/00	2	81.8
035	10/10/00	South Secondary NE quadrant 310N, 440 E	0	10/12/00	2	31.2
036	10/11/00	South Secondary SE quad 80'N, 350'E	0	10/12/00	2	30.9
037	10/11/00	South Secondary NW quad 250'N, 130E	0	10/12/00	2	38.5
038	10/17/00	South Secondary NW quad 270'N, 250' E	0	10/18/00	1	32
039	10/19/00	South Secondary NW quad 325N, 250'E	0	10/20/00	1	72
040	10/19/00	South Secondary NW quad 240'N, 340' E	0	10/20/00	1	106
041	10/27/00	North Primary 25 feet from west end along center	0	10/30/00	3	73
042	11/1/00	North secondary east side 25 feet from south end along center	0	11/2/00	1	132
043	11/3/00	North secondary east side 150 feet from south end along center	0	11/6/00	3	72

From Closure Plan- Appendix F / Response to condition 1b)

CRA
CONESTOGA-ROVERS & ASSOCIATES

PROJECT No.: 12611
PROJECT NAME: GMC Harrison Radiator
DATE: May 4/2000

DESIGNED BY: BP
CHECKED BY:
PAGE 1 OF 2

Load Bearing Capacity of Solidified Sludge

Specified unconfined compressive strength after solidification is: 25 psi

25 psi = 3600 psf

The shear strength at failure is:

$S_u = \frac{1}{2}(3600\ psf) = 1800\ psf$

Using Terzaghi's bearing capacity equation for continuous footings:

$q_{ult} = S_u N_c$

for undrained conditions, $N_c = 5.7$ (see attached reference)

$q_{ult} = 5.7 \times 1800\ psf$

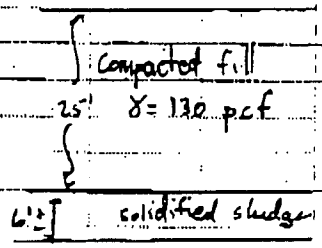
$q_{ult} = 10260\ psf$

The solidified sludge will be covered by 10 to 25' of compacted fill.

Assuming the maximum surcharge load of 25', the load applied to the solidified sludge will be:

$q = 25\ ft \times 130\ pcf$

$= 3250\ psf$



Factor of safety, F.S

$F.S = \frac{q_{ult}}{q}$

$= \frac{10260\ psf}{3250\ psf}$

$F.S = 3.2$ (O.K. since F.S. > 2)

From Closure Plan - Appendix F

Response to OEPA condition (c)

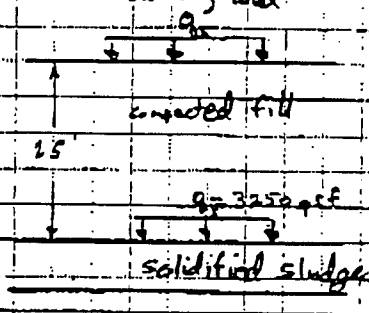
CRA
CONESTOGA-ROVERS & ASSOCIATES

PROJECT No.: 12611
PROJECT NAME: GMC Harrison Paddock
DATE: May 4 /2000

DESIGNED BY: BP
CHECKED BY:
PAGE 2 OF 2

Additional Load Due to Future Building

To maintain a factor of safety F.S ≥ 2, the applied building load plus the compacted fill load must not exceed allowable bearing capacity



$$q_{all} = \frac{q_{ult}}{F.S}$$

$$= \frac{10260 \text{ psf}}{2}$$

$$q_{all} = 5130 \text{ psf}$$

$$\therefore \quad q_B + q_s \leq 5130 \text{ psf}$$

$$q_B \leq (5130 - 3250) \text{ psf}$$

$$q_B \leq 1880 \text{ psf}$$

Therefore provided building loads do not exceed 1880 psf, the load bearing capacity of the sludge will not be exceeded and the factor of safety will be greater than 2

Response to CRA Question #5

CRA CONESTOGA-ROVERS & ASSOCIATES	PROJECT No.: 12611 PROJECT NAME: GM Morvine Lagoon Closure DATE: November 30, 2000	DESIGNED BY: JW CHECKED BY: BP PAGE 1 OF 1

Verification of Load Bearing Capacity of Solidified Sludge

North Lagoons

- lowest UCS result - 72 psi (10,368 psf) (Sample #43)

Shear strength at failure is:

$$S_u = \frac{1}{2}(10,368) = 5184 \text{ psf}$$

- per Terzaghi, bearing capacity equation is

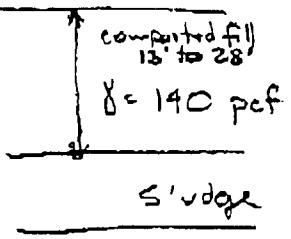
$$q_{ult} = S_u \cdot N_c$$

where N_c is 5-7 for undrained conditions.

$$\therefore q_{ult} = 5184 \times 5.7 = 29,549 \text{ psf}$$

- using maximum fill thickness of 28', the load applied to sludge is:

$$q = 28 \times 140 = 3,920 \text{ psf}$$



factor of safety F.S.

$$F.S = \frac{q_{ult}}{q_{actual}} = \frac{29,549}{3920} = 7.5 >> 2$$

$\therefore$ OK since F.S > 2

REALM

GM MORAINE FACILITIES

3600 DRYDEN ROAD · MORAINE, OHIO 45439-1410 · (937) 455-4092 · FAX (937) 455-4036

TRANSMITTAL COVER SHEET

To:	Chris Cotton	From:	Pam Stubbs
Fax:	285-6249	Fax:	(937)395-5181
Phone:		Phone:	(937)395-5092
cc:			

DATE: March 9, 2001

MESSAGE:

Here are the revised cover drawings for the North and South Lagoon that we spoke about. Although they differ from the one's originally submitted with the closure plan, the cover construction elements specified in the closure plan remain the same. Please call me if you have any questions!

Thanks!

APPENDIX C

SURVEYED VOLUMES OF IN SITU SLUDGE

Judge Engineering Company

Professional Engineers and Surveyors • Consultants

1:2611

September 29, 2000

South Lagoons

Mr. Jack Bruckl
Sevenson Environmental Services, Inc.
2749 Lockport Road
Niagara Falls, NY 14305

Re: GM Harrison Radiator Plant, Dryden Road, Moraine, OH
Lagoon Volume Estimate

Dear Mr. Bruckl:

This letter and the attached topographic drawing describe the steps taken by Judge Engineering Company (Judge) to arrive at the volumes of excavation within the three lagoons at the above site.

Drawing C-1 (attached) is a contour map of the existing site prior to commencement of excavation activities. Locations and depths of test probes to the estimated original ground surface underlying the sludge are also shown.

Typically volume calculations are based on the volume differences generated between the pre-developed and post-developed surveyed ground surfaces. The extent of surveyed points utilized to generate these surfaces will dictate the degree of accuracy obtained with the volumetric estimate. This typical case applies to Lagoon 1 where pre-developed and post-developed ground surfaces were surveyed.

In the case of Lagoon 2 and 3, a proposed post-developed surface was generated utilizing information gathered from the test probe locations. Care should be taken utilizing these volumetric estimates for Lagoons 2 and 3 as they reflect a proposed rather than actual post-developed surface. To determine the toe of the slope within these sludge lagoons, the existing bank slope was projected down to intersect with the horizontal plane generated by the depths of the test probe locations. This slope was generally found to be 2 horizontal : 1 vertical. If a vertical cut is utilized the volumes calculated will increase.

The actual and proposed excavated volumes were calculated using the composite method and are based on the difference between the surveyed pre-existing ground surface and/or the actual/ proposed ground surface generated utilizing the outlined assumptions. The bank volumes calculated are as follows:

Lagoon 1	-	7,609 B.C.Y. Confirmed
Lagoon 2	-	3,857 B.C.Y. Estimated
Lagoon 3	-	36,148 B.C.Y. Estimated

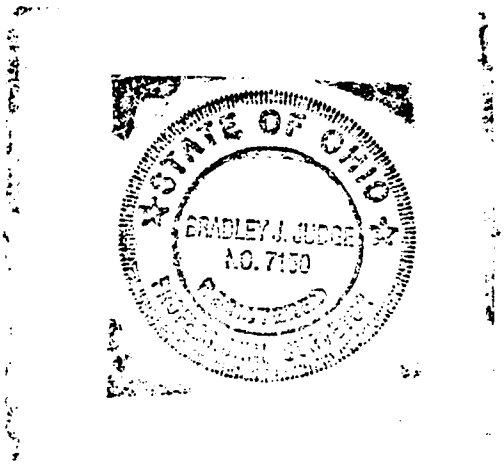
1201 East David Road • Kettering, Ohio 45429 • (937) 294-1441 • FAX (937) 294-6498
E-Mail: judge@erinet.com • Web Site: http://www.erinet.com/judge/www

We trust that this is acceptable. Should you have any questions please do not hesitate to contact us at 937-294-1441.

Yours sincerely,

Robert "Rob" P. Taylor, P.E.

Bradley J. Judge, P.S.



Judge Engineering Company

Professional Engineers and Surveyors • Consultants

12611

North Lagoons

October 25, 2000

Mr. Jack Bruckl
Sevenson Environmental Services, Inc.
2749 Lockport Road
Niagara Falls, NY 14305

Re: Fill Requirements for North Lagoons
GM Harrison Radiator Plant
Dryden Rod, Moraine, Ohio

Dear Mr. Bruckl:

This letter describes the steps taken by Judge Engineering Company to arrive at the bank volume of sludge within the North Lagoons. The North Lagoons for the purposes of this letter are considered to be the horseshoe-shaped lagoon along with the lagoon immediately south of the horseshoe-shaped lagoon.

Volume calculations are based on the volume differences generated between the estimated lagoon bottoms and existing lagoon surfaces. The estimated lagoon bottom was determined from a series of test probes within the lagoons. To determine the toe of the slope within these sludge lagoons, the existing slope was projected down to intersect with the horizontal plane generated by the depths of the test probe locations. This slope was generally found to be 2 horizontal : 1 vertical.

An estimated sludge volume of 7,074 B.C.Y. was calculated using the composite method.

We trust that this is acceptable. Should you have any questions please do not hesitate to contact us at 937-294-1441.

Yours sincerely,

Robert "Rob" P. Taylor, P.E.

STATE OF OHIO
ROBERT
P.
TAYLOR
E-64158
REGISTERED
PROFESSIONAL ENGINEER

Bradley J. Judge

Bradley J. Judge, P.S.

STATE OF OHIO
BRADLEY J. JUDGE
NO. 7158
PROFESSIONAL SURVEYOR

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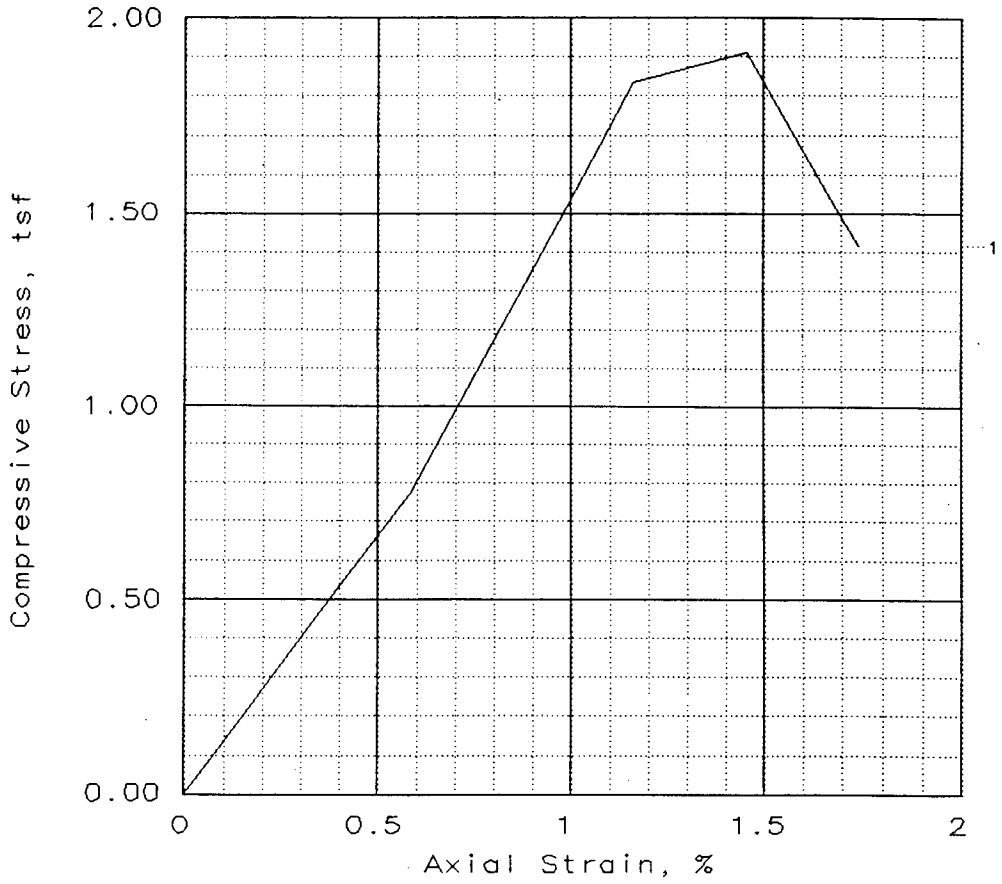
E-Mail: judge@erinet.com • Web Site: http://www.erinet.com/judge/www

APPENDIX D

COMPRESSIVE STRENGTH TESTING OF SOLIDIFIED SLUDGE LABORATORY REPORTS

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.91			
Undrained shear strength, tsf	0.96			
Failure strain, %	1.5			
Strain rate, %/min	1.00			
Water content, %	20.8			
Wet density, pcf	102.9			
Dry density, pcf	85.2			
Saturation, %	62.6			
Void ratio	0.8329			
Specimen diameter, in	2.00			
Specimen height, in	3.44			
Height/diameter ratio	1.72			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 9/19/00
Remarks:
LAB NO. 7424

MIXED ON 9/14/00
REMOLDED ON 9/15/00
Fig. No.: ——

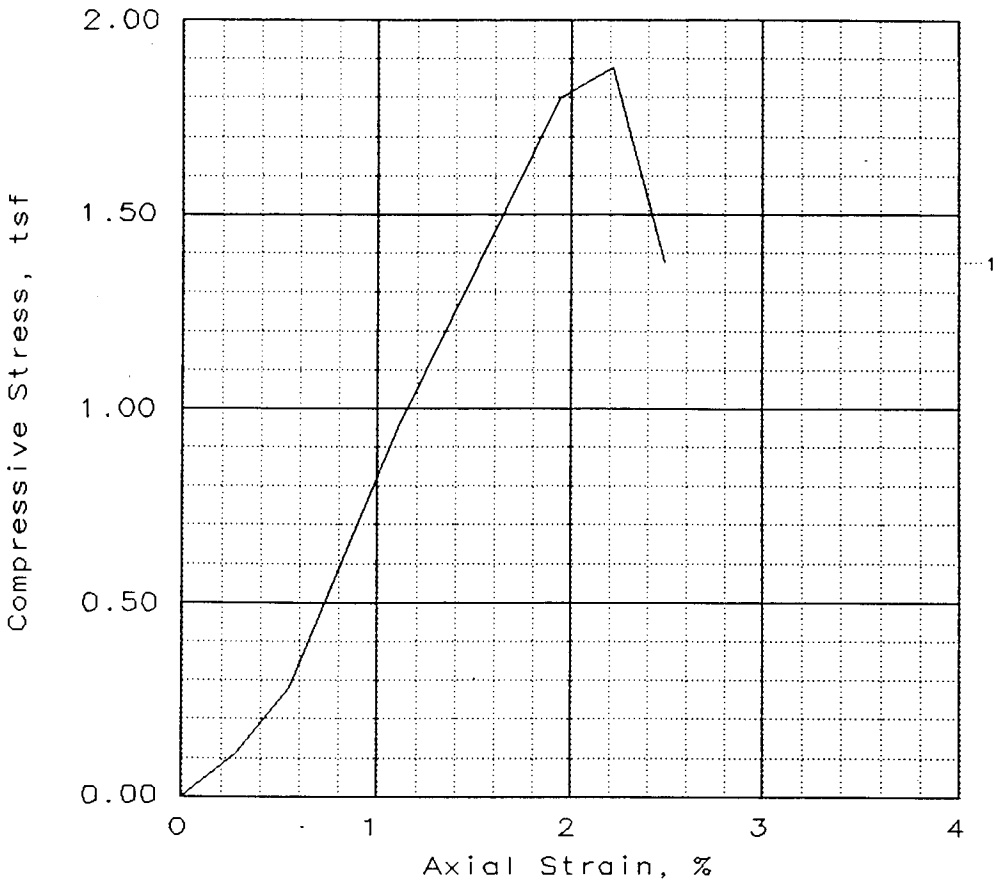
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 13A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.88			
Undrained shear strength, tsf	0.94			
Failure strain, %	2.2			
Strain rate, %/min	1.00			
Water content, %	19.7			
Wet density, pcf	101.6			
Dry density, pcf	84.9			
Saturation, %	58.7			
Void ratio	0.8389			
Specimen diameter, in	1.98			
Specimen height, in	3.61			
Height/diameter ratio	1.82			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 9/20/00
Remarks:
LAB NO. 7487
TESTED ON 9/19/00
MIXED ON 9/14/00
REMOLDED ON 9/15/00
Fig. No.: ——

Client: CONESTOGA-ROVERS & ASSOC. LTD

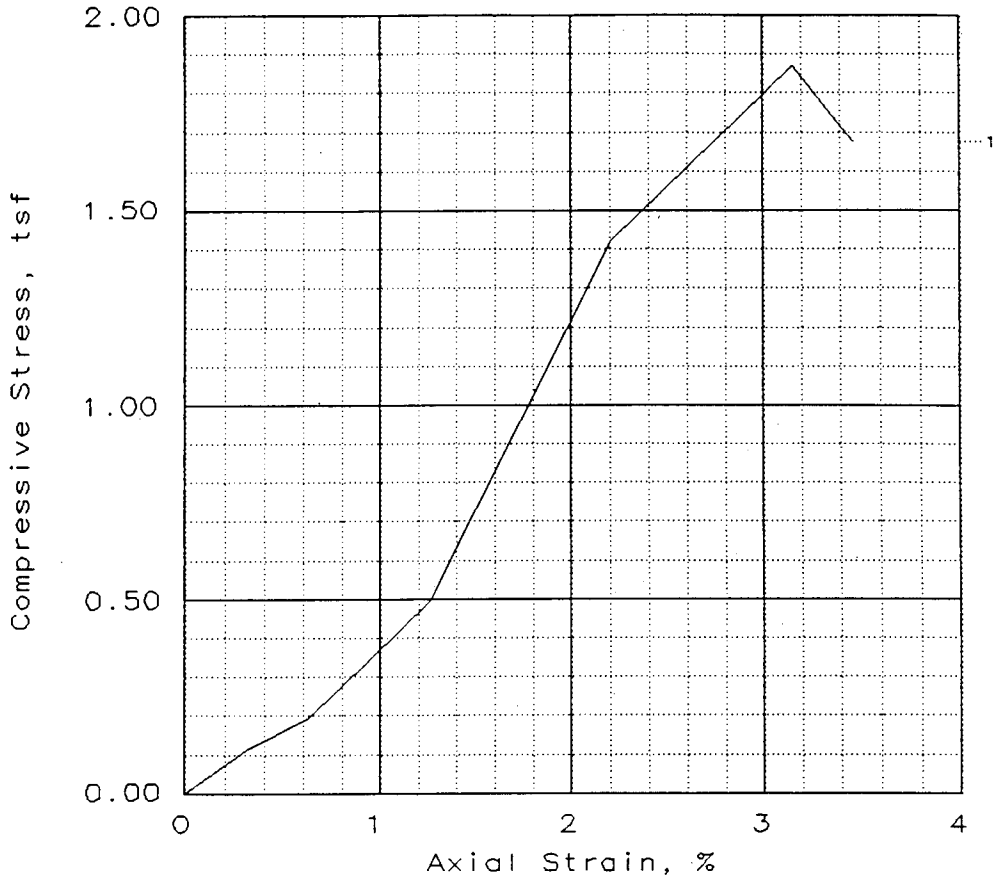
Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 13B

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

(12611)

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.87			
Undrained shear strength, tsf	0.94			
Failure strain, %	3.2			
Strain rate, %/min	1.00			
Water content, %	19.6			
Wet density, pcf	102.7			
Dry density, pcf	85.9			
Saturation, %	60.0			
Void ratio	0.8168			
Specimen diameter, in	1.99			
Specimen height, in	3.17			
Height/diameter ratio	1.59			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 9/22/00
Remarks:
LAB NO. 7573
(7) DAY TEST
MIXED ON 9/14/00
REMOLDED ON 9/15/00
Fig. No.: ———

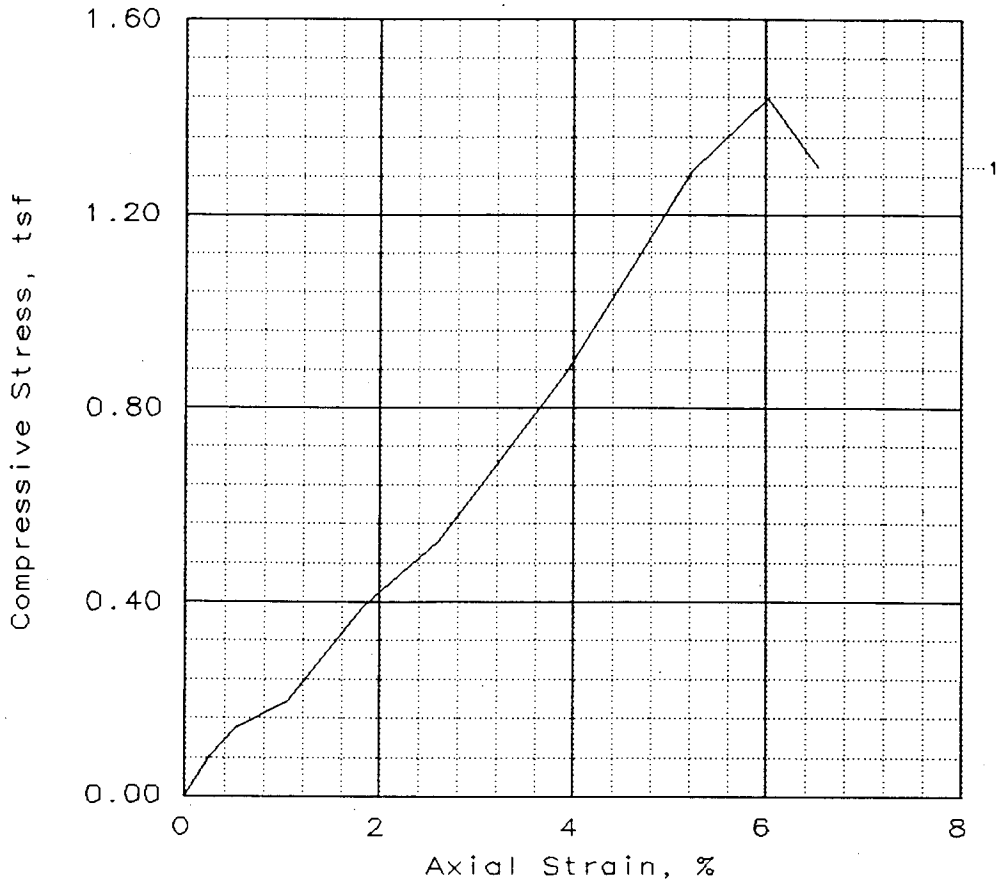
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 13C

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.44			
Undrained shear strength, tsf	0.72			
Failure strain, %	6.0			
Strain rate, %/min	1.00			
Water content, %	40.6			
Wet density, pcf	108.6			
Dry density, pcf	77.2			
Saturation, %	99.4			
Void ratio	1.0216			
Specimen diameter, in	1.98			
Specimen height, in	3.82			
Height/diameter ratio	1.93			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 9/20/00

Remarks:
LAB NO. 7544
RAN SAME DAY, MIXED & PICKED UP 9/19/00, REMOLDED

Fig. No.: ——

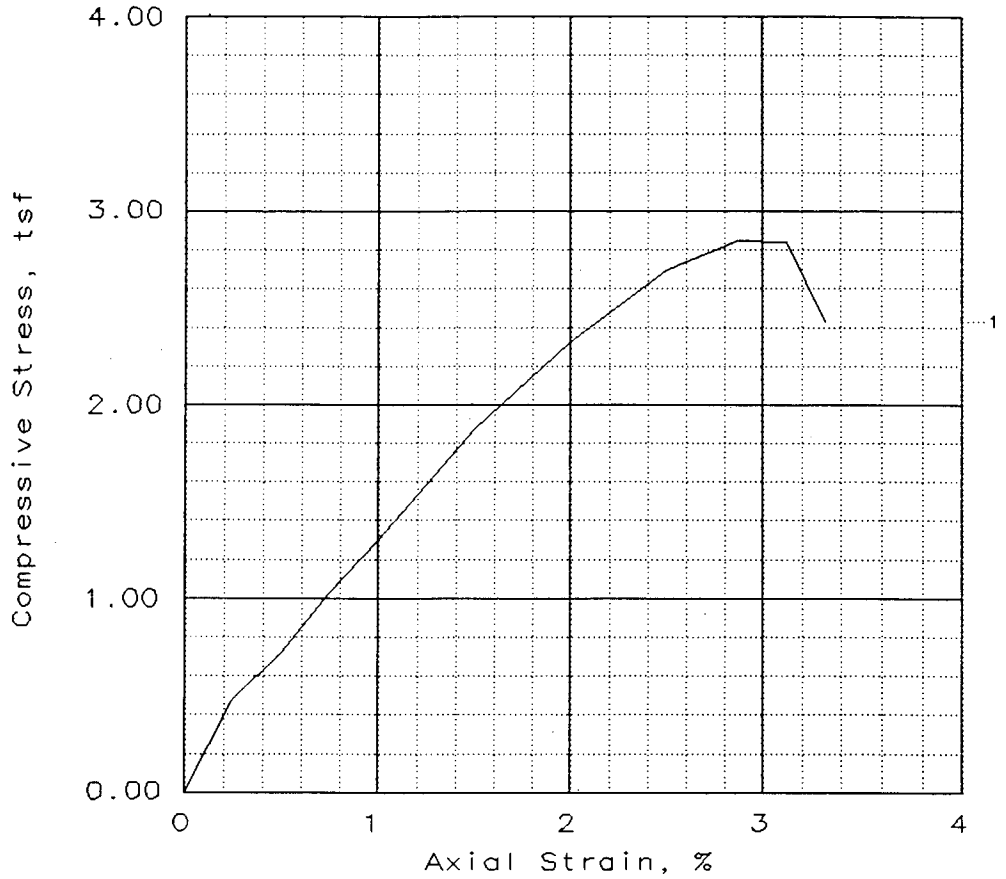
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 14 (PRIMARY SOUTH)

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.85			
Undrained shear strength, tsf	1.42			
Failure strain, %	2.9			
Strain rate, %/min	1.00			
Water content, %	37.6			
Wet density, pcf	107.6			
Dry density, pcf	78.2			
Saturation, %	94.4			
Void ratio	0.9967			
Specimen diameter, in	1.99			
Specimen height, in	4.00			
Height/diameter ratio	2.01			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 9/21/00

Remarks:
LAB NO. 7547
PICKED UP & REMOLDED ON 9/19

Fig. No.: ——

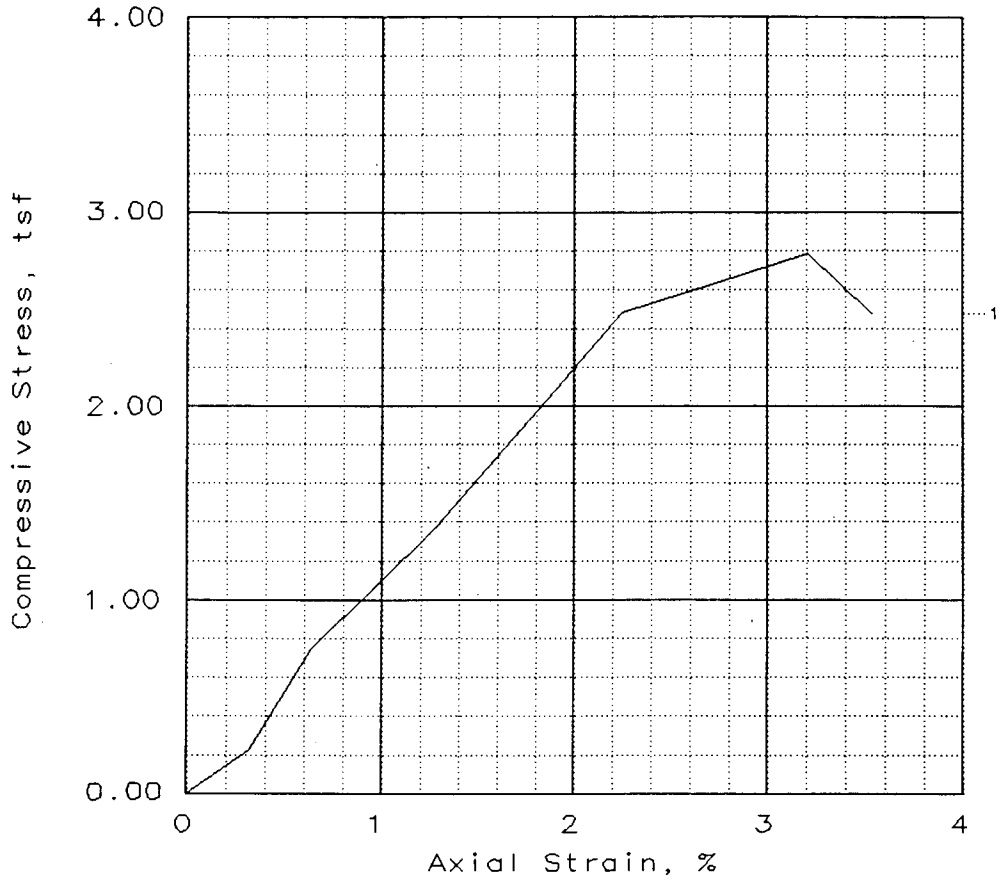
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 14-A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.79			
Undrained shear strength, tsf	1.39			
Failure strain, %	3.2			
Strain rate, %/min	1.00			
Water content, %	18.2			
Wet density, pcf	116.4			
Dry density, pcf	98.5			
Saturation, %	77.6			
Void ratio	0.5847			
Specimen diameter, in	1.99			
Specimen height, in	3.11			
Height/diameter ratio	1.56			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 9/20/00

Remarks:
LAB NO. 7545
RAN SAME DAY, MIXED & PICKED UP 9/19/00, REMOLDED

Fig. No.: ———

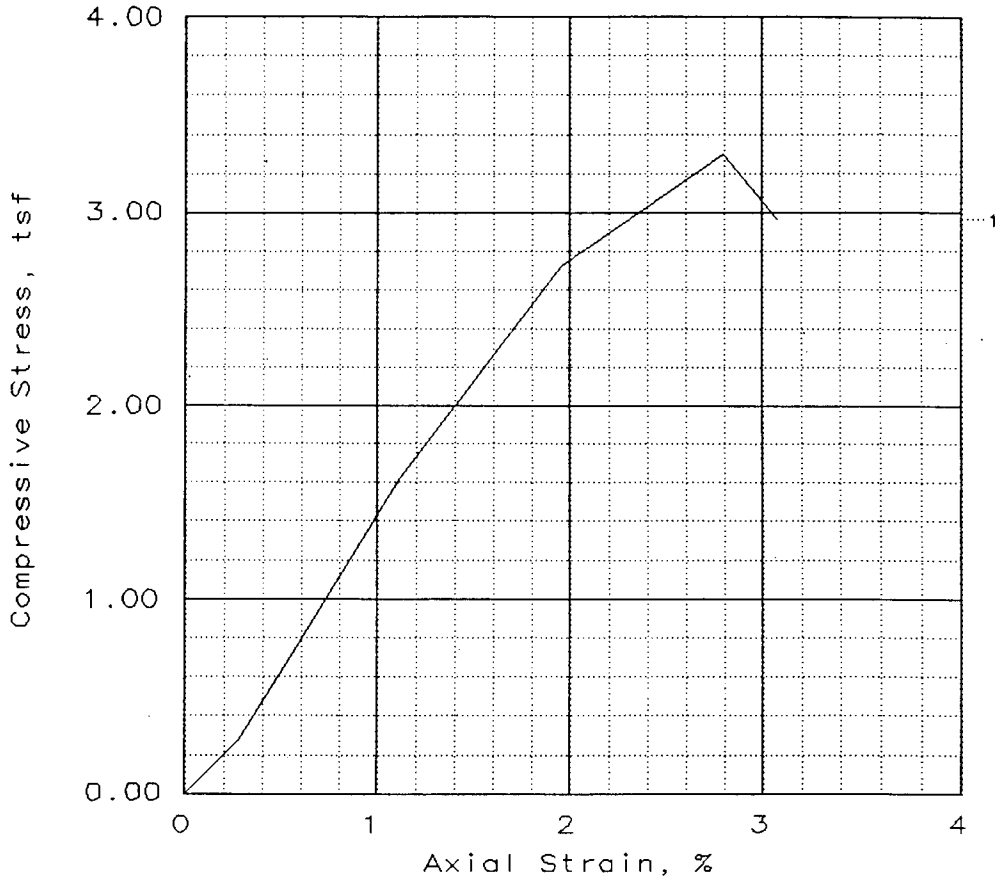
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 15 (PRIMARY MIDD.)

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	3.30			
Undrained shear strength, tsf	1.65			
Failure strain, %	2.8			
Strain rate, %/min	1.00			
Water content, %	21.5			
Wet density, pcf	120.5			
Dry density, pcf	99.2			
Saturation, %	93.6			
Void ratio	0.5738			
Specimen diameter, in	2.00			
Specimen height, in	3.58			
Height/diameter ratio	1.79			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 9/20/00

Remarks:
LAB NO. 7546
RAN SAME DAY, MIXED & PICKED UP 9/19/00, REMOLDED

Fig. No.: ——

Client: CONESTOGA-ROVERS & ASSOC. LTD

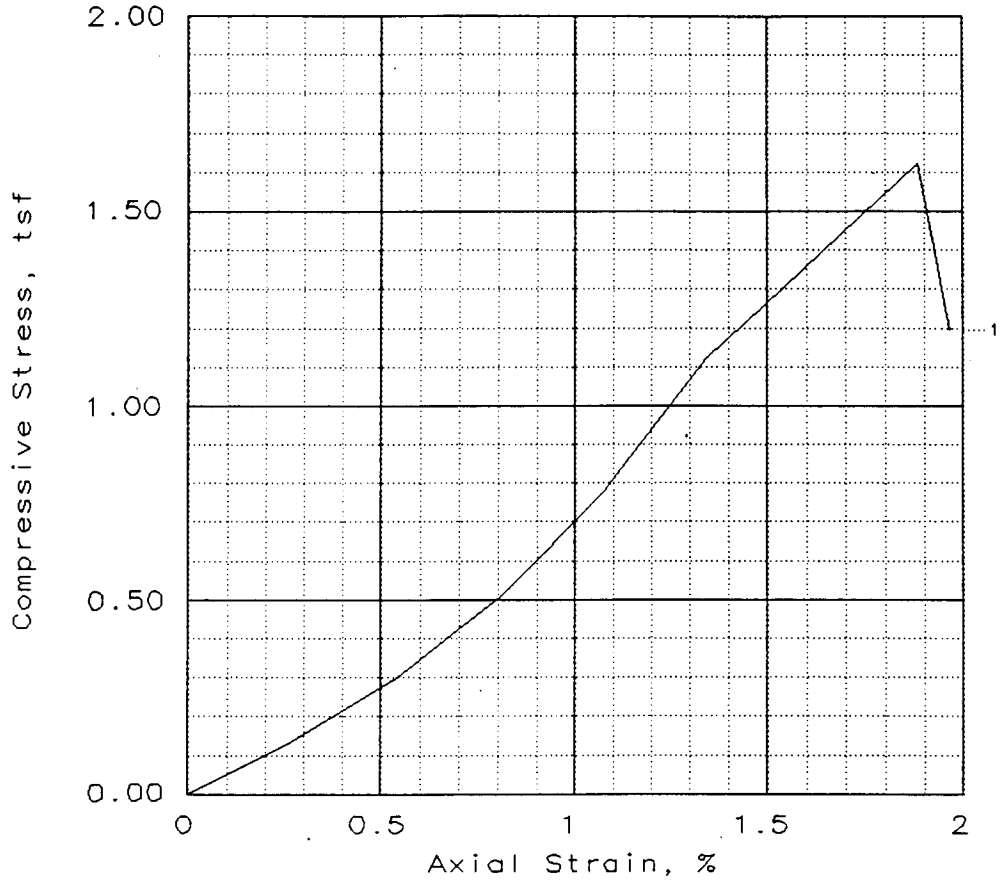
Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 16 (SECONARY
SOUTHEAST

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

12611

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.62			
Undrained shear strength, tsf	0.81			
Failure strain, %	1.9			
Strain rate, %/min	1.00			
Water content, %	32.2			
Wet density, pcf	95.4			
Dry density, pcf	72.2			
Saturation, %	69.2			
Void ratio	1.1631			
Specimen diameter, in	2.02			
Specimen height, in	3.71			
Height/diameter ratio	1.84			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7629

REMOLDED
PICKED UP & DELIVERED 9/22/00
Fig. No.: ——

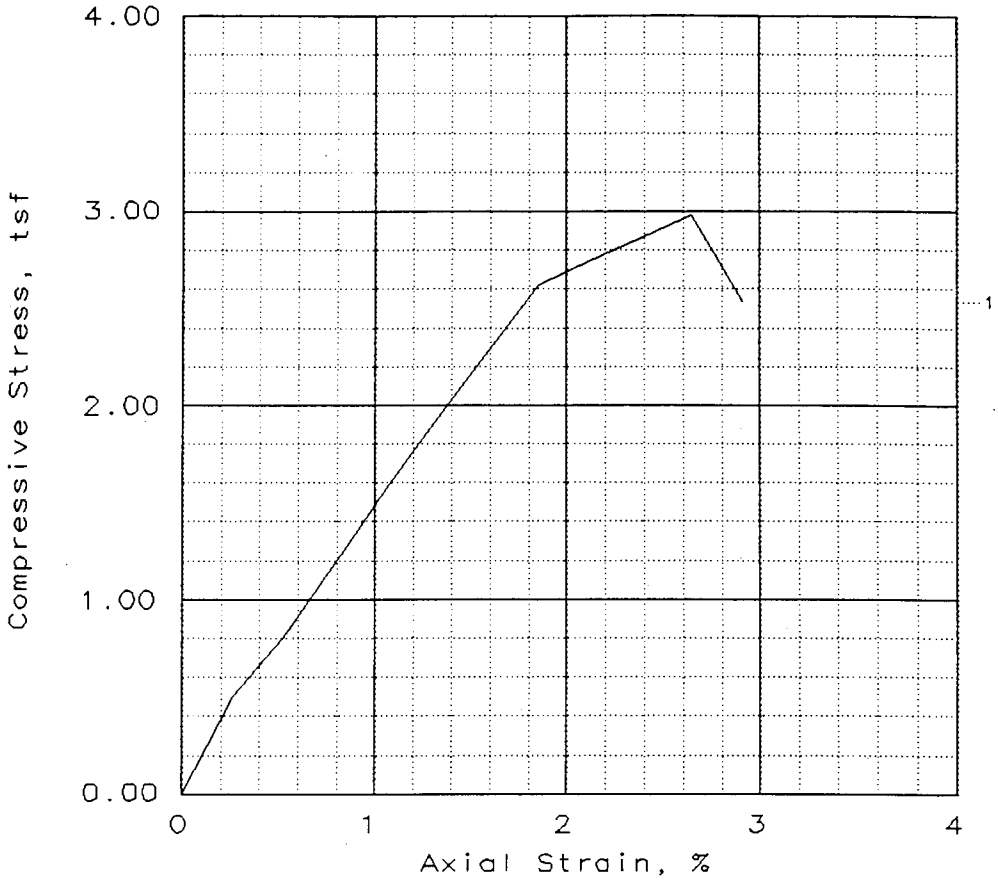
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 17 (PRIMARY)

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.98			
Undrained shear strength, tsf	1.49			
Failure strain, %	2.6			
Strain rate, %/min	1.00			
Water content, %	33.1			
Wet density, pcf	105.0			
Dry density, pcf	78.9			
Saturation, %	84.6			
Void ratio	0.9786			
Specimen diameter, in	2.00			
Specimen height, in	3.78			
Height/diameter ratio	1.89			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7684

REMOLDED
MAT'L FROM 9/26/00
Fig. No.: ——

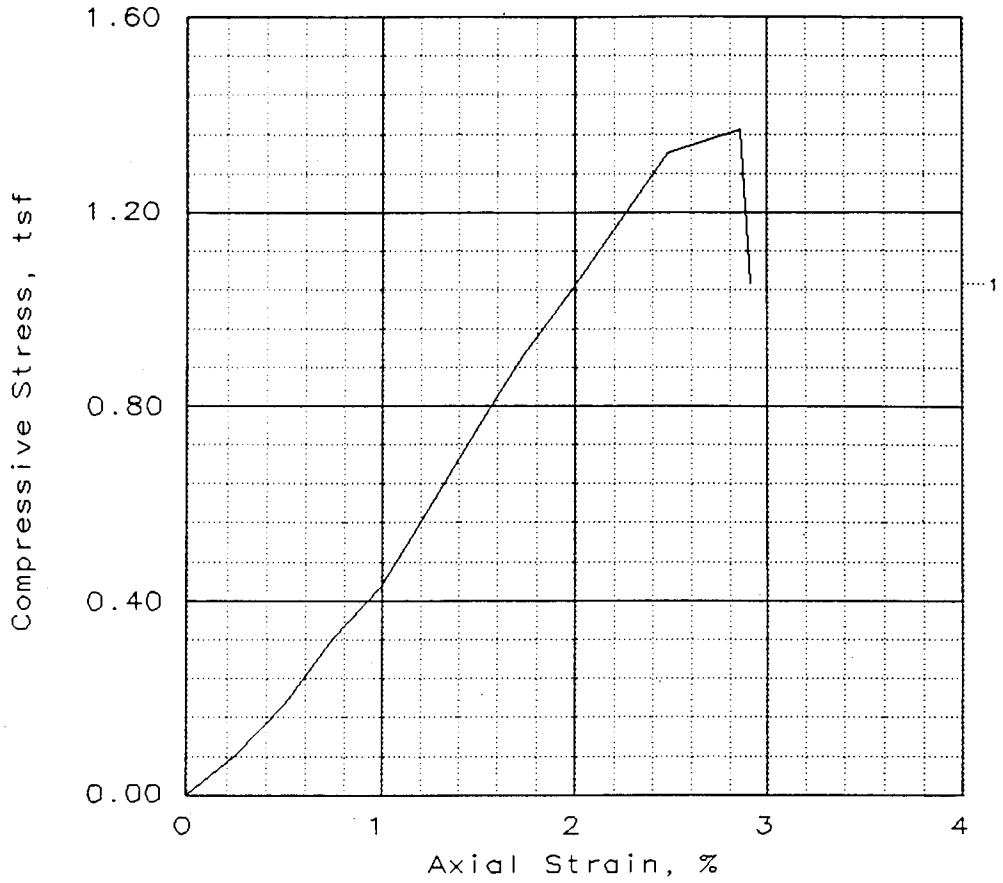
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 17-A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.37			
Undrained shear strength, tsf	0.68			
Failure strain, %	2.9			
Strain rate, %/min	1.00			
Water content, %	37.5			
Wet density, pcf	97.9			
Dry density, pcf	71.2			
Saturation, %	78.7			
Void ratio	1.1923			
Specimen diameter, in	2.02			
Specimen height, in	4.02			
Height/diameter ratio	1.99			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7630

REMOLDED
PICKED UP & DELIVERED 9/22/00
Fig. No.: ———

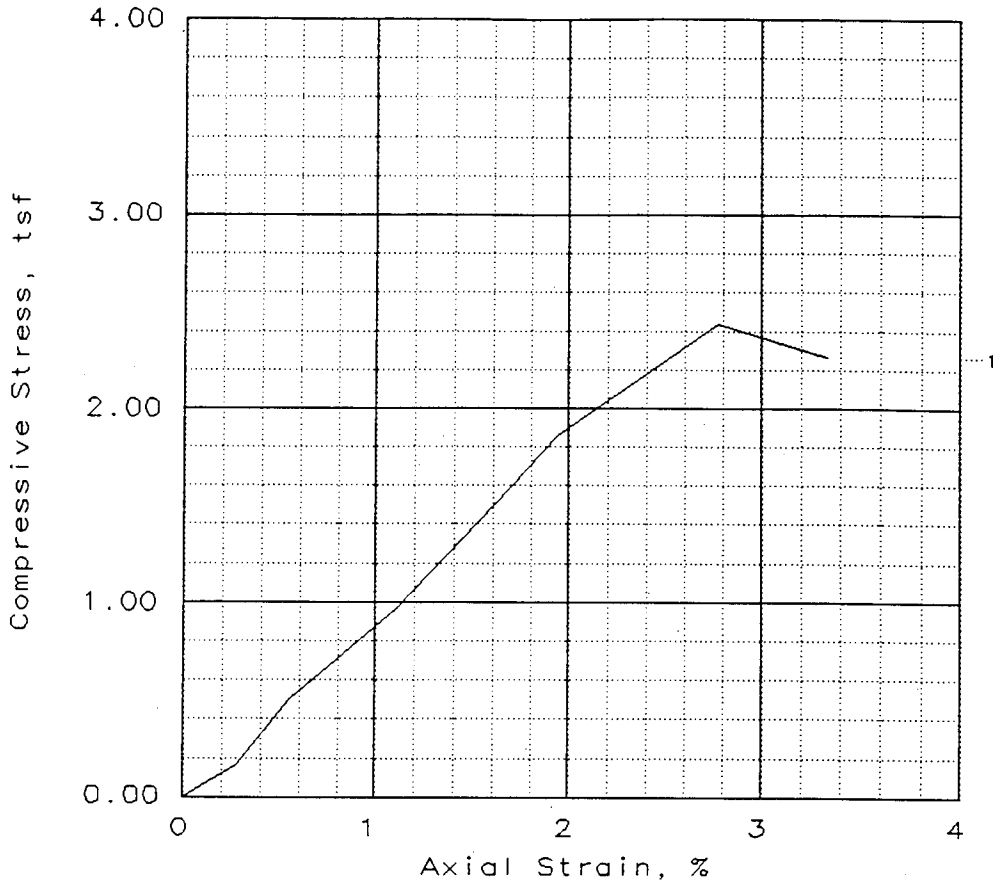
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 18 (SECONDARY)

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.44			
Undrained shear strength, tsf	1.22			
Failure strain, %	2.8			
Strain rate, %/min	1.00			
Water content, %	43.8			
Wet density, pcf	101.4			
Dry density, pcf	70.5			
Saturation, %	90.2			
Void ratio	1.2139			
Specimen diameter, in	1.99			
Specimen height, in	3.60			
Height/diameter ratio	1.80			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7685

REMOLDED
MAT'L FROM 9/26/00
Fig. No.: ——

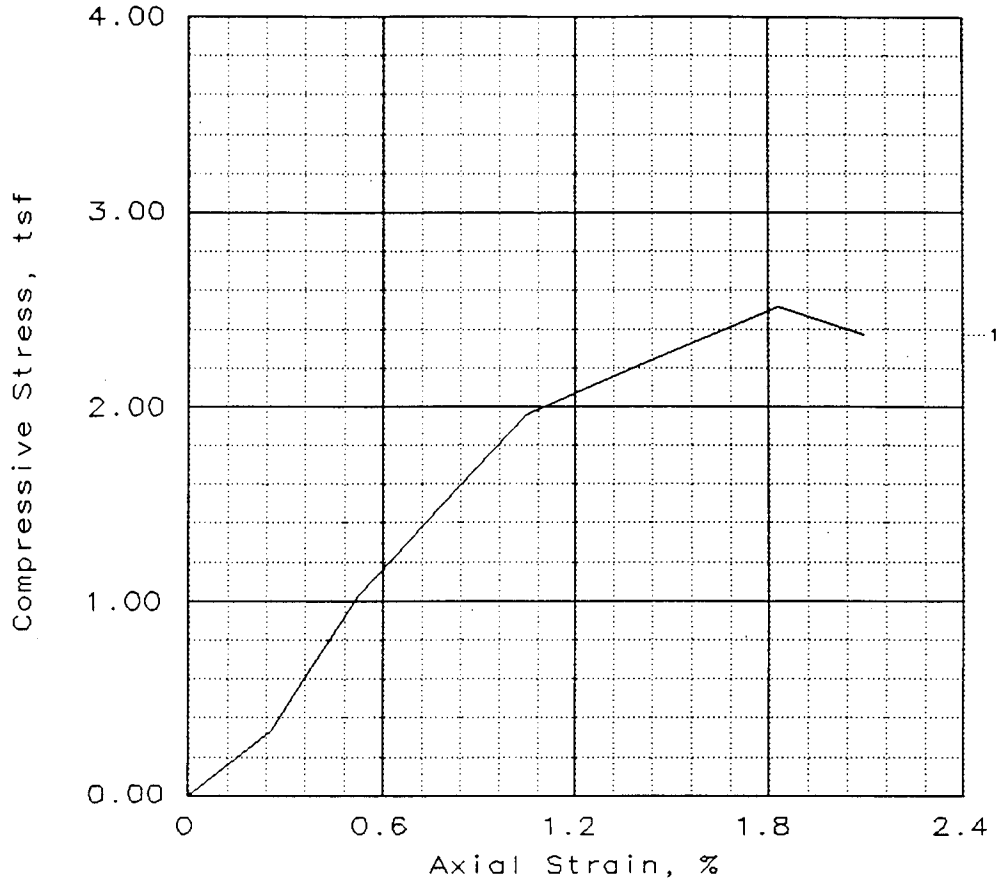
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 18-A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.52			
Undrained shear strength, tsf	1.26			
Failure strain, %	1.8			
Strain rate, %/min	1.00			
Water content, %	42.2			
Wet density, pcf	99.7			
Dry density, pcf	70.1			
Saturation, %	86.1			
Void ratio	1.2261			
Specimen diameter, in	1.99			
Specimen height, in	3.82			
Height/diameter ratio	1.92			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00

Remarks:
LAB NO. 7905

SAMPLE & REMOLDED ON 9/22/00
(7) DAY TEST
Fig. No.: ———

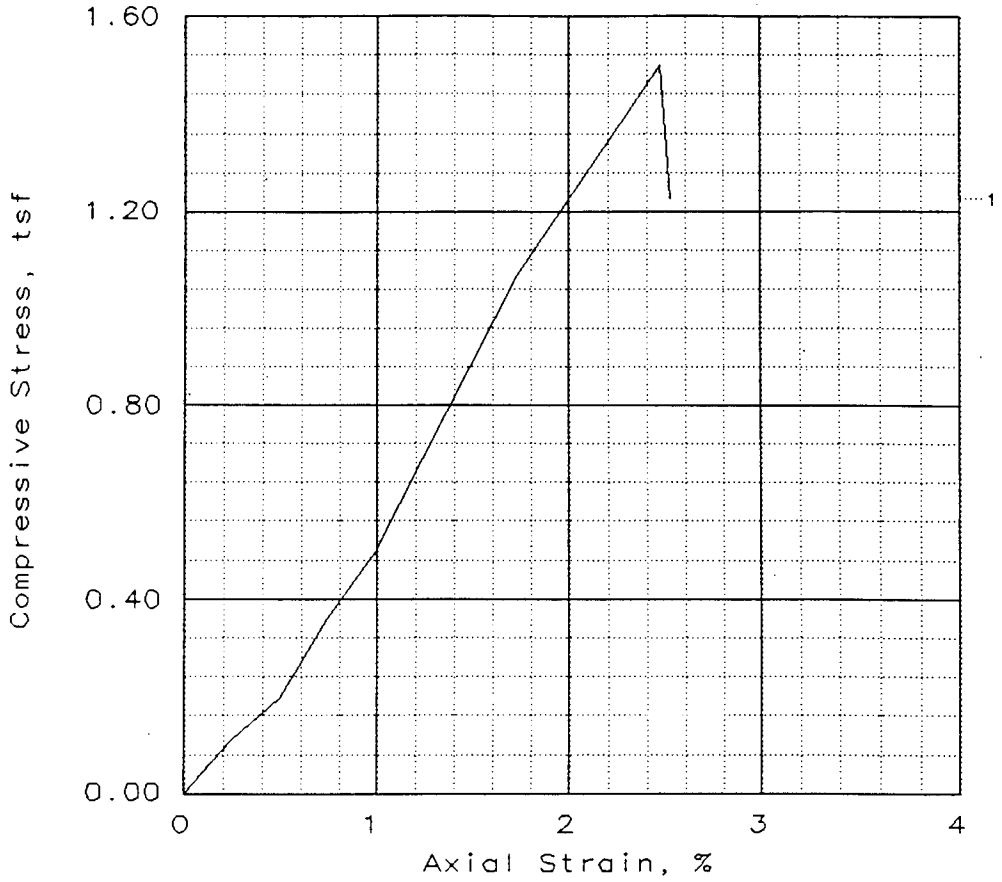
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 18-B

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.50			
Undrained shear strength, tsf	0.75			
Failure strain, %	2.5			
Strain rate, %/min	1.00			
Water content, %	41.3			
Wet density, pcf	100.7			
Dry density, pcf	71.3			
Saturation, %	86.8			
Void ratio	1.1897			
Specimen diameter, in	1.99			
Specimen height, in	4.04			
Height/diameter ratio	2.03			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7631

REMOLDED
PICKED UP & DELIVERED 9/22/00
Fig. No.: ———

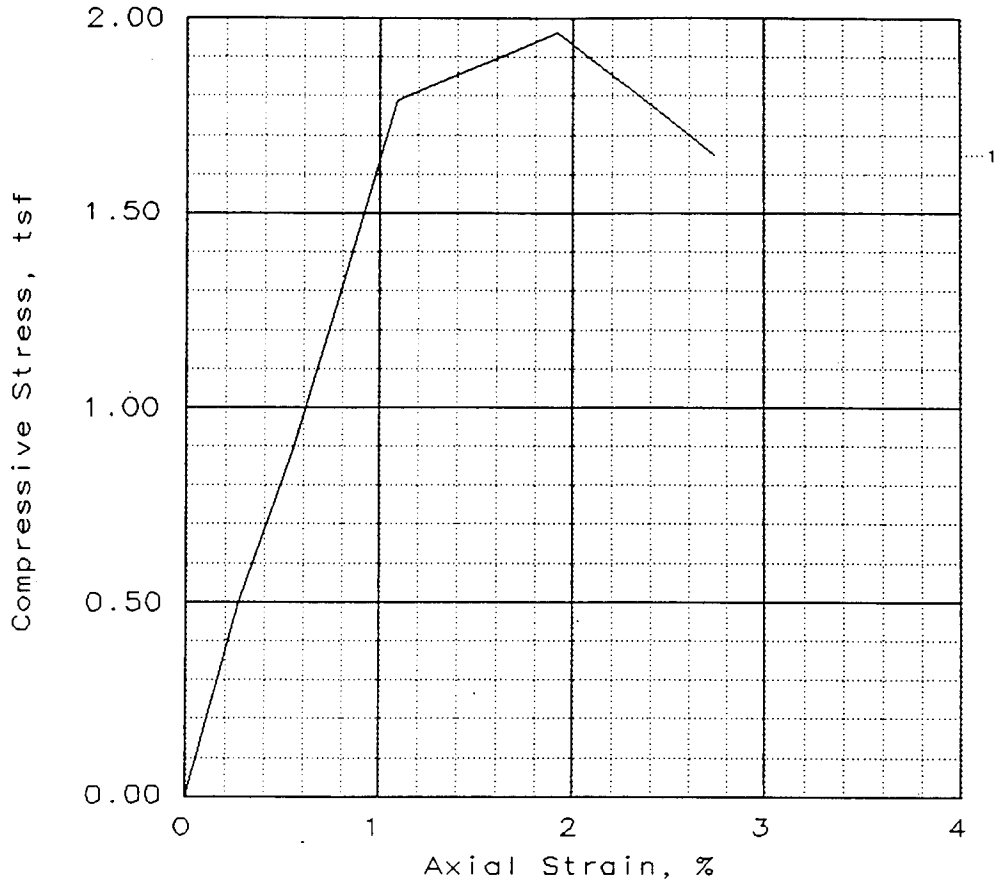
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 19 (SECONDARY)

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.96			
Undrained shear strength, tsf	0.98			
Failure strain, %	1.9			
Strain rate, %/min	1.00			
Water content, %	39.2			
Wet density, pcf	100.8			
Dry density, pcf	72.4			
Saturation, %	84.9			
Void ratio	1.1551			
Specimen diameter, in	2.00			
Specimen height, in	3.65			
Height/diameter ratio	1.83			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7686

REMOLDED
MAT'L FROM 9/26/00
Fig. No.: ———

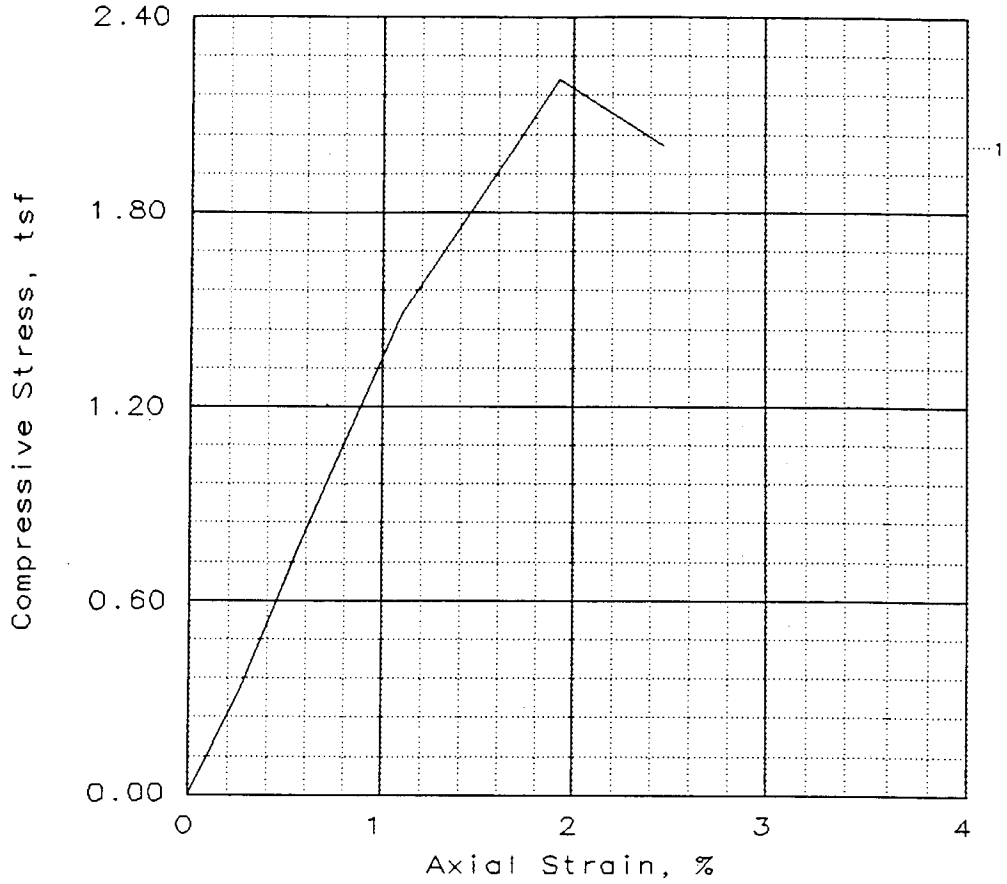
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 19-A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.21			
Undrained shear strength, tsf	1.10			
Failure strain, %	1.9			
Strain rate, %/min	1.00			
Water content, %	39.6			
Wet density, pcf	101.7			
Dry density, pcf	72.9			
Saturation, %	86.7			
Void ratio	1.1408			
Specimen diameter, in	2.00			
Specimen height, in	3.64			
Height/diameter ratio	1.82			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7906

REMOLDED ON 9/22/00
SAMPLED ON 9/22/00
Fig. No.: ——

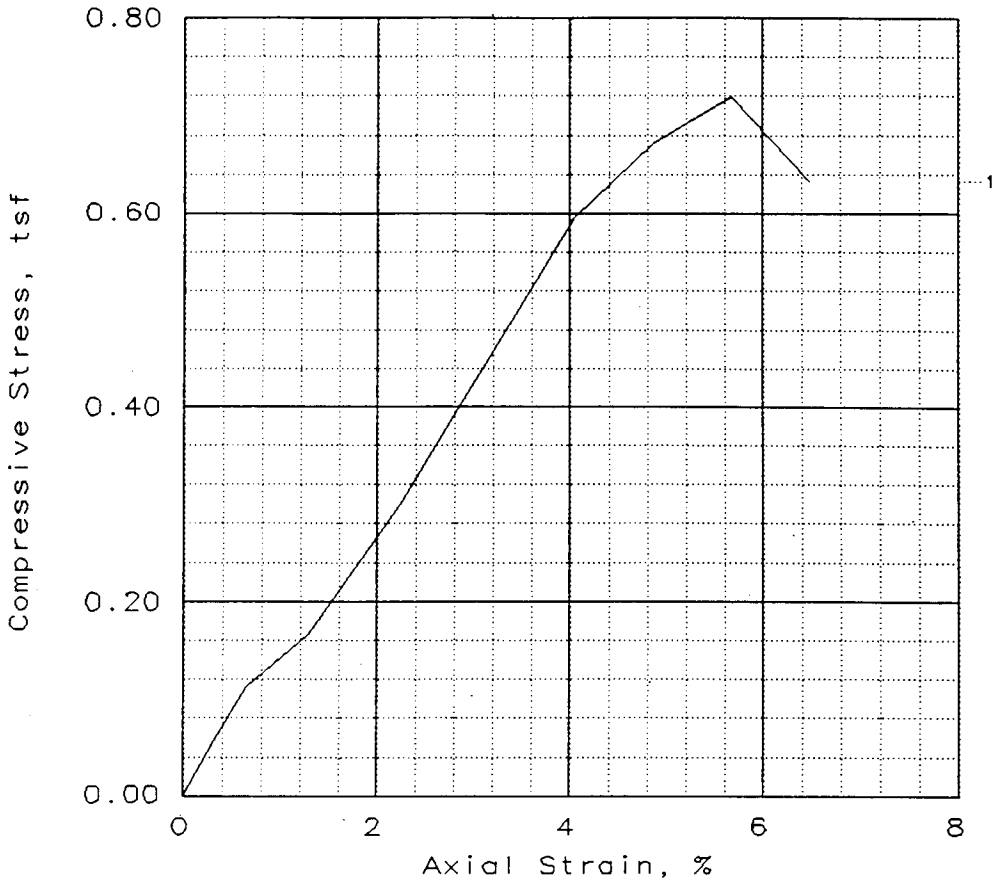
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 19-B

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.72			
Undrained shear strength, tsf	0.36			
Failure strain, %	5.7			
Strain rate, %/min	1.00			
Water content, %	73.2			
Wet density, pcf	94.2			
Dry density, pcf	54.4			
Saturation, %	97.9			
Void ratio	1.8685			
Specimen diameter, in	1.98			
Specimen height, in	3.08			
Height/diameter ratio	1.56			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7716

REMOLDED
MAT'L FROM 9/26/00
Fig. No.: ———

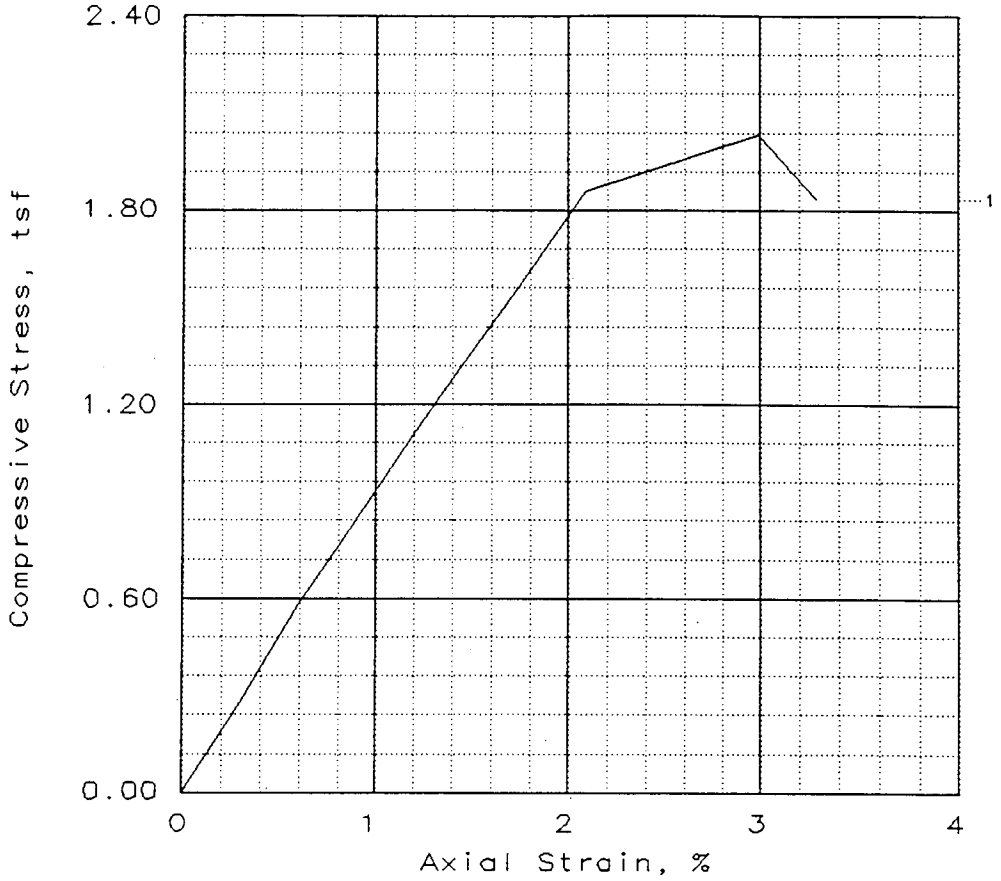
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 20

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.03			
Undrained shear strength, tsf	1.02			
Failure strain, %	3.0			
Strain rate, %/min	1.00			
Water content, %	68.3			
Wet density, pcf	92.9			
Dry density, pcf	55.2			
Saturation, %	93.4			
Void ratio	1.8288			
Specimen diameter, in	1.99			
Specimen height, in	3.34			
Height/diameter ratio	1.68			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7907

SAMPLED & REMOLDED ON 9/26/00
(3) DAY TEST
Fig. No.: ———

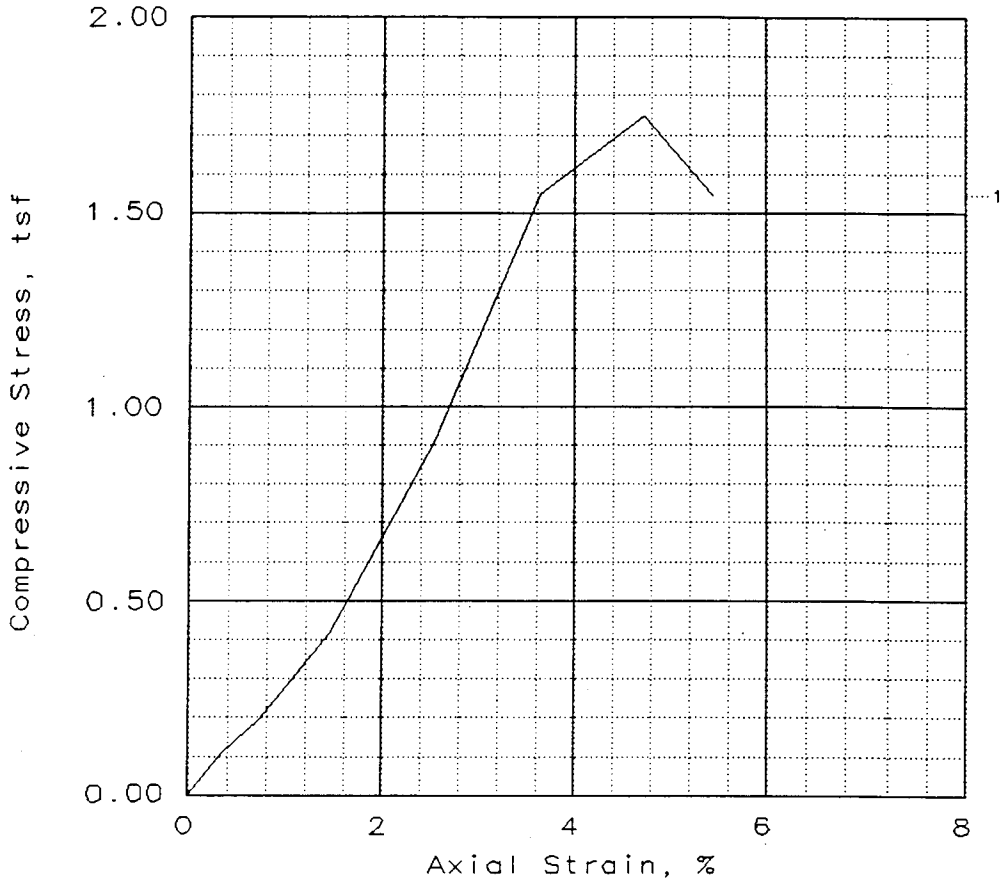
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 20-A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.75			
Undrained shear strength, tsf	0.87			
Failure strain, %	4.7			
Strain rate, %/min	1.00			
Water content, %	73.3			
Wet density, pcf	91.1			
Dry density, pcf	52.5			
Saturation, %	93.0			
Void ratio	1.9710			
Specimen diameter, in	1.98			
Specimen height, in	2.75			
Height/diameter ratio	1.39			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 7939

SAMPLED & REMOLDED ON 9/26/00
(7) DAY TEST
Fig. No.: ———

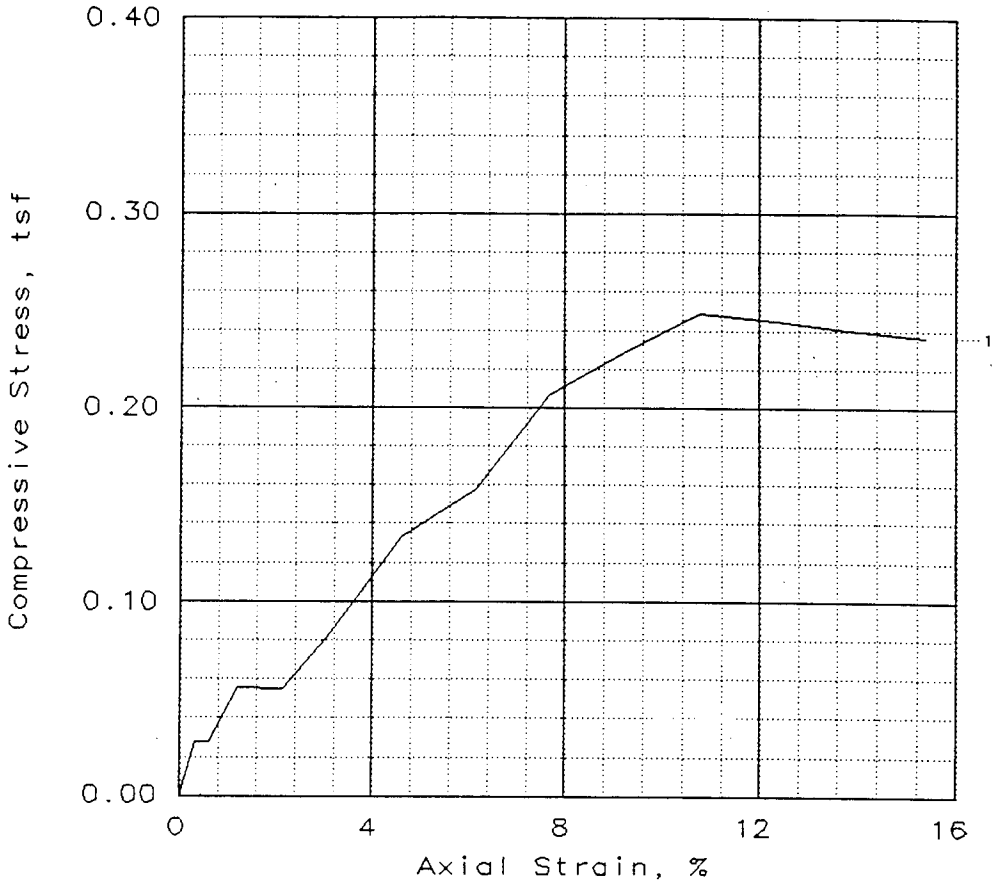
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 20-B

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.25			
Undrained shear strength, tsf	0.12			
Failure strain, %	10.8			
Strain rate, %/min	1.00			
Water content, %	100.0			
Wet density, pcf	90.1			
Dry density, pcf	45.0			
Saturation, %	101.4			
Void ratio	2.4645			
Specimen diameter, in	1.99			
Specimen height, in	3.25			
Height/diameter ratio	1.63			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7717

REMOLDED ON 9/26/00
MAT'L FROM 9/26/00
Fig. No.: ——

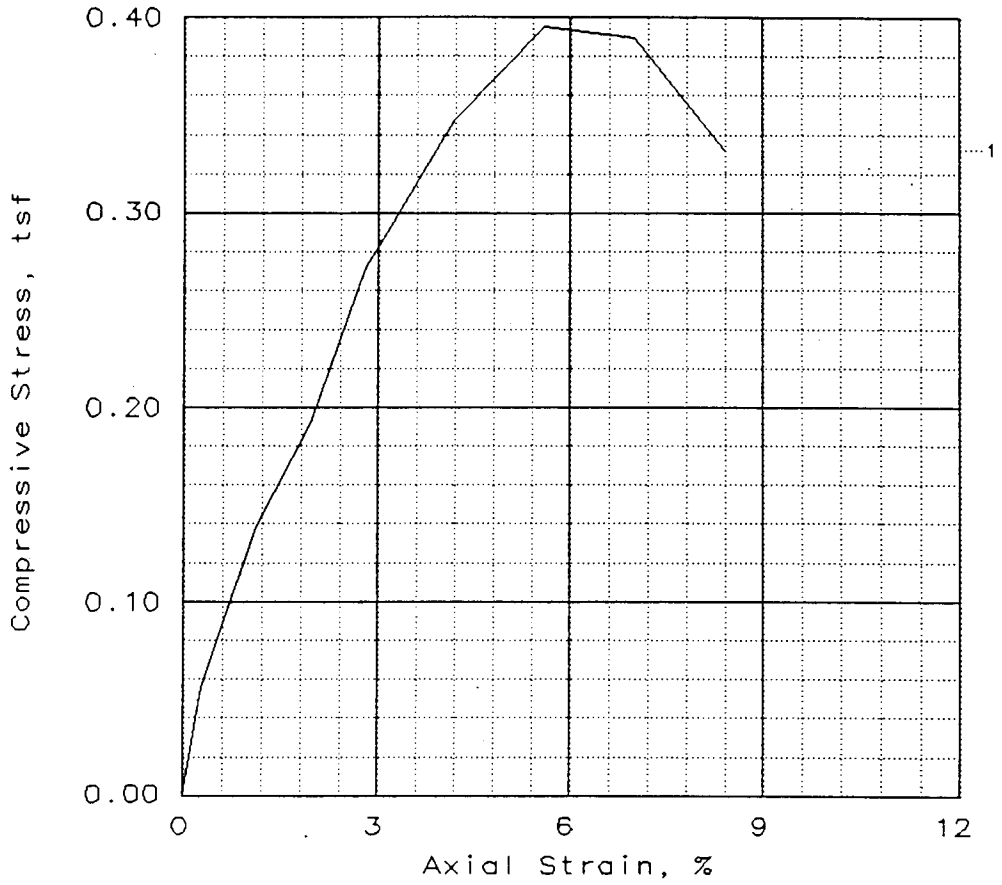
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 21

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.40			
Undrained shear strength, tsf	0.20			
Failure strain, %	5.6			
Strain rate, %/min	1.00			
Water content, %	100.7			
Wet density, pcf	86.7			
Dry density, pcf	43.2			
Saturation, %	96.4			
Void ratio	2.6117			
Specimen diameter, in	1.99			
Specimen height, in	3.57			
Height/diameter ratio	1.79			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00

Remarks:
LAB NO. 7908

SAMPLED & REMOLDED ON 9/26/00
(3) DAY TEST
Fig. No.: ——

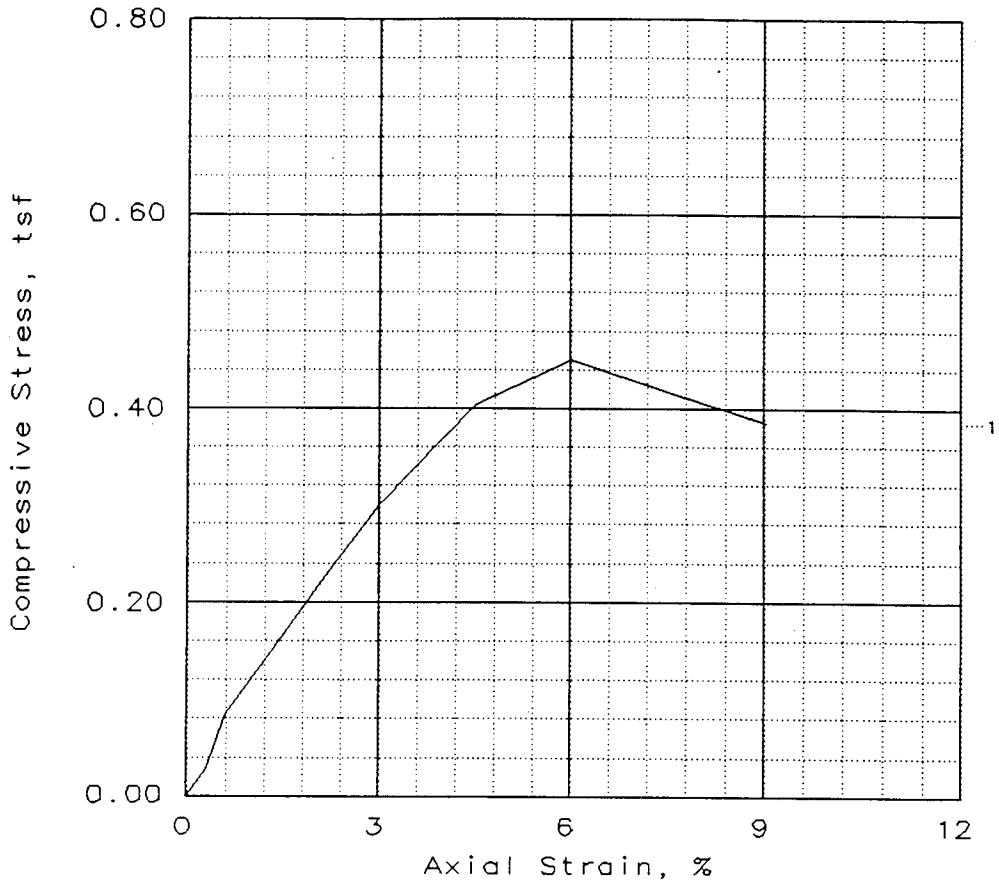
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 21-A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.45			
Undrained shear strength, tsf	0.23			
Failure strain, %	6.0			
Strain rate, %/min	1.00			
Water content, %	101.2			
Wet density, pcf	87.9			
Dry density, pcf	43.7			
Saturation, %	98.4			
Void ratio	2.5706			
Specimen diameter, in	1.98			
Specimen height, in	3.32			
Height/diameter ratio	1.68			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00

Remarks:
LAB NO. 7940

SAMPLED & REMOLDED ON 9/26/00

Fig. No.: ——

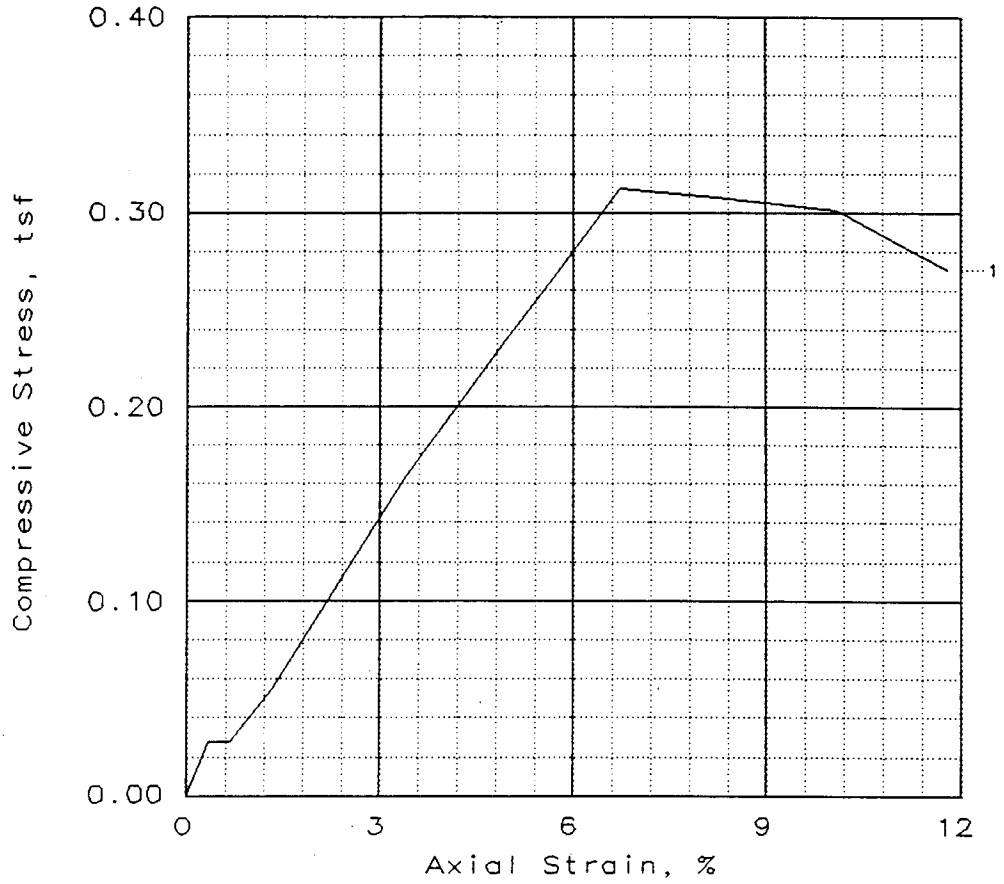
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 21-B

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.31			
Undrained shear strength, tsf	0.16			
Failure strain, %	6.7			
Strain rate, %/min	1.00			
Water content, %	98.0			
Wet density, pcf	89.4			
Dry density, pcf	45.2			
Saturation, %	99.8			
Void ratio	2.4555			
Specimen diameter, in	1.99			
Specimen height, in	2.97			
Height/diameter ratio	1.49			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7718

REMOLDED ON 9/26/00
MAT'L FROM 9/26/00
Fig. No.: ——

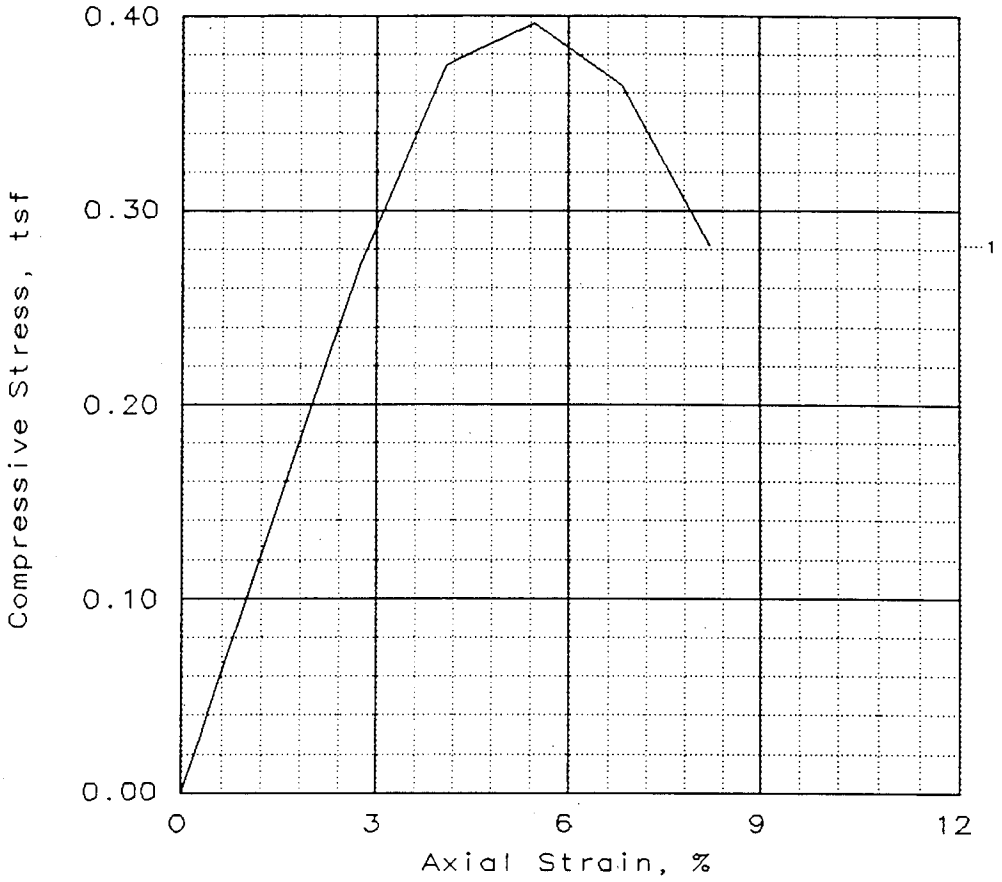
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 22

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.40			
Undrained shear strength, tsf	0.20			
Failure strain, %	5.5			
Strain rate, %/min	1.00			
Water content, %	100.0			
Wet density, pcf	87.4			
Dry density, pcf	43.7			
Saturation, %	97.2			
Void ratio	2.5726			
Specimen diameter, in	1.99			
Specimen height, in	3.65			
Height/diameter ratio	1.83			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/2/00
Remarks:
LAB NO. 7909

SAMPLE & REMOLDED ON 9/26/00
(3) DAY TEST
Fig. No.: ——

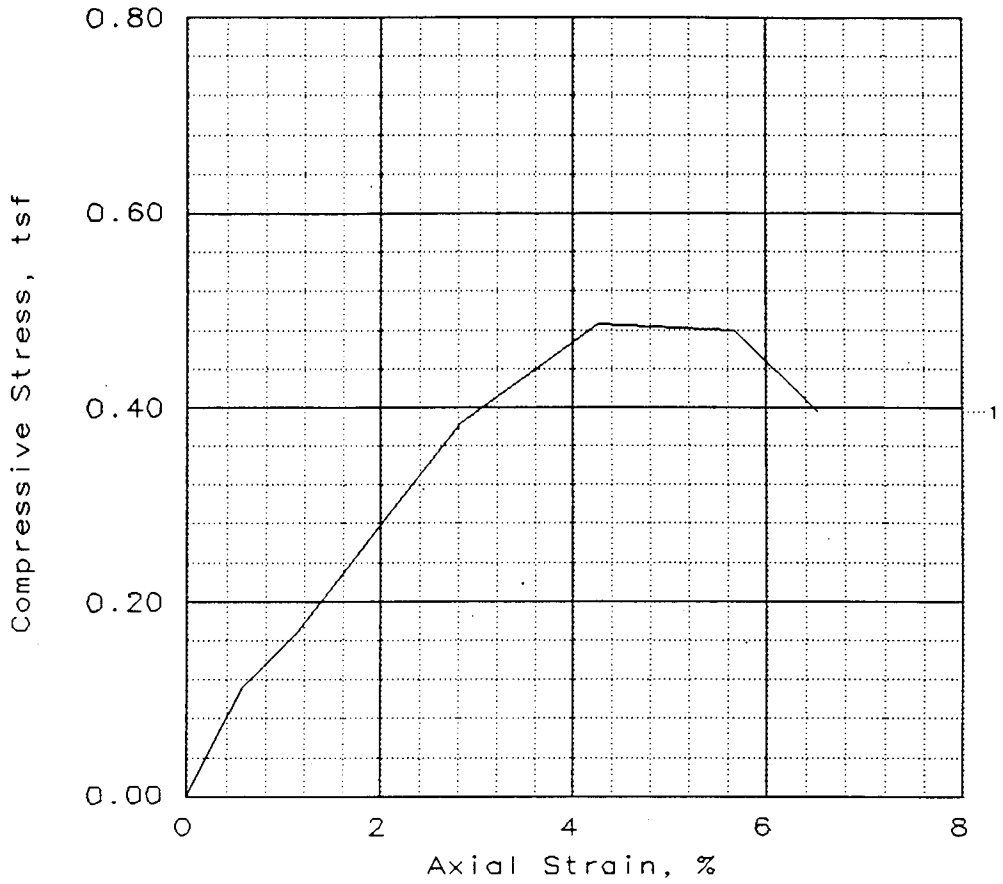
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 22-A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.49			
Undrained shear strength, tsf	0.24			
Failure strain, %	4.3			
Strain rate, %/min	1.00			
Water content, %	101.1			
Wet density, pcf	88.4			
Dry density, pcf	43.9			
Saturation, %	99.1			
Void ratio	2.5530			
Specimen diameter, in	1.98			
Specimen height, in	3.52			
Height/diameter ratio	1.78			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 7941

SAMPLED & REMOLDED ON 9/26/00
(7) DAY TEST
Fig. No.: ———

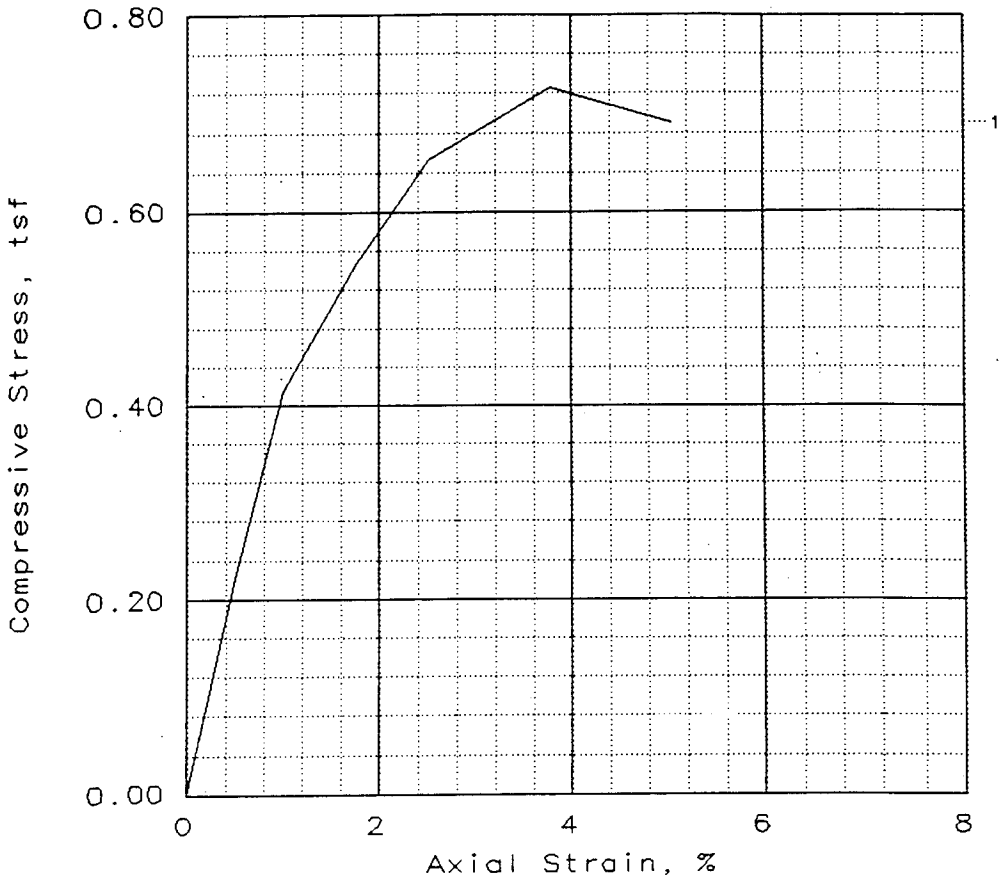
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 22-B

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.73			
Undrained shear strength, tsf	0.36			
Failure strain, %	3.8			
Strain rate, %/min	1.00			
Water content, %	96.7			
Wet density, pcf	87.3			
Dry density, pcf	44.4			
Saturation, %	96.0			
Void ratio	2.5178			
Specimen diameter, in	1.99			
Specimen height, in	3.96			
Height/diameter ratio	1.99			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 7785

SAMPLED & REMOLDED ON 9/28/00
(4) DAY TEST
Fig. No.: ———

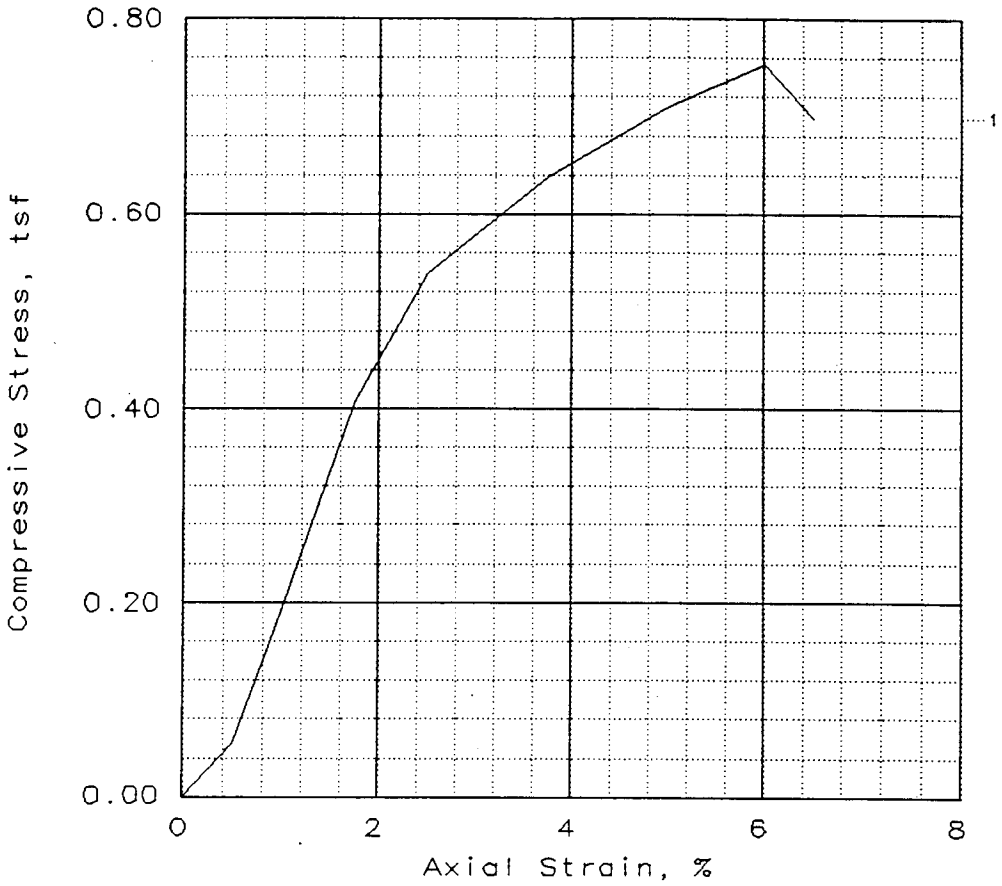
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 23

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.75			
Undrained shear strength, tsf	0.38			
Failure strain, %	6.0			
Strain rate, %/min	1.00			
Water content, %	91.5			
Wet density, pcf	85.9			
Dry density, pcf	44.8			
Saturation, %	92.2			
Void ratio	2.4814			
Specimen diameter, in	2.00			
Specimen height, in	3.99			
Height/diameter ratio	2.00			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 7786

SAMPLED & REMOLDED ON 9/28/00
(4) DAY TEST
Fig. No.: ——

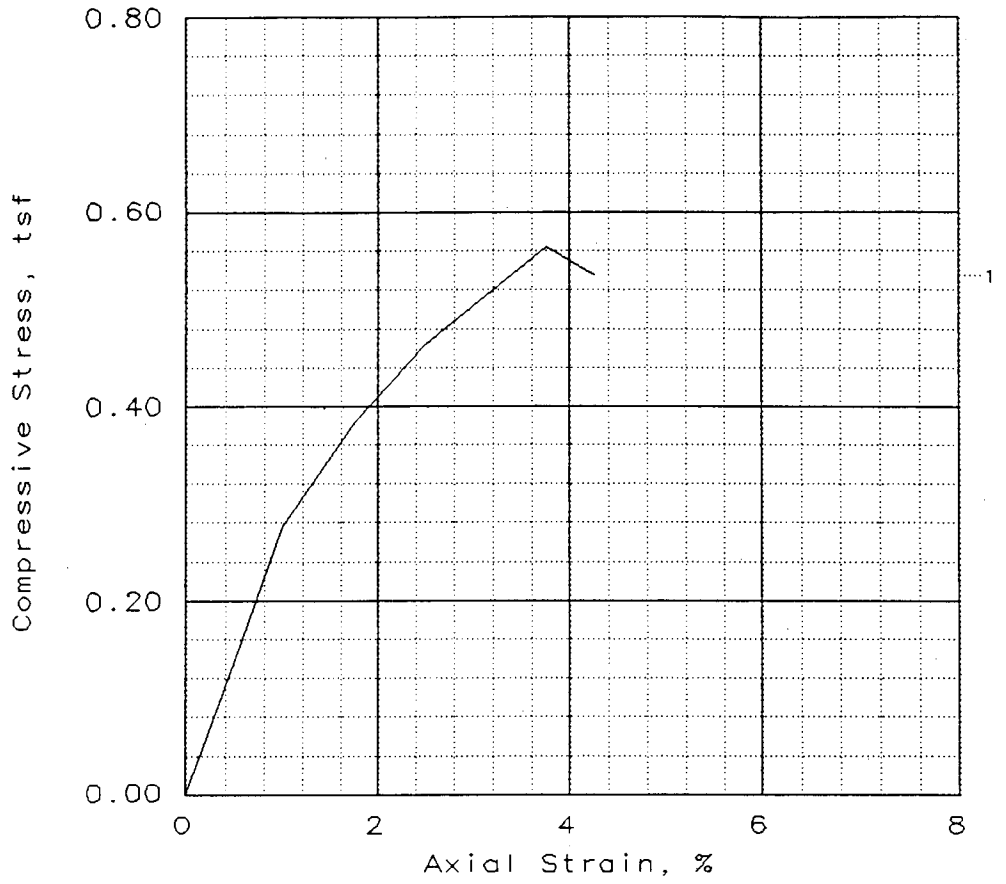
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 24

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.56			
Undrained shear strength, tsf	0.28			
Failure strain, %	3.8			
Strain rate, %/min	1.00			
Water content, %	78.5			
Wet density, pcf	91.1			
Dry density, pcf	51.0			
Saturation, %	95.3			
Void ratio	2.0595			
Specimen diameter, in	1.99			
Specimen height, in	3.99			
Height/diameter ratio	2.01			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 7787

SAMPLED & REMOLDED ON 9/28/00
(4) DAY TEST
Fig. No.: ——

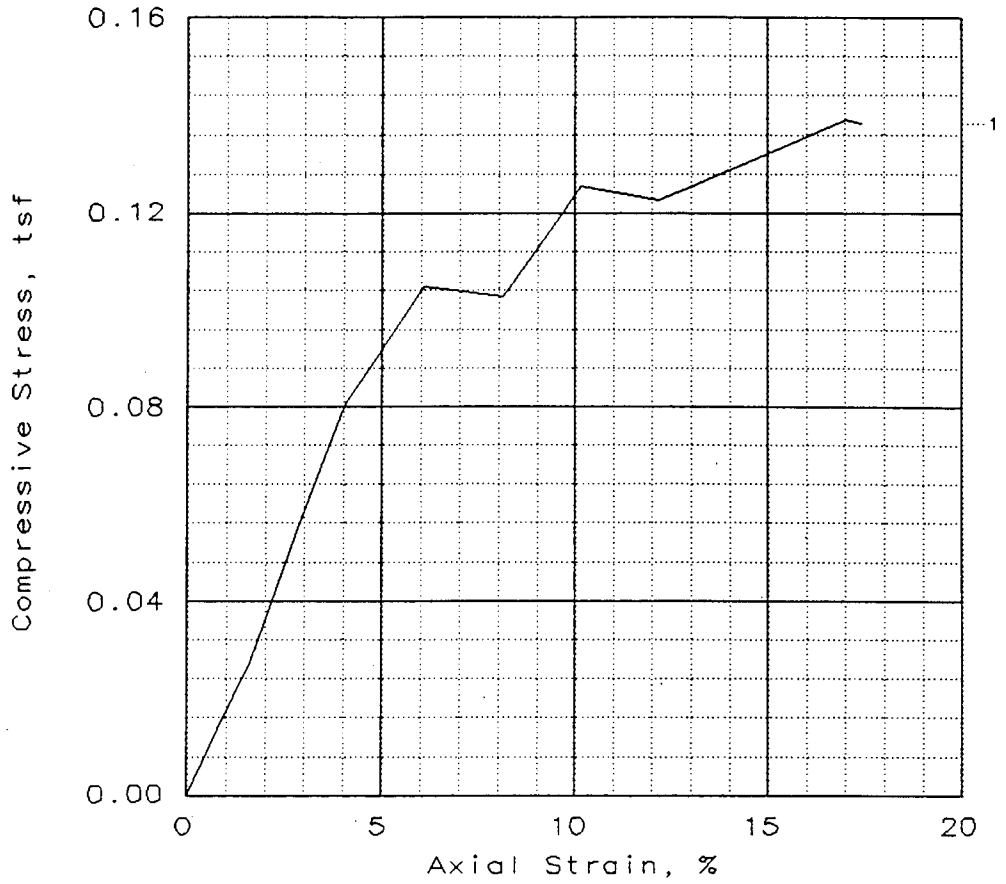
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 25

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.14			
Undrained shear strength, tsf	0.07			
Failure strain, %	17.1			
Strain rate, %/min	1.00			
Water content, %	53.5			
Wet density, pcf	104.4			
Dry density, pcf	68.0			
Saturation, %	103.2			
Void ratio	1.2955			
Specimen diameter, in	1.99			
Specimen height, in	2.46			
Height/diameter ratio	1.24			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 7997

SAMPLED & REMOLDED ON 10/3/00
(2) DAY TEST
Fig. No.: ———

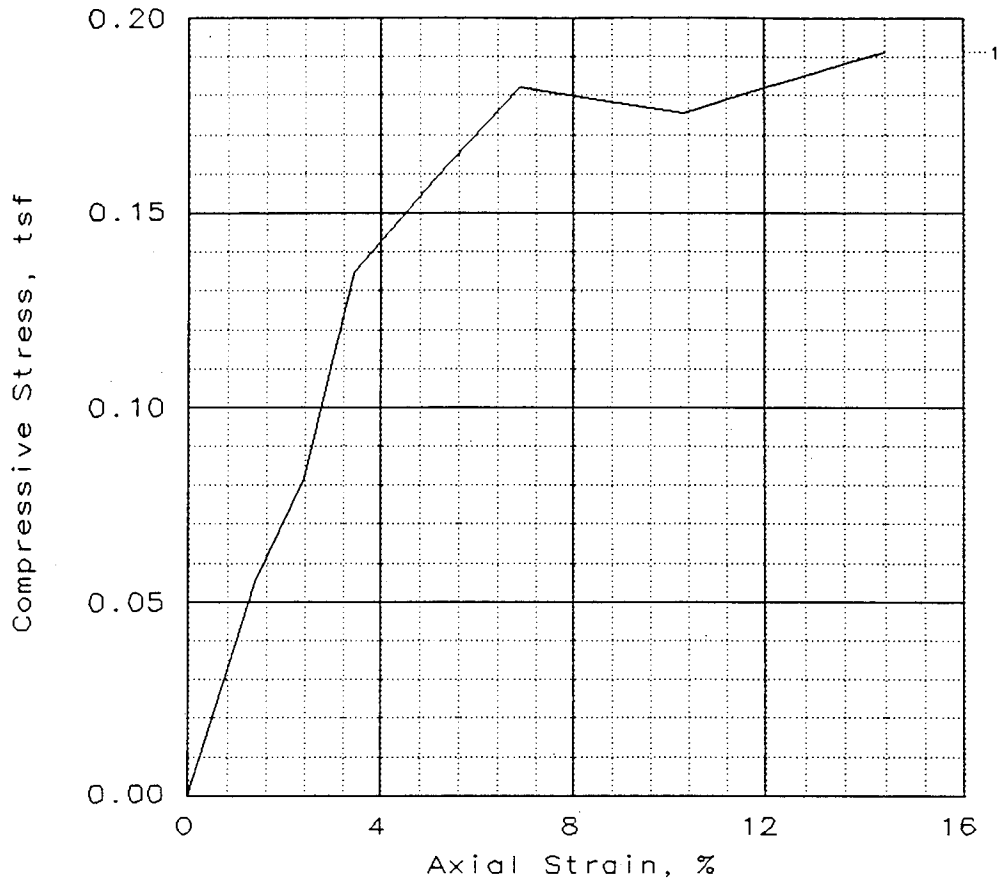
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 26

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.19			
Undrained shear strength, tsf	0.10			
Failure strain, %	14.4			
Strain rate, %/min	1.00			
Water content, %	59.2			
Wet density, pcf	97.0			
Dry density, pcf	61.0			
Saturation, %	94.8			
Void ratio	1.5599			
Specimen diameter, in	1.99			
Specimen height, in	2.91			
Height/diameter ratio	1.46			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/11/00
Remarks:
LAB NO. 8094

SAMPLED & REMOLDED ON 10/3/00
(7) DAY TESTED
Fig. No.: ——

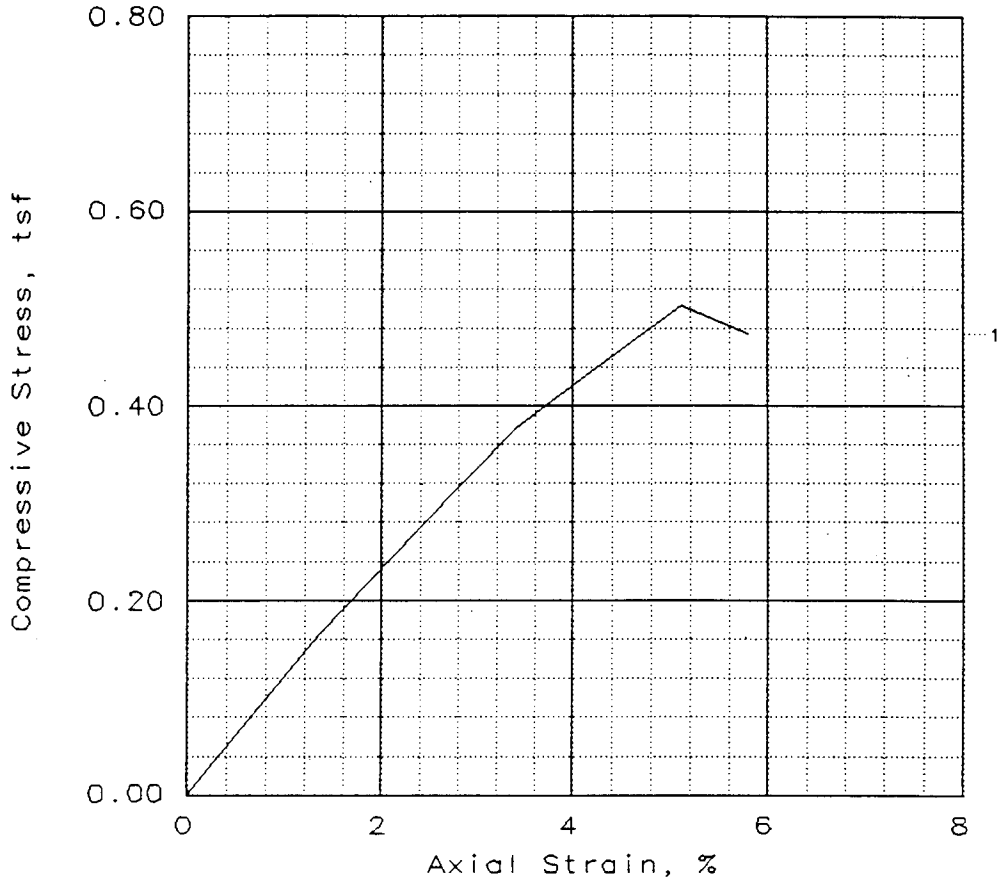
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 26A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.50			
Undrained shear strength, tsf	0.25			
Failure strain, %	5.1			
Strain rate, %/min	1.00			
Water content, %	54.9			
Wet density, pcf	99.7			
Dry density, pcf	64.4			
Saturation, %	96.3			
Void ratio	1.4253			
Specimen diameter, in	1.99			
Specimen height, in	2.93			
Height/diameter ratio	1.47			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 7998

SAMPLED & REMOLDED ON 10/3/00
(2) DAY TEST
Fig. No.: ———

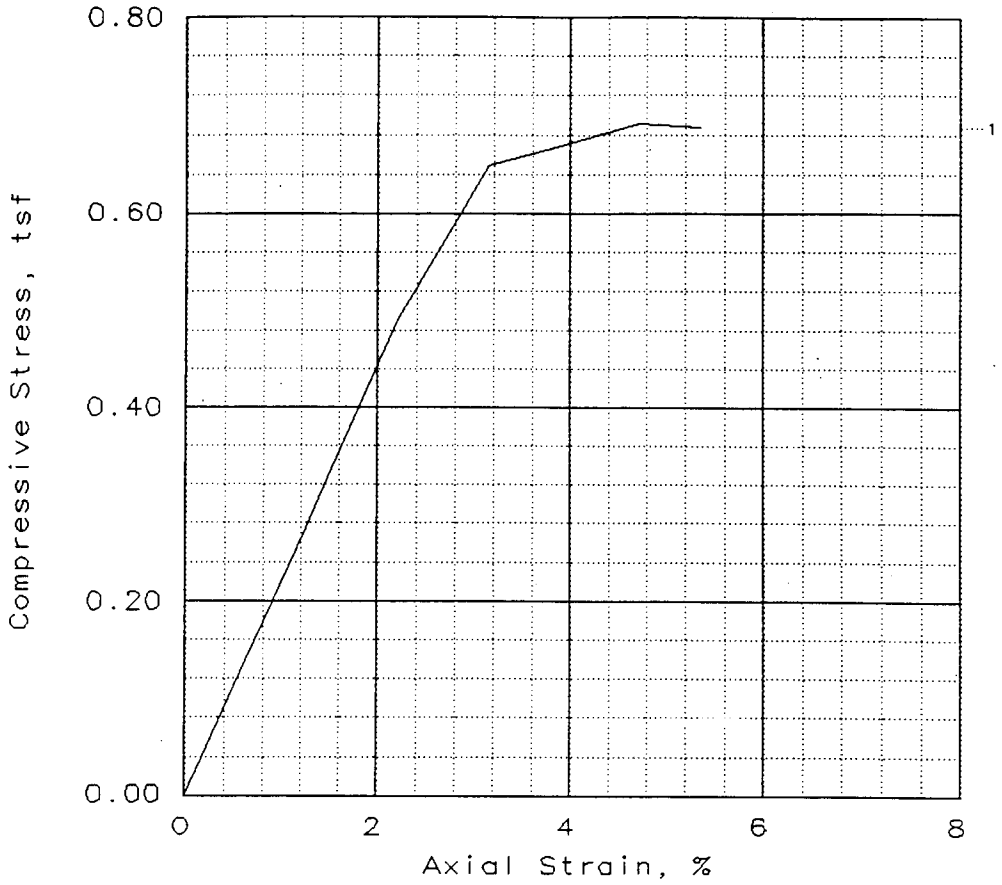
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 27

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.69			
Undrained shear strength, tsf	0.35			
Failure strain, %	4.7			
Strain rate, %/min	1.00			
Water content, %	54.7			
Wet density, pcf	99.6			
Dry density, pcf	64.4			
Saturation, %	96.0			
Void ratio	1.4240			
Specimen diameter, in	1.99			
Specimen height, in	3.17			
Height/diameter ratio	1.59			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/11/00
Remarks:
LAB NO. 8095

SAMPLED & REMOLDED ON 10/3/00
(7) DAY TESTED
Fig. No.: ——

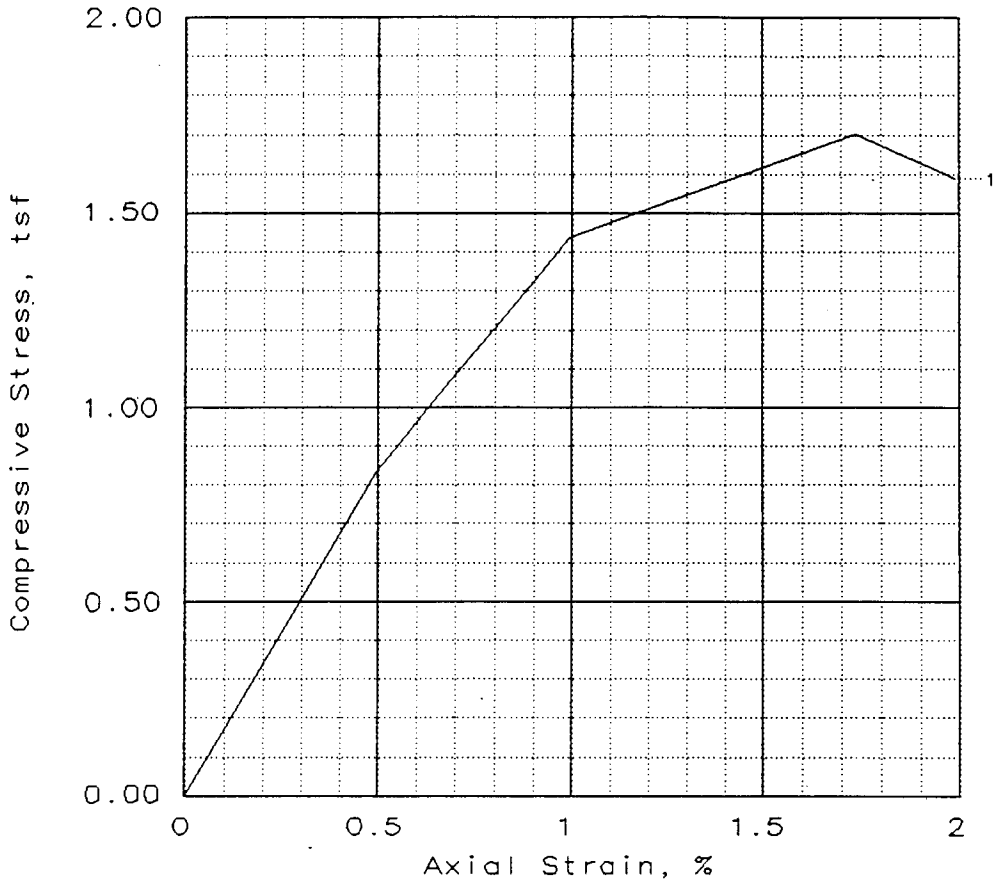
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 27A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	1.70			
Undrained shear strength, tsf	0.85			
Failure strain, %	1.7			
Strain rate, %/min	1.00			
Water content, %	70.6			
Wet density, pcf	84.8			
Dry density, pcf	49.7			
Saturation, %	82.5			
Void ratio	2.1398			
Specimen diameter, in	1.99			
Specimen height, in	4.02			
Height/diameter ratio	2.02			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 7999

SAMPLED & REMOLDED ON 10/3/00
(2) DAY TEST
Fig. No.: ——

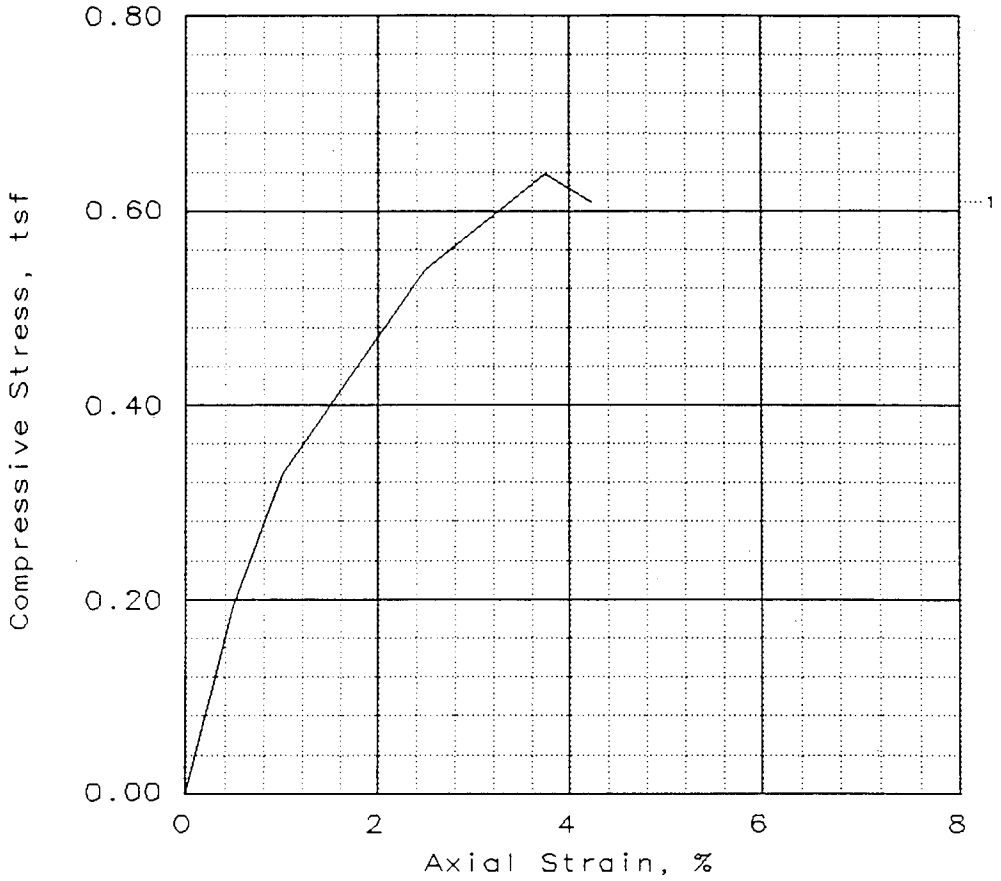
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 28

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.64			
Undrained shear strength, tsf	0.32			
Failure strain, %	3.7			
Strain rate, %/min	1.00			
Water content, %	78.5			
Wet density, pcf	87.2			
Dry density, pcf	48.9			
Saturation, %	89.4			
Void ratio	2.1940			
Specimen diameter, in	2.00			
Specimen height, in	4.01			
Height/diameter ratio	2.01			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00

Remarks:
LAB NO. 8000

SAMPLED & REMOLDED ON 10/3/00
(2) DAY TEST
Fig. No.: ———

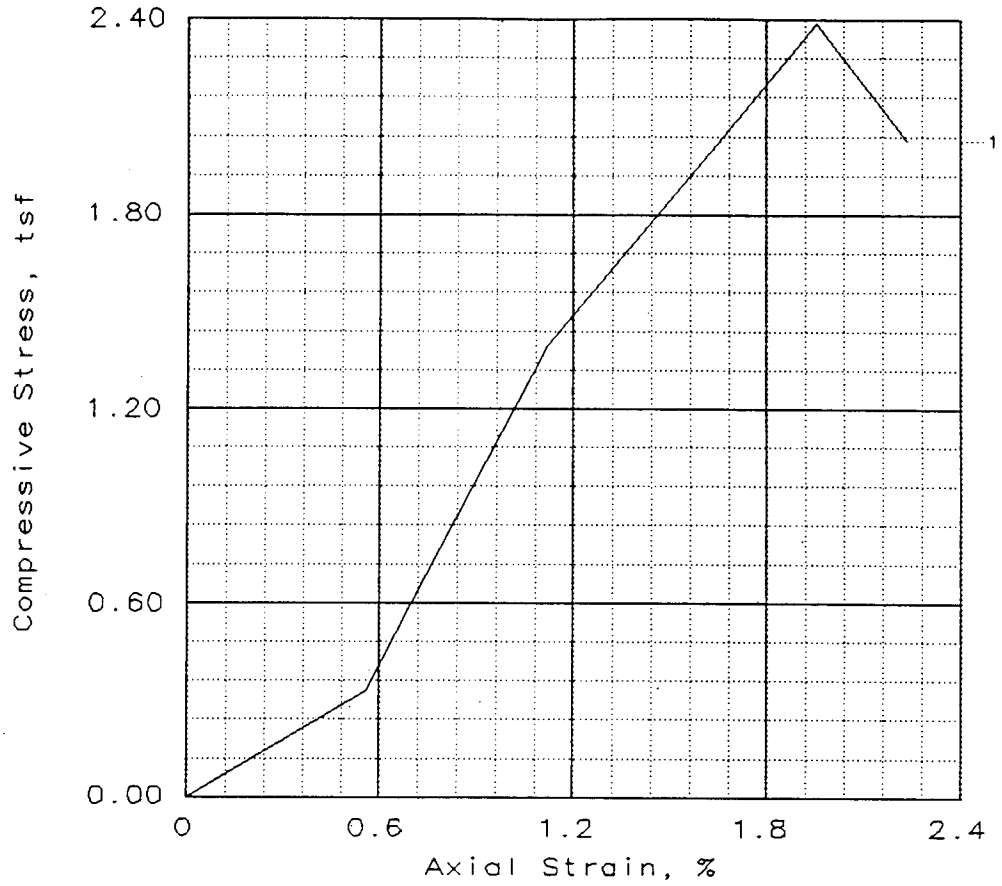
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 29

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.39			
Undrained shear strength, tsf	1.19			
Failure strain, %	2.0			
Strain rate, %/min	1.00			
Water content, %	69.1			
Wet density, pcf	86.5			
Dry density, pcf	51.2			
Saturation, %	84.3			
Void ratio	2.0493			
Specimen diameter, in	2.00			
Specimen height, in	3.57			
Height/diameter ratio	1.79			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/11/00
Remarks:
LAB NO. 8096

SAMPLED & REMOLDED ON 10/3/00
(7) DAY TESTED
Fig. No.: ——

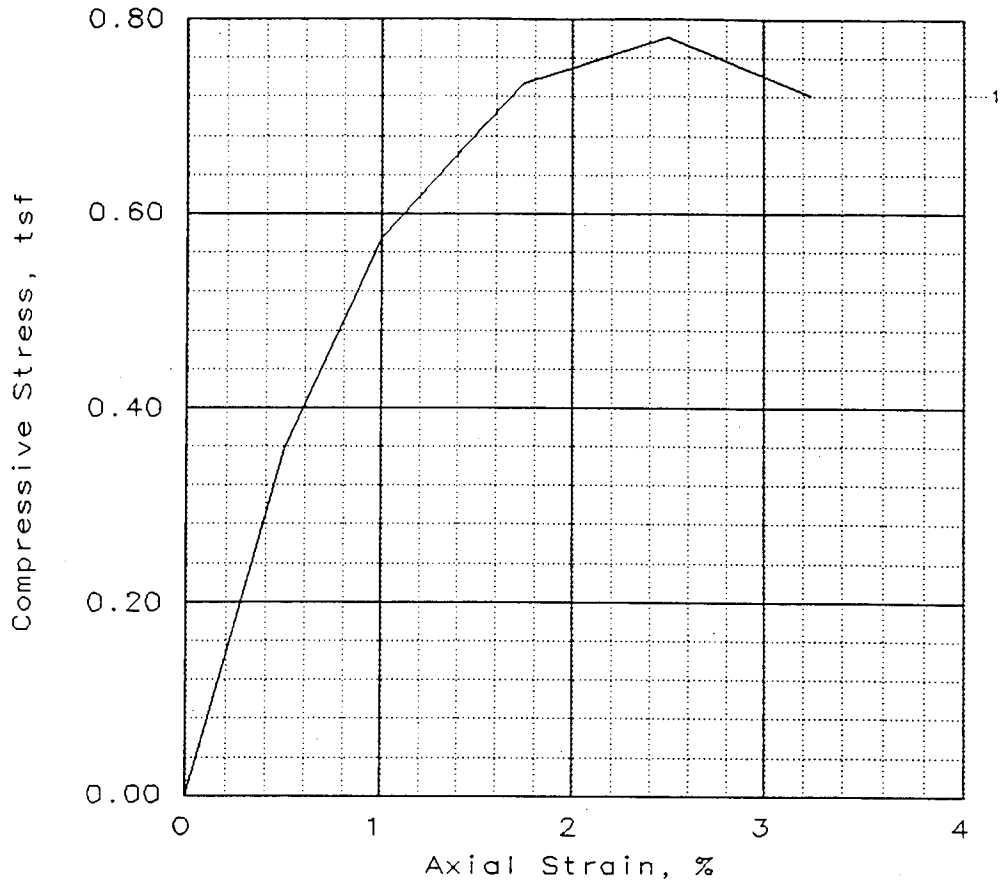
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 28A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	0.78			
Undrained shear strength, tsf	0.39			
Failure strain, %	2.5			
Strain rate, %/min	1.00			
Water content, %	82.9			
Wet density, pcf	87.2			
Dry density, pcf	47.7			
Saturation, %	91.1			
Void ratio	2.2748			
Specimen diameter, in	2.00			
Specimen height, in	4.00			
Height/diameter ratio	2.00			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/11/00
Remarks:
LAB NO. 8097

SAMPLED & REMOLDED ON 10/3/00
(7) DAY TESTED
Fig. No.: ———

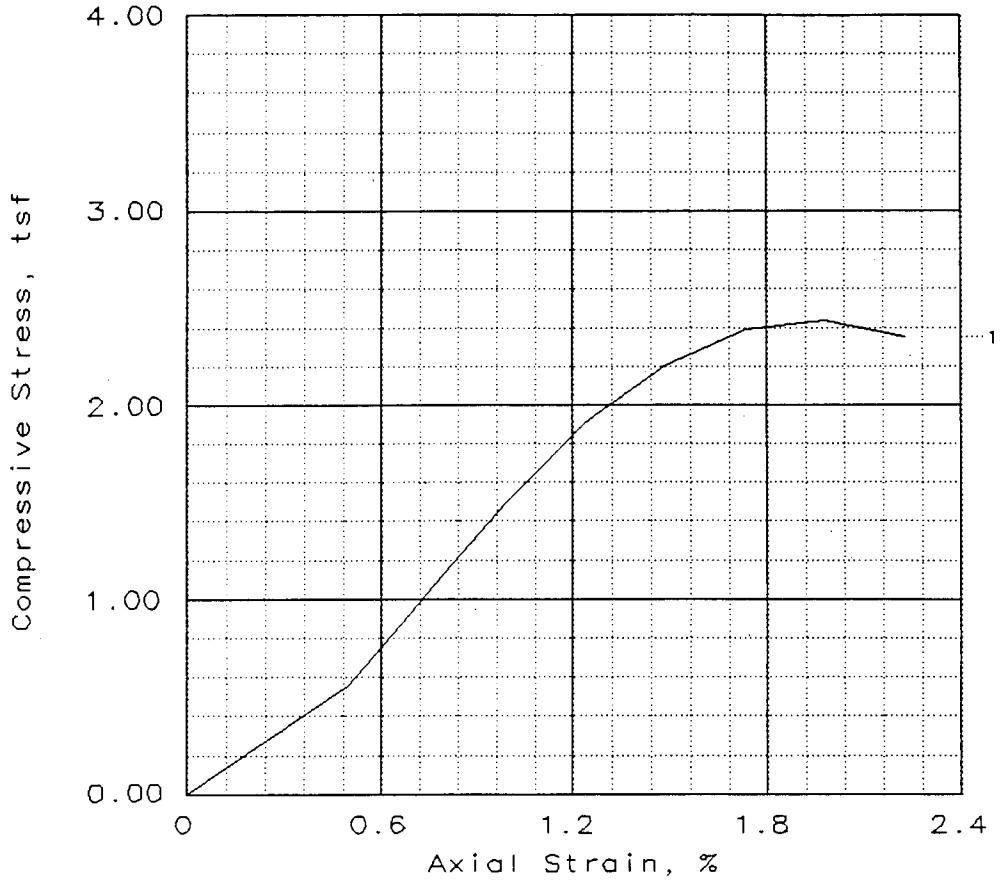
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 29A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.44			
Undrained shear strength, tsf	1.22			
Failure strain, %	2.0			
Strain rate, %/min	1.00			
Water content, %	35.5			
Wet density, pcf	105.0			
Dry density, pcf	77.5			
Saturation, %	87.5			
Void ratio	1.0135			
Specimen diameter, in	1.99			
Specimen height, in	4.03			
Height/diameter ratio	2.03			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 8001

SAMPLED & REMOLDED ON 10/4/00
(1) DAY TEST
Fig. No.: ——

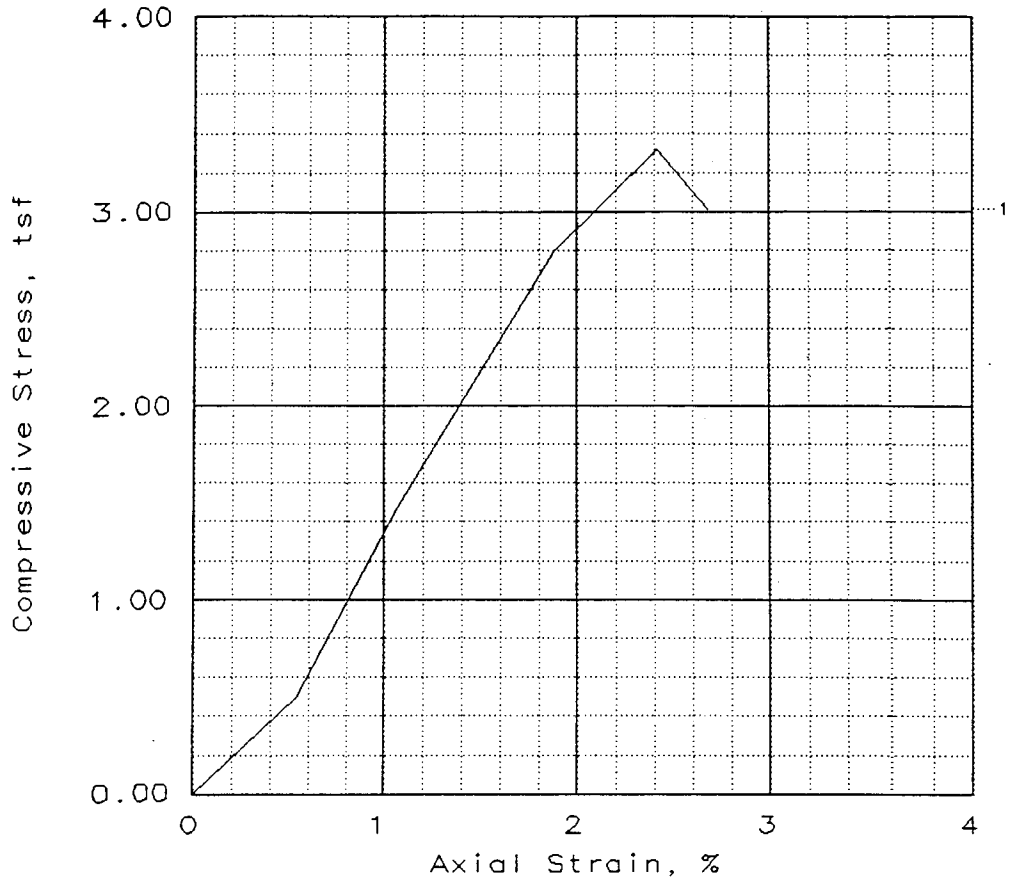
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 30

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	3.32			
Undrained shear strength, tsf	1.66			
Failure strain, %	2.4			
Strain rate, %/min	1.00			
Water content, %	36.7			
Wet density, pcf	104.2			
Dry density, pcf	76.2			
Saturation, %	87.6			
Void ratio	1.0471			
Specimen diameter, in	2.00			
Specimen height, in	3.72			
Height/diameter ratio	1.86			

Description:

GS= Type:

Project No.: 11294.020
Date: 10/11/00
Remarks:
LAB NO. 8091

SAMPLED & REMOLDED ON 10/4/00
(6) DAY TESTED
Fig. No.: ——

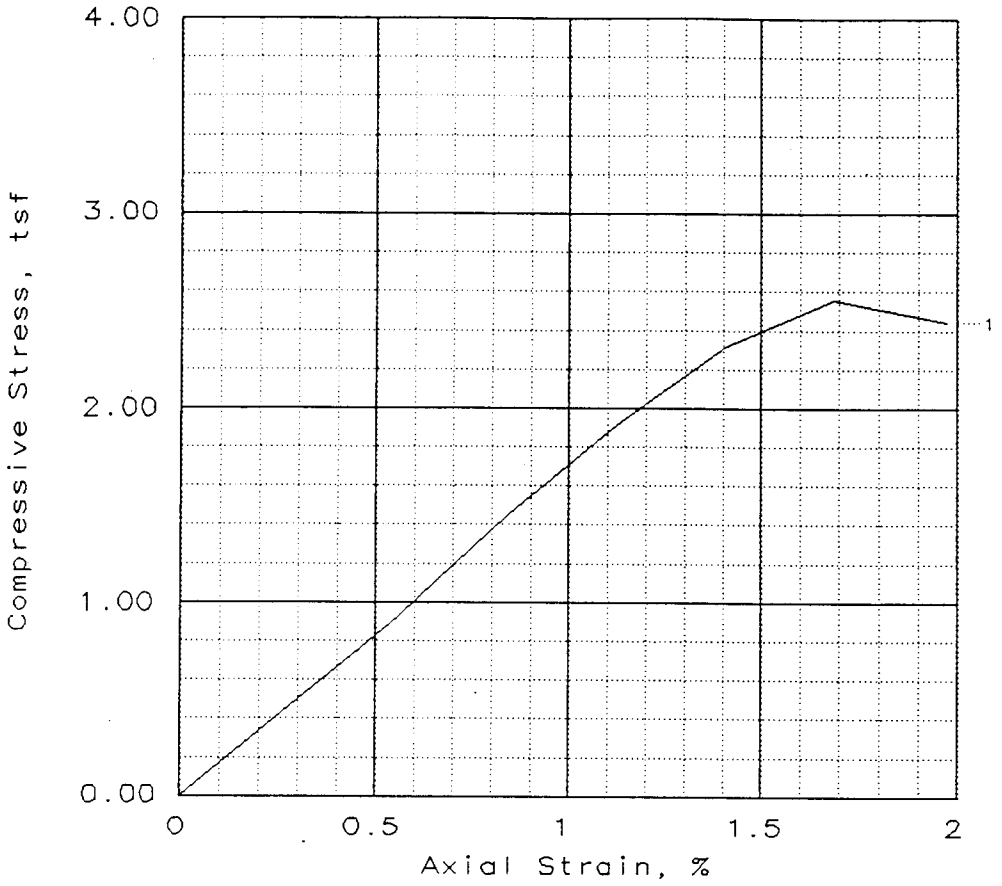
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 30A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.56			
Undrained shear strength, tsf	1.28			
Failure strain, %	1.7			
Strain rate, %/min	1.00			
Water content, %	34.1			
Wet density, pcf	104.5			
Dry density, pcf	77.9			
Saturation, %	85.0			
Void ratio	1.0027			
Specimen diameter, in	2.00			
Specimen height, in	3.55			
Height/diameter ratio	1.78			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 8002

SAMPLED & REMOLDED ON 10/4/00
(1) DAY TEST
Fig. No.: ——

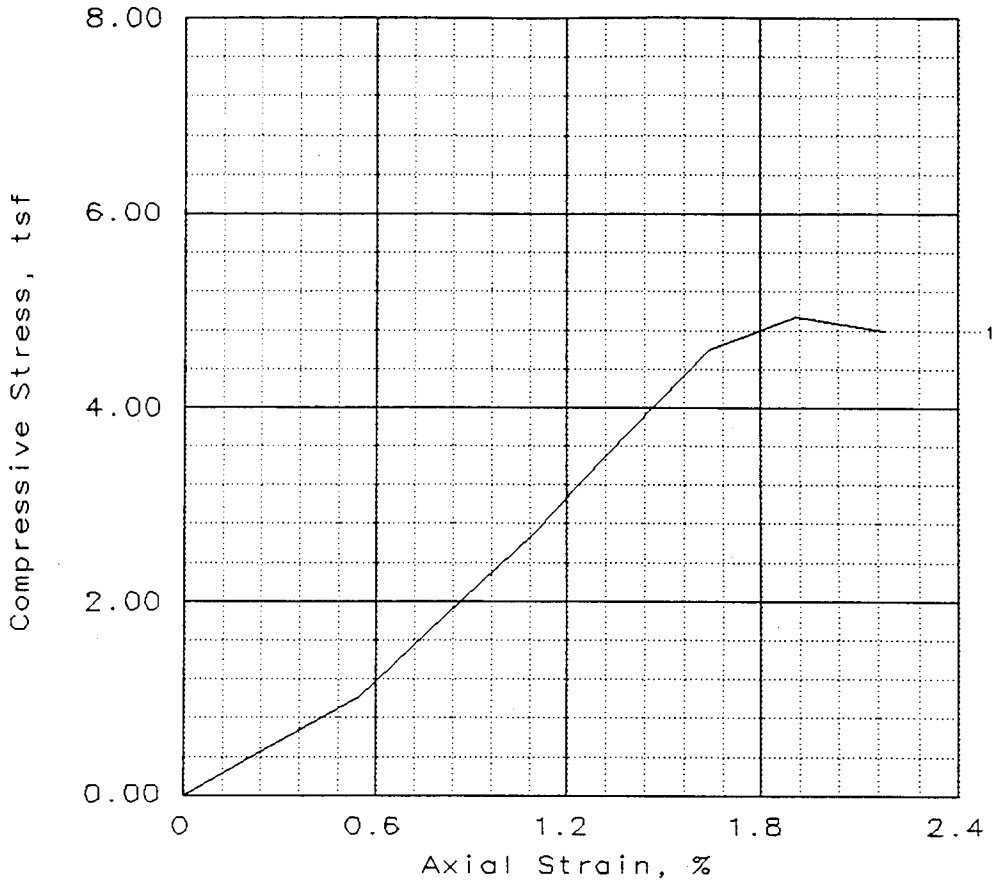
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 31

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	4.94			
Undrained shear strength, tsf	2.47			
Failure strain, %	1.9			
Strain rate, %/min	1.00			
Water content, %	37.4			
Wet density, pcf	104.8			
Dry density, pcf	76.3			
Saturation, %	89.4			
Void ratio	1.0465			
Specimen diameter, in	2.00			
Specimen height, in	3.66			
Height/diameter ratio	1.83			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/11/00
Remarks:
LAB NO. 8092

SAMPLED & REMOLDED ON 10/4/00
(6) DAY TESTED
Fig. No.: ——

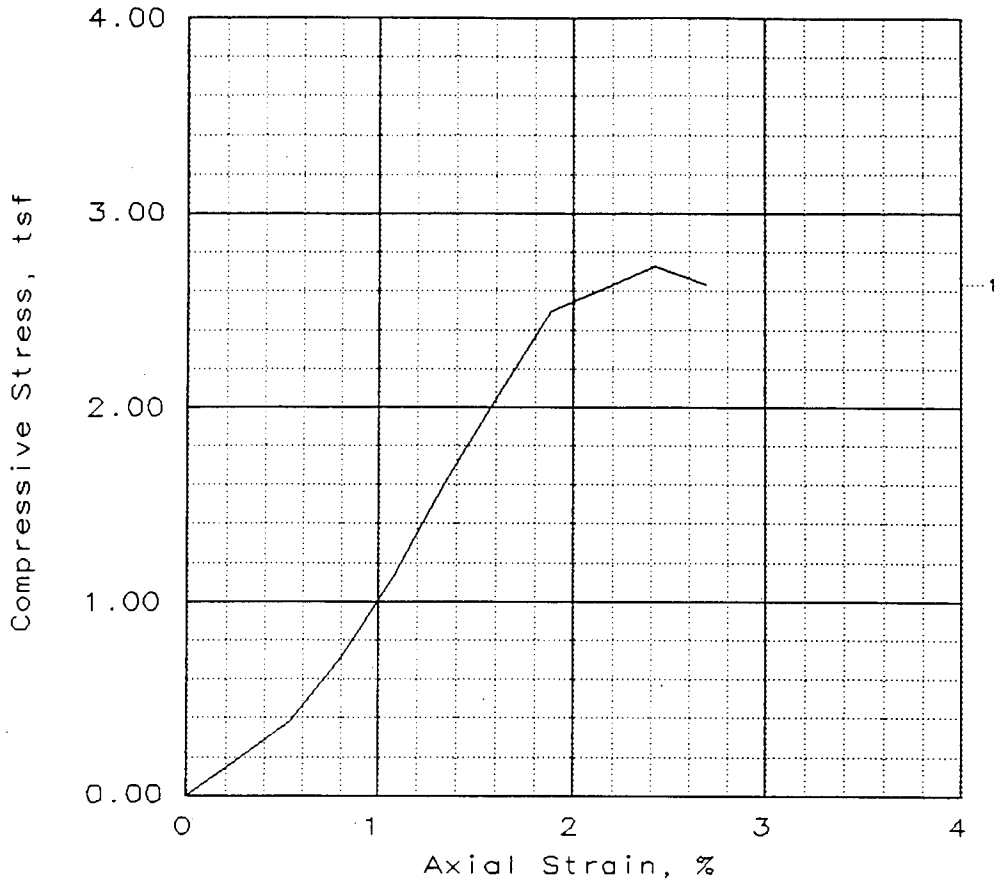
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 31A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.73			
Undrained shear strength, tsf	1.36			
Failure strain, %	2.4			
Strain rate, %/min	1.00			
Water content, %	41.3			
Wet density, pcf	89.0			
Dry density, pcf	62.9			
Saturation, %	69.8			
Void ratio	1.4794			
Specimen diameter, in	2.00			
Specimen height, in	3.71			
Height/diameter ratio	1.86			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/6/00
Remarks:
LAB NO. 8003

SAMPLED & REMOLDED ON 10/4/00

Fig. No.: ———

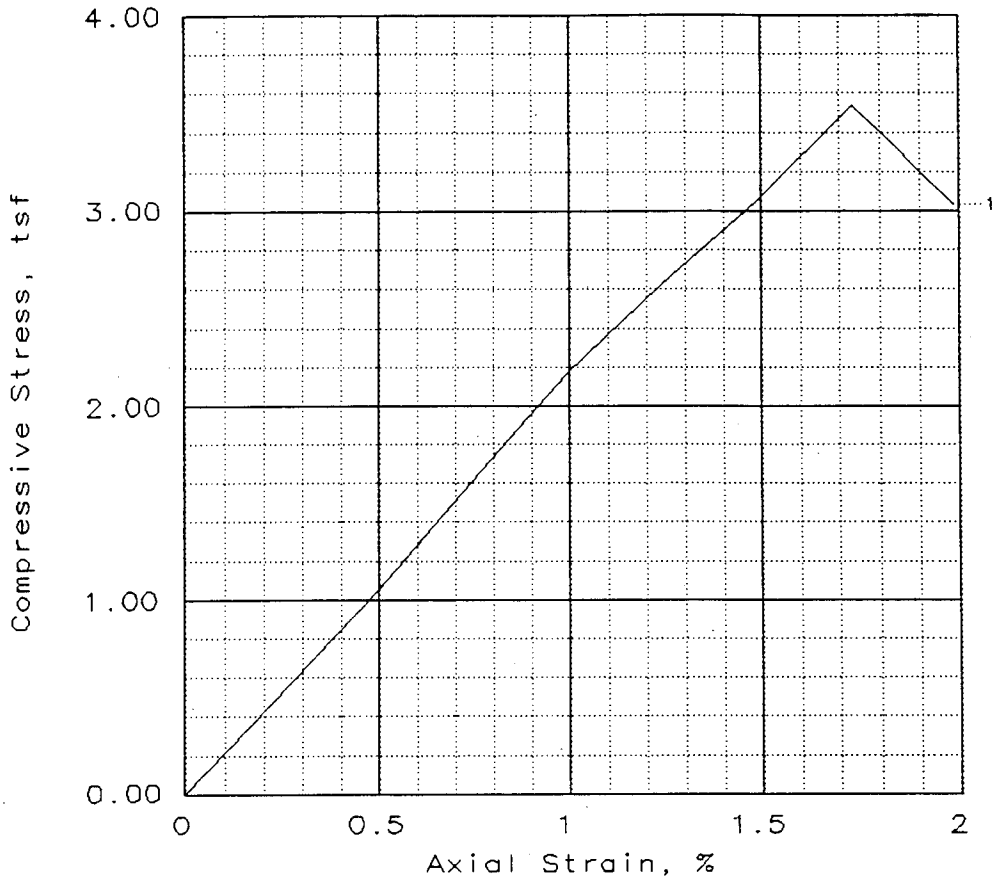
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 32

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	3.53			
Undrained shear strength, tsf	1.77			
Failure strain, %	1.7			
Strain rate, %/min	1.00			
Water content, %	36.4			
Wet density, pcf	91.2			
Dry density, pcf	66.9			
Saturation, %	68.2			
Void ratio	1.3342			
Specimen diameter, in	2.00			
Specimen height, in	4.03			
Height/diameter ratio	2.02			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/11/00
Remarks:
LAB NO. 8093

SAMPLED & REMOLDED ON 10/4/00
(6) DAY TESTED
Fig. No.: ——

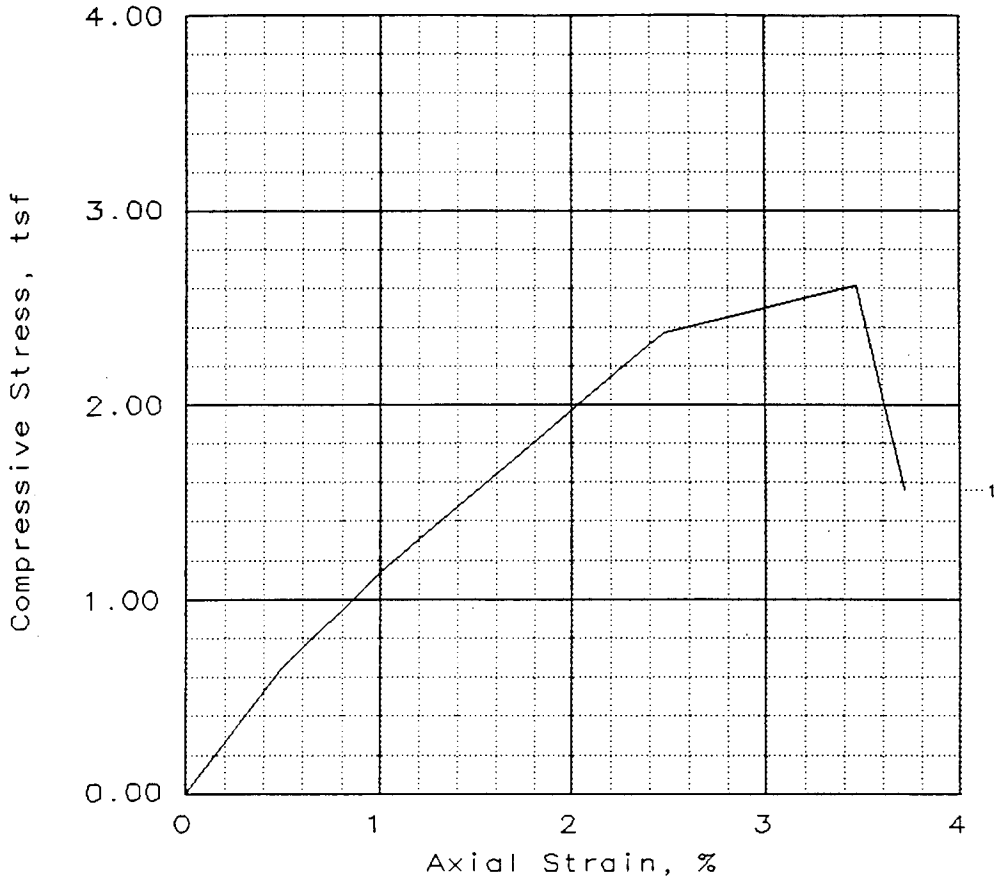
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 32A

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.62			
Undrained shear strength, tsf	1.31			
Failure strain, %	3.5			
Strain rate, %/min	1.00			
Water content, %	32.9			
Wet density, pcf	112.9			
Dry density, pcf	85.0			
Saturation, %	98.3			
Void ratio	0.8362			
Specimen diameter, in	1.99			
Specimen height, in	4.03			
Height/diameter ratio	2.03			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/11/00
Remarks:
LAB NO. 8090

SAMPLED & REMOLDED ON 10/9/00
(1) DAY TESTED
Fig. No.: ———

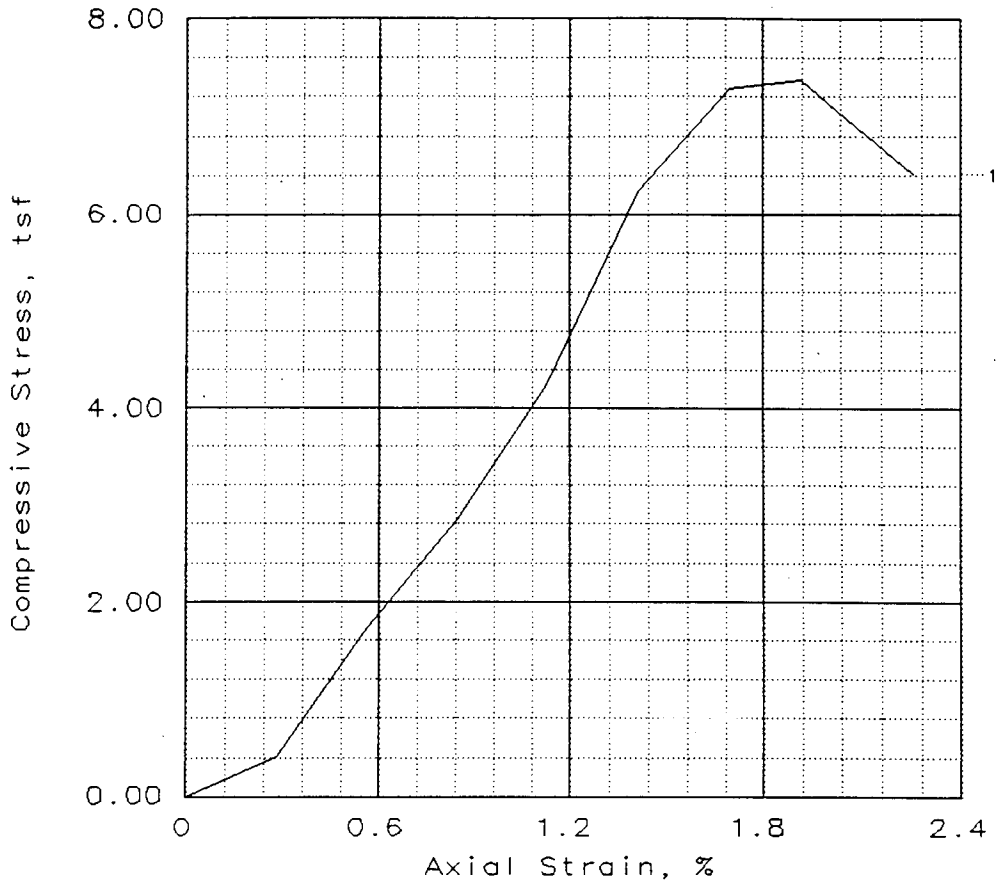
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 33

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	7.38			
Undrained shear strength, tsf	3.69			
Failure strain, %	1.9			
Strain rate, %/min	1.00			
Water content, %	17.6			
Wet density, pcf	108.7			
Dry density, pcf	92.4			
Saturation, %	57.2			
Void ratio	0.8368			
Specimen diameter, in	2.00			
Specimen height, in	3.54			
Height/diameter ratio	1.77			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/13/00
Remarks:
LAB NO. 8213

SAMP. & REMOLDED ON 10/10/00
(2) DAY TESTED
Fig. No.: ——

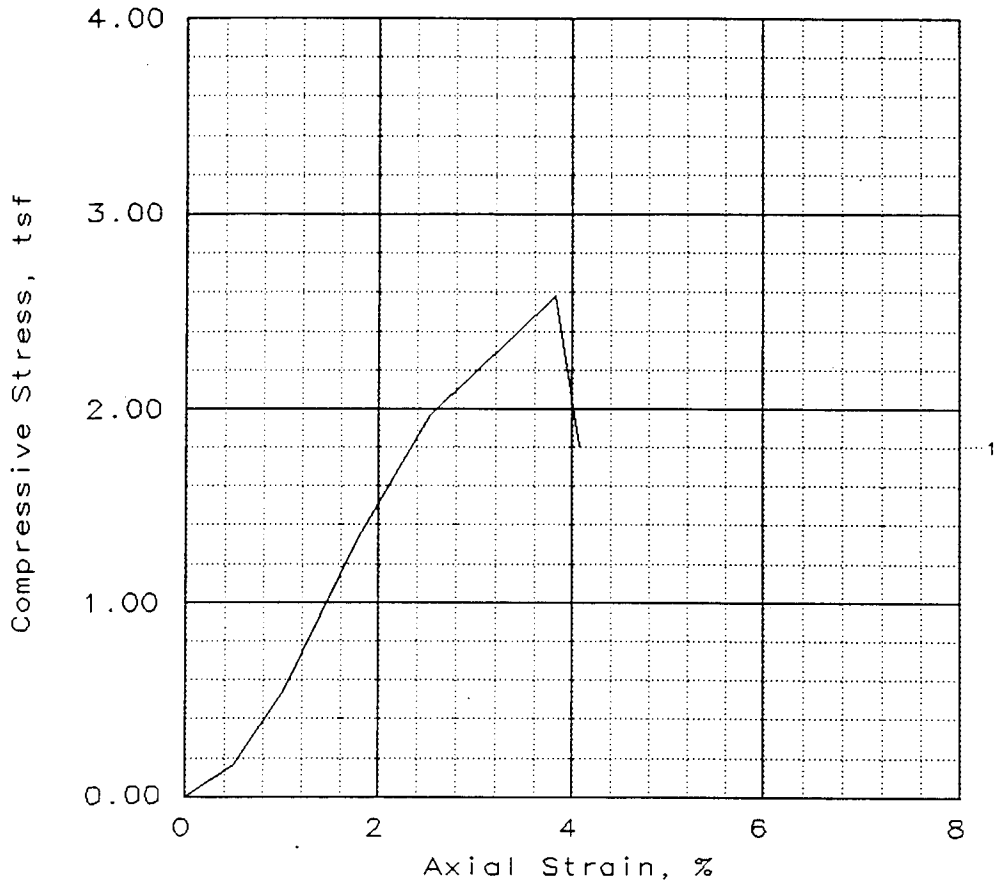
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 34

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.58			
Undrained shear strength, tsf	1.29			
Failure strain, %	3.8			
Strain rate, %/min	1.00			
Water content, %	43.7			
Wet density, pcf	103.2			
Dry density, pcf	71.8			
Saturation, %	87.1			
Void ratio	1.3640			
Specimen diameter, in	2.00			
Specimen height, in	3.92			
Height/diameter ratio	1.96			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/13/00
Remarks:
LAB NO. 8214

SAMP. & REMOLDED ON 10/10/00
(2) DAY TESTED
Fig. No.: ——

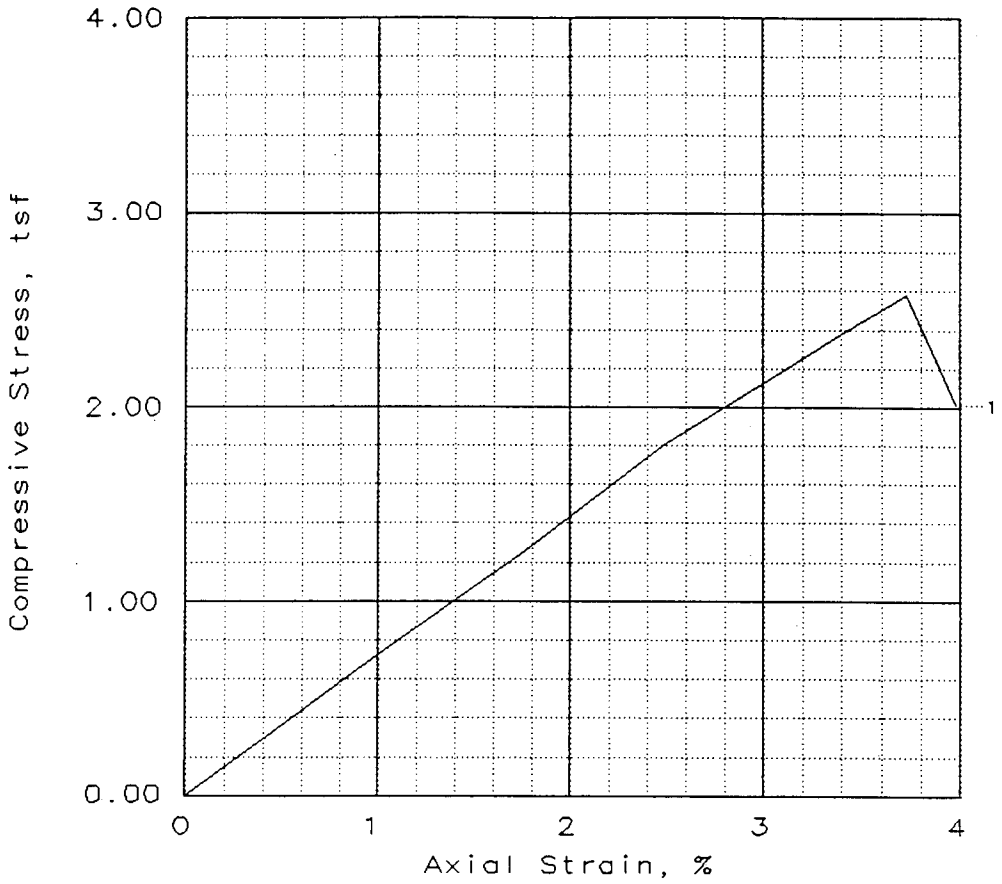
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 35

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.58			
Undrained shear strength, tsf	1.29			
Failure strain, %	3.7			
Strain rate, %/min	1.00			
Water content, %	25.9			
Wet density, pcf	120.6			
Dry density, pcf	95.8			
Saturation, %	91.3			
Void ratio	0.7725			
Specimen diameter, in	1.99			
Specimen height, in	4.02			
Height/diameter ratio	2.02			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/13/00
Remarks:
LAB NO. 8215

SAMP. & REMOLDED ON 10/11/00
(1) DAY TESTED
Fig. No.: ——

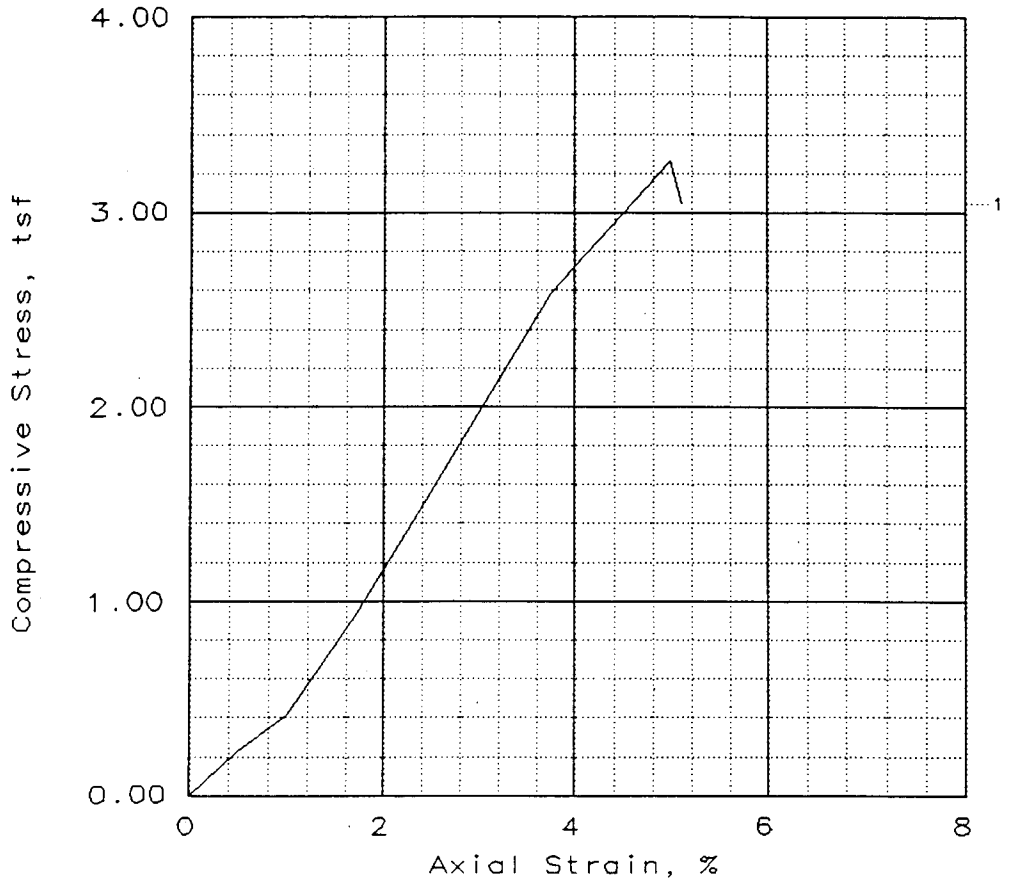
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 36

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	3.27			
Undrained shear strength, tsf	1.63			
Failure strain, %	5.0			
Strain rate, %/min	1.00			
Water content, %	28.6			
Wet density, pcf	116.8			
Dry density, pcf	90.8			
Saturation, %	89.4			
Void ratio	0.8691			
Specimen diameter, in	1.99			
Specimen height, in	4.01			
Height/diameter ratio	2.02			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/13/00
Remarks:
LAB NO. 8216

SAMP. & REMOLDED ON 10/11/00
(1) DAY TESTED
Fig. No.: ——

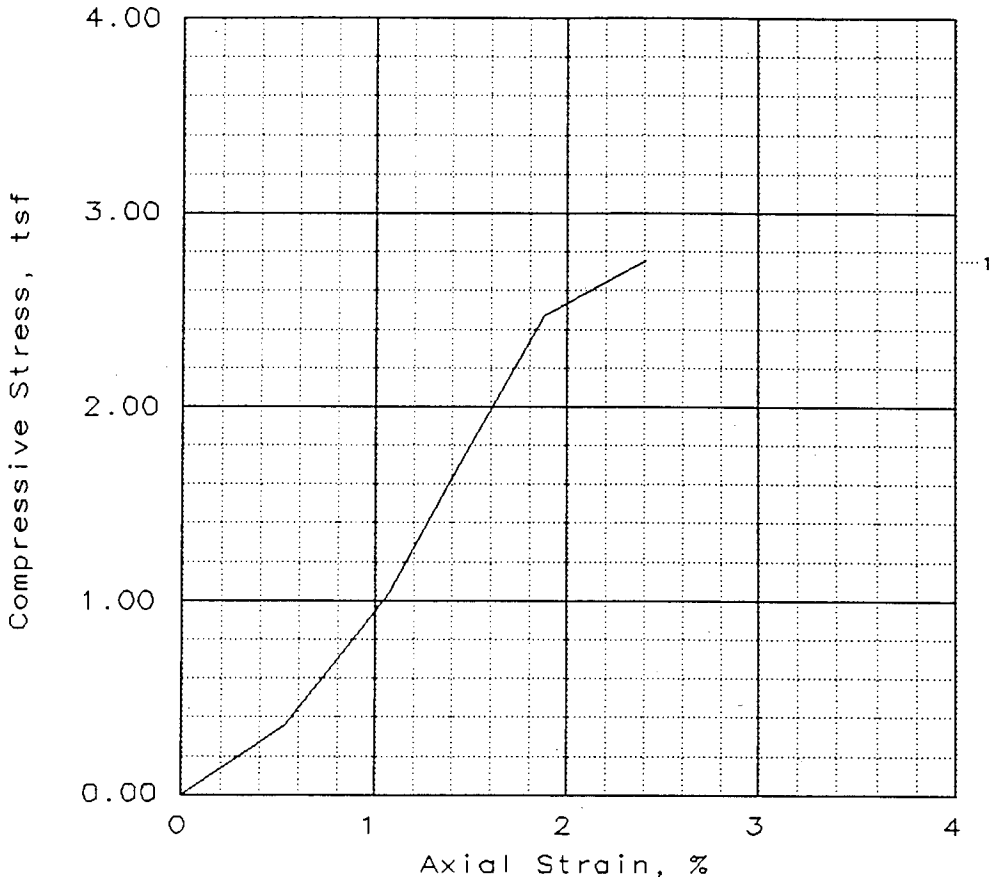
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 37

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	2.75			
Undrained shear strength, tsf	1.38			
Failure strain, %	2.4			
Strain rate, %/min	1.00			
Water content, %	18.1			
Wet density, pcf	118.8			
Dry density, pcf	100.6			
Saturation, %	82.1			
Void ratio	0.5515			
Specimen diameter, in	2.00			
Specimen height, in	3.73			
Height/diameter ratio	1.87			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/20/00
Remarks:
LAB NO. 8216

SAMP. & REMOLDED ON 10/17/00
(1) DAY TESTED
Fig. No.: ——

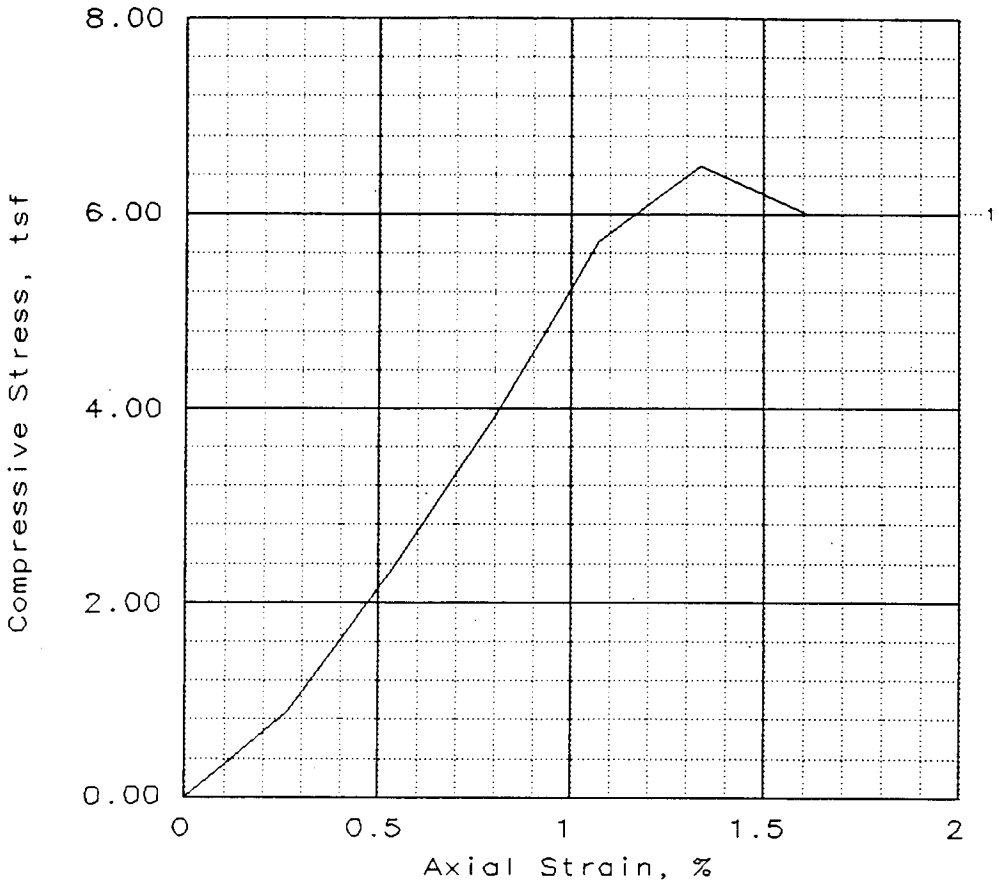
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 38

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	6.49			
Undrained shear strength, tsf	3.25			
Failure strain, %	1.3			
Strain rate, %/min	1.00			
Water content, %	12.1			
Wet density, pcf	113.3			
Dry density, pcf	101.1			
Saturation, %	55.6			
Void ratio	0.5444			
Specimen diameter, in	2.00			
Specimen height, in	3.73			
Height/diameter ratio	1.87			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/23/00

Remarks:
LAB NO. 8510

SAMP. & REMOLDED ON 10/19/00
(1) DAY TESTED
Fig. No.: ——

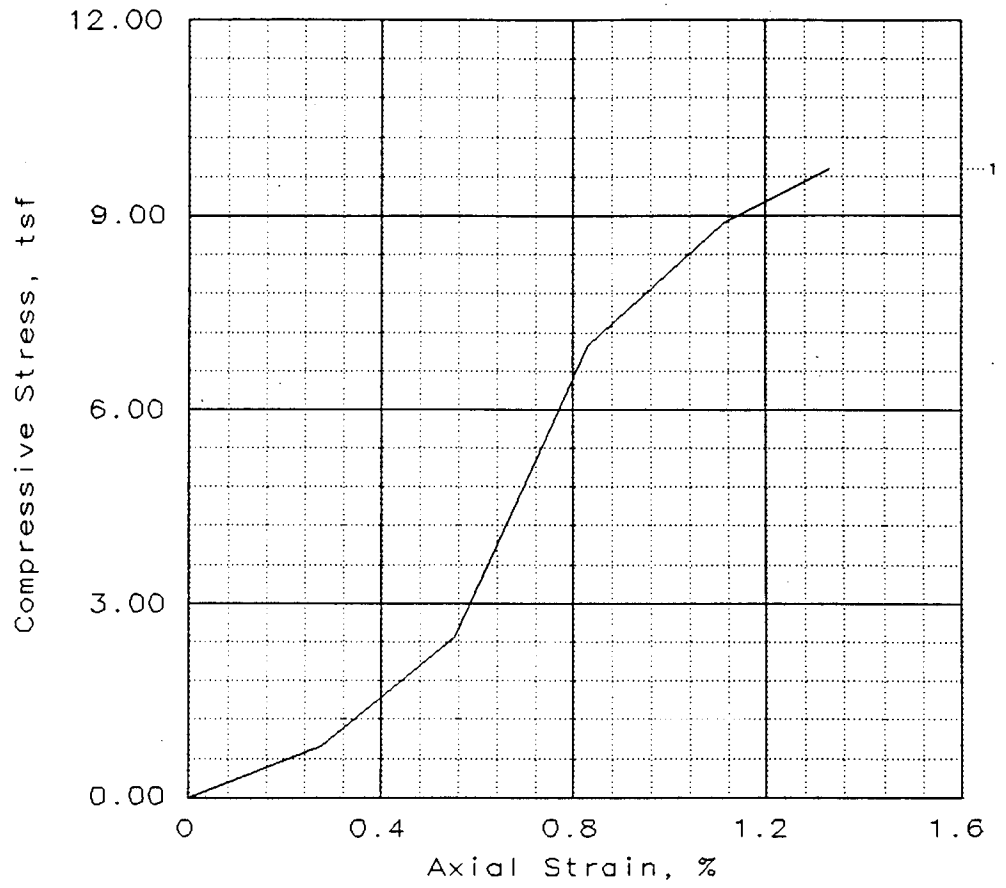
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 39

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	9.72			
Undrained shear strength, tsf	4.86			
Failure strain, %	1.3			
Strain rate, %/min	1.00			
Water content, %	10.8			
Wet density, pcf	124.3			
Dry density, pcf	112.2			
Saturation, %	69.2			
Void ratio	0.3910			
Specimen diameter, in	2.00			
Specimen height, in	3.60			
Height/diameter ratio	1.80			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/23/00
Remarks:
LAB NO. 8511

SAMP. & REMOLDED ON 10/19/00
(1) DAY TESTED
Fig. No.: ——

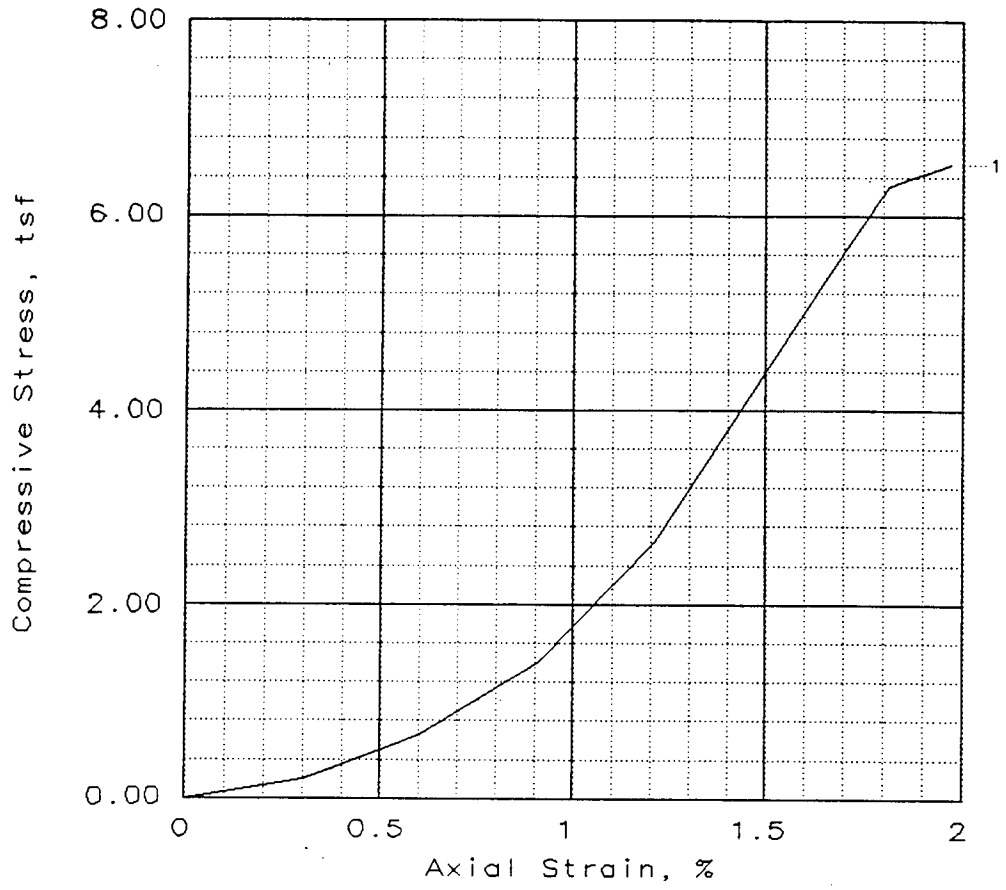
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 40

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	6.53			
Undrained shear strength, tsf	3.27			
Failure strain, %	2.0			
Strain rate, %/min	1.00			
Water content, %	6.4			
Wet density, pcf	117.1			
Dry density, pcf	110.1			
Saturation, %	38.2			
Void ratio	0.4176			
Specimen diameter, in	2.00			
Specimen height, in	3.30			
Height/diameter ratio	1.65			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 10/31/00

Remarks:
LAB NO. 8755
(3) DAY TEST
SAMPLED & REMOLDED 10/27/00

Fig. No.: ——

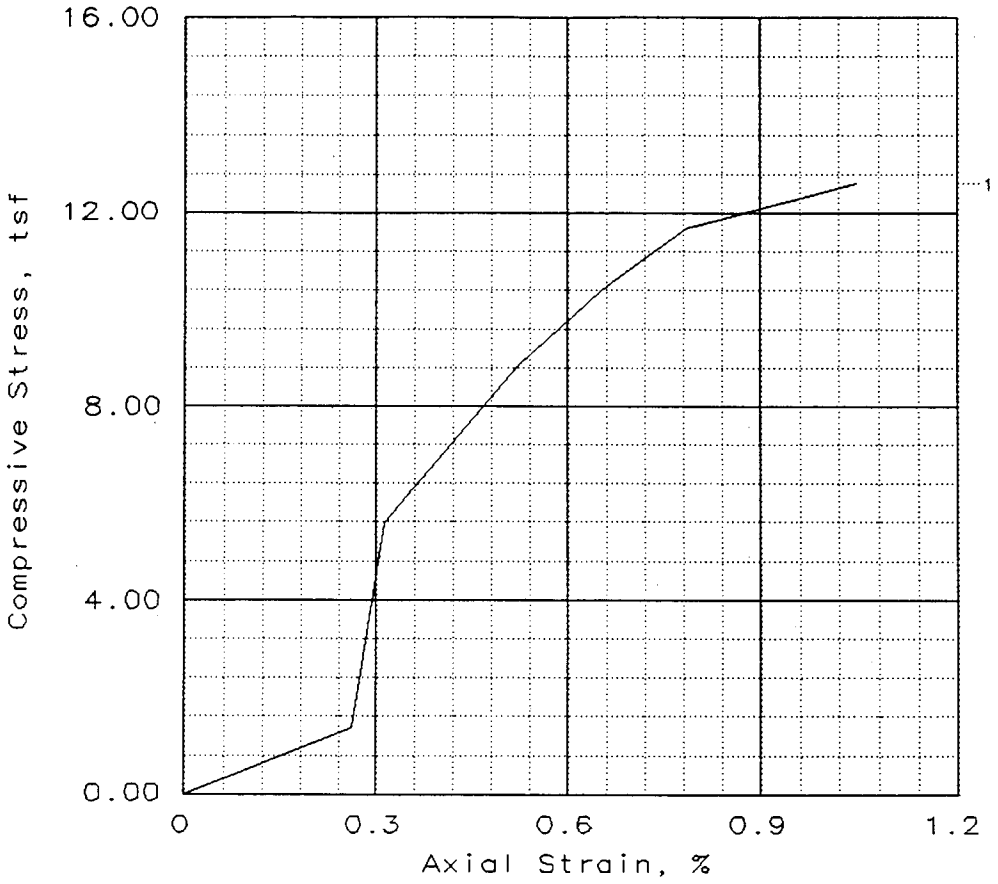
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 41

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	12.60			
Undrained shear strength, tsf	6.30			
Failure strain, %	1.0			
Strain rate, %/min	1.00			
Water content, %	10.4			
Wet density, pcf	125.6			
Dry density, pcf	113.8			
Saturation, %	69.8			
Void ratio	0.3716			
Specimen diameter, in	2.01			
Specimen height, in	3.82			
Height/diameter ratio	1.90			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 11/3/00
Remarks:
LAB NO. 8956
(1) DAY TEST
SAMPLED & REMOLDED 11/1/00

Fig. No.: ——

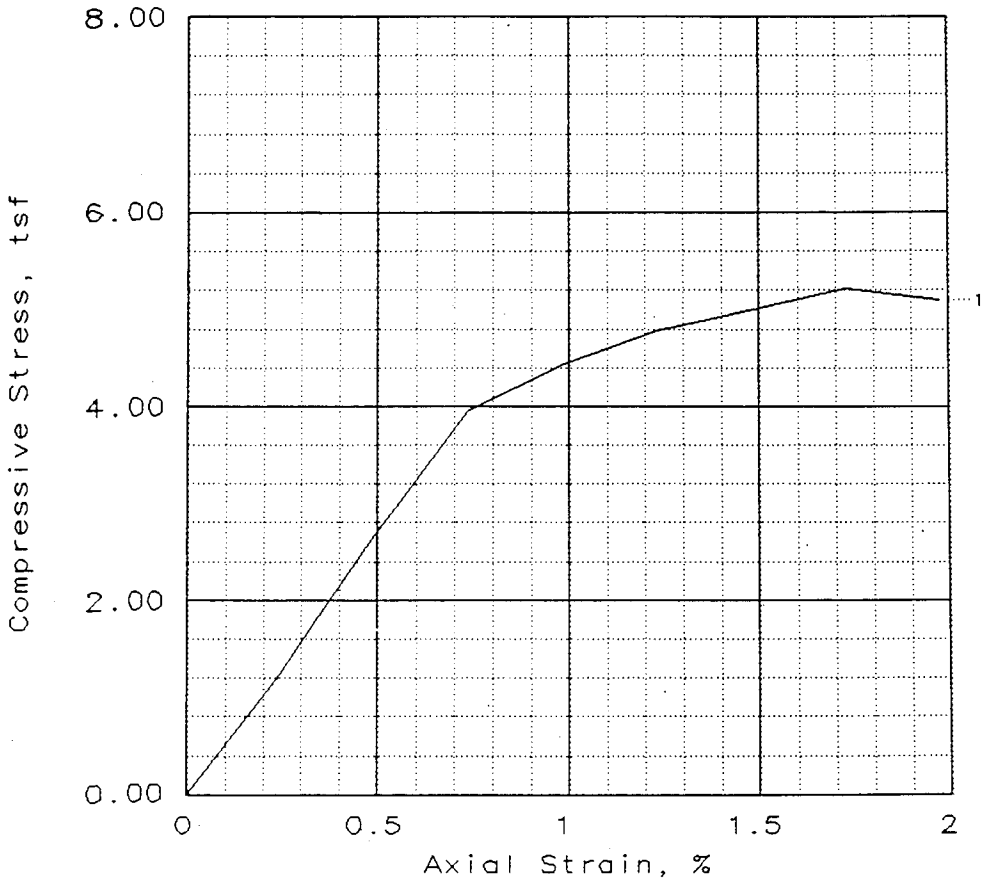
Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 42

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

UNCONFINED COMPRESSION TEST



SAMPLE NO.	1			
Unconfined strength, tsf	5.22			
Undrained shear strength, tsf	2.61			
Failure strain, %	1.7			
Strain rate, %/min	1.00			
Water content, %	17.8			
Wet density, pcf	124.9			
Dry density, pcf	106.0			
Saturation, %	94.2			
Void ratio	0.4718			
Specimen diameter, in	2.00			
Specimen height, in	4.05			
Height/diameter ratio	2.03			

Description:

			GS=	Type:

Project No.: 11294.020
Date: 11/7/00
Remarks:
LAB NO. 8981
(3) DAY TEST
SAMPLED & REMOLDED 11/3/00

Fig. No.: ——

Client: CONESTOGA-ROVERS & ASSOC. LTD

Project: LAGOON CLOSURE
MORAINE, OH
Location: SAMPLE 43

UNCONFINED COMPRESSION TEST

H. C. NUTTING COMPANY

APPENDIX E

SOIL COMPACTION TESTING RESULTS

- EXISTING ON-SITE SOIL STOCKPILES
  - COMMON FILL USED FOR BACKFILL
- CLAY FOR SOUTH LAGOON COVER SYSTEM

FILE ONLY
DO NOT TYPE
12611

REPORT OF SOIL COMPACTION INSPECTION

Proj. Start: 845
Proj. Stop: 945
Travel Time: 2.0
Total Hours: 3.0

Report Date: September 20, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga-Rovers & Associates Ltd.
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Partly Cloudy
PM _____
Temperature:
AM 68 °
PM _____ °
Nuclear Meter Utilized: X

Area Being Tested: Self Drying Lagoon
Hauling Equipment Used: Tandem Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot
Source of Borrow: Off Site
Material Description: Dark Brown silty, sandy gravel
ity Tests Today: 3 **Water Added:** No

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Sketch	1st Lift	135.8 @ 6.8%	128.3	9.4	94.4 *	95
2	See Sketch	1st Lift	135.8 @ 6.8%	133.3	7.7	98.2	95
3	See Sketch	1st Lift	135.8 @ 6.8%	130.1	9.5	95.8	95

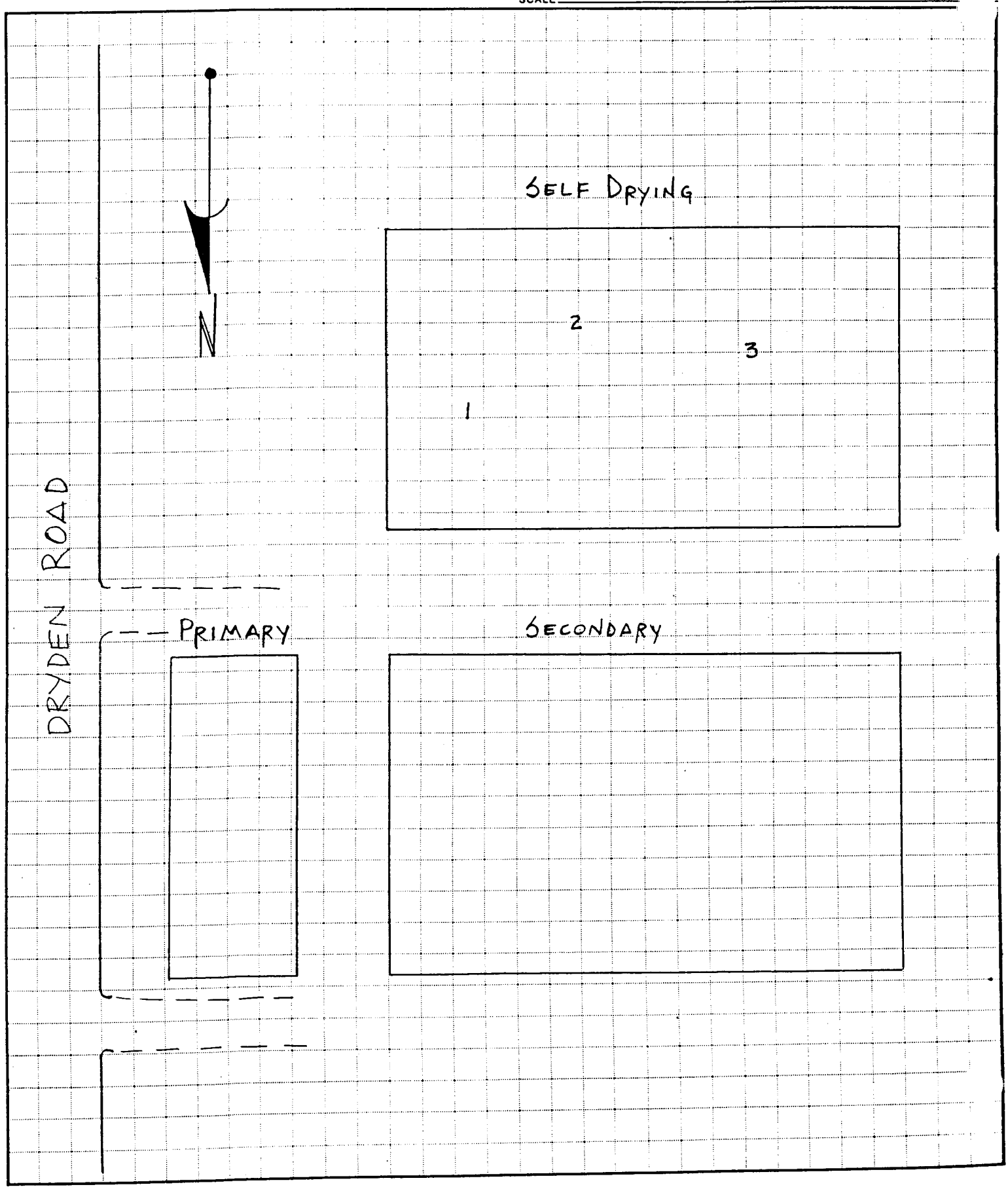
Remarks: * All test results were conveyed to on-site contractor personnel and client representative, Jeroen Winterink.

Technician: Harold Widener

ribution: Hand written to client and contractor on site - original to file

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

JOB CKA - MORAINE LAGOON CLOSURE 12611
SHEET NO. _____ OF _____
CALCULATED BY HRW DATE 9.20.00
CHECKED BY _____ DATE _____
SCALE NO SCALE



12611

H. C. NUTTING COMPANY

GEOTECHNICAL, GEO-ENVIRONMENTAL AND TESTING ENGINEERS
SINCE 1921

611 LUNKEN PARK DR.	CINCINNATI OH 45226	513/321-5816
790 MORRISON RD.	COLUMBUS OH 43230	614/863-3113
912 MORRIS ST.	CHARLESTON WV 25301	304/344-0821
349 WALNUT ST.	LAWRENCEBURG IN 47025	812/539-4300
470-B CONWAY CT. Ste. B-8	LEXINGTON KY 40511	

REPORT OF SOIL COMPACTION INSPECTION

DATE 9.22.00
PROJ. START 900
PROJ. STOP 1000
TRAVEL TIME 2.0
TOTAL HOURS 3.0
ORDER NO. 11294.020
REPORT NO.

CLIENT C.R.A

PROJECT MORAINE LAGOON CLOSURE

CONTRACTOR SEVENSON

Nuclear Meter Utilized ☒

WEATHER CONDITIONS:
☒ FAIR ☐ CLOUDY
☐ RAIN ☐ SNOW

TEMPERATURE: AM 64 PM

AREA BEING FILLED SELF DRYING LAGOON 2nd LIFT
HAULING EQUIPMENT USED TANDEM DUMP TRUCKS
ROLLING EQUIPMENT USED VIBRATORY SHEEPSFOOT / VIBRATORY SMOOTH DRUM
EST. CU. YDS. TODAY WATER ADDED
SOURCE OF BORROW OFF SITE
MATERIAL DESCRIPTION Brown Sandy Silty Gravel
DENSITY TESTS MADE TODAY 3 NOS. THRU

FIELD DENSITY TEST RESULTS

TEST NUMBER	TEST LOCATION	FILL HEIGHT OR ELEVATION	MAXIMUM DRY DENSITY @ OPTIMUM PERCENT MOISTURE (lbs./cu. ft.)	FIELD DRY DENSITY (lbs./cu. ft.)	FIELD MOISTURE %	PERCENT COMPACTION	PERCENT COMPACTION REQUIRED
1	SEE SKETCH	2nd LIFT	135.8 @ 6.8%	132.5	8.5	97.6	95
2	↓	↓	↓	128.9	11.3	94.9	↓
3	↓	↓	↓	128.8	10.6	94.8	↓

*DENSITY TEST NO. _____ IS A RETEST OF TEST NO. _____ PERFORMED ON _____

REMARKS ALL TEST RESULTS WERE CONVEYED TO ON SITE PROJECT PERSONNEL AND CLIENT REPRESENTATIVE JEROEN WINTERINK.

DISTRIBUTION

Reorder No. 102-0069

INSPECTOR HAROLD WIDENER

C.R.A.

MORAINE LAGOON CLOSURE

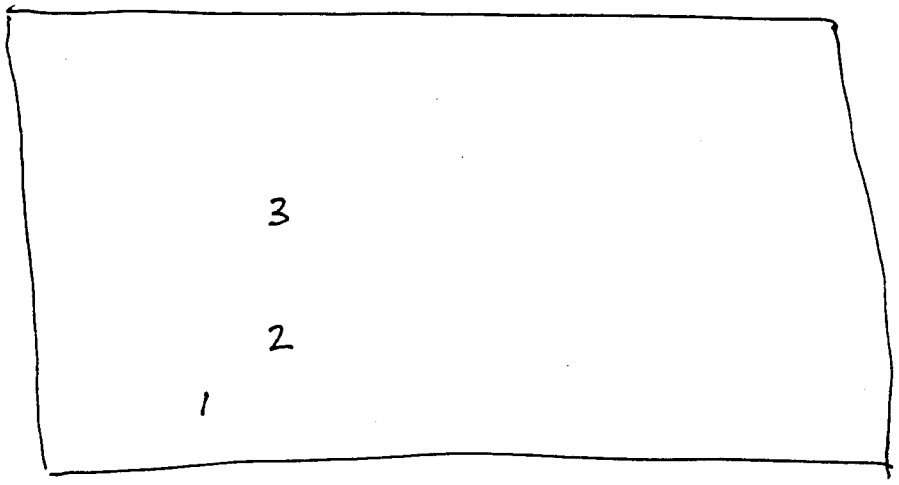
9.22.00

SELF DRYING LAGOON - SECOND LIFT

DENSITY TEST LOCATIONS

H. WIDENER

NO SCALE



12611

H. C. NUTTING COMPANY

GEOTECHNICAL, GEO-ENVIRONMENTAL AND TESTING ENGINEERS
SINCE 1921

611 LUNKEN PARK DR.	CINCINNATI OH 45226	513/321-5816
790 MORRISON RD.	COLUMBUS OH 43230	614/863-3113
912 MORRIS ST.	CHARLESTON WV 25301	304/344-0821
349 WALNUT ST.	LAWRENCEBURG IN 47025	812/539-4300
470-B CONWAY CT. Ste. B-8	LEXINGTON KY 40511	

DATE 9-28-00
PROJ. START
OJ. STOP
AVEL TIME
TOTAL HOURS
ORDER NO. 112900220
REPORT NO.

REPORT OF SOIL COMPACTION INSPECTION

CLIENT CONESTOGA - ROVERS

PROJECT LAGOON CLOSURE

CONTRACTOR

Nuclear Meter Utilized ☐

WEATHER CONDITIONS:
☐ FAIR ☒ CLOUDY
☐ RAIN ☐ SNOW

TEMPERATURE: AM ____ PM ____

AREA BEING FILLED PRIMARY
HAULING EQUIPMENT USED DUMP TRUCK
ROLLING EQUIPMENT USED VIBRATORY SHEEPSFOOT
EST. CU. YDS. TODAY ____ WATER ADDED ____
SOURCE OF BORROW
MATERIAL DESCRIPTION SILTY SANDY CL & GRAVEL
DENSITY TESTS MADE TODAY 2 NOS. 1 THRU 2

FIELD DENSITY TEST RESULTS

TEST NUMBER	TEST LOCATION	FILL HEIGHT OR ELEVATION	MAXIMUM DRY DENSITY @ OPTIMUM PERCENT MOISTURE (lbs./cu. ft.)	FIELD DRY DENSITY (lbs./cu. ft.)	FIELD MOISTURE %	PERCENT COMPACTION	PERCENT COMPACTION REQUIRED
1	PRIMARY	2ND LIFT	135.8 @ 6.8	131.4	10.2	97	95
2	"	"	"	128.6	10.2	95	"
~~3~~	~~"~~	~~"~~					"
	(SEE SKETCH)						

* DENSITY TEST NO. ____ IS A RETEST OF TEST NO. ____ PERFORMED ON ____

REMARKS

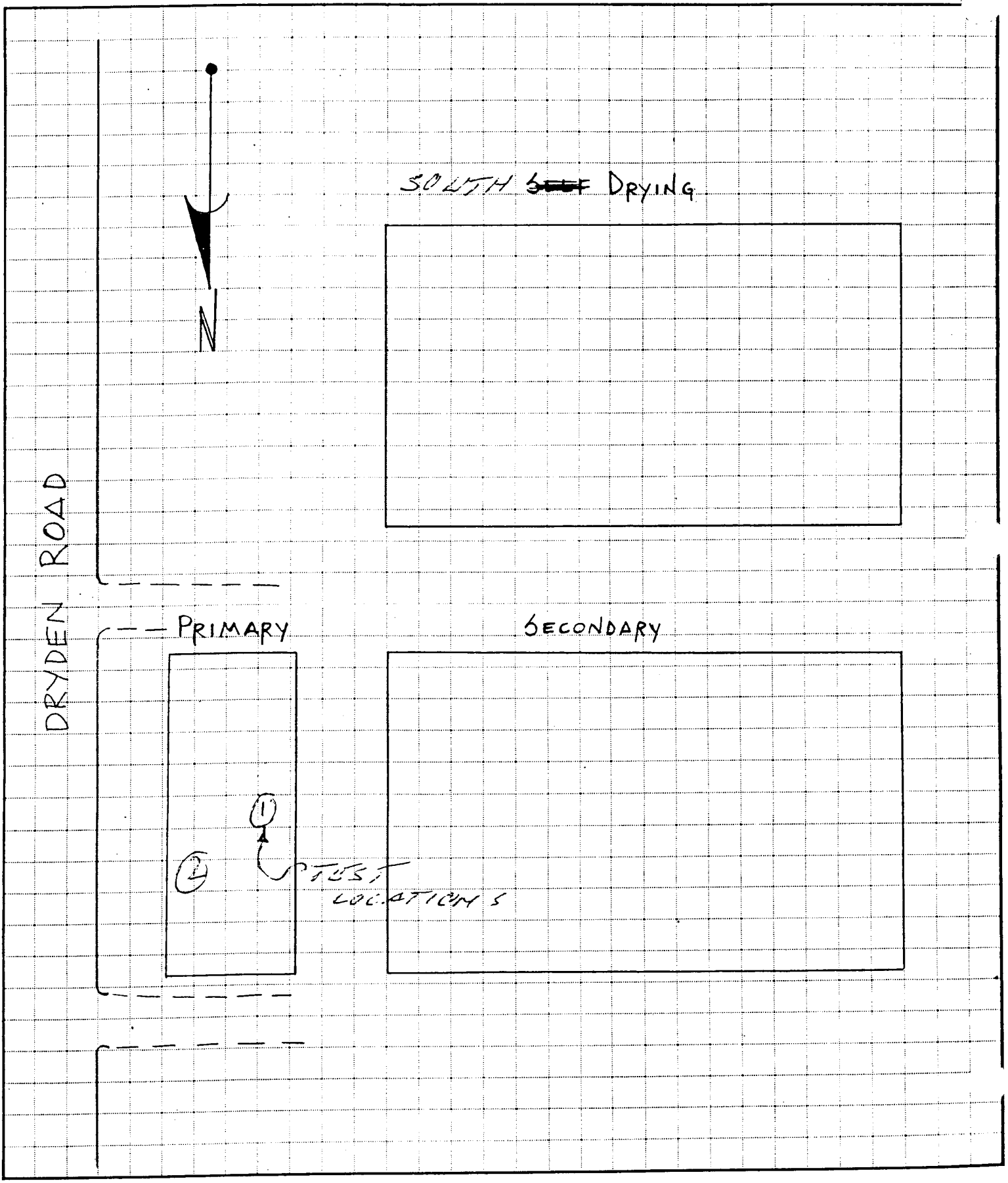
[illegible] CUT OF AREA

DISTRIBUTION

INSPECTOR

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

JOB CRA - MORAINE LAGOON CLOSUR
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY 11294.020 DATE 9-28-00
SCALE NO SCALE



12611

H. C. NUTTING COMPANY

GEOTECHNICAL, GEO-ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921

611 LUNKEN PARK DR. CINCINNATI OH 45226 513/321-5816
790 MORRISON RD. COLUMBUS OH 43230 614/863-3113
912 MORRIS ST. CHARLESTON WV 25301 304/344-0821
349 WALNUT ST. LAWRENCEBURG IN 47025 812/539-4300
470-B CONWAY CT. Ste. B-8 LEXINGTON KY 40511

DATE 10.2.00
PROJ. START 10:00
PROJ. STOP 12:00
TRAVEL TIME 2.00
TOTAL HOURS 4.00
ORDER NO. 11294.020
REPORT NO. _____

File Only Do Not Type

REPORT OF SOIL COMPACTION INSPECTION

CLIENT CRA
PROJECT Lagoon Closure
CONTRACTOR Stevenson

Nuclear Meter Utilized ☒

WEATHER CONDITIONS:
~~☒~~ FAIR AM ☒ CLOUDY PM - Sunny
☐ RAIN ☐ SNOW

TEMPERATURE: AM 55 PM 83

AREA BEING FILLED Primary & South Drying Lagoons
HAULING EQUIPMENT USED _____
ROLLING EQUIPMENT USED _____
EST. CU. YDS. TODAY _____ WATER ADDED _____
SOURCE OF BORROW _____
MATERIAL DESCRIPTION Dark Brown Silty Sandy gravel
DENSITY TESTS MADE TODAY 6 NOS. 1 THRU 6

FIELD DENSITY TEST RESULTS

TEST NUMBER	TEST LOCATION	FILL HEIGHT OR ELEVATION	MAXIMUM DRY DENSITY @ OPTIMUM PERCENT MOISTURE (lbs./cu. ft.)	FIELD DRY DENSITY (lbs./cu. ft.)	FIELD MOISTURE %	PERCENT COMPACTION	PERCENT COMPACTION REQUIRED
1	SEE DIAGRAM	4th Lift	135.8 @ 6.8	125.7	9.7	92	95
2				127.2	9.2	94	
3				125.6	11.1	92	
4				124.5	10.6	92	
5				131.6	7.7	97	
6				128.9	7.2	95	

* DENSITY TEST NO. _____ IS A RETEST OF TEST NO. _____ PERFORMED ON _____

REMARKS _____

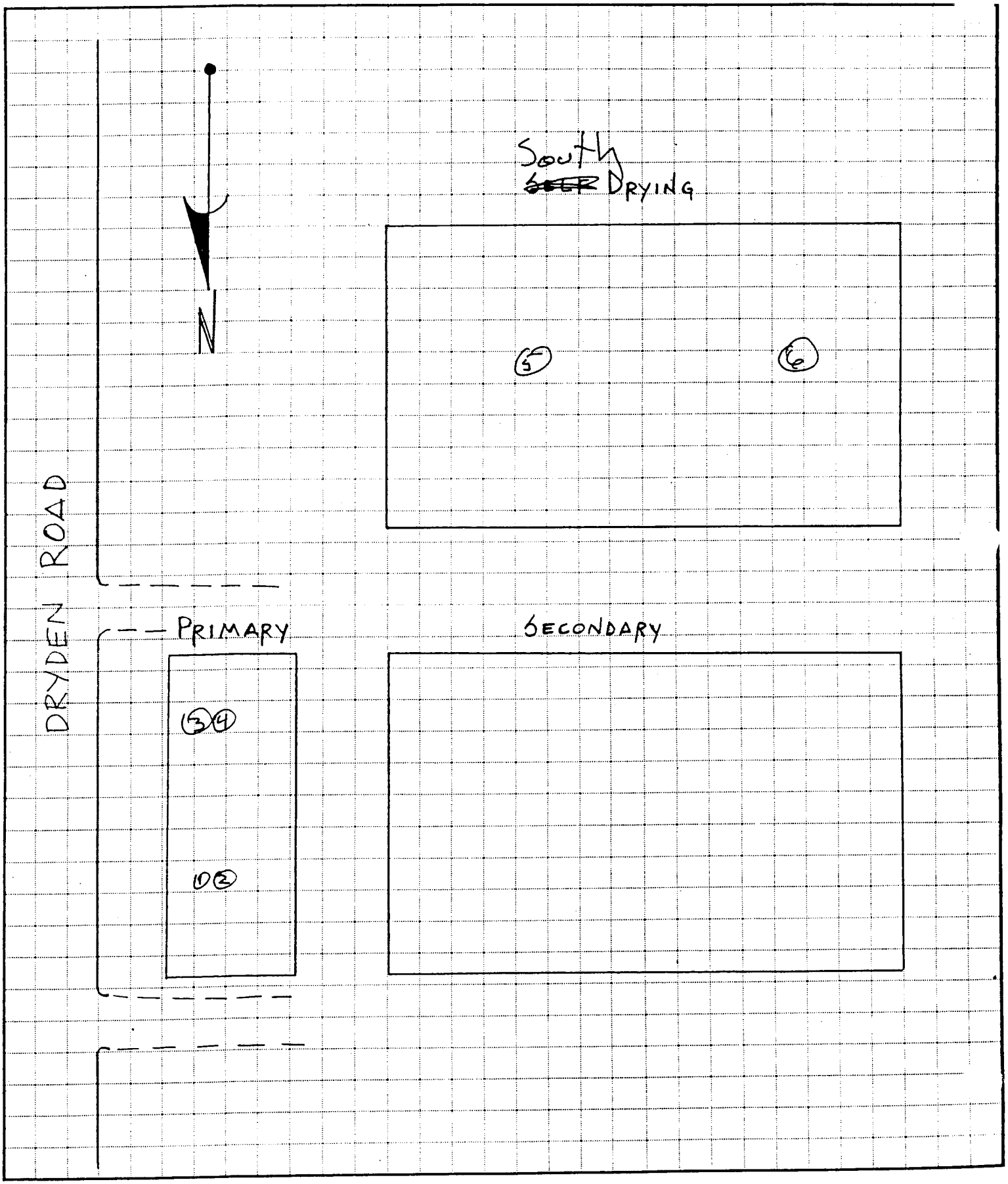
RECEIVED OCT 0 5 2000

DISTRIBUTION

INSPECTOR MIKE ESPELAGE

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

JOB CRA - MORAINE LAGOON CLOSUR
SHEET NO. _____ OF _____
CALCULATED BY Espl Agl DATE 10-2-00
CHECKED BY _____ DATE _____
SCALE NO SCALE



12611

H. C. NUTTING COMPANY

GEOTECHNICAL, GEO-ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921

611 LUNKEN PARK DR. CINCINNATI OH 45226 513/321-5816
790 MORRISON RD. COLUMBUS OH 43230 614/863-3113
912 MORRIS ST. CHARLESTON WV 25301 304/344-0821
349 WALNUT ST. LAWRENCEBURG IN 47025 812/539-4300
470-B CONWAY CT. Ste. B-8 LEXINGTON KY 40511

DATE 10-3-00
PROJ. START 10:00
PROJ. STOP 11:45
TRAVEL TIME 3.00
TOTAL HOURS 3.75
ORDER NO. 11294.020
REPORT NO. _____

FILE ONLY
DO NOT TYPE

REPORT OF SOIL COMPACTION INSPECTION

CLIENT Conestoga Rovers
PROJECT Lagoon Closure
CONTRACTOR Severson

Nuclear Meter Utilized ☒

WEATHER CONDITIONS:
☒ FAIR ☐ CLOUDY
☐ RAIN ☐ SNOW

TEMPERATURE: AM 61 PM ~~84~~

AREA BEING FILLED Primary Lagoon
HAULING EQUIPMENT USED _____
ROLLING EQUIPMENT USED _____
EST. CU. YDS. TODAY _____ WATER ADDED _____
SOURCE OF BORROW _____
MATERIAL DESCRIPTION Dark Brown Silty Sandy Gravel
DENSITY TESTS MADE TODAY _____ NOS. _____ THRU _____

FIELD DENSITY TEST RESULTS

TEST NUMBER	TEST LOCATION	FILL HEIGHT OR ELEVATION	MAXIMUM DRY DENSITY @ OPTIMUM PERCENT MOISTURE (lbs./cu. ft.)	FIELD DRY DENSITY (lbs./cu. ft.)	FIELD MOISTURE %	PERCENT COMPACTION	PERCENT COMPACTION REQUIRED
1	[illegible]	5th Lift	135.8 @ 6.8	121.1	10.9	89	95
2	SEE Diagram	↓	↓	124.1	9.6	92	↓
3	↓			121.5	9.6	89	
4				120.9	10.3	89	

* DENSITY TEST NO. _____ IS A RETEST OF TEST NO. _____ PERFORMED ON _____

REMARKS _____

DISTRIBUTION

RECEIVED OCT 05 AM

INSPECTOR MIKE ESPERAGE

Reorder No. 102-0069

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

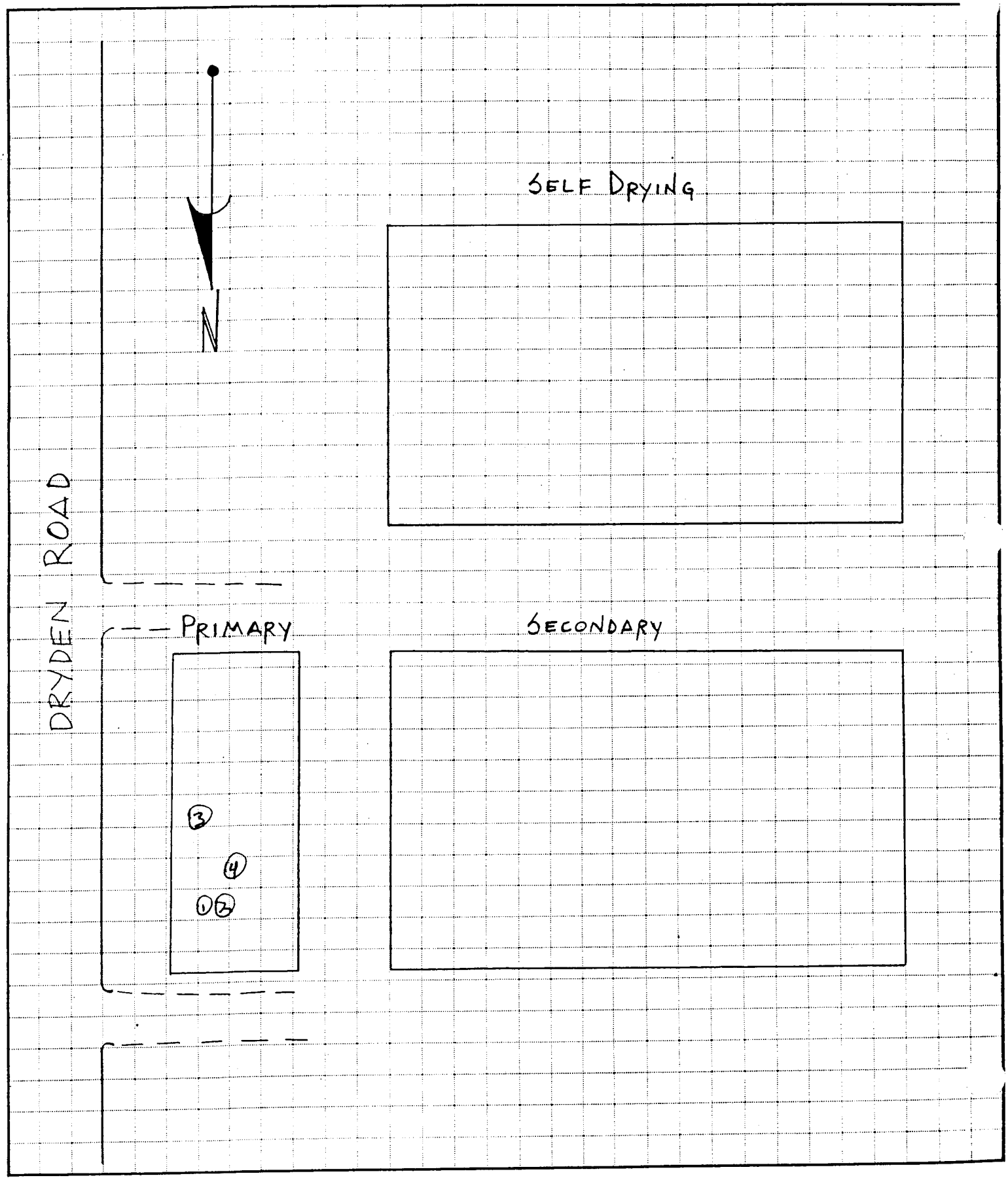
JOB CKA - MORAINE LAGOON CLOSUR

SHEET NO. _____ OF _____

CALCULATED BY Espelage DATE 10.3.00

CHECKED BY _____ DATE _____

SCALE NO SCALE



12611

REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 900
Proj. Stop: 1000
Travel Time: 2
Total Hours: 3

Report Date: October 4, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Partly Cloudy
PM _____
Temperature:
AM 68 °
PM _____ °
Nuclear Meter Utilized: X

Area Being Tested: Primary Lagoon
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
ity Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch	Lift 5	133.7 @ 8.8	123.2	9.7	92*	95
2	See Attached Sketch	Lift 5	133.7 @ 8.8	124.4	8.5	93*	95
3	See Attached Sketch	Lift 5	133.7 @ 8.8	124.9	8.7	93*	95

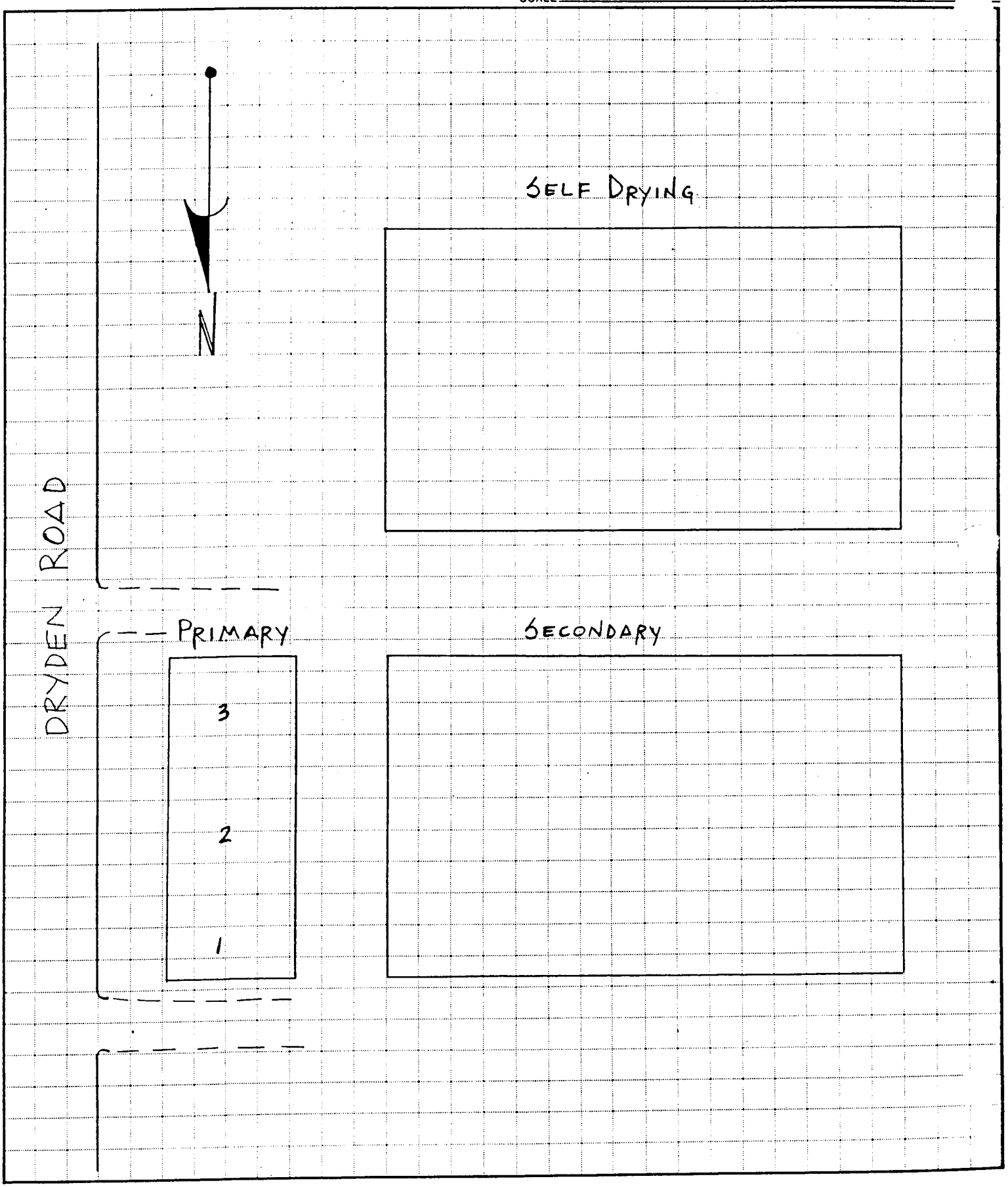
Remarks: • Three bulk samples of the sludge/cement kiln dust, were collected from the Secondary lagoon and submitted to the HCN laboratory of strength analysis.

Technician: Harold Widener

ribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

JOB CNA MORAINE LAGOON CLOSURE
SHEET NO. _____ OF _____
CALCULATED BY HRW DATE 4 OCT 00
CHECKED BY _____ DATE _____
SCALE NO SCALE



1761

REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 800
Proj. Stop: 1000
Travel Time: 2
Total Hours: 4

Report Date: October 9, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Partly Cloudy
PM _____
Temperature:
AM 38 °
PM _____ °
Nuclear Meter Utilized: X

Area Being Tested: Primary, Secondary and South Lagoons
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
sity Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - Primary	Lift 5	133.7 @ 8.8	129.2	8.8	97	95
2	See Attached Sketch - Secondary	Lift 5	135.8 @ 6.8	138.7	6.8	102	95
3	See Attached Sketch - South	Lift 5	133.7 @ 8.8	132.8	9.0	99	95
4	See Attached Sketch - South	Lift 5	135.8 @ 6.8	129.0	10.0	97	95

Remarks:
- One bulk sample of the sludge/cement kiln dust, was collected from the Secondary lagoon and submitted to the HCN laboratory of strength analysis.
- Tests 1, 3 and 4 were re-tests from areas that were previously tested and found to be deficient in compaction. These areas now are in compliance with project compaction specifications.

Technician: Harold Widener

Distribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

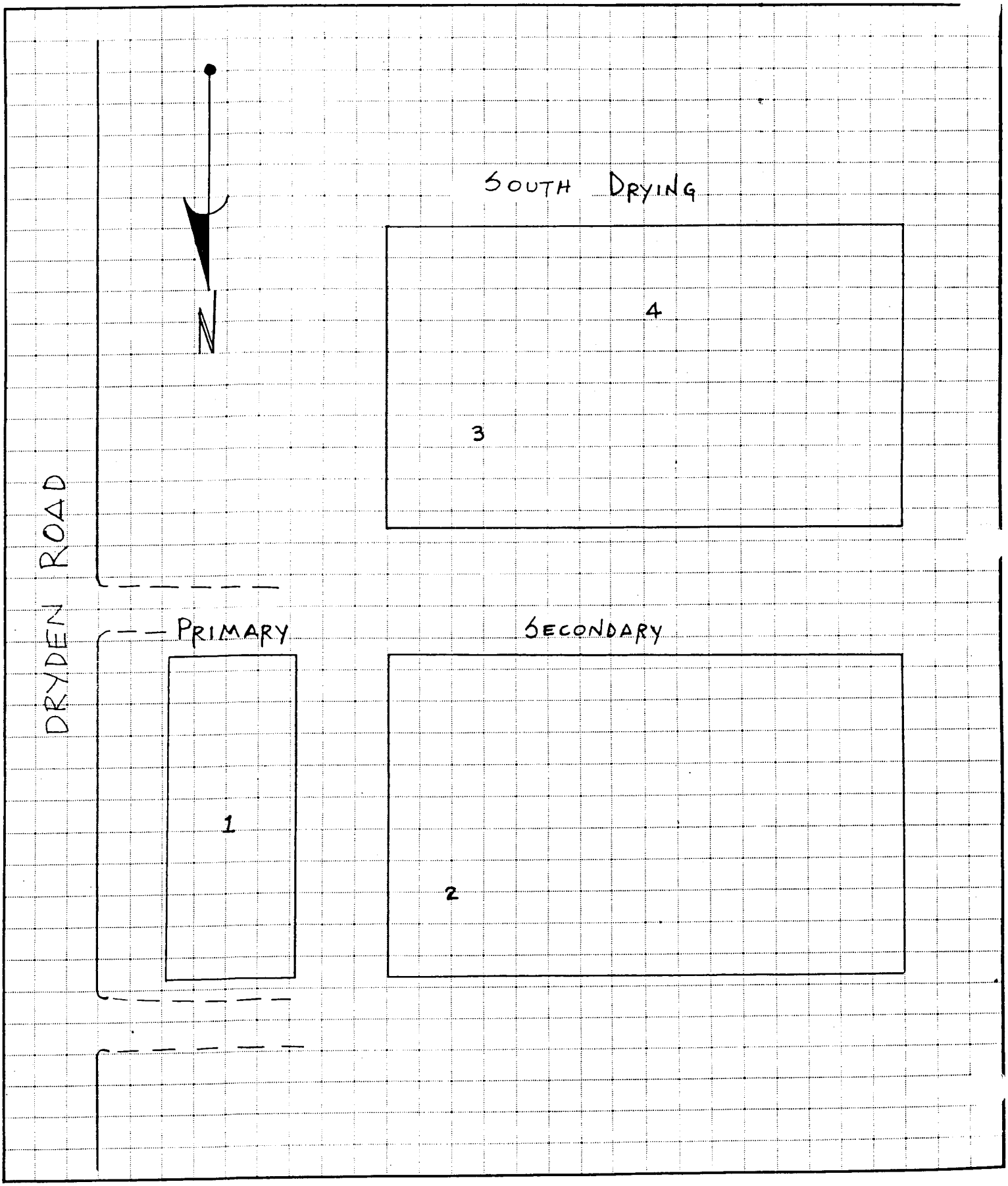
JOB CKA Moraine Lagoon Closure

SHEET NO. _____ OF _____

CALCULATED BY HRW DATE 9 Oct 00

CHECKED BY _____ DATE _____

SCALE No Scale



REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 1000
Proj. Stop: 1030
Travel Time: 2
Total Hours: 2.5

Report Date: October 12, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Cloudy
PM _____
Temperature:
AM 48 °
PM °
Nuclear Meter Utilized: X

Area Being Tested: Secondary and South Lagoons
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
sity Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - South	Lift 6	139.7 @ 6.7	140.3	8.3	101*	95
2	See Attached Sketch - South	Lift 6	139.7 @ 6.7	144.3	9.5	103*	95
3	See Attached Sketch - Secondary	Lift 2	139.7 @ 6.7	145.7	7.4	104*	95
4	See Attached Sketch - Secondary	Lift 2	139.7 @ 6.7	141.8	7.6	102*	95

Remarks: * The high test results may be a result of an inordinate amount of rock in the fill material.

Technician: Harold Widener

tribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

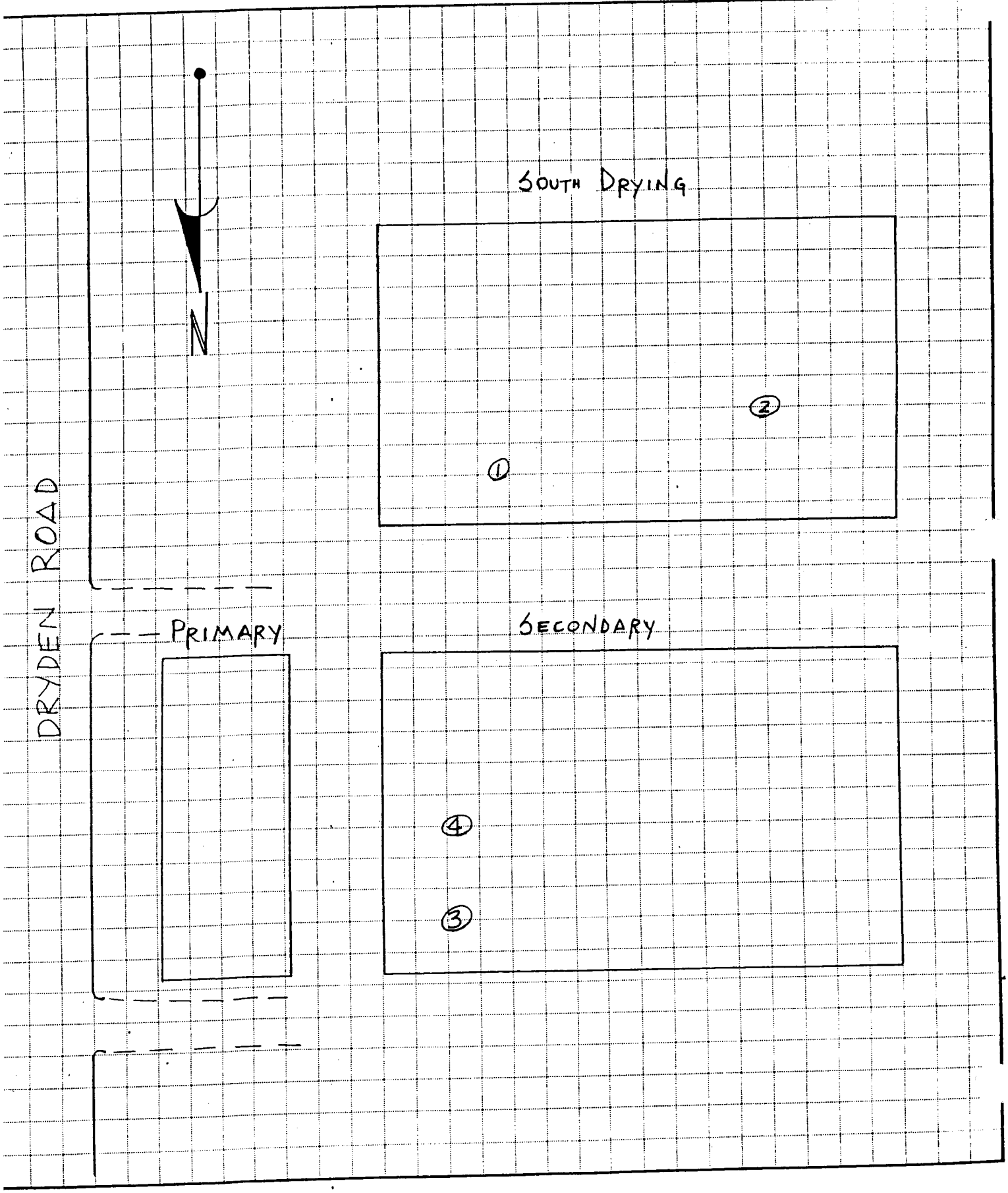
JOB CRA - Moraine Lagoon Closure

SHEET NO. _____ OF _____

CALCULATED BY HPW DATE 12 OCT 00

CHECKED BY _____ DATE _____

SCALE No Scale



REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 930
Proj. Stop: 1030
Travel Time: 2
Total Hours: 3

Report Date: October 16, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Sunny
PM _____
Temperature:
AM 45 °
PM _____ °
Nuclear Meter Utilized: X

Area Being Tested: Secondary and South Lagoons
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
sity Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - Secondary	Lift 3	139.7 @ 6.7	142.1	8.9	102*	95
2	See Attached Sketch - Secondary	Lift 3	139.7 @ 6.7	145.1	7.8	104*	95
3	See Attached Sketch - Secondary	Lift 1	139.7 @ 6.7	149.4	6.0	107*	95
4	See Attached Sketch - Secondary	Lift 1	139.7 @ 6.7	150.9	5.7	108*	95
5	See Attached Sketch - South	Lift 7	139.7 @ 6.7	145.6	8.1	104*	95
6	See Attached Sketch - South	Lift 7	139.7 @ 6.7	140.3	9.1	100	95

Remarks: * The high test results may be a result of an inordinate amount of rock in the fill material.

Technician: Harold Widener

tribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

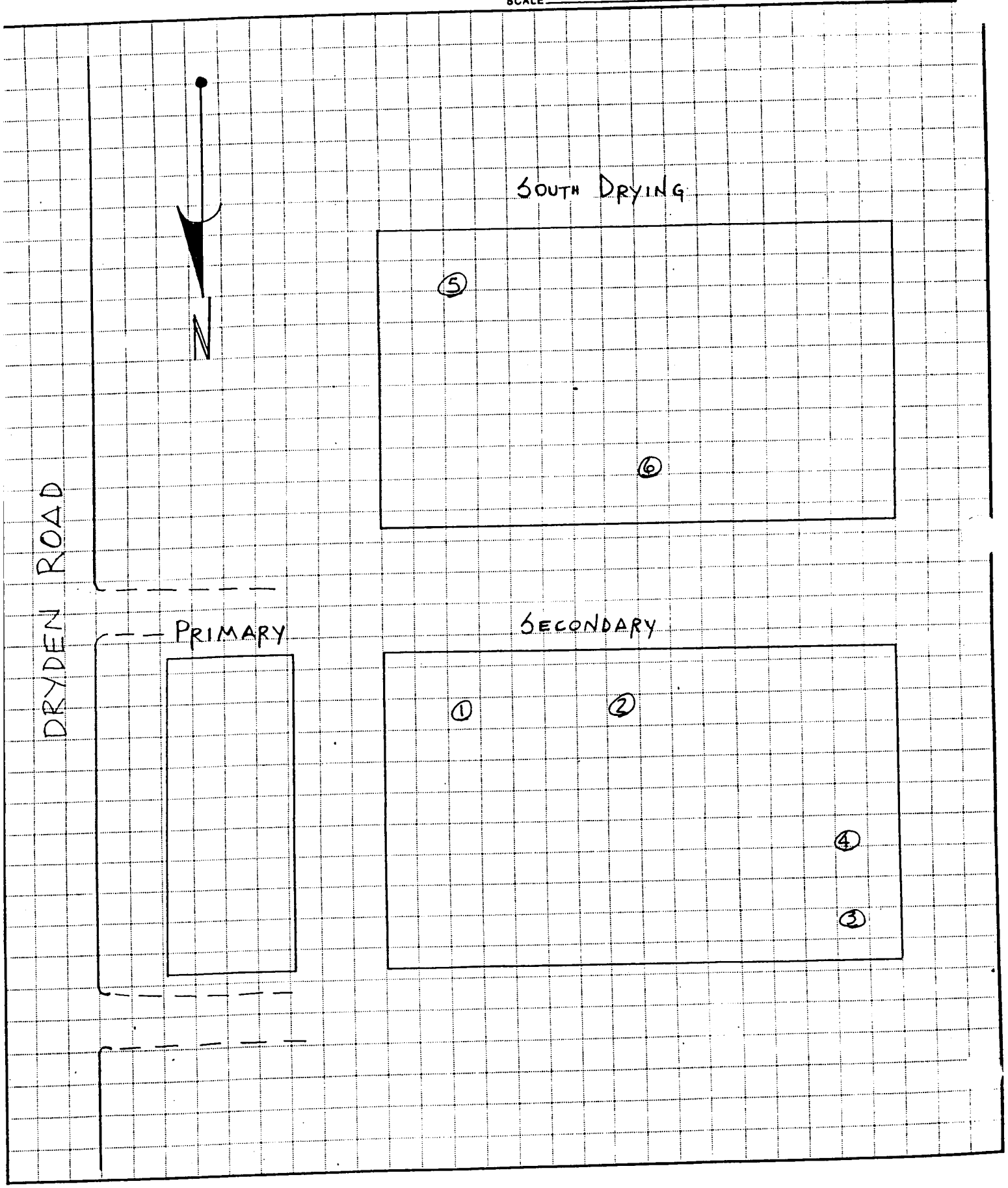
JOB CRA - MORAINE LAGOON

SHEET NO. _____ OF _____

CALCULATED BY HLW DATE 16 OCT 00

CHECKED BY _____ DATE _____

SCALE NO SCALE



REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 930
Proj. Stop: 1030
Travel Time: 2
Total Hours: 3

Report Date: October 26, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Sunny
PM _____
Temperature:
AM 45 °
PM _____ °
Nuclear Meter Utilized: X

Area Being Tested: Secondary and South Lagoons
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
sity Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - South	Lift 9	135.7 @ 7.4	130.6	8.5	96	95
2	See Attached Sketch - South	Lift 8	133.7 @ 8.8	127.7	10.0	96	95
3	See Attached Sketch - Secondary	Lift 1	133.7 @ 8.8	129.8	8.8	97	95
4	See Attached Sketch - Secondary	Lift 1	133.7 @ 8.8	128.9	10.3	96	95

Remarks:

Technician: Harold Widener

ribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

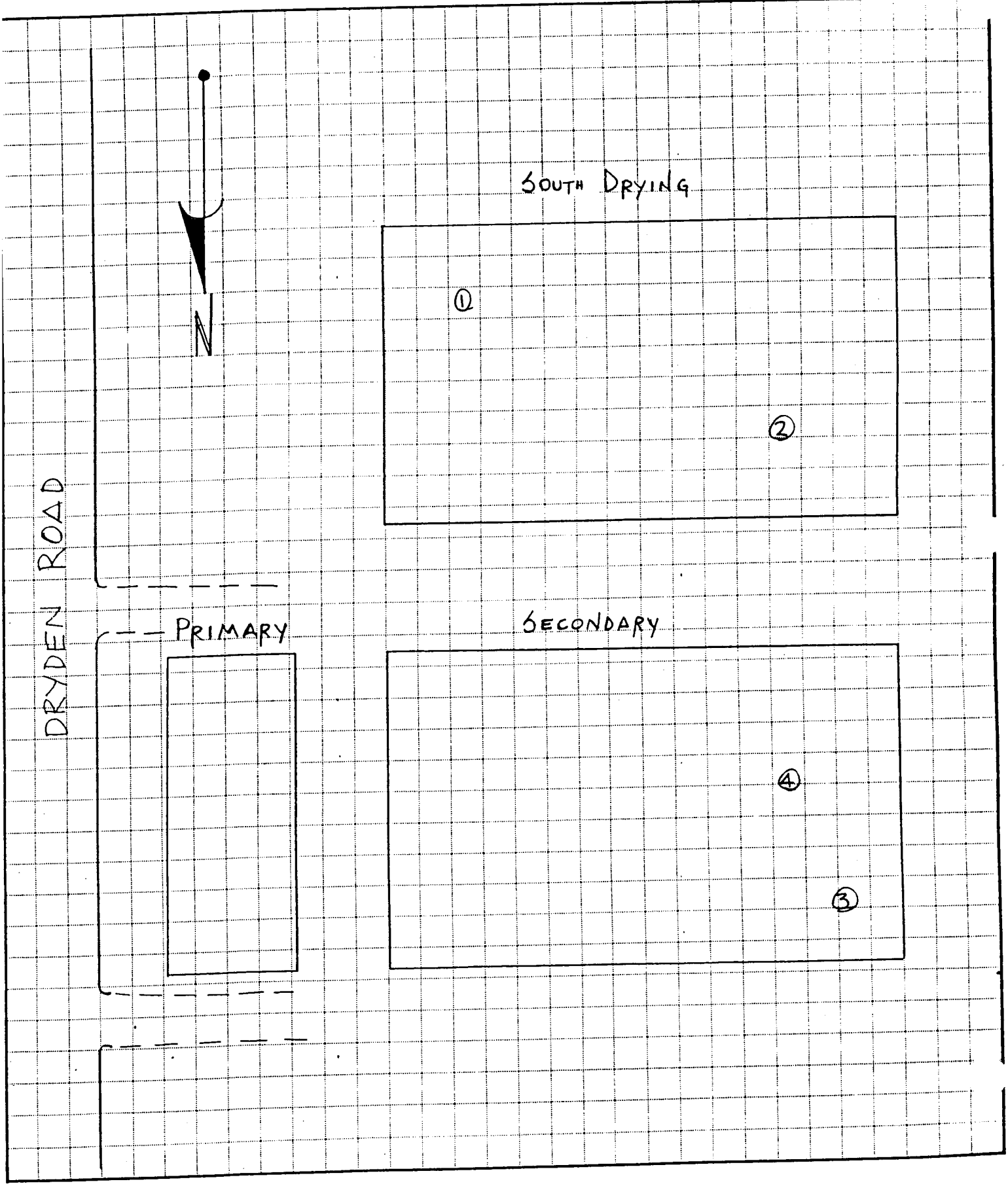
JOB CRA - Moraine Lagoon Closure

SHEET NO. _____ OF _____

CALCULATED BY HRW DATE 20 Oct 00

CHECKED BY _____ DATE _____

SCALE No Scale



REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 1130
Proj. Stop: 1230
Travel Time: 2
Total Hours: 3

Report Date: October 25, 2000 **Report No.**
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor:

Weather Conditions:
AM Cloudy
PM
Temperature:
AM 54 °
PM °
Nuclear Meter Utilized: X

Area Being Tested: Primary Lagoon
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
sity Tests Today: **Water Added:**

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - Primary	Lift 7	135.8 @ 6.8	136.0	7.3	100	95
2	See Attached Sketch - Primary	Lift 7	133.8 @ 6.8	135.2	8.3	100	95
3	See Attached Sketch - Primary	Lift 6	133.8 @ 6.8	129.7	9.3	96	95
4	See Attached Sketch - Primary	Lift 6	133.8 @ 6.8	132.6	8.2	98	95

Remarks:

Technician: Harold Widener

ribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

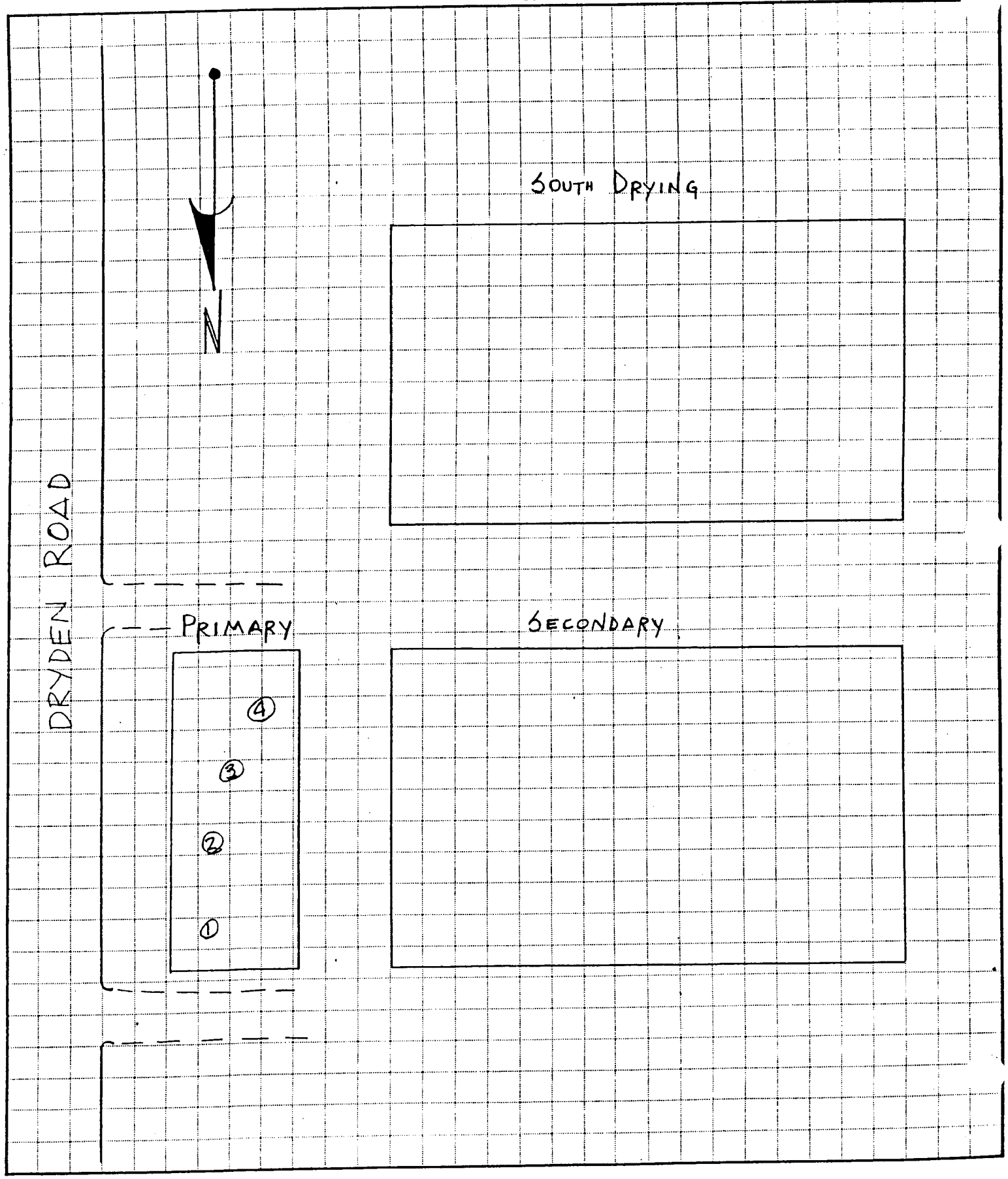
JOB CRA - MORAINE LAGOON CLOSURE

SHEET NO. _____ OF _____

CALCULATED BY HRW DATE 25 OCT 00

CHECKED BY _____ DATE _____

SCALE NO SCALE



REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 930
Proj. Stop: 1100
Travel Time: 2
Total Hours: 3.5

Report Date: October 27, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Sunny
PM _____
Temperature:
AM 55 °
PM °
Nuclear Meter Utilized: X

Area Being Tested: Secondary Lagoon
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
sity Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - Secondary	Lift 2	135.8 @ 6.8	135.0	7.4	99	95
2	See Attached Sketch - Secondary	Lift 1	135.8 @ 6.8	133.6	8.3	98	95
3	See Attached Sketch - Secondary	Lift 4	135.8 @ 6.8	133.9	8.9	99	95

Remarks:

Technician: Harold Widener

tribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

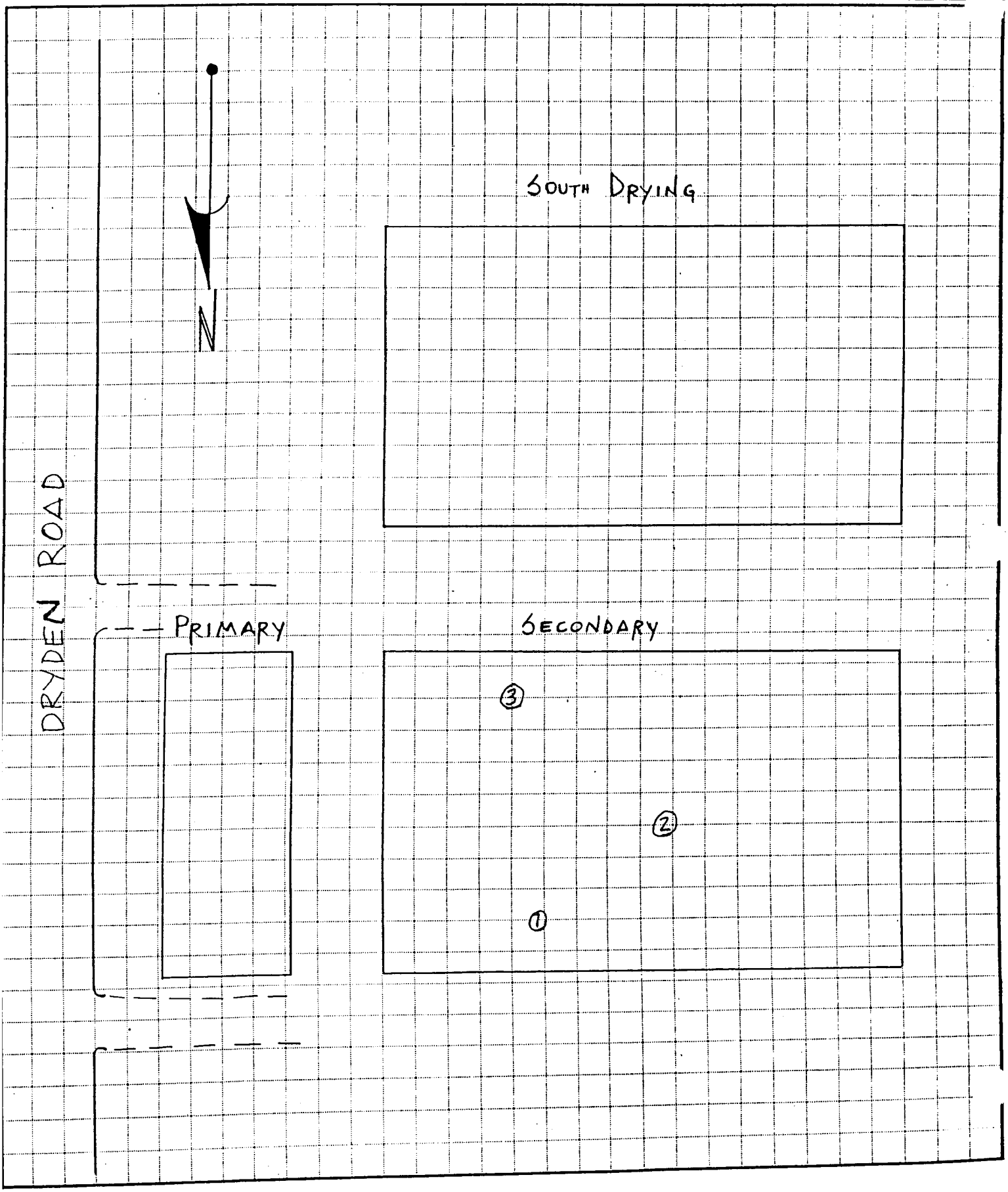
JOB OKA Pigeon Lagoon Closure

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE 10·27·00

CHECKED BY _____ DATE _____

SCALE No Scale



REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 930
Proj. Stop: 1100
Travel Time: 2
Total Hours: 3.5

Report Date: October 31, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Sunny
PM _____
Temperature:
AM 57 °
PM °
Nuclear Meter Utilized: X

Area Being Tested: South Secondary Lagoon; North Secondary Lagoon
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
ity Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - Secondary	Lift 3	139.7 @ 6.7	138.1	6.2	99	95
2	See Attached Sketch - Secondary	Lift 4	139.7 @ 6.7	135.2	8.2	97	95
3	See Attached Sketch - Secondary	Lift 4	133.7 @ 8.8	131.2	9.1	98	95
4	See Attached Sketch - Secondary	Lift 2	139.7 @ 6.7	139.2	7.8	100	95
5	See Attached Sketch - Secondary	Lift 3	139.7 @ 6.7	136.5	7.9	98	95
6	See Attached Sketch - North Secondary	Lift 1	139.7 @ 6.7	129.7	8.8	93 *	95

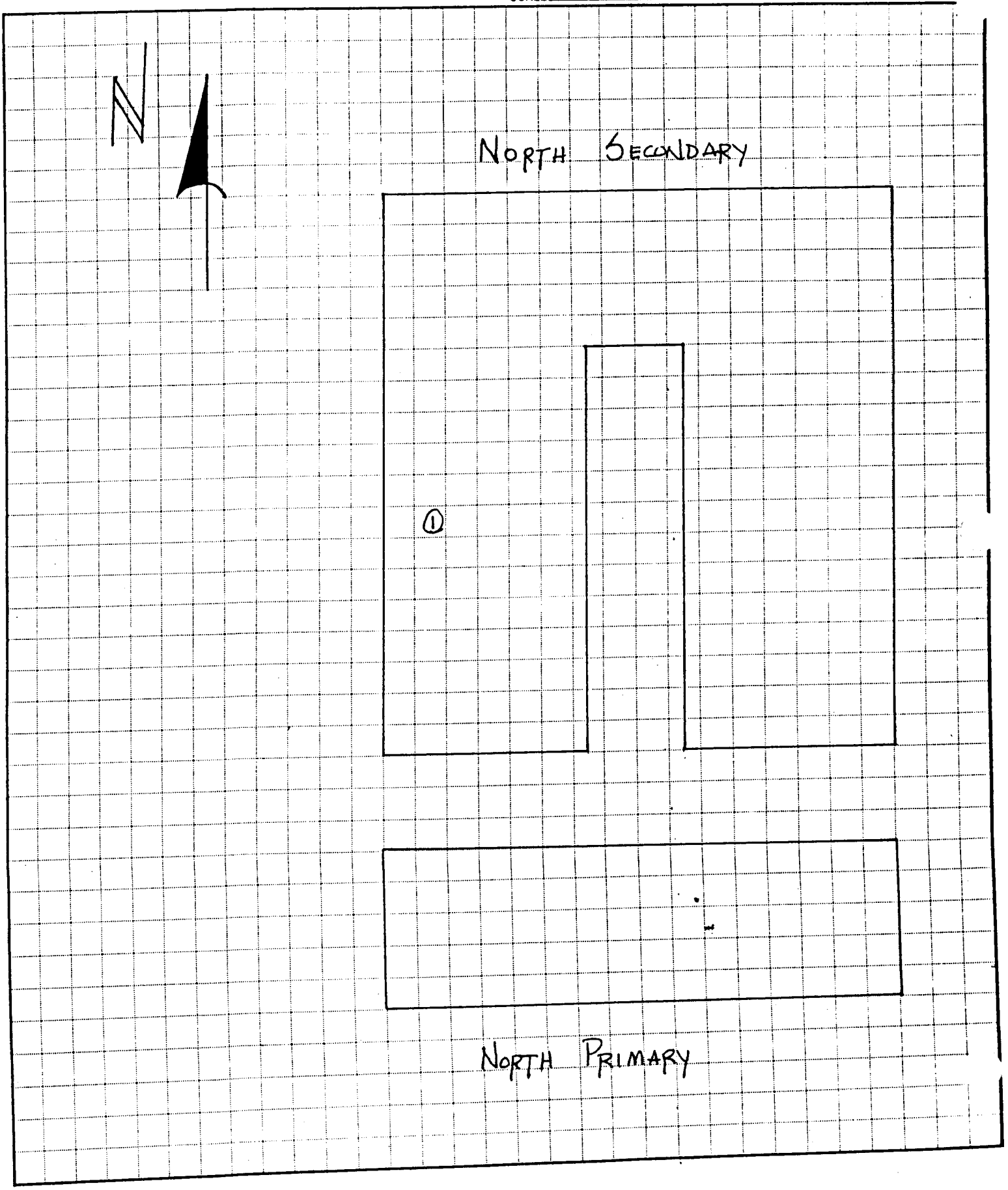
Remarks: Insufficient compaction was due in part to higher moisture content, excessively thick lift (± 4 feet) and insufficient compactive effort.

Technician: Harold Widener

Distribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

JOB MORAINE LAGOON CLOSURE
SHEET NO. NORTH LAGOONS - GATE 7
CALCULATED BY _____ DATE _____
CHECKED BY HLW DATE 10.31.00
SCALE NONE



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CINCINNATI, OHIO 45226
(513) 321-5816

JOB CRA - MORAINE LAGOON CLOSURE

SHEET NO. _____ OF _____

CALCULATED BY HRW DATE 10-31-00

CHECKED BY _____ DATE _____

SCALE NO SCALE

SOUTH DRYING

DRYDEN ROAD

PRIMARY

SECONDARY

③ ② ⑤ ① ④

REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 930
Proj. Stop: 1100
Travel Time: 2
Total Hours: 3.5

Report Date: November 1, 2000 **Report No.**
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor:

Weather Conditions:
AM Sunny
PM
Temperature:
AM 57 °
PM °
Nuclear Meter Utilized: X

Area Being Tested: South Secondary Lagoon; North Secondary Lagoon
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
Density Tests Today: **Water Added:**

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - Secondary	Lift 5	139.7 @ 6.7	135.5	8.8	97	95
2	See Attached Sketch - Secondary	Lift 4	139.7 @ 6.7	137.1	7.0	98	95
3	See Attached Sketch - North Secondary	1	139.7 @ 6.7	131.5	10.1	94*	95
4	See Attached Sketch - North Secondary	1	139.7 @ 6.7	130.0	9.8	93*	95
5	See Attached Sketch - North Secondary	2	139.7 @ 6.7	136.1	7.6	98	95

Remarks: * Insufficient compaction was possibly due to high moisture content.

Technician: Harold Widener

Distribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

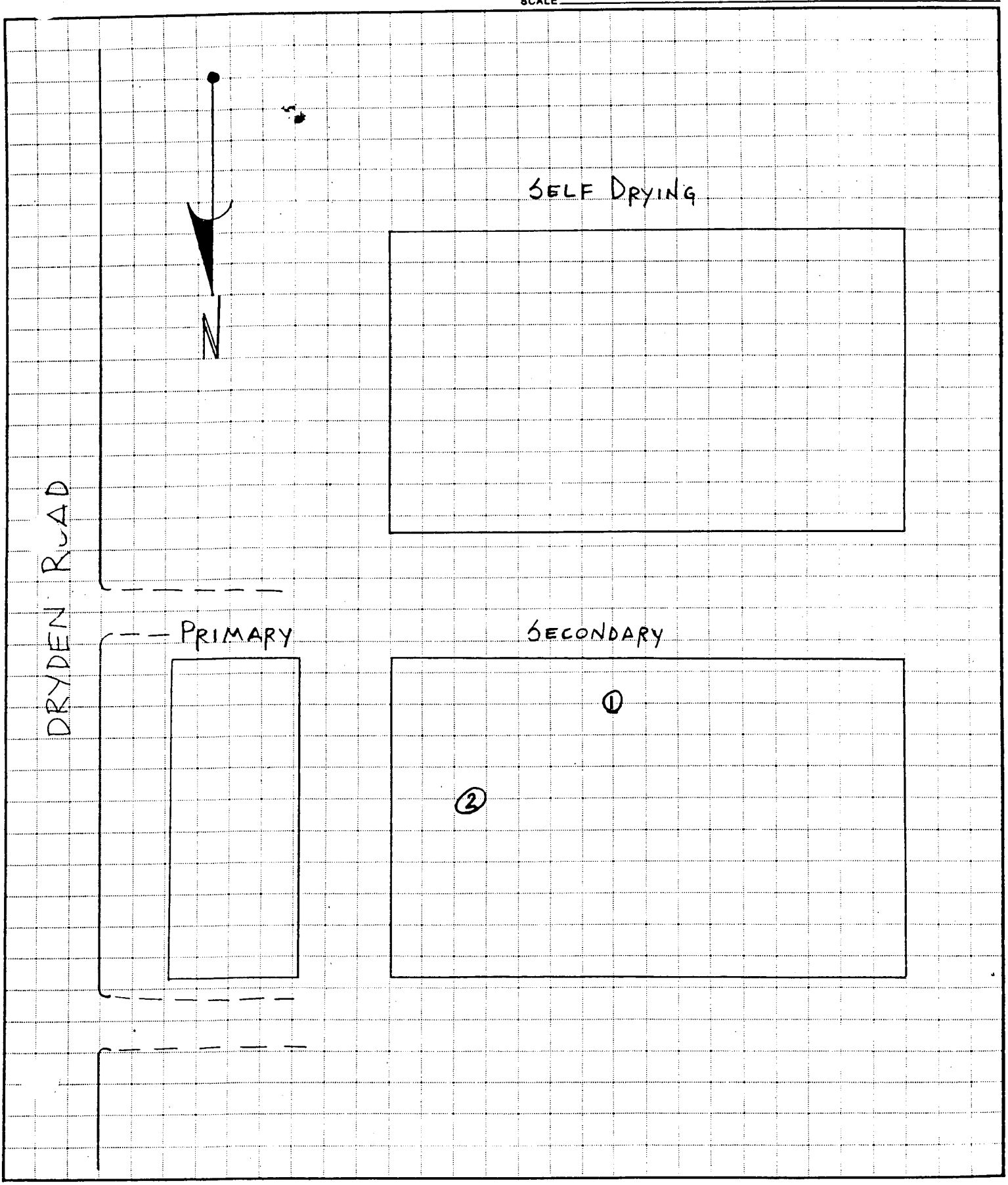
JOB CRA - MORAINE LAGOON CLOSUR

SHEET NO. _____ OF _____

CALCULATED BY HRW DATE 11·1·00

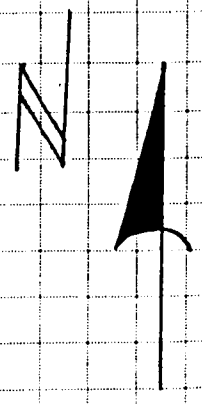
CHECKED BY _____ DATE _____

SCALE NO SCALE

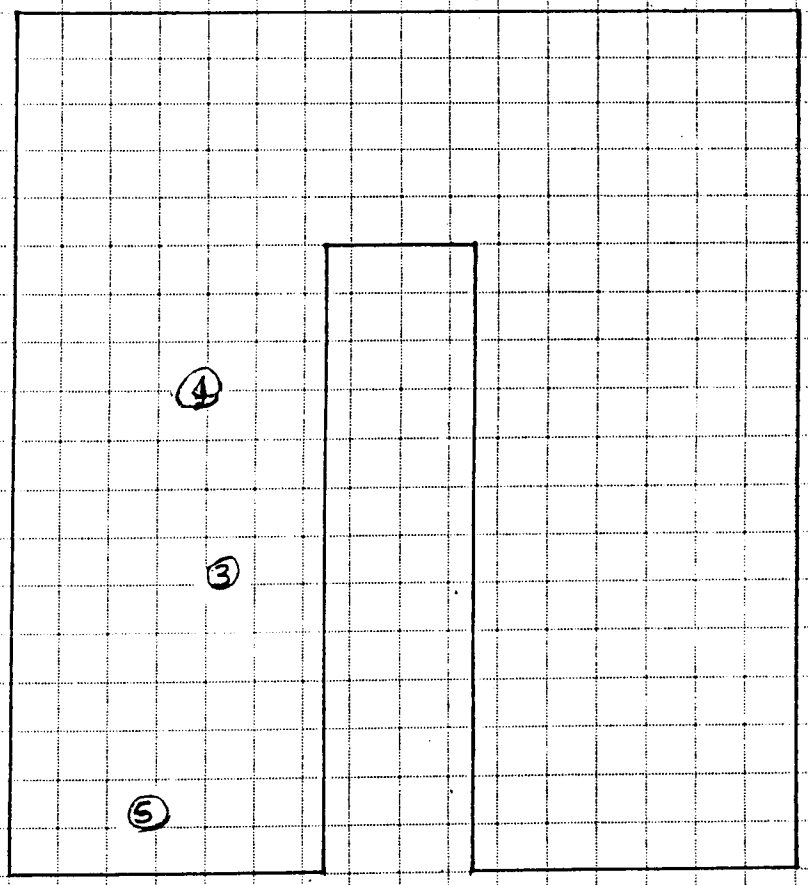


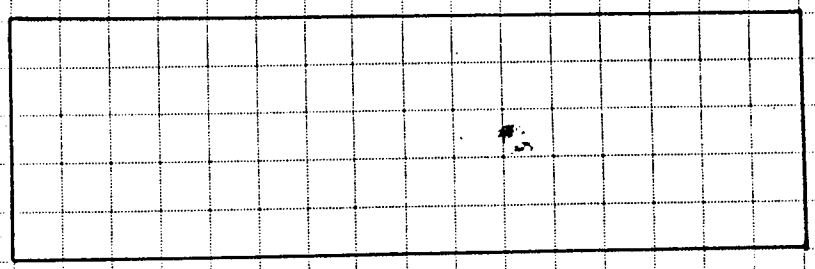
H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

JOB MORAINE LAGOON CLOSURE
SHEET NO. NORTH LAGOONS - GATE 7
CALCULATED BY _____ DATE _____
CHECKED BY HLW DATE 11-1-00
SCALE NONE



NORTH SECONDARY





NORTH PRIMARY

REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 1000
Proj. Stop: 1100
Travel Time: 2
Total Hours: 3

Report Date: November 3, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Cloudy
PM _____
Temperature:
AM 50 °
PM °
Nuclear Meter Utilized: X

Area Being Tested: North Secondary Lagoon
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
sity Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - North Secondary	Lift 2	139.7 @ 6.7	135.4	6.5	97	95

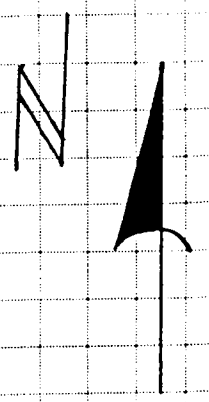
Remarks:

Technician: Harold Widener

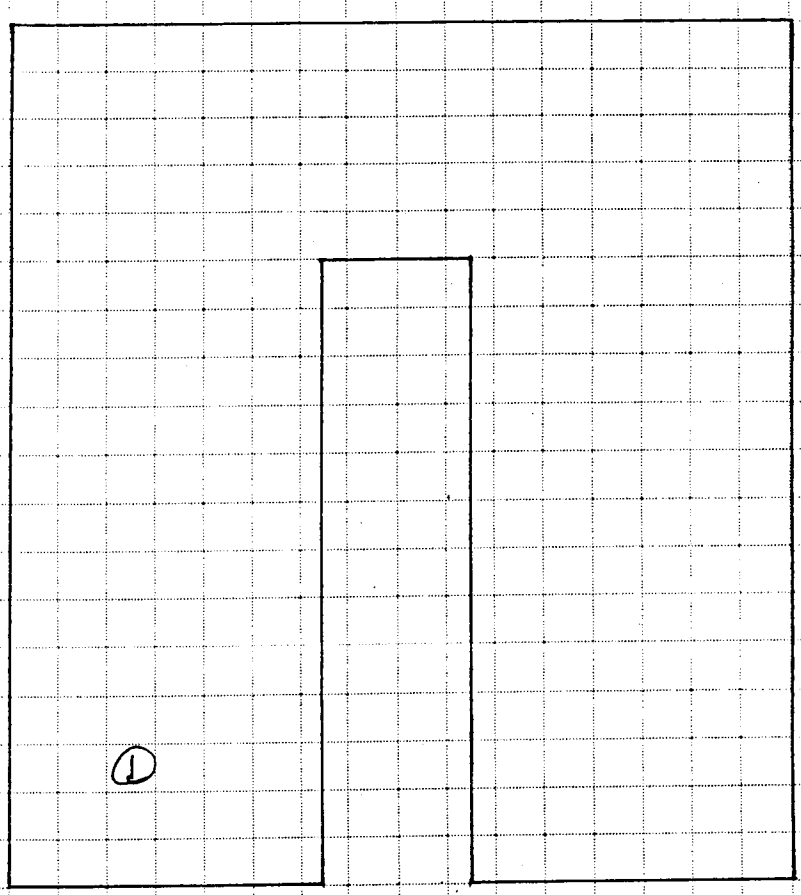
tribution:

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

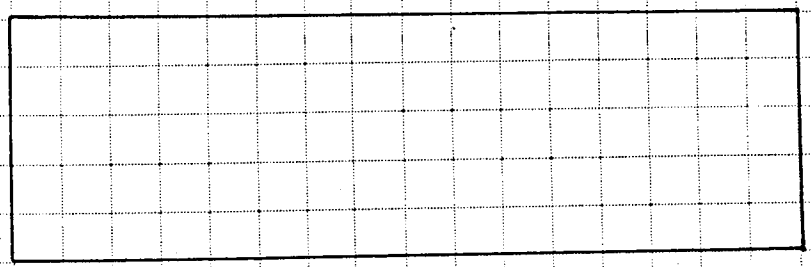
JOB MORAINE LAGOON CLOSURE
SHEET NO. NORTH LAGOONS - GATE 7
CALCULATED BY _____ DATE _____
CHECKED BY HLW DATE NOV 3, 2000
SCALE NONE



NORTH SECONDARY



①



NORTH PRIMARY

REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 0930
Proj. Stop: 1100
Travel Time: 2
Total Hours: 3.5

Report Date: November 6, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Cloudy
PM _____
Temperature:
AM 50 °
PM °
Nuclear Meter Utilized: X

Area Being Tested: South Secondary, North Primary, North Secondary Lagoon
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
Density Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - South Secondary	Lift 3	139.7 @ 6.7	143.3	5.9	103	95
2	See Attached Sketch - South Secondary	Lift 4	139.7 @ 6.7	142.1	6.0	102	95
3	See Attached Sketch - South Secondary	Lift 5	139.7 @ 6.7	133.5	9.7	96	95
4	See Attached Sketch - South Secondary	Lift 6	139.7 @ 6.7	145.8	5.5	104	95
5	See Attached Sketch - North Primary	Lift 1	139.7 @ 6.7	133.5	6.6	96	95
6	See Attached Sketch - North Primary	Lift 1	139.7 @ 6.7	139.7	6.4	100	95
7	See Attached Sketch - North Primary	Lift 3	139.7 @ 6.7	140.6	6.3	100	95
8	See Attached Sketch - North Primary	Lift 3	139.7 @ 6.7	141.2	6.1	101	95
9	See Attached Sketch - North Primary	Lift 1	139.7 @ 6.7	128.7	11.4	92 *	95

Remarks: High compaction is probably a result of larger rock in the fill material
*The failing test result is probably a result of high moisture content in the fill material.

Technician: Harold Widener

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

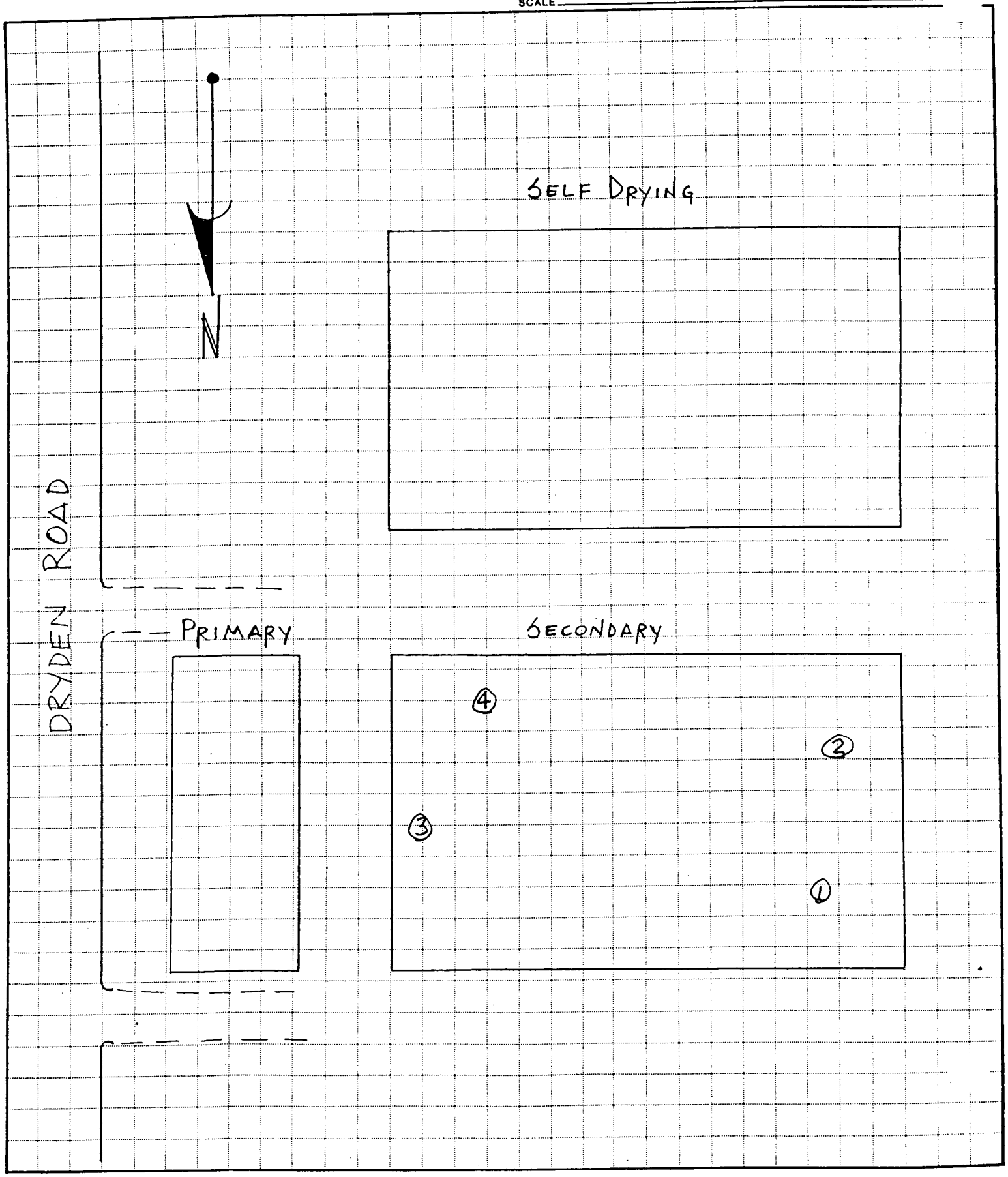
JOB CKA - MORAINE LAGOON CLOSU

SHEET NO. _____ OF _____

CALCULATED BY KRW DATE Nov 6, 2000

CHECKED BY _____ DATE _____

SCALE No SCALE



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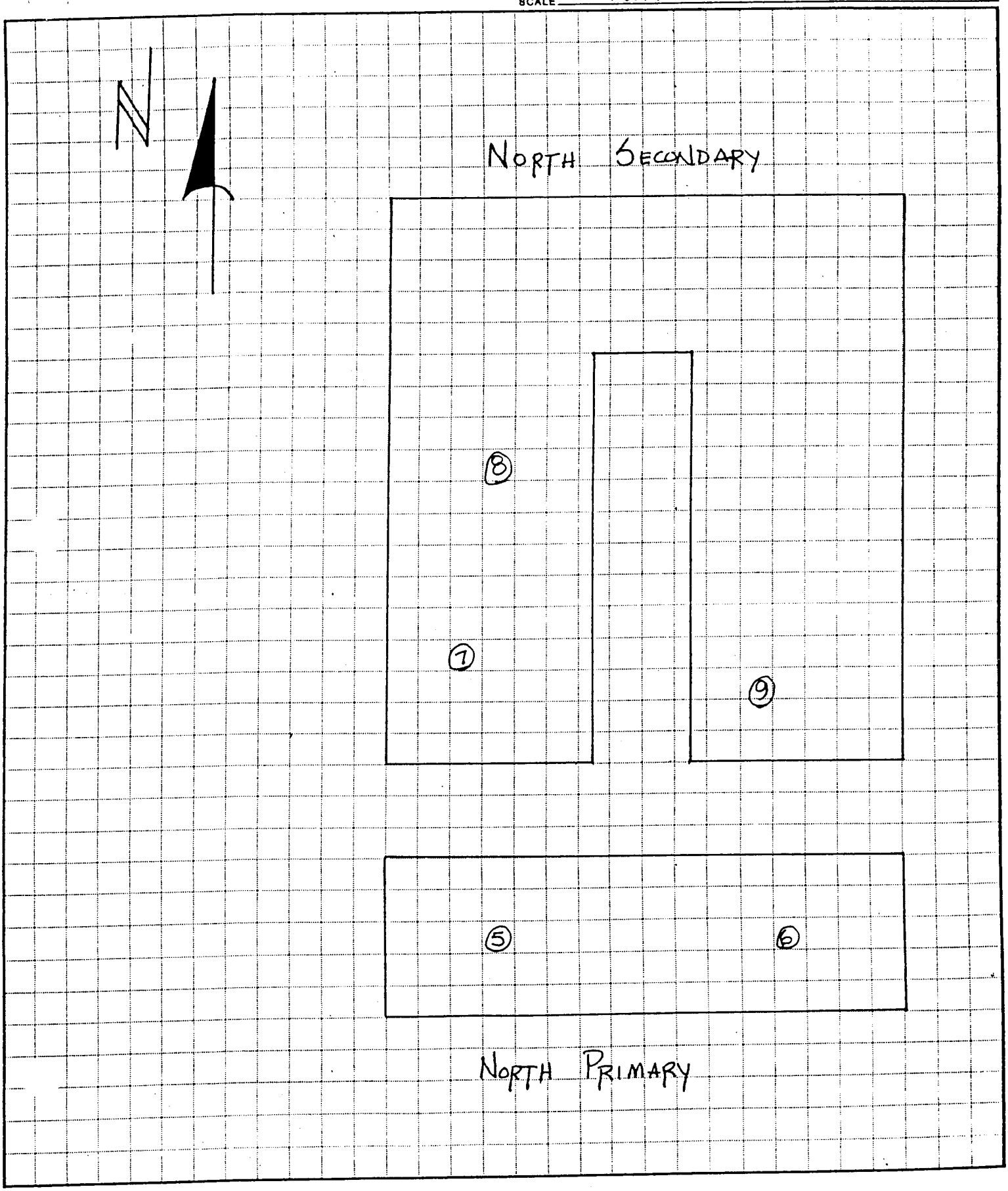
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

JOB MORAINE LAGOON CLOSURE
SHEET NO. NORTH LAGOONS - GATE 7
CALCULATED BY _____ DATE _____
CHECKED BY HRW DATE NOV 6, 2000
SCALE NONE



REPORT OF SOIL COMPACTION INSPECTION

FILE ONLY - DO NOT TYPE

Proj. Start: 0900
Proj. Stop: 1030
Travel Time: 2
Total Hours: 3.5

Report Date: November 15, 2000 **Report No.** _____
Order No.: 11294.020
Client: Conestoga Rover & Associates
Project Moraine Lagoon Closure
Moraine, Ohio
Contractor: Sevenson
Subcontractor: _____

Weather Conditions:
AM Sunny
PM _____
Temperature:
AM 45 °
PM _____ °
Nuclear Meter Utilized: X

Area Being Tested: South Secondary, North Primary, North Secondary Lagoon
Hauling Equipment Used: Tandem Axle Dump Trucks
Rolling Equipment Used: Vibratory Sheepsfoot Roller
Source of Borrow: Off Site
Material Description: Dark Brown silty clay with gravel
Density Tests Today: _____ **Water Added:** _____

FIELD DENSITY TEST RESULTS

Test No.	Test Location	Fill Height or Elevation	Maximum Dry Density @ Optimum Percent Moisture (lbs/cu ft)	Field Dry Density (lbs/cu ft)	Field Moisture %	Percent Compaction	Percent Compaction Required
1	See Attached Sketch - South Secondary	Lift 5	139.7 @ 6.7	133.5	9.0	95	95
2	See Attached Sketch - South Secondary	SG	139.7 @ 6.7	132.6	8.6	95	95
3	See Attached Sketch - South Secondary	Lift 6	139.7 @ 6.7	132.4	7.4	95	95
4	See Attached Sketch - North Primary	Lift 2	139.7 @ 6.7	132.5	8.4	95*	95
5	See Attached Sketch - North Primary	Lift 2	139.7 @ 6.7	136.1	7.9	97	95
6	See Attached Sketch - North Secondary	Lift 1	139.7 @ 6.7	135.6	6.1	97	95
7	See Attached Sketch - North Secondary	Lift 4	139.7 @ 6.7	139.4	7.2	100	95
8	See Attached Sketch - North Secondary	Lift 4	139.7 @ 6.7	132.4	8.3	95	95

Remarks: Test number 4 is a retest of the area which failed to meet compaction specifications on November 6, 2000.

Technician: Harold Widener

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

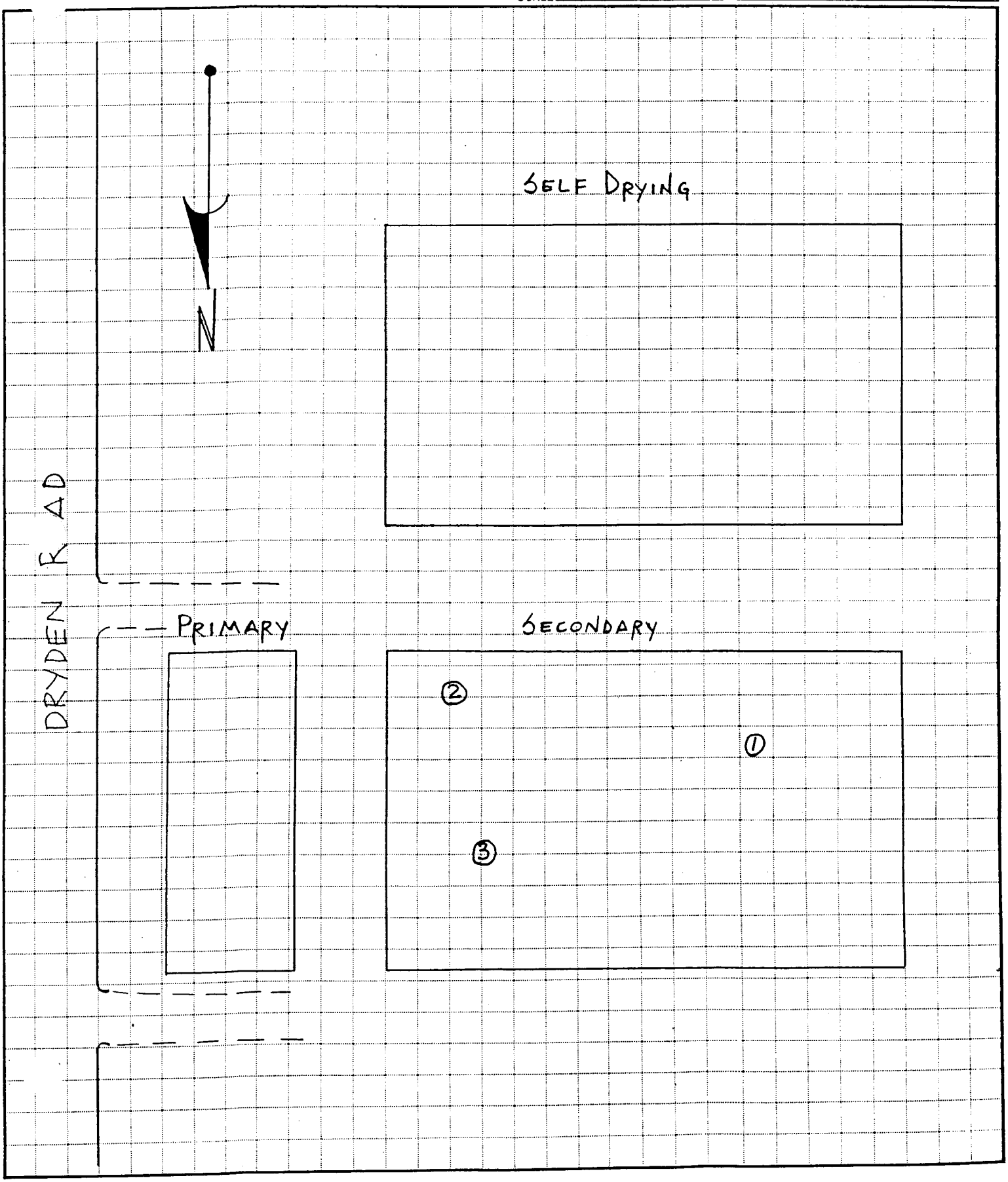
JOB CKA - MORAINE LAGOON CLOSURE

SHEET NO. _____ OF _____

CALCULATED BY HRW DATE 15 NOV 00

CHECKED BY _____ DATE _____

SCALE NO SCALE



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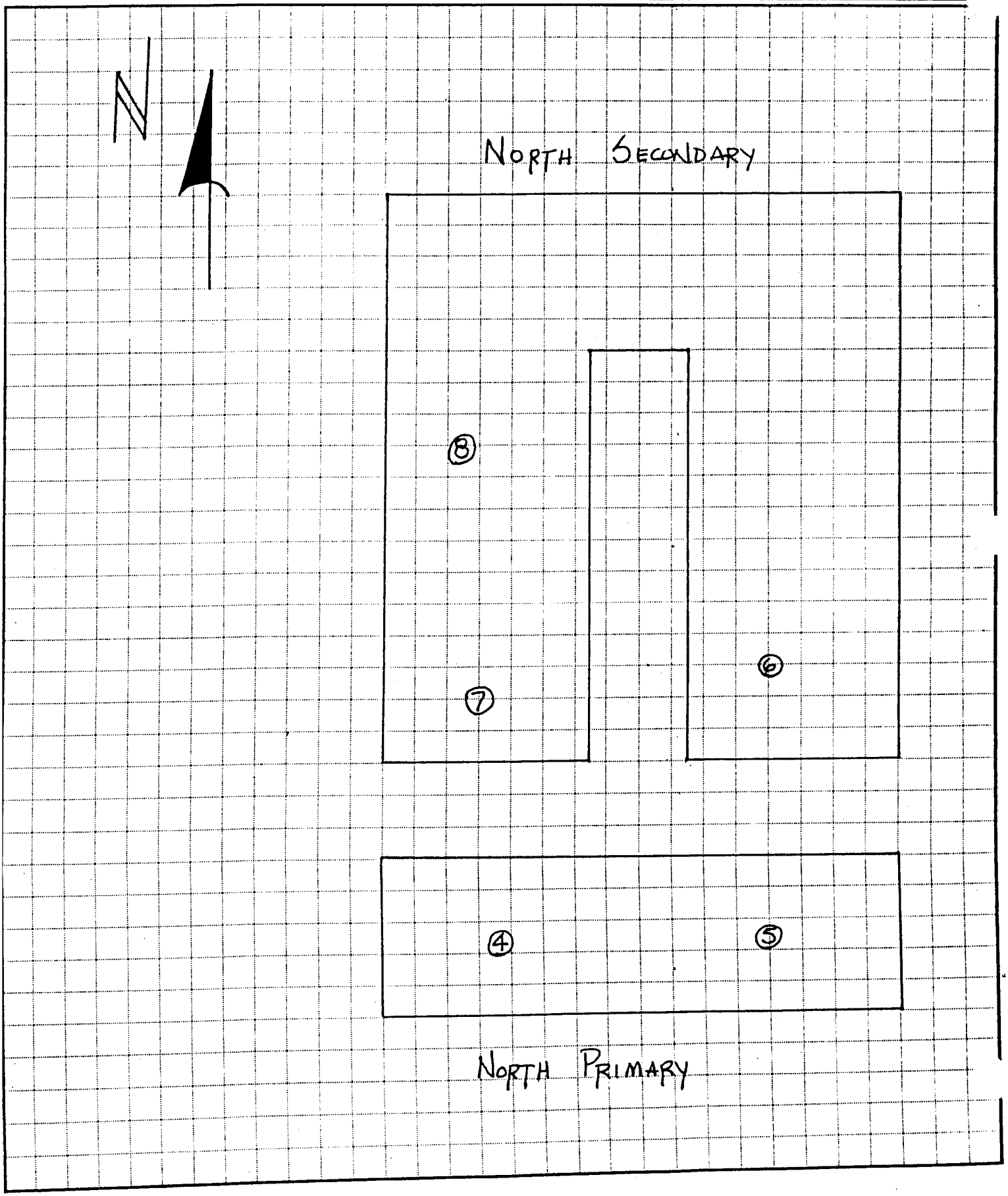
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

JOB MORAINE LAGOON CLOSURE
SHEET NO. NORTH LAGOONS - GATE 7
CALCULATED BY _____ DATE _____
CHECKED BY HRW DATE 15 Nov 00
SCALE NONE



H. C. NUTTING COMPANY

GEOTECHNICAL, GEO-ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921

4120 AIRPORT RD. •CINCINNATI OH 45226 •513/321-5816
790 MORRISON RD. •COLUMBUS OH 43230-6642 •614/863-3113
912 MORRIS ST. •CHARLESTON WV 25301 •304/344-0821
349 WALNUT ST. •LAWRENCEBURG IN 47025 •812/539-4300

DATE 12 PC 01-01-00
PROJ. START 9:25 AM
PROJ. STOP
TOTAL TIME 2.50 hr
TOTAL HOURS
ORDER NO. 11294.020
REPORT NO.

REPORT OF SOIL COMPACTION INSPECTION

CLIENT Conestoga-Rovers & Assoc. Ltd
PROJECT Lagoon Closure
Moraine Ohio
CONTRACTOR Levinson Const Co

WEATHER CONDITIONS:
☐ FAIR ☑ CLOUDY
☐ RAIN ☐ SNOW

Nuclear Meter Utilized ☑

TEMPERATURE: AM 22 PM

AREA BEING FILLED North Secondary East & North sides third lift
HAULING EQUIPMENT USED Off road Dump trucks 3- D400E
ROLLING EQUIPMENT USED 2-CP 563D sheepfoot
EST. CU. YDS. TODAY WATER ADDED 3/0
SOURCE OF BORROW On site
MATERIAL DESCRIPTION Dark Br clay w/ gravel
DENSITY TESTS MADE TODAY NOS. THRU

FIELD DENSITY TEST RESULTS

TEST NUMBER	TEST LOCATION	FILL HEIGHT OR ELEVATION	MAXIMUM DRY DENSITY @ OPTIMUM PERCENT MOISTURE (lbs./cu. ft.)	FIELD DRY DENSITY (lbs./cu. ft.)	FIELD MOISTURE %	PERCENT COMPACTION	PERCENT COMPACTION REQUIRED
1	North Secondary East Side	3rd lift	134.7 @ 6.7	138.4	5.7	99	98
2	" "	3rd lift	↓	137.4	6.3	98	↓
3	North Secondary North side	3rd lift	↓	138.5	7.2	99	↓

*DENSITY TEST NO. _____ IS A RETEST OF TEST NO. _____ PERFORMED ON _____

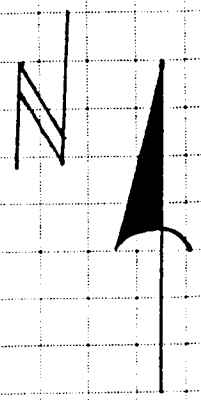
REMARKS See diagram with report for location

DISTRIBUTION

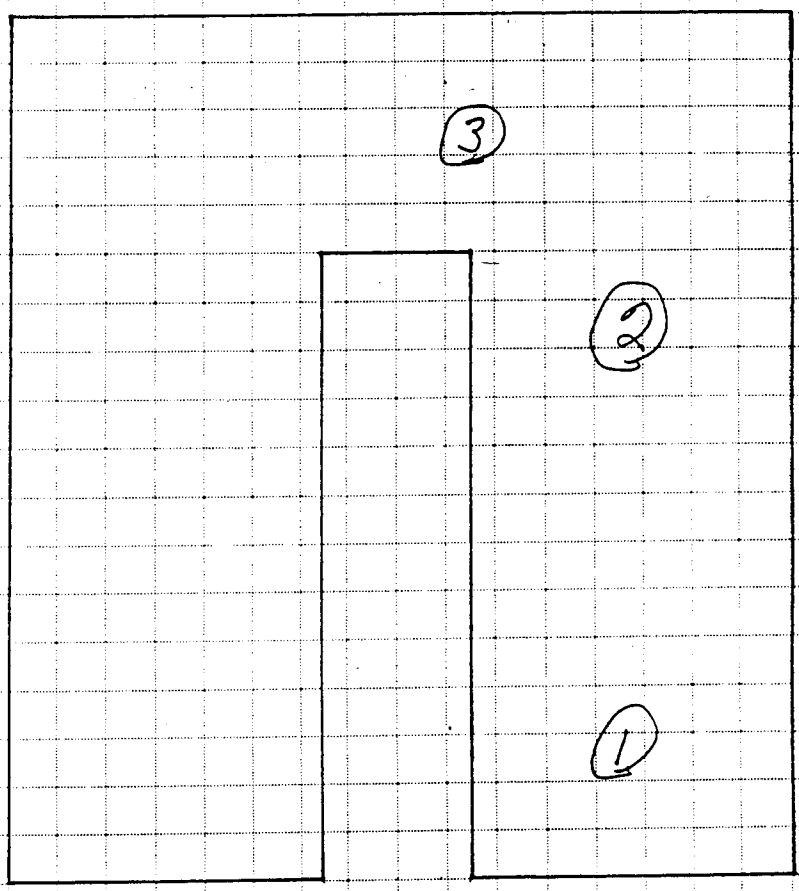
INSPECTOR Jerry McMahon

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

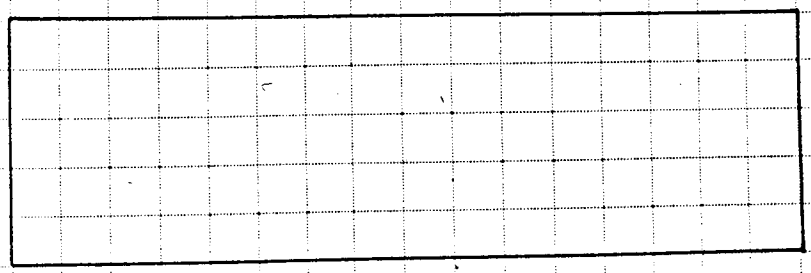
JOB MORAINE LAGOON CLOSURE
SHEET NO. NORTH LAGOONS - GATE 7
CALCULATED BY _____ DATE _____
CHECKED BY HLW DATE _____
SCALE NONE



NORTH SECONDARY



third lift



NORTH PRIMARY

H. C. NUTTING COMPANY

GEOTECHNICAL, GEO-ENVIRONMENTAL AND TESTING ENGINEERS
SINCE 1921

611 LUNKEN PARK DR. CINCINNATI OH 45226 513/321-5816
790 MORRISON RD. COLUMBUS OH 43230 614/863-3113
912 MORRIS ST. CHARLESTON WV 25301 304/344-0821
349 WALNUT ST. LAWRENCEBURG IN 47025 812/539-4300
470-B CONWAY CT. Ste. B-8 LEXINGTON KY 40511

DATE 12-8-00
PROJ. START 9:30
PROJ. STOP 11:30
T EL TIME 2
T AL HOURS 4½
ORDER NO. 11294.020
REPORT NO. _____

pg 1/2

REPORT OF SOIL COMPACTION INSPECTION

CLIENT Conestoga - Rovers & Assocs. LTD
PROJECT LAGOON Closure
CONTRACTOR Sevenson

Nuclear Meter Utilized ☐

WEATHER CONDITIONS:
☐ FAIR ☒ CLOUDY
☐ RAIN ☐ SNOW

TEMPERATURE: AM 39 PM _____

AREA BEING FILLED North lagoons North Secondary
HAULING EQUIPMENT USED off Rd trucks
ROLLING EQUIPMENT USED Vibratory Sheeps foot Compactor
EST. CU. YDS. TODAY _____ WATER ADDED NO
SOURCE OF BORROW Site
MATERIAL DESCRIPTION Br. Gravelly Silty Clay
DENSITY TESTS MADE TODAY 4 NOS. 1 THRU 4

FIELD DENSITY TEST RESULTS

TEST NUMBER	TEST LOCATION	FILL HEIGHT OR ELEVATION	MAXIMUM DRY DENSITY @ OPTIMUM PERCENT MOISTURE (lbs./cu. ft.)	FIELD DRY DENSITY (lbs./cu. ft.)	FIELD MOISTURE %	PERCENT COMPACTION	PERCENT COMPACTION REQUIRED
1	See Sketch	Lift #5	(Mod.) 139.7@6.7	123.2	11.2	88	95
2	↓	Lift #5	↓	137.2	8.4	98	↓
3		Lift #6		127.8	11.7	92	
4		Lift #6		129.1	11.2	92	

*DENSITY TEST NO. _____ IS A RETEST OF TEST NO. _____ PERFORMED ON _____

REMARKS Density test Randomly performed @ Clients Request' wm. Jeroen Winterink was present during testing and informed of All test Results. HCN will be Called When Further Services are Required.

DISTRIBUTION

Reorder No. 102-0069

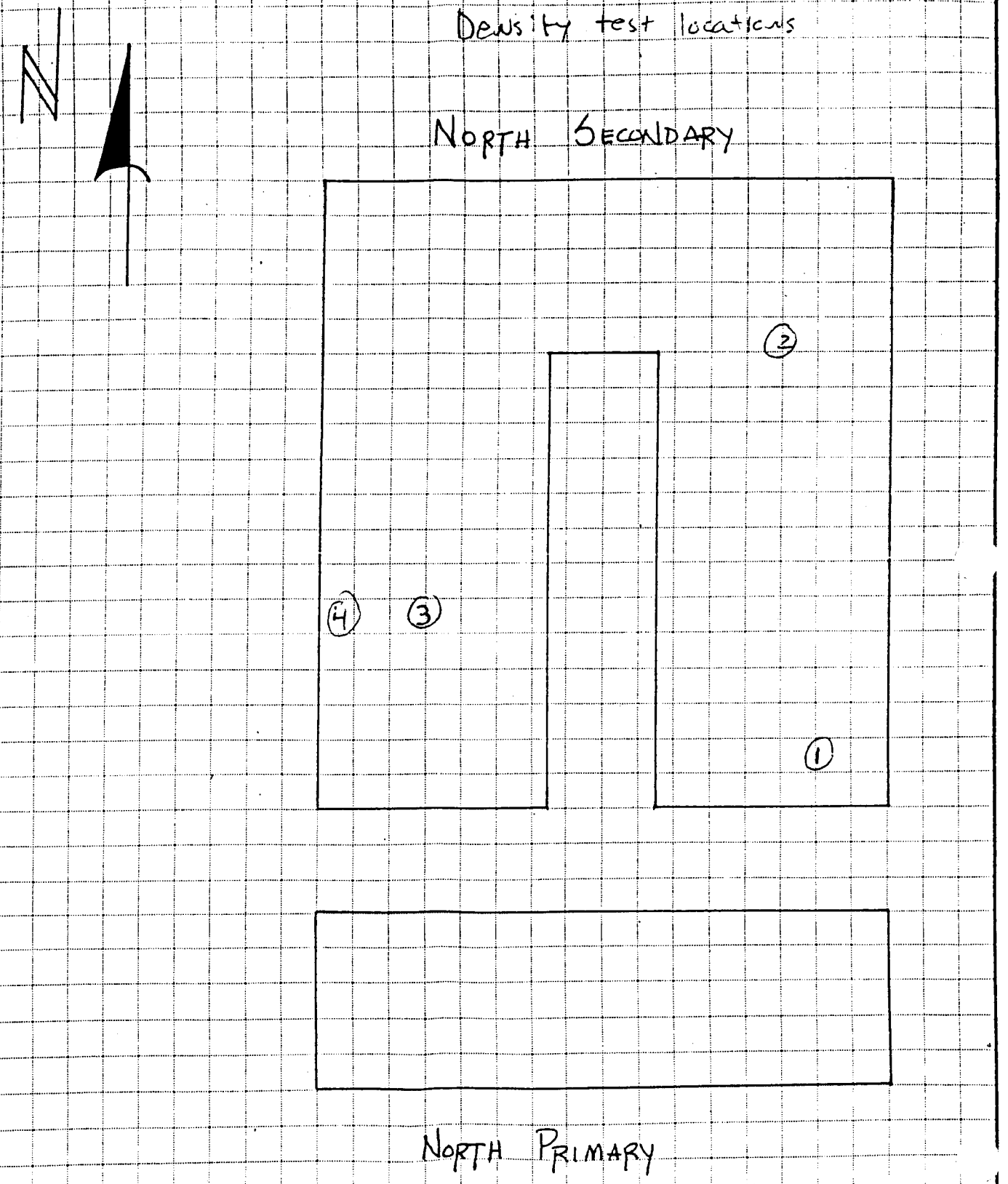
INSPECTOR Wm. Wingfield

H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

2/2

JOB MORAINE LAGOON CLOSURE
SHEET NO. NORTH LAGOONS - GATE 7
CALCULATED BY _____ DATE _____
CHECKED BY HLW DATE 12-8-00
SCALE NONE

Density test locations



PROJ. START
PROJ. STOP 0900
TRAVEL TIME 3.0
TOTAL HOURS 4.5
ORDER NO. 11294020
REPORT NO.

611 LUNKEN PARK DR. CINCINNATI OH 45226 513/321-5816
790 MORRISON RD. COLUMBUS OH 43230 614/863-3113
912 MORRIS ST. CHARLESTON WV 25301 304/344-0821
349 WALNUT ST. LAWRENCEBURG IN 47025 812/539-4300
470-B CONWAY CT. Ste. B-8 LEXINGTON KY 40511

REPORT OF SOIL COMPACTION INSPECTION

CLIENT CRA ConesTAGA

PROJECT MORAINE LAGOON

CONTRACTOR Tommy

Nuclear Meter Utilized ☑

WEATHER CONDITIONS:
☒ FAIR ☐ CLOUDY
☐ RAIN ☐ SNOW

TEMPERATURE: AM 24° PM

AREA BEING FILLED Parking Lot NE Secondary
HAULING EQUIPMENT USED CAT Dump Truck
ROLLING EQUIPMENT USED 25 TON Vibratory Sheepsfoot
EST. CU. YDS. TODAY _____ WATER ADDED n/a
SOURCE OF BORROW on SITE
MATERIAL DESCRIPTION Dark br. Sandy Silty Gravel w/Clay
DENSITY TESTS MADE TODAY 4 NOS. 1 THRU 4

FIELD DENSITY TEST RESULTS

TEST NUMBER	TEST LOCATION	FILL HEIGHT OR ELEVATION	MAXIMUM DRY DENSITY @ OPTIMUM PERCENT MOISTURE (lbs./cu. ft.)	FIELD DRY DENSITY (lbs./cu. ft.)	FIELD MOISTURE %	PERCENT COMPACTION	PERCENT COMPACTION REQUIRED
1	See Sketch	6" B S.G.	133.7 @ 8.0	131.8	9.4	98	98%
2	"	↓	↓	130.7	10.0	98	↓
3	"			132.2	9.1	99	
4	"			131.9	9.5	99	

* DENSITY TEST NO. _____ IS A RETEST OF TEST NO. _____ PERFORMED ON _____

REMARKS Inspector Suggested To Contractor To monitor moisture content closely, material coming in on NW side of North Secondary is wet. Inspector suggested to contractor to disc material, Contractor stated there was a disc on site.

DISTRIBUTION

Order No. 102-0069

INSPECTOR Don Abdon

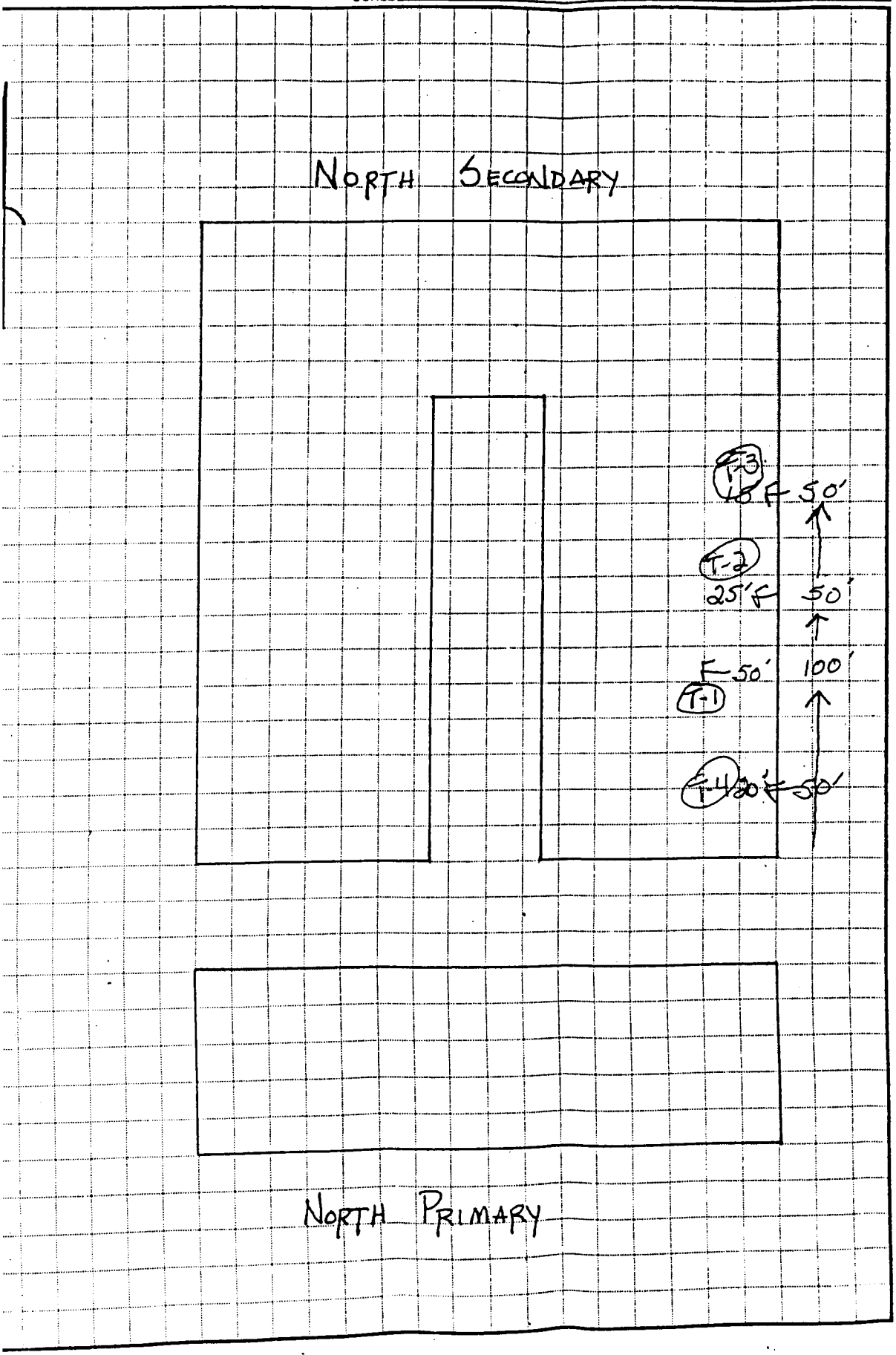
NUTTING CO.
20 Airport Road
INATI, OHIO 45226
13) 321-5816

SHEET NO. NORTH LAGOONS - GATE 7

CALCULATED BY _____ DATE _____

CHECKED BY HLW DATE 3/1/01

SCALE NONE



E 3/7/01
J. START 8:45
J. S 9:45
VEL ME
AL HOURS
ER NO. 11294.020
ORT NO.

H. C. NUTTING COMPANY
GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS
SINCE 1921

4120 AIRPORT RD. •CINCINNATI OH 45226 •513/321-5816
3940 OLYMPIC BLVD. •ERLANGER KY 41018 •606/283-9914
790 MORRISON RD. •BLACKLICK OH 43004 •614/863-3113
912 MORRIS ST. •CHARLESTON WV 25301 •304/344-0821

REPORT OF SOIL COMPACTION INSPECTION

ENT Conestoga-Rovers & Assoc. Ltd
JECT Lagoon Closure
ITRACTOR Stevenson

WEATHER CONDITIONS:
☐ FAIR ☐ CLOUDY
☐ RAIN ☐ SNOW

lear Meter Utilized [X]

TEMPERATURE: AM 33 PM _____

AREA BEING FILLED See Sketch
HAULING EQUIPMENT USED 1- Bell Moxy Rock truck MT36
ROLLING EQUIPMENT USED 1- Ingersoll Rand vibratory sheepsfoot
EST. CU. YDS. TODAY _____ WATER ADDED no
SOURCE OF BORROW _____
MATERIAL DESCRIPTION Brown gravelly silty clay
DENSITY TESTS MADE TODAY _____ NOS. 1 THRU 4

FIELD DENSITY TEST RESULTS

ST BER	TEST LOCATION	FILL HEIGHT OR ELEVATION	MAXIMUM DRY DENSITY @ OPTIMUM PERCENT MOISTURE (lbs./cu. ft.)	FIELD DRY DENSITY (lbs./cu. ft.)	FIELD MOISTURE %	PERCENT COMPACTION	PERCENT COMPACTION REQUIRED
	See	2' below bench	139.7 @ 6.7	135.3	7.7	97	95 Mod
		2' below bench	"	134.6	8.1	96	
	Sketch	3' below bench	"	133.5	7.9	96	
		3' below bench	"	132.3	8.3	95	
	attached						

NSITY TEST NO. _____ IS A RETEST OF TEST NO. _____ PERFORMED ON _____

REMARKS Density tests performed on test basis only at the request of the client

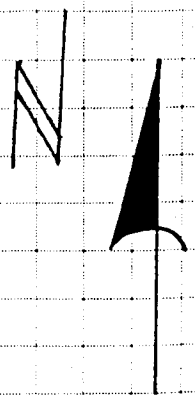
RIBUTION

INSPECTOR William Redmond

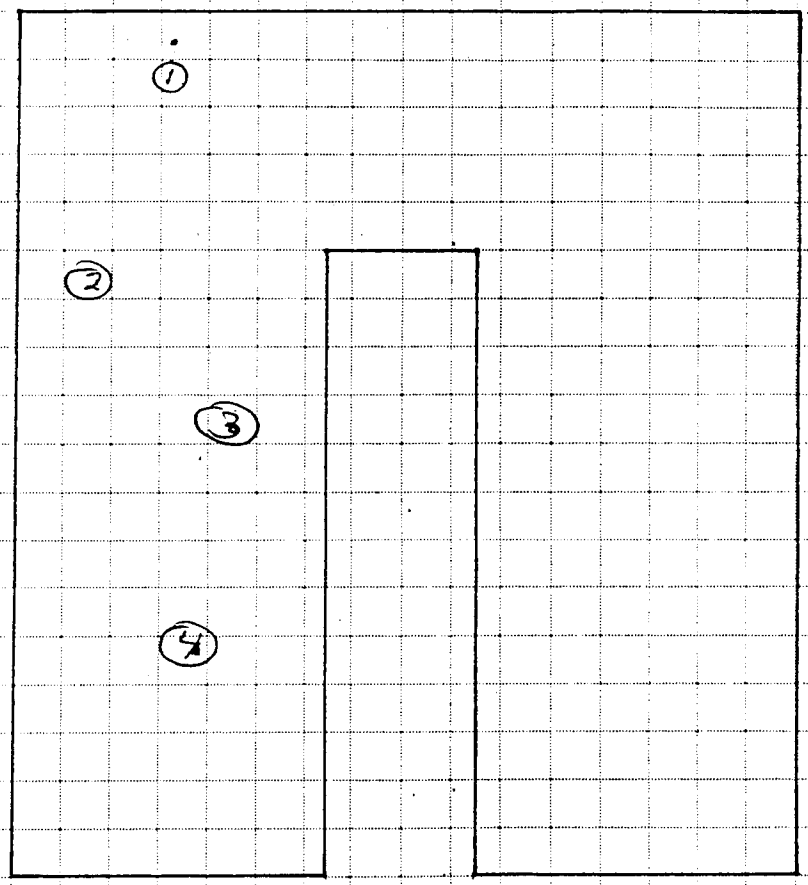
70

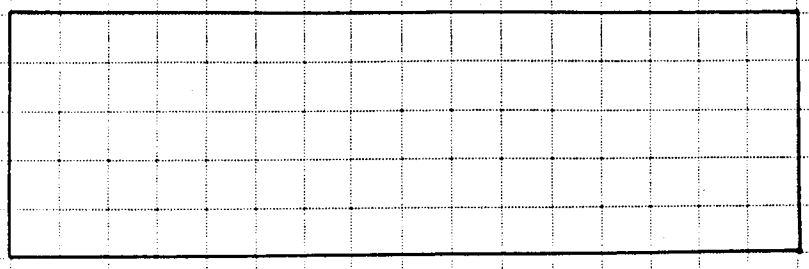
H.C. NUTTING CO.
4120 Airport Road
CINCINNATI, OHIO 45226
(513) 321-5816

JOB MORAINE LAGOON CLOSURE
SHEET NO. NORTH LAGOONS - GATE 7
CALCULATED BY _____ DATE _____
CHECKED BY HLW DATE 3/7/01
SCALE NONE



NORTH SECONDARY





NORTH PRIMARY

12611-02

H. C. NUTTING COMPANY

GEOTECHNICAL, GEO-ENVIRONMENTAL AND TESTING ENGINEERS
SINCE 1921

611 LUNKEN PARK DR.	CINCINNATI OH 45226	513/321-5816
790 MORRISON RD.	COLUMBUS OH 43230	614/863-3113
912 MORRIS ST.	CHARLESTON WV 25301	304/344-0821
349 WALNUT ST.	LAWRENCEBURG IN 47025	812/539-4300
470-B CONWAY CT. Ste. B-8	LEXINGTON KY 40511	

REPORT OF SOIL COMPACTION INSPECTION

DATE 6-8-01
PROJ. START 8:00 AM
PROJ. STOP 9:15 AM
TRAVEL TIME
TOTAL HOURS
ORDER NO. 11294020
REPORT NO.

CLIENT Conestoga-Rovers & Assocs LTD.
PROJECT Lagoon Closure
CONTRACTOR Barrett paving
Nuclear Meter Utilized ☒

WEATHER CONDITIONS:
☐ FAIR ☒ CLOUDY
☐ RAIN ☐ SNOW

TEMPERATURE: AM 70 PM

AREA BEING FILLED North Lagoon
HAULING EQUIPMENT USED Truck
ROLLING EQUIPMENT USED Flat Drum rollers
EST. CU. YDS. TODAY WATER ADDED
SOURCE OF BORROW off site
MATERIAL DESCRIPTION 304 Stone
DENSITY TESTS MADE TODAY NOS. THRU

FIELD DENSITY TEST RESULTS

TEST NUMBER	TEST LOCATION	FILL HEIGHT OR ELEVATION	MAXIMUM DRY DENSITY @ OPTIMUM PERCENT MOISTURE (lbs./cu. ft.)	FIELD DRY DENSITY (lbs./cu. ft.)	FIELD MOISTURE %	PERCENT COMPACTION	PERCENT COMPACTION REQUIRED
1	North	S/G- 0'	141.9 @ 5.9	142.4	4.6	100	95
2	Lagoon			145.4	6.8	102	
3				142.0	4.8	100	
4				134.8	4.6	95	
5				142.3	5.4	100	
6				138.1	4.9	97	
7				142.8	4.4	101	
8				142.5	6.0	100	
9				139.6	4.9	98	

* DENSITY TEST NO. _____ IS A RETEST OF TEST NO _____ PERFORMED ON _____

REMARKS

DISTRIBUTION

INSPECTOR Ray Becker

Reorder No. 102-0069

APPENDIX F

NOTICE OF INTENT

Notice of Intent (NOI) For Coverage Under Ohio Environmental Protection Agency General Permit

(Read accompanying instructions carefully before completing this form)

Submission of this NOI constitutes notice that the party identified in Section I of this form intends to be authorized to discharge into state waters under the NPDES general permit program. Becoming a permittee obligates a discharger to comply with the terms and conditions of the permit. Complete all information - THIS FORM MUST BE COMPLETELY TYPEWRITTEN AND ORIGINAL (not a copy) - NOT FOLDED OR STAPLED - FOR PROPER ELECTRONIC SCANNING. Forms transmitted by fax will not be accepted. A check in the amount of $200, payable to "Treasurer, State of Ohio", must accompany this form.

I. Applicant Information/Mailing Address

Company Name: General Motors Corporation

Contact Person: Pam Stubbs Phone: (937)455-4092

Mailing Address: 3600 Dryden Road

City: Moraine State: Ohio Zip Code: 45439

II. Facility/Site Location Information

Facility Name: Former GM Harrison Radiator Division, North and South Lagoons

Facility Contact Person: Pam Stubbs Phone: (937)455-4092

Facility Address/Location: 3600 Dryden Road

City: Moraine State: Ohio Zip Code: 45439

County: Montgomery Township(s):

Quarter: Section(s): Range:

Receiving Stream: Great Miami River

MS4 Operator Name:

If aware of a state nature preserve within 1,000 feet of the facility/site, check here:

Enter river code here, if discharge is to a river designated scenic, wild, or recreational, or to a tributary within 1,000 feet (see instructions):

General Permit Number: OH R 1 0 0 0 0 0 Initial coverage: X Renewal Coverage:

Type of Activity: Construction Activity (Cover Consrtuction)

SIC Code(s): N/A

Existing NPDES Permit Number: 1IC0000*FD

ODNR Coal Mining Application Number:

Outfall:	Design Flow (MGD)	Latitude	Longitude

Proposed Project Start Date (MO DY YR): 02 01 01

Estimated Completion Date: (MO DY YR): 08 31 01

Total Size of Site (Acres): 17

Payment Information: Check # 102346 Date of Check: 8/30/00

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name (typed): William J. McFarland Date: 7-8-00

Signature: William J. McFarland

A 4454 (Rev. 7/99)

NPDES Permit No.: OHR100000

Effective Date: October 26, 1992

Expiration Date: April 26, 1994

OHIO ENVIRONMENTAL PROTECTION AGENCY

AUTHORIZATION FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et. seq. hereafter referred to as "the Act"), and the Ohio Water Pollution Control Act (Ohio Revised Code Chapter 6111), discharges of storm water from sites where construction activity is being conducted, as defined in Part I.B. of this permit, are authorized by the Ohio Environmental Protection Agency, hereafter referred to as "Ohio EPA", to discharge from the outfalls at the sites and to the receiving waters of the state identified in their Notices of Intent Application form (NOI) on file with Ohio EPA in accordance with the conditions specified in Parts I through VII of this permit.

This permit is conditioned upon payment of applicable fees and submittal of the Notice of Intent Application form.

This permit and the authorization to discharge shall expire at midnight on the expiration date shown above. In order to receive authorization to discharge above the beyond date of expiration, the permittee shall submit such information and forms as are required by the Ohio EPA.

Donald R. Schregardus
Director

PART I. COVERAGE UNDER THIS PERMIT

A. Permit Area. This permit covers the entire State of Ohio.

B. Eligibility.

1. Except for storm water discharges identified under paragraph I.B.2., this permit may cover all new and existing discharges composed entirely of storm water discharges associated with construction activity. Construction activities covered by this permit include any clearing, grading, excavating, grubbing and/or filling activities that result in the disturbance of five or more acres of total land. Operations that result in the disturbance of less than five acres of total land which are not part of a larger common plan of development are exempt from coverage under this permit.

2. Limitations on coverage. The following storm water discharges associated with construction activity are not covered by this permit.

   a. Storm water discharges associated with construction activity that contain discharges of material other than storm water;
   b. Storm water discharges associated with industrial activity that originate from the site after construction activities have been completed and the site has undergone final stabilization;
   c. Storm water discharges associated with construction activity that the Director has shown to be or may reasonably be expected to be contributing to a violation of a water quality standard;
   d. Storm water discharges associated with industrial activity from inactive mining or inactive oil and gas operations occurring on Federal lands where an operator cannot be identified;
   e. Storm water discharges authorized by an individual permit; and
   f. Storm water discharges to combined or sanitary sewer systems.

C. Requiring an individual permit or an alternative general permit.

1. The Director may require any person authorized by this permit to apply for and obtain either an individual NPDES permit or an alternative NPDES general permit. Any interested person may petition the Director to take action under this paragraph. The Director may require any owner or developer authorized to discharge under this permit to apply for an individual NPDES permit only if the owner or developer has been notified in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the owner or developer to file the application, and a statement that on the effective date of the individual NPDES permit or the alternative general permit as it applies to the individual permittee, coverage under this general permit shall automatically terminate. The Director may grant additional time to submit the application upon request of the applicant. If an owner or developer fails to submit in a timely manner an individual NPDES permit application required by the Director under this paragraph, then the applicability of this permit to the individual NPDES permittee is automatically terminated at the end of the day specified for application submittal.

2. Any owner or developer authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual permit. The owner or developer shall submit an individual application with reasons supporting the request to the Director in accordance with the requirements of 40 CFR 122.26. The request shall be granted by issuing of an individual permit if the reasons cited by the owner or developer are adequate to support the request.

3. When an individual NPDES permit is issued to an owner or developer otherwise subject to this permit, or the owner or developer is approved for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee is automatically terminated on the effective

date of the individual permit or the date of approval for coverage under the alternative general permit, whichever the case may be.

D. Application requirements for sites that comprise part of a larger common plan of development. If the owner or developer obtains a permit for a development then sells off lots or parcels within that development, permit coverage must be continued on those lots. A NOI must be submitted for these lots if the developer does not retain permit responsibility for the entire development.

E. Authorization.

Owners or developers of storm water discharges associated with construction activity must submit a Notice of Intent Application form (NOI) in accordance with the requirements of part II of this permit to be authorized to discharge under this general permit. After the NOI Application form is reviewed by the Director, the permittee shall be notified that the application has been approved and is authorized to discharge storm water associated with construction activity under the terms and conditions of this permit. Upon review of the NOI, the Director may deny coverage under this permit and require submittal of an application for an individual NPDES permit. Applicants denied coverage under the general permit shall have 45 days to submit an individual permit application.

Part II. NOTICE OF INTENT REQUIREMENTS

A. Deadlines for Notification. Individuals who intend to obtain coverage for a storm water discharge associated with construction activity under this general permit shall submit a Notice of Intent Application form (NOI) at least 45 days prior to the commencement of a new construction activity or in the case of an existing construction activity, or activities scheduled to begin before December 17, 1992, by November 3, 1992.

B. Failure to Notify. Owners/developers, who fail to notify the Director of their intent to be covered, and discharge pollutants to waters of the United States without an NPDES permit, are in violation of ORC 6111. In such instances, Ohio EPA may bring an enforcement action for any discharges of storm water associated with construction activity that have occurred on or after the dates specified in Part II.

C. Contents of Notice of Intent Application Form. The applicant shall complete and submit an approved Notice of Intent form provided by Ohio EPA. The form shall include the following items:

1. The permittees name, address, contact person and telephone number;

2. Site name, contact person, telephone number and mailing address of the site for which the notification is submitted. The site location described in terms of the latitude and longitude of the approximate center of the facility to the nearest 15 seconds, or the nearest quarter section (if the section, township and range is provided) where the construction site is located. The name and number of the U.S.G.S. quad map that the construction site is located on;

3. The name of the immediate receiving water(s) or if the discharge is through a municipal separate storm sewer, the name of the municipal operator of the storm sewer;

4. The number of any NPDES permit for any discharge (including non-storm water discharges) from the site that is currently authorized by an NPDES permit;

5. The proposed start and end date of the project; and

6. An estimate of the area to be disturbed.

D. Where to submit. Facilities which discharge storm water associated with construction activity must submit signed copies of the Notice of Intent Application form provided by the Director (or photocopy thereof) to the following address:

Ohio Environmental Protection Agency
General Permits Program
Construction - NOI
P.O. Box 1049
Columbus, OH 43266-0149

E. Additional Notification. Facilities which discharge storm water associated with construction activities and are operating under approved local sediment and erosion plans, grading plans, or storm water management plans, in addition to filing copies of the Notice of Intent in accordance with paragraph II.D. shall submit signed copies of the Notice of Intent form to the local agency approving such plans in accordance with the deadlines in Part II. A. of this permit.

F. Renotification. Upon reissuance of this general permit, the permittee is required to notify the Director of his intent to be covered by the general permit renewal.

PART III. SPECIAL CONDITIONS, MANAGEMENT PRACTICES, AND OTHER NON-NUMERIC LIMITATIONS.

A. Prohibition on non-storm water discharges. All discharges covered by this permit shall be composed entirely of storm water. Discharges of material other than storm water must be in compliance with an individual NPDES permit or alternative general permit (other than this permit) issued for the discharge.

B. Releases in excess of Reportable Quantities. This permit does not relieve the permittee of the reporting requirements of 40 CFR part 117 and 40 CFR part 302. The discharge of hazardous substances in the storm water discharge(s) from a facility shall be minimized in accordance with the applicable storm water pollution prevention plan for the facility , and in no case, during any 24-hour period, shall the discharge(s) contain a hazardous substance equal to or in excess of reportable quantities.

C. Storm Water Pollution Prevention Plans. A storm water pollution prevention plan (plan) shall be developed for each facility covered by this permit. Storm water pollution prevention plans shall be prepared in accordance with good engineering and/or conservation practices by a professional experienced in the design and implementation of standard erosion and sediment control practices. The plan shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges associated with construction activities. In addition, the plan shall describe and ensure the implementation of practices which are used to reduce the pollutants in storm water discharges associated with construction activity and to assure compliance with ORC 6111.04, OAC 3745-1, and the terms and conditions of this permit.

1. The plan shall be completed prior to the timely submittal of an NOI to be covered under this permit and updated in accordance with Part III. C. 3. For construction activities begun on or before October 1, 1992 or activities scheduled to begin before December 17, 1992, the plan shall provide for compliance with the terms and schedule of the plan by December 17, 1992. For construction activities that begin after December 17, 1992, the plan shall provide for compliance with the terms and schedule of the plan beginning with the initiation of construction activities.

2. Signature and Plan Review. The plan shall be signed in accordance with Part V. G., and shall be made available immediately upon request of the Director during working hours or if possible retained on site at the facility which generates the storm water discharge. A copy of the NOI and letter authorizing discharges under the general permit shall be posted at the site in a prominent place for public viewing (such as alongside a building permit). The permittee shall make plans available upon request to the Director; or local agency approving sediment and erosion plans, grading plans, or storm water management plans; or in the case of a storm water discharge associated with construction activity which discharges through a municipal separate storm sewer system with a NPDES permit, to the municipal operator of the system. The Director, or authorized representative, may notify the permittee at any time that the plan does not meet one or more of the minimum requirements of this Part.

Immediately after such notification from the Director, (or as otherwise provided by the Director), or authorized representative, the permittee shall make the required changes to the plan and shall submit to the Director a written certification that the requested changes have been made.

3. The permittee shall amend the plan whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to waters of the United States or if the storm water pollution prevention plan proves to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity. Amendments to the plan may be reviewed by Ohio EPA in the same manner as Part III.C.2.

4. The permittee shall inform all contractors and subcontractors who will be involved in the implementation of the storm water pollution prevention plan of the terms and conditions of this general (NPDES) permit that authorizes the discharge of storm water from the construction site. Before conducting any service at the site all contractors and subcontractors shall understand the conditions and standards of the pollution prevention plan and the schedule proposed for their implementation.

5. Operations that discharge storm water from construction activities are subject to the following requirements and the storm water pollution prevention plan shall include the following items:

   a. Site description. Each plan shall provide a description of the following:

      i. A description of the nature and type of the construction activity;

      ii. Total area of the site and the area of the site that is expected to undergo excavation, filling or grading;

      iii. A calculation of the runoff coefficients for both the pre-construction and post construction site conditions;

      iv. Existing data describing the soil and the quality of any discharge from the site;

      v. The schedule of major construction operations as related to implementing erosion and sediment control practices and storm water management facilities;

      vi. The name and/or location of the immediate receiving stream or surface water(s) and the subsequent named receiving water(s);

      vii. Site map showing:

         (A) Limits of earth-disturbing activity including areas used for borrow or spoil;
         (B) Existing and proposed contours and drainage patterns anticipated after major grading activities;
         (C) Surface water locations including springs, wetlands, streams, lakes, etc. on or within 200 feet of the site;
         (D) Existing and planned locations of buildings and utilities which may affect erosion and sediment control practices;
         (E) Erosion and sediment control practices;
         (F) Permanent storm water management practices to be used to control pollutants in storm water after construction operations have been completed.

   b. Controls. Each construction operation covered by this permit shall develop a description of controls appropriate for the construction operation, and implement such controls. The controls shall include the following minimum components:

i. **Erosion and sediment controls.**

(A) **Stabilization/nonstructural practices.** A description of control practices designed to preserve existing vegetation where attainable and revegetate disturbed areas as soon as practicable after grading or construction shall be provided. Such practices may include: temporary seeding, permanent seeding, mulching, matting, sod stabilization, vegetative buffer strips, phasing and protection of trees. The operator shall initiate appropriate vegetative practices on all disturbed areas within seven (7) days if they are to remain dormant (undisturbed) for more than forty-five (45) days. For areas within fifty (50) feet of any stream, first order or larger, soil stabilization practices shall be initiated within two (2) days on all inactive, disturbed areas. Permanent or temporary soil stabilization shall be applied to disturbed areas within seven (7) days after final grade is reached on any portion of the site. When seasonal conditions prohibit the application of temporary or permanent seeding, non-vegetative soil stabilization practices such as mulching and matting shall be used.

(B) **Structural practices.** A description of structural practices that shall store runoff allowing sediments to settle and/or divert flows from exposed soils or otherwise limit runoff from eroding exposed areas of the site shall be provided. Structural practices shall be used to control erosion and trap sediment from all sites remaining disturbed for more than fourteen (14) days. Such practices may include among others sediment traps, sediment basins, silt fences, earth diversion dikes, check dams and storm drain inlet protection.

(1) Timing. Sediment control structures shall be functional throughout earth disturbing activity. Sediment ponds and perimeter sediment barriers shall be implemented as the first step of grading and within seven days from the start of grubbing. They shall continue to function until the upslope development area is restabilized.

(2) Settling Ponds. Concentrated storm water runoff from disturbed areas flowing at rates which exceed the design capacity of sediment barriers shall pass through a sediment-settling pond. The facility's storage capacity shall be sixty seven (67) cubic yards per acre of drainage area.

(3) Sediment Barriers. Sheet flow runoff from denuded areas shall be intercepted by sediment barriers. Sediment barriers, such as sediment fences or diversions directing runoff to settling facilities, shall protect adjacent properties and water resources from sediment transported by sheet flow.

(4) Stream Protection. Structural practices shall be designed and implemented on site to protect all adjacent streams, first order and larger, from the impacts of sediment runoff.

(5) Other erosion and sediment control practices shall prevent sediment laden water from entering storm drain systems, unless the storm drain system drains to a settling pond. These practices shall divert runoff from disturbed areas and steep slopes where practicable and stabilize channels and outfalls from erosive flows.

ii. **Post-Construction Storm Water Pollution Prevention.** A description of measures that will be installed during the construction process to

control pollutants in storm water discharges that will occur after construction operations have been completed shall be provided. Such practices may include among others: infiltration of runoff; flow reduction by use of open vegetated swales and natural depressions and storm water retention and detention ponds.

Where such controls are needed to prevent or minimize erosion, velocity dissipation devices shall be placed at the outfall of all detention or retention structures and along the length of any outfall channel as necessary to provide a non-erosive flow velocity from the structure to a water course. Justification shall be provided by the permittee for rejecting each practice based on site conditions.

This permit only addresses the installation of storm water management measures, and not the ultimate operation and maintenance of such structures after the construction activities have been completed and the site has undergone final stabilization. Permittees are only responsible for the installation and maintenance of storm water management measures prior to the final stabilization of the site, and are not responsible for the maintenance after storm water discharges associated with construction activity have been eliminated from the site.

iii. Surface Water Protection. If the project site contains any streams, rivers, lakes, wetlands or other surface waters, certain construction activities at the site may be regulated under the Clean Water Act. Sections 404 and 401 of the Act regulate the discharge of dredged or fill material into surface waters, and the impacts of such activities on water quality, respectively. Construction activities in surface waters which may be subject to Clean Water Act regulation include, but are not limited to: sewer line crossings, grading, backfilling or culverting streams, filling wetlands, road and utility line construction, bridge installation, and installation of flow control structures. If the project contains streams, rivers, lakes or wetlands or possible wetlands, you should contact the appropriate U.S. Army Corps of Engineers District Office. (CAUTION: Any area of seasonally wet hydric soil is a potential wetland - please consult the Soil Survey and list of hydric soils for your County, available at your Soil Conservation Service county office.) If you have any questions about Section 401 water quality certification, please contact the Ohio Environmental Protection Agency, Section 401 Coordinator.

U.S. Army Corps of Engineers (Section 404 regulation):

Huntington, WV District	(304) 529-5210	(Muskingum, Hocking and Scioto River Basin)
Buffalo, NY District	(716) 879-4330	(Lake Erie Basin)
Pittsburgh, PA District	(412) 644-6872	(Mahoning River Basin)
Louisville, KY District	(502) 582-5607	(Little & Great Miami River Basin)

The Ohio Environmental Protection Agency (Section 401 regulation):
Columbus, OH (614) 644-2856 (all of OH)

iv. Other controls.

(A) Waste disposal. No solid (other than sediment) or liquid waste, including building materials, shall be discharged in storm water runoff.
(B) Off-site vehicle tracking of sediments shall be minimized.
(C) The plan shall ensure and demonstrate compliance with applicable State or local waste disposal, sanitary sewer or septic system regulations.

v. **Maintenance.** All temporary and permanent control practices shall be maintained and repaired as needed to assure continued performance of their intended function. The pollution prevention plan shall be designed to minimize maintenance requirements. The applicant shall provide a description of maintenance procedures needed to assure the continued performance of control practices.

vi. **Inspections.** At a minimum, procedures in a plan shall provide that all erosion and sediment controls on the site are inspected at least once every seven (7) calendar days and within 24 hours after any storm event greater than 0.5 inch of rain per 24 hour period. In addition, qualified inspection personnel (provided by the permittee) shall conduct a weekly inspection of the construction site to identify areas contributing to storm water discharges associated with construction activity and evaluate whether measures to prevent erosion and control pollutant loadings identified in a storm water pollution prevention plan are adequate and properly implemented in accordance with the schedule proposed in Part III. C.5.a.v. of this permit or whether additional control measures are required. Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the plan shall be observed to ensure that they are operating correctly. Discharge locations shall be inspected to ascertain whether erosion and sediment control measures are effective in preventing significant impacts to the receiving waters. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site vehicle tracking.

The permittee shall maintain for two (2) years following the submittal of the NOT a record summarizing the results of the inspection, names(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the storm water pollution prevention plan and a certification that the facility is in compliance with the plan and the permit, and identify any incidents of non-compliance. The record and certification shall be signed in accordance with Part V.G. of this permit.

c. Erosion and sediment control practices used to satisfy the conditions of this permit shall meet the standards and specifications in the current edition of Water Management and Sediment Control in Urbanizing Areas (Soil Conservation Service, USDA).

d. **Approved State or local plans.** All dischargers regulated under this general permit must comply with the lawful requirements of municipalities, counties and other local agencies regarding discharges of storm water from construction activities. All erosion and sediment control plans and storm water management plans approved by local officials shall be retained with the storm water pollution prevention plan prepared in accordance with this permit. Applicable requirements for erosion and sediment control and storm water management approved by local officials are, upon submittal of a NOI form, incorporated by reference and enforceable under this permit even if they are not specifically included in a storm water pollution prevention plan required under this permit.

e. The terms and conditions of this permit shall remain in effect until final site stabilization is achieved and all temporary erosion and sediment control practices are disposed of. All temporary erosion and sediment control practices shall be removed and disposed of within thirty (30) days after final site stabilization is achieved or after the temporary practices are no longer needed unless authorized by the approving agency. Trapped sediment shall be permanently stabilized to prevent further erosion.

f. If specific site conditions prohibit the implementation of any of the erosion and sediment control practices contained in this permit, then the permittee shall provide justification for rejecting each practice based on site conditions. Exceptions from implementing the erosion and sediment control standards contained in this permit will be reviewed and issued on a case-by-case basis.

6. No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

7. All storm water pollution prevention plans required under this permit are considered reports that shall be available to the public under section 308(b) of the Act. The permittee shall make plans available to the public upon request or provide a copy of the plans at public expense in a timely manner. However, the permittee may claim any portion of a storm water pollution plan as confidential in accordance with 40 CFR part 2.

PART IV. NOTICE OF TERMINATION REQUIREMENTS

A. Once the construction activity is completed, the permittee shall submit a Notice of Termination form. This form shall be signed in accordance with the signatory requirements of Part V.G. and submitted within 45 days after final site stabilization has been achieved. Final site stabilization is considered achieved once all temporary erosion and sediment control practices are removed and disposed of and all trapped sediment has been permanently stabilized to prevent further erosion.

B. **Failure to Notify.** The terms and conditions of this permit shall remain in effect until a signed Notice of Termination form is submitted. Failure to submit a Notice of Termination constitutes a violation of this permit and may affect the ability of the permittee to obtain general permit coverage in the future.

C. **Contents of Notice of Termination form.**

1. OEPA Permit number (as assigned by Ohio EPA).
2. Name, mailing address and location of the facility for which the notification is submitted.
3. The permittee's name, address and telephone number.
4. Certification that final site stabilization has been achieved and all elements of the Storm Water Pollution Prevention Plan have been completed. The following certification signed in accordance with Part V.G of this permit shall be made:

> *"I certify under penalty of law that all elements of the storm water pollution prevention plan have been completed, the disturbed soils at the identified facility have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with construction activity from the identified facility that are authorized by a NPDES general permit have otherwise been eliminated. I understand that by submitting this notice of termination, that I am no longer authorized to discharge storm water associated with construction activity by the general permit, and that discharging pollutants in storm water associated with construction activity to waters of the United States is unlawful under ORC 6111 where the discharge is not authorized by a NPDES permit."*

6. Where to submit. All Notices of Termination are to be sent, using the form provided by the Director (or photocopy thereof), to the Ohio EPA at the following address:

Ohio Environmental Protection Agency
General Permits Program
Construction - NOT
P.O. Box 1049
Columbus, OH 43266-0149

PART V. STANDARD PERMIT CONDITIONS.

A. Duty to Comply.

1. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of ORC 6111 and is grounds for enforcement action; for termination of coverage under this permit, revocation and reissuance or modification; or for denial of a permit renewal application.

2. Penalities for Violations of Permit Conditions.

a. Criminal

(1) ORC Chapter 6111 provides that any person who violates permit conditions is subject to a fine or by imprisonment for not more than 1 year, or both.

(2) False Statement. ORC Section 2921.13 provides that any person who knowingly makes false material statement, representation, or certification in any application, record, report plan or other document filed or required to be maintained or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or record required to be maintained under the Act, shall upon conviction, be punished by a fine or by imprisonment for not more than 6 months, or both.

b. Civil Penalties - ORC Chapter 6111 provides that any person who violates a permit condition is subject to civil penalties.

B. Continuation of the expired general permit. An expired general permit continues in force and effect until a new general permit is issued. Only those facilities authorized to discharge under the expired general permit are covered by the continued permit.

C. Need to halt or reduce activity not a defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Duty to provide information. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine compliance with this permit. The permittee shall also furnish to the Director upon request copies of records required to be kept by this permit.

F. Other information. When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the Notice of Intent, Storm Water Pollution Prevention Plan, Notice of Termination or in any other report to the Director, he or she shall promptly submit such facts or information.

G. Signatory requirements. All Notices of Intent, Notices of Termination, storm water pollution prevention plans, reports, certifications or information either submitted to the Director or the operator of a large or medium municipal separate storm sewer system, or that this permit requires be maintained by the permittee, shall be signed.

1. These items shall be signed as follows:

   a. For a corporation: By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

      1. A president, secretary, treasurer or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

      2. The manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25,000,000 (in second-quarter 1980 dollars) if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

   b. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

   c. For a municipality: State, Federal or other public agency; by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to the Director.
   b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position).
   c. Changes to authorization. If an authorization under paragraph V.G.2. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph V.G.2. must be submitted to the Director prior to or together with any reports, information or application to be signed by an authorized representative.

E. Certification. Any person signing documents under this section shall make the following certification:

> *"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*

I. Penalties for falsification of monitoring systems. ORC Chapter 6111 provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by fines and imprisonment.

J. Oil and hazardous substance liability. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under section 311 of the CWA.

K. Property rights. The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

L. Severability. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

M. Transfers. Ohio NPDES general permit coverage is transferable. The Ohio EPA must be notified in writing sixty days prior to any proposed transfer of coverage under an Ohio NPDES general permit. The transferee must inform the Ohio EPA it will assume the responsibilities of the original permittee transferor.

N. Environmental laws. No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

O. Proper operation and maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of the permit.

P. Inspection and entry. The permittee shall allow the Director or an authorized representative of EPA, or, in the case of a facility which discharges through a municipal separate storm sewer, an authorized representative of the municipal operator or the separate storm sewer receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

PART VI. Reopener Clause

A. If there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with construction activity covered by this permit, the owner or operator of such discharge may be required to obtain individual permit or an alternative general permit in accordance with part I.C of this permit or the permit may be modified to include different limitations and/or requirements.

B. Permit modification or revocation will be conducted according to ORC Chapter 6111.

PART VII. DEFINITIONS

"Act" means Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500,

as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117, and Pub. L. 100-4, 33 U.S.C. 1251 et. seq.

"Best Management Practices" (BMP's) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of Waters of the United States. BMP's also include treatment requirements, operating procedures, and practices to control plant and/or construction site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Commencement of Construction" - The initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

"Director" means the Director of the Ohio Environmental Protection Agency.

"Final Stabilization" means that all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of at least 70% cover for the area has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed.

"First Order Stream" means all streams identified on a U.S.G.S. 7.5 minute topographical map by either a dashed or solid blue line.

"Large and Medium municipal separate storm sewer system" means all municipal separate storm sewers that are either:

(i) located in an incorporated place (city) with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census (these cities are listed in Appendices F and G of 40 CFR Part 122); or

(ii) located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships or towns within such counties (these counties are listed in Appendices H and I of 40 CFR Part 122); or

(iii) owned or operated by a municipality other than those described in paragraph (i) or (ii) and that are designated by the Director as part of the large or medium municipal separate storm sewer system.

"Larger common plan of development"- a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

"National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA. The term includes an "approved program".

"NOI" means notice of intent to be covered by this permit (see Part II of this permit)

"NOT" means notice of termination (see Part IV of this permit).

"Point Source" means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or the floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

"Runoff Coefficient" means the fraction of total rainfall that will appear at the conveyance as runoff.

"Storm Water" means storm water runoff, snow melt, and surface runoff and drainage.

"SWPPP" means storm water pollution prevention plan to be completed as a condition of this permit (see part III of this permit).

Ohio Environmental Protection Agency
Modification of National Pollutant Discharge
Elimination System (NPDES) General Permit

Issue Date: August 27, 1993 Existing Permit No.: OHR100000

Effective Date: February 7, 1994

General Permit for Storm Water Associated with Construction Activity

In accordance with Rule 3745-33-06 of the Ohio Administrative Code (formerly Ohio EPA Regulation RP-31-06), the above referenced NPDES General Permit is hereby modified as follows:

See attached pages for revisions. New language in capital letters and deleted languague has a line through it.

All terms and conditions of the existing permit not recommended for modification by this document will remain in effect. Any modified term or condition contained in this modification shall supersede, on the date this modification is effective, the existing respective term or condition of the permit.

When the modification is effective, the Ohio EPA permit number will remain OHR100000

Donald R. Schregardus

Donald R. Schregardus
Director

Modification of General Permit
for Storm Water Associated with Construction Activity

PART I. COVERAGE UNDER THIS PERMIT

Page 3

D. Application requirements for sites that comprise part of a larger common plan of development. If the owner or developer obtains a permit for a development then sells off lots or parcels within that development permit coverage must be continued on those lots. AN NOI INDIVIDUAL LOT NOTICE OF INTENT must be submitted for these lots if the developer does not retain permit responsibility for the entire development.

PART II. NOTICE OF INTENT REQUIREMENTS

Page 3

A. Deadlines for Notification. Individuals who intend to obtain initial coverage for a storm water discharge associated with construction activity under this general permit shall submit a Notice of Intent Application form (NOI) at least 45 days prior to the commencement of a new construction activity or in the case of an existing construction activity, or activities scheduled to begin before December 17, 1992, by November 3, 1992. INDIVIDUALS OR ENTITIES WHO INTEND TO ACCEPT RESPONSIBILITY FOR A PORTION OF A DEVELOPMENT FROM AN EXISTING PERMITTEE FOR COMPLYING WITH THIS PERMIT WHETHER AS SOLE RESPONSIBLE PARTY OR AS A CO-PERMITTEE SHALL SUBMIT AN INDIVIDUAL LOT NOI FORM, TO BE PROVIDED BY THE DIRECTOR, 7 DAYS PRIOR TO INITIATING CONSTRUCTION OR AS OF THE DAY THE ENTITY BECOMES THE OWNER OF PART OF THE DEVELOPMENT, WHICHEVER COMES FIRST.

D. Where to submit. Facilities which discharge storm water associated with construction activity must submit signed copies of the Notice of Intent AND INDIVIDUAL LOT NOI Application forms provided by the Director (or photocopy thereof) to the following address:

PART III. SPECIAL CONDITIONS, MANAGEMENT PRACTICES, AND OTHER NON-NUMERIC LIMITATIONS

Page 4

C. 1. The plan shall be completed prior to the timely submittal of an NOI OR INDIVIDUAL LOT NOI to be covered under this permit and updated in accordance with Part III, C. 3. For construction activities begun on or before October 1, 1992 or activities scheduled to begin before December 17, 1992, the plan shall provide for compliance with the terms and schedule of the plan by December 17, 1992. For construction activities that begin after December 17, 1992, the plan shall provide

for compliance with the terms and schedule of the plan beginning with the initiation of construction activities.

PART IV. NOTICE OF TERMINATION REQUIREMENTS

Follows Part IV.C. on page 9

D. ALTERNATIVE FACTORS ALLOWING SUBMISSION OF A NOTICE OF TERMINATION (NOT). IF THE INITIAL OWNER OR DEVELOPER OF A SITE HAS SOLD OFF ALL THE INDIVIDUAL PARCELS WHERE CONSTRUCTION IS NOT COMPLETED WITHIN THE AREA ADDRESSED BY THE ORIGINAL NOI; ENTERED INTO A CONTRACT WITH THE NEW OWNER WHEREBY THE NEW OWNER ACCEPTS RESPONSIBILITY FOR COMPLYING WITH THE REQUIREMENTS AND CONDITIONS OF THIS PERMIT; HAS PROVIDED THE FOLLOWING TO THE INDIVIDUAL LOT OWNER: A COPY OF THIS PERMIT, A SITE MAP OF THE DEVELOPMENT IDENTIFYING INDIVIDUAL LOTS, AND THE OPPORTUNITY TO OBTAIN A COPY OF THE ORIGINAL STORM WATER POLLUTION PREVENTION PLAN; AND HAS COMPLIED WITH THE OTHER CONDITIONS OF THIS PERMIT; THEN THE INITIAL PERMITTEE MAY SUBMIT A NOTICE OF TERMINATION TO TERMINATE COVERAGE.

PART V. STANDARD PERMIT CONDITIONS

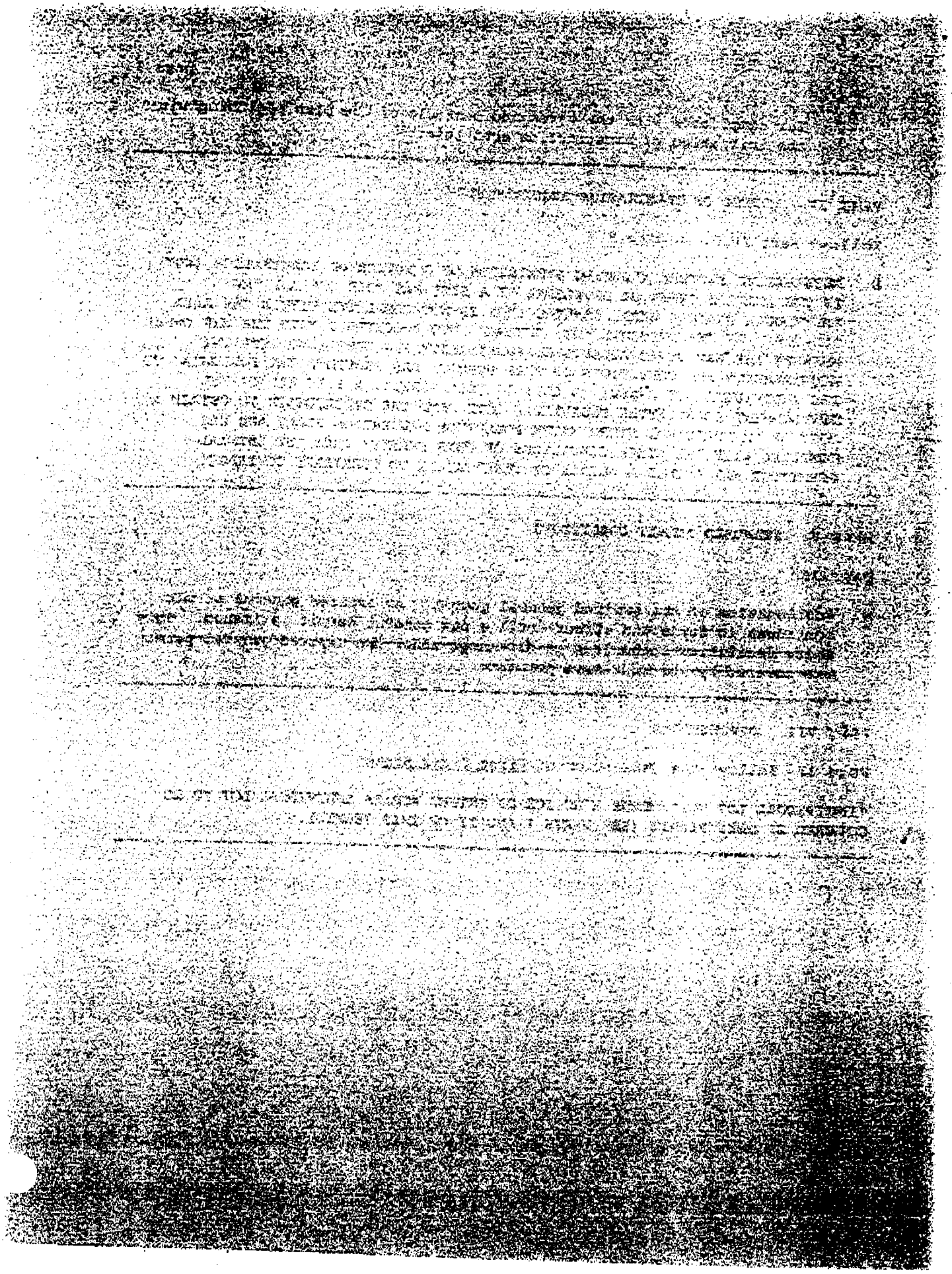
Page 10

B. Continuation of the expired general permit. An expired general permit continues in force and effect until a new general permit is issued. Only those facilities authorized to discharge under the expired general permit are covered by the continued permit.

PART VII. DEFINITIONS

Page 13 Follows the definition of First Order Stream.

"INDIVIDUAL LOT NOI" MEANS A NOTICE OF INTENT FOR AN INDIVIDUAL LOT TO BE COVERED BY THIS PERMIT (SEE PARTS I AND II OF THIS PERMIT).



APPENDIX G

SOIL GEOTECHNICAL PROPERTIES

- EXISTING ON-SITE SOIL STOCKPILES
  - COMMON FILL USED FOR BACKFILL
- MILLER BROS. EXCAVATING
  - CLAY FOR SOUTH LAGOON COVER SYSTEM
- MILLER BROS. EXCAVATING
  - TOP SOIL FOR SOUTH LAGOON COVER SYSTEM

H Nutting Company
611 Lunken Park Drive
Cincinnati, Ohio 45226

3/12/01 smo

Conestoga-Rovers & Assoc. LT
Lagoon Closure
Moraine, OH
HCN W.O. # 11294.020

TABLE I: CLASSIFICATION TEST DATA

Boring No.	Sample No.	Depth (ft.)	Mechanical Analysis				Moisture Content (%)	Atterberg Limits			Max. Dry Density (pcf)	Optimum Moisture (%)	U.S.C.S Classification	Loss On Ignition (%)	pH
			% Gravel	% Sand	% Silt	% Clay		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index					
TP-1	6	---	2	45	33	20	---	34	18	16	103.9	18.9	CL	---	---
TP-2	5	---	5	37	24	34	---	52	21	31	100.8	20.8	CH	---	---
~~TP-3~~	~~7~~	~~---~~	~~1~~	~~22~~	~~42~~	~~35~~	~~---~~	~~42~~	~~18~~	~~24~~	~~97.7~~	~~22.6~~	~~CL~~	~~---~~	~~---~~

1tb3-12

Clay soil from this source (TP-3, Sample 7) not used.

Samples #5 + 6 Miller - Olive Road
- Clay source used for South Lagoon Cover

~~Sample #7 - Jergens - 2 1 4.~~

H.C. NUTTING COMPANY

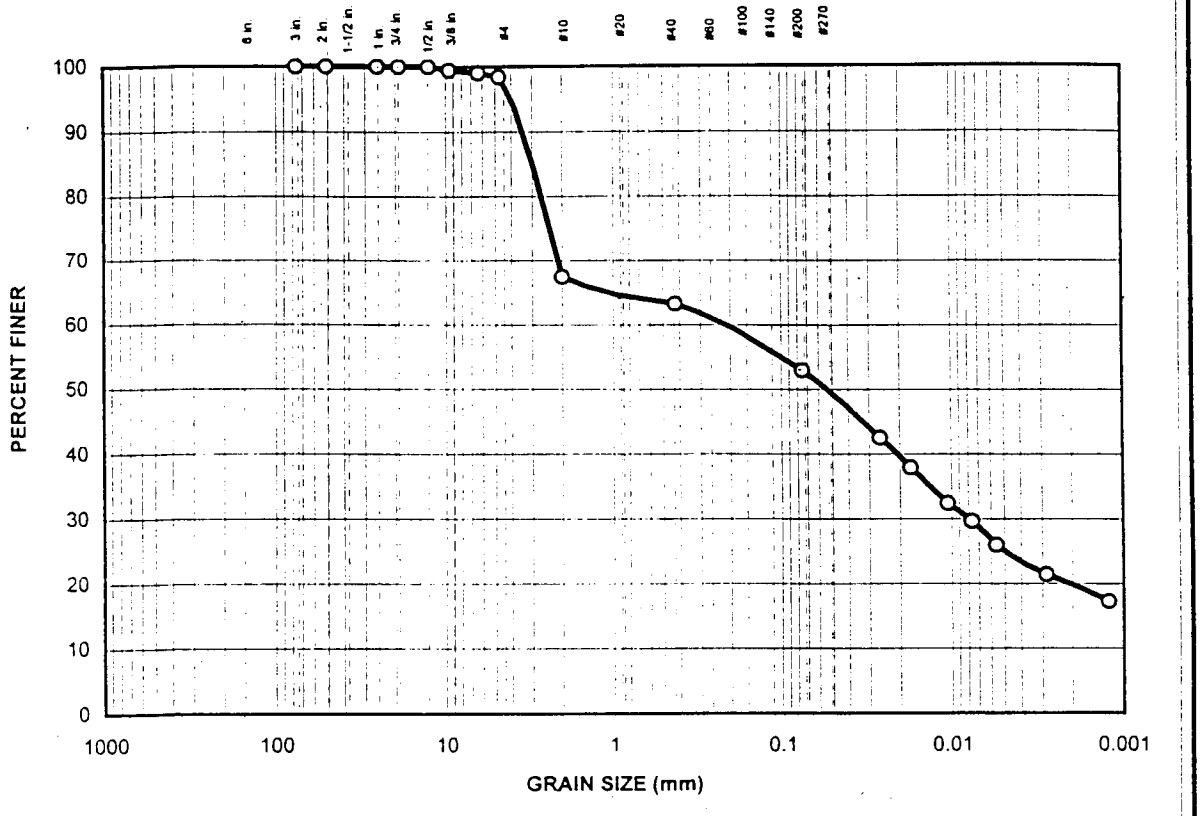
Robert L. House,
Vice President/Lab. Director

Tim Goodall,
Laboratory Manager

P 6 11

Clay Cover

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test Specification: ASTM D 422

% Cobbles	% Gravel	% Sand	%Silt	%Clay	USCS	USDA	AASHTO	GI
	1.6	45.4	33.1	19.8	CL		A-6	5

Sieve	3"	2"	1"	3/4"	1/2"	3/8"	1/4"	#4
% Finer	100.0	100.0	100.0	100.0	100.0	99.4	99.0	98.4

Sieve	#10	#40	#200					
% Finer	67.5	63.3	53.0					

D85	D60	D50	D30	D10	Cc	Cu	LL	PI
3.01	0.22	0.05	0.01				34	16

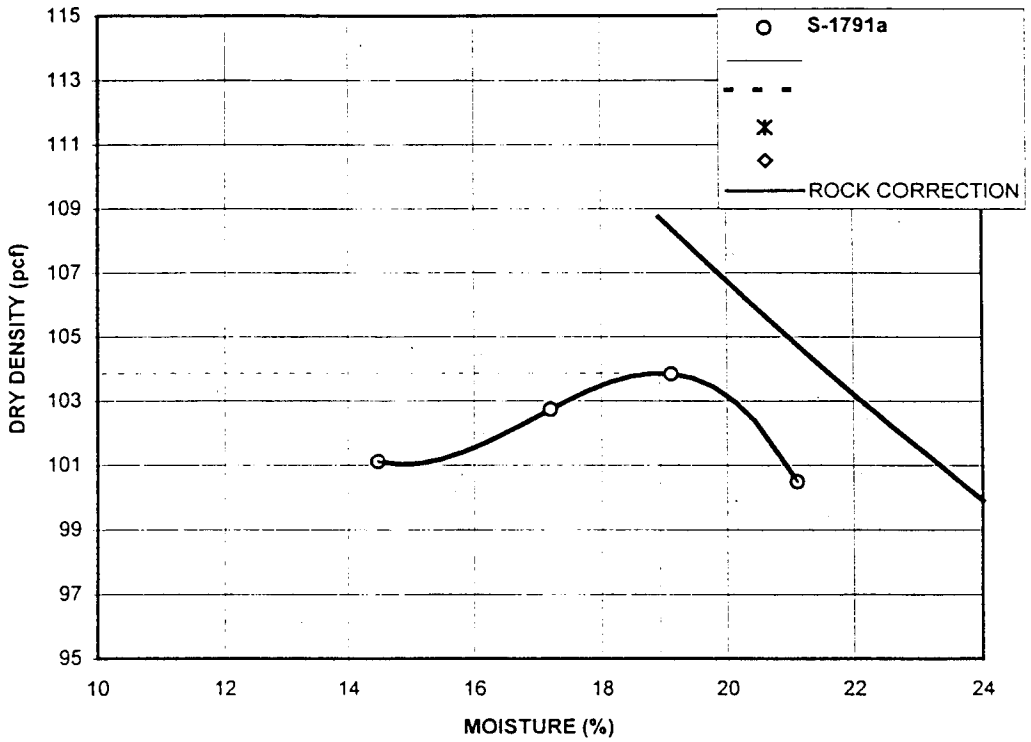
	Material Description	Remarks
	BROWN SANDY LEAN CLAY	
USCS:	CL (Sandy lean clay)	
USDA:	Clay loam	

Project Name	Lagoon Closure		Tested by	KC	Review. by TGG
Client	Conestoga-Rovers & As	W.O.# 11294.020	SOIL OR GRAVEL CLASSIFICATION TEST		
Sample Number	S-1791a				
Sample Location	TP-1 #6				
Date	9-Mar-01	Lab No. 1791	H. C. NUTTING COMPANY		

3/9/01

Clay Cover

MOISTURE - DENSITY RELATIONSHIP TEST



Test Specification: ASTM D698-91 Standard, Method B ZAV @ Gs 2.6

Classification			Natural	Specific			% >	% <
USCS	USDA	AASHTO	Moisture (%)	Gravity	LL	PI	3/8 in	#200
CL		A-6			34.	16.	99.0	53.0

Test Result	S-1791a
Maximum Dry Density (pcf)	**103.9**
Optimum Moisture (%)	**18.9**
Corrected Maximum Dry Density	
Corrected Optimum Moisture (%)	

Material Description	Remarks
BROWN SANDY LEAN CLAY	

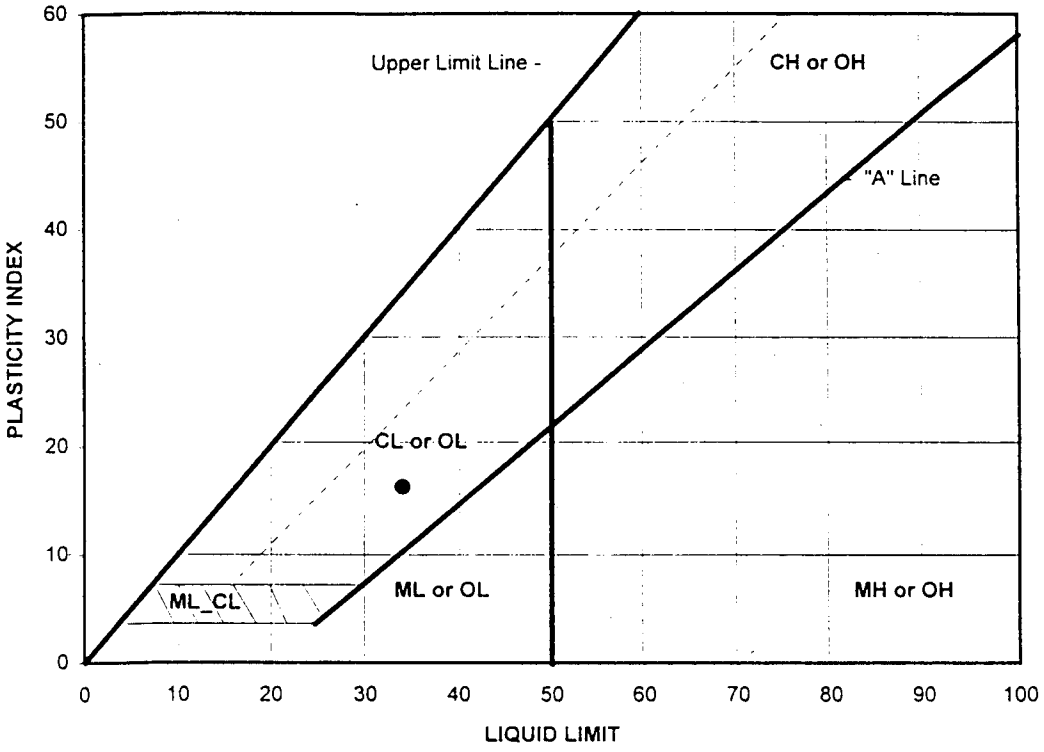
Project Name	Lagoon Closure			Prep By	DR Tested By DR
Client ID	Conestoga-Rovers & As	W.O.#	11294.020		
Sample Number	S-1791a			MOISTURE - DENSITY RELATIONSHIP TEST	
Sample Location	TP-1 #6			H. C. NUTTING COMPANY	
Date	6-Mar-01	Lab No.	1791		

Miller - Olive Road.

3/9/01

Clay Cover

LIQUID AND PLASTIC LIMITS TEST



Test Specification: ASTM D 4318

	LL	PL	PI	% Sand	% Silt	USCS	USDA	AASHTO
1	34	18	16	45.4	33.1	CL		A-6
2								
3								
4								
5								
6								
7								

Material Description	Remarks
BROWN SANDY LEAN CLAY USCS: CL (Sandy lean clay) USDA:	

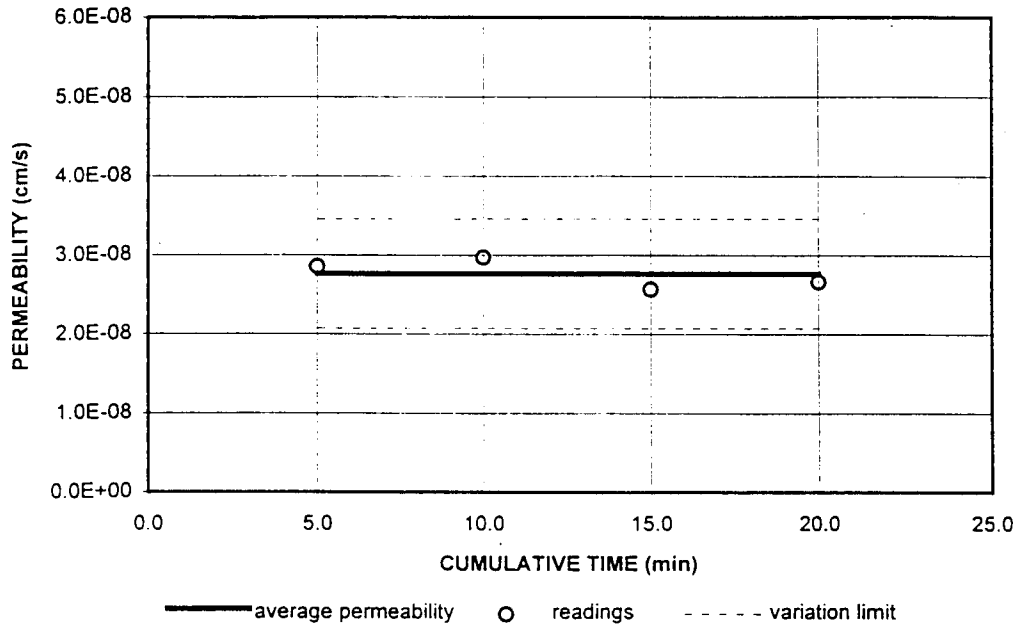
Project Name	Lagoon Closure			Tested by KC	Review. by TGG
Client	Conestoga-Rovers & As	W.O.#	11294.020	LIQUID AND PLASTIC LIMITS TEST	
Sample Number	S-1791a			H. C. NUTTING COMPANY	
Sample Location	TP-1 #6				
Date	9-Mar-01	Lab No.	1791		

Miller - Olive Road.

3/9/01

Clay Cover

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.08	2.86E-08	
21.00	5.00	10.00	13.52	2.97E-08	
21.00	5.00	15.00	13.06	2.57E-08	**2.8E-08**
21.00	5.00	20.00	12.60	2.66E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)	103.9	Specimen Height, (inches)	3.00	2.94
Opti. M.C., (%)	18.9	Specimen Diameter, (inches)	4.00	4.00
Comp. Method	D698-91 Standard,	Moisture Content, (%)	20.96	25.23
% Recompct.	95.0	Percent Saturation (%)	77.95	98.47
Test Pressures (psi)		Wet Mass Density (pcf)	119.33	126.07
Backpressure	90.00	Dry Mass Density (pcf)	98.65	100.67
Cell pressure	93.00	Void Ratio	0.74	0.70
Eff. Stress	3.00	Calculated Porosity, %	42.51	41.34

USCS	CL	LL	34.0	PI	16.3
Permeant Used:	WATER	Remarks	95% @ OPT. + 2 %

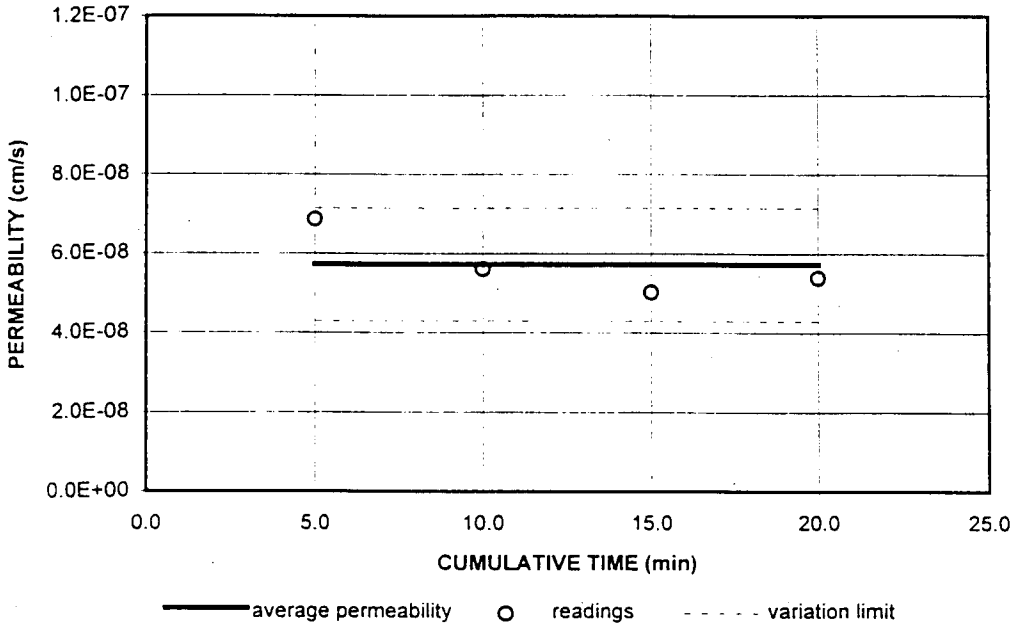
Project Name	Lagoon Closure			Tested by	FCE Reviewed by TGG
Client	Conestoga-	W.O.#	11294.020		
Sample Number	S-1791b			FLEXIBLE WALL PERMEABILITY TEST	
Sample Location	TP-1 #6				
Date	3/9/01	Lab No.	1791	H. C. NUTTING COMPANY	

Miller - Olive Road.

3/9/01

Clay Cover

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	15.19	6.87E-08	
21.00	5.00	10.00	14.08	5.60E-08	
21.00	5.00	15.00	13.15	5.02E-08	**5.7E-08**
21.00	5.00	20.00	12.23	5.39E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)	103.9	Specimen Height, (inches)	3.00	2.93
Opti. M.C., (%)	18.9	Specimen Diameter, (inches)	4.00	4.00
Comp. Method	D698-91 Standard,	Moisture Content, (%)	18.72	24.57
% Recompct.	95.2	Percent Saturation (%)	69.95	97.16
Test Pressures (psi)		Wet Mass Density (pcf)	117.36	126.08
Backpressure	90.00	Dry Mass Density (pcf)	98.85	101.22
Cell pressure	93.00	Void Ratio	0.74	0.70
Eff. Stress	3.00	Calculated Porosity, %	42.39	41.02

USCS	CL	LL	34.0	PI	16.3
Permeant Used:	WATER	Remarks	95% @ OPT.		

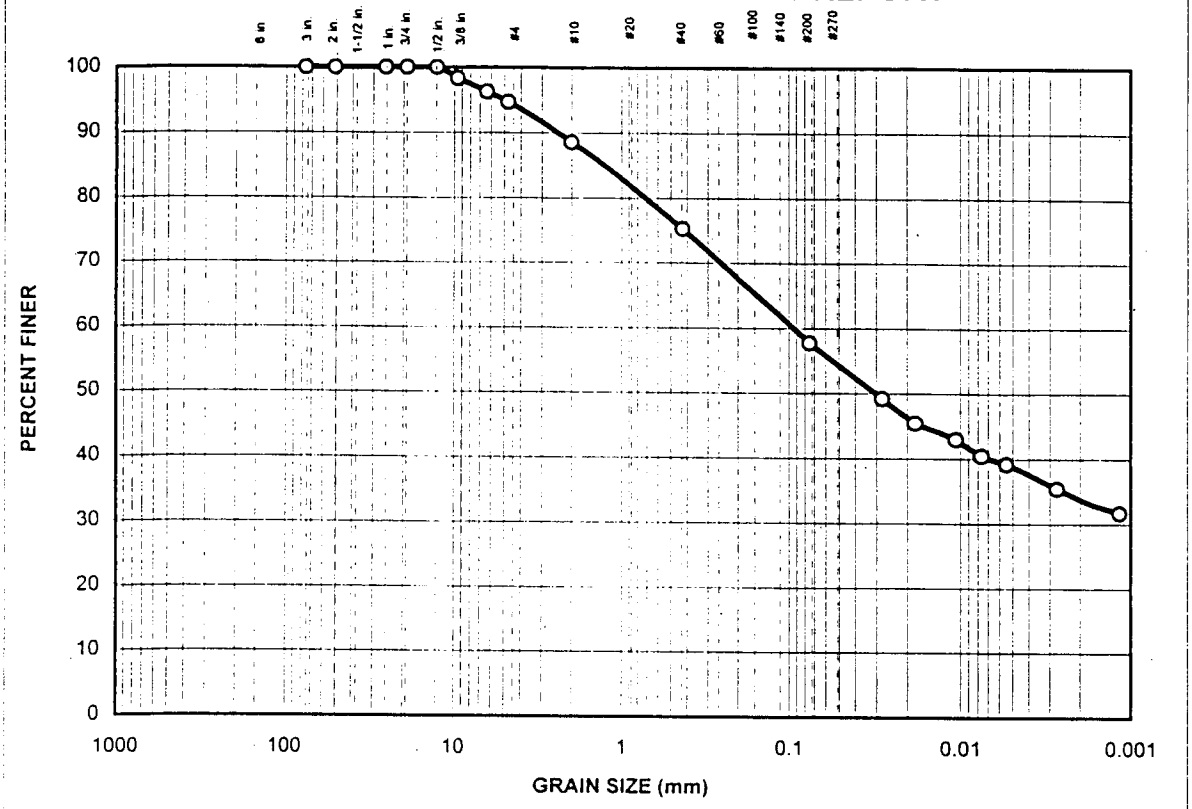
Project Name	Lagoon Closure			Tested by	FCE Reviewed by TGG
Client	Conestoga- W.O.#		11294.020		
Sample Number	S-1791a			FLEXIBLE WALL PERMEABILITY TEST	
Sample Location	TP-1 #6				
Date	3/9/01	Lab No.	1791	H. C. NUTTING COMPANY	

Miller - Olive Road

3/9/01

Clay Cover

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test Specification: ASTM D 422

% Cobbles	% Gravel	% Sand	%Silt	%Clay	USCS	USDA	AASHTO	GI
	5.3	36.9	24.0	33.7	CH		A-7-6	15

Sieve	3"	2"	1"	3/4"	1/2"	3/8"	1/4"	#4
% Finer	100.0	100.0	100.0	100.0	100.0	98.3	96.3	94.7

Sieve	#10	#40	#200					
% Finer	88.6	75.3	57.8					

D85	D60	D50	D30	D10	Cc	Cu	LL	PI
1.31	0.10	0.03					52	31

	Material Description	Remarks
	BROWN SANDY FAT CLAY	
USCS:	CH (Sandy fat clay)	
USDA:	Sandy loam	

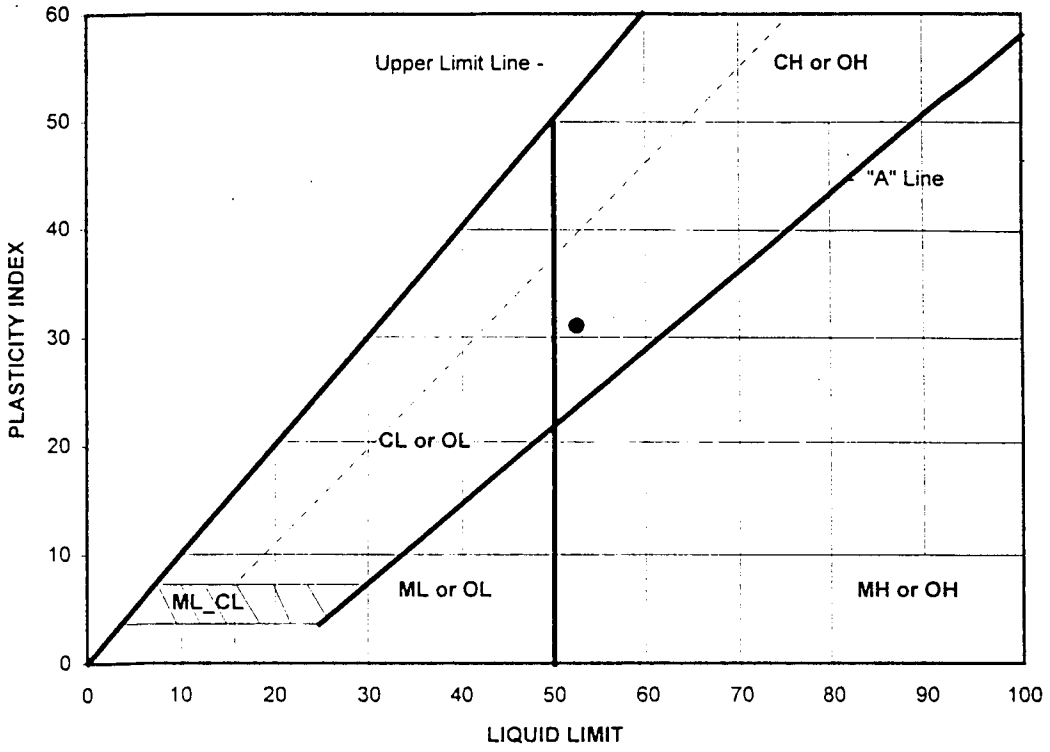
Project Name	Lagoon Closure			Tested by KC	Review. by TGG
Client	Conestoga-Rovers	W.O.#	11294.020	SOIL OR GRAVEL CLASSIFICATION TEST	
Sample Number	S-1792a			H. C. NUTTING COMPANY	
Sample Location	TP-2 #5				
Date	9-Mar-01	Lab No.	1792		

Miller - Olive Rd

3/9/01

Clay cover

LIQUID AND PLASTIC LIMITS TEST



Test Specification: ASTM D 4318

	LL	PL	PI	% Sand	% Silt	USCS	USDA	AASHTO
1	52	21	31	36.9	24.0	CH		A-7-6
2								
3								
4								
5								
6								
7								

Material Description	Remarks
BROWN SANDY FAT CLAY USCS: CH (Sandy fat clay) USDA:	

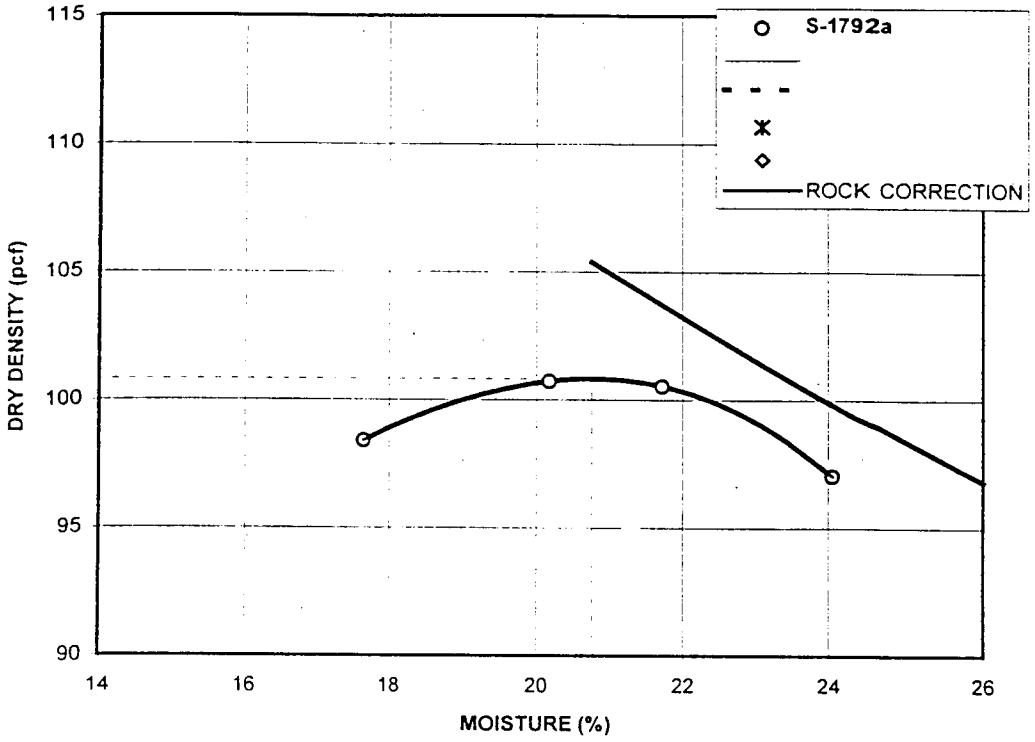
Project Name	Lagoon Closure			Tested by KC	Review. by TGG
Client	Conestoga-Rovers	W.O.#	11294.020	LIQUID AND PLASTIC LIMITS TEST	
Sample Number	S-1792a			H. C. NUTTING COMPANY	
Sample Location	TP-2 #5				
Date 9-Mar-01	Lab No.		1792		

Miller

3/9/01

Clay Cover

MOISTURE - DENSITY RELATIONSHIP TEST



Test Specification: ASTM D698-91 Standard, Method B ZAV @ Gs 2.6

Classification			Natural	Specific			% >	% <
USCS	USDA	AASHTO	Moisture (%)	Gravity	LL	PI	3/8 in	#200
CH		A-7-6			52.	31.	96.3	57.8

Test Result	S-1792a
Maximum Dry Density (pcf)	**100.8**
Optimum Moisture (%)	**20.8**
Corrected Maximum Dry Density	
Corrected Optimum Moisture (%)	

Material Description	Remarks
BROWN SANDY FAT CLAY	

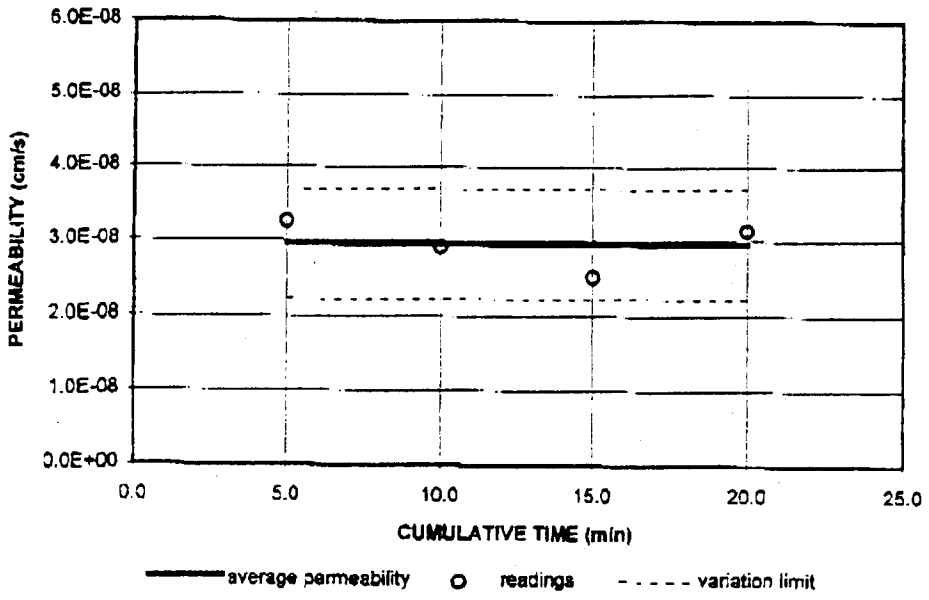
Project Name	Lagoon Closure			Prep By	DR Tested By DR
Client ID	Conestoga-Rovers	W.O.#	11294.020		
Sample Number	S-1792a			MOISTURE - DENSITY RELATIONSHIP TEST	
Sample Location	TP-2 #5			H. C. NUTTING COMPANY	
Date	6-Mar-01	Lab No.	1792		

Miller Olive Rd

3/9/01

Clay Cover

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.36	3.26E-08	
21.00	5.00	10.00	13.80	2.91E-08	
21.00	5.00	15.00	13.34	2.52E-08	**3.0E-08**
21.00	5.00	20.00	12.78	3.14E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)	100.8	Specimen Height, (inches)	3.00	2.97
Optl. M.C., (%)	20.8	Specimen Diameter, (inches)	4.00	4.00
Comp. Method	D698-91 Standard,	Moisture Content, (%)	22.50	27.44
% Recompct.	95.2	Percent Saturation (%)	78.57	98.04
Test Pressures (psi)		Wet Mass Density (pcf)	117.59	123.57
Backpressure	90.00	Dry Mass Density (pcf)	95.99	96.96
Cell pressure	93.00	Void Ratio	0.79	0.77
Eff. Stress	3.00	Calculated Porosity, %	44.06	43.50

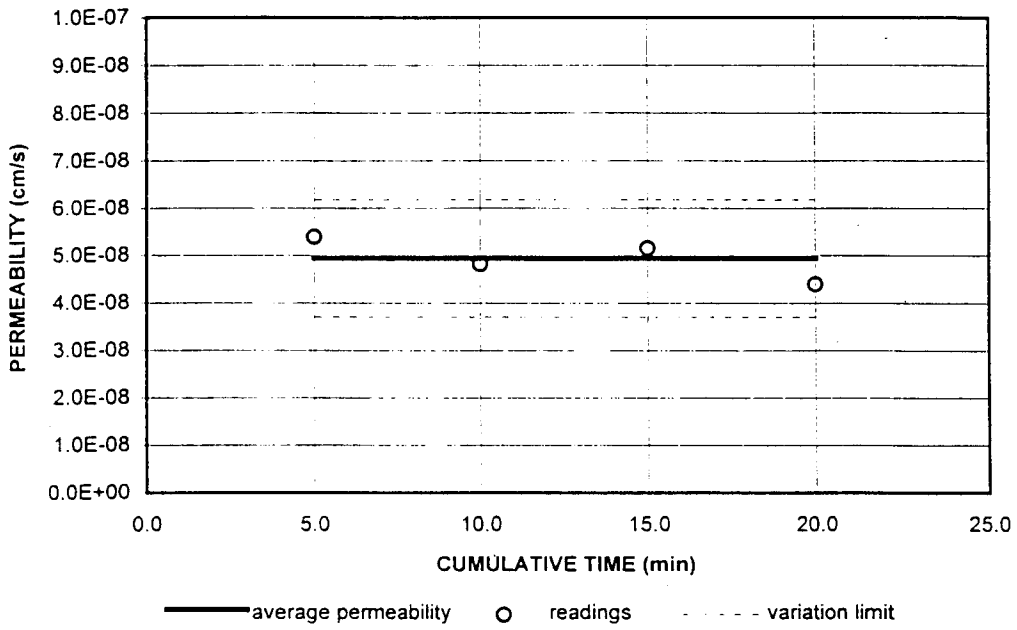
USCS	CH	LL	52.4	PI	31.1
Permeant Used:	WATER	Remarks	95% @ +2%		

Project Name	Lagoon Closure			Tested by	FCE Reviewed by TGG
Client	Conestoga-W.O.#		11294.020		
Sample Number	S-1792b			FLEXIBLE WALL PERMEABILITY TEST	
Sample Location	TP-2 #5			H. C. NUTTING COMPANY	
Date	3/9/01	Lab No.	1792		

3/20/01

Clay Cover

FLEXIBLE WALL PERMEABILITY TEST



Test Specification: ASTM D 5084

Fluid Temp. (°C)	Elapsed Time (min.)	Cumulative Time (min.)	Gradient (cm-Hg)	Calculated Permeability (cm/sec)	Average Permeability (cm/sec)
21.00	5.00	5.00	14.63	5.40E-08	
21.00	5.00	10.00	13.71	4.82E-08	
21.00	5.00	15.00	12.78	5.16E-08	**4.9E-08**
21.00	5.00	20.00	12.04	4.40E-08	

Compaction Data		Sample Data	Initial	Final
Proctor (pcf)	100.8	Specimen Height, (inches)	3.00	2.96
Opti. M.C., (%)	20.8	Specimen Diameter, (inches)	4.00	4.00
Comp. Method	D698-91 Standard,	Moisture Content, (%)	20.89	27.21
% Recompct.	94.9	Percent Saturation (%)	72.43	97.26
Test Pressures (psi)		Wet Mass Density (pcf)	115.68	123.37
Backpressure	90.00	Dry Mass Density (pcf)	95.69	96.98
Cell pressure	93.00	Void Ratio	0.79	0.77
Eff. Stress	3.00	Calculated Porosity, %	44.24	43.48

USCS	CH	LL	52.4	PI	31.1
Permeant Used:	WATER	Remarks	95% @ OPT.		

Project Name	Lagoon Closure		Tested by	FCE	Reviewed by TGG
Client	Conestoga- W.O.#	11294.020			
Sample Number	S-1792a				
Sample Location	TP-2 #5				
Date	3/9/01	Lab No. 1792			

FLEXIBLE WALL PERMEABILITY TEST

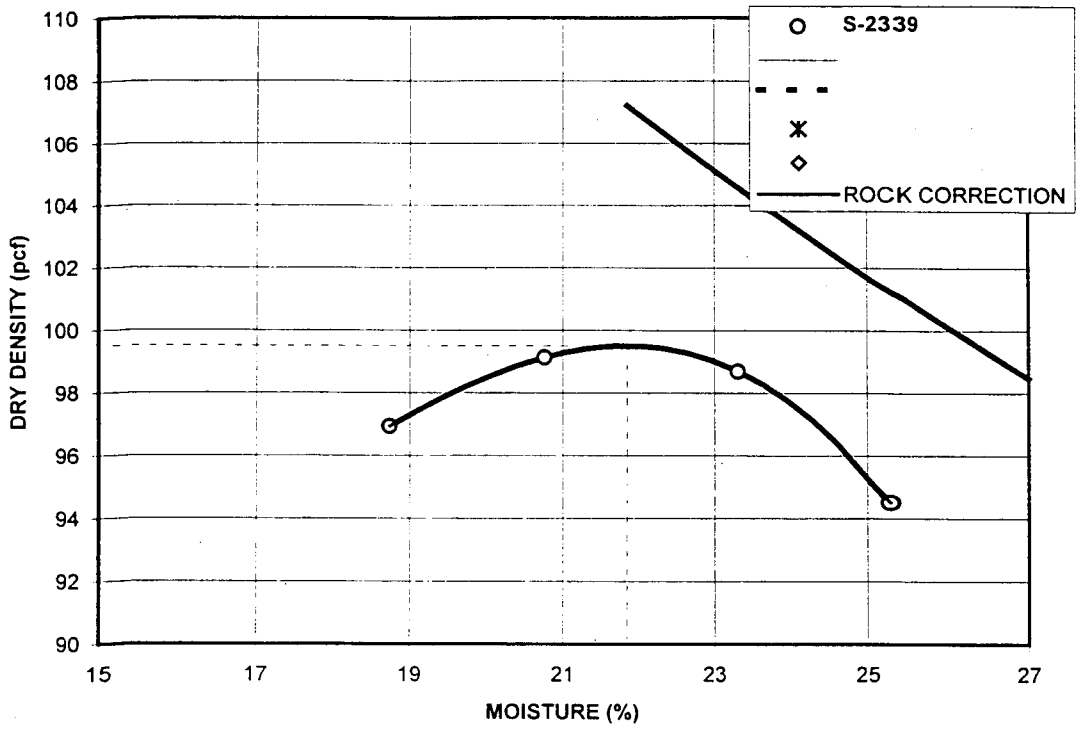
H. C. NUTTING COMPANY

Miller

3/9/01

Clay Cover

MOISTURE - DENSITY RELATIONSHIP TEST



Test Specification: ASTM D698-91 Standard, Method B ZAV @ Gs= 2.75

Classification			Natural	Specific			% >	% <
USCS	USDA	AASHTO	Moisture (%)	Gravity	LL	PI	3/8 in	#200

Test Result	S-2339				
Maximum Dry Density (pcf)	**99.5**				
Optimum Moisture (%)	**21.8**				
Corrected Maximum Dry Density					
Corrected Optimum Moisture (%)					

Material Description	Remarks
DK BROWN CLAY	

Project Name Lagoon Closure
Client ID Conestoga-Rovers & As W.O.# 11294.020
Sample Number S-2339
Sample Location grab from Site - fwd
Date 02-Apr-01 Lab No. L-2339

Prep By DR Tested By DR

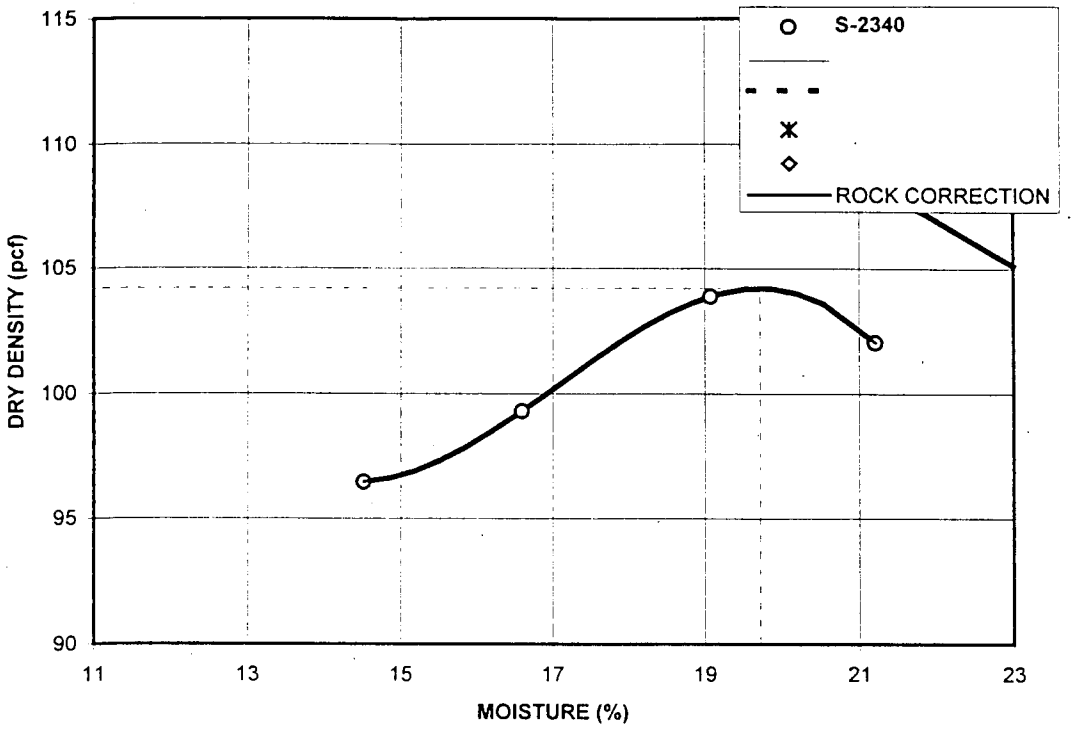
MOISTURE - DENSITY RELATIONSHIP TEST

H. C. NUTTING COMPANY

04/02/2001

Clay Cover

MOISTURE - DENSITY RELATIONSHIP TEST



Test Specification: ASTM D698-91 Standard, Method B ZAV @ Gs= 2.75

Classification			Natural	Specific			% >	% <
USCS	USDA	AASHTO	Moisture (%)	Gravity	LL	PI	3/8 in	#200

Test Result	S-2340
Maximum Dry Density (pcf)	**104.2**
Optimum Moisture (%)	**19.7**
Corrected Maximum Dry Density	
Corrected Optimum Moisture (%)	

Material Description	Remarks
BROWN CLAY	

Project Name Lagoon Closure
Client ID Conestoga-Rovers & As W.O.# 11294.020
Sample Number S-2340
Sample Location grab from site fw
Date 02-Apr-01 Lab No. L-2340

Prep By DR Tested By DR

MOISTURE - DENSITY RELATIONSHIP TEST

H. C. NUTTING COMPANY

APPENDIX H

SOIL CHEMICAL PROPERTIES

- MILLER BROS. EXCAVATING
  - CLAY FOR SOUTH LAGOON COVER SYSTEM
- MILLER BROS. EXCAVATING
  - TOP SOIL FOR SOUTH LAGOON COVER SYSTEM

DATA CHEM LABORATORIES
A SPRENGER COMPANY

-115 – Soil: Clay + Topsoil used for South Lagoon Cover (Miller Bros.)
-116 Soil - not used for fill (Jergens)
-118 Soil - not used for fill

Submitted To: Matt Elkins
Conestoga-Rovers & Associates
2441 Crowne Point Dr.
Cincinnati, OH 45241

Reference Data:	**Volatile Organic Compounds**
Client Sample No.:	12611-022701JW-115 through 12611-030101JW-118
P.O. No.:	Not Available
Sample Location:	GM Moraine Lagoon Closure; 12611-02
Sample Type:	Soil
Method Reference:	8260
DCL Set ID No.:	01-M-1087
DCL Sample ID No.:	01-06199 through 01-06201
Sample Receipt Date:	3/5/2001
Analysis Date:	3/6/2001

These samples were analyzed for volatile organic compounds according to EPA SW-846 method 8260A.

Analysis was performed on a Hewlett-Packard 5973 GC/MS/DS. All tuning, SPCC and CCC quality control criteria for the initial calibration curve and daily calibration standard were met prior to sample analysis.

The results for the 8260 analysis are reported in µg/Kg for soil samples (PPB). Soil samples are reported on a wet weight basis. Results relate only to the items tested.

Leah Sherman NB

Leah Sherman

Data for samples -116 & -118 not included

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513.733-5336, FAX 513.733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800.230-8071, FAX 415.892-9469

Data Table (PPB)

Client #	12611-022701JW-115	EQL
DCL #	01-06199	
Dichlorodifluoromethane	ND	5
Chloromethane	ND	5
Vinyl Chloride	ND	5
Bromomethane	ND	5
Chloroethane	ND	5
Trichlorofluoromethane	ND	5
1,1-Dichloroethene	ND	5
Acetone	ND	50
Carbon Disulfide	ND	50
Methylene Chloride	ND	5
trans-1,2-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
2,2-Dichloropropane	ND	5
cis-1,2-Dichloroethene	ND	5
MTBE	ND	10
Chloroform	ND	5
2-Butanone	ND	50
Bromochloromethane	ND	5
1,1,1-Trichloroethane	ND	5
1,1-Dichloropropene	ND	5
Carbon Tetrachloride	ND	5
Benzene	ND	5
1,2-Dichloroethane	ND	5
Trichloroethene	ND	5
1,2-Dichloropropane	ND	5
Bromodichloromethane	ND	5
Dibromomethane	ND	5
cis-1,3-Dichloropropene	ND	5
Toluene	ND	5
trans-1,3-Dichloropropene	ND	5
4-Methyl-2-Pentanone	ND	50
1,1,2-Trichloroethane	ND	5
Tetrachloroethene	ND	5
2-Hexanone	ND	50
1,3-Dichloropropane	ND	5
Dibromochloromethane	ND	5
1,2-Dibromoethane	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
1,1,1,2-Tetrachloroethane	ND	5
m,p-Xylene	ND	5

Data Table (PPB)

Client #	12611-022701JW-115	EQL
DCL #	01-06199	
o-Xylene	ND	5
Styrene	ND	5
Isopropyl benzene	ND	5
Bromoform	ND	5
1,1,2,2-Tetrachloroethane	ND	5
1,2,3-Trichloropropane	ND	5
n-Propyl benzene	ND	5
Bromobenzene	ND	5
1,3,5-Trimethylbenzene	ND	5
2-Chlorotoluene	ND	5
4-Chlorotoluene	ND	5
tert-Butylbenzene	ND	5
1,2,4-Trimethylbenzene	ND	5
sec-Butylbenzene	ND	5
p-Isopropyltoluene	ND	5
1,3-Dichlorobenzene	ND	5
1,4-Dichlorobenzene	ND	5
n-Butylbenzene	ND	5
1,2-Dichlorobenzene	ND	5
1,2-Dibromo-3-chloropropane	ND	10
1,2,4-Trichlorobenzene	ND	5
Hexachlorobutadiene	ND	5
Naphthalene	ND	5
1,2,3-Trichlorobenzene	ND	5

ND indicates not detected at or above the EQL value. NS indicates compound not spiked. B indicates compound found in system blank.

Unknown Compounds Tentative Identification

PPB

Client #	12611-022701JW-115
DCL #	01-06199

* Tentative identification based on NBS spectral library

Surrogate % Recovery

Dibromofluoromethane	104	**92-118**
Toluene-D8	99	**94-107**
Bromofluorobenzene	105	**83-121**

Data Table (PPB)

Client #		QA/QC % Recovery	QA/QC % Recovery	QA/QC % Recovery		EQL
DCL #	Blank	LCS	06199MS	06199MSD		
Dichlorodifluoromethane	ND	NS	NS	NS		5
Chloromethane	ND	NS	NS	NS		5
Vinyl Chloride	ND	NS	NS	NS		5
Bromomethane	ND	NS	NS	NS		5
Chloroethane	ND	NS	NS	NS		5
Trichlorofluoromethane	ND	NS	NS	NS		5
1,1-Dichloroethene	ND	**108**	**109**	**109**		5
Acetone	ND	NS	NS	NS		50
Carbon Disulfide	ND	NS	NS	NS		50
Methylene Chloride	ND	NS	NS	NS		5
trans-1,2-Dichloroethene	ND	NS	NS	NS		5
1,1-Dichloroethane	ND	NS	NS	NS		5
2,2-Dichloropropane	ND	NS	NS	NS		5
cis-1,2-Dichloroethene	ND	NS	NS	NS		5
MTBE	ND	NS	NS	NS		10
Chloroform	ND	NS	NS	NS		5
2-Butanone	ND	NS	NS	NS		50
Bromochloromethane	ND	NS	NS	NS		5
1,1,1-Trichloroethane	ND	NS	NS	NS		5
-Dichloropropene	ND	NS	NS	NS		5
Carbon Tetrachloride	ND	NS	NS	NS		5
Benzene	ND	**109**	**107**	**111**		5
1,2-Dichloroethane	ND	NS	NS	NS		5
Trichloroethene	ND	**106**	**105**	**105**		5
1,2-Dichloropropane	ND	NS	NS	NS		5
Bromodichloromethane	ND	NS	NS	NS		5
Dibromomethane	ND	NS	NS	NS		5
cis-1,3-Dichloropropene	ND	NS	NS	NS		5
Toluene	ND	**107**	**107**	**109**		5
trans-1,3-Dichloropropene	ND	NS	NS	NS		5
4-Methyl-2-Pentanone	ND	NS	NS	NS		50
1,1,2-Trichloroethane	ND	NS	NS	NS		5
Tetrachloroethene	ND	NS	NS	NS		5
2-Hexanone	ND	NS	NS	NS		50
1,3-Dichloropropane	ND	NS	NS	NS		5
Dibromochloromethane	ND	NS	NS	NS		5
1,2-Dibromoethane	ND	NS	NS	NS		5
Chlorobenzene	ND	**106**	**106**	**107**		5
Ethylbenzene	ND	NS	NS	NS		5
1,1,1,2-Tetrachloroethane	ND	NS	NS	NS		5
m p-Xylene	ND	NS	NS	NS		5

Data Table (PPB)

Client #		QA/QC % Recovery	QA/QC % Recovery	QA/QC % Recovery		F
DCL #	Blank	LCS	06199MS	06199MSD		
o-Xylene	ND	NS	NS	NS		5
Styrene	ND	NS	NS	NS		5
Isopropyl benzene	ND	NS	NS	NS		5
Bromoform	ND	NS	NS	NS		5
1,1,2,2-Tetrachloroethane	ND	NS	NS	NS		5
1,2,3-Trichloropropane	ND	NS	NS	NS		5
n-Propyl benzene	ND	NS	NS	NS		5
Bromobenzene	ND	NS	NS	NS		5
1,3,5-Trimethylbenzene	ND	NS	NS	NS		5
2-Chlorotoluene	ND	NS	NS	NS		5
4-Chlorotoluene	ND	NS	NS	NS		5
tert-Butylbenzene	ND	NS	NS	NS		5
1,2,4-Trimethylbenzene	ND	NS	NS	NS		5
sec-Butylbenzene	ND	NS	NS	NS		5
p-Isopropyltoluene	ND	NS	NS	NS		5
1,3-Dichlorobenzene	ND	NS	NS	NS		5
1,4-Dichlorobenzene	ND	NS	NS	NS		5
n-Butylbenzene	ND	NS	NS	NS		5
1,2-Dichlorobenzene	ND	NS	NS	NS		
1,2-Dibromo-3-chloropropane	ND	NS	NS	NS		-
1,2,4-Trichlorobenzene	ND	NS	NS	NS		5
Hexachlorobutadiene	ND	NS	NS	NS		5
Naphthalene	ND	NS	NS	NS		5
1,2,3-Trichlorobenzene	ND	NS	NS	NS		5

ND indicates not detected at or above the EQL value. NS indicates compound not spiked. B indicates compound found in system blank.

Unknown Compounds Tentative Identification

PPB

Client #		QA/QC % Recovery	QA/QC % Recovery	QA/QC % Recovery		
DCL #	Blank	LCS	06199MS	06199MSD		

* Tentative identification based on NBS spectral library

Surrogate % Recovery

Dibromofluoromethane	104	101	107	105		**92-118**
Toluene-D8	100	100	101	100		**94-107**
Bromofluorobenzene	107	108	107	105		**83-121**

* Tentative identification based on NBS spectral library

Leah Sherman
Analyst

Reviewer

14 14

Cooler Receipt Worksheet (Revised 12/14/99) **Page** 8 **of** 8

Set I.D.: 1087 Date/Time of Receipt: 3/2/01 1438

Client Name: CRA

Cooler Temperature: 17.7 °C

Receipt Clerk: Jewel

- ☐ pH Criteria not Met
- ☐ Missing Samples
- ☐ Broken/Leaking Samples
- ☒ Cooler Temperature Out of Range
- ☐ Insufficient Sample Volume
- ☐ Headspace in Volatile Bottles
- ☐ Other:

- ☐ Missing Paperwork
- ☐ Incorrect Preservation
- ☐ Chain of Custody Error
- ☐ Incorrect Bottle Type
- ☐ Tubes/Filters Broken
- ☐ Custody Seals Broken

PH Check:		Value										
Metals	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Cyanide	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Ammonia	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Total Phenolics	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
TPH (418.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Oil & Grease (413.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
8260 /8021 /8015	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Other:	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12

Comments:

Client Contact: Company:

Date: Time:

CHAIN OF CUSTODY RECORD 01-C4M252W-1087

CONESTOGA-ROVERS & ASSOCIATES
2441 Crowne Point Drive
Cincinnati, OH 45241 (513) 326-7600

SHIPPED TO (Laboratory Name): Datachem Labs

REFERENCE NUMBER: 12611-02
CM - Moraine Lagoon Closure

SAMPLER'S SIGNATURE: _____ PRINTED NAME: Winterink

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	PARAMETERS: VOCs	SVOCs	Pest	PCBs	Metals-TAL	TPH-DRO	Herbs	Cl-	REMARKS
1	2-27		12611-022701-JW-115	Soil	8	✓	✓	✓	✓	✓	✓	✓	06194	One-week TAT
2	2-28		12611-022801-JW-116	"	8	✓	✓	✓	✓	✓	✓	✓	06200	"
3	3-1		12611-030101-JW-118	"	7	✓	✓		✓	✓			06201	"

TOTAL NUMBER OF CONTAINERS: 23

HEALTH/CHEMICAL HAZARDS:

RELINQUISHED BY: ① _____	DATE: 3/2/01 TIME:	RECEIVED BY: ① Laura Julian	DATE: 3/2/01 TIME: 14:38
RELINQUISHED BY: ② _____	DATE: TIME:	RECEIVED BY: ② _____	DATE: TIME:
RELINQUISHED BY: ③ _____	DATE: TIME:	RECEIVED BY: ③ _____	DATE: TIME:

METHOD OF SHIPMENT: hand delivery

WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenroc –Sampler Copy

SAMPLE TEAM: Winterink

RECEIVED FOR LABORATORY BY: _____ DATE: _____ TIME: _____

No C 2153

1001 (D) APR 28/97(NF) REV. 0 (F-15)

DATA CHEM LABORATORIES
A SORENSON COMPANY

See note on page 1 of VOC report

Submitted To: Matt Elkins
Conestoga-Rovers & Associates
2441 Crowne Point Dr.
Cincinnati, OH 45241

Reference Data:	**Semi-Volatile Organic Compounds**
Client Sample No.:	12611-022701JW-115 through 12611-030101JW-118
P.O. No.:	Not Available
Sample Location:	GM Moraine Lagoon Closure; 12611-02
Sample Type:	Soil
Method Reference:	8270
DCL Set ID No.:	01-M-1087
DCL Sample ID No.:	01-06199 through 01-06201
Sample Receipt Date:	3/5/2001
Preparation Date:	3/6/2001
Analysis Date:	3/7-9/2001

These samples were analyzed for BNA compounds according to EPA metho. 8270C (SW-846 December,1997).

For preparation of the samples, 30 g of each sample was spiked with surrogate spiking solution and extracted as prescribed in EPA Extraction Method 3550. The extracts were then concentrated to 1.0ml and spiked with an internal standard solution prior to analysis. Results relate only to the items tested.

Analysis of the samples was performed on a Hewlett-Packard 5973 GC/MS. All tuning, SPCC and CCC quality control criteria prescribed in the method were met for the initial calibration curve and daily calibration standard. Samples are reported on a wet weight basis.

Brandy Spahr

Brandy Spahr

CINCINNATI OFFICE
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513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9469

Data Table

µg/Kg

Client #	12611-022 701JW-115	**EQL**
DCL #	01-06199	
N-Nitrosodimethylamine	ND	**330**
Pyridine	ND	**330**
Picoline (2-)	ND	**330**
Methyl Methanesulfonate	ND	**330**
Ethyl Methanesulfonate	ND	**330**
Phenol	ND	**330**
Aniline	ND	**330**
Bis(2-Chloroethyl)Ether	ND	**330**
Chlorophenol (2-)	ND	**330**
Pentachloroethane	ND	**330**
Dichlorobenzene (1,3-)	ND	**330**
Dichlorobenzene (1,4-)	ND	**330**
Benzyl Alcohol	ND	**660**
Dichlorobenzene (1,2-)	ND	**330**
Methylphenol (2-)	ND	**330**
Bis(2-Chloroisopropyl)Ether	ND	**330**
Methylphenol(3- and 4-)	ND	**330**
Acetophenone	ND	**330**
N-Nitroso-Di-N-Propylamine	ND	**330**
Hexachloroethane	ND	**330**
o-Toluidine	ND	**330**
Nitrobenzene	ND	**330**
N-Nitrosopiperidine	ND	**330**
Isophorone	ND	**330**
Nitrophenol (2-)	ND	**330**
Dimethylphenol (2,4-)	ND	**330**
Bis(2-Chloroethoxy)Methane	ND	**330**
Dichlorophenol (2,4-)	ND	**330**
Trichlorobenzene (1,2,4-)	ND	**330**
Naphthalene	ND	**330**
Chloroaniline (4-)	ND	**660**
Dichlorophenol (2,6-)	ND	**330**
Hexachlorobutadiene	ND	**330**
N-Nitroso-Di-N-Butylamine	ND	**330**
Chloro-3-Methylphenol (4-)	ND	**660**
Methyl Naphthalene (2-)	ND	**330**
Hexachlorocyclopentadiene	ND	**330**
Tetrachlorobenzene (1,2,4,5-)	ND	**330**
Trichlorophenol (2,4,6-)	ND	**330**
Trichlorophenol (2,4,5-)	ND	**330**
Chloronaphthalene (2-)	ND	**330**
Nitroaniline (2-)	ND	**1650**

Data Table

µg/Kg

Client #	12611-022 701JW-115	**EQL**
DCL #	01-06199	
Dimethyl Phthalate	ND	**330**
Dinitrotoluene (2,6-)	ND	**330**
Acenaphthylene	ND	**330**
Nitroaniline (3-)	ND	**1650**
Acenaphthene	ND	**330**
Dinitrophenol (2,4-)	ND	**1650**
Nitrophenol (4-)	ND	**1650**
Pentachlorobenzene	ND	**330**
Dinitrotoluene (2,4-)	ND	**330**
Dibenzofuran	ND	**330**
Naphthylamine (1-)	ND	**330**
Tetrachlorophenol (2,3,4,6-)	ND	**330**
Naphthylamine (2-)	ND	**330**
Diethyl Phthalate	ND	**330**
Chlorophenyl Phenyl Ether (4-)	ND	**330**
Fluorene	ND	**330**
Nitroaniline (4-)	ND	**660**
Dinitro-2-methylphenol (4,6-)	ND	**1650**
N-Nitrosodiphenylamine	ND	**330**
5-nitro-o-toluidine	ND	**330**
Diphenylhydrazine (1,2-)	ND	**330**
Phenacetin	ND	**660**
Bromophenyl Phenyl Ether (4-)	ND	**330**
Hexachlorobenzene	ND	**330**
Aminobiphenyl (4-)	ND	**660**
Pronamide	ND	**330**
Pentachlorophenol	ND	**1650**
Pentachloronitrobenzene	ND	**660**
Phenanthrene	ND	**330**
Anthracene	ND	**330**
Di-N-Butyl Phthalate	ND	**330**
Benzidine	ND	**330**
Fluoranthene	ND	**330**
Pyrene	ND	**330**
P-Dimethylaminoazobenzene	ND	**330**
ButylBenzyl Phthalate	ND	**330**
Bis(2-Ethylhexyl Phthalate)	ND	**1650**
Dichlorobenzidine (3,3-)	ND	**660**
Benzo(a)Anthracene	ND	**330**
Chrysene	ND	**330**
Di-N-Octyl Phthalate	ND	**330**
7,12-Dimethylbenz(a)anthracene	ND	**330**

Data Table

µg/Kg

Client #	12611-022 701JW-115	EQL
DCL #	01-06199	
Benzo(b)Fluoroanthene	ND	330
Benzo(k)Fluoroanthene	ND	330
Benzo(a)Pyrene	ND	330
Methylcholanthrene(3-)	ND	330
Indeno(1.2.3-cd)Pyrene	ND	150
Dibenz(a,h)Anthracene	ND	330
Benzo(g,h,i)Perylene	ND	330

ND indicates not detected at or above the EQL. J indicates value below the EQL. B indicates compound found in blank. NS indicates compound not spiked.

Unknown Compounds Tentative Identification

µg/Kg

Client #	12611-022 701JW-115
DCL #	01-06199

* Tentative identification based on NBS spectral library

Surrogate Recovery

2-Fluorophenol	62	56-88
Phenol-D6	71	46-92
Nitrobenzene-D5	73	51-94
2-Fluorobiphenyl	74	53-96
2,4,6-Tribromophenol	65	51-96
Terphenyl-D14	85	56-109

Data Table

µg/Kg

Client #		% QC Recovery	% QC Recovery	% QC Recovery	EQL
DCL #	Blank	LCS	MS6200	MSD6200	
N-Nitrosodimethylamine	ND	NS	NS	NS	**330**
Pyridine	ND	NS	NS	NS	**330**
Picoline (2-)	ND	NS	NS	NS	**330**
Methyl Methanesulfonate	ND	NS	NS	NS	**330**
Ethyl Methanesulfonate	ND	NS	NS	NS	**330**
Phenol	ND	**57**	**57**	**58**	**330**
Aniline	ND	NS	NS	NS	**330**
Bis(2-Chloroethyl)Ether	ND	NS	NS	NS	**330**
Chlorophenol (2-)	ND	**75**	**77**	**78**	**330**
Pentachloroethane	ND	NS	NS	NS	**330**
Dichlorobenzene (1,3-)	ND	NS	NS	NS	**330**
Dichlorobenzene (1,4-)	ND	**62**	**64**	**63**	**330**
Benzyl Alcohol	ND	NS	NS	NS	**660**
Dichlorobenzene (1,2-)	ND	NS	NS	NS	**330**
Methylphenol (2-)	ND	NS	NS	NS	**330**
Bis(2-Chloroisopropyl)Ether	ND	NS	NS	NS	**330**
Methylphenol(3- and 4-)	ND	NS	NS	NS	**330**
Acetophenone	ND	NS	NS	NS	**3**
N-Nitroso-Di-N-Propylamine	ND	**64**	**66**	**65**	**330**
Hexachloroethane	ND	NS	NS	NS	**330**
o-Toluidine	ND	NS	NS	NS	**330**
Nitrobenzene	ND	NS	NS	NS	**330**
N-Nitrosopiperidine	ND	NS	NS	NS	**330**
Isophorone	ND	NS	NS	NS	**330**
Nitrophenol (2-)	ND	NS	NS	NS	**330**
Dimethylphenol (2,4-)	ND	NS	NS	NS	**330**
Bis(2-Chloroethoxy)Methane	ND	NS	NS	NS	**330**
Dichlorophenol (2,4-)	ND	NS	NS	NS	**330**
Trichlorobenzene (1,2,4-)	ND	**70**	**72**	**71**	**330**
Naphthalene	ND	NS	NS	NS	**330**
Chloroaniline (4-)	ND	NS	NS	NS	**660**
Dichlorophenol (2,6-)	ND	NS	NS	NS	**330**
Hexachlorobutadiene	ND	NS	NS	NS	**330**
N-Nitroso-Di-N-Butylamine	ND	NS	NS	NS	**330**
Chloro-3-Methylphenol (4-)	ND	**77**	**75**	**76**	**660**
Methyl Naphthalene (2-)	ND	NS	NS	NS	**330**
Hexachlorocyclopentadiene	ND	NS	NS	NS	**330**
Tetrachlorobenzene (1,2,4,5-)	ND	NS	NS	NS	**330**
Trichlorophenol (2,4,6-)	ND	NS	NS	NS	**3**
Trichlorophenol (2,4,5-)	ND	NS	NS	NS	**-**
Chloronaphthalene (2-)	ND	NS	NS	NS	**330**
Nitroaniline (2-)	ND	NS	NS	NS	**1650**

Data Table

µg/Kg

Client #		% QC Recovery	% QC Recovery	% QC Recovery	EQL
DCL #	Blank	LCS	MS6200	MSD6200	
Dimethyl Phthalate	ND	NS	NS	NS	330
Dinitrotoluene (2,6-)	ND	NS	NS	NS	330
Acenaphthylene	ND	NS	NS	NS	330
Nitroaniline (3-)	ND	NS	NS	NS	1650
Acenaphthene	ND	77	79	78	330
Dinitrophenol (2,4-)	ND	NS	NS	NS	1650
Nitrophenol (4-)	ND	77	68	77	1650
Pentachlorobenzene	ND	NS	NS	NS	330
Dinitrotoluene (2,4-)	ND	77	73	75	330
Dibenzofuran	ND	NS	NS	NS	330
Naphthylamine (1-)	ND	NS	NS	NS	330
Tetrachlorophenol (2,3,4,6-)	ND	NS	NS	NS	330
Naphthylamine (2-)	ND	NS	NS	NS	330
Diethyl Phthalate	ND	NS	NS	NS	330
Chlorophenyl Phenyl Ether (4-)	ND	NS	NS	NS	330
Fluorene	ND	NS	NS	NS	330
Nitroaniline (4-)	ND	NS	NS	NS	660
Nitro-2-methylphenol (4,6-)	ND	NS	NS	NS	1650
N-Nitrosodiphenylamine	ND	NS	NS	NS	330
5-nitro-o-toluidine	ND	NS	NS	NS	330
Diphenylhydrazine (1,2-)	ND	NS	NS	NS	330
Phenacetin	ND	NS	NS	NS	660
Bromophenyl Phenyl Ether (4-)	ND	NS	NS	NS	330
Hexachlorobenzene	ND	NS	NS	NS	330
Aminobiphenyl (4-)	ND	NS	NS	NS	660
Pronamide	ND	NS	NS	NS	330
Pentachlorophenol	ND	49	47	50	1650
Pentachloronitrobenzene	ND	NS	NS	NS	660
Phenanthrene	ND	NS	NS	NS	330
Anthracene	ND	NS	NS	NS	330
Di-N-Butyl Phthalate	ND	NS	NS	NS	330
Benzidine	ND	NS	NS	NS	330
Fluoranthene	ND	NS	NS	NS	330
Pyrene	ND	82	83	82	330
P-Dimethylaminoazobenzene	ND	NS	NS	NS	330
ButylBenzyl Phthalate	ND	NS	NS	NS	330
Bis(2-Ethylhexyl Phthalate)	ND	NS	NS	NS	1650
Dichlorobenzidine (3,3-)	ND	NS	NS	NS	660
Benzo(a)Anthracene	ND	NS	NS	NS	330
Chrysene	ND	NS	NS	NS	330
Di-N-Octyl Phthalate	ND	NS	NS	NS	330
7,12-Dimethylbenz(a)anthracene	ND	NS	NS	NS	330

Data Table

µg/Kg

Client #		% QC Recovery	% QC Recovery	% QC Recovery	EQL
DCL #	Blank	LCS	MS6200	MSD6200	
Benzo(b)Fluoroanthene	ND	NS	NS	NS	330
Benzo(k)Fluoroanthene	ND	NS	NS	NS	330
Benzo(a)Pyrene	ND	NS	NS	NS	330
Methylcholanthrene(3-)	ND	NS	NS	NS	330
Indeno(1.2.3-cd)Pyrene	ND	NS	NS	NS	150
Dibenz(a,h)Anthracene	ND	NS	NS	NS	330
Benzo(g,h,i)Perylene	ND	NS	NS	NS	330

ND indicates not detected at or above the EQL. J indicates value below the EQL. B indicates compound found in blank. NS indicates compound not spiked.

Unknown Compounds Tentative Identification

µg/Kg

Client #		% QC Recovery	% QC Recovery	% QC Recovery
DCL #	Blank	LCS	MS6200	MSD6200

* Tentative identification based on NBS spectral library

Surrogate Recovery

2-Fluorophenol	76	73	76	76	56-88
Phenol-D6	76	78	78	79	46-92
Nitrobenzene-D5	74	76	76	77	51-94
2-Fluorobiphenyl	74	75	77	75	53-96
2,4,6-Tribromophenol	59	65	64	68	51-96
Terphenyl-D14	93	94	87	88	56-109

Brandy Spahr
Analyst

Reviewer

14 14

Cooler Receipt Worksheet (Revised 12/14/99) **Page** 8 **of** 8

Set I.D.: 1087 Date/Time of Receipt: 3/2/01 1438

Client Name: CRA

Cooler Temperature: 17.7 °C

Receipt Clerk: [signature]

- ☐ pH Criteria not Met
- ☐ Missing Samples
- ☐ Broken/Leaking Samples
- ☑ Cooler Temperature Out of Range
- ☐ Insufficient Sample Volume
- ☐ Headspace in Volatile Bottles
- ☐ Other:

- ☐ Missing Paperwork
- ☐ Incorrect Preservation
- ☐ Chain of Custody Error
- ☐ Incorrect Bottle Type
- ☐ Tubes/Filters Broken
- ☐ Custody Seals Broken

PH Check:	Value											
Metals	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Cyanide	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Ammonia	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Total Phenolics	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
TPH (418.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Oil & Grease (413.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
8260 /8021 /8015	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Other:	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12

Comments:

Client Contact: Company:

Date: Time:

CHAIN OF CUSTODY RECORD 01-C4M252W-108

CONESTOGA-ROVERS & ASSOCIATES
2441 Crowne Point Drive
Cincinnati, OH 45241 (513) 326-7600

SHIPPED TO (Laboratory Name): Datachem Labs

REFERENCE NUMBER: 12611-02
GM-Moraine Lagoon Closure

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: Winterink

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	VOCs	SVOCs	Pest	PCBs	Metals-TAL	TPH-DRO	Hers	01-	REMARKS
1	2-27		12611-022701-JW-115	Soil	8	✓	✓	✓	✓	✓	✓	✓	06199	one-week TAT
2	2-28		12611-022801-JW-116	"	8	✓	✓	✓	✓	✓	✓	✓	06200	"
3	3-1		12611-030101-JW-118	"	7	✓	✓		✓	✓			06201	"
			TOTAL NUMBER OF CONTAINERS		23									HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ① [signature]	DATE: 3/2/01 TIME:	RECEIVED BY: ① Laura Julian	DATE: 3/2/01 TIME: 14:38
RELINQUISHED BY: ②	DATE: TIME:	RECEIVED BY: ②	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT: hand delivery WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: Winterink

RECEIVED FOR LABORATORY BY: NO C 2153
DATE: TIME:

1001 (D) APR 28/97(NF) REV. 0 (F-15)

DATA CHEM LABORATORIES
A SORENSON COMPANY

See note on page 1 of VOC report

Submitted To:
Matt Elkins
Conestoga-Rovers & Associates
9033 Meridian Way
Westchester, Ohio 45069

Reference Data: **PESTICIDES**

Sample Location:	GM Moraine Lagoon Closure; 12611-02
Sample Type:	Soil
Client Sample No.:	12611-022701JW-115 through 12611-022701JW-116
PO #:	Not Available
Method Reference:	8081 Organochlorine Pesticides/PCB
Sample Set ID#:	01-C-1087
DATACHEM Lab No.:	01-06199 through 01-06200
Sample Receipt Date:	3/5/2001
Preparation Date:	3/6/2001
Analysis Date:	3/6/2001

The samples were prepared for analysis by E.P.A. method SW-846-3510 and analyzed using E.P.A. method 8081.

The analysis was performed using a HP 6890 Plus gas chromatograph equipped with electron capture detectors. The analysis was performed on a 30 meter DB-5 fused capillary column. The confirmation analysis was performed on a 30 meter DB-1701 fused capillary column.

Results relate only to the items tested.

The results are provided in the enclosed data table.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Tami S. Anderson
Analyst

James R. Baxter
Laboratory Director

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 290-8071, FAX 415 893-9469

Data Table
mg/Kg
(ppm)

Client #	12611-022701JW-115	**EQL**
DCL #	01-06199	
Aldrin	ND	.002
alpha-BHC	ND	.002
beta-BHC	ND	.002
gamma-BHC(Lindane)	ND	.002
delta-BHC	ND	.004
Chlordane	ND	.033
4,4'-DDD	ND	.004
4,4'-DDE	ND	.004
4,4'-DDT	ND	.004
Dieldrin	ND	.002
Endosulfan I	ND	.002
Endosulfan II	ND	.004
Endosulfan Sulfate	ND	.004
Endrin	ND	.004
Endrin Aldehyde	ND	.004
Endrin Ketone	ND	.004
Heptachlor	ND	.002
Heptachlor Epoxide	ND	.002
Methoxychlor	ND	.02
Toxaphene	ND	.2
TCMX % Rec.	99.	
DCBP % Rec.	97.	

ND indicates not detected at or above the EQL.

Tami S. Anderson
Analyst

James Baxter
Laboratory Director

QC Data Table
% Recovery

Client #			
DCL #	**LCS**	**01-06200 MS**	**01-06200 MSD**
gamma-BHC(Lindane)	84.	79.	82.
Heptachlor	91.	83.	86.
Aldrin	97.	89.	92.
Dieldrin	99.	90.	92.
Endrin	95.	87.	90.
4,4'-DDT	109.	102.	106.
TCMX % Rec.	103.	99.	101.
DCBP % Rec.	106.	97.	99.

Tami S. Anderson
Analyst

James Baxter
Laboratory Director

Cooler Receipt Worksheet (Revised 12/14/99) **Page** 4 **of** 4

Set I.D.: 1087 Date/Time of Receipt: 3/2/01 1438

Client Name: CRA

Cooler Temperature: 17.7 °C

Receipt Clerk: Jewel

- ☐ pH Criteria not Met
- ☐ Missing Samples
- ☐ Broken/Leaking Samples
- ☒ Cooler Temperature Out of Range
- ☐ Insufficient Sample Volume
- ☐ Headspace in Volatile Bottles
- ☐ Other:

- ☐ Missing Paperwork
- ☐ Incorrect Preservation
- ☐ Chain of Custody Error
- ☐ Incorrect Bottle Type
- ☐ Tubes/Filters Broken
- ☐ Custody Seals Broken

PH Check:		Value										
Metals	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Cyanide	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Ammonia	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Total Phenolics	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
TPH (418.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Oil & Grease (413.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
8260 /8021 /8015	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Other:	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12

Comments:

Client Contact: Company:

Date: Time:

DATA CHEM LABORATORIES
A SORENSON COMPANY

see note on Page 1 of VOC report.

Submitted To:
Matt Elkins
Conestoga-Rovers & Associates
9033 Meridian Way
Westchester, Ohio 45069

Reference Data: **PCB's**

Sample Location:	GM Moraine Lagoon Closure; 12611-02
Sample Type:	Soil
Client Sample No.:	12611-022701JW-115 through 12611-022701JW-118
PO #:	Not Available
Method Reference:	EPA 8082
Sample Set ID#:	01-C-1087
DATACHEM Lab No.:	01-06199 through 01-06201
Sample Receipt Date:	3/5/2001
Preparation Date:	3/6/2001
Analysis Date:	3/7/2001

The samples were prepared for analysis by E.P.A. method SW-846-3550 and analyzed using E.P.A. method SW-846-8082.

The analysis was performed using a Hewlett Packard 5890 gas chromatograph equipped with an electron capture detector and a DB-5 capillary column with temperature programming from 190°C to 300°C.

Results relate only to the items tested.

The results are provided in the enclosed data table.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Tami S. Anderson
Analyst

Edward J. Lisch Sr. for JRB
James R. Baxter
Laboratory Director

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9469

DATA TABLE
mg/Kg

Aroclors

Client #	DCL #	1016	1221	1232	1242	1248	1254	1260	TCMX % Rec	DCBP % Rec
12611-022701JW-115	01-06199	ND	ND	ND	ND	ND	ND	ND	80.	103.
	EQL	.02	.04	.02	.02	.02	.02	.02		

ND indicates not detected at or above the EQL.

The LCS, MS and MSD are spiked at .33 mg/kg

QC DATA TABLE
mg/Kg

Aroclors

Client #	DCL #	1016	1221	1232	1242	1248	1254	1260	TCMX % Rec	DCBP % Rec
	EXT BLK	ND	ND	ND	ND	ND	ND	ND	94.	118.
	LCS	ND	ND	ND	ND	ND	ND	.30	87.	113.
	01-06200 MS	ND	ND	ND	ND	ND	ND	.25	80.	99.
	01-06200 MSD	ND	ND	ND	ND	ND	ND	.26	77.	98.
	EQL	.02	.04	.02	.02	.02	.02	.02		

ND indicates not detected at or above the EQL.

The LCS, MS and MSD are spiked at .33 mg/kg

Tami S. Anderson
Analyst

Reviewer

Cooler Receipt Worksheet (Revised 12/14/99) **Page** 3 **of** 3

Set I.D.: 1087 Date/Time of Receipt: 3/2/01 1438

Client Name: CRA

Cooler Temperature: 17.7 °C

Receipt Clerk: [signature]

- ☐ pH Criteria not Met
- ☐ Missing Samples
- ☐ Broken/Leaking Samples
- ☑ Cooler Temperature Out of Range
- ☐ Insufficient Sample Volume
- ☐ Headspace in Volatile Bottles
- ☐ Other: _____
- ☐ Missing Paperwork
- ☐ Incorrect Preservation
- ☐ Chain of Custody Error
- ☐ Incorrect Bottle Type
- ☐ Tubes/Filters Broken
- ☐ Custody Seals Broken

		Value										
PH Check:												
Metals	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Cyanide	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Ammonia	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Total Phenolics	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
TPH (418.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Oil & Grease (413.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
8260 /8021 /8015	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Other: _____	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12

Comments: _____

Client Contact: _____ Company: _____

Date: _____ Time: _____

DATA CHEM LABORATORIES
A ROPER-SON COMPANY

Submitted To: Matt Elkins
Conestoga-Rovers & Associates
9033 Meridian Way
Weschester, Ohio 45069

Reference Data: **Herbicides**
Sample Location: GM Moraine Lagoon Closure; 12611-02
Sample Type: soil
Client Sample No.: 12611-022701JW-115 through 12611-022701JW-118
PO #: Not Available
Method Reference: SW8151A
Sample Set ID#: 01-C-1087
DATACHEM Lab No.: 01-06199 through 01-06201
Preparation Date: 03/14/01
Analysis Date: 03/15/012

Data Table ug/kg

Client ID	Lab ID	2,4,5-T	2,4,5-TP	2,4-D
12611-022701JW-115	01-06199	ND	ND	ND
Reporting limit		800	800	800

Data Table ug/kg

Client ID	Lab ID	2,4,5-T	2,4,5-TP	2,4-D
12611-022701JW-116	01-06200	ND	ND	ND
Reporting limit		780	780	780

Surrogate Results

Client ID	Lab ID	2,4, DAA	RLimit	%Recovery
12611-022701JW-115	01-06199	43	2.3	40
12611-0222701JW-118	01-06200	46	2.3	44

CT&E laboratories performed the analysis on these samples. The results apply only to the portion of the sample analyzed.

James W. Carter
Reviewer

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 883-9469

DATA CHEM LABORATORIES
A SORENSON COMPANY

see note on page 1 of VOC report

Submitted To: Matt Elkins
Conestoga-Rovers & Associates
9033 Meridian Way
Westchester, Ohio 45069

Reference Data:	**Metals**
Client Sample No.:	12611-022701-JW-115 through 12611-030101-JW-118
Reference No.:	12611-02
Sample Location:	GM Moraine Lagoon Closure
Sample Type:	Soil
Method Reference:	3050/6010
DCL Set ID No.:	01-S-1087
DCL Sample ID No.:	01-06199 through 01-06201
Sample Receipt Date:	3/2/2001
Preparation Date:	03/06/01
Analysis Date:	03/16/01

The samples were prepared in accordance with EPA method 3050. The samples were then analyzed in accordance with EPA method 6010 using a Perkin Elmer 3000XL (ICP) purged spectrometer.

Results relate only to the items tested.

The results are in the enclosed data table.

Chris Baugues
Analyst

Reviewer

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9469

Results
mg/Kg (ppm)

Client #	12611-022701JW-115					
DCL #	01-06199					RPL
Aluminum	**13000.**					**20.**
Antimony	ND					**3.0**
Arsenic	**14.**					**5.0**
Barium	**110.**					**10.**
Beryllium	**0.9**					**0.4**
Cadmium	ND					**0.5**
Calcium	**2800.**					**20.**
Chromium	**18.**					**1.0**
Cobalt	**9.1**					**5.0**
Copper	**20.**					**2.5**
Iron	**26000.**					**10.**
Lead	**14.**					**1.5**
Magnesium	**3300.**					**20.**
Manganese	**400.**					**1.5**
Nickel	**27.**					**5.0**
tassium	**750.**					**20.**
Selenium	ND					**3.0**
Silver	ND					**1.0**
Sodium	**42.**					**20.**
Thallium	ND					**3.0**
Vanadium	**34.**					**5.0**
Zinc	**78.**					**5.0**

ND indicates the value is below the Reporting Limit.
RPL stands for Reporting Limit.

Chris Baugues
Analyst

Reviewer

QC Results
mg/Kg (ppm)

Client #		% Recovery	% Recovery	% Recovery		
DCL #	Prep Blank	LCS	01-06201MS	01-06201MSD		RPL
Aluminum	ND	-	NA	NA		20.
Antimony	ND	90.	50.*	48.*		3.0
Arsenic	ND	96.	83.	83.		5.0
Barium	ND	95.	82.	84.		10.
Beryllium	ND	96.	86.	86.		0.4
Cadmium	ND	98.	92.	91.		0.5
Calcium	ND	103.	NA	NA		20.
Chromium	ND	97.	86.	85.		1.0
Cobalt	ND	99.	87.	87.		5.0
Copper	ND	98.	96.	98.		2.5
Iron	ND	119.	NA	NA		10.
Lead	ND	96.	83.	82.		1.5
Magnesium	ND	105.	NA	NA		20.
Manganese	ND	95.	82.	96.		1.5
Nickel	ND	96.	89.	90.		5.0
Potassium	ND	96.	175.*	167.*		20.
Selenium	ND	94.	87.	84.		3
Silver	ND	94.	92.	91.		1.0
Sodium	ND	118.	256.*	273.*		20.
Thallium	ND	105.	89.	87.		3.0
Vanadium	ND	97.	88.	89.		5.0
Zinc	ND	99.	85.	87.		5.0

ND indicates the value is below the Reporting Limit.
RPL stands for Reporting Limit.
LCS stands for laboratory control sample; MS stands for matrix spike; MSD stands for matrix spike duplicate.
NA indicates the sample result was greater than four times the spiked amount.
* These elements for the MS and MSD are outside control limits (+/- 25%) due to matrix effects.

Chris Baugues
Analyst

Reviewer

Cooler Receipt Worksheet (Revised 12/14/99) **Page** 1 of 1 6 (3/14/01) 6

Set I.D.: 1087 Date/Time of Receipt: 3/2/01 1438

Client Name: CRA

Cooler Temperature: 17.7 °C

Receipt Clerk: [signature]

- ☐ pH Criteria not Met
- ☐ Missing Samples
- ☐ Broken/Leaking Samples
- ☒ Cooler Temperature Out of Range
- ☐ Insufficient Sample Volume
- ☐ Headspace in Volatile Bottles
- ☐ Other:

- ☐ Missing Paperwork
- ☐ Incorrect Preservation
- ☐ Chain of Custody Error
- ☐ Incorrect Bottle Type
- ☐ Tubes/Filters Broken
- ☐ Custody Seals Broken

PH Check:	Value											
Metals	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Cyanide	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Ammonia	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Total Phenolics	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
TPH (418.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Oil & Grease (413.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
8260 /8021 /8015	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Other:	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12

Comments:

Client Contact: Company:

Date: Time:

CHAIN OF CUSTODY RECORD

01-C4M252W-1087

CONESTOGA-ROVERS & ASSOCIATES 2441 Crowne Point Drive Cincinnati, OH 45241 (513) 326-7600	SHIPPED TO (Laboratory Name): Datachem Labs	REFERENCE NUMBER: 12611-02 GM-Moraine Lagoon Closure

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: Winterink

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	VOCs	SVOCs	Pest	PCBs	Metals-TAL	TPH-DRO	Herbs	01-	REMARKS
1	2-27		12611-022701-JW-115	Soil	8	✓	✓	✓	✓	✓	✓	✓	06199	One-week TAT
2	2-28		12611-022801-JW-116	"	8	✓	✓	✓	✓	✓	✓	✓	06200	"
3	3-1		12611-030101-JW-118	"	7	✓	✓		✓	✓			06201	"

TOTAL NUMBER OF CONTAINERS: 23

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
① [signature]	DATE: 3/2/01 TIME:	① Laura Juline	DATE: 3/2/01 TIME: 14:38
②	DATE: TIME:	②	DATE: TIME:
③	DATE: TIME:	③	DATE: TIME:

METHOD OF SHIPMENT: hand delivery

WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: Winterink

RECEIVED FOR LABORATORY BY:

DATE: TIME:

No C 2153

1001 (D) APR 2.. .F) REV. 0 (F-15)

DATA CHEM LABORATORIES
A SORENSON COMPANY

see note on page 1 of VOC report

Submitted To: Matt Elkins
Conestoga-Rovers & Associates
9033 Meridian Way
Westchester, Ohio 45069

Reference Data:	**Mercury**
Client Sample No.:	12611-022701-JW-115 through 12611-030101-JW-118
P.O. No.:	Not Available
Sample Location:	GM Moraine Lagoon Closure; 12611-02
Sample Type:	Soil
Method Reference:	EPA 7471
DCL Set ID No.:	01-S-1087
DCL Sample ID No.:	01-06199 through 01-06201
Sample Receipt Date:	03/05/2001
Preparation Date:	03/06/2001
Analysis Date:	03/07/2001

The samples were prepared and analyzed in accordance with EPA method 7471 using a Varian SpectrAA 300 (AAS).

The results are in the enclosed data table.

Results relate only to the items tested.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Stephanie Wilcox
Analyst

Reviewer

CINCINNATI OFFICE
4389 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9469

Mercury Results
ppm (mg/Kg)

Client #	DCL #	Hg
12611-022701JW-115	01-06199	ND
LOD		**0.3**

ND indicates the value is below the limit of detection (LOD)

QC Results

	% Recovery	RPD
Blank	ND	-
LCS/QC-10069	103.	-
01-06200 MS	98.	2
01-06200 MSD	96.	2

LCS - Laboratory Control Sample
MS - Matrix Spike Sample
RPD - Relative Percent Difference

Stephanie Wilcox
Analyst

Reviewer

Cooler Receipt Worksheet (Revised 12/14/99)

Set I.D.: 1087 Date/Time of Receipt: 3/2/01 1438

Client Name: CRA

Cooler Temperature: 17.7 °C

Receipt Clerk: [signature]

- ☐ pH Criteria not Met
- ☐ Missing Samples
- ☐ Broken/Leaking Samples
- ☒ Cooler Temperature Out of Range
- ☐ Insufficient Sample Volume
- ☐ Headspace in Volatile Bottles
- ☐ Other:
- ☐ Missing Paperwork
- ☐ Incorrect Preservation
- ☐ Chain of Custody Error
- ☐ Incorrect Bottle Type
- ☐ Tubes/Filters Broken
- ☐ Custody Seals Broken

		Value										
PH Check:	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Metals	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Cyanide	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Ammonia	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Total Phenolics	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
TPH (418.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Oil & Grease (413.1)	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
8260 /8021 /8015	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12
Other:	Yes /No /NA	<2	3	4	5	6	7	8	9	10	11	>12

Comments:

Client Contact: Company:

Date: Time:

CHAIN OF CUSTODY RECORD 01-C4M252W-1087

CONESTOGA-ROVERS & ASSOCIATES
2441 Crowne Point Drive
Cincinnati, OH 45241 (513) 326-7600

SHIPPED TO (Laboratory Name): Datachem Labs

REFERENCE NUMBER: 12611-02
GM-Moraine Lagoon Closure

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: Winterink

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	VOCs	SVOCs	Pest	PCBs	Metals-TAL	TPH-DRO	Herbs	01-	REMARKS
1	2-27		12611-022701-JW-115	Soil	8	✓	✓	✓	✓	✓	✓	✓	06199	one-week TAT
2	2-28		12611-022801-JW-116	"	8	✓	✓	✓	✓	✓	✓	✓	06200	"
3	3-1		12611-030101-JW-118	"	7	✓	✓		✓	✓			06201	"

TOTAL NUMBER OF CONTAINERS: 23

HEALTH/CHEMICAL HAZARDS:

RELINQUISHED BY: ① [signature]	DATE: 3/2/01 TIME:	RECEIVED BY: ① Laura Julian	DATE: 3/2/01 TIME: 14:38
RELINQUISHED BY: ②	DATE: TIME:	RECEIVED BY: ②	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT: hand delivery

WAY BILL No.

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: Winterink

RECEIVED FOR LABORATORY BY:

DATE: TIME:

No C 2153

1001 (D) APR 28/97(NF) REV 0 (F-15)

DATA CHEM LABORATORIES
A SORENSON COMPANY

Submitted To:
Matt Elkins
Conestoga-Rovers & Associates
9033 Meridian Way
Westchester, Ohio 45069

Reference Data: **Diesel Range Organics**

Sample Location:	GM Moraine Lagoon Closure; 12611-02
Sample Type:	Soil
Client Sample No.:	12611-022701JW-115 through 12611-022701JW-116
PO #:	Not Available
Method Reference:	Method 8015 Diesel Range Organics
Sample Set ID#:	01-C-1087
DATACHEM Lab No.:	01-06199 through 01-06200
Sample Receipt Date:	3/5/2001
Preparation Date:	3/6/2001
Analysis Date:	3/6/2001

The samples were prepared for analysis by extraction in methylene chloride. The analysis was performed using a Hewlett Packard 5890 gas chromatograph equipped with a flame ionization detector and a DB-5 capillary column with temperature programming from 40°C to 300°C.

Results relate only to the items tested.

The results are provided in the enclosed data table.

Tami S. Anderson
Analyst

James R. Baxter
Laboratory Director

DATA TABLE

Client #	DCL #	8015 DRO mg/Kg	Nonane % recovery	Pentacosane % recovery
12611-022701JW-115	01-06199	ND	65.	76.
	EQL	**15.**		

Cooler Receipt Worksheet (Revised 12/14/99) **Page 3 of 3**

Set I.D.: 1087 Date/Time of Receipt: 3/2/01 1438

Client Name: CRA

Cooler Temperature: 17.7 °C

Receipt Clerk: Jewel

☐ pH Criteria not Met
☐ Missing Samples
☐ Broken/Leaking Samples
☑ Cooler Temperature Out of Range
☐ Insufficient Sample Volume
☐ Headspace in Volatile Bottles
☐ Other:

☐ Missing Paperwork
☐ Incorrect Preservation
☐ Chain of Custody Error
☐ Incorrect Bottle Type
☐ Tubes/Filters Broken
☐ Custody Seals Broken

PH Check:	Value
Metals	Yes /No /NA <2 3 4 5 6 7 8 9 10 11 >12
Cyanide	Yes /No /NA <2 3 4 5 6 7 8 9 10 11 >12
Ammonia	Yes /No /NA <2 3 4 5 6 7 8 9 10 11 >12
Total Phenolics	Yes /No /NA <2 3 4 5 6 7 8 9 10 11 >12
TPH (418.1)	Yes /No /NA <2 3 4 5 6 7 8 9 10 11 >12
Oil & Grease (413.1)	Yes /No /NA <2 3 4 5 6 7 8 9 10 11 >12
8260 /8021 /8015	Yes /No /NA <2 3 4 5 6 7 8 9 10 11 >12
Other:	Yes /No /NA <2 3 4 5 6 7 8 9 10 11 >12

Comments:

Client Contact: Company:

Date: Time:

DATA CHEM LABORATORIES
A SORENSON COMPANY

Submitted To: Matt Elkins
Conestoga-Rovers & Associates
9033 Meridian Way
Westchester, Ohio 45069

Reference Data:	**Total Petroleum Hydrocarbons**
Client Sample No.:	12611-022701JW-115 through 12611-022801JW-116
P.O. No.:	Not Available
Sample Location:	GM Moraine Lagoon Closure; 12611-02
Sample Type:	Soil
Method Reference:	8015 GRO
DCL Set ID No.:	01-C-1087
DCL Sample ID No.:	01-06199 through 01-06200
Sample Receipt Date:	03/05/01
Analysis Date:	03/06/01
Calibration Date:	03/06/01

The soil samples were analyzed for Gasoline Range Organics (GRO) using EPA Method 8015. The analysis was performed on a Tracor Model 9000 gas chromatograph equipped with flame ionization detector(FID). A 75m DB-624 capillary column thermally programmed from 35°C to 230°C was used to separate the analytes.

Results relate only to the items tested.

The results are in the enclosed data table.

Jeff Ogle
Analyst

Reviewer

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9469

Data Table

Client #	DCL #	TPH (GRO) mg/kg	Surrogate % Recovery
12611-022701JW-115	01-06199	ND	109.
	EQL	2.	

ND indicates not detected at or above the EQL

QC Data % Recovery

DCL #	TPH (GRO)	Surrogate
LCS	110.	135.
01-05234 MS	100.	122.
01-05234 MSD	102.	119.

Jeff Ogle
Analyst

Reviewer

Cooler Receipt Worksheet (Revised 12/14/99) **Page** 3 **of** 3

Set I.D.: 1087 Date/Time of Receipt: 3/2/01 1438

Client Name: CRA

Cooler Temperature: 17.7 °C

Receipt Clerk: [signature]

- ☐ pH Criteria not Met
- ☐ Missing Samples
- ☐ Broken/Leaking Samples
- ☑ Cooler Temperature Out of Range
- ☐ Insufficient Sample Volume
- ☐ Headspace in Volatile Bottles
- ☐ Other:

- ☐ Missing Paperwork
- ☐ Incorrect Preservation
- ☐ Chain of Custody Error
- ☐ Incorrect Bottle Type
- ☐ Tubes/Filters Broken
- ☐ Custody Seals Broken

		Value
PH Check:	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Metals	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Cyanide	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Ammonia	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Total Phenolics	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
TPH (418.1)	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Oil & Grease (413.1)	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
8260 /8021 /8015	Yes /No /NA	<2 3 4 5 6 7 8 9 10 11 >12
Other:		

Comments:

Client Contact: Company:

Date: Time:

CHAIN OF CUSTODY RECORD 01-C4M2S2W-1087

CONESTOGA-ROVERS & ASSOCIATES
2441 Crowne Point Drive
Cincinnati, OH 45241 (513) 326-7600

SHIPPED TO (Laboratory Name): Datachem Labs

REFERENCE NUMBER: 12611-02
GM-Moraine Lagoon Closure

SAMPLER'S SIGNATURE: [signature] PRINTED NAME: Winterink

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. of Containers	VOCs	SVOCs	Pest	PCB	Metals-TAL	TPH-DRO	Herb	01-	REMARKS
1	2-27		12611-022701-JW-115	Soil	8	✓	✓	✓	✓	✓	✓	✓	06199	One-week TAT
2	2-28		12611-022801-JW-116	"	8	✓	✓	✓	✓	✓	✓	✓	06200	"
3	3-1		12611-030101-JW-118	"	7	✓	✓		✓	✓			06201	"

TOTAL NUMBER OF CONTAINERS: 23

HEALTH/CHEMICAL HAZARDS

RELINQUISHED BY: ① [signature]	DATE: 3/2/01 TIME:	RECEIVED BY: ① Laura Julian	DATE: 3/2/01 TIME: 14:38
RELINQUISHED BY: ②	DATE: TIME:	RECEIVED BY: ②	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ③	DATE: TIME:

METHOD OF SHIPMENT: hand delivery

WAY BILL No.

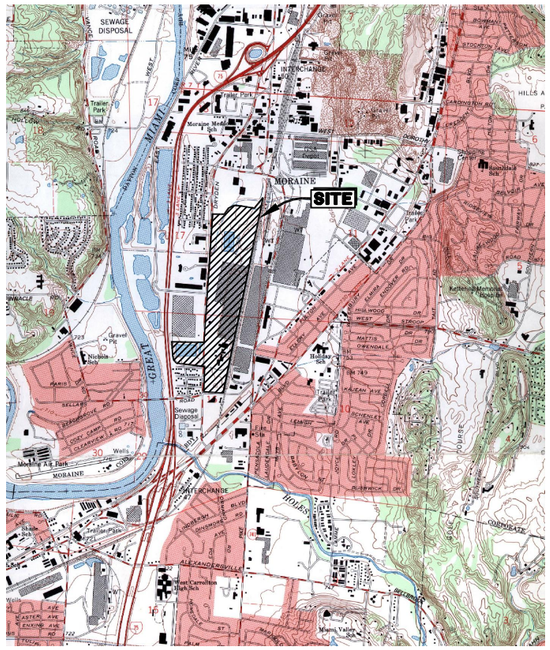
White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: Winterink

RECEIVED FOR LABORATORY BY:

DATE: TIME:

No C 2153



SOURCE: USGS QUADRANGLE MAP, DAYTON SOUTH, OHIO

KEY MAP

DRAWING INDEX

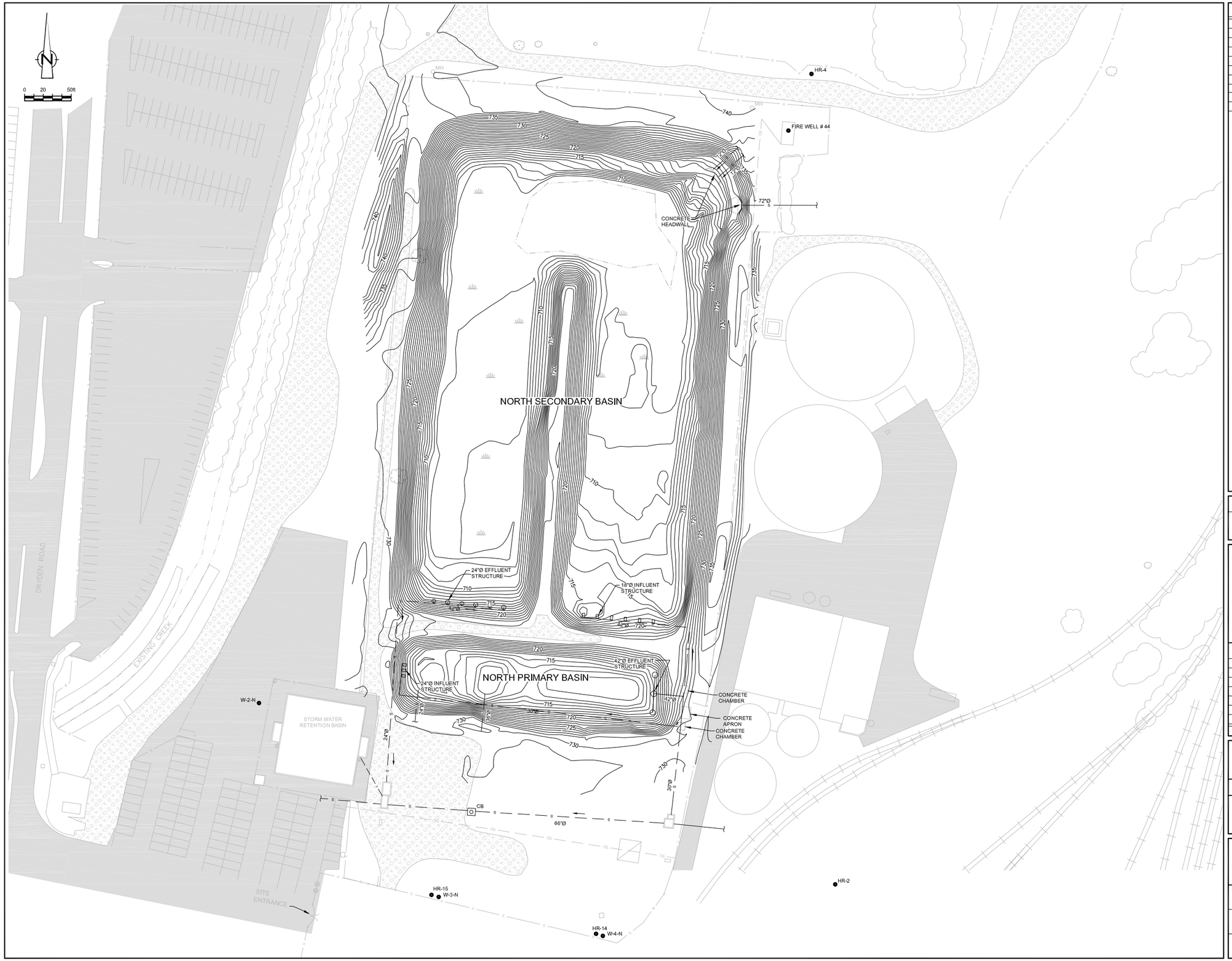
FILE NUMBER	PLAN NUMBER	DRAWING TITLE
12611-02(005)GN-WA001	1	PRE-CLOSURE CONDITIONS NORTH LAGOON - 2000
12611-02(005)GN-WA002	2	PRE-CLOSURE CONDITIONS SOUTH LAGOON - 2000
12611-02(005)GN-WA003	3	SITE WORK NORTH LAGOON
12611-02(005)GN-WA004	4	SITE WORK SOUTH LAGOON
12611-02(005)GN-WA008	5	BACKFILL/SUBGRADE SURVEY NORTH LAGOON
12611-02(005)GN-WA009	6	BACKFILL/SUBGRADE SURVEY SOUTH LAGOON
12611-02(005)GN-WA005	7	FINAL GRADES - ASPHALT PAVEMENT COVER NORTH LAGOON
12611-02(005)GN-WA006	8	FINAL GRADES - VEGETATED SOIL/CLAY COVER SOUTH LAGOON
12611-02(005)GN-WA007	9	DETAILS

AS BUILT DRAWINGS
NORTH AND SOUTH LAGOONS

AUGUST 2001

HARRISON RADIATOR DIVISION FACILITY
MORAINE, OHIO

CONESTOGA-ROVERS & ASSOCIATES



No.	Revision	Date	Initial

LEGEND

- FENCE
- ASPHALT PAVEMENT
- GRAVEL SURFACE
- EDGE OF WATER
- RAILROAD
- VEGETATION
- WET AREA
- 725 CONTOUR AND ELEVATION (ft.)
- S STORM SEWER
- OE OVERHEAD POWER LINE
- CB CATCHBASIN
- MH MANHOLE
- TREE
- HR-4 MONITORING WELL
- W-3-N MONITORING WELL

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

HARRISON RADIATOR DIVISION FACILITY MORAINE, OHIO

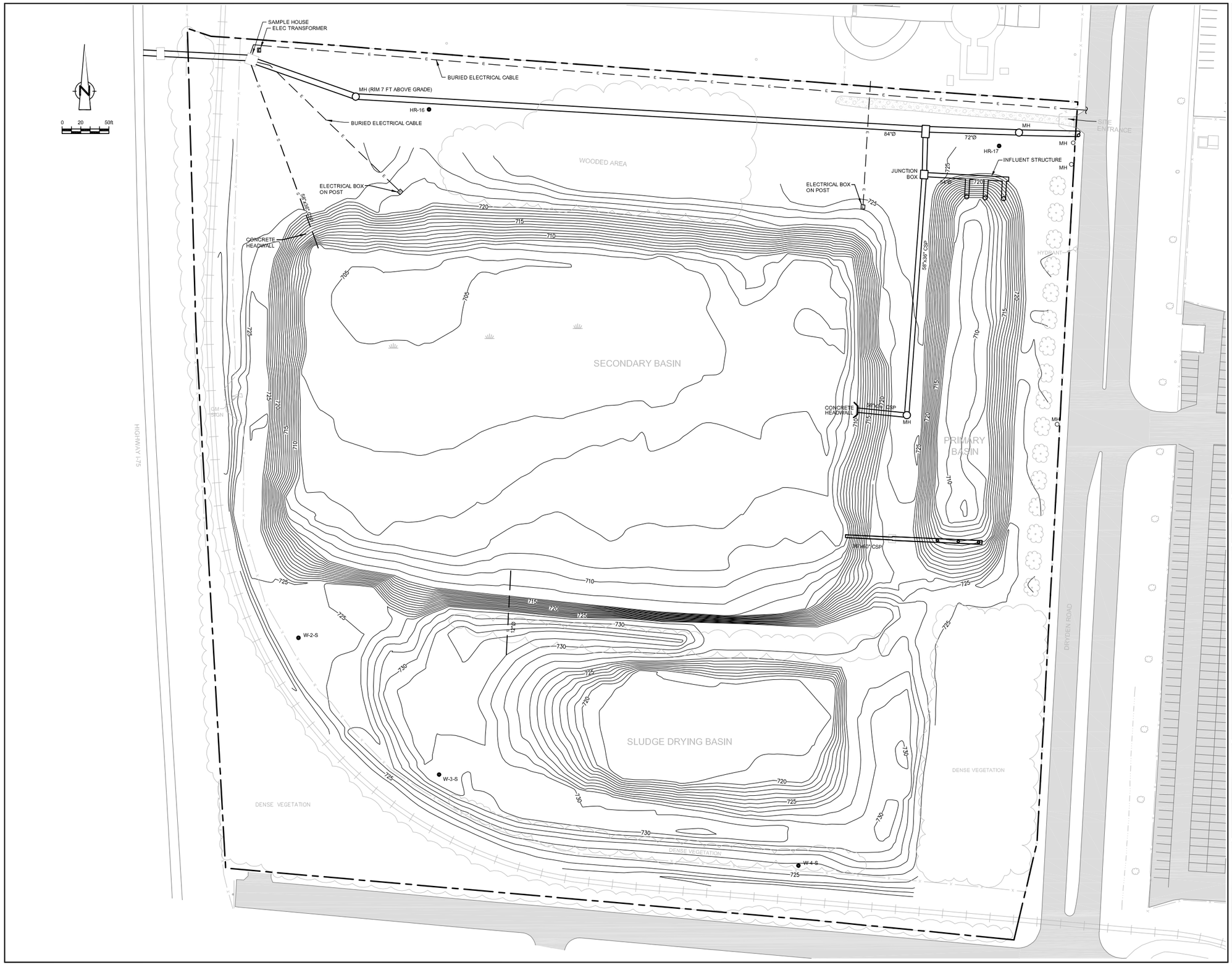
PRE-CLOSURE CONDITIONS NORTH LAGOON - 2000

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
JUDGE ENGINEERING, SURVEY RECEIVED NOVEMBER 1, 2000

Project Manager:	Reviewed By:	Date:	
I. RICHARDSON	J. WINTERINK	AUGUST 2001	
Scale: 1"=50'	Project No.: 12611-02	Report No.: 005	Drawing No.: PLAN 1

12611-02(005)GN-WA001 AUG 10/2001



No	Revision	Date	Initial

LEGEND

- APPROXIMATE LOT LINE
- FENCE
- ASPHALT PAVEMENT
- GRAVEL SURFACE
- EDGE OF WATER
- RAILROAD
- VEGETATION
- WET AREA
- 725 — CONTOUR AND ELEVATION (ft.)
- S — STORM SEWER
- CSP — CORRUGATED STEEL PIPE
- UNDERGROUND PIPING
- E — ELECTRICAL CABLE
- TREE
- W-2-S — MONITORING WELL
- HR-17 — MONITORING WELL
- MH — MANHOLE

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

HARRISON RADIATOR DIVISION FACILITY
MORAINE, OHIO

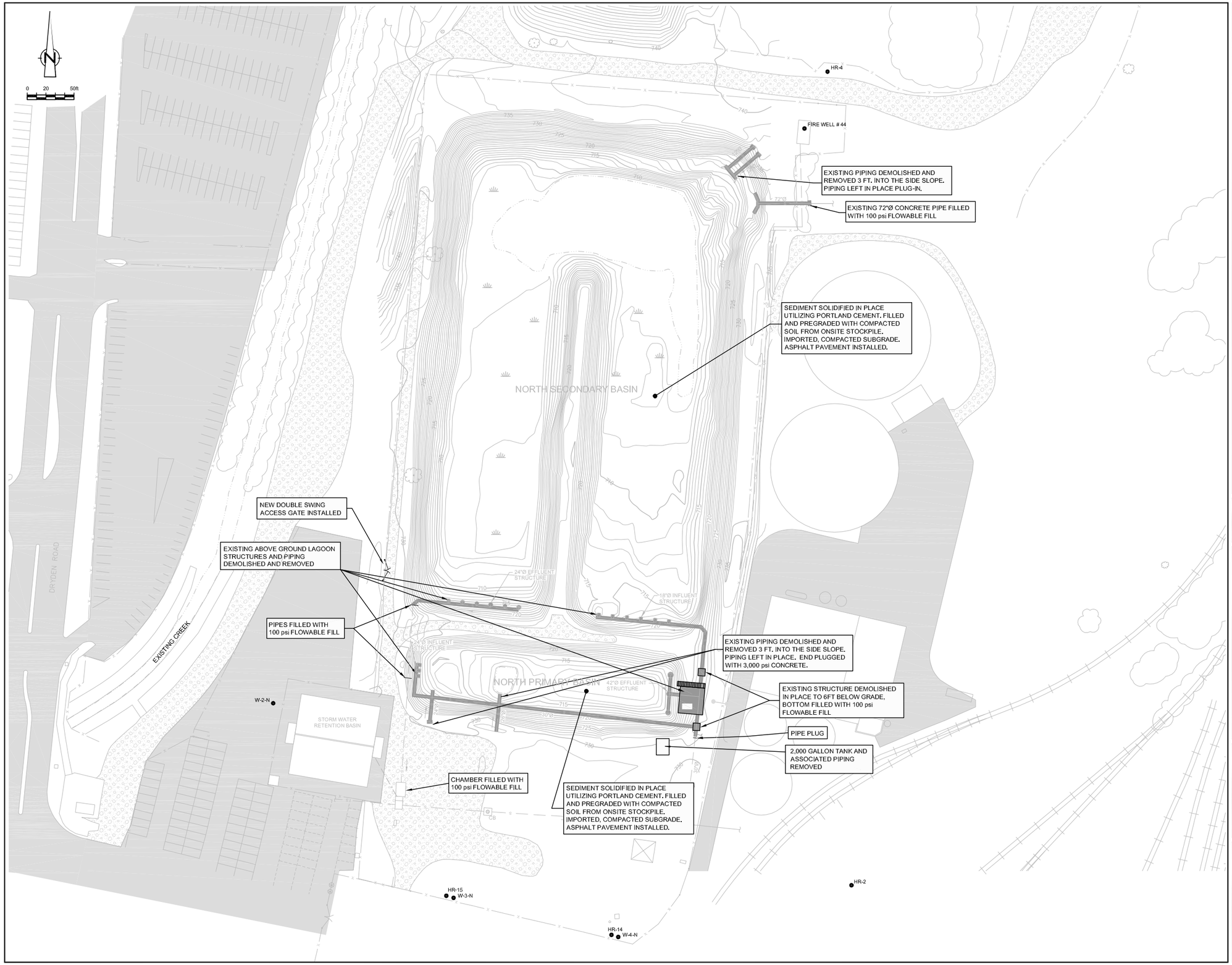
PRE-CLOSURE CONDITIONS
SOUTH LAGOON - 2000

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
JUDGE ENGINEERING, SURVEY RECEIVED OCTOBER 11, 2000

Project Manager:	Reviewed By:	Date:	
I. RICHARDSON	J. WINTERINK	AUGUST 2001	
Scale: 1"=50'	Project No: 12611-02	Report No: 005	Drawing No: PLAN 2

12611-02(005)GN-WA002 AUG 10/2001



No	Revision	Date	Initial

LEGEND

NEW	EXISTING	
		FENCE
		TURN DIAL TYPE ENTRANCE
		EXISTING ASPHALT PAVEMENT
		GRAVEL SURFACE
		EDGE OF WATER
		RAILROAD
		VEGETATION
		WET AREA
	725	CONTOUR AND ELEVATION (ft.)
	S	STORMWATER SEWER
	OE	OVERHEAD POWER LINE
	CB	CATCHBASIN
		TREE
	HR-4	MONITORING WELL
	W-3-N	MONITORING WELL
		EXTENT OF PIPING AND LAGOON STRUCTURES DEMOLISHED AND REMOVED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

HARRISON RADIATOR DIVISION FACILITY MORAINE, OHIO

AS BUILT

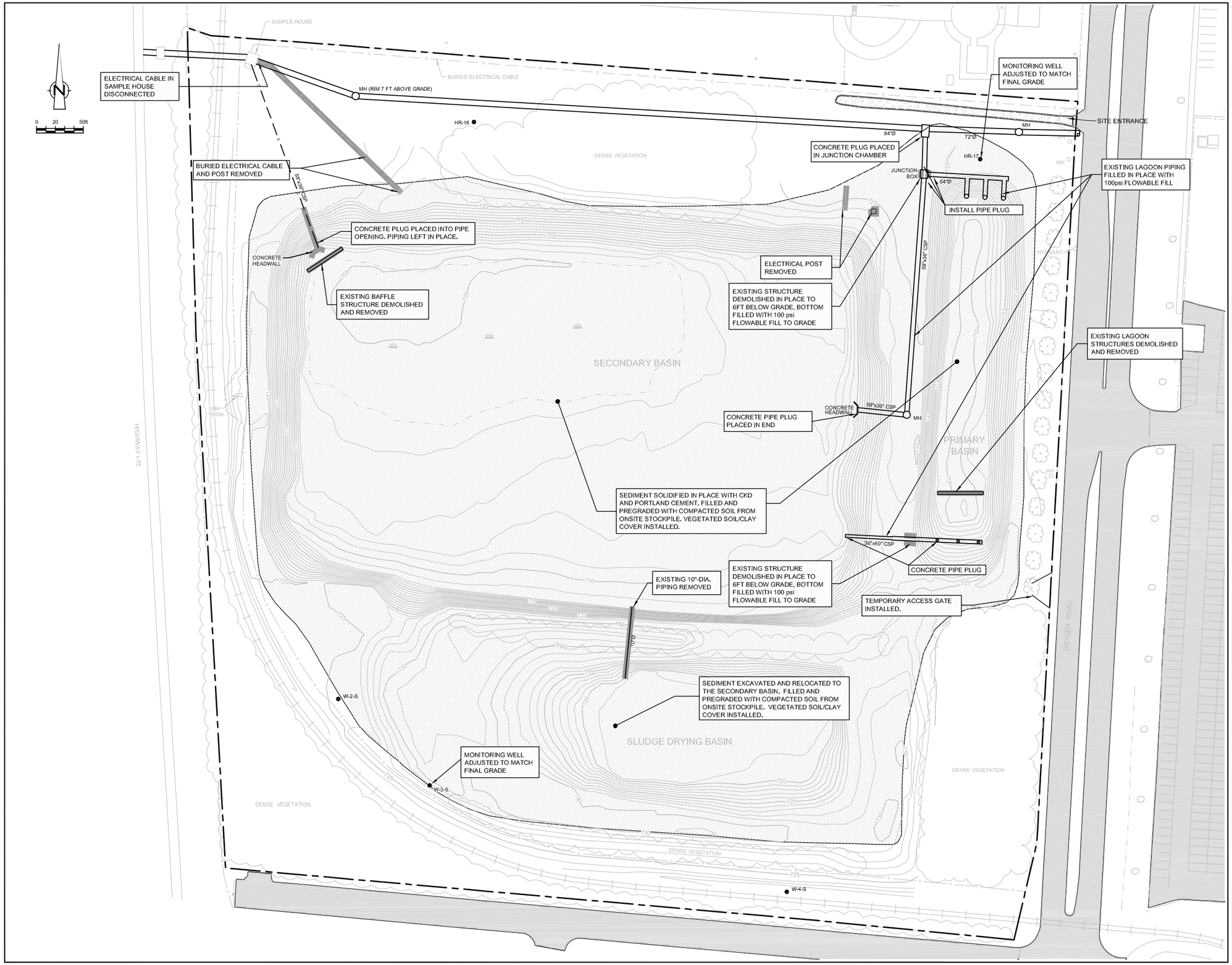
SITE WORK NORTH LAGOON

CRA CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
JUDGE ENGINEERING, SURVEY RECEIVED NOVEMBER 1, 2000

Project Manager:	Reviewed By:	Date:	
I. RICHARDSON	J. WINTERINK	AUGUST 2001	
Scale: 1"=50'	Project No: 12611-02	Report No: 005	Drawing No: PLAN 3

12611-02(005)GN-WA003 AUG 10/2001



No	Revision	Date	Initial

LEGEND

NEW	EXISTING	
		APPROXIMATE LOT LINE
	x	FENCE
		ASPHALT PAVEMENT
		GRAVEL SURFACE
		EDGE OF WATER
		RAILROAD
		VEGETATION
		WET AREA
	725	CONTOUR AND ELEVATION (ft.)
	s	STORMWATER SEWER
	CSP	CORRUGATED STEEL PIPE
		UNDERGROUND PIPING
	s	ELECTRICAL CABLE
		TREE
	W-2-S	MONITORING WELL
	HR-17	MONITORING WELL
MH	MH	MANHOLE
		LIMIT OF VEGETATIVE SOIL/CLAY COVER
	s	EXTENT OF PIPING AND LAGOON STRUCTURES DEMOLISHED AND REMOVED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

HARRISON RADIATOR DIVISION FACILITY
MORAINE, OHIO

AS BUILT

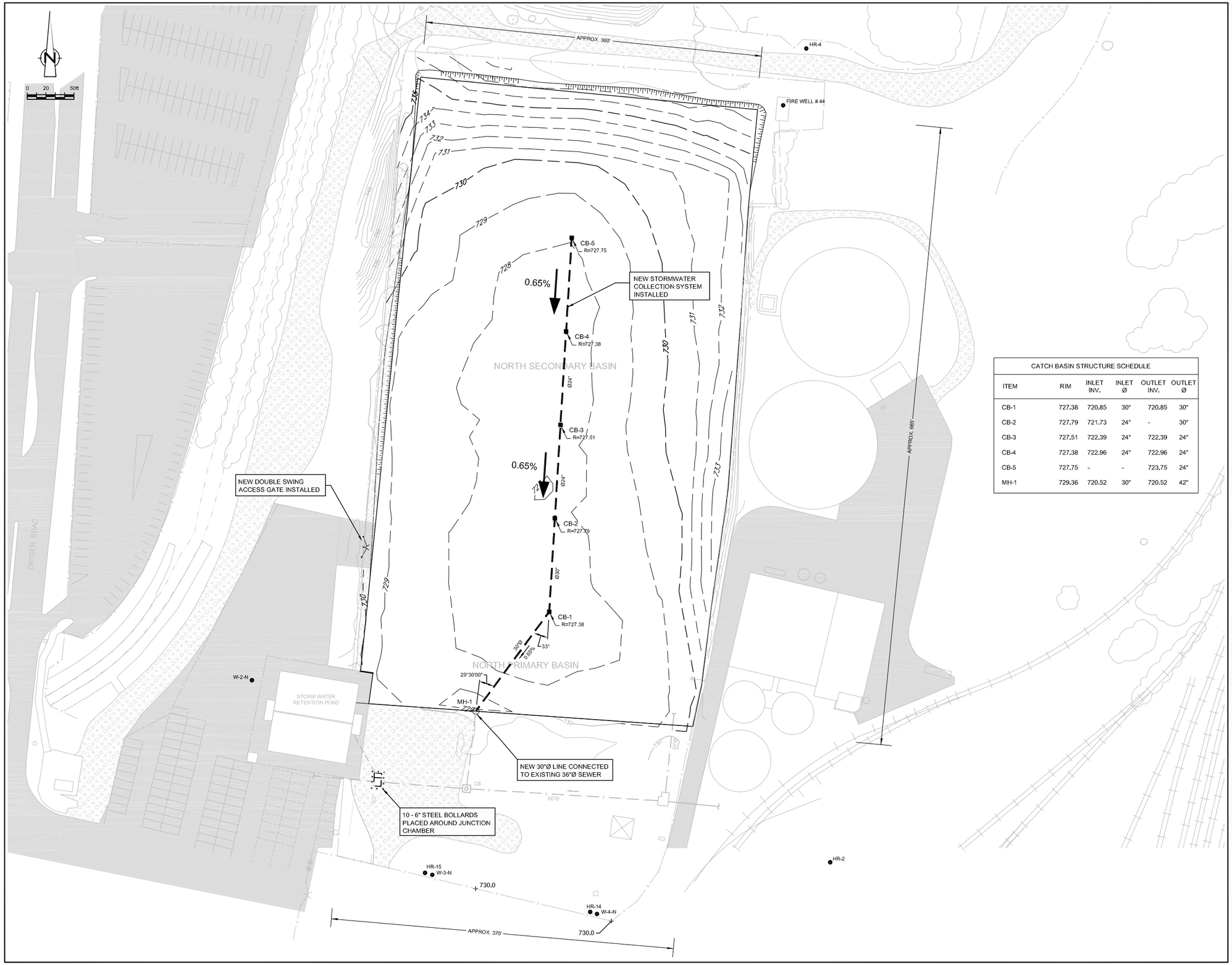
SITE WORK
SOUTH LAGOON

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
JUDGE ENGINEERING, SURVEY RECEIVED OCTOBER 11, 2000

Project Manager:	Reviewed By:	Date:	
I. RICHARDSON	J. WINTERINK	AUGUST 2001	
Scale: 1"=50'	Project No: 12611-02	Report No: 005	Drawing No: PLAN 4

12611-02(005)GN-WA004 AUG 10/2001



CATCH BASIN STRUCTURE SCHEDULE					
ITEM	RIM	INLET INV.	INLET Ø	OUTLET INV.	OUTLET Ø
CB-1	727.38	720.85	30"	720.85	30"
CB-2	727.79	721.73	24"	-	30"
CB-3	727.51	722.39	24"	722.39	24"
CB-4	727.38	722.96	24"	722.96	24"
CB-5	727.75	-	-	723.75	24"
MH-1	729.36	720.52	30"	720.52	42"

No	Revision	Date	Initial

LEGEND

NEW	EXISTING	
		FENCE
		TURN DIAL TYPE ENTRANCE
		ASPHALT PAVEMENT
		GRAVEL SURFACE
		EDGE OF WATER
		RAILROAD
		VEGETATION
737	725	CONTOUR AND ELEVATION (ft.)
	S	STORMWATER SEWER
	OE	OVERHEAD POWER LINE
		TREE
	HR-4	MONITORING WELL
	W-3-N	MONITORING WELL
■ CB	CB	CATCHBASIN
○ MH-1		MANHOLE
R=734.5		RIM ELEVATION
		LIMIT OF ASPHALT COVER

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

HARRISON RADIATOR DIVISION FACILITY MORAINE, OHIO

AS BUILT

BACKFILL/SUBGRADE SURVEY NORTH LAGOON

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: JUDGE ENGINEERING, FILE No. 2797L

Project Manager:	Reviewed By:	Date:	
I. RICHARDSON	J. WINTERINK	AUGUST 2001	
Scale: 1"=50'	Project No: 12611-02	Report No: 005	Drawing No: PLAN 5

12611-02(005)GN-WA008 AUG 10/2001

CATCH BASIN STRUCTURE SCHEDULE					
ITEM	RIM	INLET INV.	INLET Ø	OUTLET INV.	OUTLET Ø
CB-6	724,21	-	-	718,91	18"
CB-7	718,83	-	-	714,53	24"
MH-2	724,54	710,64	24"	709,64	65" H 38" V

No	Revision	Date	Initial

LEGEND

NEW	EXISTING	
		APPROXIMATE LOT LINE
		FENCE
		ASPHALT PAVEMENT
		GRAVEL SURFACE
		EDGE OF WATER
		RAILROAD
		VEGETATION
S	S	STORMWATER SEWER
	CSP	CORRUGATED STEEL PIPE
		UNDERGROUND PIPING
	E	ELECTRICAL CABLE
	W-2-S	MONITORING WELL
	HR-17	MONITORING WELL
MH	MH	MANHOLE
CB		CATCHBASIN
726	725	CONTOUR AND ELEVATION (ft.)
		LIMIT OF VEGETATIVE SOIL/CLAY COVER

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

CONTOURS REVISED	SEPT 29/00	AW
Status	Date	Initial

HARRISON RADIATOR DIVISION FACILITY MORAINE, OHIO

AS BUILT

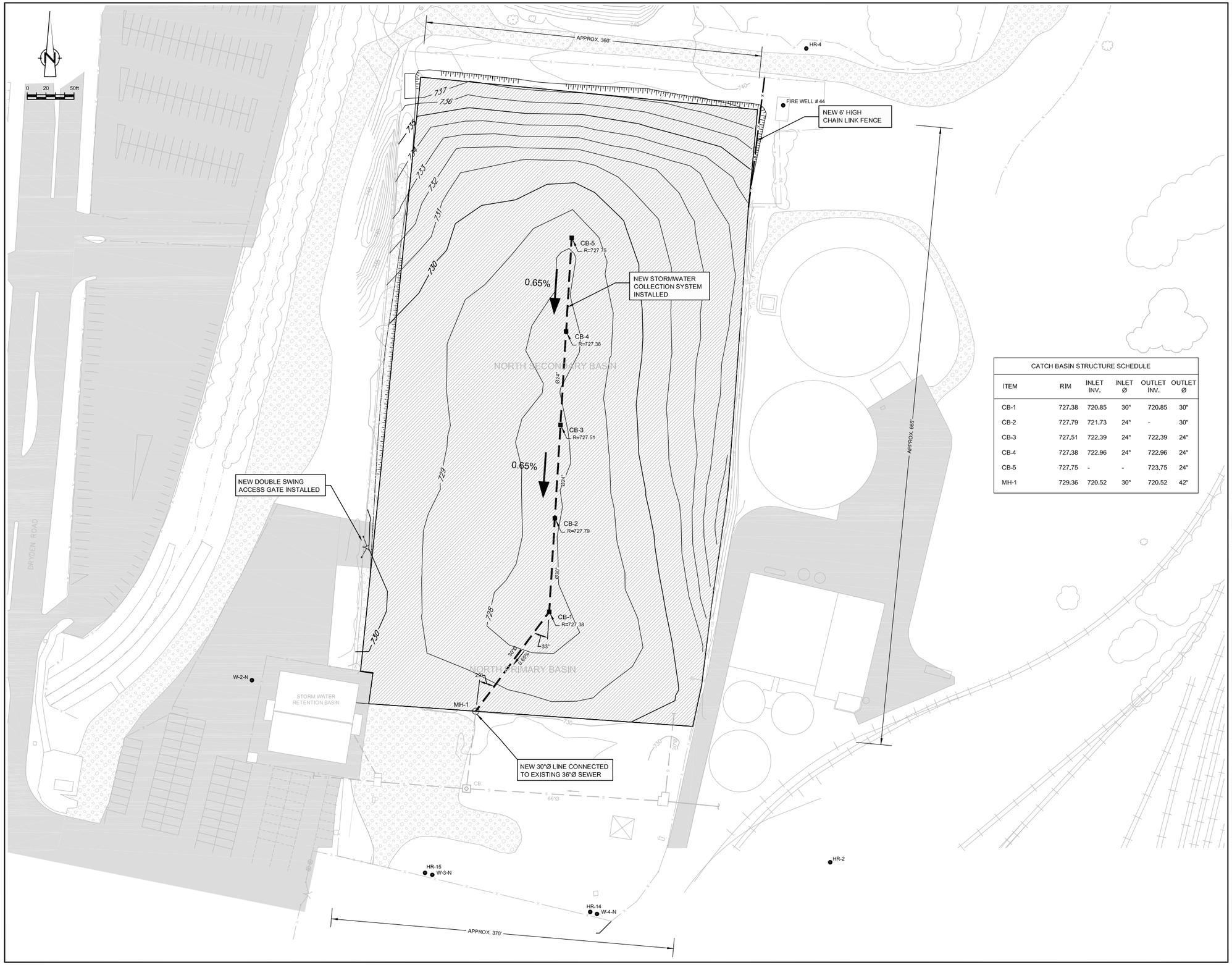
BACKFILL/SUBGRADE SURVEY SOUTH LAGOON

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: JUDGE ENGINEERING, FILE No. 2797k

Project Manager:	Reviewed By:	Date:	
I. RICHARDSON	J. WINTERINK	AUGUST 2001	
Scale: 1"=50'	Project No: 12611-02	Report No: 005	Drawing No: PLAN 6

12611-02(005)GN-WA009 AUG 10/2001



CATCH BASIN STRUCTURE SCHEDULE					
ITEM	RIM	INLET INV.	INLET Ø	OUTLET INV.	OUTLET Ø
CB-1	727.38	720.85	30"	720.85	30"
CB-2	727.79	721.73	24"	-	30"
CB-3	727.51	722.39	24"	722.39	24"
CB-4	727.38	722.96	24"	722.96	24"
CB-5	727.75	-	-	723.75	24"
MH-1	729.36	720.52	30"	720.52	42"

N°	Revision	Date	Initial

LEGEND

NEW	EXISTING	
		FENCE
		TURN DIAL TYPE ENTRANCE
		ASPHALT PAVEMENT
		GRAVEL SURFACE
		EDGE OF WATER
		RAILROAD
		VEGETATION
737	725	CONTOUR AND ELEVATION (ft.)
	S	STORMWATER SEWER
	OE	OVERHEAD POWER LINE
		TREE
	HR-4	MONITORING WELL
	W-3-N	MONITORING WELL
CB	CB	CATCHBASIN
MH-1		MANHOLE
R=734.5		RIM ELEVATION
		LIMIT OF ASPHALT COVER

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

HARRISON RADIATOR DIVISION FACILITY MORAINE, OHIO

AS BUILT

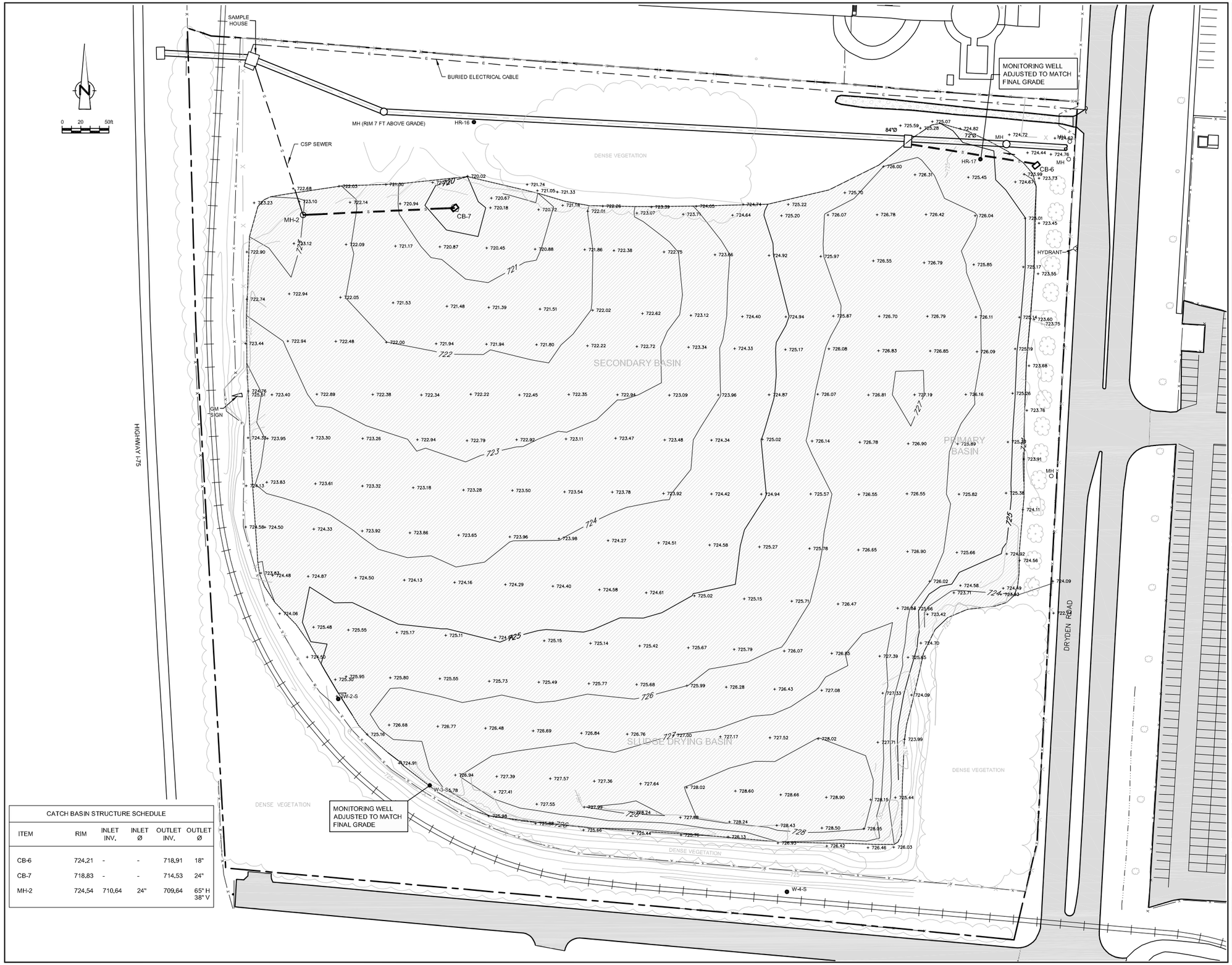
FINAL GRADES - ASPHALT PAVEMENT COVER NORTH LAGOON

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: JUDGE ENGINEERING, FILE No. 2797L

Project Manager:	Reviewed By:	Date:	
I. RICHARDSON	J. WINTERINK	AUGUST 2001	
Scale: 1"=50'	Project N°: 12611-02	Report N°: 005	Drawing N°: PLAN 7

12611-02(005)GN-WA005 AUG 10/2001



CATCH BASIN STRUCTURE SCHEDULE					
ITEM	RIM	INLET INV.	INLET Ø	OUTLET INV.	OUTLET Ø
CB-6	724,21	-	-	718,91	18"
CB-7	718,83	-	-	714,53	24"
MH-2	724,54	710,64	24"	709,64	65" H 38" V

N№	Revision	Date	Initial

LEGEND

NEW	EXISTING	
		APPROXIMATE LOT LINE
	x	FENCE
		ASPHALT PAVEMENT
		GRAVEL SURFACE
		EDGE OF WATER
		RAILROAD
		VEGETATION
	s	STORMWATER SEWER
	CSP	CORRUGATED STEEL PIPE
		UNDERGROUND PIPING
	E	ELECTRICAL CABLE
	W-2-S	MONITORING WELL
	HR-17	MONITORING WELL
MH	MH	MANHOLE
CB		CATCHBASIN
727	725	CONTOUR AND ELEVATION (ft.)
s		STORMWATER SEWER
		LIMIT OF VEGETATED SOIL/CLAY COVER
+ 723.91		FINAL GRADE SPOT ELEVATION

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

CONTOURS REVISED	SEPT 29/00	AW
Status	Date	Initial

HARRISON RADIATOR DIVISION FACILITY MORAINE, OHIO

AS BUILT

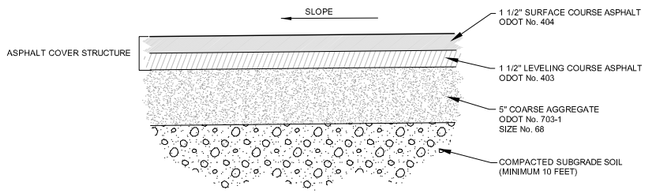
FINAL GRADES - VEGETATED SOIL/CLAY COVER SOUTH LAGOON

CONESTOGA-ROVERS & ASSOCIATES

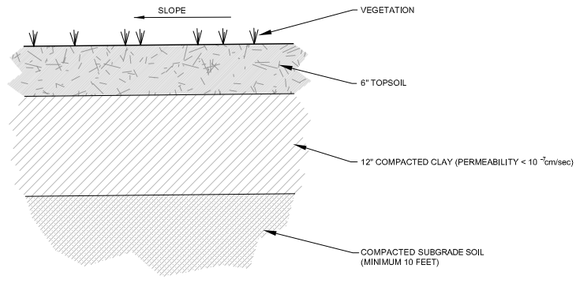
Source Reference: JUDGE ENGINEERING, FILE No. 2797k

Project Manager:	Reviewed By:	Date:	
I. RICHARDSON	J. WINTERINK	AUGUST 2001	
Scale: 1"=50'	Project N№: 12611-02	Report N№: 005	Drawing N№: PLAN 8

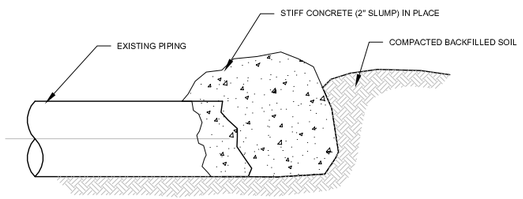
12611-02(005)GN-WA006 AUG 10/2001



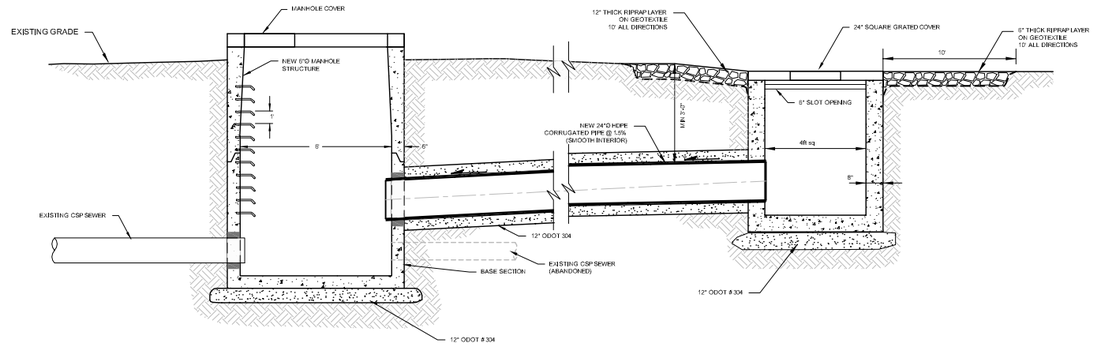
ASPHALT PAVEMENT COVER DETAIL



SOIL COVER DETAIL

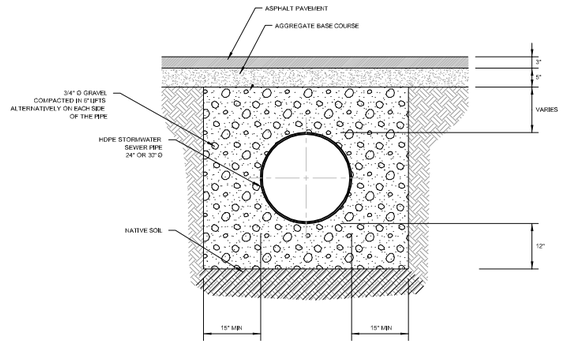


PIPE PLUG DETAIL
N.T.S.



NEW MANHOLE DETAIL
N.T.S.

DITCH INLET STRUCTURE DETAIL
N.T.S.



STORMWATER SEWER BEDDING DETAIL
N.T.S.

No	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

CONTOURS REVISED	SEPT 29/00	AW
Status	Date	Initial

HARRISON RADIATOR DIVISION FACILITY
MORAINE, OHIO

AS BUILT

DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
I. RICHARDSON	J. WINTERINK	AUGUST 2001	
Scale: AS SHOWN	Project No: 12611-02	Report No: 005	Drawing No: PLAN 9

12611-02(005)GN-WA007 AUG 10/2001

Photograph No. 1

Initial Site Conditions - South Lagoon - Secondary Basin

Looking northeast prior to grubbing.

Photograph No. 2

Initial Site Conditions - South Lagoon - Secondary Basin

Looking northwest prior to grubbing.

Photograph No. 3

Initial Site Conditions - North Lagoon

Looking south from the top of soil stockpile.

Photograph No. 4

South Lagoon – Sludge Drying Basin After Excavation

Looking southwest after leveling.

Photograph No. 5

South Lagoon – New Entrance Gate

Looking west at new entrance gate.

Photograph No. 6

South Lagoon – Upgrading Roads

Installing fabric to upgrade existing access roads.

Photograph No. 7

Sludge Transfer - South Lagoon – Sludge Drying Basin

Loading dry sludge into off-road truck for transfer to secondary basin of South Lagoon.

Photograph No. 8

Sludge Transfer - South Lagoon - Secondary Basin.

Transferring of dry sludge from sludge drying basin to southwest corner of secondary basin of South Lagoon. Looking south from northwest corner.

Photograph No. 9

Sludge Transfer - South Lagoon - Secondary Basin

Spreading transferred dry sludge overtop of existing sludge. Looking southeast from west bank.

Photograph No. 10

Backfilling - South Lagoon – Sludge Drying Basin

Placing first lift of soil in emptied basin. Looking west from northeast corner.

Photograph No. 11

Solidifying Sludge - South Lagoon - Secondary Basin

Preparing trench for visqueen pocket and CKD delivery. Looking west from southeast corner.

Photograph No. 12

Solidifying Sludge - South Lagoon - Secondary Basin

Unloading CKD into visqueen pocket. Looking west from southeast corner.

Photograph No. 13

Solidifying Sludge - South Lagoon - Secondary Basin

Unloading CKD into visqueen pocket. Looking at southeast corner from east bank.

Photograph No. 14

Solidifying Sludge - South Lagoon - Primary Basin

Mixing sludge with CKD. Looking southeast from west bank.

Photograph No. 15

Solidifying Sludge - South Lagoon - Secondary Basin

Unloading CKD into visqueen pockets. Looking southeast from west bank.

Photograph No. 16

Solidifying Sludge - South Lagoon - Secondary Basin

Mixing soil and CKD with sludge. Looking northeast from south bank.

Photograph No. 17

Solidifying Sludge - South Lagoon - Primary Basin

Proof rolling solidified sludge prior to backfilling. Looking south from north bank.

Photograph No. 18

Solidifying Sludge - South Lagoon –Primary Basin

Placing first lift of soil on solidified sludge. Looking northwest from southeast corner.

Photograph No. 19

Solidifying Sludge - South Lagoon - Secondary Basin

Mixing soil and CKD with sludge. Looking southeast from north west corner.

Photograph No. 20

Solidifying Sludge - South Lagoon - Secondary Basin

Mixing soil and CKD with sludge. Looking northwest from south bank.

Photograph No. 21

Solidifying Sludge - South Lagoon - Secondary Basin

Mixing soil and Portland cement with sludge. Looking southwest from north bank.

Photograph No. 22

Backfilling - South Lagoon - Secondary Basin

Backfilling operation in foreground. Mixing soil and CKD with sludge in background. Looking northwest from southeast corner.

Photograph No. 23

Backfilling - South Lagoon - Secondary Basin

Backfilling soil on top of solidified sludge. Looking southeast from west bank.

Photograph No. 24

Backfilling - South Lagoon – Secondary Basin

Backfilling operation. Looking west from east bank.

Photograph No. 25

Backfilling - North Lagoon - Secondary Basin

Backfilling west side after sludge was transferred to east side. Looking north from south bank.

Photograph No. 26

Solidifying Sludge - North Lagoon - Primary Basin

Mixing soil and Portland cement with sludge. Looking west from east bank.

Photograph No. 27

Solidifying Sludge - North Lagoon – Primary Basin

Mixing soil and Portland cement with sludge. Looking south from north stockpile.

Photograph No. 28

Backfilling - North Lagoon - Primary Basin

Backfilling operation. Looking east from west bank.

Photograph No. 29

Solidifying Sludge - North Lagoon - Secondary Basin

Mixing soil and Portland cement with sludge. Looking north from south bank.

Photograph No. 30

Solidifying Sludge - North Lagoon - Secondary Basin

Mixing soil and Portland cement with sludge. Looking southeast from center berm.

Photograph No. 31

Ponded Area - North Lagoon - Secondary Basin

Ponded area at north end. Looking north from center berm.

Photograph No. 32

Solidifying Sludge - North Lagoon – Secondary Basin

Unloading Portland cement into visqueen pocket after sludge has been displaced using rip rap rock. Looking southwest from northeast bank.

Photograph No. 33

Solidifying Sludge - North Lagoon – Secondary Basin

Mixing Portland cement with sludge. Looking northeast from center berm.

Photograph No. 34

Backfilling - South Lagoon – Secondary Basin

Backfilling operation. Looking southeast from north west corner.

Photograph No. 35

Backfilling - North Lagoon – Secondary Basin

Backfilling operation. Looking north from south bank.

Photograph No. 36

Backfilling - North Lagoon - Secondary Basin

Backfilled to subgrade. Looking southwest from north end.

Photograph No. 37

Installing Cover - South Lagoon – Secondary Basin

Installation of clay cover. Looking north from southeast corner.

Photograph No. 38

Installing Cover - South Lagoon – Secondary Basin

Installation of clay cover. Southeast corner.

Photograph No. 39

Drainage Pipe Tie-in - South Lagoon

New drainage pipe tie in to existing concrete junction chamber. Northeast corner of the Site. Looking at east face of junction chamber.

Photograph No. 40

Manhole - North Lagoon

New transition manhole between yet to be installed new drain pipe and existing previously abandoned concrete drain line. Looking southwest.

Photograph No. 41

Catchbasin - North Lagoon

New catchbasin at northern end prior to mortaring. Looking southeast.

Photograph No. 42

Backfilling - North Lagoon

Backfilled to subgrade. Base sections for new catchbasins are installed, as is connecting drain pipe. Looking south from north end.

Photograph No. 43

Installing Cover - North Lagoon

Prepared sub base prior to installation of asphalt. Looking south from north end.

Photograph No. 44

Installing Cover - North Lagoon

Placement of initial lift of asphalt pavement on prepared sub base. Looking north along east side.

Photograph No. 45

Completed Cover - North Lagoon

Completed asphalt cover and new locked gate. Looking eastward at new gate along west side.

Photograph No. 46

South Lagoon

New catchbasin in northwest corner complete with rip rap apron. Topsoil has been installed for cover system, but has not yet been raked or seeded. Looking east.

Photograph No. 47

Installing Cover - South Lagoon

Hydro-seed mixture being spray applied to prepared topsoil. Looking southeast from northwest corner.

Photograph No. 48

Completed Cover - South Lagoon

Completed cover system. Looking northwest from southeast corner.