b. Observe the panel surface as it is deployed and record all panel defects and disposition of the defects; all repairs are to be made in accordance with the specifications.

c. Observe that equipment used does not damage the FML by handling, trafficking, leaking hydrocarbons, or by any other means.

d. Verify that the surface beneath the FML has not deteriorated since previous acceptance by the Contractor.

e. Verify there are no stones, construction debris, or other items beneath the FML that could cause damage.

f. Observe that the FML is not dragged across an unprepared surface; if the FML is dragged across an unprepared surface, it shall be inspected for texture damage and scratches and repaired or rejected as necessary.

g. Verify that the method used to unroll the panels does not cause scratches or harmful wrinkles in the FML and does not damage the supporting soil.

h. Record weather conditions including temperature, wind, and humidity; the FML shall not be deployed in the presence of excessive moisture, such as fog, dew, or mist; or in high winds and extreme temperatures, as determined by Contractor and accepted by the County.

i. Verify that people working during the installation of FML do not smoke, wear shoes that could damage the FML, or engage in activities that could damage the FML.

j. Verify that the method used to deploy the panel eliminates wrinkles and that the panels are anchored to prevent movement by wind.

k. Verify that direct contact with the FML is limited to the lowest practicable level; i.e., the FML is protected by geotextiles, extra FML, or other suitable materials in areas where traffic may be expected.

The QA/QC Monitors shall inform the Contractor, and the QA/QC Manager, if the above conditions are not met.

The QA/QC Monitors shall observe each panel for damage after placement and prior to seaming. The QA/QC Monitors shall advise the Contractor which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected shall be marked, and the QA/QC Monitors shall record their removal from the work area. The QA/QC Monitors will maintain an updated FML panel replacement log.

5.4.3. Field Seaming

The Contractor shall update the layout plan daily as the job proceeds. Prior to seaming, each welding and seaming apparatus shall be tested in accordance with the specifications to determine if the equipment is functioning properly. The QA/QC Monitors shall observe all trial welding operations and record the results. If at any time the QA/QC Monitor observes an operator or seaming apparatus not functioning properly, a test shall be performed on a trial weld. If there are significant changes in temperature, humidity, wind speed or if there is an operational shut down, the trial weld test shall be repeated. Laboratory tests may be carried out at the discretion of the QA/QC Monitors to verify field test results.

During seaming operations the QA/QC Monitors shall verify that:

a. The Contractor has the number of seamers and spare parts agreed to in the pre-construction meeting.

b. Equipment used for seaming will not damage the FML.

c. The extrusion welder is purged prior to beginning a seam until all the heat-degraded extrudate is removed (extrusion welding only).

d. Seam grinding has been completed less than one hour before seam welding (extrusion welding only).

e. The ambient temperature measured 6 inches above the FML surface is between 40 and 104 degrees Fahrenheit and relative humidity is less than 80%.

f. The end of old welds more than 5 minutes old are ground to expose new material before restarting a weld (extrusion welding only).

g. The weld is free of dust and other debris.

h. For intersecting T seams, the first seam is ground to a smooth incline prior to welding.

i. The seams are overlapped a minimum of 4 inches.

j. No solvents or adhesives or free moisture are present in the seam area.

k. The procedure used to temporarily hold the panels together does not damage the panels and does not preclude QA/QC testing.

l. The panels are being seamed in accordance with the Project Drawings and Specifications or the manufacturers' instructions, using approved proper

equipment with gauges giving applicable temperatures.

m. The electric generator is placed on a smooth base such that no damage occurs to the FML.

n. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage.

o. The welded FML is protected from damage in heavily trafficked areas.

The QA/QC Monitors shall log all appropriate temperatures and conditions, and shall log and report to the QA/QC Manager any instances of noncompliance.

Trial Seam Samples: Samples of trial seams are not removed from installed seams, but are made alongside the seaming work area by the Contractor using the same FML sheet and the same installation procedures as for the FML installation itself. As such, they are **nondestructive samples**. Trial seams shall be made on fragment pieces of FML to verify that seaming conditions are adequate. Such trial seams shall be made at the beginning of each seaming period; which will include the start of day, mid-day, and any time equipment is shut down or seaming operation is suspended more than ½ hour for each seaming equipment used that day. Also, each seamer shall make at least one trial seam each day. Trial seams shall be made under the same conditions as actual seams.

The trial seam sample shall be at least 3 feet long. Trial seam sample width shall be 1 foot plus a seam-width, after seaming with the seam centered lengthwise. The seam overlap shall be as per the specifications.

Two specimens, each 1-inch wide, from opposite ends of the trial seam, shall be cut from the trial seam sample by the Contractor. The Contractor using a field tensiometer shall test the specimens respectively in shear and peel. They shall not fail in the seam, and shall satisfy peel and tensile strength requirements. If a specimen fails, the seaming equipment and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial welds are achieved. After completing a successful trial nondestructive sample, the Contractor shall cut a 2-foot square remnant from the sample and mark the welder number, date, time, ambient temperature, welder temperature, and speed, and shall submit it to the QA/QC Monitor, who will assign an identification number and enter the information on the nondestructive sample form. The QA/QC Monitors shall document the results of field tests carried out on trial seams.

General Seaming Procedure: Unless otherwise specified, the general seaming procedure to be used by the Contractor shall be as follows:

"Fishmouths" or wrinkles at seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut "fishmouths" or wrinkles shall be seamed, and any portion where the overlap is inadequate shall then be patched with an oval or round patch of the same

FML extending a minimum of 6 inches beyond the cut in all directions. All corners of the patch shall be rounded with a one-inch minimum radius.

Panel seaming shall extend the full width of all panels, including material placed in the anchor trench.

Panels shall be planned to eliminate the need for cross seams. All intersecting T seams shall be offset at least two feet, and shall be extrusion-welded where they intersect.

The QA/QC Monitors shall verify that the above seaming procedures are followed, and shall inform the QA/QC Manager if they are not.

5.5. FML Construction Testing

5.5.1. Nondestructive Seam Testing

The Contractor shall perform nondestructive testing on all field seams over their full length using a vacuum test unit, or a spark detector, as applicable. All testing shall be conducted in the presence of the QA/QC Monitor. The area to be tested shall be cleaned of all dust, debris, dirt, and other foreign matter. **The purpose of nondestructive tests is to check the continuity of seams; they do not provide information on seam strength.** Continuity testing shall be carried out as the seaming work progresses, not at the completion of all field seaming. The equipment shall be used for its applicable purpose in accordance with the equipment manufacturer's instructions. Defective and questionable sections shall be clearly marked and repaired as necessary.

For the nondestructive seam testing, the QA/QC Monitor shall:

a. Observe and record all continuity testing and field testing of trial seams.

b. Record the location seam and panel number, date, time, equipment number, QA/QC Monitor, test number, technician's name, weld, sheet and ambient temperatures, and results of all testing.

c. Mark the failed areas with a waterproof marker compatible with the lining and inform the Contractor of any required repairs.

d. Verify that all testing is completed in accordance with the Specifications.

e. Verify that all repairs are completed and tested in accordance with the Specifications.

5.5.2. Destructive Seam Testing

5.5.2.1. General

Destructive seam tests shall be performed at selected locations on the side slope FML liner and the FML of the bottom floor liner. **The purpose of these tests is to evaluate seam strength**. Seam strength testing shall be done as the seaming work progresses, not at the completion of all field seaming.

Destructive sampling involves samples removed from the installed field seams by the Geosynthetics Subcontractor. Test locations shall be determined at the discretion of the QA/QC Monitors, and the Contractor shall not be informed in advance of the locations where the seam samples will be made or will be removed. A minimum of one destructive sample per 500 feet of field seam shall be made. This is a minimum frequency for the entire installation. Frequency of samples may be increased based on performance and as determined by the QA/QC Manager.

Additional samples may be removed if the QA/QC Monitor suspects a seam may not meet project specification requirements.

5.5.2.2. Sampling Procedures

Samples shall be made or removed by the Geosynthetic Subcontractor at locations selected by the QA/QC Monitors as the seaming operation progresses. The QA/QC Monitor shall:

a. Observe the making or removal of samples.

b. Mark each sample with an identifying number that contains the seam number and record sample location on the panel layout drawing and enter the information on a log form.

c. Record the sample location, weather conditions, and reason sample was made or taken, such as random sample, visual appearance, or the result of a previous failure.

d. Mark sample identifying number on FML adjacent to the location where sample was taken.

All holes in the FML resulting from destructive seam sampling shall be immediately repaired in accordance with repair procedures described herein. The continuity of the new seams in the repaired area shall be tested according to procedures described herein.

5.5.2.3. Size of Samples

The samples shall have a length of 38 inches and a width of 12 inches plus seam width. Two different types of destructive samples shall be made from this large sample. The first type is two small samples for field-testing. Each of these samples shall be one inch in length with a width of 12 inches plus seam width and shall be taken at opposite ends of the sample. The seam shall be centered parallel to the length.

The second type is the sample designated for laboratory testing that is the portion of seam located between the two small field test samples. The sample for laboratory testing shall be 36 inches long with a width of 12 inches plus seam width. The seam shall be centered parallel to the length. If the field tests on the two 1-inch-long samples pass, the samples for laboratory testing shall be cut into three equal parts and be distributed as follows:

a. One part to the independent testing laboratory for testing

b. One part to the Contractor

c. One part to the County for archive storage

5.5.2.4. Field Testing

The two 1-inch-wide samples shall be tested in the field for peel adhesion and bonded seam strength (shear) by the Geosynthetics Subcontractor, and shall not fail in the seam, but shall have a film tearing bond. If one or both of the samples fails in either peel or shear, the Contractor can, at his discretion, reconstruct or cap strip the seam between passed test locations, or takes another test sample ten feet from the point of the failed test and repeat this procedure. If the second test passes, the Contractor can either reconstruct or cap strip the seam between the two passed test locations. If subsequent tests fail, the length of seam between passed tests shall be capped as required in the specifications. Repeated failures indicate that either the seaming equipment or the operator is not performing properly and appropriate action shall be taken.

All specimens of a field weld sample tested by the Contractor in the field shall pass. If any specimen fails, the entire sample shall be considered as a failure, and the field weld shall be rejected. In this event, the field seams(s) shall be rejected as being not in conformance with the specifications, and corrective measures shall be implemented.

5.5.3. Laboratory Testing

Once the field tests have passed, a sample will be recovered from between passing field sample locations for testing by the independent testing laboratory. Destructive test samples will be packaged and shipped to the laboratory on the same day the sample is made or

removed by the Contractor in a manner that will not damage the test sample. The County will be responsible for storing the archive samples.

All destructive field seam specimens tested by the independent testing laboratory (sets of five test specimens are performed) shall allow for one failure out of five tested and the rest shall pass. If two specimens out of five fail, the entire sample shall be considered as a failure, and the field weld(s) performed by the same welding equipment between adjacent destructive samples on either side of the failed sample shall be considered to not be in conformance with the Specifications.

New test samples shall be taken 10 feet on both sides of the failed destructive sample and they shall be tested using the same procedures outlined above. If these new test samples PASS, the weld need only be reconstructed or capped between the 2 passing tests. If either of these new test samples FAIL, the iterative process of sampling as outlined above is repeated until passing test results are observed. In this case, the entire seam between the two successful test samples shall be capped or reconstructed. If capping a field seam is required, the Contractor shall use a cover strip of the same material (and from the same roll if available) and a minimum of 8" in width. The cap strip shall be extrusion welded and tested as required for extrusion welding. In cases involving more than 50 feet of reconstructed or capped seam, the cap-strip seam shall also be tested. In no case shall field-testing of installed seams be used for final acceptance.

Testing shall include peel adhesion and bonded seam strength (shear) (ASTM D4437). At least five (5) specimens each shall be tested for peel and shear. Minimum test values shall be in accordance with the project specifications. The independent testing laboratory shall provide test results within 24 hours after receipt of samples for testing. Certified test results shall be provided within five days. The QA/QC Monitor shall document all test results and shall immediately notify the Contractor in the event of a failed test.

5.6. Defects and Repairs

5.6.1. Identification

All seams and non-seam areas of the FML shall be examined by the QA/QC Monitors for identification of defects, holes, blisters, un-dispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the FML helps to detect defects, the surface of the FML shall be clean at the time of examination. The Contractor shall clean the FML surface if the amount of dust or mud inhibits examination.

Each suspect location both in seam and non-seam areas shall be tested using the methods described herein, as appropriate. Each location that fails nondestructive testing shall be marked by the QA/QC Monitor, and then repaired and retested by the Contractor. Work shall not proceed with any materials that will cover locations that have been repaired until laboratory test results with passing values have been obtained.

5.6.2. Repair Procedures

Any portion of the FML with a flaw or that fails a nondestructive or destructive test shall be repaired in accordance with the Specifications. The QA/QC Monitor shall locate and describe all repairs on the appropriate forms. Repair procedures include the following:

a. Patching: used to repair large holes, tears, large panel defects, and destructive sample locations that are less than 25 square feet in total area.
b. Extrusion: used to repair small defects in the panels and seams.
c. Capping: used to repair failed welds or to cover seams where welds cannot be nondestructively tested.
d. Removal: used to replace areas with large defects where the preceding methods are not appropriate; also used to remove excess material, such as wrinkles, from the installed FML.

5.7. Seam Test Summary

The QA/QC Manager shall summarize documentation of all nondestructive and destructive seam-testing results, including repairs.

5.8. Wrinkles

When placing soil cover or drainage materials over the FML, temperature changes or creep may cause wrinkles to develop in the FML. Any wrinkles that can fold over will be repaired either by cutting out excess material, or, if possible, allowing the FML to contract due to temperature reduction. In no case shall material be placed over the FML that could result in the FML folding. All folded FML shall be removed. No material shall be placed in areas where FML is not in contact with the supporting subgrade or GCL.

5.9. County Acceptance

The Contractor shall retain all ownership and responsibility for the FML until acceptance by County. The FML shall be accepted by the County when:

A. The installation of the FML, other geosynthetic materials, drainage layer, and protective cover is finished and summarized in writing by the QA/QC Manager.

B. All seams have been observed, tested, and summarized in writing by the QA/QC Manager.

C. All required laboratory tests have been completed and summarized in writing by the QA/QC Manager.

D. All required Geosynthetics Subcontractor supplied documentation has been received and summarized in writing by the QA/QC Manager.

E. All record drawings to be used in the preparation of the final As-Built Plans have been completed and summarized in writing by the QA/QC Manager.

F. All above documentation and any additional documentation concerning the FML is received from the QA/QC Manager and Contractor, and is accepted by the County.

END OF SECTION

SECTION 6 - GEOTEXTILES

6.1. GENERAL

The Quality Control Plan to be implemented for the work by the Geotextile manufacturer, the Contractor and/or the lining subcontractor shall be in accordance with this QA/QC Plan.

The County and the QA/QC Consultant will arrange for a pre-installation meeting with the Contractor prior to installation of the geotextile. Topics for review/discussion shall include, as a minimum, project plans and specification, QA/QC procedures, approved submittals, and a demonstration of a sewn field seam using the same materials, equipment and procedures specified for the geotextile.

6.2. MANUFACTURING

The Geotextile manufacturer shall provide the QA/QC Manager with the following manufacturer's literature:

A. A materials specification sheet including all specified properties measured using test methods indicated in the specifications, or the equivalent.

B. The sampling procedure and results of testing.

C. A certification that property values given in the materials specification sheet are guaranteed by the Geosynthetics manufacturer.

The QA/QC Manager shall verify that:

A. The property values certified by the Geotextile manufacturer meet all of the project specifications.

B. The measurements of properties by the Geotextile Manufacturer are properly documented and the test methods used are acceptable.

Prior to shipment, the Geotextile manufacturer shall provide the QA/QC Manager with a quality control certificate for each roll of geotextile. A responsible person employed by the Geotextile manufacturer shall sign the quality control certificate. The quality control certificate shall include:

A. Lot and roll numbers and identification

B. Sampling procedures and results of quality control tests evaluated in accordance with the methods indicated in the Special Provisions or by equivalent methods approved by the QA/QC Consultant

The QA/QC Consultant shall do the following:

A. Verify that the quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it.

B. Review the quality control certificates and verify that the certified roll properties meet all project specifications.

6.3. DELIVERY

6.3.1. Transportation and Handling

Transportation of the geotextile and all handling on-site is the responsibility of the Contractor.

The QA/QC Monitor shall verify the following:

a. The geotextile has been protected from ultraviolet light exposure, precipitation, or any other damaging conditions.

b. Equipment used to unload the rolls will not damage the geotextile.

c. Care is used to unload the rolls.

d. All required documentation has been received.

Upon delivery at the site, the Geosynthetics Subcontractor and QA/QC Monitors shall conduct a surface observation of rolls for defects and for damage. This observation shall be conducted without unrolling rolls unless defects or damages are found or suspected. The QA/QC Manager shall report to the County if any rolls, or portions thereof, should be rejected and removed from the site because they have severe flaws.

Any damaged rolls shall be rejected and removed from the site or stored at a location, separate from accepted rolls, designated by the Resident Engineer. All rolls that do not have proper Geotextile Manufacturer's documentation shall also be stored at a separate location until all documentation has been received and approved. The QA/QC Monitors shall maintain an updated log on the geotextile received.

6.3.2. Geotextile Storage

The Contractor shall be responsible for the storage of geotextile on-site. The Contractor should protect storage space from theft, vandalism, damage from vehicles, or other harm.

The geotextile shall be protected from ultraviolet light exposure and from contamination by surface run-off. Any geotextile so contaminated shall not be used in the construction.

The QA/QC Monitors shall verify that the materials shall not be stored directly on the ground, and that storage of the Geotextile ensures adequate protection against damage from actions of man, weather, animals, and other sources.

6.4. GEOTEXTILE CONFORMANCE TESTING

6.4.1. Tests

Upon delivery of the rolls of geotextile, the QA/AC Manager shall verify that samples are removed and forwarded to the Independent Testing Laboratory for testing to verify conformance to project specifications.

As a minimum, tests to determine the field characteristics shall be in accordance with project specifications.

6.4.2. Sampling Procedures

Unless otherwise specified, samples shall be taken at a rate of one per lot or one per 100,000 square feet, whichever results in the greater number of samples.

6.4.3. Test Results

The QA/QC Manager shall document all results from Independent Testing Laboratory conformance testing, and shall report any non-conformance to the Contractor. For geotextile rolls rejected and replaced with new rolls from a different lot, the Contractor shall be responsible for all costs associated with retesting of new rolls.

6.5. GEOTEXTILE INSTALLATION

6.5.1. Surface Preparation

Prior to installation of geotextile on the Canyon floor (over the LCRS coarse sand layer), the Contractor, Geosynthetics Subcontractor, Resident Engineer, and QA/QC Monitors shall verify that:

a. All lines and grades have been verified by a qualified surveyor.

b. The supporting surface does not contain any oversize particles or other sharp objects that could damage the geotextile.

c. All construction stakes and hubs have been removed and the resulting holes have been properly filled.

d. The Contractor has certified in writing that the surface on which the geotextile shall be installed is acceptable.

Prior to installing cushion geotextile on the side slopes, the Contractor, and QA/QC Monitor shall verify that all installation of FML seaming and repairs has been completed and documented.

The Contractor shall give the certificate of acceptance to the QA/QC Manager prior to commencement of geotextile installation for each uncovered portion of FML. The QA/QC Monitors shall have a copy of this certificate before installation of geotextile commences in any given area. The QA/QC Monitors shall also observe the subject area. The QA/QC Monitor shall have the authority to reject an area even after the Contractor has accepted it.

At any time before, during, or after the supporting surface has been accepted, it shall be the Contractor's responsibility to indicate to the County any change in the supporting soil condition that may require repair work. The QA/QC Monitor shall also make observations to identify such conditions.

6.5.2. Geotextile Placement

The QA/QC Monitors shall establish a chart showing correspondence between roll numbers, certification reports, and panel identification code. The field panel identification code shall be used for all QC records and for the As-Built Plans.

Field Panel Placement: The QA/QC Monitors shall record the identification code, location, and date of installation of each field panel.

During panel placement, the QA/QC Monitor shall:

a. Verify that field panels are installed at the location indicated in the layout plan, as accepted or modified by the County.

b. Verify that the surface beneath the geotextile has not deteriorated since previous acceptance.

c. Verify that the method used to unroll the panels does not cause folds in the geotextile and does not damage the supporting surface.

d. Verify that there are no stones, construction debris, or other items beneath the geotextile that could cause damage.

e. Observe and document the geotextile as it is placed and record all defects; all repairs are to be made in accordance with the Specifications.

f. Verify that equipment used does not damage the geotextile or supporting surface by handling, traffic, leakage of hydrocarbons, or by other means.

g. Verify that people working during installation of geotextile do not smoke, wear shoes that could damage the geotextile or liner, or engage in activities that could damage the geotextile or liner.

h. Verify that the geotextiles are properly anchored to prevent movement by the wind, and record the procedure used. (Securing pins are unacceptable.)

i. Verify that the adjacent panels of geotextile are overlapped a minimum of six-inches (6") and properly sewn.

j. Verify that the geotextile is cut only with an approved geotextile cutter, and is not torn or ripped.

The QA/QC Monitors shall inform the Contractor, the QA/QC Manager, and the Resident Engineer if the above conditions are not met. The QA/QC Monitors shall observe and document the condition of each panel after placement. The QA/QC Monitors shall advise the QA/QC Manager which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected shall be marked, and the QA/QC Monitors shall record their removal from the work area. The QA/QC Monitors shall maintain a geotextile panel replacement log.

6.6. COUNTY ACCEPTANCE

The Contractor shall retain all ownership and responsibility for the geotextile until acceptance by the County. The geotextile shall be accepted by the County when:

A. The installation is finished and summarized in writing by the QA/QC Manager.

B. All construction and materials mentioned in this section have been completed and tested, as appropriate, and summarized in writing by the QA/QC Manager.

C. All required manufacturer's and supplier's documentation has been received and summarized in writing by the QA/QC Manager.

D. All record drawings to be used in the preparation of the final As-Built Plans have been completed and summarized in writing by the QA/QC Manager.

E. All above documentation and any additional documentation concerning the items mentioned in this section is received from the QA/QC Manager and Contractor, and is

SECTION 7 - LEACHATE COLLECTION AND REMOVAL SYSTEM

7.1. LCRS CONSTRUCTION

7.1.1. Piping & Leachate Storage Tank

Piping and leachate tank installations shall be observed and documented by the QA/QC Monitor to verify that the installations are performed in accordance with manufacturer's recommendations and with the requirements of the Contract Documents; and that the grades and locations are consistent with the Contract Documents.

Prior to beginning this construction, the Contractor shall submit to the County descriptive literature about the fusion equipment to be used, and shall submit certification from the pipe installer that the jointing technicians are qualified and experienced in heat fusion joining of specified pipe in accordance with Title 49 CFR 192.285. A minimum of two test joints shall be fused and cut from each pipe size and each SDR prior to beginning of joining that piping system. The test joints shall be visually observed and documented by the QA/QC Monitor and the County in accordance with Title 49 CFR 192.285.

7.1.2. Construction Material

The HDPE pipe and all other construction material suppliers shall provide certification to the County that the delivered materials comply with the pertinent project specifications.

7.1.3. County Acceptance

The Contractor shall retain all ownership and responsibility for the above-mentioned items until final acceptance by the County. The above-mentioned items shall be accepted by the County when:

a. The installation is finished and approved in writing by the QA/QC Manager.

b. All construction and materials related to this section have been completed and tested appropriately, and approved in writing by the QA/QC Manager.

c. All required manufacturer's and supplier's documentation have been received and approved in writing by the QA/QC Manager.

d. All record drawings to be used in the drafting of the final As-Built Plans have been completed and approved in writing by the QA/QC Manager.

e. All above documentation and any additional documentation concerning the items mentioned in this section have been received from the QA/QC Manager and Contractor, and have been accepted by the County.

7.2. DRAINAGE LAYER CONSTRUCTION

7.2.1. General

Permeable materials used for the construction of the drainage layer shall be placed in accordance with the requirements of all Contract Documents and shall be observed and tested by the QA/QC Consultant. Tests shall be performed at the independent laboratory.

In general, QA/QC monitoring of the installation of the Drainage Layer will include the following activities:

a. reviewing documentation of the material qualification test results provided by the Contractor;
b. sampling and testing for conformance of the materials to the Specifications;
c. documenting that the gravel is installed using the specified equipment and procedures;
d. documenting that the LCRS trenches and subdrains are constructed to the lines and grades shown on the Drawings; and
e. monitoring that the construction activities do not cause damage to geosynthetic materials.

7.2.2. Material Properties Testing

The suppliers of LCRS drainage materials shall provide laboratory test results showing compliance with material specifications provided in the Contract Documents. In addition, minimum testing by the QA/QC Consultant shall consist of at least one particle-size analysis (ASTM D422) per material source prior to placement of material and at least one test per 1,000 cubic yards during placement. In addition, at least one permeability test by ASTM D2434 shall be performed on each of the drainage materials.

7.2.3. In-Place Properties Testing

The QA/QC Consultant shall observe Contractor's placement operation of LCRS materials. Judgment of density will be based on visual observation of the construction activities and equipment utilized to perform this work

7.2.4. County Acceptance

The LCRS materials not complying with the project specified gradations or permeability shall be rejected. The Contractor shall retain all ownership and responsibility for the drainage layer until final acceptance by the County. The drainage layer shall be accepted by the County when:

a. The installation is finished and approved in writing by the QA/QC Manager

b. All required laboratory tests have been completed and approved in writing by the QA/QC Manager

c. All record drawings to be used in the drafting of the final As-Built Plan have been completed and approved in writing by the QA/QC Manager

d. All above documentation and any additional documentation (geotextile and pipe conformance documentation) concerning the drainage layer have been received from the QA/QC Manager and Contractor, and have been accepted by the County.

END OF SECTION

SECTION 8 - PROTECTIVE SOIL LAYER

The QA/QC procedures indicated in this section are only intended to assure that the preparation and installation of the materials for the protective soil layer are done in such a manner as to assure that the completed underlying geosynthetic layers are not damaged. Protective soil layer shall be prepared and installed in accordance with the requirements of the Contract Documents.

Important points for QC of materials in contact with geosynthetics include the following:

A. Placement of soils, sand, or other types of earth cover on top of the geosynthetics shall not be performed until all destructive and nondestructive testing have been performed and accepted, and the liner materials have been surveyed for "as-built" drawings.

B. Placement shall be performed in a manner to eliminate wrinkles. Equipment operators shall be briefed on method of placement relative to thermal expansion and contraction of the FML.

C. Soil material placed on top of the geosynthetics should be stockpiled and pushed off the stockpile to create a cascading effect of the cover material on top of the geosynthetics; or otherwise, be placed with a front-end loader.

D. Drainage layer and soil from the Protective Soil Layer shall be installed in such a manner that the geosynthetics are not folded or wrinkled by the advancing placement and grading and compaction activities. When placing materials over geosynthetics, materials shall be placed in the direction from the overlying geosynthetics to the underlying geosynthetics.

E. Equipment used for placing soil shall not be driven directly on the geosynthetics. Track-mounted equipment with low ground pressure treads, or low-pressure tires, no larger than a Caterpillar Model D-6 or equivalent, shall be used for spreading. In no case shall equipment be allowed to operate on less than (12") twelve-inches of cover over geosynthetic material. The Contractor shall avoid sharp turns, sudden starts or stops, spinning and digging of tracks, or any other operation that could damage the landfill lining system. At no time shall trucks, or any other vehicle with concentrated wheel loads, be permitted to operate on less than (12") twelve-inches of compacted cover material placed above the geosynthetics.

F. Gradation of the side slope protective soil layer shall be tested by the QA/QC Consultant every 1,000 cubic yards to verify that the material does not contain any oversize particles greater than 1 inch.

G. Gradation of the bottom floor protective soil layer shall be tested by the QA/QC Consultant every 2,000 cubic yards to verify that the material does not contain any oversize particles greater than 3 inch.

H. Gradation of the required screened material stockpile shall be tested by the QA/QC Consultant every 5,000 cubic yards to verify that the material does not contain any oversize particles greater than 1 inch.

The QA/QC Monitors shall document if any of the above conditions are not fulfilled and inform the QA/QC Manager and the County of them.

END OF SECTION

SECTION 9 - ASPHALT STRUCTURES

The following asphalt pavement requirements are the minimum requirements applicable to asphalt pavement work for this project. The Contractor must strictly comply with these requirements and all other pertinent requirements of the Contract Documents.

A. Delivery of material to the job site shall not commence until required project submittals (certificate of compliance, asphalt mix, gradation test report for aggregate base materials, etc.) have been reviewed and accepted by the County.

B. Placement of aggregate base material (where required by the Contract Documents) shall not commence until the subgrade has been examined and tested for compaction by the QA/QC Consultant, and released by the County for the placement of the subsequent layer.

C. Placement of asphalt pavement shall not commence until the subgrade has been examined and tested for compaction by the QA/QC Consultant, and released by the County per ASTM D6938.

END OF SECTION

SECTION 10 - REINFORCED CONCRETE STRUCTURES

The QA procedure is intended to assure the final product will achieve, at a minimum, the specified design strength and performance.

The following concrete requirements are the minimum requirements applicable to concrete construction for this project. The Contractor must strictly comply with these requirements and all other pertinent requirements of the Contract Documents.

A. Placement of concrete shall not commence until required mix designs have been reviewed and accepted by the County.

B. As deemed necessary by the County, sets of three (3) test cylinders of concrete being placed will be cast and tested by the County or the QA/QC consultant. One of the test cylinders will be tested after 7 days for 70 percent of project-specified design strength. The remaining two cylinders will be tested after 14 days and 28 days (for full strength) respectively. Concrete compressive strength testing shall be per ASTM C39 and ASTM C31.

END OF SECTION

APPENDIX "A"

SCAQMD Form 403-N & Rule 1150 Excavation Permit Standard Conditions

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FORM 403N

RULE 403 - LARGE OPERATION NOTIFICATION
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

21865 Copley Drive, Diamond Bar, CA 91765

Is this plan being submitted to comply with the requirements of a Notice to Comply or Notice of Violation? **YES/NO**
Notice Number_____ Please attach copy

Qualifying Criteria:

1. Does this operation contain more than 50 acres of disturbed surface area as of the date of submittal? **YES/NO**
   Please indicate the size of the project _____.
2. Will the earth moving operation exceed a daily earth moving or throughput volume of 5,000 cubic yards three times during the most recent 365-day period from the date grading begins? **YES/NO**

Please Print or Type

Contractor/ Consultant/ Owner: **(Circle one of the above)**		**Phone Number:**	
Address:	**City:**	**State:**	**Zip:**
Project Name:			
Nature of Business: □**Construction/Demolition** □**Sand & Gravel/Mining Operations** □**Cement Manufacturing**			
Name of Responsible Person of Organization:			
Title:		**Phone Number:**	
Environmental Observer: **Date Attended Dust Class:**		**Phone Number:** **ID Number:**	
Project Address: **(Attach location map)**	**City:**	**State:**	**Zip:**
Name of Property Owner: **(If different than above)**			
Anticipated Start Date:		**Anticipated Completion Date:**	
Telephone Number:			
Emergency Phone Number:			

In accordance with paragraph (e)(1) of Rule 403, I will ensure that the actions specified in Tables 2 and 3 will be implemented on-site for each applicable fugitive dust source type within the property lines and that records are maintained in accordance with Rule 403, subparagraph (e)(1)(c) . Further, I hereby certify that all information contained herein is true and correct.

SIGNATURE OF RESPONSIBLE MEMBER OF ORGANIZATION	TITLE	DATE

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

RULE 1150 EXCAVATION OF LANDFILL SITES PERMIT APPLICATION INSTRUCTIONS

GENERAL INFORMATION:

This document contains instructions for providing information necessary for the AQMD to process permit applications for Rule 1150 Excavation Permits.

One Application for Plans (Form 400-P) is generally required for each excavation project. If the project consists of treatment or processing of the excavated materials using equipment which requires a permit to construct/operate, a separate application (Form 400-A) should be filed for each equipment. Examples of these equipment include crushers, screens, mixers, conveyers, vapor extraction systems, incinerators, internal combustion engines (>50 HP), etc.

APPLICABILITY:

Except otherwise exempt by Rule 1150(c), a Rule 1150 Excavation Permit is required for all excavation activities involving a landfill. A landfill by definition of the Rule is a place, location, tract of land, area, or premises in use, or which has been used for the disposal of waste. In addition to excavations at a typical landfill being subject to this Rule, excavations of contaminated soil at any location will be subject to this Rule if the contamination occurred from the disposal of unwanted material at the site.

APPLICABLE RULES & REGULATIONS:

Reg III

Rule 306	Plan Fees, including filing fee per Rule 306(c) and initial payment of evaluation fees per Rule 306(h)(1).

Reg. IV

Rule 402	Nuisance
Rule 403	Fugitive Dust

Reg. XI

Rule 1150	Excavation of Landfill Sites
Rule 1166	VOC Emissions from Decontamination of Soil

(Copies of Rules & Regulations of AQMD can be obtained through our Public Information Center at (909) 396-3600, or at the AQMD internet home page, www.aqmd.gov.)

EMISSIONS:

ROG and particulate emissions are expected from the excavation activities. These emissions shall be mitigated using the measures identified in Item 10 under Requirements.

REQUIREMENTS:

An Excavation Management Plan must be submitted to and approved by the AQMD. The Plan shall include the following information:

1. Identification (including company name, address, contact person and phone number) of project owner, excavation contractor, on-site safety coordinator, and the firm or individuals preparing the excavation management plan.

2. A description of the background of the project site and the purpose of the excavation.

3. A contour map showing the location of the excavation site, the proposed excavation area, and the surrounding area up to 2,500 feet away form the perimeter of the proposed excavation area. The map should identify all land uses in the area and highlight areas of high population such as schools, hospitals, residential areas, restaurants, and shopping centers.

4. A list of materials buried or suspected materials buried in the site based on all available records.

5. Results of any boring tests done to characterize the disposal site including the identification of any EPA priority pollutants.

6. Results of landfill gas analyses or soil vapor phase analyses including the concentrations of methane, sulfur compounds, and any speciated non-methane hydrocarbons such as benzene and vinyl chloride, etc.

7. The total amount of material to be excavated and the landfill to which the excavated material will be hauled.

8. Scheduled excavation starting and completion dates, and number of working days required for the excavation.

9. A detailed description of how the excavation will be conducted including:

   - excavation equipment
   - surface area of excavation workface
   - surface area of refuse or contaminated soil to be exposed to the atmosphere at any one time
   - excavated material handling method
   - vehicles hauling the excavated material
   - a site layout showing the excavation area, vehicle route, equipment/vehicle cleaning area, etc.

10. A detailed description of the mitigation measures to be implemented during excavation and transportation to minimize potential emissions. The mitigation measures in general includes, but not be limited to:

- limited excavation workface
- minimized soil disturbance/transfer
- minimized refuse/contaminated soil exposure
- limited working hours
- use of long duration foams, plastic sheeting, and/or clean dirt to cover refuse/contaminated soil during non-working hours and/or when excessive emissions are detected
- water spraying
- cleaning and covering of the trucks
- good housekeeping

11. A detailed description of monitoring to be conducted during the excavation. This includes:

- continuous monitoring for organic vapors with OVA's (FID, PID, etc.) at the work face and property line (or other downwind locations within the property line)
- ambient air sampling for particulates, heavy metals, asbestos, and/or specific organic air toxics
- monitoring for odors at and beyond the property line
- monitoring for wind speed and direction

12. A contingency plan for actions to be taken when odors or elevated concentrations (specify the concentrations) of air emissions are detected, or when complaints are received from any public member.

13. A provision that the excavation activities will cease immediately when the operator is notified by a District staff that a public nuisance has occurred as required by Rule 1150 (b)(3).

RULE 1150 STANDARD CONDITIONS:

The following is a list of standard conditions that are used for Rule 1150 Permits. Conditions for an actual Permit may be a combination of the following conditions and specific restrictions applicable to the excavation under evaluation. However, all of the following conditions may not be appropriate for every excavation. The conditions for each Permit should be tailored to fit the needs of the individual excavation under review.

1. THIS EXCAVATION SHALL BE CONDUCTED IN COMPLIANCE WITH ALL PLANS AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.

2. THE EXCAVATION SHALL BE COMPLETED BY _____ __, ____, OR WITHIN _____ CALENDAR DAYS AFTER THE EXCAVATION COMMENCES, WHICHEVER OCCURS FIRST, UNLESS AN EXTENSION IS OTHERWISE APPROVED IN WRITING BY THE SCAQMD. ANY EXTENSION REQUEST SHALL BE SUBMITTED IN WRITING TO THE SCAQMD AND SHALL INCLUDE THE REASONS THE EXTENSION IS REQUIRED, THE LENGTH OF THE EXTENSION, AND THE STATUS OF THE EXCAVATION TO DATE.

3. THE SCAQMD SHALL BE NOTIFIED IN WRITING AT LEAST TWO (2) DAYS PRIOR TO THE EXCAVATION COMMENCES AND WITHIN FIVE (5) DAYS AFTER IT IS COMPLETED.

4. THIS EXCAVATION PERMIT IS VALID ONLY FOR THE REMOVAL OF APPROXIMATELY _____ CUBIC YARDS OF (EXCAVATED MATERIAL AND REFUSE) (SOIL CONTAMINATED WITH _____).

5. EXCAVATION SHALL NOT BE CONDUCTED BETWEEN THE HOURS OF _____ AND _____ OR ON SATURDAYS, SUNDAYS AND LEGAL HOLIDAYS.

6. EXCAVATION SHALL NOT BE CONDUCTED ON DAYS WHEN THE SCAQMD FORECASTS FIRST, SECOND OR THIRD STAGE EPISODES FOR AREA NUMBER __, OR WHEN THE SCAQMD REQUIRES COMPANIES IN AREA NUMBER __ TO IMPLEMENT THEIR FIRST, SECOND OR THIRD STAGE EPISODE PLANS. EPISODE FORECASTS FOR THE FOLLOWING DAY CAN BE OBTAINED BY CALLING (800) 445-3826 OR (800) 242-4666.

7. EXCAVATION SHALL NOT BE CONDUCTED WHEN THE WIND SPEED IS GREATER THAN 15 M.P.H. (AVERAGED OVER 15 MINUTES) OR THE WIND SPEED INSTANTANEOUSLY EXCEEDS 25 M.P.H.

   or

   EXCAVATION SHALL NOT BE CONDUCTED WHEN THE WIND SPEED IS GREATER THAN __ M.P.H. (AVERAGED OVER 15 CONSECUTIVE MINUTES) AND THE WIND DIRECTION IS FROM THE ARC DEFINED BY _____ THROUGH _____ TO _____.

8. DURING EXCAVATION, ALL WORKING AREAS, EXCAVATED MATERIAL AND UNPAVED ROADWAYS SHALL BE WATERED DOWN UNTIL THE SURFACE IS MOIST AND THEN MAINTAINED IN A MOIST CONDITION TO MINIMIZE DUST AND EMISSIONS.

9. WHEN LOADING IS COMPLETED AND DURING TRANSPORT, NO MATERIAL SHALL EXTEND ABOVE THE SIDES OR REAR OF THE TRUCK OR TRAILER WHICH WILL HAUL THE EXCAVATED MATERIAL.

10. (for inactive landfills)

    EXCAVATED REFUSE SHALL NOT BE STOCKPILED ON-SITE. ALL EXCAVATED REFUSE SHALL BE DEPOSITED DIRECTLY INTO THE TRUCKS OR TRAILERS WHICH WILL HAUL IT. THE TRUCK BEDS OR TRAILERS SHALL BE COMPLETELY COVERED WITH AN IMPERMEABLE COVER, WITH SUCH COVERS TIED DOWN. ALL SEAMS SHALL BE SEALED TO PREVENT ANY MATERIALS FROM ESCAPING DURING TRANSPORT.

(for active landfills)

EXCAVATED REFUSE SHALL BE TRANSPORTED TO THE ACTIVE WORKING FACE OF THE LANDFILL WITHIN ONE HOUR OF GENERATION OR AS DEEMED NECESSARY BY THE SCAQMD PERSONNEL.

11. THE EXTERIOR OF TRUCKS OR CARS (INCLUDING THE TIRES) SHALL BE CLEANED OFF PRIOR TO LEAVING THE EXCAVATION SITE.

12. THE EXCAVATION WORK FACE EXPOSED TO THE ATMOSPHERE SHALL NOT EXCEED (_____ SQUARE FEET)(____FT X ____FT).

or

THE EXCAVATION WORK FACE WHICH EXPOSES REFUSE OR OTHER EMISSION GENERATING MATERIALS TO THE ATMOSPHERE SHALL NOT EXCEED _____ SQUARE FEET.

13. ALL EXCAVATED REFUSE SHALL BE COVERED WITH EITHER A MINIMUM OF 6 INCHES OF CLEAN SOIL, APPROVED FOAM OR HEAVY-DUTY PLASTIC SHEETING WHENEVER THE EXCAVATION IS NOT ACTIVELY IN PROGRESS, AND AT THE END OF EACH WORKING DAY. FOAM BY ITSELF SHALL NOT BE USED AS A NIGHT COVER IF IT IS RAINING OR RAIN IS PREDICTED BY THE NATIONAL WEATHER SERVICE PRIOR TO THE NEXT SCHEDULED DAY OF EXCAVATION.

14. VOC CONTAMINATED SOIL (AS DEFINED BY RULE 1166) SHALL NOT BE SPREAD ONSITE OR OFFSITE IF IT RESULTS IN UNCONTROLLED EVAPORATION OF VOC TO THE ATMOSPHERE.

15. DURING EXCAVATION, IF A CONSIDERABLE NUMBER OF COMPLAINTS ARE RECEIVED, ALL WORK SHALL CEASE AND THE APPROVED MITIGATION MEASURES SHALL BE IMPLEMENTED IMMEDIATELY. OTHER MITIGATION MEASURES WHICH ARE DEEMED APPROPRIATE BY SCAQMD PERSONNEL TO ABATE A NUISANCE CONDITION SHALL BE IMPLEMENTED UPON REQUEST.

16. ALL EXCAVATED MATERIAL SHALL BE TRANSPORTED IN SUCH A MANNER AS TO PREVENT ANY EMISSIONS OF HAZARDOUS MATERIALS.

17. ALL HAZARDOUS MATERIALS SHALL BE TRANSPORTED IN CONTAINERS CLEARLY MARKED AS TO THE TYPES OF MATERIAL CONTAINED AND WHAT PROCEDURES SHOULD BE FOLLOWED IN CASE OF ACCIDENTAL SPILLS.

18. EXCAVATED LIQUID HAZARDOUS MATERIALS WITH THE POTENTIAL TO CAUSE AIR EMISSIONS SHALL BE ENCAPSULATED OR ENCLOSED IN CONTAINERS WITH SEALED LIDS BEFORE LOADING INTO THE TRANSPORT VEHICLES.

19. ALL MATERIALS THAT ARE LISTED AS HAZARDOUS BY A FEDERAL OR STATE AGENCY SHALL BE CONSIDERED "HAZARDOUS MATERIALS" FOR THE PURPOSE OF THIS PERMIT.

20. DURING EXCAVATION, MONITORING FOR THE FOLLOWING HAZARDOUS MATERIALS SHALL BE CONDUCTED IN A MANNER APPROVED BY THE SCAQMD. SAMPLES MUST BE ANALYZED AND RESULTS REPORTED TO THE SCAQMD WITHIN __ DAYS OF TAKING THE SAMPLE. OTHER HAZARDOUS MATERIALS MAY BE ADDED TO THIS LIST IF THEIR PRESENCE BECOMES KNOWN IN THE EXCAVATED MATERIALS:

A. VINYL CHLORIDE
B. HYDROGEN CYANIDE
C. DDT
D. ASBESTOS
E. HEAVY METALS-Pb,Cr,Hg
F. BENZENE
G. ETC.

21. DURING EXCAVATION, CONTINUOUS MONITORING AND RECORDING OF THE WIND SPEED AND DIRECTION SHALL BE CONDUCTED AT A SITE APPROVED BY THE SCAQMD.

22. DURING EXCAVATION, MONITORING FOR ORGANICS AS METHANE USING AN ORGANIC VAPOR ANALYZER (OVA) OR OTHER MONITOR APPROVED BY THE SCAQMD SHALL BE CONDUCTED CONTINUOUSLY AT THE WORKING FACE AND AT THE PROPERTY LINE (OR OTHER APPROVED LOCATIONS) DIRECTLY DOWNWIND OF THE EXCAVATION. THE MAXIMUM SUSTAINED READINGS SHALL BE RECORDED EVERY 15 MINUTES.

23. IF THE OVA OR OTHER APPROVED ORGANIC MONITOR SHOWS A SUSTAINED (GREATER THAN 15 SECONDS) READING OF 2,000 PPM OR GREATER AT THE WORKING FACE, THE EXCAVATION SHALL CEASE AND THE APPROVED MITIGATION MEASURES IMPLEMENTED IMMEDIATELY. EXCAVATION SHALL NOT RESUME UNTIL THE READINGS RETURN TO THE BACKGROUND LEVEL.

24. IF THE OVA OR OTHER APPROVED ORGANIC MONITOR SHOWS A SUSTAINED (GREATER THAN 15 SECONDS) READING OF 200 PPM OR GREATER DOWNWIND FROM THE SITE AT THE PROPERTY LINE (OR OTHER APPROVED LOCATIONS), THE EXCAVATION SHALL CEASE AND THE APPROVED MITIGATION MEASURES IMPLEMENTED IMMEDIATELY. EXCAVATION SHALL NOT RESUME UNTIL THE READINGS RETURN TO THE BACKGROUND LEVEL.

25. DURING EXCAVATION, HIGH VOLUME SAMPLING FOR SUSPENDED PARTICULATES SHALL BE CONDUCTED UPWIND AND DOWNWIND OF THE EXCAVATION SITE AT LOCATIONS APPROVED BY THE SCAQMD. SAMPLES SHALL BE TAKEN DURING THE FOLLOWING PERIODS:

A. ACTIVE WORK PERIOD - FROM START OF EXCAVATION (time) UNTIL ACTIVITY IS CEASED FOR THE DAY, BUT NOT LESS THAN 5 HOURS OF SAMPLING TIME.

B. INACTIVE WORK PERIOD - IMMEDIATELY FOLLOWING THE ACTIVE WORK PERIOD AND ENDING AT 6 A.M., AND A 24 HOUR SAMPLE FOR EACH NON-WORKING DAY.

26. ALL HIGH VOLUME SAMPLES TAKEN DURING ACTIVE WORK PERIODS SHALL BE ANALYZED FOR TOTAL SUSPENDED PARTICULATES AND (other contaminants). RESULTS OF THESE ANALYSES SHALL BE SUBMITTED TO THE SCAQMD WITHIN 5 DAYS OF SAMPLING. ADDITIONAL SAMPLING AND ANALYSES SHALL BE CONDUCTED UPON REQUEST BY THE SCAQMD.

27. IF ANY ANALYTICAL RESULTS SHOW THE UPWIND AND DOWNWIND DIFFERENTIAL CONCENTRATIONS OF CONTAMINANTS EXCEEDING THE FOLLOWING LIMITS, EXCAVATION ACTIVITIES SHALL CEASE UNTIL ADDITIONAL MITIGATION MEASURES ARE SUBMITTED TO AND APPROVED BY THE SCAQMD. THESE ADDITIONAL MITIGATION MEASURES SHALL BE IMPLEMENTED WHEN THE ACTIVITIES RESUME.

CONTAMINANT	CONDITION
PM10	50 ug/m^3
contaminants	ug/m^3

28. ALL SAMPLES TAKEN BY THE HIGH VOLUME SAMPLERS SHALL BE PROPERLY STORED FOR AT LEAST 10 DAYS AFTER THE EXCAVATION IS COMPLETED.

29.. ALL MONITORS SHALL BE CALIBRATED DAILY USING A METHOD APPROVED BY THE SCAQMD.

30. IF A DISTINCT ODOR (LEVEL III OR GREATER) RESULTING FROM THE EXCAVATION IS DETECTED AT OR BEYOND THE PROPERTY LINE, THE EXCAVATION SHALL CEASE AND THE APPROVED MITIGATION MEASURES IMPLEMENTED IMMEDIATELY. ODOR LEVELS WILL BE DETERMINED BY SCAQMD PERSONNEL OR ON-SITE SAFETY COORDINATOR IN THE ABSENCE OF SCAQMD PERSONNEL.

31. ALL RECORDS OF EXCAVATION WORKING HOURS, ANALYTICAL RESULTS, DAILY AMOUNTS OF MATERIALS EXCAVATED AND HAULED OFFSITE, AND OTHER RECORDS REQUIRED BY THIS PERMIT SHALL BE KEPT ON FILE FOR AT LEAST TWO YEARS AND MADE AVAILABLE TO THE SCAQMD UPON REQUEST.

32. MITIGATION MEASURES, OTHER THAN THOSE INDICATED IN THESE CONDITIONS, WHICH ARE DEEMED APPROPRIATE BY SCAQMD PERSONNEL AS NECESSARY TO PROTECT THE COMFORT, REPOSE, HEALTH OR SAFETY OF THE PUBLIC, SHALL BE IMPLEMENTED UPON REQUEST.

33. THIS PERMIT OR A COPY OF THIS PERMIT SHALL BE PRESENT AT THE EXCAVATION SITE.

Other governmental agencies may require approval before any excavation begins. It shall be the responsibility of the applicant to obtain that approval. The South Coast Air Quality Management District shall not be responsible or liable for any losses because of measures required or taken pursuant to the requirements of this approved Excavation Management Plan.

South Coast Air Quality Management District
P. O. BOX 4944
Diamond Bar, CA 91765
(909) 396- 2000

AQMD

APPLICATION FOR PLANS
FORM 400 - P

Section I - Company Information

LEGAL NAME OF APPLICANT ☐ IRS OR ☐ S.S.NUMBER

___ ___ ___ ___ ___ ___ ___ ___ ___

PERMIT TO BE ISSUED TO (SEE INSTRUCTIONS)

BUSINESS MAILING ADDRESS

Section II - Facility Information

EQUIPMENT ADDRESS/LOCATION (ENTER VARIOUS LOCATIONS, IF APPLICABLE)

NUMBER/STREET

CITY OR COMMUNITY CA ZIP CODE

FACILITY NAME (N\A FOR VARIOUS LOCATIONS)

FACILITY ID NUMBER

___ ___ ___ ___ ___ ___

NAME OF CONTACT PERSON	TITLE	CONTACT TELEPHONE NUMBER ( ) -

TYPE OF BUSINESS AT THIS FACILITY

BUSINESS TYPE CODE (SEE INSTRUCTIONS) ___ ___ ___ ___

Section III - Equipment Information

APPLICATION HEREBY SUBMITTED FOR: Rule 1150 Excavation Plan

RULE NUMBER WHICH THIS APPLICATION APPLIES TO: Rule 1150

TYPE OF PLAN APPLICATION:
☐ Compliance Plan
☑ **Excavation Plan**
☐ Other
☐ Alternative Emission Control Plan (AECP)
☐ Extreme Performance Coating Classification

IF THIS APPLICATION IS ASSOCIATED WITH CERTAIN DISTRICT APPLICATIONS(S)/PERMIT(S), ENTER APPLICATION/PERMIT NUMBER(S):

FOR THIS PROJECT HAS A CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) DOCUMENT BEEN REQUIRED BY ANOTHER GOVERNMENTAL AGENCY?
☐ No ☐ Yes, IF YES, ENTER NAME OF AGENCY AND SUBMIT A COPY IF APPROVED.

DO YOU CLAIM CONFIDENTIALITY OF DATA? (SEE INSTRUCTIONS) ☐ Yes ☐ No

OPERATING SCHEDULE (N\A FOR VARIOUS LOCATIONS)

	HOURS/DAY	DAYS/WEEK	WEEKS/YEAR
MAXIMUM			
AVERAGE			

FOR AECP PLEASE FILL IN THE TABLE BELOW:

	LBS/YEAR	DAYS/YEAR
ACTUAL USAGE TWO YEARS AGO		
ACTUAL USAGE LAST YEAR		
PROPOSED AVERAGE USE		

Section IV - Signature

I HEREBY CERTIFY THAT ALL INFORMATION CONTAINED HEREIN AND INFORMATION SUBMITTED WITH THIS APPLICATION IS TRUE AND CORRECT.
SIGNATURE OF RESPONSIBLE OFFICIAL OF FIRM: TITLE OF RESPONSIBLE OFFICIAL OF FIRM:

TYPE OR PRINT NAME OF RESPONSIBLE OFFICIAL OF FIRM:	RESPONSIBLE OFFICIAL'S TELEPHONE NUMBER ( ) -	DATE SIGNED: / /

I HEREBY CERTIFY THAT ALL INFORMATION CONTAINED HEREIN AND INFORMATION SUBMITTED WITH THIS APPLICATION IS TRUE AND CORRECT.
SIGNATURE OF PREPARER: TITLE OF PREPARER:

TYPE OR PRINT NAME OF PREPARER:	PREPARER'S TELEPHONE NUMBER ( ) -	DATE SIGNED: / /

AQMD USE ONLY	APPLICATION/TRACKING # ___ ___ ___ ___ ___ ___	PROJECT #	TYPE B C D	EQUIPMENT CATEGORY CODE: ___ ___ ___ ___ ___ ___ / ___	FEE SCHEDULE: $	VALIDATION

ENG. A R DATE	ENG. A R DATE	CLASS I III IV	ASSIGNMENT UNIT ENGINEER	ENF. SECT.	CHECK/MONEY ORDER #	AMOUNT $

FORM 400P APPLICATION INSTRUCTIONS

COMPANY INFORMATION

LEGAL NAME OF APPLICANT:
Please identify the legal entity that operates the equipment.

I.R.S. OR S.S. NO.:
This information is used for identification purposes. Please enter the Internal Revenue Service (I.R.S.) or Social Security (S.S.) number of the applicant and check the appropriate box.

PLAN TO BE ISSUED TO:
Special format is used to identify both the legal entity and the business name. Please pattern your entry after one of the following examples:

Personal Name:	John C. King
Personal Name with DBA:	ABC Store, John C. King DBA
Partnership:	John C. King, Jim Day, and Ann Smith
Partnership	ABC Store, J. King J. Day A. Smith DBA
Corporation	ABC Corporation
Corporation with Division:	ABC Corporation, Office Products Division
Corporation with DBA:	ABC Corporation, ABC Trucking Co. DBA
Governmental Agency:	Any City, Public Works Dept.
School:	John Muir High School
Colleges and Universities:	University of California, Los Angeles, Biochemistry Dept.

BUSINESS MAILING ADDRESS:
Please identify the address where all business correspondence is to be mailed.

FACILITY INFORMATION

FACILITY NAME:
For identification purposes, please enter the name of the subject facility if you have more than one facility.

FACILITY I.D. NO.:
If your facility has been issued an I.D. number by the District, please enter it in the space provided. Otherwise, leave this blank. An I.D. number will be assigned when the application is submitted.

EQUIPMENT/FACILITY LOCATION:
Please identify the address where the equipment or facility will be located. If no street address is available, please provide a location description and zip code. For equipment to be operated at *various locations*, state "various locations in SCAQMD" and the initial operating location.

TYPE OF BUSINESS:
This information is used by the District for planning and statistical purposes. Please state the type of business you conduct in this facility (e.g. refinery, paint manufacturing, dry cleaner, restaurant, etc.).

BUSINESS TYPE CODE AT THIS FACILITY:
This information is used by the District for planning and statistical purposes. Using the provided list of business codes, please enter the code which best describes your business activity at this facility.

CONTACT PERSON, TITLE, AND PHONE NUMBER:
Please identify the person name and title whom would be contacted regarding this application; also include the contact telephone number for this person.

EQUIPMENT INFORMATION

CALIFORNIA ENVIRONMENTAL QUALITY ACT:
A California Environmental Quality Act (CEQA) document (e.g., environmental impact report, negative declaration) is required for any project which results in significant effect on the environment. If such a document has been required by another governmental agency, please enter the name of that agency. A copy of this document is also required before the application can be deemed complete. Therefore, please submit a copy of the approved document.

CONFIDENTIALITY:
District records are subject to the California Public Records Act. To claim confidentiality of information submitted with this application, check "yes." Please be sure that all submitted information which you wish to be kept confidential is clearly marked as such. Please also state the reason(s) for claiming confidentiality. Examples of acceptable reasons are trade secrets and production data. Please note that state law prevents emissions data and permit documents from being kept secret.

SUPPLEMENTAL INFORMATION

In addition to this application form, please submit supporting documents containing information required by the specific rule under which the application is filed. For Rule 1146, please complete Form 1146ALT.

BUSINESS TYPE CODES
Standard Industrial Classification (SIC) Codes

A AGRICULTURE, FORESTRY, AND FISHING
0100 AGRICULTURAL PRODUCTION-CROPS
0200 AGRICULTURAL PRODUCTION-LIVESTOCK
0700 AGRICULTURAL SERVICES
0800 FORESTRY
0900 FISHING, HUNTING, AND TRAPPING
4300 U.S. POSTAL SERVICE
9900 NONCLASSIFIABLE ESTABLISHMENTS

B MINING
1000 METAL MINING
1010 Iron Ores
1020 Copper Ores
1030 Lead and Zinc Ores
1040 Gold and Silver Ores
1060 Ferroalloy Ores, Except Vanadium
1080 Metal Mining Services
1090 Miscellaneous Metal Ores
1200 COAL MINING
1220 Bituminous Coal and Lignite Mining
1230 Anthracite Mining
1240 Coal Mining Services
1300 OIL AND GAS EXTRACTION
1310 Crude Petroleum and Natural Gas
1320 Natural Gas Liquids
1380 Oil and Gas Field Services
1400 NONMETALLIC MINERALS, EXCEPT FUELS
1410 Dimension Stone
1420 Crushed and Broken Stone
1440 Sand and Gravel
1450 Clay, Ceramic, & Refractory Minerals
1470 Chemical and Fertilizer Minerals
1474 Potash, soda, and borate minerals
1475 Phosphate rock
1479 Chemical and fertilizer mining, nec
1480 Nonmetallic Minerals Services
1490 Miscellaneous Nonmetallic Minerals

C CONSTRUCTION
1500 GENERAL BUILDING CONTRACTORS
1520 Residential Building Construction
1530 Operative Builders
1540 Nonresidential Building Construction
1600 HEAVY CONSTRUCTION, EX. BUILDING
1610 Highway and Street Construction
1620 Heavy Construction, Except Highway
1700 SPECIAL TRADE CONTRACTORS
1710 Plumbing, Heating, air-conditioning
1720 Painting and Paper Hanging
1730 Electrical Work
1740 Masonry, Stonework, and Plastering
1750 Carpentry and Floor Work
1760 Roofing, Siding, and Sheet Metal Work
1770 Concrete Work
1780 Water Well Drilling
1790 Misc. Special Trade Contractors
1793 Glass and glazing work
1794 Excavation work
1795 Wrecking and demolition work
1799 Special trade contractors, nec

D MANUFACTURING
2000 FOOD AND KINDRED PRODUCTS
2010 Meat Products
2011 Meat packing plants
2013 Sausages and other prepared meats
2015 Poultry slaughtering and processing
2020 Dairy Products
2030 Preserved Fruits and Vegetables
2040 Grain Mill Products
2041 Flour and other grain mill products
2044 Rice milling
2045 Prepared flour mixes and dough's
2046 Wet corn milling
2047 Dog and cat food
2048 Prepared feeds, nec
2050 Bakery Products
2051 Bread, cake, and related products
2052 Cookies and crackers
2060 Sugar and Confectionery Products
2070 Fats and Oils
2080 Beverages
2084 Wines, brandy, and brandy spirits
2085 Distilled and blended liquors
2086 Bottled and canned soft drinks
2087 Flavoring extracts and syrups, nec
2090 Misc. Food and Kindred Products
2100 TOBACCO PRODUCTS
2200 TEXTILE MILL PRODUCTS
2210 Broadwoven Fabric Mills, Cotton
2220 Broadwoven Fabric Mills, Manmade
2230 Broadwoven Fabric Mills, Wool
2240 Narrow Fabric Mills
2250 Knitting Mills
2260 Textile Finishing, Except Wool
2270 Carpets and Rugs
2280 Yarn and Thread Mills
2290 Miscellaneous Textile Goods
2300 APPAREL AND OTHER TEXTILE PRODUCTS
2400 LUMBER AND WOOD PRODUCTS
2420 Sawmills and Planing Mills
2430 Millwork, Plywood & Structural Members
2434 Wood kitchen cabinets
2435 Hardwood veneer and plywood
2436 Softwood veneer and plywood
2439 Structural wood members, nec
2440 Wood Containers
2450 Wood Buildings and Mobile Homes
2490 Miscellaneous Wood Products
2500 FURNITURE AND FIXTURES
2510 Household Furniture
2520 Office Furniture
2521 Wood office furniture
2522 Office furniture, except wood
2530 Public Building & Related Furniture
2540 Partitions and Fixtures
2541 Wood partitions and fixtures
2542 Partitions and fixtures, except wood
2590 Miscellaneous Furniture and Fixtures
2600 PAPER AND ALLIED PRODUCTS
2610 Pulp Mills
2620 Paper Mills
2630 Paperboard Mills
2650 Paperboard Containers and Boxes
2670 Misc. Converted Paper Products
2700 PRINTING AND PUBLISHING
2710 Newspapers
2720 Periodicals
2730 Books
2731 Book publishing
2732 Book printing
2740 Miscellaneous Publishing
2750 Commercial Printing
2752 Commercial printing, lithographic
2754 Commercial printing, gravure
2759 Commercial printing, nec
2760 Manifold Business Forms
2770 Greeting Cards
2780 Blankbooks and Bookbinding
2790 Printing Trade Services
2800 CHEMICALS AND ALLIED PRODUCTS
2810 Industrial Inorganic Chemicals
2812 Alkalies and chlorine
2813 Industrial gases
2816 Inorganic pigments
2819 Industrial inorganic chemicals, nec
2820 Plastics Materials and Synthetics
2821 Plastics materials and resins
2822 Synthetic rubber
2823 Cellulosic manmade fibers
2824 Organic fibers, noncellulosic
2830 Drugs
2833 Medicinals and botanicals
2834 Pharmaceutical preparations
2835 Diagnostic substances
2836 Biological products exc. diagnostic
2840 Soap, Cleaners, and Toilet Goods
2841 Soap and other detergents
2842 Polishes and sanitation goods
2843 Surface active agents
2844 Toilet preparations
2850 Paints and Allied Products
2860 Industrial Organic Chemicals
2861 Gum and wood chemicals
2865 Cyclic crudes and intermediates
2869 Industrial organic chemicals, nec
2870 Agricultural Chemicals
2890 Miscellaneous Chemical Products
2891 Adhesives and sealants
2892 Explosives
2893 Printing ink
2895 Carbon black
2899 Chemical preparations, nec
2900 PETROLEUM AND COAL PRODUCTS
2910 Petroleum Refining
2950 Asphalt Paving and Roofing Materials
2951 Asphalt paving mixtures and blocks
2952 Asphalt felts and coatings
2990 Misc. Petroleum and Coal Products
2992 Lubricating oils and greases
2999 Petroleum and coal products, nec
3000 RUBBER AND MISC. PLASTICS PRODUCTS
3010 Tires and Inner Tubes
3020 Rubber and Plastics Footwear
3050 Hose & Belting & Gaskets & Packing
3052 Rubber & plastics hose & belting
3053 Gaskets, packing and sealing devices
3060 Fabricated Rubber Products, NEC
3061 Mechanical rubber goods
3069 Fabricated rubber products, nec
3080 Miscellaneous Plastics Products, NEC
3081 Unsupported plastics film & sheet
3082 Unsupported plastics profile shapes
3083 Laminated plastics plate & sheet
3084 Plastics pipe
3085 Plastics bottles
3086 Plastics foam products
3087 Custom compound purchased resins
3088 Plastics plumbing fixtures
3089 Plastics products, nec
3200 STONE, CLAY, AND GLASS PRODUCTS
3210 Flat Glass
3220 Glass and Glassware, Pressed or Blown
3221 Glass containers
3229 Pressed and blown glass, nec
3230 Products of Purchased Glass
3240 Cement, Hydraulic
3250 Structural Clay Products
3251 Brick and structural clay tile
3253 Ceramic wall and floor tile
3255 Clay refractories
3259 Structural clay products, nec
3260 Pottery and Related Products
3261 Vitreous plumbing fixtures
3262 Vitreous china table & kitchenware
3263 Semivitreous table & kitchenware
3264 Porcelain electrical supplies
3269 Pottery products, nec
3270 Concrete, Gypsum, and Plaster Products
3271 Concrete block and brick
3272 Concrete products, nec
3273 Ready-mixed concrete
3274 Lime
3275 Gypsum products
3280 Cut Stone and Stone Products
3290 Misc. Nonmetallic Mineral Products
3291 Abrasive products
3292 Asbestos products
3295 Minerals, ground or treated
3296 Mineral wool
3297 Nonclay refractories
3299 Nonmetallic mineral products, nec
3300 PRIMARY METAL INDUSTRIES
3310 Blast Furnace and Basic Steel Products
3312 Blast furnaces and steel mills
3313 Electrometallurgical products
3315 Steel wire and related products
3316 Cold finishing of steel shapes
3317 Steel pipe and tubes
3320 Iron and Steel Foundries
3321 Gray and ductile iron foundries
3322 Malleable iron foundries
3324 Steel investment foundries
3325 Steel foundries, nec
3330 Primary Nonferrous Metals
3331 Primary copper
3334 Primary aluminum
3339 Primary nonferrous metals, nec
3340 Secondary Nonferrous Metals
3350 Nonferrous Rolling and Drawing
3351 Copper rolling and drawing
3353 Aluminum sheet, plate, and foil
3354 Aluminum extruded products
3355 Aluminum rolling and drawing, nec
3356 Nonferrous rolling and drawing, nec
3357 Nonferrous wiredrawing & insulating
3360 Nonferrous Foundries (Castings)
3363 Aluminum die-castings
3364 Nonferrous die-casting exc. aluminum
3365 Aluminum foundries
3366 Copper foundries
3369 Nonferrous foundries, nec
3390 Miscellaneous Primary Metal Products
3398 Metal heat treating
3399 Primary metal products, nec
3400 FABRICATED METAL PRODUCTS
3410 Metal Cans and Shipping Containers
3411 Metal cans
3412 Metal barrels, drums, and pails
3420 Cutlery, Handtools, and Hardware
3430 Plumbing and Heating, Except Electric
3440 Fabricated Structural Metal Products
3441 Fabricated structural metal
3442 Metal doors, sash, and trim
3443 Fabricated plate work (boiler shops)
3444 Sheet metalwork
3446 Architectural metal work
3448 Prefabricated metal buildings
3449 Miscellaneous metal work
3450 Screw Machine Products, Bolts, Etc.
3460 Metal Forgings and Stampings
3462 Iron and steel forgings
3463 Nonferrous forgings
3465 Automotive stampings
3466 Crowns and closures
3469 Metal stampings, nec
3470 Metal Services, NEC
3471 Plating and polishing
3479 Metal coating and allied services
3480 Ordnance and Accessories, NEC
3482 Small arms ammunition
3483 Ammunition, exc. for small arms, nec
3484 Small arms
3489 Ordnance and accessories, nec
3490 Misc. Fabricated Metal Products
3491 Industrial valves
3492 Fluid power valves & hose fittings
3493 Steel springs, except wire
3494 Valves and pipe fittings, nec
3495 Wire springs
3496 Misc. fabricated wire products
3497 Metal foil and leaf
3498 Fabricated pipe and fittings
3499 Fabricated metal products, nec
3500 INDUSTRIAL MACHINERY AND EQUIPMENT
3510 Engines and Turbines
3520 Farm and Garden Machinery

BUSINESS TYPE CODES
Standard Industrial Classification (SIC) Codes

3530 Construction and Related Machinery
3531 Construction machinery
3532 Mining machinery
3533 Oil and gas field machinery
3534 Elevators and moving stairways
3535 Conveyors and conveying equipment
3536 Hoists, cranes, and monorails
3537 Industrial trucks and tractors
3540 Metalworking Machinery
3541 Machine tools, metal cutting types
3542 Machine tools, metal forming types
3543 Industrial patterns
3544 Special dies, tools, jigs & fixtures
3545 Machine tool accessories
3546 Power-driven handtools
3547 Rolling mill machinery
3548 Welding apparatus
3549 Metalworking machinery, nec
3550 Special Industry Machinery
3560 General Industrial Machinery
3561 Pumps and pumping equipment
3562 Ball and roller bearings
3563 Air and gas compressors
3564 Blowers and fans
3565 Packaging machinery
3566 Speed changers, drives, and gears
3567 Industrial furnaces and ovens
3568 Power transmission equipment, nec
3569 General industrial machinery, nec
3570 Computer and Office Equipment
3580 Refrigeration and Service Machinery
3590 Industrial Machinery, NEC
3600 ELECTRONIC & OTHER ELECTRIC EQUIPMENT
3610 Electric Distribution Equipment
3620 Electrical Industrial Apparatus
3630 Household Appliances
3640 Electric Lighting and Wiring Equipment
3650 Household Audio and Video Equipment
3660 Communications Equipment
3661 Telephone and telegraph apparatus
3663 Radio & TV communications equipment
3669 Communications equipment, nec
3670 Electronic Components and Accessories
3690 Misc. Electrical Equipment & Supplies
3700 TRANSPORTATION EQUIPMENT
3710 Motor Vehicles and Equipment
3711 Motor vehicles and car bodies
3713 Truck and bus bodies
3714 Motor vehicle parts and accessories
3715 Truck trailers
3716 Motor homes
3720 Aircraft and Parts
3730 Ship and Boat Building and Repairing
3740 Railroad Equipment
3750 Motorcycles, Bicycles, and Parts
3760 Guided Missiles, Space Vehicles, Parts
3790 Miscellaneous Transportation Equipment
3800 INSTRUMENTS AND RELATED PRODUCTS
3810 Search and Navigation Equipment
3820 Measuring and Controlling Devices
3840 Medical Instruments and Supplies
3850 Ophthalmic Goods
3860 Photographic Equipment and Supplies
3870 Watches, Clocks, Watchcases & Parts
3900 MISCELLANEOUS MANUFACTURING INDUSTRIES
3100 LEATHER AND LEATHER PRODUCTS
3910 Jewelry, Silverware, and Plated Ware
3930 Musical Instruments
3940 Toys and Sporting Goods
3950 Pens, Pencils, Office, & Art Supplies
3960 Costume Jewelry and Notions
3990 Miscellaneous Manufactures

E TRANSPORTATION AND PUBLIC UTILITIES

4000 RAILROAD TRANSPORTATION
4010 Railroads
4100 LOCAL AND INTERURBAN PASSENGER TRANSIT
4200 TRUCKING AND WAREHOUSING
4400 WATER TRANSPORTATION
4410 Deep Sea Foreign Trans. of Freight
4420 Deep Sea Domestic Trans. of Freight
4430 Freight Trans. on the Great Lakes
4440 Water Transportation of Freight, NEC
4480 Water Transportation of Passengers
4490 Water Transportation Services
4500 TRANSPORTATION BY AIR
4510 Air Transportation, Scheduled
4520 Air Transportation, Nonscheduled
4580 Airports, Flying Fields, & Services
4600 PIPELINES, EXCEPT NATURAL GAS
4610 Pipelines, Except Natural Gas
4612 Crude petroleum pipelines
4613 Refined petroleum pipelines
4619 Pipelines, nec
4800 COMMUNICATION
4810 Telephone Communication
4820 Telegraph & Other Communications
4830 Radio and Television Broadcasting
4840 Cable and Other Pay TV Services
4890 Communication Services, NEC
4900 ELECTRIC, GAS, AND SANITARY SERVICES
4910 Electric Services
4920 Gas Production and Distribution
4922 Natural gas transmission
4923 Gas transmission and distribution
4924 Natural gas distribution
4925 Gas production and/or distribution
4930 Combination Utility Services
4931 Electric and other services combined
4932 Gas and other services combined
4939 Combination utilities, nec
4940 Water Supply
4950 Sanitary Services
4952 Sewerage systems
4953 Refuse systems
4959 Sanitary services, nec
4960 Steam and Air-Conditioning Supply
4970 Irrigation Systems

F WHOLESALE TRADE

5000 WHOLESALE TRADE-DURABLE GOODS
5010 Motor Vehicles, Parts, and Supplies
5020 Furniture and Homefurnishings
5030 Lumber and Construction Materials
5040 Professional & Commercial Equipment
5050 Metals and Minerals, Except Petroleum
5060 Electrical Goods
5070 Hardware, Plumbing & Heating Equipment
5080 Machinery, Equipment, and Supplies
5090 Miscellaneous Durable Goods
5093 Scrap and waste materials
5100 WHOLESALE TRADE-NONDURABLE GOODS
5110 Paper and Paper Products
5120 Drugs, Proprietaries, and Sundries
5130 Apparel, Piece Goods, and Notions
5140 Groceries and Related Products
5150 Farm-Product Raw Materials
5160 Chemicals and Allied Products
5170 Petroleum and Petroleum Products
5171 Petroleum bulk stations & terminals
5172 Petroleum products, nec
5180 Beer, Wine, and Distilled Beverages
5190 Misc. Nondurable Goods

G RETAIL TRADE

5200 BUILDING MATERIALS & GARDEN SUPPLIES
5300 GENERAL MERCHANDISE STORES
5400 FOOD STORES
5450 Dairy Products Stores
5460 Retail Bakeries
5490 Miscellaneous Food Stores
5500 AUTOMOTIVE DEALERS & SERVICE STATIONS
5510 New and Used Car Dealers
5520 Used Car Dealers
5530 Auto and Home Supply Stores
5540 Gasoline Service Stations
5550 Boat Dealers
5560 Recreational Vehicle Dealers
5570 Motorcycle Dealers
5590 Automotive Dealers, NEC
5600 APPAREL AND ACCESSORY STORES
5700 FURNITURE AND HOMEFURNISHINGS STORES
5800 EATING AND DRINKING PLACES
5900 MISCELLANEOUS RETAIL
5910 Drug Stores and Proprietary Stores
5920 Liquor Stores
5930 Used Merchandise Stores
5940 Miscellaneous Shopping Goods Stores
5960 Nonstore Retailers
5980 Fuel Dealers
5983 Fuel oil dealers
5984 Liquefied petroleum gas dealers
5989 Fuel dealers, nec
5990 Retail Stores, NEC
6000 DEPOSITORY INSTITUTIONS
6300 INSURANCE CARRIERS
6500 REAL ESTATE

H FINANCE, INSURANCE, AND REAL ESTATE

4700 TRANSPORTATION SERVICES
4720 Passenger Transportation Arrangement
4730 Freight Transportation Arrangement
4740 Rental of Railroad Cars
4780 Miscellaneous Transportation Services
6100 NONDEPOSITORY INSTITUTIONS
6200 SECURITY AND COMMODITY BROKERS
6400 INSURANCE AGENTS, BROKERS, & SERVICE
6700 HOLDING AND OTHER INVESTMENT OFFICES

7000 HOTELS AND OTHER LODGING PLACES
7600 MISCELLANEOUS REPAIR SERVICES
7800 MOTION PICTURES
7819 Services allied to motion pictures
7900 AMUSEMENT & RECREATION SERVICES
8100 LEGAL SERVICES
8300 SOCIAL SERVICES
8400 MUSEUMS, BOTANICAL, ZOOLOGICAL GARDENS
8600 MEMBERSHIP ORGANIZATIONS
8700 ENGINEERING & MANAGEMENT SERVICES

I SERVICES

7200 PERSONAL SERVICES
7210 Laundry, Cleaning, & Garment Services
7211 Power laundries, family & commercial
7212 Garment pressing & cleaners' agents
7213 Linen supply
7215 Coin-operated laundries and cleaning
7216 Drycleaning plants, except rug
7217 Carpet and upholstery cleaning
7218 Industrial launderers
7219 Laundry and garment services, nec
7230 Beauty Shops
7240 Barber Shops
7250 Shoe Repair and Shoeshine Parlors
7260 Funeral Service and Crematories
7290 Miscellaneous Personal Services
7299 Miscellaneous personal services, nec
7300 BUSINESS SERVICES
7310 Advertising
7320 Credit Reporting and Collection
7330 Mailing, Reproduction, Stenographic
7334 Photocopying & duplicating services
7336 Commercial art and graphic design
7340 Services to Buildings
7342 Disinfecting & pest control services
7349 Building maintenance services, nec
7350 Misc. Equipment Rental & Leasing
7352 Medical equipment rental
7353 Heavy construction equipment rental
7359 Equipment rental & leasing, nec
7360 Personnel Supply Services
7380 Miscellaneous Business Services
7384 Photofinishing laboratories
7500 AUTO REPAIR, SERVICES, AND PARKING
7510 Automotive Rentals, No Drivers
7513 Truck rental and leasing, no drivers
7514 Passenger car rental
7515 Passenger car leasing
7519 Utility trailer rental
7520 Automobile Parking
7530 Automotive Repair Shops
7532 Top & body repair & paint shops
7533 Auto exhaust system repair shops
7534 Tire retreading and repair shops
7536 Automotive glass replacement shops
7537 Automotive transmission repair shops
7538 General automotive repair shops
7539 Automotive repair shops, nec
7540 Automotive Services, Except Repair
7542 Carwashes
7549 Automotive services, nec
8000 HEALTH SERVICES
8060 Hospitals
8070 Medical and Dental Laboratories
8080 Home Health Care Services
8090 Health and Allied Services, NEC
8200 EDUCATIONAL SERVICES
8210 Elementary and Secondary Schools
8220 Colleges and Universities
8230 Libraries
8240 Vocational Schools
8290 Schools & Educational Services, NEC

J PUBLIC ADMINISTRATION

9100 EXECUTIVE, LEGISLATIVE, AND GENERAL
9200 JUSTICE, PUBLIC ORDER, AND SAFETY
9220 Public Order and Safety
9221 Police protection
9223 Correctional institutions
9224 Fire protection
9300 FINANCE, TAXATION, & MONETARY POLICY
9400 ADMINISTRATION OF HUMAN RESOURCES
9500 ENVIRONMENTAL QUALITY AND HOUSING
9510 Environmental Quality
9530 Housing and Urban Development
9600 ADMINISTRATION OF ECONOMIC PROGRAMS
9621 Administration of Transportation
9660 Space Research and Technology
9700 NATIONAL SECURITY AND INTL. AFFAIRS

K NONCLASSIFIABLE ESTABLISHMENTS

Ref.: Standard Industrial Classification Manual, Executive Office of the President, Office of Management and Budget, 1987, p. 423-443.

Note: NEC - Not Elsewhere Classified MISC - Miscellaneous

APPENDIX "B"

BMP Installation Details from the CASQA Stormwater BMP Handbook

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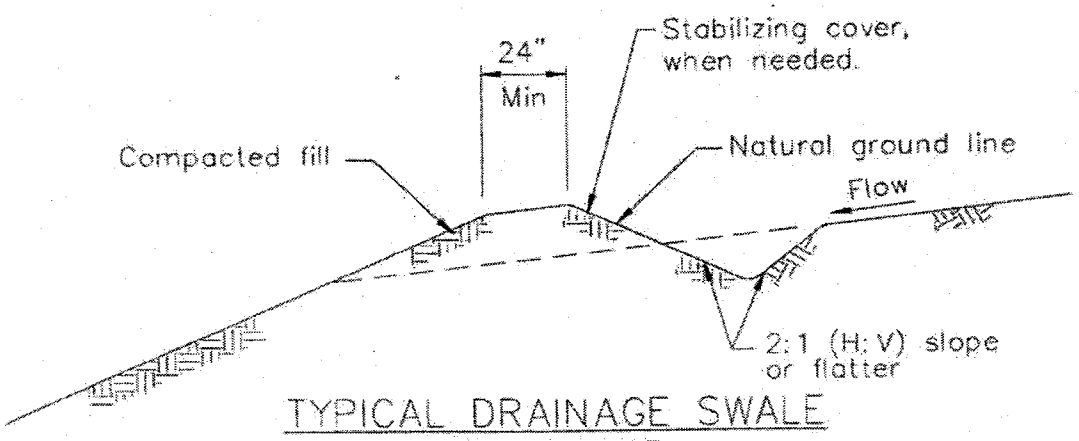
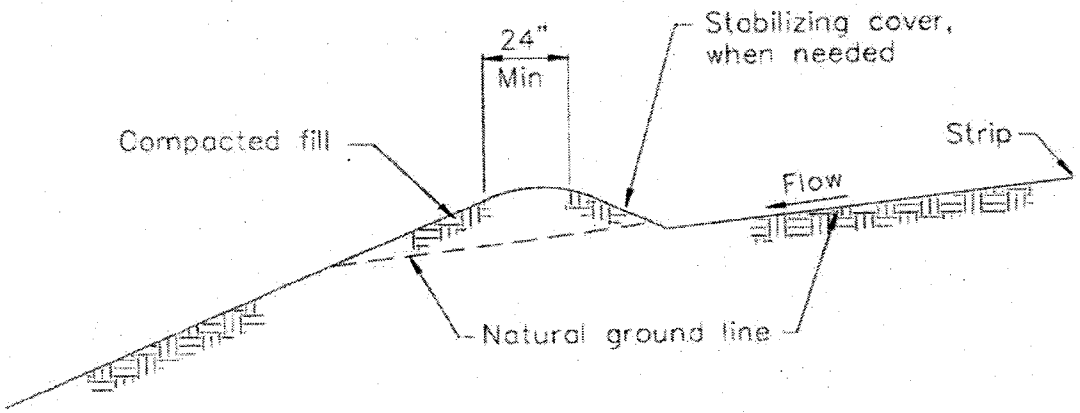
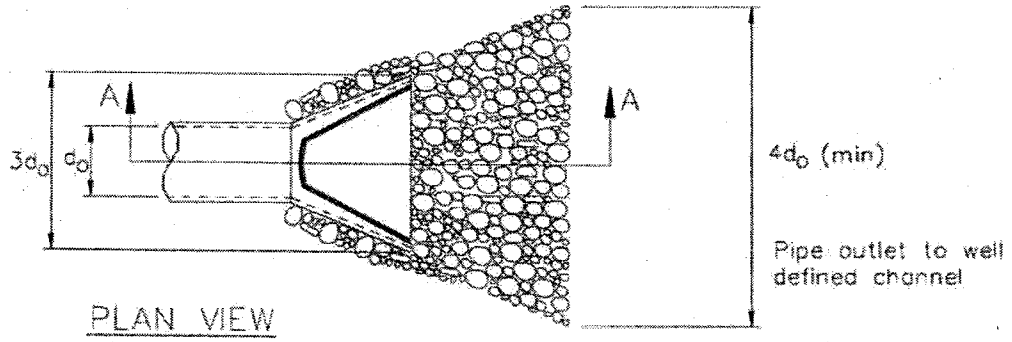


TYPICAL DRAINAGE SWALE
NOT TO SCALE

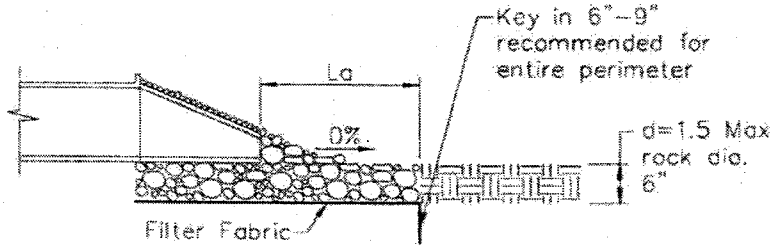
NOTES:
1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.



TYPICAL EARTH DIKE
NOT TO SCALE



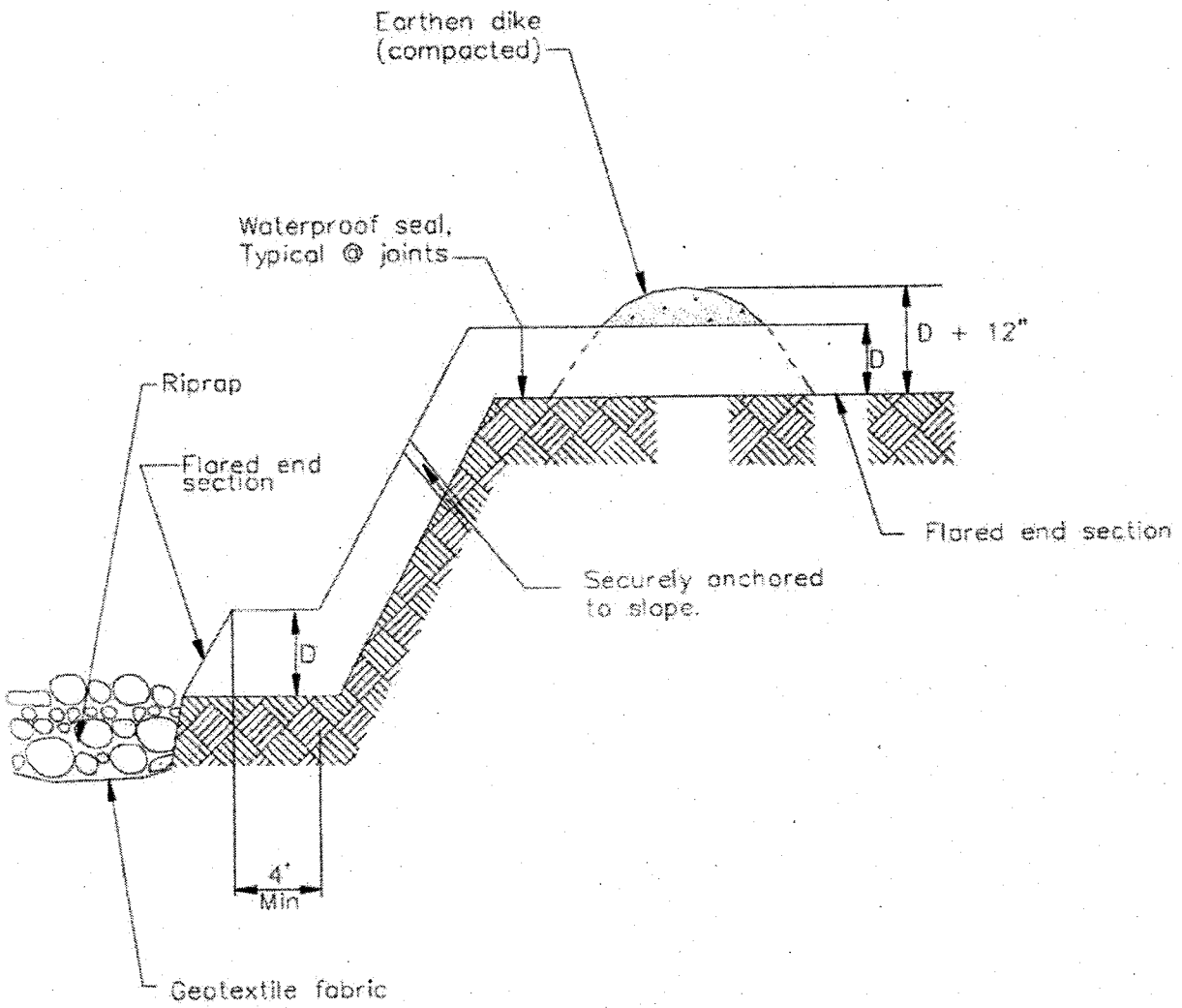
PLAN VIEW



SECTION A–A

Pipe Diameter inches	Discharge ft^3/s	Apron Length, La ft	Rip Rap D_{50} Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
	40	26	16
24	30	16	8
	40	26	8
	50	26	12
	60	30	16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS



TYPICAL SLOPE DRAIN
NOT TO SCALE

Drain Inserts MP-52

Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

California Experience

The number of installations is unknown but likely exceeds a thousand. Some users have reported that these systems require considerable maintenance to prevent plugging and bypass.

Advantages

- Does not require additional space as inserts as the drain inlets are already a component of the standard drainage systems.
- Easy access for inspection and maintenance.
- As there is no standing water, there is little concern for mosquito breeding.
- A relatively inexpensive retrofit option.

Limitations

Performance is likely significantly less than treatment systems that are located at the end of the drainage system such as ponds and vaults. Usually not suitable for large areas or areas with trash or leaves than can plug the insert.

Design and Sizing Guidelines

Refer to manufacturer's guidelines. Drain inserts come any many configurations but can be placed into three general groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are

Design Considerations

- Use with other BMPs
- Fit and Seal Capacity within Inlet

Targeted Constituents

- ✓ Sediment
- ✓ Nutrients
- ✓ Trash
- ✓ Metals
- Bacteria
- ✓ Oil and Grease
- ✓ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

CASQA California Stormwater Quality Association

one box; that is, the setting area and filtration through media occurs in the same box. One manufacturer has a double-box. Stormwater enters the first box where setting occurs. The stormwater flows into the second box where the filter media is located. Some products consist of one or more trays or mesh grates. The trays can hold different types of media. Filtration media vary with the manufacturer: types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Construction/Inspection Considerations

Be certain that installation is done in a manner that makes certain that the stormwater enters the unit and does not leak around the perimeter. Leakage between the frame of the insert and the frame of the drain inlet can easily occur with vertical (drop) inlets.

Performance

Few products have performance data collected under field conditions.

Siting Criteria

It is recommended that inserts be used only for retrofit situations or as pretreatment where other treatment BMPs presented in this section area used.

Additional Design Guidelines

Follow guidelines provided by individual manufacturers.

Maintenance

Likely require frequent maintenance, on the order of several times per year.

Cost

- The initial cost of individual inserts ranges from less than $100 to about $2,000. The cost of using multiple units in curb inlet drains varies with the size of the inlet.
- The low cost of inserts may tend to favor the use of these systems over other, more effective treatment BMPs. However, the low cost of each unit may be offset by the number of units that are required, more frequent maintenance, and the shorter structural life (and therefore replacement).

References and Sources of Additional Information

Hrachovec, R., and G. Minton, 2001, Field testing of a sock-type catch basin insert, Planet CPR, Seattle, Washington

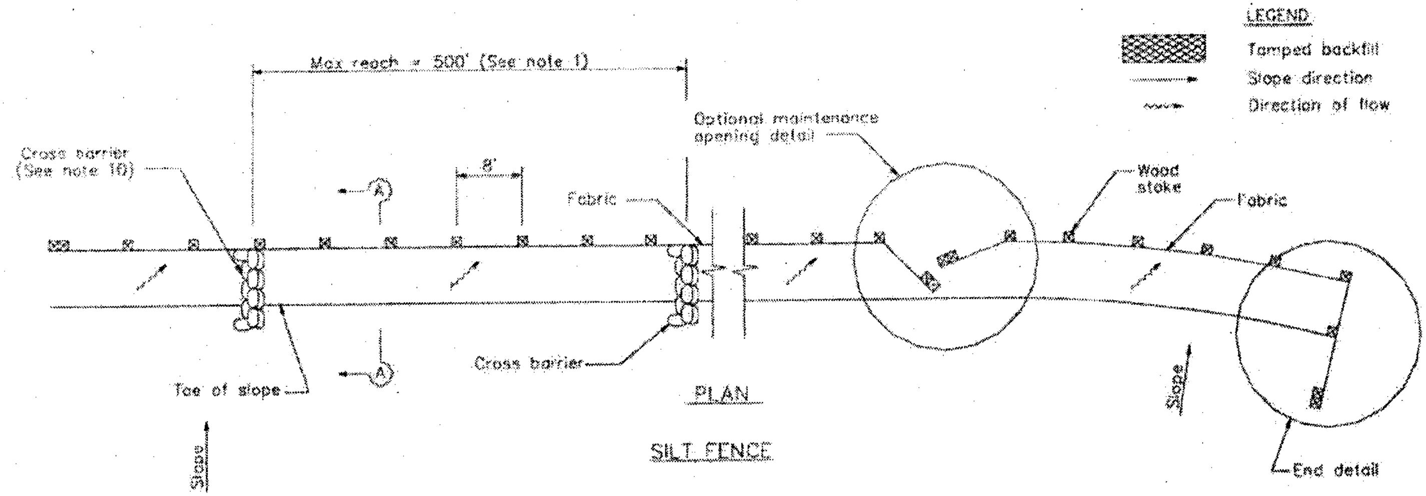
Interagency Catch Basin Insert Committee, Evaluation of Commercially-Available Catch Basin Inserts for the Treatment of Stormwater Runoff from Developed Sites, 1995

Larry Walker Associates, June 1998, NDMP Inlet/In-Line Control Measure Study Report

Manufacturers literature

Santa Monica (City), Santa Monica Bay Municipal Stormwater/Urban Runoff Project - Evaluation of Potential Catch basin Retrofits, Woodward Clyde, September 24, 1998

Woodward Clyde, June 11, 1996, Parking Lot Monitoring Report, Santa Clara Valley Nonpoint Source Pollution Control Program.

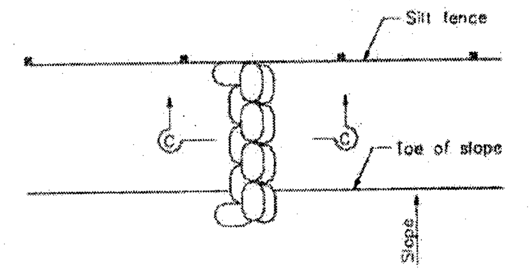


PLAN

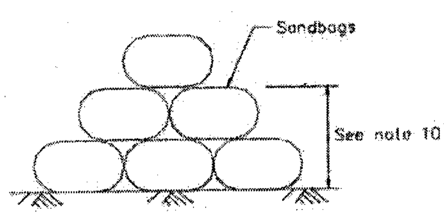
SILT FENCE

NOTES

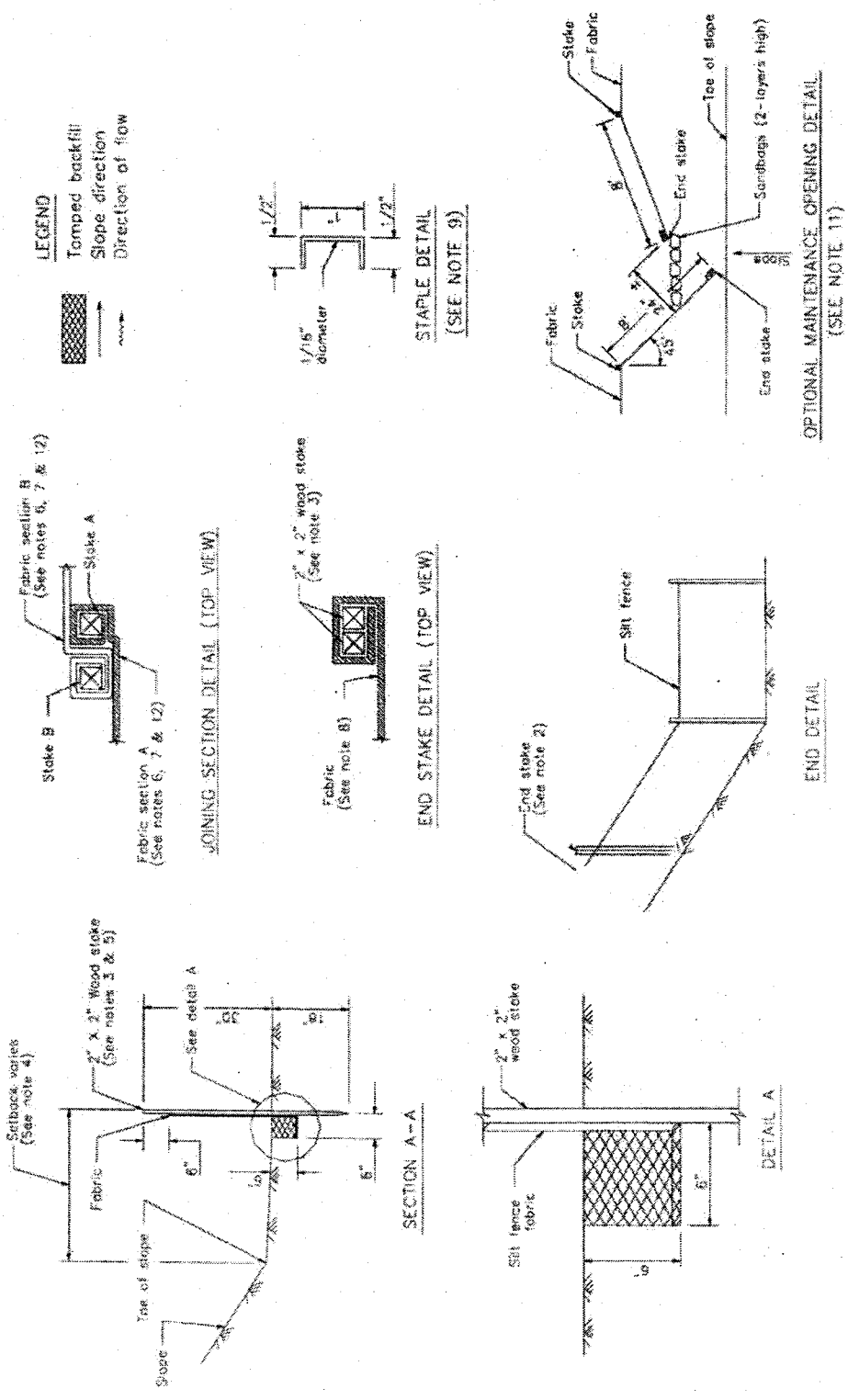
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'-0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'-0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow-through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.

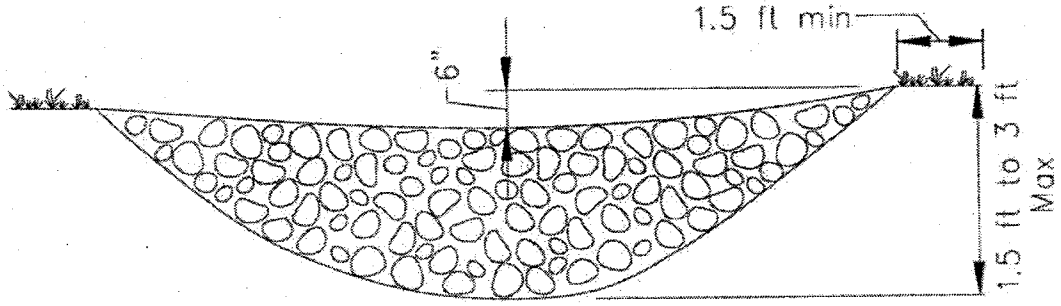


CROSS BARRIER DETAIL

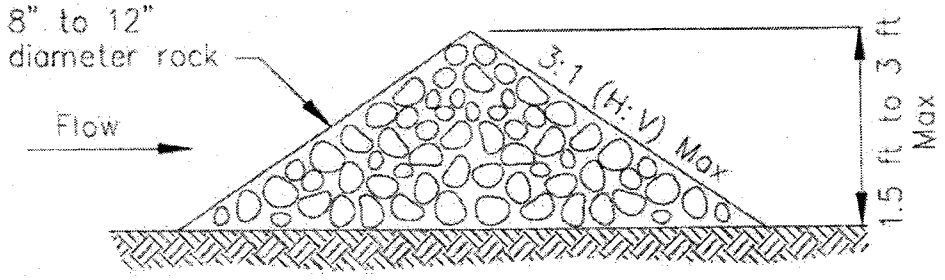


SECTION C–C


LEGEND
Tamped backfill
Slope direction
Direction of flow
1/2"
1/16" diameter
STAPLE DETAIL
(SEE NOTE 9)
Stake
Fabric
Toe of slope
End stake
Sandbags (2-layers high)
Fabric
Stake
End stake
OPTIONAL MAINTENANCE OPENING DETAIL
(SEE NOTE 11)
Fabric section B
(See notes 6, 7 & 12)
Stake A
Stake B
Fabric section A
(See notes 6, 7 & 12)
JOINING SECTION DETAIL (TOP VIEW)
2" x 2" wood stake
(See note 3)
Fabric
(See note 8)
END STAKE DETAIL (TOP VIEW)
Silt fence
End stake
(See note 2)
END DETAIL
Setback varies
(See note 4)
2" x 2" Wood stake
(See notes 3 & 5)
See detail A
Fabric
6"
6"
Toe of slope
Slope
SECTION A-A
2" x 2"
wood stake
Silt fence
fabric
6"
DETAIL A

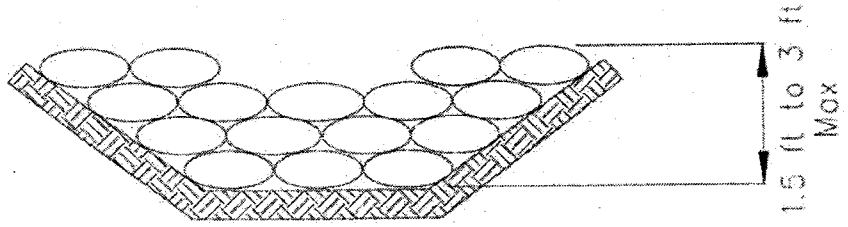


ELEVATION

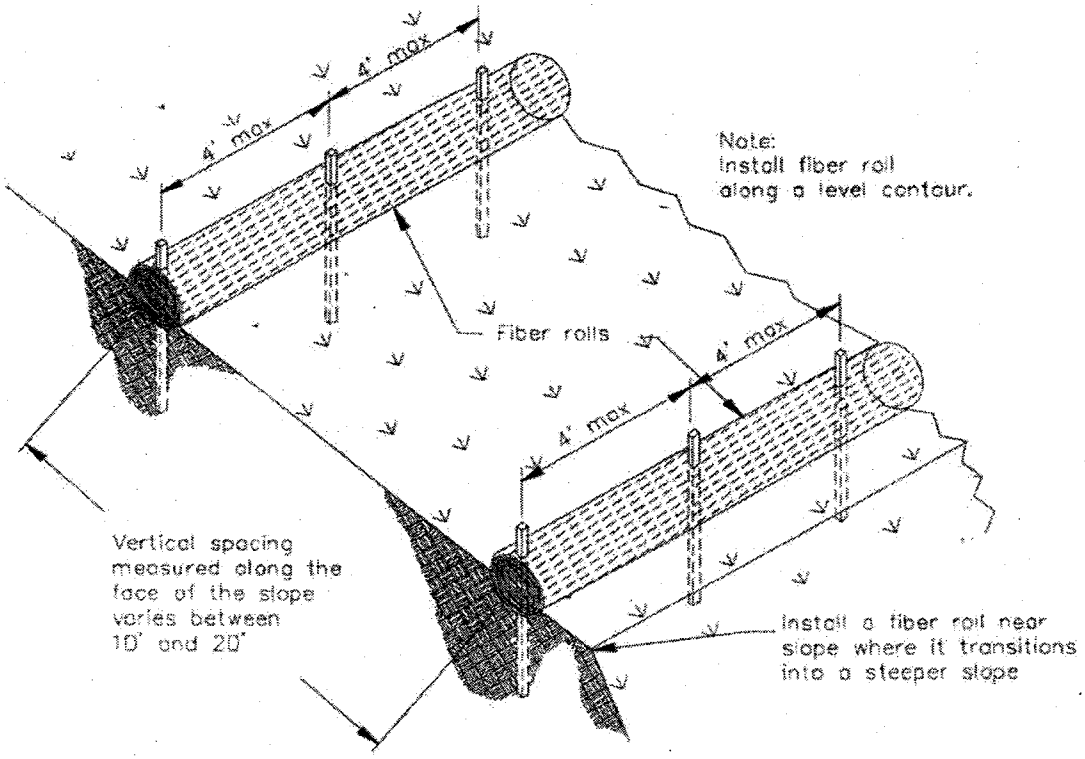


TYPICAL ROCK CHECK DAM SECTION

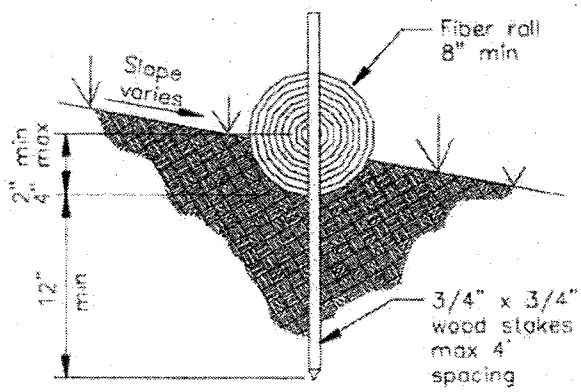
ROCK CHECK DAM
NOT TO SCALE



GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE

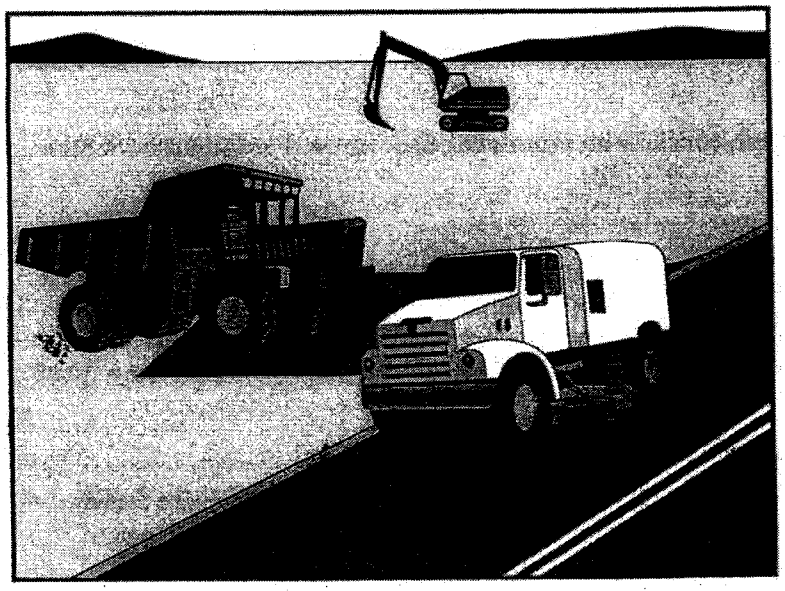


TYPICAL FIBER ROLL INSTALLATION
N.T.S.



ENTRENCHMENT DETAIL
N.T.S.

Street Sweeping and Vacuuming SE-7



Objectives		
EC	Erosion Control	
SE	Sediment Control	✓
TC	Tracking Control	✓
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
✓ **Primary Objective**
✓ **Secondary Objective**

Targeted Constituents	
Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	
Oil and Grease	✓
Organics	

Potential Alternatives

None

Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.

CASQA California Stormwater Quality Association

- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $58/hour (3 yd^3 hopper) to $88/hour (9 yd^3 hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

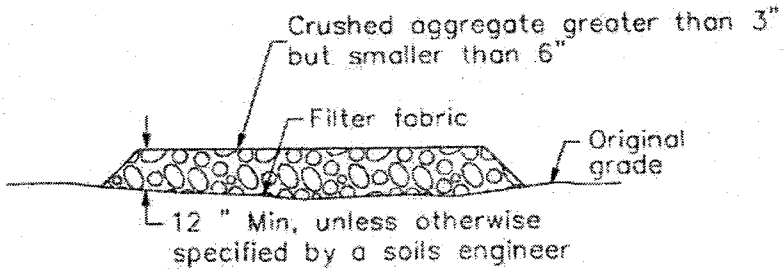
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

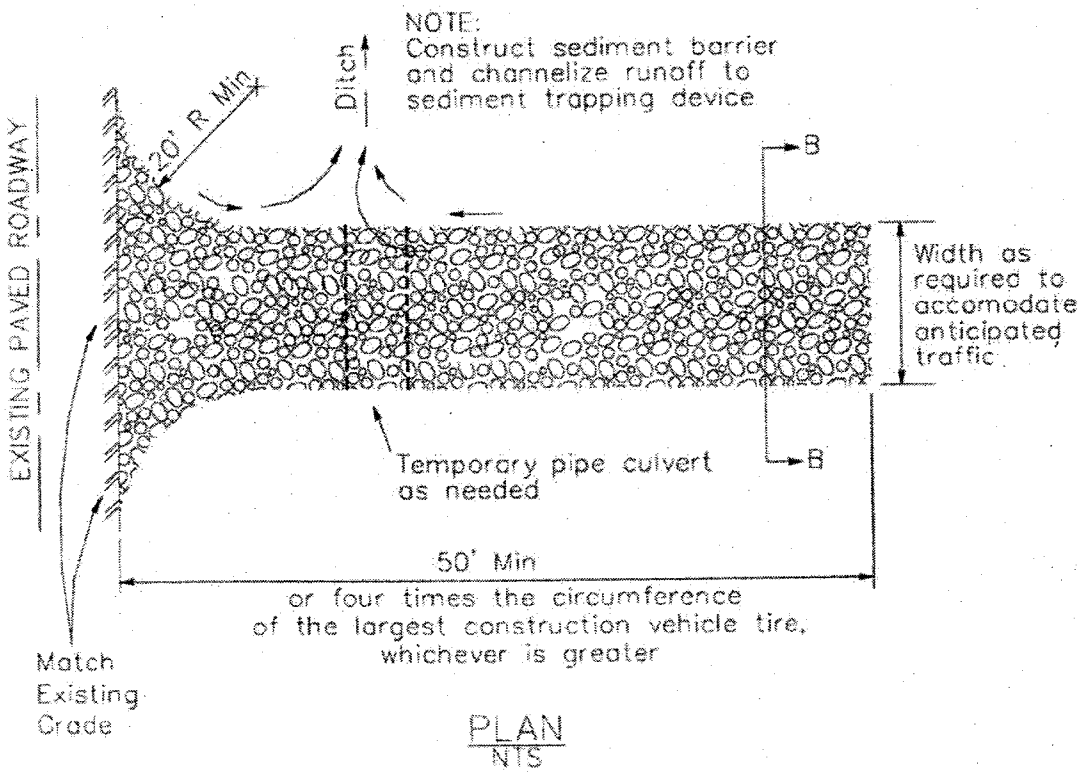
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.

Stabilized Construction Entrance/Exit TC-1

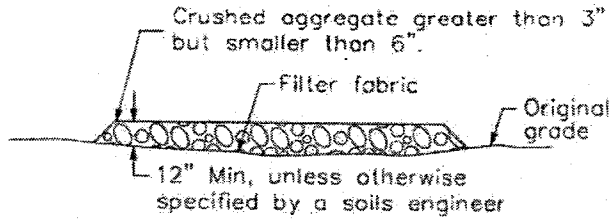


SECTION B–B
NTS

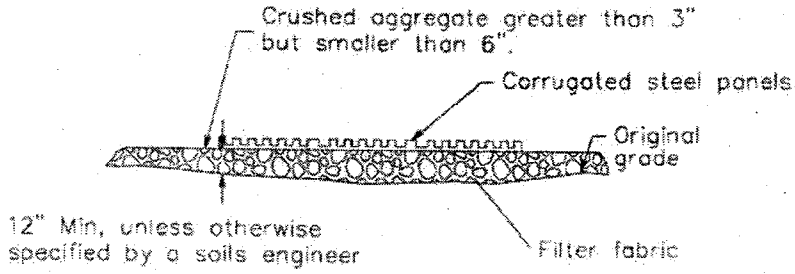


PLAN
NTS

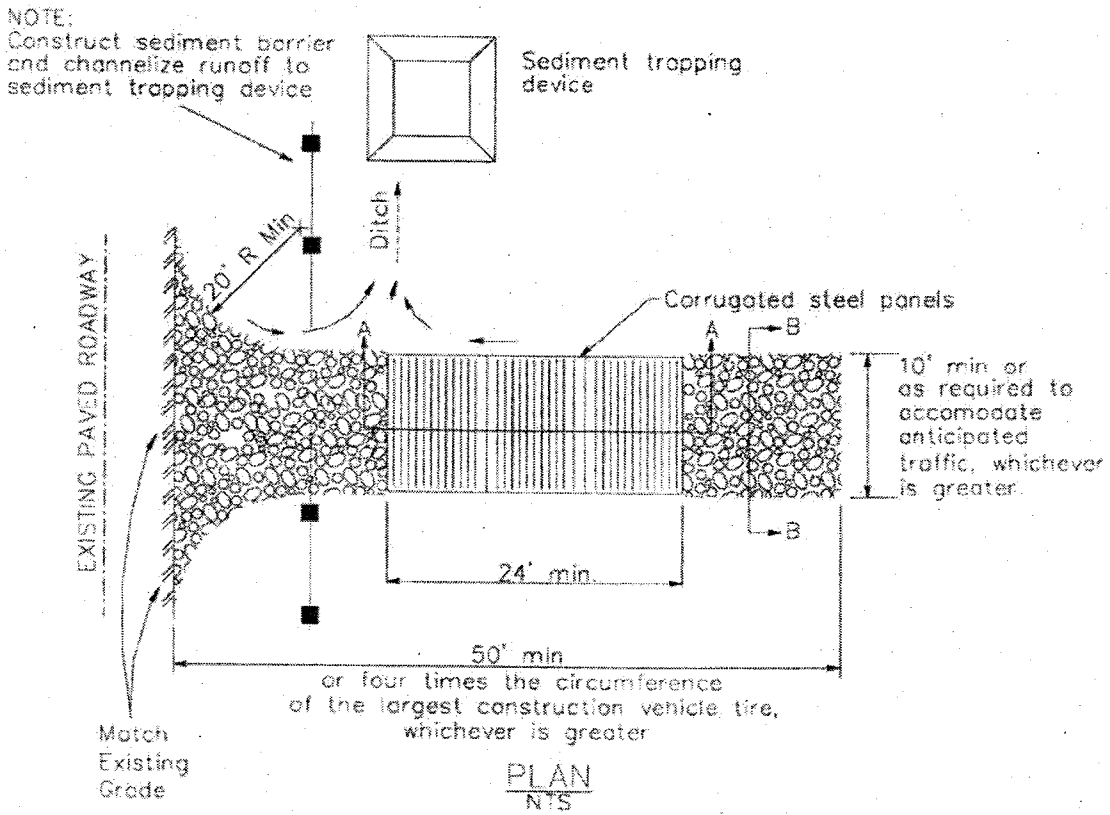
Stabilized Construction Entrance/Exit TC-1



SECTION B–B
NTS



SECTION A–A
NOT TO SCALE



PLAN
NTS

APPENDIX "C"

C4P3 Approximate Demolition Quantities

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Riverside County
Waste Management Department
Badlands Engineering Team

C4P3 Approximate Demolition Quantities

Type	Location	Thickness (in)	Length (ft)	Width (ft)	Area (sq ft)	Volume (cu ft)	Total Volume (cuft)	Total Volume (cuyd)
Rip Rap	Bench P	12	20	14	280	280	21,151	783
	Bench G	12	17	20	340	340		
	Toe of Slopes	12	10	15	150	150		
	Culvert Outlet	12	157	13	2041	2041		
	Chad's Highway	12	917	20	18,340	18,340		
Asphalt	Bench C	6	285	18	5,130	2,565	25,947	961
	Bottom of C4	6	724	18	13,032	6,516		
	Chad's Highway	6	937	36	33,732	16,866		
Shotcrete	Bench P	3	855		1.2	1,067	8,741	324
	Bench G	3	595		1.0	607		
	Toe of Slopes	3	530		1.1	574		
	Splashwalls at Bottom of C4	7	1441		3.2	4,623		
	Splashwall by Chad's Highway	8	103		9.3	961		
	Culvert	6	88		7	616		
	Outlet	6	5		7	35		
	Well Wall	7	80		3.2	257		
Reinforced Concrete	Secondary Containment Structure at the Bottom of Canyon 4:						2,499	93
	Concrete Wall	8.0	160	4		427		
	Concrete Pad	12	64	24		1,536		
	Tank 7 Concrete Pad	12	14	15	210	210		
	Tank 6 Concrete Pad	12	13	14	182	182		
	Newly Installed Tank Concrete Pad	12	12	12	144	144		
						Total	**58,337**	**2,161**

APPENDIX "D"

Stability Evaluation Badlands Sanitary Landfill, Canyon 4, Phase 3, Riverside County, California letter submitted by GeoSyntec Consultants dated January 5, 2012.

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Geosyntec consultants

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PH 714.969.0800
FAX 714.969.0820
www.geosyntec.com

11 January 2011

Mr. Andy Cortez, P.E.
Engineering Project Manager
Riverside County Waste Management Department
14310 Frederick Street
Moreno Valley, CA 92553

Subject: Stability Evaluation
Badlands Sanitary Landfill, Canyon 4, Phase 3
Riverside County, California

Dear Mr. Cortez:

GENERAL

This letter report was prepared for the Riverside County Waste Management Department (RCWMD) by Geosyntec Consultants, Inc. (Geosyntec) to document the geotechnical evaluations required for design of Canyon 4, Phase 3 (C4P3) composite liner system. Canyon 4 is at the Badlands Sanitary Landfill (site) in Riverside County, California.

The work performed by Geosyntec included static and seismic stability evaluations of representative slope configurations within C4P3 footprint. These representative configurations include configurations that control: (i) landfill liner/waste mass stability; (ii) stability of temporary cut slopes; and (iii) stability of permanent engineered fill slopes.

BACKGROUND INFORMATION

The approximate location of the site with respect to the major cities and highways in the area is shown in Figure 1. The current layout of the site, with the location of the footprints of the previously constructed phases within Canyons 3 and 4, the location of the existing unlined landfill, and the location of the proposed C4P3 expansion is shown in Figure 2.

With exception of the existing unlined landfill, the previous phases at the site are lined by composite liner systems. The extent of these previous composite liner systems is

shown in Figure 3. Detailed description of individual components of previous liner systems is provided in Table 1. Additional background information regarding conditions at the site is available in Geosyntec [2006].

PROPOSED C4P3 CONFIGURATION

The proposed C4P3 will be a modern landfill cell, designed as California Class III facility in accordance with Title 27 of the California Code of Regulations (CCR Title 27) requirements. Accordingly, C4P3 will be lined with a composite liner system. Two alternative configurations of base liner (Alternatives A and B) and two configurations of side-slope liner are considered by RCWMD, as listed in Excerpt from Table 1 below:

Excerpt from Table 1 (Table 1 enclosed at the end)

Liner System	Configuration (components from bottom to top)
Base Liner – Alternative A	• 1-ft Low Permeability Layer • 40-mil HDPE Geomembrane (double textured) • Geosynthetic Clay Liner (GCL) • 60-mil HDPE Geomembrane (double textured) • 9 to 12-in. Gravel (LCRS) • 8 oz/yd^2 Geotextile • Protective Soil Layer
Base Liner – Alternative B	• 2-ft Compacted Clay Liner (CCL) • 60-mil HDPE Geomembrane (double textured) • 9 to 12-in. Gravel (LCRS) • 8 oz/yd^2 Geotextile • Protective Soil Layer
Side Slope Liner (1.5H: 1V)	• Geosynthetic Clay Liner (GCL); • 80-mil thick HDPE geomembrane single textured • protective soil layer
Side Slope Liner (1H:1V)	• Shotcrete • 32-oz Geotextile • Geosynthetic Clay Liner (GCL); • 80-mil thick HDPE geomembrane single textured • protective soil layer

The proposed C4P3 waste fill plan, as provided by RCWMD in December 2010, is shown in Figure 4. Also included in Figure 4 are cut slope inclinations and limits of in

place refuse as of October 2009 (latest available). It should be noted that the proposed C4P3 waste fill plan merges with in-place refuse and waste fill plans of previous phases of landfill development and hence represents the final configuration of Canyon 4 development. It also should be noted that the final configuration of Canyon 4 also includes a liner expansion on the north side of the final waste fill limits within Canyons 2 and 3. That liner expansion will take place after the C4P3 expansion and hence is not part of the scope of this report.

The proposed C4P3 waste fill plan (and, by extension, the final configuration of Canyon 4 development) calls for refuse disposal to elevation 2,460 feet above mean sea level, with a maximum waste pile thickness of approximately 300 ft. The design waste pile slope inclination is 3.0H: 1.0V (Horizontal: Vertical) between benches with a maximum slope inclination, including benches, of approximately 3.5H: 1.0V.

The preliminary calculations showed that a permanent engineered fill berm at the toe of the waste is required for stability. The approximate location and extent of this toe berm are indicated on Figure 5. The face of this berm will have an inclination between benches of 2.0H: 1.0V. The maximum thickness of engineered fill in the berm will be approximately 100 feet.

It is anticipated that construction of the C4P3 liner system will begin as early as spring 2011 and waste placement in C4P3 will begin shortly after C4P3 construction is complete.

DESIGN BASIS AND STABILITY CRITERIA

General

The design basis and the stability criteria for design of C4P3 are documented in Geosyntec [2010]. These criteria were presented to the Santa Ana Regional Water Quality Control Board (RWQCB) in August 2010 and were, with minor modifications, adopted by the RWQCB shortly thereafter. Relevant information from Geosyntec [2010] is reproduced below and summarized in Table 2.

Permanent Waste Fill Slopes

As C4P3 south-facing waste slopes represent the final stage of Canyon 4 development, these slopes are considered the final configuration of landfill development. Accordingly, the following stability criteria were applied to these final waste fill slopes:

- Static Factor of Safety: FS $\geq$ 1.5;
- Seismic Loading: Maximum Credible Earthquake (MCE); and
- Maximum calculated permanent seismic displacement: $u_{max} \leq 6$ in. (for failure surfaces engaging composite landfill liner system).

Permanent Cut Slopes

Cuts slopes that will be left un-buttressed upon completion of C4P3 extend above a 45-ft wide haul road that extends along the eastern edge of C4P3 (see Figure 5). The Geosyntec [2002] study shows that bedding in this area is favorable (i.e., in-slope), with Calculated Factors of Safety in excess of 1.5. Seismically-induced raveling along these slopes (if any) is not likely impact the C4P3 composite liner system due to the width of the haul road. Therefore, and seismically-induced raveling along these slopes is considered a maintenance issue and hence no additional seismic stability evaluation of these slopes is performed as a part of this study.

Permanent Engineered Fill Slopes

Permanent engineered fill slopes in the toe berm area (see Figure 5) are considered herein the permanent configuration of landfill development. Accordingly, the following stability criteria were applied to these cut and engineered fill slopes:

- Static Factor of Safety, FS $\geq$ 1.5;
- Seismic Loading: Maximum Credible Earthquake (MCE);
- Maximum calculated permanent seismic displacement: $u_{max} \leq$ 6 in. (for failure surfaces engaging composite landfill liner system); and
- Maximum calculated permanent seismic displacement: $u_{max} \leq 36$ in. (if the critical failure surface does not engage the landfill liner system and repair of the slope is not limited by difficult access).

Temporary Cut Slopes

Temporary cut slopes are cut slopes that will be buttressed by waste within 6 to 18 months upon commissioning of C4P3 composite liner system. The following stability criteria were applied to these cut slopes:

- Static Factor of Safety, FS $\geq$ 1.2;
- Seismic Loading: Not applicable (MCE is not likely to occur within 6 to 18 month slope life); and
- Maximum calculated permanent seismic displacement: Not applicable.

SEISMIC HAZARD PARAMETERS

Source and Path Parameters

The detailed seismic hazard analysis is presented in Geosyntec [2002]. This analysis has been updated herein (Appendix A: Seismic Hazard Evaluation and Development of Design Ground Motions) to account for the new peak horizontal ground acceleration, PHGA, attenuation models [NGA Peak Ground Acceleration Attenuation Models: Abrahamson et al., 2008; Significant Duration of Strong Ground Shaking, D_s, Model: Kempton and Stewart, 2006]. The design earthquake level is MCE. The design parameters are as follows:

- Design Earthquake Level: MCE
- Controlling Fault: San Jacinto Valley segment of the San Jacinto fault;
- Design Moment Magnitude, M_w = 6.9;
- Site-to-source distance: 2.9 km;
- Bedrock PHGA = 0.44 g; and
- Bedrock D_s = 13 seconds (mean value).

The M_w 7.8 far-field event on the San Andreas fault (site-to-source distance = 16.5 km; bedrock PHGA = 0.23 g) was also considered (see Appendix A). However, consistent with evaluations documented in Geosyntec [2002], due to relatively low PHGA, this

far-field seismic event was found less damaging that its near-field counterpart and was removed from further considerations.

Design Ground Motions (Accelerograms)

A suite of design accelerograms was previously developed by Geosyntec [2002] and has been used for subsequent seismic evaluations at the site. This suite includes the following accelerograms: Tabas, Rio Dell, Stone Corral, Santa Teresa Hills, and Saratoga Aloha Avenue. All of these accelerograms were recorded in Moment Magnitude 6.9+ earthquakes and meet target spectral content and duration. Acceleration response spectra of these accelerograms are compared to the target acceleration response spectrum in Appendix A.

All five accelerograms, scaled to MCE PHGA of 0.44 g, were used to evaluate maximum permanent seismic displacements of the proposed C4P3 final waste fill plan, including the toe buttress.

SLOPE STABILITY ASSESSMENT

Method of Analysis

For static stability evaluation of final waste, cut, and engineered fill slopes, Geosyntec used the conventional limit equilibrium approach. In particular, Geosyntec employed the Morgenstern and Price [1965] method, as implemented in the computer program SLOPE/W (www.geo-slope.com). The results of static analyses are presented, for each stability configuration evaluated, in a form of critical (static) failure surface and the corresponding lowest calculated Factor of Safety (FS). The results of pseudostatic analyses are presented, for each stability configuration evaluated, in a form of critical (pseudostatic) failure surface and the corresponding lowest calculated yield acceleration of sliding mass (k_y).

The seismic stability of the final waste fill slopes was evaluated based upon the results of pseudostatic slope stability analysis (i.e., k_y) and the results of one-dimensional non-linear site response analysis of the representative landfill/soil profile, using the Newmark [1965] seismic displacement approach.

The site response analyses were conducted using the computer program D-MOD2000 [Matasovic, 1993; Matasovic, 2006; www.GeoMotions.com]. D-MOD2000 is a fully nonlinear code that solves the dynamic equation of motion in the time domain. The

behavior of soil and soil-like materials is modeled in D-MOD2000 using the non-linear hysteretic constitutive model proposed by Matasovic and Vucetic [1993]. A small amount of viscous damping (typically on the order of 0.5 percent) was assigned across the profile to ensure the numerical stability of the solution.

Maximum seismically induced permanent displacements of the waste-fill-landfill liner system were evaluated using Newmark-type [Newmark, 1965] seismic deformation analysis as coded in program YSLIP2000 [Matasovic, 1996; 2007; www.GeoMotions.com].

Representative Cross Sections and Site Response Analysis Columns

Temporary Cut Slopes

The temporary stability of cut slopes within the C4P3 footprint was evaluated during the previous comprehensive geologic evaluation of site geology by Geosyntec [2002]. The location of the representative cross sections (E-E' and G-G') evaluated by Geosyntec [2002] are shown in D-size drawing reproduced in Appendix G. It should be noted that the location of these cross sections approximately corresponds to Cross Section B-B' in Figure 5.

Final Waste Fill Slopes

A total of four representative Cross Sections (Cross Sections A-A', B-B', C-C', and D-D') was developed for evaluation of landfill liner/waste fill stability. The locations of these cross sections are shown in plan view in Figure 5. The cross sections themselves are shown in Figures 6 through 9.

Site Response Analysis Columns

A total of two representative columns for site response analyses (200-ft and 300-ft high columns) were developed. These representative columns were developed based upon the results of pseudostatic evaluations (i.e., critical pseudostatically-evaluated failure surfaces) that are also shown in Figures 6 through 9.

Material Parameters – Composite Liner System

Key Assumption

Geosyntec assumed that the alternative with lower interface shear strength (i.e., Alternative A in Table 1; encapsulated GCL) will be selected by RCWMD as the base liner system for C4P2. Therefore, stability evaluations were performed only for that alternative.

Material Parameters

Geosyntec assigned the interface shear strength parameters of C4P3 composite liner system based upon the results of conformance testing of the most recently constructed stage of Canyon 4 development - C4P2. These conformance testing results are reproduced as Appendix B. The particular shear strength parameters adopted herein are listed in Table 1. It should be noted that these adopted shear strength parameters are: (i) based upon residual (i.e., large displacement) test values; (ii) in accordance with DWR requirements, for encapsulated GCL at landfill base, 50% hydration of the GCL is assumed; and (iii) for side slope liner configurations which are without encapsulation, full hydration of the GCL was assumed.

The distribution of the C4P3 composite liner system components (base and side slope components) is shown in Figure 3. However, we note that, in order to better simulate the three-dimensional geometry at the toe of C4P3, we conservatively assigned side slope component properties in static and pseudostatic stability evaluations documented herein.

Material Parameters – MSW

Geosyntec assigned generic material parameters to Municipal Solid Waste (MSW) as follows:

- Static and pseudostatic evaluations: generic set of material parameters developed by Kavazanjian et al. [1995] based upon back-analysis of steep slopes in MSW and laboratory testing of MSW; and
- Site response analyses: generic set of material parameters developed by Matasovic and Kavazanjian [1998] based upon back-analysis of strong ground

motions at the OII landfill (Monterey Park, California) and laboratory testing of MSW recovered from the same landfill.

Waste material parameters for static and seismic (i.e., site response) analyses are summarized in Tables 3 and 4, respectively.

Material Parameters – Engineered Fill

A portion of the C4P3 liner system will be constructed of engineered fill. This engineered fill will be placed as a toe berm in the southern portion of the cell. For the purposes of stability evaluations documented herein, this engineered fill was assumed to consist of a silty sand material available on site and compacted to a minimum of 90% of the maximum dry density as established by the modified Proctor compaction test (ASTM D 1557). Based upon in Geosyntec's previous evaluations regarding this material [2002, 2009b], it can be characterized by a friction angle of 33.7 degrees, an effective cohesion of 346 psf, and a unit weight of 120 pounds per cubic foot.

Engineered fill material parameters for static and pseudostatic analyses are summarized in Table 3.

Results of Stability Evaluations

Temporary Cut Slopes

The results of static stability evaluations of temporary cut slopes are documented in Geosyntec [2002]. Locations of these representative cross sections with respect to mapped bedding orientations, Cross Sections, and the results of the stability analyses are presented in Appendix G.

Final Waste Fill Slopes

The results of static and pseudostatic stability evaluations of final waste fill slopes are presented in Figures 6 through 9. These results indicate that: (i) the lowest calculated static Factor of Safety equals FS = 2.0 (Cross Section B-B'; Figure 7); and (ii) the lowest calculated yield acceleration equals k_y = 0.25 g (Cross Section A-A'; Figure 6).

Detailed calculations (i.e., computer program graphical outputs) are presented in Appendix C.

Final Engineered Fill Slopes

The results of static and pseudostatic stability evaluations of final engineered fill slopes are presented in Figures 6, 8 and 9. These results indicate that: (i) the lowest calculated static Factor of Safety equals FS = 2.5 (Cross Section D-D'; Figure 9); and (ii) the calculated yield accelerations of engineered fill are in excess of k_y = 0.30 g (all three cross sections).

Detailed calculations (i.e., computer program graphical outputs) are presented in Appendix C.

Site Response Analysis

The results of seismic site response analyses are presented, for each accelerogram and waste fill column considered, in Table 5. These results indicate that: (i) in general, the response of the shorter column (200 ft) is higher than of its higher (300 ft) counterpart; (ii) both columns amplify the input (i.e., bedrock) motion, with amplification factor as high as 1.75 (0.77 g/0.44 g; Santa Teresa Hills accelerogram); and (iii) for three out of five accelerograms, peak average acceleration exceeds lowest calculated k_y, hence seismically-induced permanent displacements along the landfill liner can theoretically occur and hence a formal seismic deformation analysis is required.

Detailed site response calculations (i.e., computer program outputs) are presented in Appendix D.

Seismic Deformation Analysis

The results of seismic deformation analysis are shown in Figures 10 (200-ft high column), 11 (300 ft high column), and 12 (free-field condition; applicable for engineered fill in the toe berm area). These results indicate that: (i) the largest displacement response, for both waste fill column heights, is induced by the Stone Corral accelerogram scaled; (ii) as long as calculated yield acceleration of waste fill is lower than 0.2 g, calculated permanent seismic displacements will be lower than the stability criterion of 6 inches; and (iii) as long as calculated yield acceleration of toe berm area are higher than 0.06 g, calculated permanent seismic displacements will be lower than the stability criterion of 36 inches.

Detailed calculations (i.e., computer program outputs) are presented in Appendix D for waste fill slopes and in Appendix E for toe berm.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The proposed Canyon 4 Phase 3 (C4P3) configuration, as presented in this report, meets static and seismic stability criteria established for the site by Geosyntec and approved by the Santa Ana region Regional Water Quality Control Board. In particular, for permanent configurations evaluated herein, calculated static factors of safety are higher than 1.5 and calculated permanent seismic displacements are lower than 6 inches (36 inches for slope surfaces not engaging composite liner system). For interim configurations evaluated herein, calculated static factors of safety are higher than 1.2.

The above stated conclusions are valid regardless of base liner alternative (A or B, as outlined in this report) to be selected by RCWMD.

Recommendations

Based upon the results of geologic and engineering evaluations documented herein and our experience with this and other sites in the area, we recommend the following:

- In accordance with the regulatory requirements, unconsolidated and/or potentially unstable sediments within proposed C4P3 footprint, including alluvium and colluvium, should be removed by grading. Where necessary (i.e., if removed below design grades), these materials should be replaced with engineered fill, as specified below. If, during the removal operations, it is found that thickness of unconsolidated and/or potentially unstable sediments exceeds 3 to 5 feet and therefore their complete removal is burdensome, Geosyntec will, based upon the relative location, depth, and density, evaluate the situation and develop further recommendations.
- Monitoring is required during grading operations. This monitoring includes observation of cut slope conditions upon completion of every bench and immediately upon completion of grading operations.
- The monitoring should be performed by qualified personnel (i.e., a Certified Engineering Geologist (C.E.G.) registered in the State of California or registered geologist working under his direction). The responsibilities of "qualified personnel" include the following: (i) perform in-grading observations and document the observations in an in-grading report;

(ii) establish the limits (horizontal and vertical) of unconsolidated and/or potentially unstable sediments that require removal; (iii) work with the Geotechnical Engineer to develop remedial measures if removal of unconsolidated and/or potentially unstable sediments becomes burdensome, as explained above.

- The section of the C4P3 that requires placement of engineered fill (i.e., toe buttress) should be constructed in accordance with the local grading standards. This includes: (i) proper design of base and side slope drainage; (ii) proper preparation of fill subgrade (clean up to competent subgrade as determined by "qualified personnel"); and (ii) proper keying of engineered fill into the subgrade, with minimal keying depth at the toe of engineered fill slope of 5 ft.
- Engineered fill within C4P3 footprint should meet the following specifications: (i) compacted to at least 90% of the maximum dry density established by the Modified Proctor Compaction Test (ASTM D 1557); (ii) in-place moisture content not to exceed 2% above optimum; (iii) thickness of loose lifts not to exceed 12 in.; (iv) thickness of compacted lifts not to exceed 8 in.; (v) particle size within last two feet of fill not to exceed 3 in. and 6 in. below; and (vi) the particle protrusion height, at any location, should not exceed ¾ in.
- If imported material (i.e., fill imported from off site) is used to construct engineered fill, one conformance shear strength test should be performed per every 5,000 cubic yards of placed engineered fill. In any case, Construction Quality Assurance (CQA) monitoring and density testing are required during the engineered fill placement.
- Positive drainage (i.e., drainage away from graded slopes and down benches) should be established immediately upon completion of grading. As infiltration of rainwater into the slopes may have an adverse effect on slope stability, this positive drainage should be maintained until C4P3 closure.
- Placement of waste fill should commence within 6 months of completion of composite liner construction and within 18 months of completion of grading. Should placement of waste fill not commence within these time frames, the California Regional Water Quality Control Board, Santa Ana Region and Geosyntec should be notified immediately.

- Placement of C4P3 waste fill should be executed 15- to 20-ft thick lifts, starting from north. If cracking in existing waste fill, that was observed in December 2010, progresses, this practice might be revised.

- If seeps, cracking, and/or bulging are observed within the footprint of the proposed C4P3 expansion during a time when Geosyntec representatives are not present at the site, Geosyntec should be notified immediately.

LIMITATIONS

The professional opinions and recommendations expressed in this letter report are made in accordance with generally accepted standards of practice. This warranty is in lieu of any other warranty, either expressed or implied. We are responsible for the conclusions and recommendations contained in this letter report based on the data relating only to the specific project and location discussed herein. We are not responsible for the accuracy of data produced by others and relied upon in the generation of this letter report. We are not responsible for the use of the information contained in this letter report for purposes other than those expressly stated in this report.

The scope of this report encompasses only final waste fill, final engineered fill, and temporary cut slopes specifically evaluated herein. We are not responsible for stability of any other cut and/or fill slope that is (or will be) graded and/or constructed at this site.

In the event that there are changes in the design or location of this project that do not conform to the project as described herein, we will not be responsible for these changes unless given the opportunity to review them and concur with them in writing. We are not responsible for any conclusions or recommendations made by others based upon the data or conclusions contained herein unless given the opportunity to review them and concur with them in writing.

Geosyntec consultants

CLOSURE

We appreciate the opportunity to continue our service to the County. If you have any questions about this letter report, or require additional explanation of the information presented in this report, please do not hesitate to call the undersigned at (714) 969-0800.

Sincerely,

Christopher S. Conkle, P.E., G.E.
Project Engineer

Neven Matasovic, Ph.D., P.E., G.E.
Associate

Enclosure: Figures 1 through 11, Tables 1 through 5, and Appendices A through G.

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APPENDIX "E"

Hydraulic Conductivity Testing Program Results dated October 12, 2010

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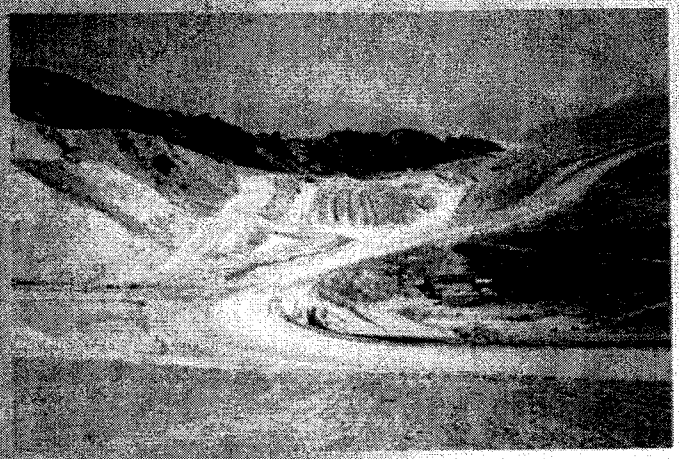
REPORT ON

QA/QC OBSERVATIONS AND TESTING FOR CLAY DELIVERY TO BADLANDS LANDFILL AND CONSTRUCTION OF TEST PAD



PREPARED FOR

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WASTE RESOURCES MANAGEMENT DISTRICT
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Project No. 97-111
November 28, 1997

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APPENDICES

1.0 INTRODUCTION

This report by Advanced Earth Sciences, Inc. (AES) presents the results of our geotechnical observations and testing during excavation of clay material from the Eastern Municipal Water District's (EMWD) Skiland site and delivery to the Badlands Landfill, and during construction of a test pad at the Badlands Landfill site. The location of the Skiland borrow site is shown on Figure 1 and the location of Badlands Landfill is shown on Figure 2. The material was stockpiled at the Badlands Landfill for later use as clay liner as part of the composite liner construction for expansion of this landfill. The purpose of the test pad construction was to evaluate the material placement, as well as processing and compaction that could produce a clay liner meeting a hydraulic conductivity of 1.0×10^{-7} cm/sec or less. Based on the results of the test pad construction, the construction specifications were to be developed that could be incorporated into the bid documents to be prepared by the Riverside County Waste Resources Management District (District) for the construction of the clay liner for Badlands Landfill.

The excavation, hauling, and stockpiling of the materials were performed by Roadway Construction between October 1 and October 20, 1997 under contract with the District. During this period, a total of approximately 50,000 tons of clay materials were hauled to the Badlands site. The processing operations of the stockpile, including spreading, discing, and moisture conditioning, were performed by Roadway Construction. The construction of the test pad was performed by the District's forces utilizing their own equipment and under the QA/QC observations by an AES senior technician. The test pad construction and testing were conducted between October 22 and 25, 1997. The full time field QA/QC observations during material excavation at the Skiland borrow site were provided by an AES senior technician who also provided part-time observation and sampling of the stockpile materials at the Badlands Landfill site. The stockpiling operations were handled on a full time observation basis by the District's Inspector.

2.0 SCOPE OF WORK

The scope of work, as presented in AES' proposal dated September 22, 1997 and as authorized by the District included the following:

- Geotechnical observations and testing during clay excavation and stockpiling;
- Geotechnical observations and testing during clay test pad construction;
- Preparation of recommendations for clay liner placement specifications to be incorporated by the District into the bid documents; and,
- Preparation of an as-built report providing certification of compliance.

A detailed discussion of the procedures and the results of our observations and testing are presented in the following sections of the report. During the progress of this project, our field technician prepared daily field reports summarizing our QA/QC observations of the Contractor's operations at the Skiland Borrow Site and at the stockpile location, as well as during test pad construction. These reports were submitted to the District's Project Manager on a regular basis. Copies of these reports are included in Appendix A. Copies of the individual laboratory test results are included in Appendix B.

3.0 CLAY EXCAVATION AND STOCKPILING

3.1 Clay Excavation at Skiland Site

The hauling Contractor, Roadway Construction, commenced clearing and grubbing of the Skiland Borrow Site on September 30, 1997. Hauling the material from the Skiland site to the Badlands Landfill commenced on October 1, 1997 and continued through October 20, 1997 using 22 to 33 bottom dump haul units. Typically, the equipment at the borrow site included a 980 front-end loader excavating off the clay face in the borrow area and loading it into the bottom dump units. A D8 dozer was used occasionally to supplement the excavation in the borrow area. A 4,000-gallon water truck was used principally for dust control in the borrow pit, although water was occasionally added to the relatively dry portion of the borrow materials to bring the moisture content to about 2 to 3 percent over optimum.

During the initial borrow operations at the southern end of the pit, the materials were typically highly plastic clays (CH) and were excavated and loaded onto dump trucks. However, following about eight to 10 days of operations, the clayey materials in the southern pond appeared to be getting depleted and an alternative location needed to be developed. About a 1-foot-thick sand

layer appeared to cover the upper part of this borrow cut which was removed and disposed off to the dikes prior to excavating this area. Also, some wet to saturated clays were encountered in this part which were in contact with a sand layer. An attempt was made to blend this wet clay layer with underlying drier materials to produce an acceptable quality of the blended product. In addition, during the last three to four days of borrow operation, a CAT 623 paddle-wheel scraper was used to recover any clayey material left on the borrow area floor that could not be picked up by the 980 loader. These materials were then spread on the active loading area to allow them to be picked up by the front-end loader. Excavation was done in a manner to maintain existing drainage patterns. The excavation areas of the borrow pit are shown on Figure 3

The hauling operations were performed for 14 working days from October 1, 1997 through October 20, 1997. During excavation and loading, the QA/QC observations were provided on nearly a full-time basis by an AES senior technician. The in situ moisture content of the borrow cut materials was checked by a microwave oven (ASTM D4643) and occasional single checkpoints were performed in the field to determine the moisture content of the in situ material relative to optimum. These single checkpoint results were compared against the available compaction curves from previous investigations by others to determine the optimum moisture content and evaluate a need for moisture conditioning of the material in the borrow pit or in the stockpile.

In addition to moisture content determinations, representative samples of the clay materials from the cut face were also obtained for laboratory classification tests, including Atterberg Limits and fines content (percent passing #200 sieve). Over the course of borrow operations, a total of six samples were tested for these properties. The purpose of these tests was to make sure that the materials being hauled would meet the clay liner requirements and to obtain an advance information on the quality of materials in the portions of the pit scheduled to be excavated over the next one to two days. The results of these tests were obtained on a fast turnaround basis (24 hours) and communicated to our field technician to help him plan the borrow cut operations. The test results on these samples are presented on Table 1 and indicated that the materials would yield acceptable quality of clay liner material.

3.2 Stockpile Operations at Badlands Landfill

The material from the Skiland borrow site was brought to the Badlands Landfill stockpile located adjacent to the scales area as shown Figure 4. The operations at the stockpile site were under full time supervision of the District's Inspector. The equipment at the stockpile site included a CAT 824 dozer with a disc and a water truck. As the bottom dumps arrived at the stockpile site and dumped the loads on the stockpile, water was added as needed by a water truck and the material spread by the dozer. The area was processed by at least one pass of a disc in an attempt to break up the clay clods and to provide relatively uniform moisture distribution and some degree of blending.

Our field technician visited the stockpile location once every day and sampled the material for moisture content and compaction checkpoints. Based on the checkpoint results, an evaluation was made to determine if water should be added to the stockpile material to bring it up to the desired range, i.e., 2 to 5 percent wet of optimum. The District's Inspector was then advised on moisture conditioning requirements as determined from the test results.

3.3 Laboratory Testing

The stockpile materials were continuously sampled to monitor the quality of the material being received and to evaluate the material suitability for clay liner construction. Since the material hauled from the borrow site was processed at the stockpile location (including spreading, moisture conditioning, and discing) and would more closely represent the properties of material used for clay liner construction, most of the laboratory tests were performed on representative samples obtained from the stockpile material rather than from Skiland borrow site.

A total of 11 samples were obtained, including eight from the stockpile and three from the Skiland borrow site and tested for laboratory classification, compaction, and hydraulic conductivity tests. The test results are presented on Table 1. For Sample Nos. 8 and 9 collected from the stockpile, additional tests were performed on the blend of the two samples (8 and 9) to determine the properties of blended material since Sample 8 appeared to be more clayey material and Sample 9 represented a relatively silty part of the borrow cut.

The laboratory tests included the following:

- *Gradation Analysis*—Gradation analysis, including hydrometer (ASTM D422), was performed on a total of six samples, including one from the Skiland borrow site and five from the stockpile site. In addition, fines content (ASTM D1140) was determined for another six samples, including two samples from the Skiland borrow site and four samples from the stockpile site.

- *Atterberg Limits*—Atterberg Limits (ASTM D4318) were determined on each of the 12 samples, including three from the borrow site and nine from the stockpile site.

- *Laboratory Compaction*—Based on the results of soil classification tests (gradation analyses and Atterberg Limits), a total of six representative samples were selected for laboratory maximum density and optimum moisture content determined by ASTM D1557.

- *Hydraulic Conductivity*—Hydraulic conductivity tests by flexible wall permeameter (ASTM D5084) were conducted on five representative samples recompacted to approximately 90 percent relative compaction and at moisture contents ranging between 2 and 5 percent wet of optimum. The tests were conducted at an effective confining pressure of 20 pounds per square inch (psi).

3.4 Discussion of Laboratory Test Results

The results of laboratory tests discussed above are summarized on Table 1. The results indicate that almost all of the material hauled from the Skiland Borrow Site and stockpiled at the Badlands Landfill consisted of highly plastic silty clays classified as CH on the Unified Soil Classification System (USCS). Only one of the 12 samples tested (Sample 2) was classified as CL on USCS. Another Sample, Sample 9, was borderline between CH and MH, but blending with Sample 8 resulted in a blended material with CH classification. The range of engineering parameters and the average values for the representative samples of materials tested are summarized below:

Parameter	Range	Average
Fines Content (% passing No. 200 Sieve) - percent	61-97	85
Clay content (< .002 mm) - percent	23-42	33
Liquid Limit	47-66	57
Plasticity Index	22-42	31

Parameter	Range	Average
Laboratory Maximum Dry Density (pcf)	103.0-112.5	106.5
Optimum Moisture Content	16.5-20.0	17.9
Hydraulic Conductivity* (cm/sec)	1.34×10^{-8} to 8.25×10^{-8}	4.1×10^{-8}
(*at 90 percent relative compaction and moisture content 2 to5 percent wet of optimum.)		

3.5 Conclusions for Clay Stockpile Material

Based on the laboratory test results for recompacted specimens, the clay liner material stockpiled at the site, when compacted to a relative compaction of at least 90 percent and at moisture content 2 to 5 percent over optimum, should easily meet the required hydraulic conductivity of 1.0×10^{-7} cm/sec or less.

4.0 TEST PAD CONSTRUCTION

4.1 General

Following the completion of hauling, processing and stockpiling the clay liner material, a test pad was constructed at the Badlands Landfill site at the location shown on Figure 4. The objectives of the test pad program were to:

- establish the placement and compaction methods for the clay liner material to meet the specification requirements for a hydraulic conductivity of 1.0×10^{-7} cm/sec or less; and,
- develop technical specifications that the District should include in the Special Provisions for the construction of clay liner.

A draft test pad program, including the test pad construction procedures and testing requirements and frequencies, was first prepared and submitted to the District's Project Manager for review. The test pad procedures were finalized after receiving the District's comments. Some modifications to the test pad program were made in the field to suit the placing and processing equipment available. A description of the test pad program actually implemented is provided in the following section. The test pad construction was performed under the geotechnical observation and oversight of our Senior Technician and was reviewed by the AES Project

Manager. The District's Inspector supervised the equipment deployment and preparation of subgrade for the test pad.

4.2 Test Pad Construction Procedures

The sequence of test pad procedures construction and testing included the following steps:

1. An area of about 40 feet x 100 feet was prepared as test pad subgrade by clearing, grubbing, ripping, and leveling the area. The pad was graded to drain to the southeast.

2. The subgrade was moisture-conditioned and proof-rolled by a number of passes of a full 4,000-gallon water truck until a non-yielding competent surface was achieved.

3. The processed material from the clay stockpile was hauled by a 623 scraper and spread on the test pad subgrade evenly by a D7 dozer to provide an approximately 8-inch-thick loose layer thickness. The lift thickness was checked by grade stakes. The material was moisture conditioned and compacted by six passes of a 5 x 5 sheepsfoot roller.

4. Lift Number 2 was placed and compacted using procedures described above. Three in situ density tests by nuclear gauge were performed on Lift 2. Two of the tests showed passing results and one showed failing result (88% compaction). It was decided to increase the number of compactor passes to eight per lift instead of the six initially started. Each of the subsequent lifts was compacted with eight passes each.

   Also, during placement of Lift No. 2, it was observed that the moisture content of the material was not uniform and that the material contained clay clods. Since no disc was available to provide further mixing and blending at the test pad location, a 14G grader was used to turn the material and provide mixing and blending. The 14G grader was also used on all subsequent lifts. In addition, since Lift No. 1 was placed without the use of disc or grader for mixing and breaking down clods, it was decided (with the approval of District's Project Manager) to increase the test pad thickness to 2.5 feet, placed in five compacted lifts of 6-inch compacted thickness each, and thereby exclude the first lift from any sampling and testing activities (especially during pushing Shelby tubes for laboratory hydraulic conductivity tests).

5. Lifts 3, 4, and 5 were constructed using procedures discussed above, including use of a 14G grader for mixing and blending. Each of these lifts was compacted by eight passes of a sheepsfoot roller. The 14G grader was also used in the stockpile in conjunction with moisture conditioning and blending of the stockpile material prior to hauling by 623 scrapers.

   On each of the Lifts 3 and 4, three nuclear density tests were performed to verify the degree of compaction. The compaction curves were established by a checkpoint performed in the field.

6. At the completion of placing and compacting Lift 5, i.e., final grade of the test pad, the following sampling and testing were performed:

   - Four in situ density tests by nuclear gauge with test locations selected such that they would record densities of Lifts 2 through 5. This was done by shaving off the necessary material from the finish test pad grade.

   - Four sand cone density tests, adjacent to nuclear density test locations to provide correlation.

   - Four in situ hydraulic conductivity tests by BAT™ method.

   - Four sets of Shelby tubes pushed hydraulically by dozer blade to a depth of about 12 inches for laboratory hydraulic conductivity testing. Two Shelby tubes were pushed at each location to provide a backup in the event that the first Shelby tube sample was impacted by any clay clods or other sample disturbance.

   - Four bulk samples collected adjacent to the in situ density test location for laboratory determination of maximum dry density and optimum moisture content.

Following completion of all sampling and testing, it is our understanding that the test pad material was excavated and hauled to the stockpile location. The clay stockpile surface and slopes were graded and sealed by compaction to minimize any moisture penetration from rains and to provide drainage.

4.3 Discussion of Test Results

The results of field and laboratory tests performed on the test pad are presented in Table 2. The test results indicate the following:

1. The compaction of each 8-inch-thick loose lift with eight passes of a sheepsfoot roller yields the desired degree of relative compaction that typically averaged about 92 percent.

2. In general, the maximum dry density of the material as hauled from the stockpile and as placed on the test pad was consistently higher than when it was sampled in the stockpile during clay delivery from the Skiland Borrow Site. This may be due to material breakdown during additional handling at the stockpile and during equipment operation during test pad construction.

3. The relative compaction based on the in situ density on the Shelby tube samples for two (P3 and P4) of the four samples was relatively low (86 and 87 percent). However, the corresponding value based on the checkpoints performed in the field was 90 percent. In our opinion, the field value is more representative of the true condition of the compacted clay liner based on the visual observation of the condition of the test pad surface and the resistance to penetration. It is highly likely that the actual material of the Shelby tube sample is not representative of the bulk sample recovered from its vicinity. Also, some minor disturbance during normal Shelby tube sampling procedures may have caused a small reduction in Shelby tube sample density.

4. The hydraulic conductivity of compacted clay liner, as determined by laboratory triaxial tests, ranged between 1.29×10^{-8} cm/sec and 3.25×10^{-8}cm/sec. The corresponding value by BAT™ method ranged between 2.94×10^{-8} and 6.88×10^{-8} cm/sec. The value by each of the test methods is well below the required maximum hydraulic conductivity value of 1.0×10^{-7} cm/sec.

The hydraulic conductivity tests using leachate as permeant were not performed since the material from the Skiland borrow source had previously been tested and found to satisfy the hydraulic conductivity requirements. Based on these results, the District requested the Regional Water Quality Control Board (RWQCB) to waive the test against leachate and the RWQCB concurred with the District's request.

5.0 CONCLUSIONS, RECOMMENDATIONS, AND CERTIFICATION

Based on the results of our field observations and the field and laboratory testing, it is our opinion that the material imported from Skiland Borrow Site and as placed in the stockpile is suitable for construction of the clay liner as a part of the composite liner. This material, when placed, moisture conditioned, and compacted in accordance with the project specifications provided in Appendix C, will meet the RWQCB requirements for the composite clay liner.

6.0 LIMITATIONS

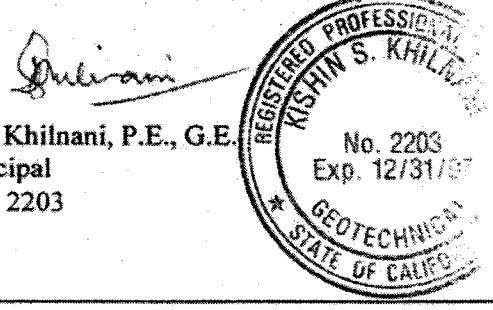
The conclusions and professional opinions presented in this report for the QA/QC observations and testing for clay delivery to Badlands Landfill and construction of test pad were developed by AES for Riverside County Waste Resources Management District (RCWRMD), in accordance with generally-accepted geologic and geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied.

The data, conclusions and recommendations contained herein should be considered to relate only to the specific project and location discussed herein. AES is not responsible for any conclusions or recommendations that may be made by others, unless we have been given an opportunity to review such conclusions or recommendations and concur in writing.

This report has not been prepared for use by parties other than RCWRMD. It may not contain relevant information for the purposes of other parties or other uses. If any changes are made in the project as outlined in this report, the conclusions and recommendations contained in the report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations of this report are modified or approved in writing by AES.

Respectfully submitted,

ADVANCED EARTH SCIENCES, INC.



Kris Khilnani, P.E., G.E.
Principal
G.E. 2203

TABLES

Table 1
Badlands Clay Delivery
Laboratory Test Results Summary

Update as of 11/24/97

Sample #	Date Sampled	Location	Gradation (D422)		Atterberg Limits (D4318)			USCS Classification	Lab Compaction (D1557)		Hydraulic Conductivity (D5084)				
			Minus #200	% Clay Content <0.002 mm	LL	PL	PI		Max. Dry Density (pcf)	Opt. Moisture Content (%)	Remolded Dry Density (pcf)	Moisture Content (%)	Relative Compaction (%)	Moisture relative to Optimum (%)	K (cm/sec)
1	10/2/97	Skiland Borrow	94	35	58	25	33	CH	106.5	16.5					
2	10/2/97	Badlands Stockpile	93	35	47	25	22	CL	107.7	17.0	97.0	21.3	90.0	+4.3	2.92×10^{-8}
3	10/3/97	Badlands Stockpile	92	42	53	24	29	CH	112.5	16.5	101.3	19.3	90.0	+2.8	1.34×10^{-8}
4	10/3/97	Skiland Borrow	97	--	66	24	42	CH							
5	10/8/97	Badlands Stockpile	88	35	58	27	31	CH							
6	10/8/97	Skiland Borrow	95	--	61	27	34	CH							
7	10/10/97	Badlands Stockpile	61	23	55	28	27	CH	103.0	20.0	92.5	24.0	90.0	+4.0	8.25×10^{-8}
8	10/14/97	Badlands Stockpile	79	--	60	26	34	CH							
9	10/14/97	Badlands Stockpile	71	--	51	28	23	CH-MH							
8+9	10/14/97	Badlands Stockpile	78	28	58	27	31	CH	105.5	19.5	95.2	24.5	90.0	+5.0	6.03×10^{-8}
10	10/15/97	Badlands Stockpile	81	--	58	27	31	CH	104.2	18.0	93.7	23.4	90.0	+5.4	2.21×10^{-8}
11	10/17/97	Badlands Stockpile	89	--	58	29	30	CH							

Table 2
Badlands Landfill Clay Liner Test Pad
Field and Laboratory Test Results Summary

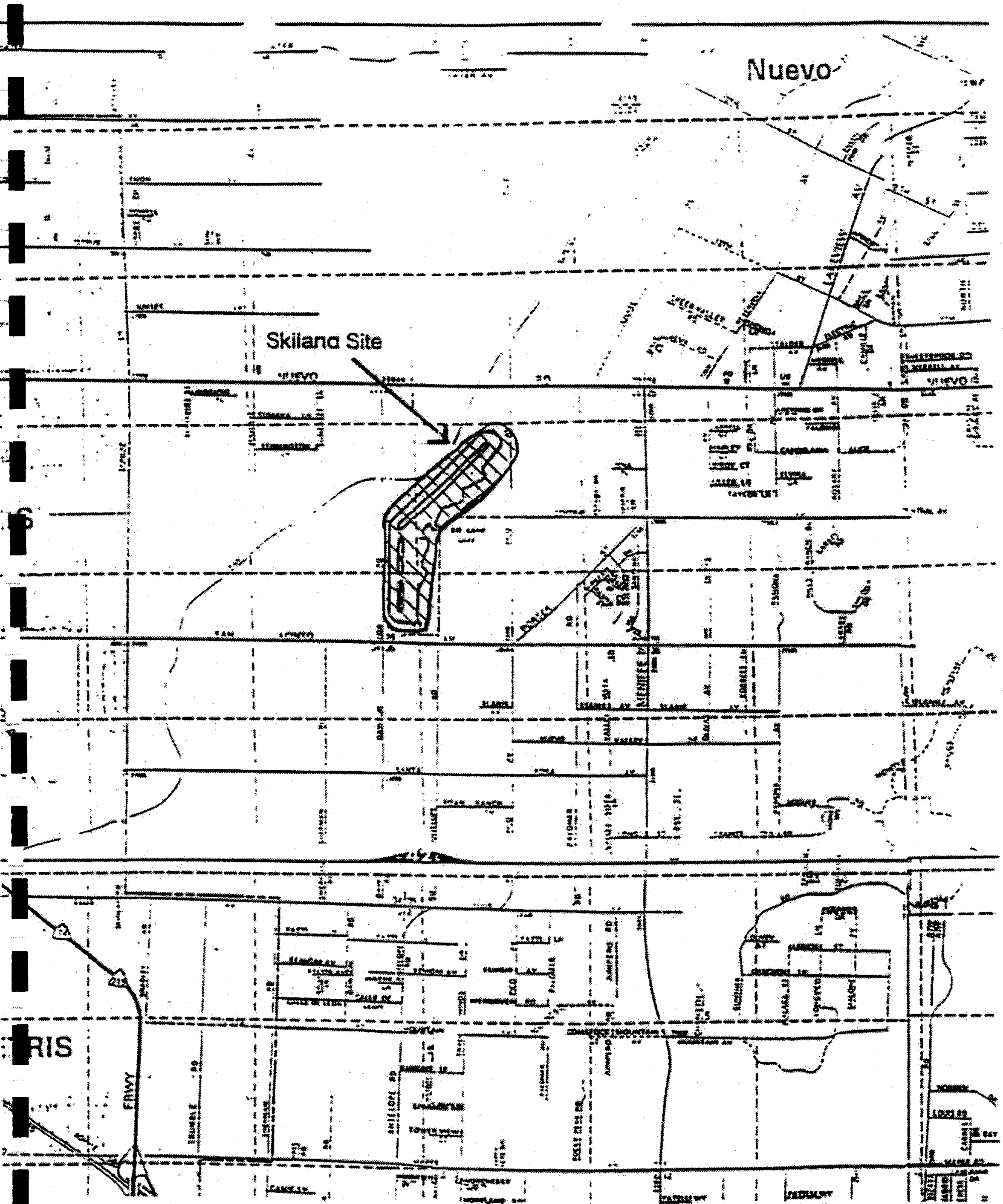
Update as of 12/1/97

Test No.	Lift No.	In-situ Dry Density (pcf)	Moisture Content (%)	Test Type	Max. Dry Density (pcf)	Opt. Moisture Content (%)	Relative Compaction (%)	Laboratory Hydraulic Conductivity (D5084)					BAT™ Hydraulic Conductivity (cm/sec)
								Dry Density (pcf)	Moisture Content (%)	Relative Compaction (%)	Moisture relative to Optimum (%)	Hydraulic Conductivity (cm/sec)	
1	2	93.5	21	N	110.0	17.0	85						
1A	2	100.7	19.5	N	110.0	17.0	92						
2	2	101.4	19.5	N	110.0	17.0	92						
3	2	100.5	19.2	N	110.0	17.0	91						
4	3	104.4	20.8	N	115.0	16.0	91						
5	3	97.2	20.5	N	115.0	16.0	85						
5A	3	106.3	19.7	N	115.0	16.0	92						
6	4	101.4	19.5	N	110.0	17.0	92						
7	4	101.8	22.5	N	110.0	17.0	93						
8	4	98.6	22.4	N	110.0	17.0	90						
9	5	103.1	21.2	N	115.0	16.0	90						
P1	5	107.4 103.9	18.6 19.1	SC N	112.7 112.7	15.0 15.0	95 92	100.4	18.3	89	+3.0	1.29×10^{-8}	2.94×10^{-8}
P2	5	105.1 105.1	17.3 16.9	SC N	112.4 112.4	14.0 14.0	94 94	107.5	17.4	96	+3.4	3.25×10^{-8}	2.68×10^{-8}
P3	5	105.2 104.3	19.5 19.2	SC N	116.4 116.4	13.6 13.6	90 90	100.2	17.1	86**	+3.5	1.56×10^{-8}	6.88×10^{-8}
P4	5	99.4 100.9	20.5 18.3	SC N	116.5 (110*) 116.5 (110*)	14.0 14.0	85 (90*) 87 (92*)	101.9	17.2	87**	+3.2	1.47×10^{-8}	3.24×10^{-8}

Notes:
N - Nuclear Gauge
SC - Sandcone

*Values based on checkpoint performed in the field.
**Lower relative compaction due to Shelby tube sample not being representative of bulk sample and/or due to possible minor sample disturbance.

FIGURES



Riverside County

Waste Resources Management District

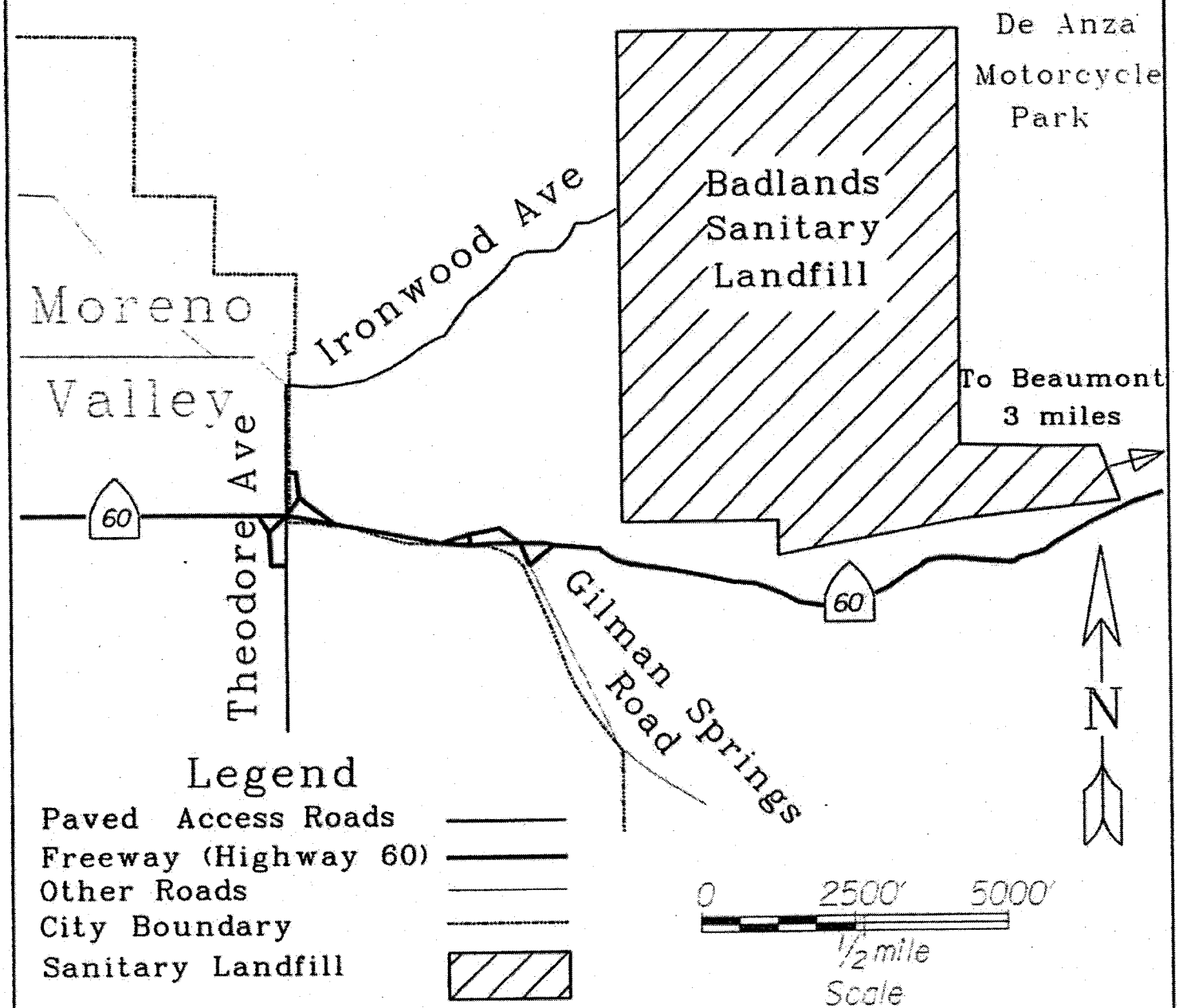
Skiland Site

Figure 1

File Directory: [illegible]

Pen Table: [illegible] | Photo

Badlands Sanitary Landfill
Vicinity Map



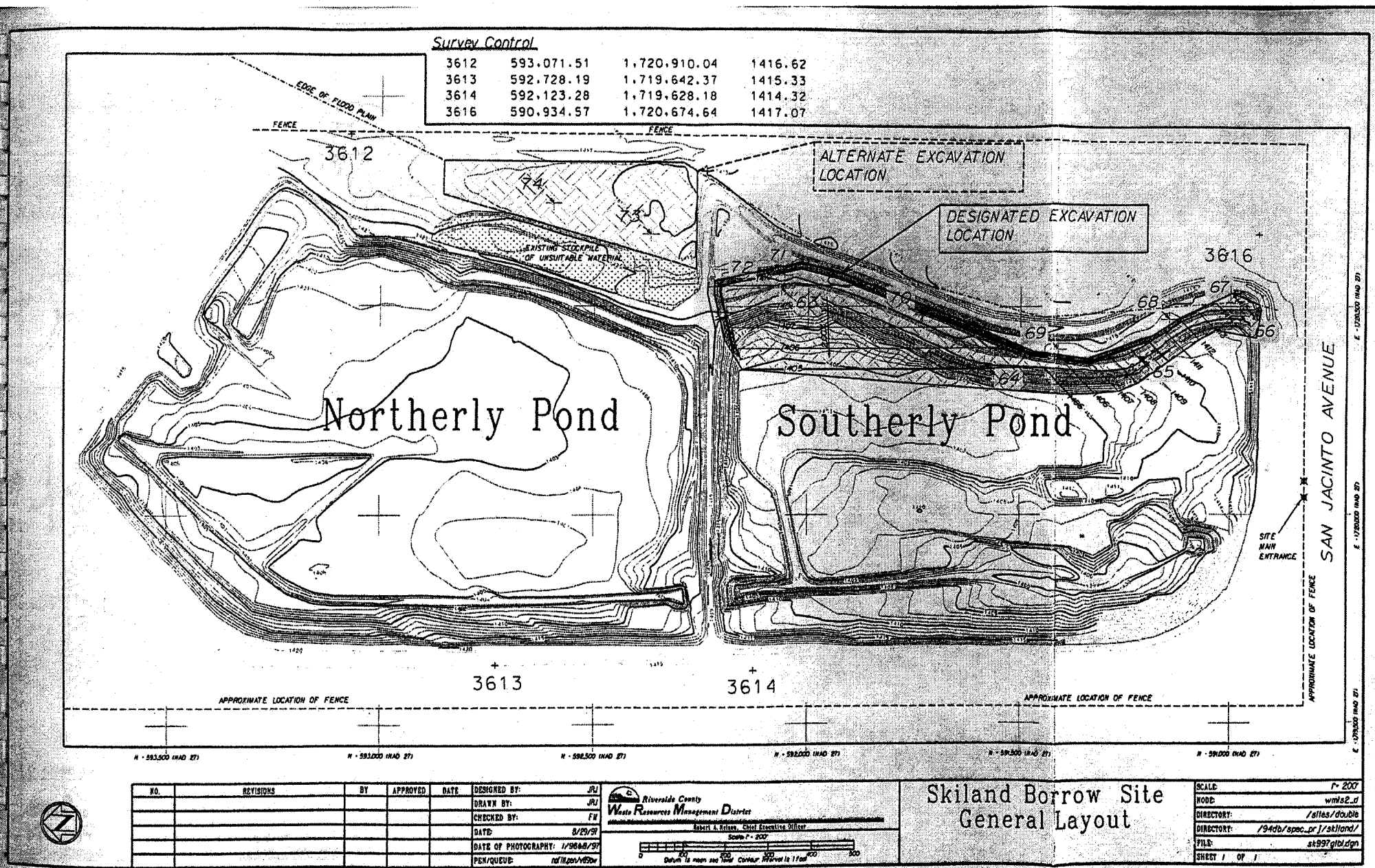
Riverside County
Waste Resources Management District

Badlands Sanitary Landfill

Vicinity Map

Figure 2

File Directory: \wmis2\sites\badlandsaba\spec\clay\ba9706vic.dgn		Date: Aug 28, 1997
Pen Table:	Photo Date:	Scale: 1"=2500'



NO.	REVISIONS	BY	APPROVED	DATE

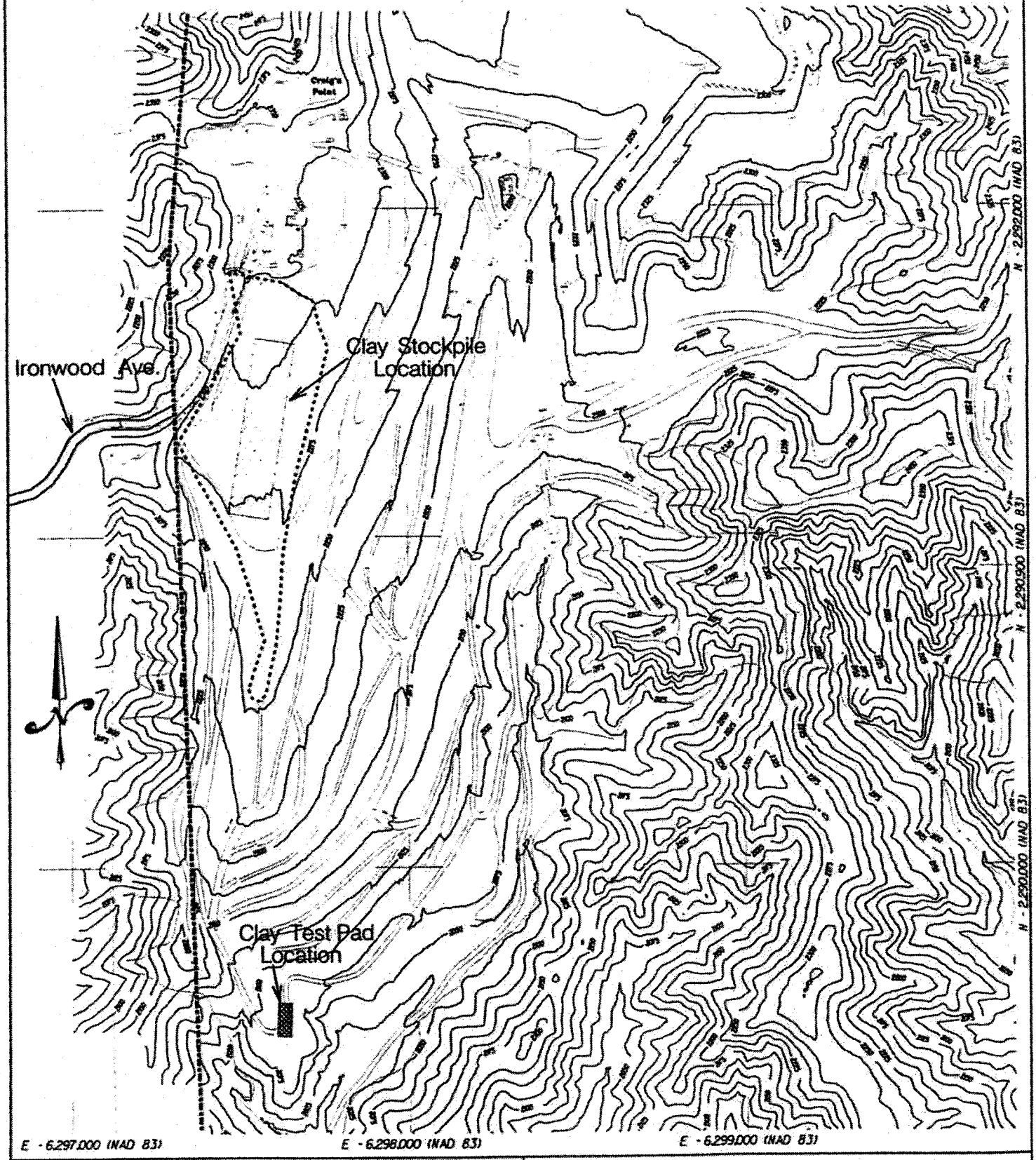
DESIGNED BY:	JRJ
DRAWN BY:	JRJ
CHECKED BY:	FW
DATE:	8/29/97
DATE OF PHOTOGRAPHY:	1/96&8/97
PEN/QUEUE:	rdfill.pen/v650w

Riverside County
Waste Resources Management District
Robert A. Nelson, Chief Executive Officer
Scale 1" = 200'
0 100 200 300 400 500
Datum is mean sea level. Contour interval is 1 foot

Skiland Borrow Site
General Layout

SCALE:	1" = 200'
NODE:	wmls2_d
DIRECTORY:	/sites/double
DIRECTORY:	/94db/spec_pr]/skl/ond/
FILE:	sk897gtbl.dgn
SHEET 1 OF 1	

Figure 3



Riverside County
Waste Resources Management District

Badlands Sanitary Landfill
Clay Stockpile and Clay Test Pad Locations

File Directory: s2d/sites/badlands/97ba/spec/clay/ba9711fg.dgn			Date: 17 Nov 97
Designed: FW	Drawn: WWW	Photo Date: 6 Nov 96	Scale: 1"=400'

Figure 4

APPENDIX A: Daily Field Reports

DAILY REPORT

PROJECT: SKILAND BORROW
PROJECT #: 97-111
LOCATION: SKILANDS / BADLANDS

DAY: WEDNESDAY, DAY 1
DATE: 10/1/97
CONTRACTOR: ROADWAY
WEATHER:

The contractor, Roadway began hauling clay at 6:30 am using 24 haul units. Borrow operation was supported by one D-8 dozer, one980 loader, and one water truck. The water truck was only operational from noon , the dozer only operational until approx. 11 a.m. The County Project Manager was on site in the morning and expressed concern about the equipment, particularly the water truck and dust control. Equipment at Badlands was also reportedly not operational. By 2 p.m. when the Contractor quit hauling we were informed by the County officials that approximately 1 foot of clay was placed in the stockpile area.

The material hauled today was the windrowed materials which the contractor had produced without any QA Observation yesterday. We were informed by the county personnel and did observe some concentrations of organic material. When organics were observed, they were wasted in a separate area. This problem should not re-occur as a more stringent brushing effort was implemented today. Moistures varied in the borrow from 15% to 34% , water was added at Badlands by a County truck. At Skiland site, water truck was used for dust control. One composite microwave sample and check-point yielded 23% moisture on a predicted 18.5% omc curve , indicating that an adequate product should be expected with proper mixing.

DAILY REPORT

PROJECT:	SKILAND BORROW	DAY	THURSDAY, Day 2
PROJECT #:	97-111	DATE	10/2/97
LOCATION:	SKILANDS / BADLANDS	CONTRACTOR	ROADWAY
		WEATHER	

Roadway resumed hauling clay at 6:30 am using up to 27 trucks. A 980 loader and a water truck supported the Skilands site. Material continued to be excavated along the berm from the south in a northerly direction. With the District's consent some water may be added at Skilands to help improve overall mixing efficiency. Amounts of water will be closely monitored and only added to the outer shell which has become very dry. A visit was made to the Badlands stockpile area to observe the operations and perform field moisture tests. At the stockpile site, the contractor was using a water truck and an 824 with a disc. Two microwave composite sample moistures yielded results of 24% and 22.5%. Data from day 1 indicated an 18.5% optimum. As some patchy dry areas were observed, the contractor was asked to increase the water slightly and increase the mixing effort. Overall the stockpiling operation appears to be satisfactory. Moisture composite in the Skilands site yielded a 25.4% not including the outer dry shell. Today material was hauled from the boring 65-64 area of the berm at an approximate depth of 6 - 9 feet. A brown silt has been encountered near the estimated depth of boring 64 and is being avoided. This layer appears to be rising and will be closely monitored. The contractor was also advised that if quantities were not met, we would have to return to the area of borings 67 - 70 which is now used as access by haul units. A composite sample was taken from Badlands stockpile (sample #2) today and sent to laboratory for testing.

Approximate tonnage reported for Day 1	3.300 Tons
Cumulative tonnage to Day 1	3,300 Tons

DAILY REPORT

PROJECT:	SKILAND BORROW	DAY	FRIDAY, Day 3
PROJECT #:	97-111	DATE	10/3/97
LOCATION:	SKILANDS / BADLANDS	CONTRACTOR	ROADWAY
		WEATHER	

Roadway resumed hauling clay at 6:30 am using up to 32 trucks. A 980 loader and a water truck supported the Skilands site. Material continued to be excavated along the berm from the south in a northerly direction. In the early morning, directed the loader operator and foreman not to continue excavating from the outer edge of the berm due to concentrations of organic material. This is the area started by the dozer and left unfinished when the dozer broke down. The contractor informed that they would work on Saturday to finish the brushing operation. The foreman and I went over the desired results from the brushing. The dozer was not operational and brushing will be accomplished with the 980 loader. I also mentioned to the County inspector that there appears to be a telephone type cable running the length of the berm and that some effort should be made to remove it from the stockpile. The contractor was also advised about the cable. A pit was excavated behind the loader's operation to observe if any materials are being left behind and approx. another 3 feet of usable material was noted. The contractor was advised that the primary concern was to achieve the quantities, a concern of his is also to leave the proper grades. When asked of the overall pit excavation plan I replied that we would follow the borings and if suitable material ran deeper that we would excavate deeper if necessary to meet the quantities. A trip was made to Badlands in the morning and the overall operation seened to be running quite well. The operation was similar as the day before, but a more even moisture was achieved. Composit moisture samples were taken and microwave results were 25.7% and 22.2%. A check point was run in the morning and in the afternoon indicating a 17% and 18.5% optimum. Two composite moistures taken at the Skiland site indicate an approx moisture of 19% to 23% for the material being exported.

Approximate tonnage reported for Day 2, Thursday	3,450 Tons
Cumulative tonnage to Day 2	6,750 Tons

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	MONDAY DAY 4
PROJECT #	97111	DATE	10/6/97
LOCATION	SKILAND / BADLANDS	PREPARED BY	MARK HUGGARD
CONTRACTOR	ROADWAY		

The contractor resumed hauling from Skilands using 26 haul units today. The D8 dozer is no longer on site. The contractor spent Saturday grubbing the areas shown by AES. The slope areas were adequately grubbed , but the area between the levees were not satisfactory and all parties concerned were made aware that further effort was necessary before this area could be excavated. The contractor was in agreement and it was decided that a blade would be a more appropriate piece of equipment. The blade is scheduled for tomorrow. Due to time constraints today no field moistures were taken at Skilands . Two composite moisture samples from Badlands yielded a 22% and a 25% . A sample was prepared for check point but was not yet run due to difficulties in the borrow. As the outer shell portion has been grubbed , he began to haul this material today, going about 3 feet deeper than the previous pass. We were, in my opinion, at or within 1 foot of the clay limits in our excavation , although it is expected to become deeper in the northern portion. We have encountered several pockets of coarse sand and attempts were made to limit concentrations while still maximizing the clay source . This effort consumed most of the day, with good co-operation from the contractor. A trip was made to Badlands to observe the stockpiling and to collect sample for lab testing. The stockpiling operation appeared to be the same as last week and the material does have ample moisture. Methods to remove some sand layers to access the clay in the north end were discussed with county and contractor. We also discussed expanding the north eastern boundary. A test pit excavated after hours revealed that clay extended in this area also. The contractor was made aware that the excavation would get quite deep in the nothern part of the pit.

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	TUESDAY DAY 5
PROJECT #	97111	DATE	10/7/97
LOCATION	SKILAND / BADLANDS	PREPARED BY	MARK HUGGARD
CONTRACTOR	ROADWAY		

Up to 32 haul units were used today to continue with the borrow from Skiland. A 12G blade was onsite and working by 6:15 A.M. We continued hauling material from the shell of the berm, by mid morning the material became very wet. A field moisture of 47% was recorded. Materials above this layer were drier and when blended seemed to yield reasonable moisture. A trip to Badlands was made early in the day to observe the results. On our visit, no water was being added as we had requested the County Inspector over the phone. The mix appeared to be acceptable. Two materials, a CL and a CH were the main types, some silt and sand were observed. Two samples were taken yielding moistures of 26% and 22%. Two check points ran indicated 17% and 18.5% omc. Saturated materials and sand pockets are making the excavation more difficult. Where the sand is mixed with clay, the clay is a CH which should be able to accept some small amounts of sand. The south end is more of a CL type material is underlain by a silt.

The blade was used first thing in the morning by the foreman and was idle the rest of the day. The water-truck was operational on a part time basis. A meeting with the County, the contractor and AES is scheduled for tomorrow morning to discuss and clarify those areas where we will have to remove some sand to access clay.

Tonnage hauled on Monday	3,780
Cumulative to Monday	15,126

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	WEDNESDAY DAY 6
PROJECT #	97111	DATE	10/8/97
LOCATION	SKILAND / BADLANDS	PREPARED BY	MARK HUGGARD
CONTRACTOR	ROADWAY		

The contractor advised us that 24 haul units were used today to haul from the clay borrow area at Skiland to the stockpile area at Badlands. A 980 loader was used excavating to approximately -6 feet in the northern section between the leeves. The N.W. corner of the site is not being excavated at this time due to overlying sand layer. An agreement was reached in an on-site meeting between the County and Roadway to remove the overlying sands and unacceptable material at our direction. This work will be done after hours if it cannot be done during operating hours. A record of time and equipment will be kept. Today, the 980 loader with operator worked at our direction for 1 hour after the trucks were finished, I.e., until 3:30 P.M. In this hour a portion of the sand layer was exposed and the overlying usable clay was stockpiled for use. We expect approximately 50 yards of waste materials will be generated. Materials varied greatly from CH to CL and from wet clays in the 40% moisture range to the drier clays with moisture content about 22% in the south end. We will probably have to aerate the wet fat clay as it does not load well nor does it mix easily at the stockpile. The 14 G blade was operational part time as was the water truck. A check point today from a composite sample indicated 17% omc. A composite moisture from Badlands was 23.6% with a moisture of 22% as delivered to stockpile. This number is subjective due to the amounts of fat clay delivered. It was reported that the contractor may finish in 12 days at the present rate of production. We were advised to prepare to build the test pad immediately after that.

Tonnage hauled on Tuesday	4,300 Tons
Total tons to Tuesday	19,426 Tons

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	Thursday Day 7
PROJECT #	97111	DATE	10/9/97
LOCATION	SKILAND / BADLANDS	CONTRACTOR	ROADWAY
		PREPARED BY	MARK HUGGARD

Up to 33 haul units were reportedly used today. In the early morning the contractor was advised that materials being excavated were very dry and much water would have to be added at the stockpiling operation at Badlands. I estimate that there may be only 1-1/2 days of hauling left in this area before it is depleted and it will probably be necessary to use the alternate area. I also re-evaluated the areas we have just completed and found that there is possibly 1 foot of useable material on a portion of the bottom , which if salvaged should be done with a blade or dozer. The contractor stayed past normal working hours again in an attempt to remove the sands from the underlying Clay . One 980 loader, one operator, and one belly dum with driver stayed until 4P.M. One foreman stayed 1/2 hour. The operation was slow as some of the underlying clay which is very wet is mixed with the sands and plugs up the truck while dumping, it gets stuck at the dyke frequently. At this point there is a 7-9 foot face which agrees with the borings. Some of the underlying silts are being included in the excavated materials. One 14 G blade was operated in the morning on brushing and on road maintenance. One water truck operated part time and broke down early in the day. Dust did not become very noticeable until late in the shift. The foreman was informed that he should have an operational watertruck available in the morning. A trip to Badlands was made and composite moistures yielded 23% and 26%. The operation seemed to be running well despite the high volume. The contractor was advised that high volume may affect his moistures adversely.

Tons on Wednesday	3,528 (estimated)
cumulative tons to Wednesday	22,954 (estimated)

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	FRIDAY Day 8
PROJECT #	97111	DATE	10/10/97
LOCATION	SKILAND / BADLANDS	CONTRACTOR	ROADWAY
		PREPARED BY	MARK HUGGARD

The contractor continued with the stockpiling operation today using 24 haul units reported by the foreman in the morning. Work continued in the north end of the borrow in the morning. K. Khilnani and F. Mina were on site in the morning and the issues of the borrow operations and the quality of material in the pit were discussed. The quantities generated vs. the area remaining were a major issue. Although the contractor has agreed to salvage the remaining 1 foot of material left behind, there is doubt as to whether we can generate sufficient materials. It was decided to go back to an area previously left behind as having a high silt content or being marginal ML and incorporating this into the stockpile and mixing with CH material being excavated. This was actually started today. A trip to Badlands stockpile operation was made and the results of 1/2 day mixing were observed and evaluated by K. Khilnani and F. Mina. There appeared to be 1 foot of blended material which visually appeared to be CL type material. A sample was taken from the stockpile for lab tests. A visit was also made to the site selected for test pad and procedure was discussed. But due to the meetings daily field tests were not run. Monday due to the holiday a limited operation will be run at Skiland borrow only. No hauling will take place. We will be continuing with the removal of sand layer. Also the contractor plans to remove grubbed materials to the stockpile. We have requested Atterberg Limits test results on stockpile sample on "Rush" basis by Monday so that the success of blending silty type material with CH soils may be evaluated.

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	MONDAY Day 9
PROJECT #	97111	DATE	10/13/97
LOCATION	SKILAND / BADLANDS	CONTRACTOR	ROADWAY
		PREPARED BY	MARK HUGGARD

There was no clay stockpile production or hauling today due to Columbus Day holiday on contract related incidentals and some extra work as discussed earlier. At 7 A.M. one 980 loader, one tandem haul unit and one foreman began exposing and removal of the sand layer in the northwest area of the pit, at our direction. The sand layer was surrounded by a saturated fat clay which was also disturbed and spread out to aerate adjacent to its location. Several test pits were excavated with the loader to assess the materials which were left behind. The equipment was used at the County's direction until 11 A.M. at which time the contractor began to remove the grubbed materials left onsite.

No material hauled this date

cumulative tonnage to date Approximately 30,000 tons

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	Tuesday Day 10
PROJECT #	97111	DATE	10/14/97
LOCATION	SKILAND / BADLANDS	CONTRACTOR	ROADWAY
		PREPARED BY	MARK HUGGARD

Stockpiling operations resumed today after the Columbus Day holiday. Excavation started in the north end of the site and was moved to a lesser quality material for a while, then back to the northern end. The excavation was deepened in this area in an effort to maximize the clay volume by adding some of the underlying silty material. The results of our attempts doing this on Friday yielded a marginal CH/MH material. There is not much clay material being left behind but in discussions with the contractor and County, we concluded that the remaining clay needs to be picked up now, before the higher grade material is exhausted. It was originally thought that this may not be necessary, but quantities left in the pit indicate that we probably will run short. We were assured by the contractor that a 623 scraper would be on site and operational tomorrow. A visit and sample from Badlands indicated that the stockpile material moistures were low and the contractor was asked to rework the stockpile with the disc and water. A check point indicated that omc was 21.5% and field moistures were 22% and 26%. The holes excavated also appeared dry. The County Inspector was also informed that moistures in the stockpile were low. The 14G blade is no longer on site.

Tonnage this date	2,900 tons
Cumulative tonnage to date	Approximately 32,900 tons

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	WEDNESDAY DAY 11
PROJECT #	97111	DATE	10/15/97
LOCATION	SKILAND / BADLANDS	CONTRACTOR	ROADWAY

The contractor resumed hauling at 6:30 A.M. using up to 23 haul units and loaded by a 980 loader. By 10 A.M. mechanical difficulties forced the contractor to quit hauling materials. Approximately 1300 tons had been delivered to Badlands. A 623 scraper was on site and operational as promised by the contractor. I spent the day with the scraper, directing the clay removal areas which were added to the existing clay borrow. By 2 P.M. all known clay areas had been removed . Some underlying silts were included in an attempt to increase volume. A sample of this material was sent to the lab in the afternoon for analysis.

Tons on Wed.	1300 Tons
cumulative to Wed.	35000 Tons

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	Thursday Day 12
PROJECT #	97111	DATE	10/16/97
LOCATION	SKILAND / BADLANDS	CONTRACTOR	ROADWAY

The contractor reported 24 haul units used today. One 980 loader was used for loading. One 623 scraper was idle on site. One water truck was used for dust control and to provide some moisture conditioning at the Skiland site. Materials were hauled from the northern end of the site. On a visit to Badlands stockpile, 2 moistures were taken with results of 22% and 27%. Moisture was still being added to this material that looked relatively dry. A check point indicated an omc of 21 %.

It was observed that the stockpiled material was beginning to become silty. A change was made in the cut area to improve the grade of materials being shipped. The County inspector was made aware of the change. The silty material in the bottom rose in elevation which will reduce yields. We have been given authorization to go to the alternate site if necessary. Latest lab results indicate borderline CH/MH . The addition of silts to increase yield are not producing a CL but a MH instead. We have been instructed by the County to flat grade the alternate area if used.

Tonnage on Thursday:	3,795 Tons
Cumulative to date:	38,800 Tons

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	FRIDAY DAY 13
PROJECT #	97111	DATE	10/17/97
LOCATION	SKILAND / BADLANDS	CONTRACTOR	ROADWAY
		PREPARED BY	MARK HUGGARD

The contractor continued to haul from Skilands using 27 haul units loaded by the 980 loader. Hauling resumed at the north end of the southern cell. As it is becoming more apparent that we will have to haul from the northern cell also, a 623 scraper was available even today. We have been instructed to maintain even grades by hauling from an even cut but today as stockpiling began we discovered that a significant portion of the surface is covered by up to one foot of sand. If we were to maintain the even grades suggested by the County, we would not be generating an acceptable product. The County inspector was advised and it was decided that the most efficient course of action was to begin with the removal of the sand layer on only the southern most portion. Approximately half of the day was spent removing sand to the levees. Stockpiling of the fat clay began in the afternoon. We are trying to maintain the same drainage as requested by the County. Work is scheduled for tomorrow. A sample was also taken to the lab from Badlands.

Tons exported today	4069 Tons
Cumulative to date	42910 Tons

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	SATURDAY DAY 14
PROJECT #	97111	DATE	10/18/97
LOCATION	SKILAND / BADLANDS	CONTRACTOR	ROADWAY
		PREPARED BY	MARK HUGGARD

Hauling resumed today using up to 31 haul units and the 980 loader. The water truck was not available in the morning and the County inspector at Badlands was advised. The contractor was advised that if a water truck was not operational by 10 A.M. that he should shut down the operations as we were creating substantial amounts of dust. The driver did show up by 10 A.M. and the haul continued throughout the day. The scraper was used to stockpile from 6:30 A.M. to 7 A.M. and for one and half hours removed sand to the levee again before resuming the clay stockpiling. It was necessary to extend the work area to maintain the general grades as requested by the County. The contractor used the scraper part-time to create finish grades in the southern cell. Materials in the southern cell were exhausted today leaving approximately 3,000 tons to be hauled as per the contractor's estimate.

Tons exported today	Tons
Cumulative to date	Tons

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	MONDAY DAY 15
PROJECT #	97111	DATE	10/20/97
LOCATION	SKILAND / BADLANDS	CONTRACTOR	ROADWAY
		PREPARED BY	MARK HUGGARD

Roadway continued with the haul from Skiland today using the 980 loader and approximately 23 trucks. The haul was entirely from materials stockpiled in the alternate site by the 623 scraper. By 2 P.M., the contractor had achieved the target quantities. A sample taken at Badlands stockpile indicated 22% moisture content with a target of 24% . The operators and watertruck were requested to increase the moisture conditioning of the stockpile. Materials were being disced during our visit. At Skiland, the contractor has been contouring cut areas to meet drainage grades required by the county. County officials have directed the contractor to grade the alternate area to drain to the southwest, and also to seal the stockpile at Badlands.

cumulative tons 50,000

DAILY REPORT

PROJECT	BADLANDS TEST PAD	DAY	WEDNESDAY
PROJECT #	97111	DATE	OCT. 22
LOCATION	BADLANDS	CONTRACTOR	R,W,M,D,
		PREPARED BY	MARK HUGGARD

Began setting up the area for the test pad with the county inspector. We set up limits of approximately 100 feet by 40 feet and lathe with the desired lift thickness. The subgrade preparation appeared to be adequate, considering the cemented layers .By mid morning the equipment began top haul from the stockpile area. Only a D7 dozer with a 5x5 sheepsfoot, a 623 scraper and a watertruck were available for use. I inquired about a disc for the stockpile , none was immediately available. The material at the top of the stockpile came in dry and water was added at the test pad area. The first loads dumped by the scraper were very thick and the dozer with the 5x5 attached could not adequately spread or mix the materials. Two loads of the second lift were placed in the afternoon. Some clay material was also placed beyond the test pad area to minimize contamination from surrounding sands. A 14 G blade was made available for 1 hour which was not sufficient for pad construction.

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	THURSDAY
PROJECT #	97111	DATE	10/23/97
LOCATION	BADLANDS LANDFILL	CONTRACTOR	
		PREPARED BY	MARK HUGGARD

Requested a dozer to rip the top of the stockpile for the addition of water which was at approximately +2% of OMC at that time. The dozer was made available for 1 hour in the morning, but yielded unsatisfactory results, leaving large clods and uneven moisture. Some material was brought to the test pad, and due to clods greater than 4 inches, uneven moistures and lift thickness, it was decided to not continue the test pad construction. K. Khilnani and F. Mina were informed. K.Khilnani was already enroute to the site. It was decided that the County would supply a 14G blade full time as a disc was not immediately available. The blade was available after lunch, yielding approximately 2 hours of production. It was found by the County Inspector that the lifts were underbuilt at the ends and overbuilt at the middle. Important decisions reached today were: To build a 5th lift due to contamination in the 1st lift and to use the blade for producing a suitable mixture in the stockpile and for lift thickness control. These changes are expected to yield a much better and more controlled product. Production resumed and the second lift was finished with minor rework. Construction of the third lift began late in the day.

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	FRIDAY
PROJECT #	97111	DATE	10/24/97
LOCATION	BADLANDS LANDFILL	CONTRACTOR	
		PREPARED BY	MARK HUGGARD

Remainder of the 3rd lift was placed and tested with passing tests on a 110 lb curve. One check point was performed. The blade was then sent to the stockpile for processing again. As water was added, the material became very slippery and equipment could not manouver easily. This is due to the fact that the material being CH, would not mix with moisture easily. The fourth lift was placed and compacted and the final round of testing began in the afternoon. Two BAT tips were set and run late in the afternoon. These tips were reset to be run on Saturday morning. Density tests were also performed and Shelby tubes were pushed.

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	SATURDAY
PROJECT #	97111	DATE	10/25/97
LOCATION	BADLANDS LANDFILL	CONTRACTOR	
		PREPARED BY	MARK HUGGARD

Present at the site from 6 am to 11 am to finish testing of the test pad. During the retrieval of shelby tubes at P-2, the pore pressure dropped in the BAT tip and the tip was reset. It was to be run on Monday after the pore pressure stabilizes.One test area at the edge of the pad yielded questionable results and an alternate test area was used. The dozer was used to push two more shelby tubes.

DAILY REPORT

PROJECT	SKILAND BORROW	DAY	MONDAY
PROJECT #	97111	DATE	10/27/97
LOCATION	BADLANDS LANDFILL	CONTRACTOR	
		PREPARED BY	MARK HUGGARD

Arrived at the site at 6 am to run the last BAT test. Finished the test and left the site. Delivered the remaining soil samples to the laboratory.

APPENDIX B: Laboratory Test Data Sheets

AP Engineers
Geotechnical Testing Laboratory

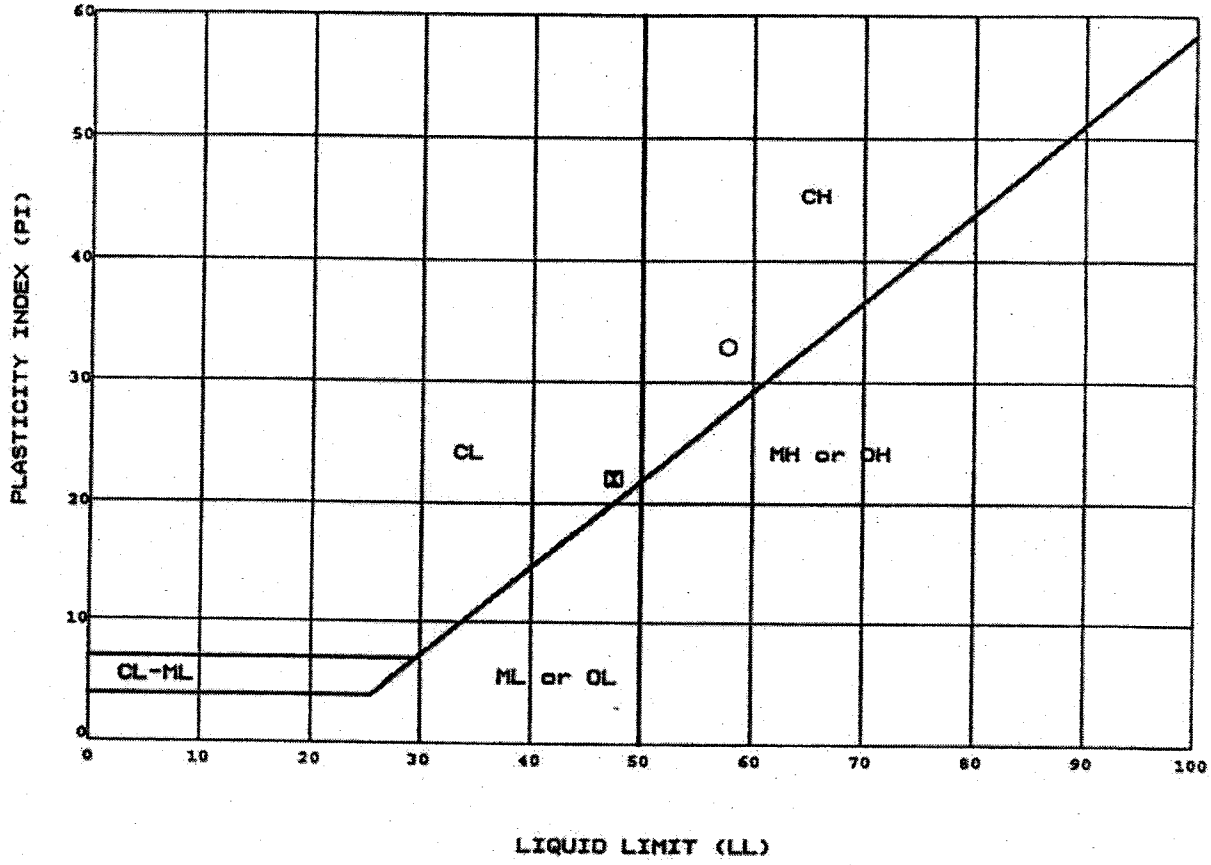
PERCENT PASSING NO. 200 SIEVE
ASTM D 1140

AP Lab No.: 97-1014
Date: 10/20/97

Project Name: Badland
Project No.: 97-111

Boring No.	Sample No.	Depth (feet)	Soil Description	USCS	Percent Fines (%)
--	Bag 4		Fat Clay	CH	97
--	Bag 6		Fat Clay	CH	95
--	Bag 8		Clay w/ silt	CH	79
--	Bag 9		Clay w/ silt	CH-MH	71
--	Bag 10		Clay w/ silt	CH	81
--	Bag 11		Clay w/ silt tr. sa.& gr	CH	89

2603 Pomona Blvd, Pomona, CA 91768
Tel (909) 869-6316 Fax (909) 869-6318



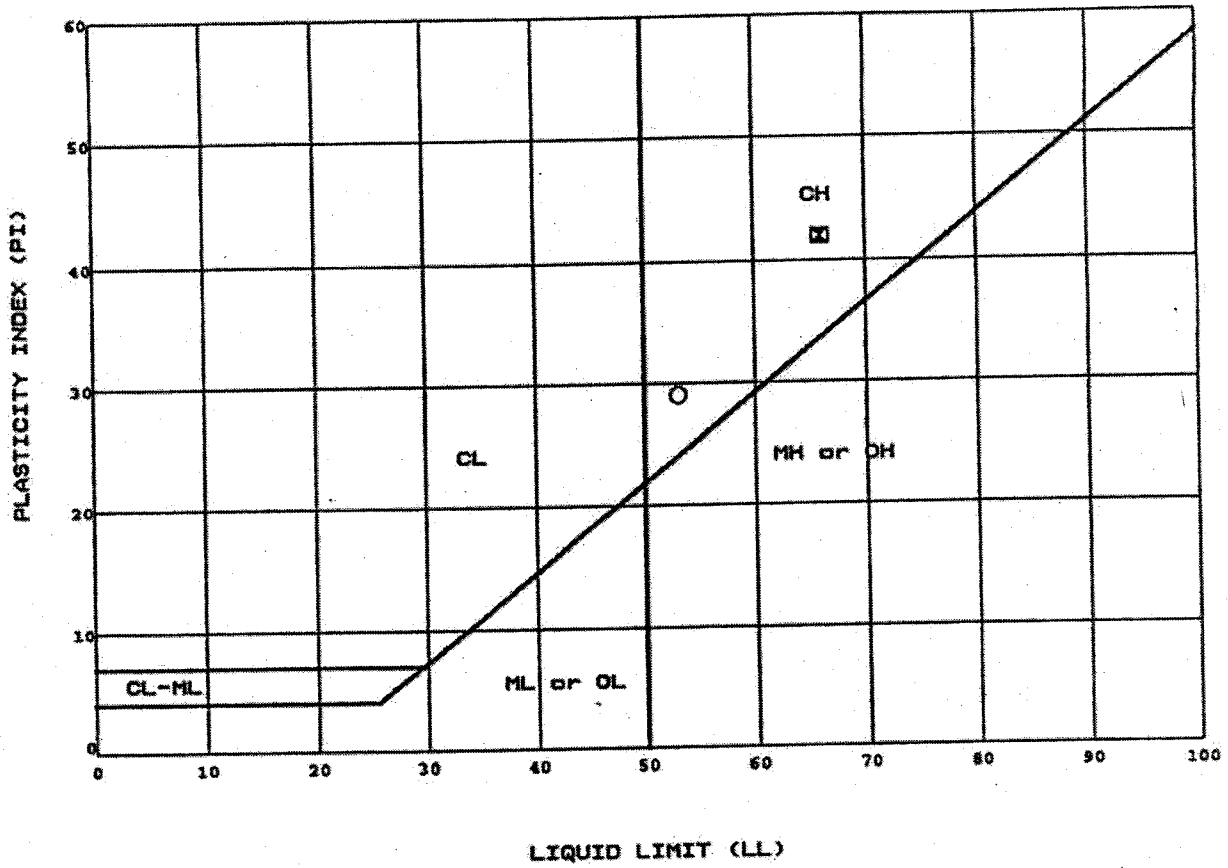
Symbol	Boring Number	Sample Number	Depth (feet)	LL	PL	PI	U.S.C.S. Symbol
O	BAG	#1		58	25	33	CH
⊠	BAG	#2		47	25	22	CL

ATTERBERG LIMITS
ASTM D 4318-93

Project No. 97-111-01

Project Name Badland

Date 10/29/97 Figure No. _____



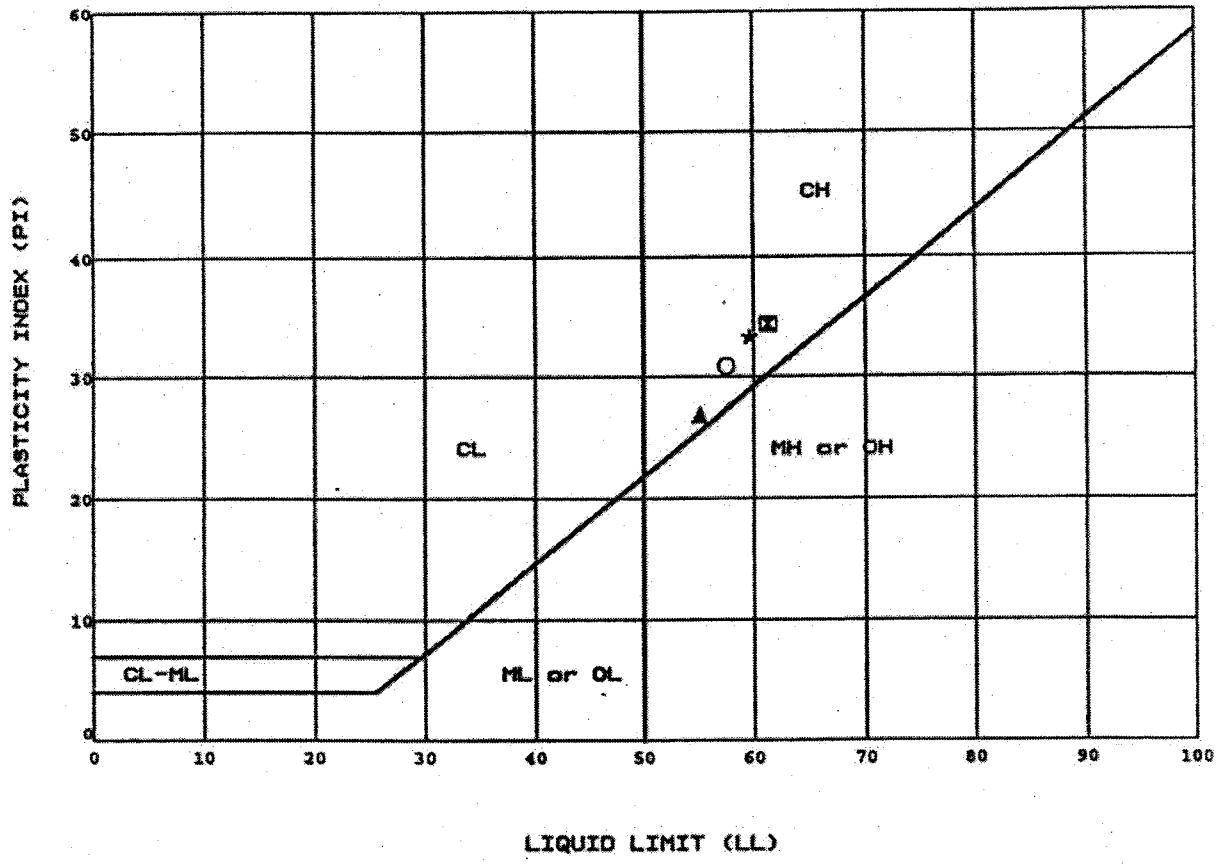
Symbol	Boring Number	Sample Number	Depth (feet)	LL	PL	PI	U.S.C.S. Symbol
○	BAG	#3		53	24	29	CH
⊠	BAG	#4		66	24	42	CH

ATTERBERG LIMITS
ASTM D 4318-93

Project No. 97-111

Project Name Badland

Date 10/29/97 Figure No. _____



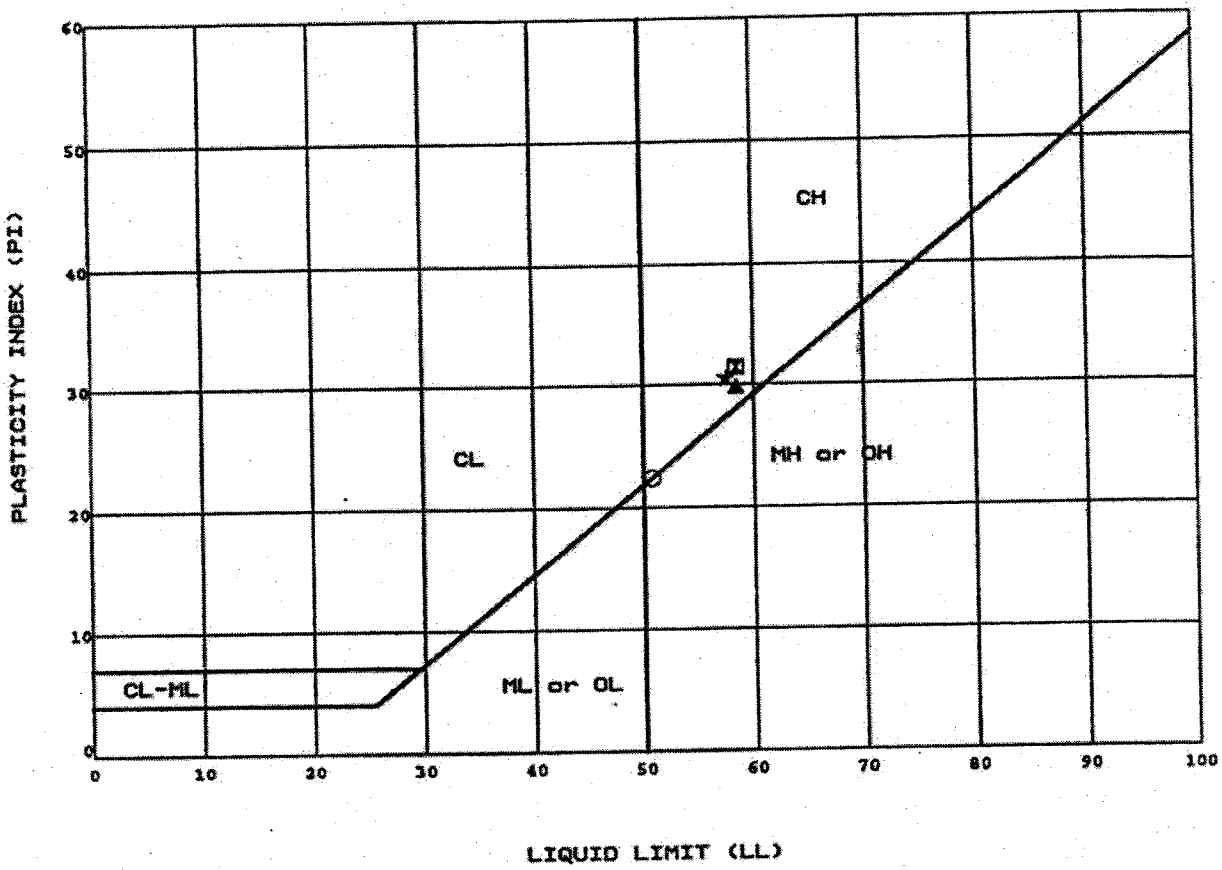
Symbol	Boring Number	Sample Number	Depth (feet)	LL	PL	PI	U.S.C.S. Symbol
O	BAG	#5		58	27	31	CH
⊠	BAG	#6		61	27	34	CH
▲	BAG	#7		55	28	27	CH
★	BAG	#8		60	26	33	CH

ATTERBERG LIMITS
ASTM D 4318-93

Project No. 97-111

Project Name Badland

Date 10/29/97 Figure No. _____



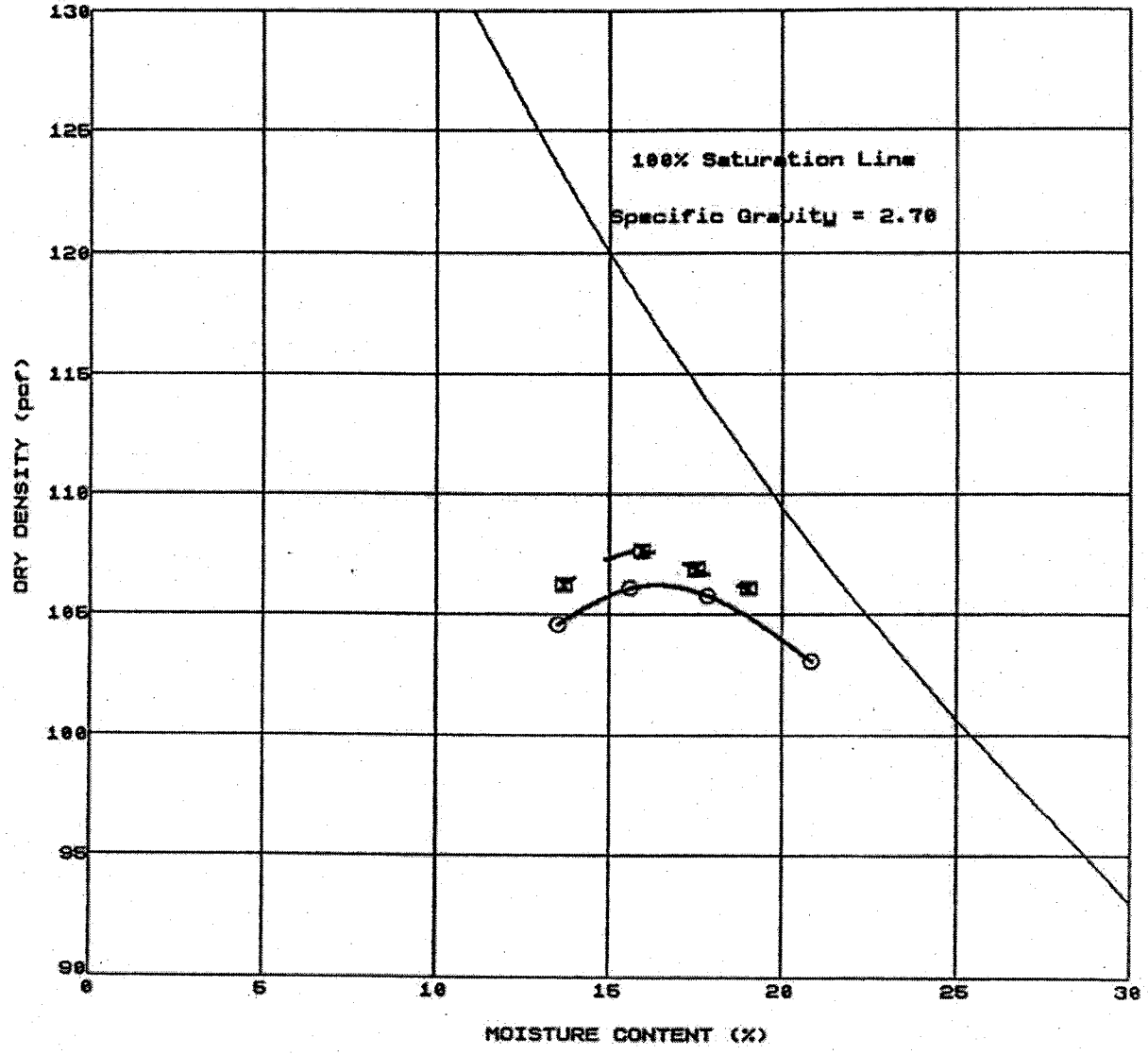
Symbol	Boring Number	Sample Number	Depth (feet)	LL	PL	PI	U.S.C.S. Symbol
○	BAG	Bag #9		51	28	22	CH-MH
⊠	BAG	Bag #10		58	27	31	CH
▲	BAG	Bag #11		58	29	30	CH
★	BAG	Bag 8+9		58	27	31	CH

ATTERBERG LIMITS
ASTM D 4318-93

Project No. 97-111

Project Name Badland

Date 10/22/97 Figure No. _____



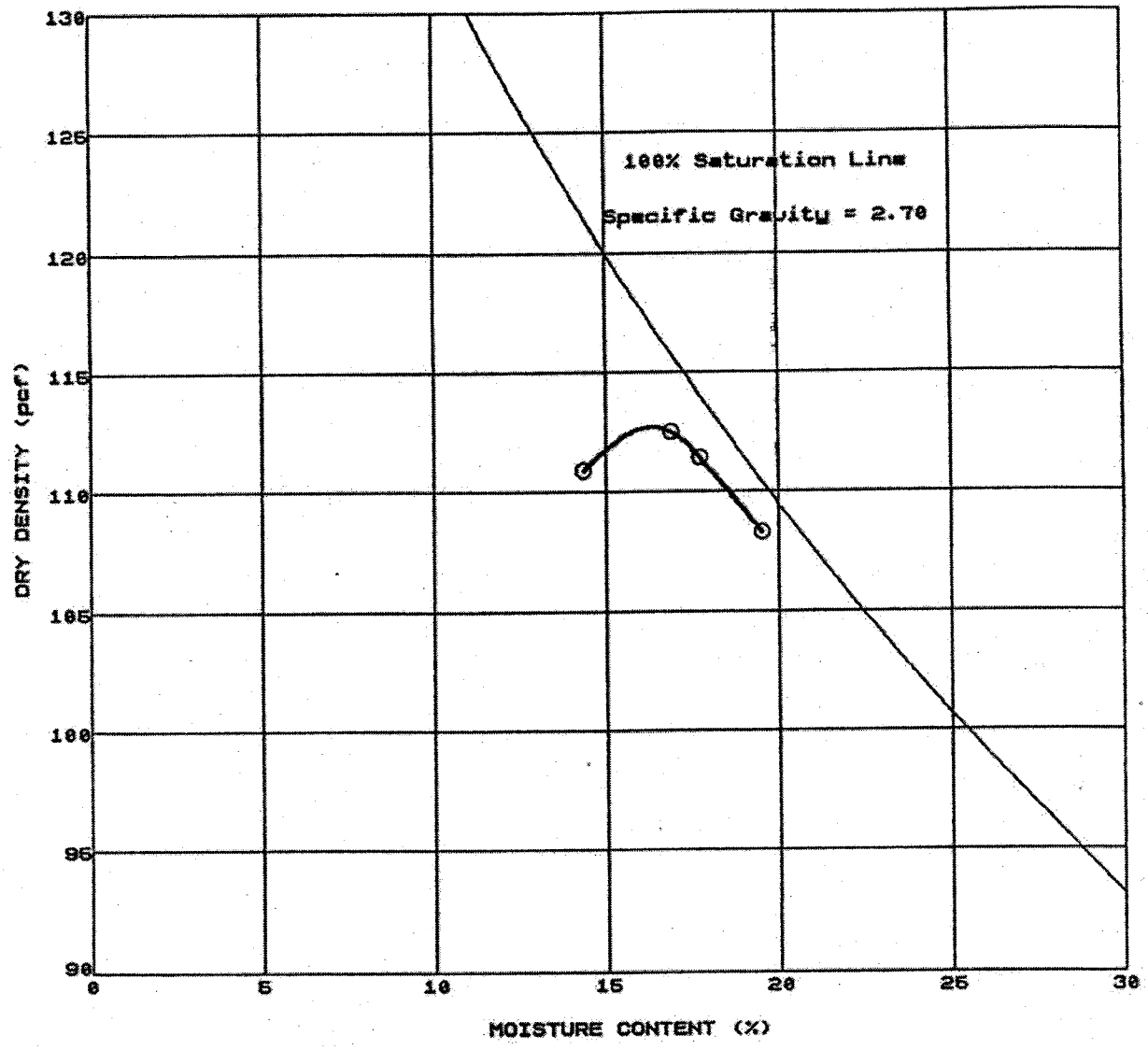
Symbol	Sample Identification	Soil Description	Optimum Moisture (%)	Maximum Dry Density (pcf)
○	Bag #1	Olive Gray Silty Clay	16.5	106.5
⊠	Bag #2	Olive Gray Silty Clay	17.0	107.7

MAXIMUM DENSITY TEST
ASTM D 1557

Project No. 97-111-01

Project Name Badland

Date 10/30/97 Figure No. _____



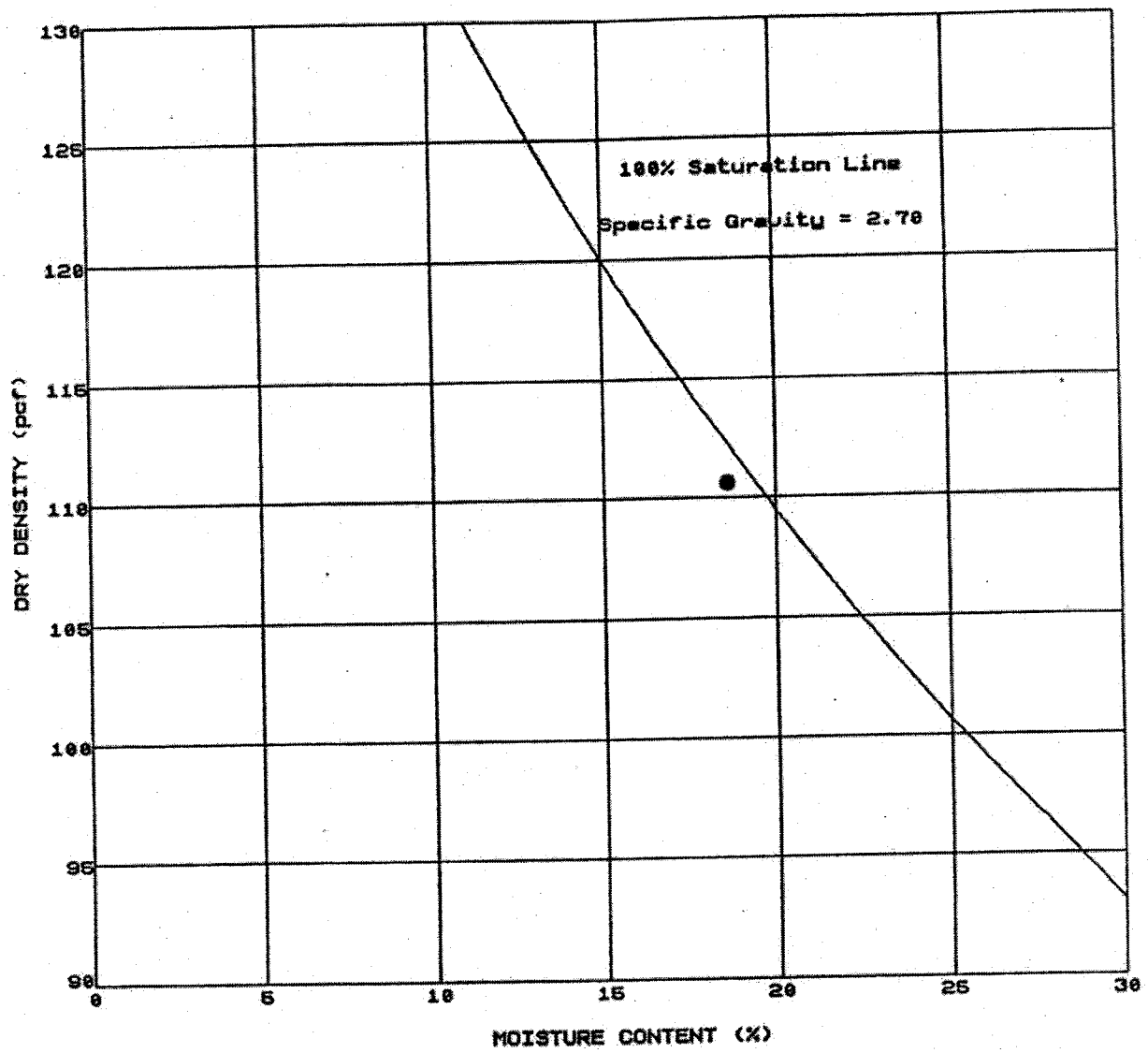
Symbol	Sample Identification	Soil Description	Optimum Moisture (%)	Maximum Dry Density (pcf)
○	Bag #3	Yel Brn Silty Clay	16.5	112.5

MAXIMUM DENSITY TEST
ASTM D 1557

Project No. 97-111

Project Name Badland

Date 9/10/97 Figure No. _____



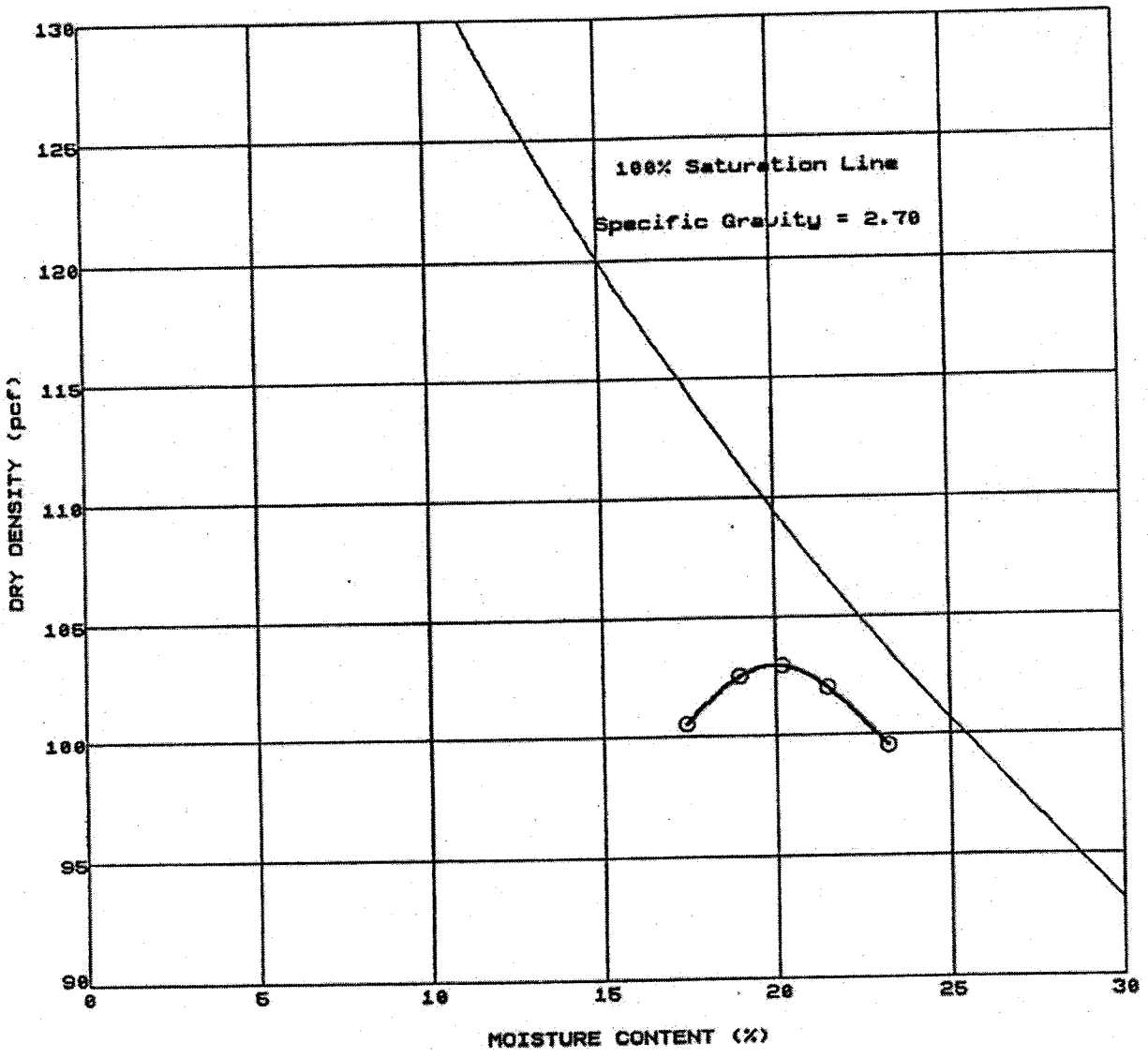
Symbol	Sample Identification	Soil Description	Optimum Moisture (%)	Maximum Dry Density (pcf)
●	Bag #5	Olive Brn Silty Clay		

MAXIMUM DENSITY TEST
ASTM D 1557

Project No. 97-111

Project Name Badland

Date 10/22/97 Figure No. _____



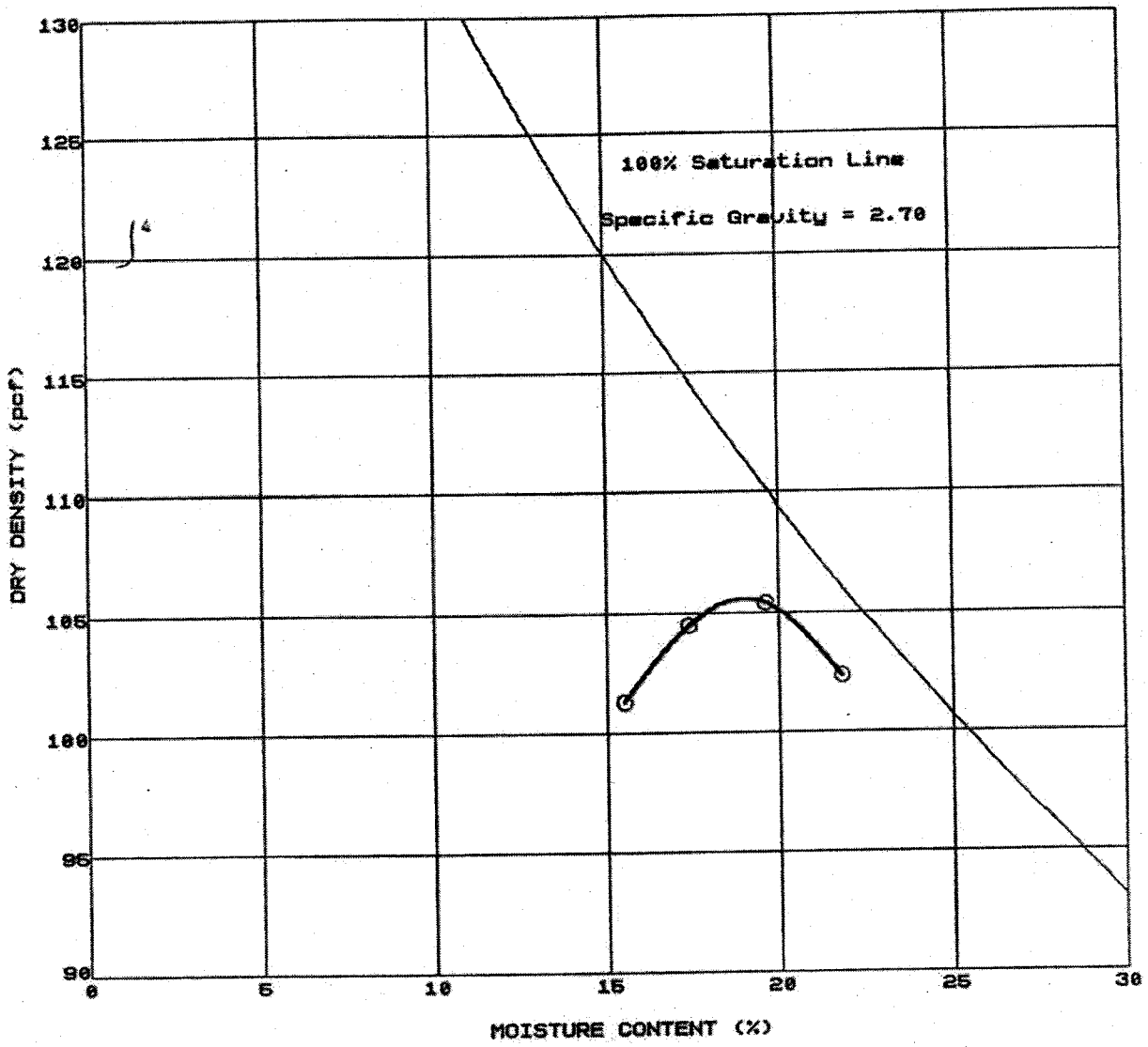
Symbol	Sample Identification	Soil Description	Optimum Moisture (%)	Maximum Dry Density (pcf)
○	Bag #7	Pale Olive Silty Clay	20.0	103.0

MAXIMUM DENSITY TEST
ASTM D 1557

Project No. 97-111

Project Name Badland

Date 10/16/97 Figure No. _____



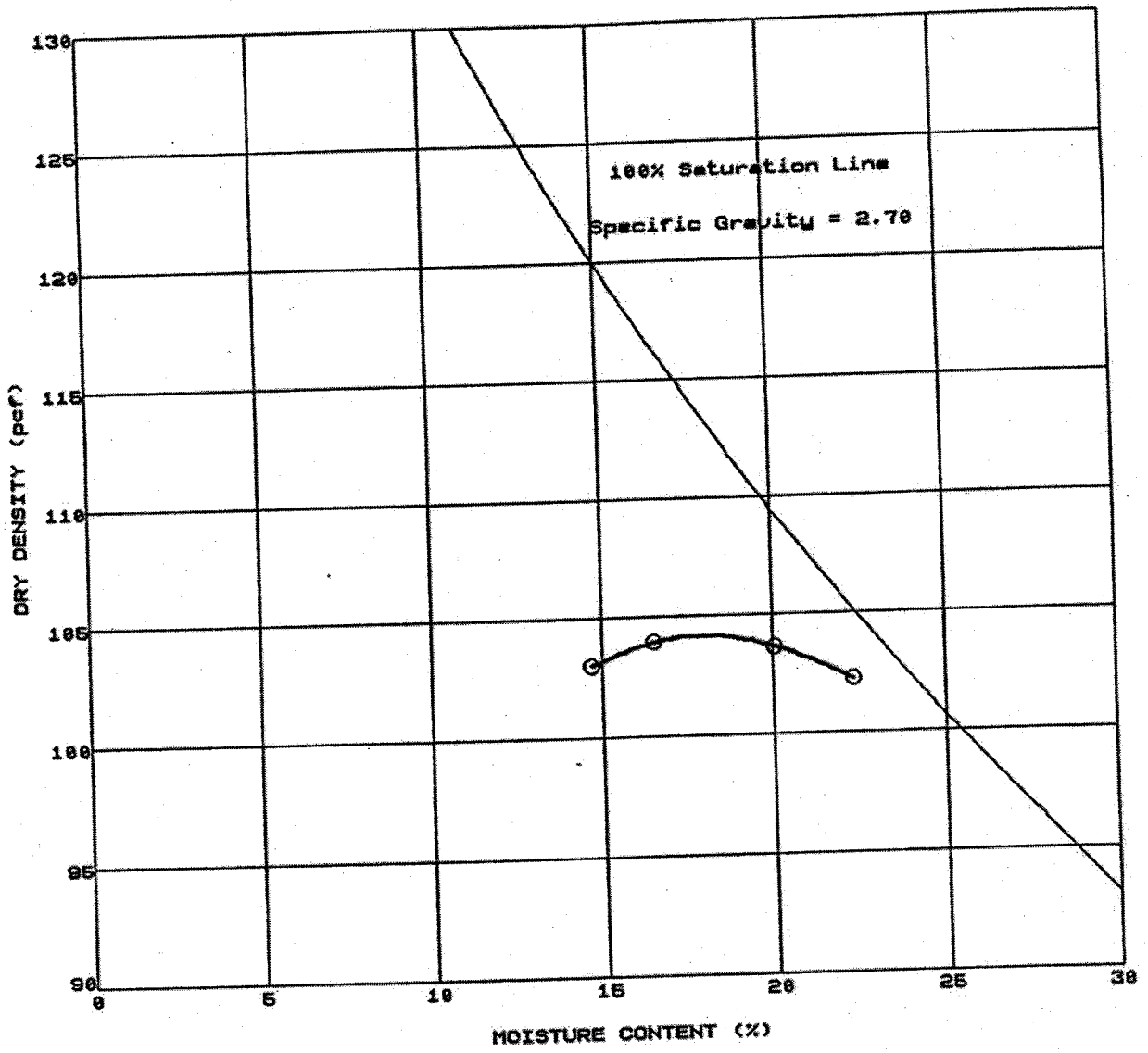
Symbol	Sample Identification	Soil Description	Optimum Moisture (%)	Maximum Dry Density (pcf)
○	Bag#8+Bag#9	Olive Brn Silty Clay	19.5	105.5

MAXIMUM DENSITY TEST
ASTM D 1557

Project No. 97-111

Project Name Badland

Date 11/8/97 Figure No. _____



Symbol	Sample Identification	Soil Description	Optimum Moisture (%)	Maximum Dry Density (pcf)
○	Bag #10	Yel. Brn. Silty Clay	18.0	104.2

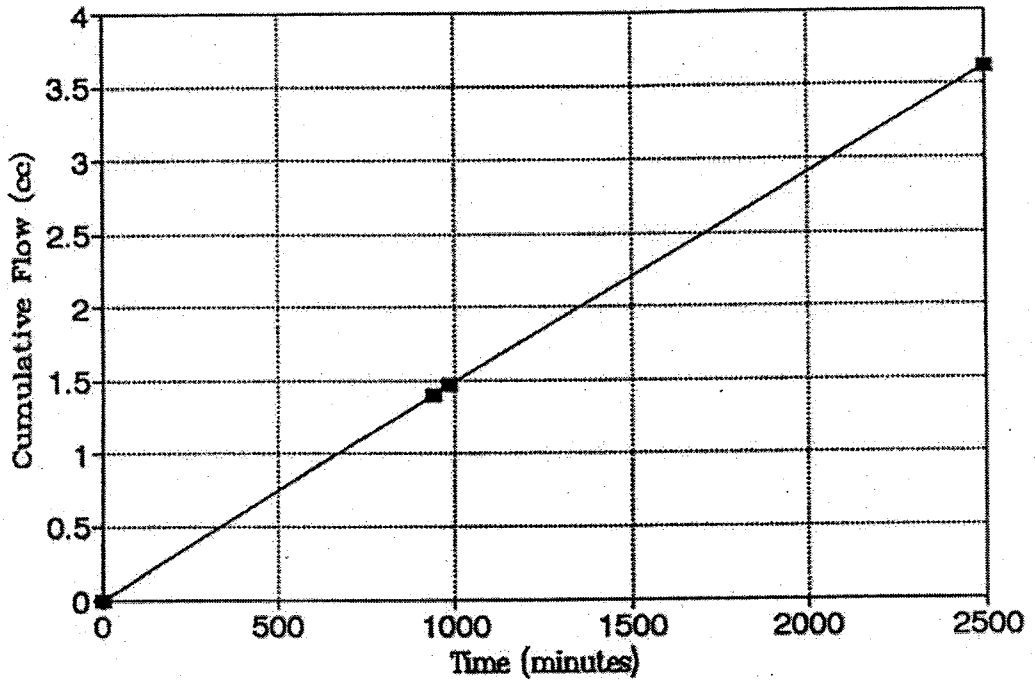
MAXIMUM DENSITY TEST
ASTM D 1557

Project No. 97-111

Project Name Badland

Date 10/24/97 Figure No. _____

CUMULATIVE FLOW VS TIME



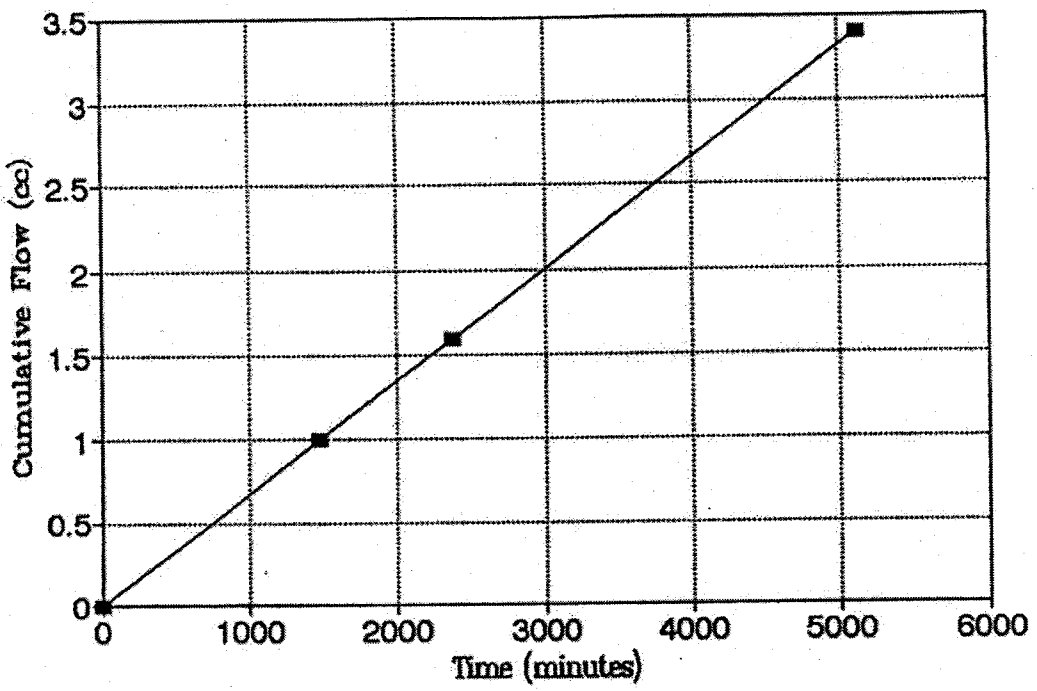
Project Name :	Badland	Tested by :	AP
Project No. :	97-111	Date:	10/17/97
Boring No. :			
Sample:	#2		
Depth (ft):			
Sample Diameter (in.) :	2.425		
Sample Height (in.) :	3.000		
Sample Type:	Remolded to 90% @ opt +4		
Dry Density (pcf):	97.0		
Moisture Content (%):	21.3		
Soil Description:	Olive Gray Silty Clay		

Results:		
	Confining Pressure (psi) =	20
	Total Head Loss (inches) =	83.1
	Flow Rate, q (cc/sec) =	2.41E-05
	Gradient, i =	27.69231
	Hydraulic Conductivity, k (cm/sec.)=	2.92E-08

HYDRAULIC CONDUCTIVITY TEST

ASTM D 5084

CUMULATIVE FLOW VS TIME



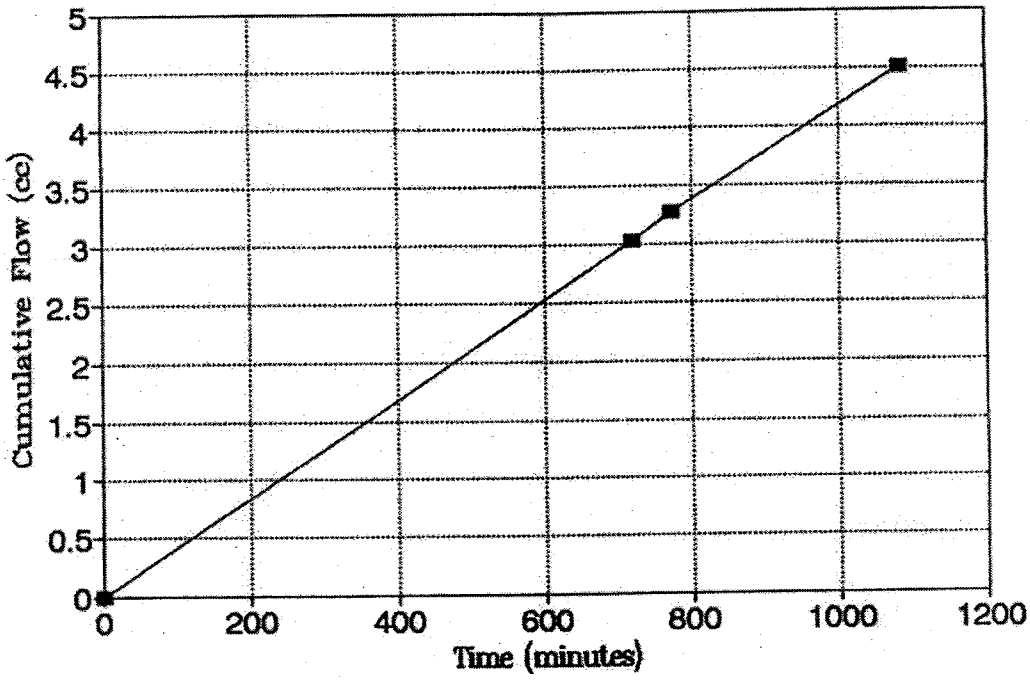
Project Name :	Badland	Tested by :	AP
Project No. :	97-111	Date:	10/20/97
Boring No. :			
Sample:	#3		
Depth (ft):			
Sample Diameter (in.) :	2.425		
Sample Height (in.) :	3.000		
Sample Type:	Remolded to 90% @ opt +3		
Dry Density (pcf):	101.3		
Moisture Content (%):	19.3		
Soil Description:	Olive Gray Fat Clay		

Results:		
	Confining Pressure (psi) =	20
	Total Head Loss (inches) =	83.1
	Flow Rate, q (cc/sec) =	1.10E-05
	Gradient, i =	27.69231
	Hydraulic Conductivity, k (cm/sec.)=	1.34E-08

HYDRAULIC CONDUCTIVITY TEST

ASTM D 5084

CUMULATIVE FLOW VS TIME



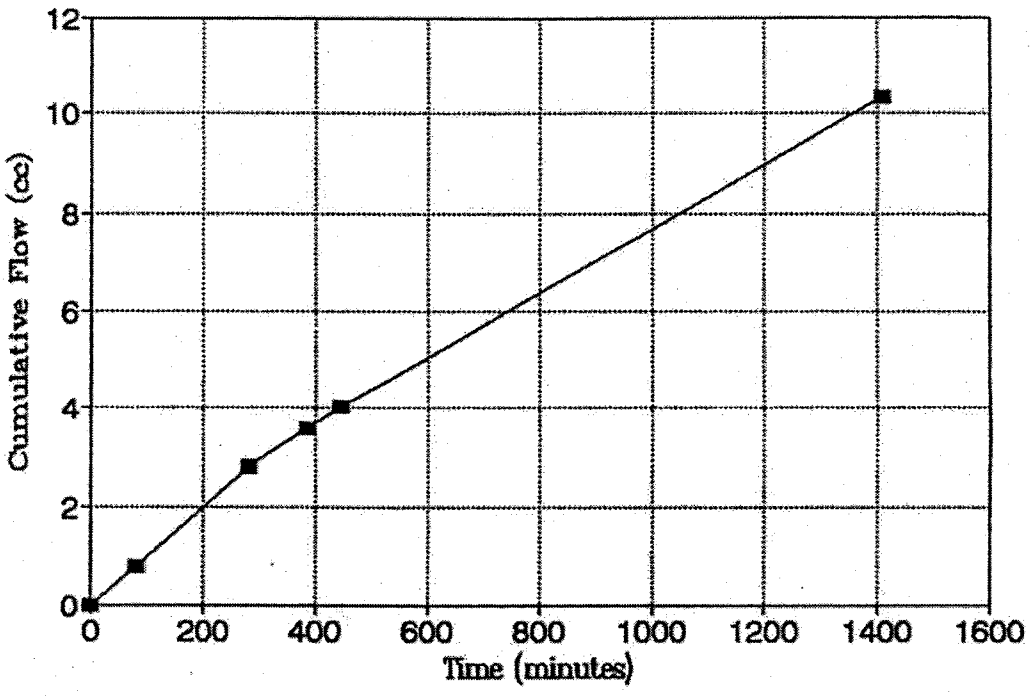
Project Name :	Badland	Tested by :	AP
Project No. :	97-111	Date:	11/08/97
Boring No. :			
Sample:	#8&#9 Mix		
Depth (ft):			
Sample Diameter (in.) :	2.415		
Sample Height (in.) :	3.000		
Sample Type:	Remolded to 90% @ opt +5		
Dry Density (pcf):	95.2		
Moisture Content (%):	24.5		
Soil Description:	Olive Brn Silty Clay		

Results:		
	Confining Pressure (psi) =	20
	Total Head Loss (inches) =	166.2
	Flow Rate, q (cc/sec) =	9.88E-05
	Gradient, i =	55.38462
	Hydraulic Conductivity, k (cm/sec.)=	**6.03E-08**

HYDRAULIC CONDUCTIVITY TEST

ASTM D 5084

CUMULATIVE FLOW VS TIME



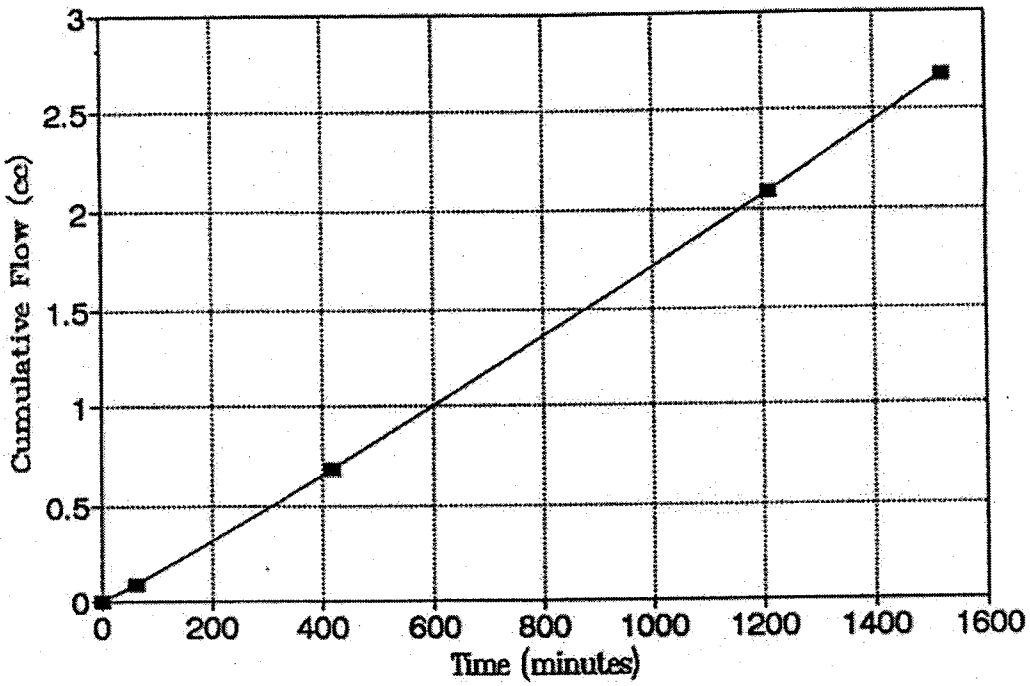
Project Name :	Badland	Tested by :	AP
Project No. :	97-111	Date:	10/22/97
Boring No. :			
Sample:	#7		
Depth (ft):			
Sample Diameter (in.) :	2.425		
Sample Height (in.) :	3.052		
Sample Type:	Remolded to 90% @ opt +4		
Dry Density (pcf):	92.5		
Moisture Content (%):	24.0		
Soil Description:	Yel Brn Silty Clay		

Results:		
	Confining Pressure (psi) =	20
	Total Head Loss (inches) =	138.5
	Flow Rate, q (cc/sec) =	1.11E-04
	Gradient, i =	45.36748
	Hydraulic Conductivity, k (cm/sec.)=	8.25E-08

HYDRAULIC CONDUCTIVITY TEST

ASTM D 5084

CUMULATIVE FLOW VS TIME

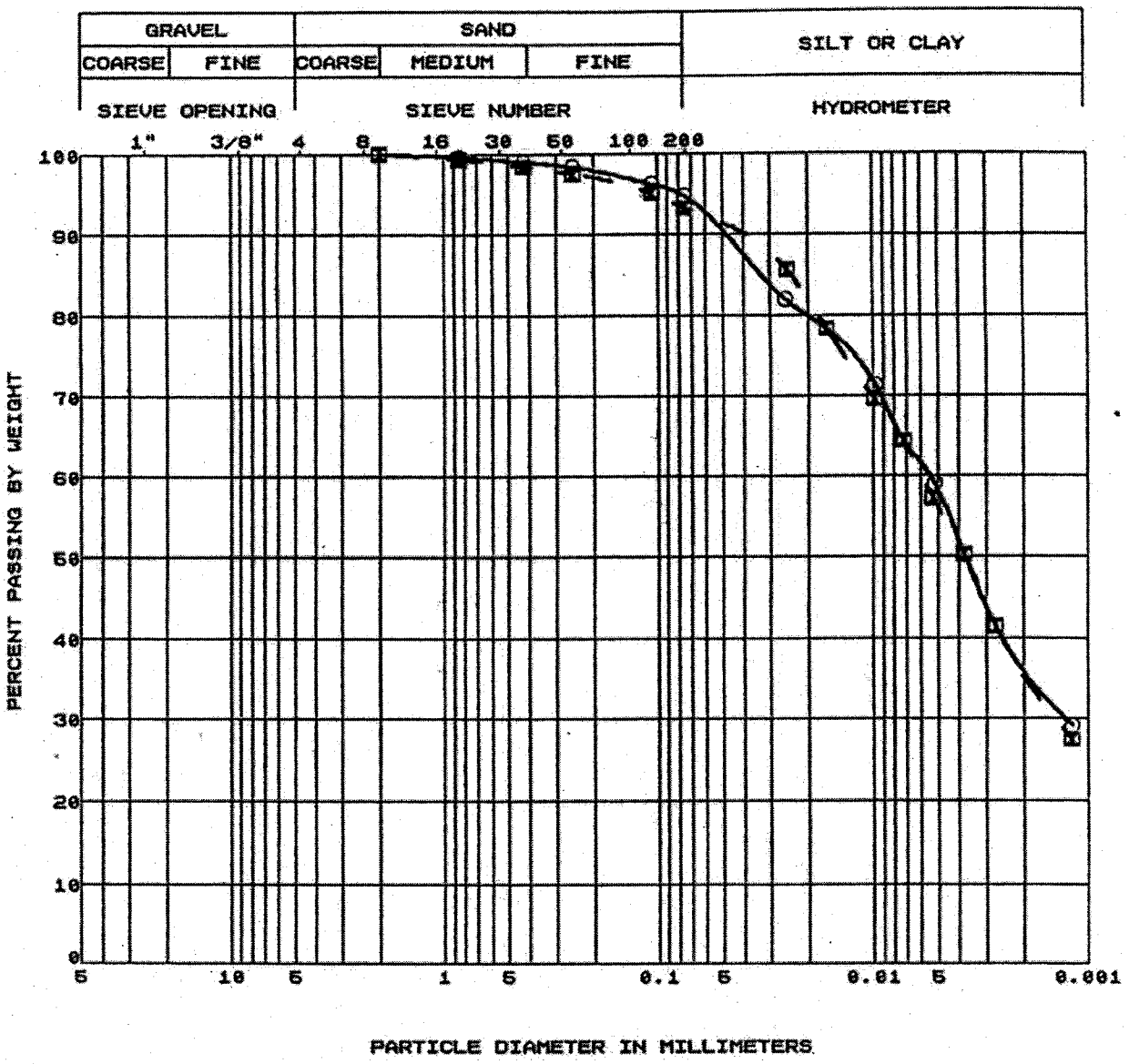


Project Name :	Badland	Tested by :	AP
Project No. :	97-111	Date:	10/25/97
Boring No. :			
Sample:	#10		
Depth (ft):			
Sample Diameter (in.) :	2.415		
Sample Height (in.) :	3.000		
Sample Type:	Remolded to 90% @ opt +5		
Dry Density (pcf):	93.7		
Moisture Content (%):	23.4		
Soil Description:	Yel. Brn Silty Clay		

Results:		
	Confining Pressure (psi) =	20
	Total Head Loss (inches) =	138.5
	Flow Rate, q (cc/sec) =	3.02E-05
	Gradient, i =	46.15385
	Hydraulic Conductivity, k (cm/sec.)=	2.21E-08

HYDRAULIC CONDUCTIVITY TEST

ASTM D 5084



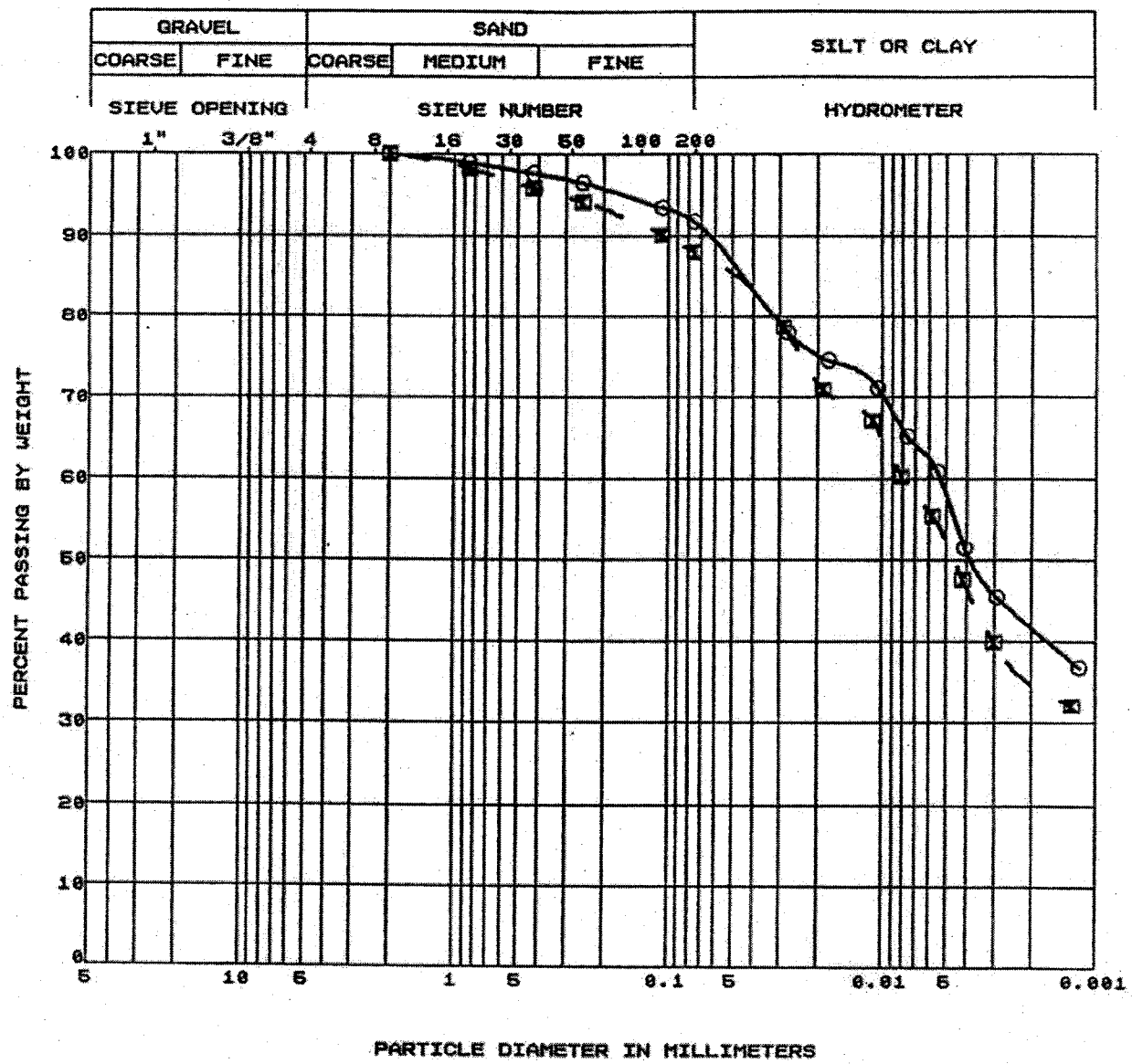
Symbol	Boring Number	Sample Number	Sample Depth (feet)	Percent Passing No. 200 Sieve	Soil Type
○	-	Bag 1	-	94.7	CH
⊠	-	Bag 2		93.2	CL

GRAIN SIZE DISTRIBUTION CURVE
ASTM D 422

Project No. 97-111-01

Project Name Skiland

Date 10/5/97 Figure No. _____



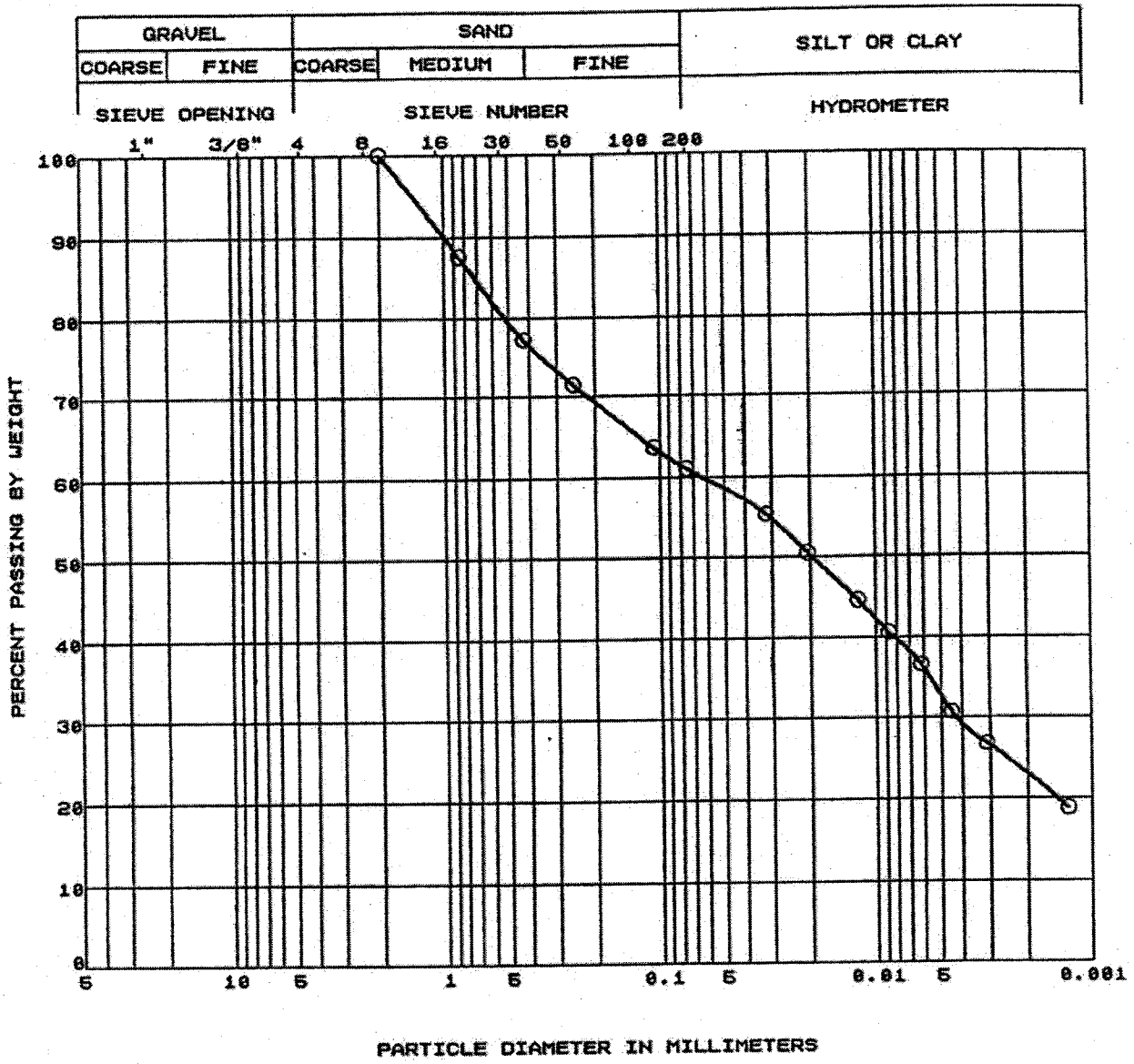
Symbol	Boring Number	Sample Number	Sample Depth (feet)	Percent Passing No. 200 Sieve	Soil Type
○	BAG	#3		91.7	CH
⊠	BAG	#5		88.0	CH

GRAIN SIZE DISTRIBUTION CURVE
ASTM D 422

Project No. 97-111

Project Name Badland

Date 10/13/97 Figure No. _____



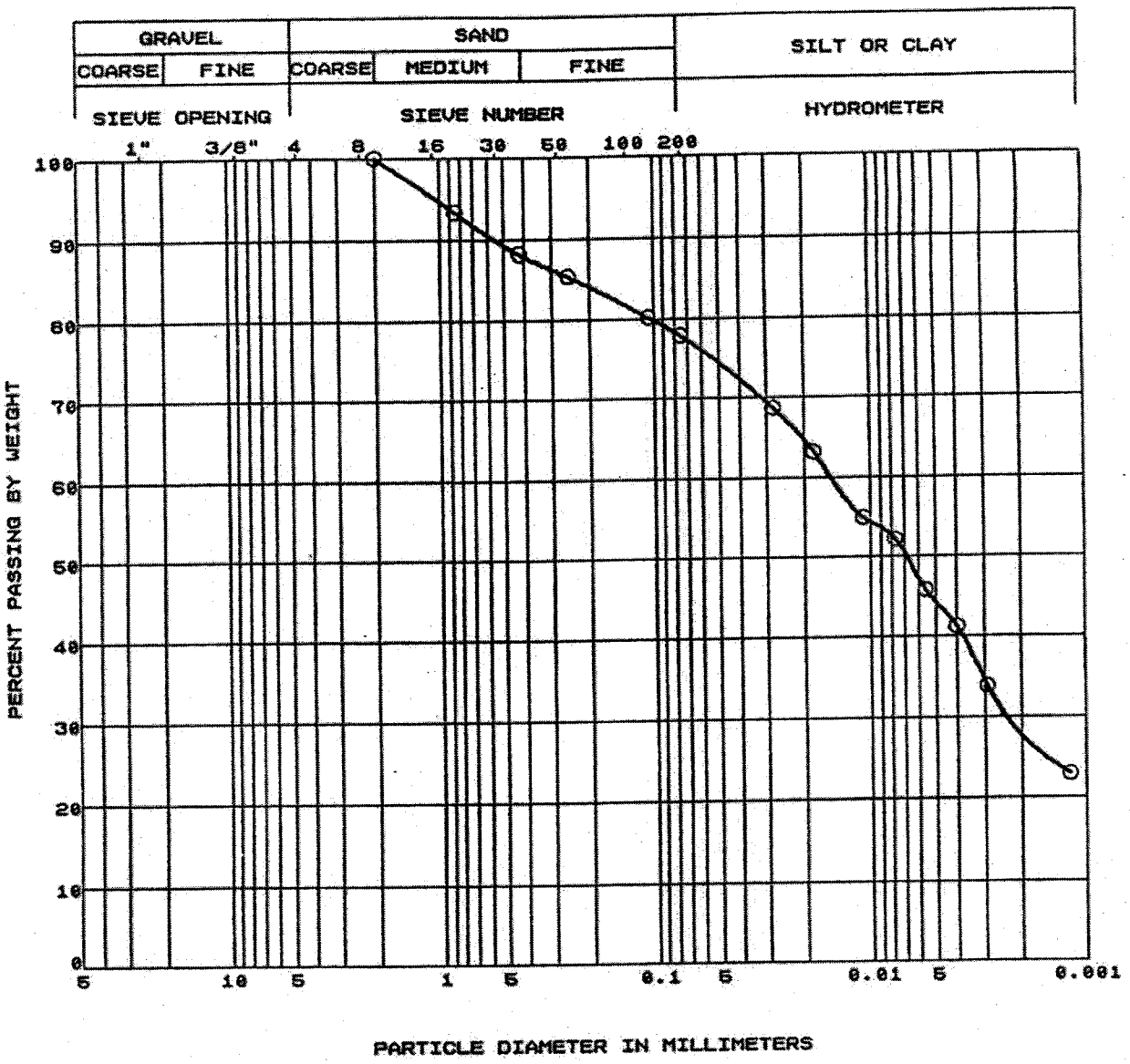
Symbol	Boring Number	Sample Number	Sample Depth (feet)	Percent Passing No. 200 Sieve	Soil Type
O	BAG	#7		61.1	CH

GRAIN SIZE DISTRIBUTION CURVE
ASTM D 422

Project No. 97-111

Project Name Badland

Date 10/16/97 Figure No. _____



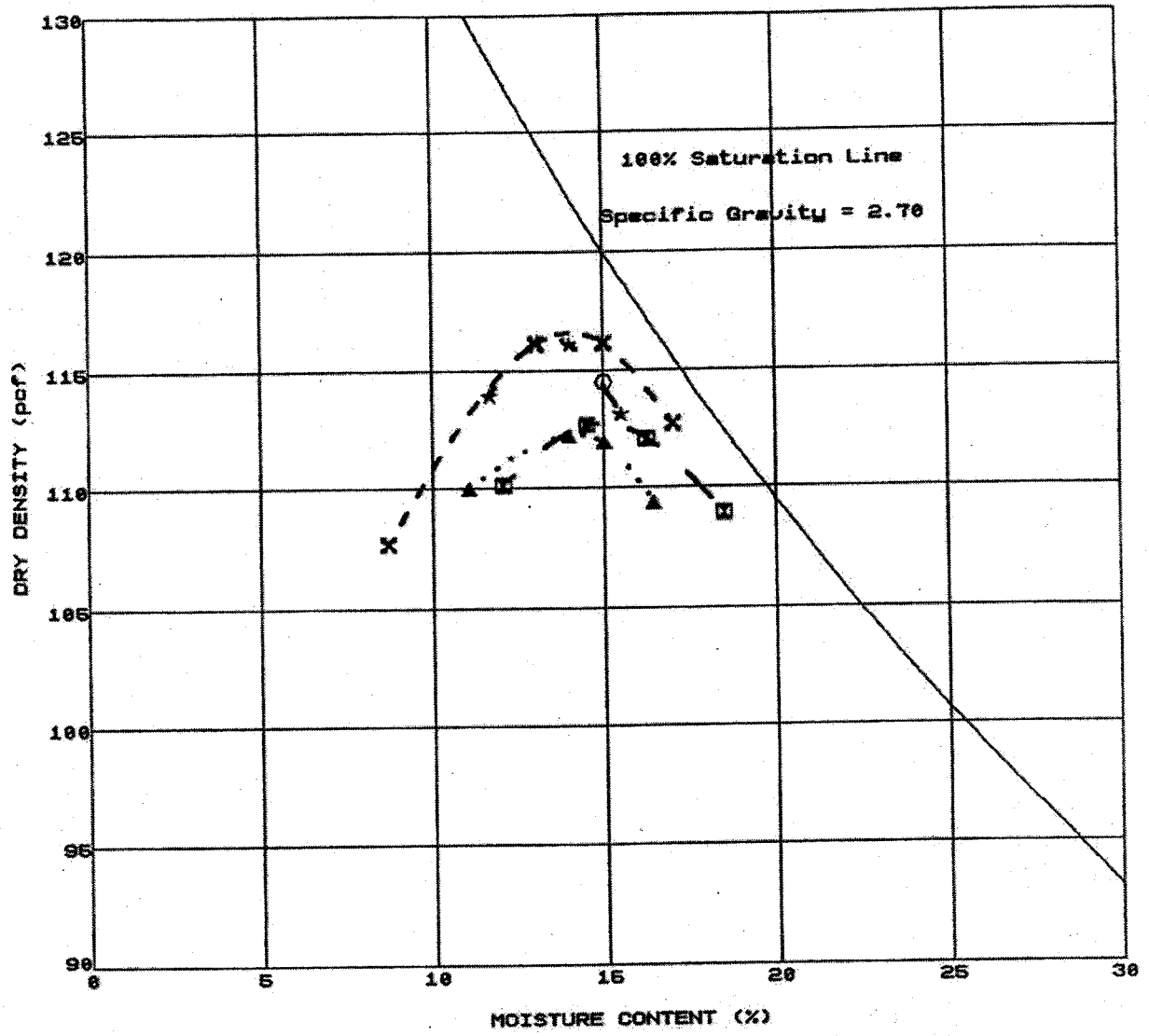
Symbol	Boring Number	Sample Number	Sample Depth (feet)	Percent Passing No. 200 Sieve	Soil Type
O	BAG	Bag 8+9	89.0	78.0	CH

GRAIN SIZE DISTRIBUTION CURVE
ASTM D 422

Project No. 97-111

Project Name Badland

Date 10/20/97 Figure No. _____



Symbol	Sample Identification	Soil Description	Optimum Moisture (%)	Maximum Dry Density (pcf)
○	Bulk 1	Olive Brown Silty Clay	15.0	114.5
⊠	P-1	Drk. Gray Silty Clay	15.3	112.7
▲	P-2	Drk. Gray Sandy Clay	14.0	112.4
★	P-3	Olive Brown Silty Clay	13.6	116.4
×	P-4	Olive Brn Silty Clay	14.0	116.5

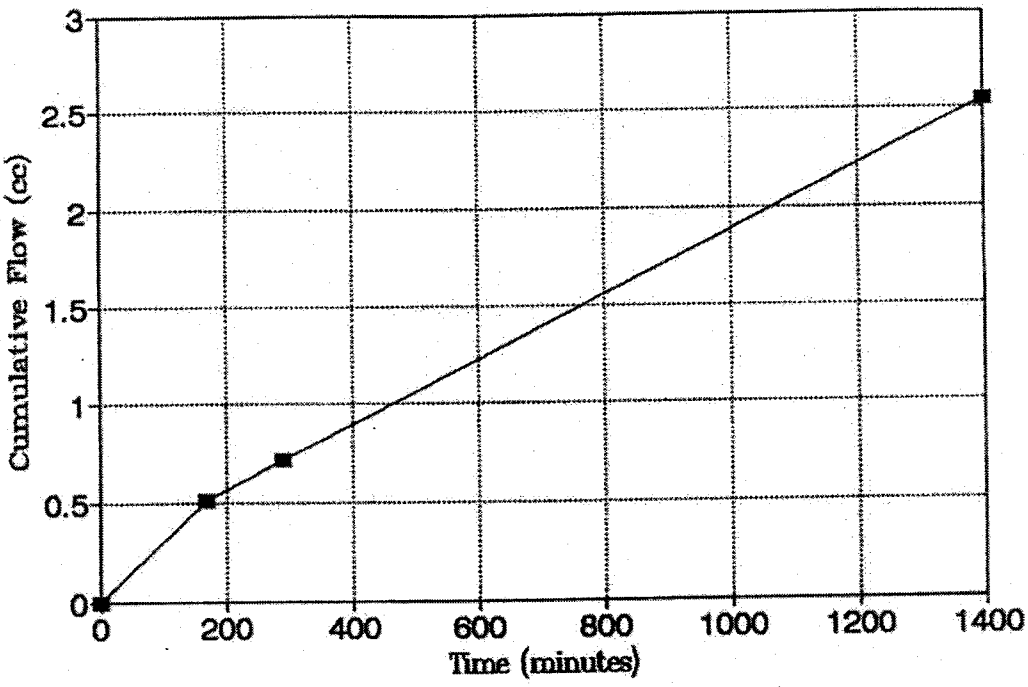
MAXIMUM DENSITY TEST
ASTM D 1557

Project No. 97-111-02

Project Name Badland/Test Pad

Date 11/5/97 Figure No. _____

CUMULATIVE FLOW VS TIME



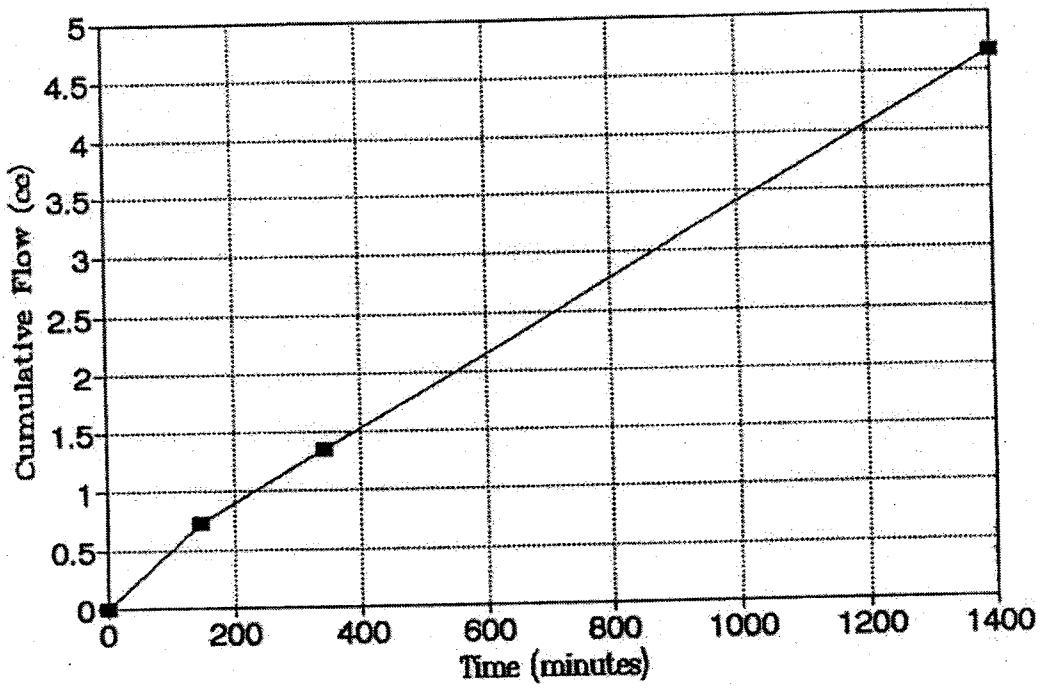
Project Name :	Badland/Test Pad	Tested by :	AP
Project No. :	97-111-01	Date:	10/29/97
Boring No. :			
Sample:	P-1		
Depth (ft):			
Sample Diameter (in.) :	2.875		
Sample Height (in.) :	2.700		
Sample Type:	Shelby Tube		
Dry Density (pcf):	100.4		
Moisture Content (%):	18.3		
Soil Description:	Brn Silty Clay		

Results:		
	Confining Pressure (psi) =	20
	Total Head Loss (inches) =	138.5
	Flow Rate, q (cc/sec) =	2.76E-05
	Gradient, i =	51.28205
	Hydraulic Conductivity, k (cm/sec.)=	1.29E-08

HYDRAULIC CONDUCTIVITY TEST

ASTM D 5084

CUMULATIVE FLOW VS TIME



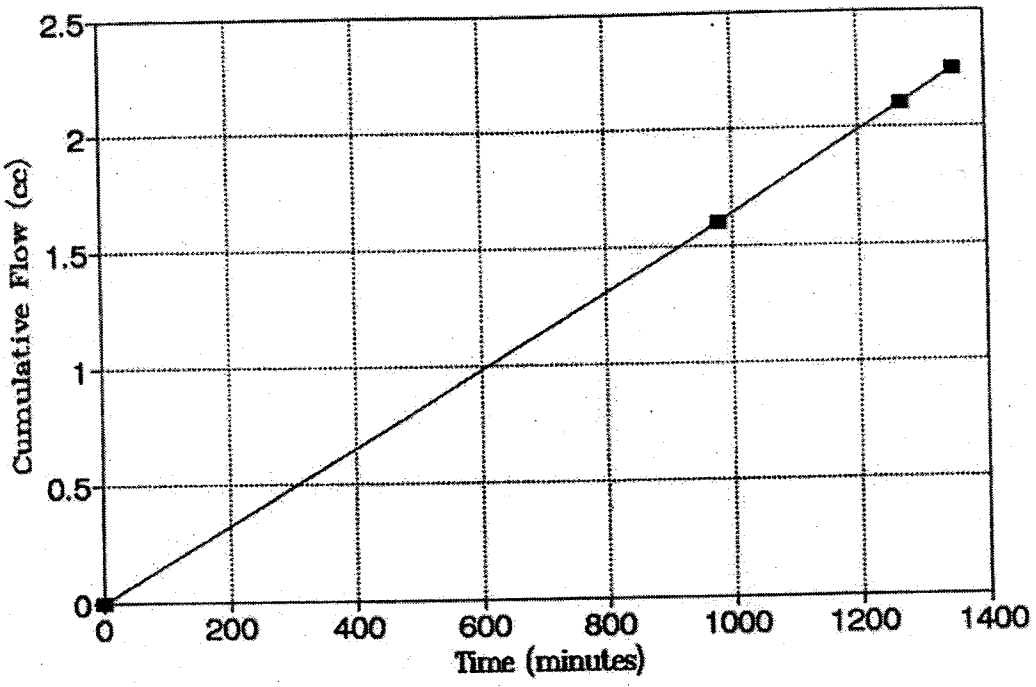
Project Name :	Badland/Test Pad	Tested by :	AP
Project No. :	97-111-01	Date:	10/29/97
Boring No. :			
Sample:	P-2		
Depth (ft):			
Sample Diameter (in.) :	2.875		
Sample Height (in.) :	3.600		
Sample Type:	Shelby Tube		
Dry Density (pcf):	107.5		
Moisture Content (%):	17.4		
Soil Description:	Brn Silty Clay		

Results:		
	Confining Pressure (psi) =	20
	Total Head Loss (inches) =	138.5
	Flow Rate, q (cc/sec) =	5.23E-05
	Gradient, i =	38.46154
	Hydraulic Conductivity, k (cm/sec.)=	3.25E-08

HYDRAULIC CONDUCTIVITY TEST

ASTM D 5084

CUMULATIVE FLOW VS TIME



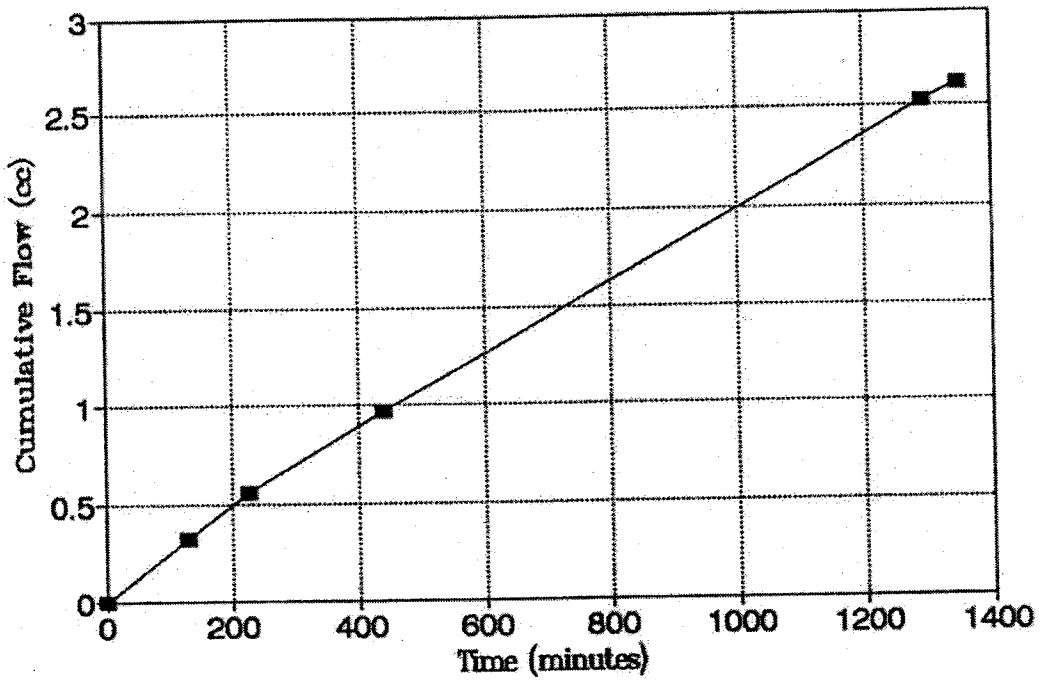
Project Name :	Badland/Test Pad	Tested by :	AP
Project No. :	97-111-01	Date:	10/29/97
Boring No. :			
Sample:	P-3		
Depth (ft):			
Sample Diameter (in.) :	2.875		
Sample Height (in.) :	3.250		
Sample Type:	Shelby Tube		
Dry Density (pcf):	100.2		
Moisture Content (%):	17.1		
Soil Description:	Brn Silty Clay		

Results:		
	Confining Pressure (psi) =	20
	Total Head Loss (inches) =	138.5
	Flow Rate, q (cc/sec) =	2.78E-05
	Gradient, i =	42.60355
	Hydraulic Conductivity, k (cm/sec.)=	1.56E-08

HYDRAULIC CONDUCTIVITY TEST

ASTM D 5084

CUMULATIVE FLOW VS TIME



Project Name :	Badland/Test Pad	Tested by :	AP
Project No. :	97-111-01	Date:	11/4/97
Boring No. :			
Sample:	P-4		
Depth (ft):			
Sample Diameter (in.) :	2.875		
Sample Height (in.) :	2.700		
Sample Type:	Shelby Tube		
Dry Density (pcf):	101.9		
Moisture Content (%):	17.2		
Soil Description:	Brn Silty Clay		

Results:		
	Confining Pressure (psi) =	20
	Total Head Loss (inches) =	138.5
	Flow Rate, q (cc/sec) =	3.15E-05
	Gradient, i =	51.28205
	Hydraulic Conductivity, k (cm/sec.)=	1.47E-08

HYDRAULIC CONDUCTIVITY TEST

ASTM D 5084

APPENDIX C: Clay Liner Specifications

2.2 Compacted Clay Liner

2.2.1 Description

This work shall include furnishing all labor, supervision, tools, equipment, and materials necessary to complete the work of constructing a compacted clay liner for the Canyon 4, Phase I Area, as shown on the Plans and as directed by the Engineer. This work also includes processing of clay liner material in the stockpile prior to hauling to Canyon 4, Phase 1 for composite liner construction; construction of a production pad; and the construction of a 24"-thick compacted monolithic clay liner. All construction operations related to construction of the compacted clay liner, including processing in the stockpile, placement, moisture conditioning, and compaction of the compacted clay liner, shall conform to applicable requirements of the Standard Specifications and to the requirements specified herein.

This process ultimately shall result in the construction of a compacted, 24-inch-thick liner achieving a laboratory hydraulic conductivity of $1x10^{-7}$ cm/sec or less, using the ASTM D5084 test method. The compacted clay liner shall be placed over Consultant approved areas of hard, dense, undisturbed, natural subgrade; properly prepared subgrade; or engineered fill subgrade.

The District has stockpiled enough quantity of clay liner material (for Canyon 4, Phase 1 and future phases) imported from the Eastern Municipal Water District's Skiland site at the landfill site at the location shown on the drawings. During stockpiling, the material was moisture-conditioned and disced. The Contractor shall be responsible for additional processing in the stockpile, including discing, moisture-conditioning and mixing, as necessary, to produce a uniform material prior to hauling to the placement area.

At the completion of clay hauling and stockpiling, a clay liner test pad was constructed at the landfill site by the District to determine the placement methods and compactive effort necessary to produce a clay liner meeting the requirements of these specifications. A copy of the report on the results of QA/QC observation and testing during clay liner stockpiling and test pad construction is included in Appendix ___ to these specifications.

2.2.2 Materials

Specifications for the clay material is described in Section 3.4 of these specifications.

2.2 Compacted Clay Liner

2.2.1 Description

This work shall include furnishing all labor, supervision, tools, equipment, and materials necessary to complete the work of constructing a compacted clay liner for the Canyon 4, Phase I Area, as shown on the Plans and as directed by the Engineer. This work also includes processing of clay liner material in the stockpile prior to hauling to Canyon 4, Phase 1 for composite liner construction; construction of a production pad; and the construction of a 24"-thick compacted monolithic clay liner. All construction operations related to construction of the compacted clay liner, including processing in the stockpile, placement, moisture conditioning, and compaction of the compacted clay liner, shall conform to applicable requirements of the Standard Specifications and to the requirements specified herein.

This process ultimately shall result in the construction of a compacted, 24-inch-thick liner achieving a laboratory hydraulic conductivity of $1x10^{-7}$ cm/sec or less, using the ASTM D5084 test method. The compacted clay liner shall be placed over Consultant approved areas of hard, dense, undisturbed, natural subgrade; properly prepared subgrade; or engineered fill subgrade.

The District has stockpiled enough quantity of clay liner material (for Canyon 4, Phase 1 and future phases) imported from the Eastern Municipal Water District's Skiland site at the landfill site at the location shown on the drawings. During stockpiling, the material was moisture-conditioned and disced. The Contractor shall be responsible for additional processing in the stockpile, including discing, moisture-conditioning and mixing, as necessary, to produce a uniform material prior to hauling to the placement area.

At the completion of clay hauling and stockpiling, a clay liner test pad was constructed at the landfill site by the District to determine the placement methods and compactive effort necessary to produce a clay liner meeting the requirements of these specifications. A copy of the report on the results of QA/QC observation and testing during clay liner stockpiling and test pad construction is included in Appendix ___ to these specifications.

2.2.2 Materials

Specifications for the clay material is described in Section 3.4 of these specifications.

2.2.3 Production Pads

Prior to constructing the compacted clay layer, the Contractor shall construct at least one 100-foot x 45-foot x 2-foot-thick production pad for the clay material to be used in construction of the clay liner. The production pad shall be used to verify that the construction equipment and methods employed can

2.2.4.3 Moisture Conditioning of Clay in the Stockpile

The clay soil material in the existing stockpile shall be moisture conditioned, thoroughly mixed, and shall be disced or rotomixed to break down the clay clods and provide a uniform moisture content. The moisture content shall be brought to within 2 to 5 percent above the optimum moisture content as determined by ASTM D1557-78 or as directed by the QA/QC Consultant following the construction of the production pads and as approved by the Engineer. If the moisture content in the stockpile area is higher than permissible limits, the material will be thoroughly disced and allowed to air dry before placing in the Canyon 4, Phase 1 clay liner area

2.2.4.4 Spreading and Placement of Clay in the Canyon 4, Phase 1

The material shall be hauled from the stockpile and shall be uniformly spread on the prepared and scarified subgrade surface to provide a loose lift thickness not exceeding 8 inches. Removal of oversize particles (greater than 1 inch size) shall be performed on the fill by approved rock rakes or other equipment, as approved by the Engineer. Any clay clods greater than 1 inch size shall be broken down by suitable equipment.

2.2.4.5 Moisture Conditioning of the Clay in the Canyon 4, Phase 1 Area

Following spreading and oversize particle removal, the lift shall be moisture conditioned by a carefully controlled spray nozzle and disced or processed by appropriate means to achieve uniform moisture conditioning. The moisture content shall be in the range of 2 to 5 percent over optimum as determined by ASTM D 1557-78 or as determined by the QA/QC Consultant following construction of the production pads and as directed by the Engineer.

If the moisture content of the clay in the previous lift becomes too high due to rain or Contractor's construction methods (greater than 5 percent above optimum or as determined by the consultant following the construction of the production pads), the contractor shall either remove the clay from the Canyon 4, Phase 1 Subgrade Area and haul it to the stockpile or, at the direction of the Consultant and with written approval of the Engineer, may disc and rework it in place in the Canyon 4, Phase 1 area. If moisture content of the clay spread on the previous layer is too high, with a moisture content of greater than 5% above OMC or as determined by the consultant following the construction of the production pads, or if proper compaction is not being achieved due to excessive moisture, the Contractor shall remove the material or permit it to dry, assisting it by discing and harrowing, as necessary, until the moisture content is reduced to 2% to 5% above OMC. If material is left to dry, no material may be

placed over the wet material until it has been dried to the proper moisture content, reworked, and properly compacted to the satisfaction of the Engineer and Consultant.

If the moisture content of the clay is less than specified (less than 2% above OMC), the Contractor shall spray water on the layer, and shall work the moisture into the layer by harrowing or using other methods approved by the Engineer and Consultant, until a uniform distribution of moisture at the proper moisture content is obtained.

2.2.4.6 Compaction of the Clay Liner

Following moisture conditioning, each lift shall be compacted by a compaction method proposed by the Contractor and approved by the Engineer and Consultant. The clay material shall be compacted to a dry density of at least 90 percent of the maximum dry density determined by ASTM D1557-78. If additional compaction is required to obtain the required hydraulic conductivity, the cost of such additional compactive effort shall be borne by the Contractor. The required minimum degree of compaction shall have been demonstrated by the construction of production pads. The number of passes of the compactor shall be increased if the minimum density is not achieved within the moisture content range specified above at the sole expense of the Contractor. Compacted lift thickness shall not exceed 6 inches.

2.2.4.7 Soils Testing of the Clay Liner

The QA/QC Consultant will perform gradation analysis, insitu density tests, insitu hydraulic conductivity tests and will recover representative tube samples for laboratory *hydraulic conductivity* tests. Both the compaction testing and the hydraulic conductivity testing shall be performed by the Consultant at the District's expense. Should areas which have failed the compaction tests and/or if the Contractor failed to follow proper procedures in achieving required compaction as specified in these specifications and QA/QC plan, the failed areas shall be reworked by the Contractor at the direction of the Engineer at the Contractor's expense. The retest of areas which have failed the specified testing shall be performed by the Consultant at the Contractor's expense.

****The following sections will be handled by the RCWRMD based on the liner design and construction schedule.**

2.2.4.8 Finished Surface of the Clay Liner and Placement of FML

The successive lifts of the clay liner shall be bonded by scarifying a portion of the lower lift to prevent lamination of the fill. The total compacted thickness of the low permeability layer shall be a minimum of 24" as shown on the Plans.

After construction and compaction of the clay liner as specified and required in all subsections of section 2.2.4 of these specifications, the finished surface of the clay liner shall be graded and proof rolled with a steel drum roller to the elevations shown on the Plans to create a smooth and uniform surface free of rocks, debris, sharp objects or any other objects which may damage the FML. Dozers with slope boards should be fitted with smooth blades where used to trim clay. The finished clay liner shall be smooth, uniform and free of depressions that could potentially pool leachate. The finished top surface of the clay surface shall be compatible with the FML and GCL manufacture's and installer's recommendations and as specified in Sections 2.7 and 2.8 of these Special Provisions. The clay surface shall be covered with the FML as soon as practicable to minimize development of desiccation cracks, saturation or erosion damage. The maximum time limit allowed prior to covering the clay liner is three (3) calendar days. Any cracking, saturation or erosion which occurs prior to covering with the FML, shall be repaired at the direction of the Consultant to the satisfaction of the Engineer at the sole expense of the Contractor.

2.2.4.9 Construction Scheduling to Protect the Clay Liner and GCL

Prior to start of work, the Contractor shall submit a Phased Construction Plan for the District's approval. This Phased Construction Plan shall include a map showing how large an area will be worked at a time and also showing the order of construction for all components of the bottom liner system. The maximum time for placement of the clay liner shall not exceed 10 working days in this schedule. The maximum time for deployment of the GCL shall not exceed 10 working days in this schedule. Deployment of the FML should begin within 5 calendar days of the start of construction of the clay liner or start of the deployment of the GCL, whichever date causes the earliest start date of the deployment of the FML. The FML should be completely deployed and fusion welded within 5 calendar days of starting deployment. Finish welding shall be completed as soon as possible after deployment. Consideration should be made to timing of weekends and holidays in the development of this schedule. The purpose of these

scheduling constraints is to protect the clay liner in the event of wet weather during the installation of the clay liner. The Contractor may submit alternative approaches for Engineer's approval.

2.2.4.10 Stockpiling Prohibited on the Canyon 4, Phase 1 Subgrade

The Contractor shall not stockpile any materials on the subgrade unless approval to do so is granted in writing by the Engineer.

2.2.4.11 Protection from Desiccation, Erosion and Saturation

The compacted clay liner shall be maintained at a moisture content between 2% and 5% above OMC, and shall be prevented from drying or becoming saturated prior to placement of the FML. Any compacted clay liner surface shall be moisture conditioned at least every day. Any drying, cracking, rutting, saturation or unevenness shall be repaired and re-compacted to the satisfaction of the Engineer and Consultant.

If rain is expected, the Clay liner shall be covered to protect it from damage due to excess moisture. Covering material shall consist of the required FML layer or a synthetic protective cover approved by the Engineer and Consultant. Extreme care shall be exercised in removing any temporary cover layer, so that the compacted clay liner is not damaged. Any resulting damage that occurs shall be repaired by the contractor by removal, reprocessing, and recompaction of material to the satisfaction of the Engineer and Consultant. Costs associated with protection of the clay layer, removal of temporary cover materials or repair of the clay layer due to damage of any kind shall be borne by the Contractor with no additional payment allowed.

2.2.5 QA/QC

All work shall be performed in accordance with the QA/QC Plan, Section 7.0, under the ongoing observation of the Engineer and Consultant. During compacted clay liner construction, the Engineer shall have the authority to order an immediate stoppage due to improper procedures or for any other reason, including inclement weather, that, in his sole opinion, may result in a defective compacted clay liner.

2.2.6 Measurement and Payment

The compacted clay liner shall be measured in place, after proper moisture content and relative compaction have been achieved, resulting in the desired hydraulic conductivity. Quantities shall be

APPENDIX "F"

QED Environmental Systems Slider Pump and Accessories

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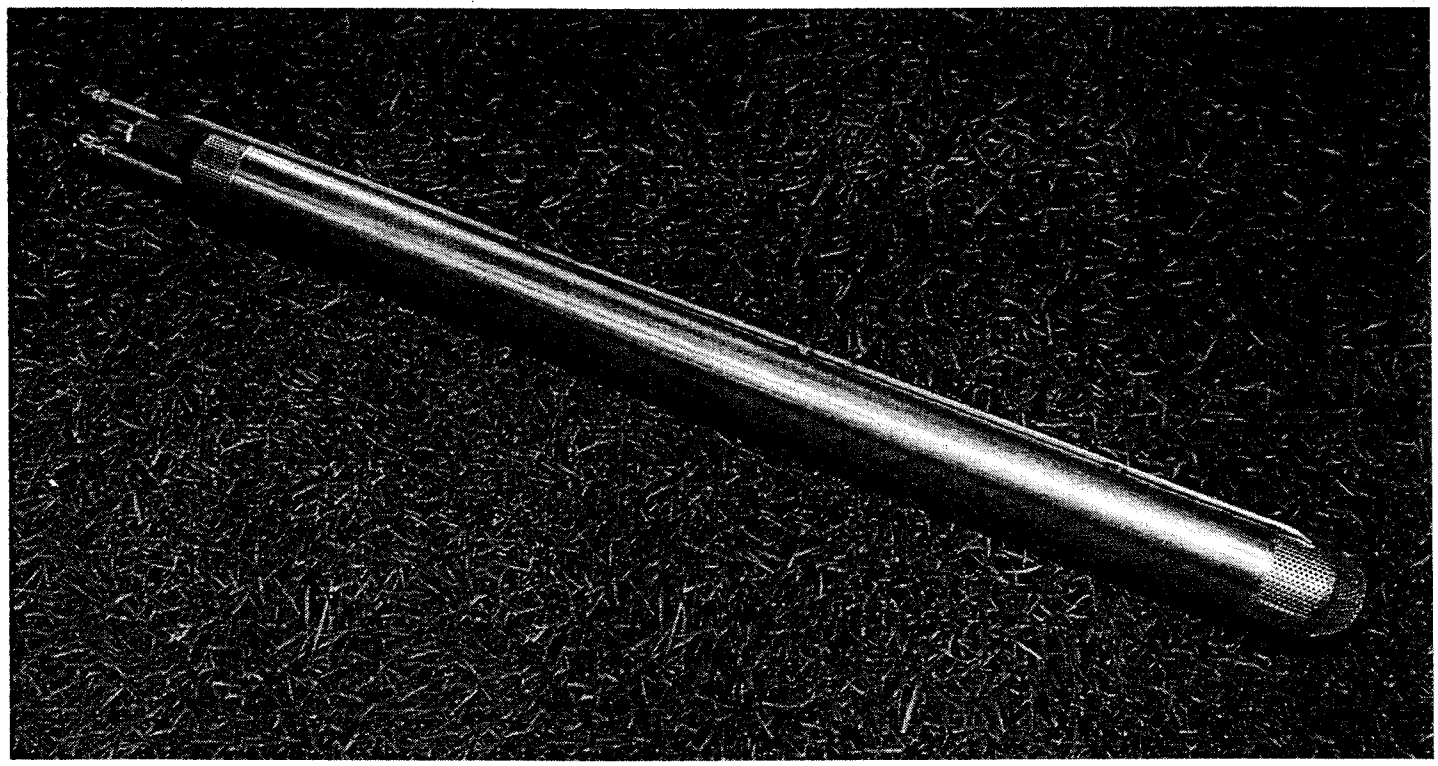
SLIDER™ Pump

Reliable Pumping in angled wells or landfill risers



The increased availability of special drilling equipment has caused more landfills and cleanup projects to appreciate the unique advantages of low-angle (slanted) wells or risers where conventional vertical wells are inefficient or impossible to use.

However, slant wells are useless without the right pumps -- and typical electric submersible or pneumatic pumps don't operate effectively in low-angle installations.

QED Slider™ pumps provide the answer. They have proprietary angle-independent valves to operate on any angle. They are especially suited for tough landfill duty, providing excellent resistance to sediment clogging and solvent attack. Slider pumps are operated by QED's standard controller modules.

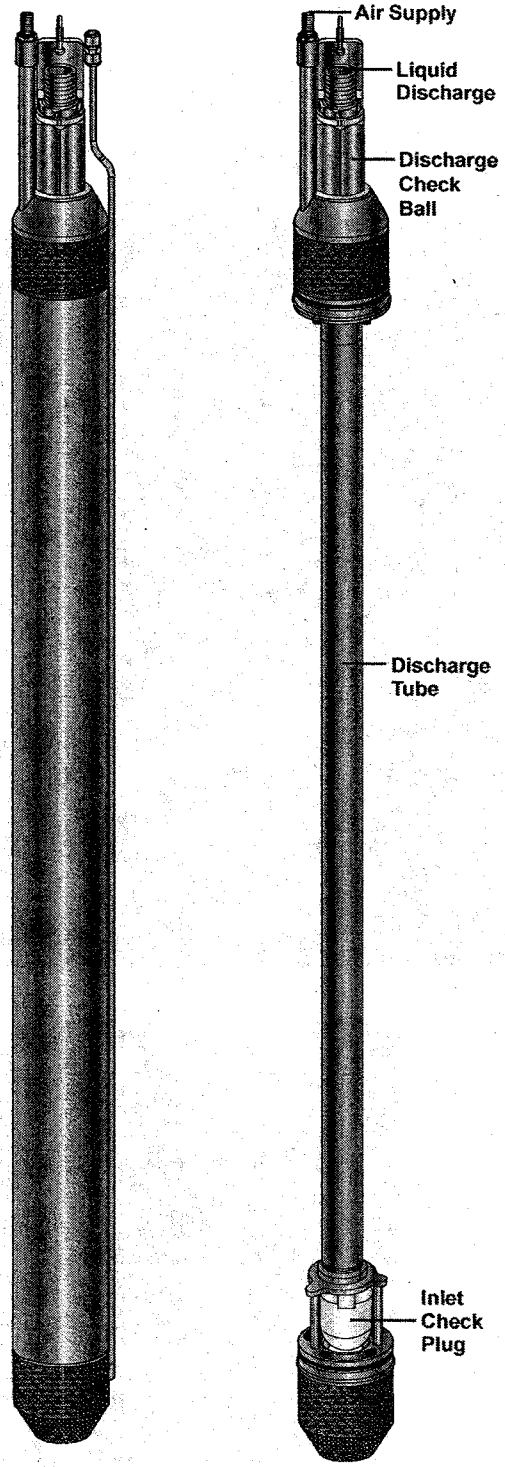
QED Leads the Way...

- 100% air-powered operation.
- Operates in angled wells or risers.
- Flows up to 3,000 G.P.D. (11.3 m3/day).
- Tapered ends make installation easy.
- Explosion Proof.
- Can Pump Dry Without Affecting the Pump.
- Highly Chemical Resistant.

QED Environmental Systems
Leaders in Environmental Compliance Products

P.O. Box 3726 Ann Arbor, MI 48106-3726 USA
1-800-624-2026 FAX (734) 995-1170
info@qedenv.com www.qedenv.com

Specifications

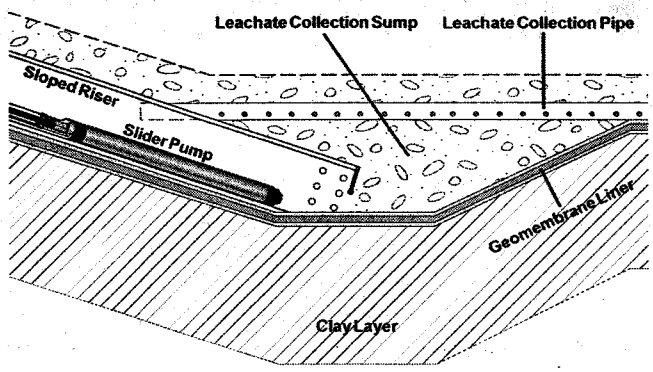


Pump Type:	Angle-Independent Positive Air Displacement
Dimensions:	Outside Diameter = 3.8" (9.7 cm) Length = 59.5" (151.1 cm) Weight = 29.2 lbs. (13.2 kg)
Materials:	Stainless Steel, Teflon, UHMWPE, Viton
Fittings:	Discharge = Stainless Steel Barb Type Air Supply = Stainless Steel Barb Type Bubbler = Stainless Steel Compression Type
Tubing:	Discharge Size = 1-1/4" (32 mm) O.D. Air Supply Size = 1/2" (13 mm) O.D. Bubbler Size = 1/4" (6 mm) O.D.
Maximum Pump Stroke:	1.28 Gallons (4.8 liters)
Operating Pressure Range:	0-100 P.S.I (0-700 kPa).
Maximum Lift:	200 Feet (62 meters)
Maximum Drawdown (on 3:1 slope):	12 inches (304.8 ml)
Maximum Flow Rate at 70 Ft (21.3 m) Pump Depth with 2 ft (.6 m) Submergence:	2 GPM (7.5 LPM) (Consult factory for other conditions)
Air Consumption:	7 S.C.F.M. (12 m³/h)
Cap Sizes:	4" (150 mm) and up (The Slider pump cannot be used in wells with smaller I.D. than 4" schedule 40).

Pump Volume:

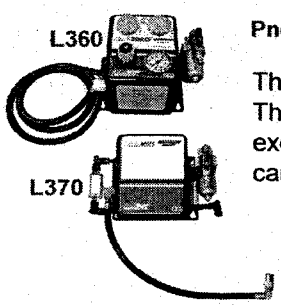
Liters	Milliliters	Gallons	Ounces
4.843	4843	1.28	163.84

Typical Application: Landfill sloped riser-pump inlet placed at the bottom of the leachate drainage sump.



Accessories:

Standard Well Caps or Custom Flanges
37060 Cable-3/16" (5 mm) Stainless Steel
L350 Exhaust Valve
35097 1/2" (13 mm) O.D. Nylon Air Supply Tubing
38882 1-1/4" (32 mm) O.D. Nylon Discharge Tubing
35715 1/4" (6 mm) O.D. Nylon Bubbler Tube



Pneumatic Controllers

The L360 Pulse Sender cycle controller provides rugged, all-pneumatic control of pump cycle times. The L360 is especially suited to sites where no electronics are allowed, or where pump cycle rates exceed the limits of the C100M in solar mode. The L370 LevelMate provides on/off level control and can be used with the L360 to shut off the system when the well level drops below the set point.

PROJECT DRAWINGS (HALF SIZE AND FULL SIZE)

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