



SUBJECT: Addendum #1 (Containing 8 items)

PROJECT: **Phase VIA Excavation Project**

OWNER: Flathead County Solid Waste District
4098 Highway 93 North
Kalispell, MT 59901

ENGINEER: SWT Engineering
800-C South Rochester Ave
Ontario, CA 91761
909.390.1328

DATE: April 3, 2026

TO: All holders of drawings and specifications for:
Phase VIA Excavation Project

This addendum modifies the Plans and Contract Documents dated March 2026 and shall become part of the Plans and Contract Documents, and any changes should be taken into account for Official Bidding Documents in the preparation of bids. **Acknowledge receipt of this Addendum in the space provided on the Bid Form.** Failure to do so may subject the Bidder to disqualification.

1) PROJECT MANUAL & CONTRACT DOCUMENTS – SECTION II BIDDING DOCUMENTS (DIGITAL):

Utilize Attachment 1 to this Addendum #1 Document to replace Bid Form and Proposal (Digital) Section II Bidding Documents (NOT FOR BIDDING).

- Add new Bid Item #11 Diesel Fuel Price Adjustment Allocation with Quantity 1 and Unit Lump Sum (LS)

2) PROJECT MANUAL & CONTRACT DOCUMENTS – SECTION II BIDDING DOCUMENTS (OFFICIAL):

Replace completely the “Official” Bidding Documents with the issued Addendum #1 Official Bidding Documents. Official Addendum 1 replacement package will be distributed only to existing official plan holders/bidders (per official list) and will be made available with the acquisition of new “Official” Bidding Documents. Attach any subsequent issued addendums to the newly issued Addendum #1 Official Bidding Documents.

- Add new Bid Item #11 Diesel Fuel Price Adjustment Allocation with Quantity 1 and Unit Lump Sum (LS)

3) PROJECT MANUAL & CONTRACT DOCUMENTS – SUPPLEMENTARY CONDITIONS

Article 13 – Cost Of Work: Allowances, Unit Price Work, Section SC-13.03 Unit Price Work, Subsection E – Adjustments in Unit Price:

Add: 4. Diesel Fuel Price Adjustment Allocation



4. Diesel Fuel Price Adjustment Allocation

General: A fuel price adjustment provision is included in this Contract for all responsive bidders, as described below.

- Notify the Engineer in writing by the Notice to Proceed date or at the pre-construction conference, whichever comes first, of intent to participate in fuel price adjustment.
- Eligible contract items include, and are limited to, Bid Items 7 and 8 subjected to the fuel price adjustment provision. This list along with associated prices must be submitted to the Engineer for approval by the Pre-Construction Conference using the Montana Department of Transportation Form MDT-CON-109-11.
- Contractor shall provide actual diesel fuel costs along with the calculations used to determine the costs for the respective contract items. The accumulated diesel fuel costs may not exceed 20% of the contract unit price without additional justification acceptable to the Engineer. Items measured on a lump sum basis will not be eligible for fuel price adjustment.
- Base Price: The base price for the contract will be the average of the high and low price for the 5 business days before the bid opening.
- Monthly Average Price: The monthly average price will be the average of the high and low prices on Wednesday of each week in the adjustment period taken for Platt's Oilgram Price Report or S&P Global, or other fuel price report determined by the Owner and Engineer for ultra-low sulfur diesel fuel only. The adjustment period for fuel is from the Wednesday of the full week before the beginning of the estimate cycle to the Wednesday of the full week prior to the next estimate cycle. If the estimate cycle extends beyond the monthly estimate period, only the fuel prices from the month in which the item is added to the estimate will be used to generate the average price.
- Adjustments: Adjustments will be made only when the monthly average price exceeds \$0.25 per gallon more or less than the base price. The adjustments will be for the amount exceeding \$0.25 per gallon. Adjustments will be calculated using the increase or decrease between the base price and the monthly average price at the time that the Contract Items are added to the progress estimate.
- Include only the cost of fuel associated with Bid Items 7 and 8 in Fuel Price Adjustment Item List. Do not include additional cost related to items such as servicing of equipment, lubricants, tire and ground engaging component wear, depreciation, insurance, storage, licenses, inspection, etc.
- The total of the fuel price adjustments will be added to, or subtracted from, the monthly progress estimate.

4) PROJECT MANUAL & CONTRACT DOCUMENTS – SECTION IV SPECIAL PROVISIONS

Section 41 Measurement and Payment, subsection 41.6 Description of Work:

Add the following Bid Item #11

11. Diesel Fuel Price Adjustment Allocation

General: Bid item includes an additional \$125,000 as part of the Base Bid. The intent of this bid item is to provide a budget to cover the potential cost increase due to fuel price adjustment(s) during construction. Utilization of funds under this bid item is optional at the Contractor's discretion and shall be governed by the Fuel Price Adjustment provisions of the Montana Department of Transportation, and as described in Item #3 of this addendum. If required, funds from this allocation may be applied to Bid Items 7 and 8 to account for adjustments made under the Fuel Price Adjustment provisions.



Work Includes at a minimum:

- Providing all labor, materials, and administrative effort necessary to implement the Fuel Price Adjustment provisions;
- Monitoring and Documenting monthly ultra-low sulfur diesel fuel price indices/ benchmarks and coordination with the Engineer/Owner;
- Prepare and Submit for MDT-CON-109-11 with supporting calculations for review and approval applicable to the Fuel Price Adjustment Provisions;
- Coordination, as necessary, of Monthly Progress Payment Applications in accordance with the Fuel Price Adjustment Provisions.

Measurement: Approved production quantities of eligible Bid Items (Items 7 & 8) incorporated into monthly progress payment applications. No measurement will be made for Lump Sump Bid Items or materials temporarily stockpiled at the contractors discretion, as determined by the Fuel Price Adjustment Provisions.

Payment: Fuel Price Adjustment will be calculated monthly and applied as an adjustment to monthly progress payment applications. In accordance with the Fuel Price Adjustment clause; when the monthly fuel price increase exceeds the specified threshold, the Contractor will be compensated for the increase and when the monthly fuel price decrease exceeds the specified threshold, a credit will be issued to the Owner. Only the portion of the fuel price change exceeding the threshold will be considered in the calculation.

5) PROJECT MANUAL & CONTRACT DOCUMENTS – SECTION IV SPECIAL PROVISIONS

Section 41 Measurement and Payment, subsection 41.6 Description of Work:

Under bid Items, modify the following work to the bid items under section “Work Includes at a Minimum”

- Delete all requirements for removal of the existing farm fence, subject fence has been removed under a separate contract.
- Requirements for the Contractor’s Geotechnical Consultant to perform testing of low-permeability material (LPM) test pad(s) are deleted from Description of Work Items. All such testing, for LPM test pads only, will be performed by the Owner’s Geotechnical Consultant and laboratory. The Contractor remains responsible for processing (1” minus) on-site native materials in accordance with Section 2300 - Earthwork.
- Required amount of topsoil to be striped is 12 inches with a +/- tolerance of 3 inches. In areas where topsoil is in excess of 15 inches depth, all additional remaining topsoil (after 15 inch depth has been stripped) can be combined with the unclassified excavation material and hauled to the stockpile.
- Bid Items to be modified are listed as follows:

2. Construction Survey & Material Testing

Work Includes at a minimum:

- ~~Provide material testing, and compaction testing, and permeability testing for Demonstration Fill – Low Permeability Test Pad as defined in Technical Specifications (02300 Earthwork);~~

3. Miscellaneous Site Work



Work Includes at a minimum:

- ~~• Complete removal and disposal of farm fence at the locations designated on the plans. Fence material may be disposed of within the approved designated area located at the landfill;~~

4. Clearing and Grubbing Phase VIA Excavation Area

Work Includes at a minimum:

- ~~• Demolish existing wire fence approximately 2,990 LF as shown on the Plans;~~
- Required amount of topsoil to be striped is 12 inches with a +/- tolerance of 3 inches. In areas where topsoil is in excess of 15 inches depth, all additional remaining topsoil (after 15-inch depth has been striped) can be combined with the unclassified excavation material and hauled to the stockpile.

9. Low Permeability Test Pad

Work Includes at a minimum:

- LPM shall be 1-inch minus virgin fine-grained processed on-site low-permeability (~~processed glacial till~~) (~~1×10^{-6} cm/sec or slower~~) material;
- Processed LPM will be placed 6- to 8-inch lifts compacted to a total of 26" minimum depth;
- Material gradation ~~and permeability~~ shall meet the requirements of Technical Specifications;

6) PROJECT MANUAL & CONTRACT DOCUMENTS – SECTION V TECHNICAL SPECIFICATIONS – SECTION 2300 EARTHWORK

Delete Section 2300 - Earthwork in its entirety and replace with Attachment 3 of this Addendum No. 1. A summary of modifications is provided below for convenience; however, Attachment 3 governs and includes all revisions shown in track changes (strike/delete) format.

- Any provisions in the Technical Specifications requiring the Contractor's qualified Geotechnical Consultant to perform field and laboratory testing of the low-permeability material (LPM) test pad(s) shall be deleted.
- All such LPM testing will be performed by the Owner/Engineer's Geotechnical Consultant in accordance with the Technical Specifications.
- Modify CQA Frequency Testing performed by the Contractor's Geotechnical Consultant, Table 1A.

7) CONTRACTOR QUESTIONS/CLARIFICATIONS

The following items were questions asked by Contractors as of 04/03/2026 answers are in italicized text):

Question 1

Will an Engineer's Cost Opinion be provided?

Response: Engineers' Cost opinion for the Phase VIA Excavation Project is \$4,500,000.00

Question 2

Are there any Geotechnical Investigations of the Proposed Work Area?

Response: Attachment 4 of this Addendum #1 includes limited Boring Logs from perimeter Groundwater



Monitoring wells provided to support contractor bids.

Question 2

Does embankment fill material have to be screened to suffice 6-inch minus requirements?

Response: Contractor is required to determine means and methods for embankment filling material, but embankment material cannot exceed 6-inch minus material as the fill materials have to be able resist lateral loads and overturning from future refuse fill.

8) ATTACHMENTS

1. Bid Form and Proposal (Digital) Section II Bidding Documents (NOT FOR BIDDING)
2. MDT - Fuel Price Adjustment Item List
3. Technical Specifications – Earthwork (02300)
4. Site Geology Exhibit and Limited Boring Logs

The undersigned Contractor hereby acknowledges receipt of Addendum 1, including the attachments listed in the addendum, and has incorporated these provisions into their bid. This signed Addendum must be submitted with the Contractor’s original Bid:

Signature	Title
Company	Date

If you have any questions, please e-mail them to Brett Walcheck at bww@swteng.com by 12:00PM April 7, 2026 (questions will not be accepted nor responded to after this date).

By: Brett Walcheck, P.E.

END OF ADDENDUM #1



ATTACHMENT 1

BID FORM AND PROPOSAL (DIGITAL) SECTION II BIDDING DOCUMENTS (NOT FOR BIDDING)

**SECTION II
BID PROPOSAL - DIGITAL**

ALL BIDDERS MUST CONTACT FLATHEAD COUNTY SOLID WASTE DISTRICT OR THE ENGINEER, SWT ENGINEERING, INC., AT THE ADDRESS STIPULATED IN THE INVITATION TO BID TO OBTAIN “OFFICIAL” BID DOCUMENTS AND TO GET THEIR NAME ADDED TO THE PLAN HOLDERS LIST.

NO BIDS WILL BE CONSIDERED UNLESS THEY ARE SUBMITTED ON THE “OFFICIAL” BID DOCUMENTS AND THE CONTRACTORS NAME HAS BEEN ADDED TO THE PLAN HOLDERS LIST.

THE FOLLOWING PAGES SHOW THE APPROXIMATE QUANTITIES OF WORK EXPECTED FOR THIS PROJECT. IN THE EVENT OF DISCREPANCIES BETWEEN THE FOLLOWING APPROXIMATE BID QUANTITIES AND THE QUANTITIES LISTED IN THE “OFFICIAL” BID PROPOSAL, THE “OFFICIAL” BID PROPOSAL SHALL GOVERN.

NOT FOR BIDDING

BID PROPOSAL - DIGITAL

BID SCHEDULE

FLATHEAD COUNTY SOLID WASTE DISTRICT
PHASE VIA EXCAVATION PROJECT

BASE BID ITEMS

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	AMOUNT
1	MOBILIZATION, BONDING, SUBMITTALS, AND TRAFFIC CONTROL <u>May Not Exceed 5% of Total Bid</u> See Section IV (41.6) for Description of Work	1	LS	\$	\$
2	CONSTRUCTION SURVEY & MATERIAL TESTING See Section IV (41.6) for Description of Work	1	LS	\$	\$
3	MISCELLANEOUS SITE WORK See Section IV (41.6) for Description of Work	1	LS	\$	\$
4	EROSION CONTROL/FINAL STABILIZATION See Section IV (41.6) for Description of Work	1	LS	\$	\$
5	CLEARING AND GRUBBING FOR PHASE VIA EXCAVATION AREA See Section IV (41.6) for Description of Work	1	LS	\$	\$
6	CLEARING AND GRUBBING FOR STOCKPILE AREA See Section IV (41.6) for Description of Work	1	LS	\$	\$
7	UNCLASSIFIED EXCAVATION TO EMBANKMENT FILL See Section IV (41.6) for Description of Work	100,000	CY	\$	\$
8	UNCLASSIFIED EXCAVATION/ TRANSPORT TO STOCKPILE See Section IV (41.6) for Description of Work	435,000	CY	\$	\$
9	LOW PERMEABILITY TEST PAD See Section IV (41.6) for Description of Work	2	EA	\$	\$
10	ADDITIONAL \$100,000 COST LIMIT See Section IV (41.6) for Description of Work	1	LS	\$ \$100,000	\$ \$100,000

11	DIESEL FUEL PRICE ADJUSTMENT ALLOCATION See Section IV (41.6) for Description of Work	1	LS	\$	\$125,000	\$	\$125,000
----	---	---	----	----	-----------	----	-----------

Abbreviations: L.S. = Lump Sum, EA. = Each, L.F. = Lineal Feet, C.Y.= Cubic Yards,
S.Y. = Square Yards, S.F. = Square Feet, U.P. = Unit Price

NOT FOR BIDDING



ATTACHMENT 2
MDT - FUEL PRICE ADJUSTMENT ITEM LIST

Fuel Price Adjustment Item List

Project Description:

Prime Contractor:

Fed/State Project Number:

Project Manager:

Contract ID:

Contract Amount: _____

Date: _____

	Item Code Description	Unit Bid Price	Diesel	Propane	Gasoline	% Unit Bid*
+						
-	Bid Item#7-Unclassified Excavation to Embankment Fill					NaN
	Bid Item#8-Unclassified Excavation/ Transport to Stockpile					NaN

Contractor Representative:



ATTACHMENT 3
TECHNICAL SPECIFICATIONS

- SECTION 02300 EARTHWORK

SECTION 23000

EARTHWORK

1.0 GENERAL

This section sets forth the requirements for unclassified excavation, embankment / unclassified fill, screening, processing and placement of low-permeability material (LPM) test pads.

The Contractor shall assure that the Engineer, or the Engineer's designated representative, shall at all times have safe access to the work for the purpose of monitoring, observation, and as-needed Construction Quality Assurance (CQA). The Contractor shall coordinate and cooperate with the Engineer during, if required, all sampling, testing, and certification required by these Specifications.

1.1 Work Included

Clearing, grubbing, and removal of existing surface improvements within the limits of construction.

Unclassified excavation and/or embankment fill, required to bring the proposed borrow excavation and stockpile to the line and grades indicated on the Plans.

Moisture conditioning, compaction, and grading of the subgrade within the cell area in preparation for placement of unclassified fill.

Furnishing and placing of water for compaction.

Moisture conditioning, compaction, and grading of the subgrade within the cell area in preparation for placement of LPM.

Place, moisture condition, and compact LPM to meet the project performance specification requirements for the composite liner system.

1.2 Project Sequencing Plan and Earthwork Operations Plan

The Contractor's activities shall not interfere with the operation of the landfill or waste placement operations. The Contractor shall sequence construction so that landfill traffic will at all times have uninterrupted access to the waste placement area. The Contractor shall submit for the approval of the Engineer, a sequencing plan that reflects the proposed sequencing of construction on the access road, including traffic control measures/haul routes to be used and maintained during construction. Earthwork hauling limitations to be followed as described in the Special Provisions.

The Contractor shall include an Earthwork Operations Plan within the Project Sequencing Plan, that describes the entire grading operation and relationship to other Specification Section Requirements. At minimum, this Plan shall include the following items:

- Preparing the work area to start work, which includes removal of existing accumulated surface water and haul road preparation;
- Topsoil stripping removal and select stockpiling;
- Excavation, hauling and stockpiling; haul roads, dust control;
- Boulder removal and select stockpiling;
- If applicable – Screening plant location, operating permit, and oversize material stockpile location; and

- Processing and Placement of Low-permeability material barrier layer test pad.

1.3 **Submittals Required**

The Contractor shall thoroughly review the Technical Specifications and identify all required Project submittals. Submittals shall be in accordance with Technical Specification Section 01300 requirements. Copies of all test results and field and office worksheets shall be furnished to the OWNER after the tests are complete. The submittals listed below are intended as a general summary of the submittal items contained in this section. This submittal list does not release the Contractor from the responsibility of identifying and providing all information requested.

- Earthwork/Project Sequencing Plan
 - This plan shall include Contractor's proposed sequence of earthwork and placement in various stockpiles, proposed haul routes, protection measures of haul routes. This plan shall incorporate sequencing requirements as described in Section 1.2 of Technical Specifications Section 02300 and in the Special Provisions. No earthwork activity shall commence prior to submittal of this plan and its approval by the Engineer.
- Traffic Control Plan
- Dust Control Plan
- Survey Data including the contractor provided Pre-Construction survey of the Phase VI Excavation area, and contractor provided post construction, interim quantity verification (as-needed), final quantity verification, Record Surveys, and other survey data as required.
- Surface Dewatering Plan including preparation, selection of materials and equipment, mobilization, operation, maintenance, removal of pumping equipment facilities, piping, etc. used during construction activities and in dewatering of the Phase VI existing Excavation Area prior to commencing of the Construction Project.
- Screening Operation Plan, including Statewide Permit, if applicable.
- Earthwork Plan
- Test Reports: The testing agency shall submit following reports, duplicated, directly to Engineer from the testing services, with copy to the Contractor.
 1. Field density reports and map of test location.
 2. Optimum moisture-maximum density curve for each type of soil used for fills.
 3. Other reports of any testing hereinafter specified deemed necessary by Geotechnical Engineer or requested by the Engineer.

1.4 **References**

General: The work shall comply with the most recent standards or tentative standards as published at the date of the contract and as listed in this specification using the abbreviation shown.

American Society for Testing and Materials (ASTM):

1. D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft)

2. D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
3. D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³)(2,700 kN-m/m³)
4. D2167 Standard Test Method for Density and Unit Weight of Soil In Place by the Rubber Balloon Method
5. D2216 Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
6. D2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
7. D2922 Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
8. D2937 Standard Test Methods for Density of Soil in Place by the Drive-Cylinder Method
9. D3017 Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
10. D4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.5 **Definitions**

1. **Unclassified Excavation:** Excavation to specified lines, grades, and elevations indicated on the Plans.
2. **Unclassified Fill:** Native, non-organic, material generated from unclassified excavation areas as indicated on the Plans
3. **Oversize Boulder:** For the purposes of unclassified excavation, boulder shall be defined as material that cannot be dislodged by a Caterpillar Model No. D-8N, heavy duty track-type tractor, rated at not less than 285 hp flywheel power and equipped with a single shank hydraulic ripper, capable of exerting not less than 45,000 lbs breakout force.
4. **Unsuitable Material:** For the purposes of embankment, unsuitable material shall be defined as material that exhibits excessive pumping or that does not meet density requirements due to unsatisfactory material as determined by Geotechnical Engineer.
5. **Unsatisfactory Materials:** Unsatisfactory materials includes those materials containing roots and other organic matter, trash, debris, frozen materials, and stones larger than 6 inches in any dimensions.

6. Degree of Compaction: Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D698 or ASTM D1557 as specified, abbreviated below as a percent of laboratory maximum density.
7. Geotechnical Engineer: A representative of a qualified geotechnical testing laboratory which will be used by the CONTRACTOR to provide the required quality assurance testing.

1.6 Quality Assurance

1. Geotechnical Engineer: The Contractor shall retain a licensed independent Geotechnical Engineer and Test Laboratory approved by the Owner to insure that earthwork meets the requirements of the specifications for density and moisture content.
2. Inclement Weather: If fill operations are ceased due to weather (rain, freezing, snow, etc.), construction shall not be resumed until the Geotechnical Engineer has verified soil strength has not been adversely affected. If soil strength has been decreased, the affected portion of fill shall be rescarified, moistened, or dried as required and recompacted to the specified density.
3. Inspection: The Contractor shall conduct daily inspections and more often if necessary to verify that the specifications are being met for the installation of materials.
4. Coordination: The Contractor shall coordinate the work with the Owner's Inspector by notifying the Inspector of scheduled work in advance. The Contractor shall coordinate work with other trades whose work will be affected on the site.
5. Drainage: The Contractor shall be responsible for the proper drainage of the site during construction of the project. Water shall not be allowed to accumulate in any of the excavated areas. Storm or ground water collecting on site during construction shall be removed by pumping, ditching, or other suitable means.

2.0 MATERIALS

2.1 Embankment / Unclassified Fill

Native material from unclassified excavation area indicated on the Plans shall be used in the construction of unclassified fill(s).

Rocks or rock fragments greater than 6 inches in any dimension shall be removed from the unclassified fill within liner areas and disposed of as directed by the Engineer. Rocks or rock fragments less than 6 inches shall be distributed evenly throughout the embankment / unclassified fill. "Nesting" of rock or rock fragments will not be permitted.

Contractor should assume that the quantity of rocks or rock fragments exceeding the material specification of each soil material type constitute up to 15-percent or less of the material by volume. Contractors should assume that this estimated quantity shall be processed out of the unclassified fill (Rocks or rock fragments greater than 6 inches in any dimension) and stockpile unclassified fill (Rocks or rock fragments greater than 48 inches in any dimension) by hand

picking, rock raking and/or screening, or other Contractor-selected method to remove oversize material to meet the material specification for each soil type identified for the project – this work shall be included in the contractor’s unit price for each specified soil material.

All oversize material (rock/boulders) shall be stockpiled by the Contractor, and shall be transported on a weekly basis, (or more often as necessary so as to dispose of all oversize rock within the project by the time earthwork operations cease), to the area indicated on the Plans at the “Boulder Stockpile” area.

Fill materials obtained from within the project limits (excavation areas) shall be free of unsatisfactory materials.

2.2 Stockpile Fill

Native material from unclassified excavation area indicated on the Plans shall be used in the construction of stockpile fill(s).

Rocks or rock fragments greater than 48 inches in any dimension shall be removed from the unclassified fill within liner areas and disposed of as directed by the Engineer. Rocks or rock fragments less than 48 inches shall be distributed evenly throughout the embankment / unclassified fill. "Nesting" of rock or rock fragments will not be permitted.

Contractor should assume that that the quantity of rocks or rock fragments exceeding the material specification of each soil material type constitute up to 1-percent or less of the material by volume. Contractors should assume that this quantity shall be processed out of the stockpile fill (Rocks or rock fragments greater than 48 inches in any dimension) by hand picking, rock raking and/or screening, or other Contractor-selected method to remove oversize material to meet the material specification for each soil type identified for the project – this work shall be included in the contractor’s unit price for each specified soil material.

All oversize material (rock/boulders) shall be stockpiled by the Contractor, and shall be transported on a weekly basis, (or more often as necessary so as to dispose of all oversize rock within the project by the time earthwork operations cease), to the area indicated on the Plans at the “Rock/Boulder Stockpile” area.

Fill materials obtained from within the project limits (excavation areas) shall be free of unsatisfactory materials.

2.3 Low-Permeability Material (LPM)

Material from unclassified excavation area indicated on the Plans shall be used in the construction of LPM Test Pads.

It is anticipated that the native glacial till material could require selective grading and potential temporary stockpiling of these materials for use as the specified low-permeability material.

Rocks or rock fragments greater than 1 inch in any dimension shall be removed from the unclassified fill and disposed of as directed by the Engineer. "Nesting" of rock or rock fragments will not be permitted. Fill materials obtained from within the project limits shall be free of organic matter, debris, and cobbles.

All oversize material (rock/boulders) shall be stockpiled by the Contractor, and shall be transported on a weekly basis, (or more often as necessary so as to dispose of all oversize rock within the project by the time earthwork operations cease), to the area indicated on the Plans at the “Rock/Boulder Stockpile” area.

Fill materials obtained from within the project limits (excavation areas) shall be free of unsatisfactory materials.

2.3.1 Screening of On-Site Material

Screening of on-site material will be required to comply with the particle size requirements for LPM, the native material cannot be broken up with conventional earthworks machinery (e.g., dozers with sheepsfoot, compactors, etc). The Contractor shall mobilize a screen and/or crushing plant that complies with any applicable MDEQ regulations and permit requirements. The Contractor shall be responsible for all permits and/or fees associated with the operation, as required by local, state, or federal agencies.

3.0 CONSTRUCTION METHODS

3.1 Clearing, Grubbing, and Demolition

Clearing and Grubbing consists of removing all vegetation, brush, trees, logs, tree stumps, roots, and root mat to a minimum depth of 12” below the existing ground surface in the areas shown on the Plans (undisturbed excavation and stockpile areas) and as described in the Special Provisions. Material generated from clearing and grubbing operations shall be transported directly to the topsoil berm(s) or stockpiles as shown on the Plans and as described in the Special Provisions.

Material indicated on the plans to be removed and salvaged, shall be transported to the Owner’s material storage area located adjacent to Pond 2, or to other locations, on the site, as directed by the Engineer.

Material indicated on the plans to be demolished, and/or other improvements (including existing fencing/signage) within the limits of the work, not designated to be protected, and that interfere with excavation or fill activities shall be removed and transported to active waste fill area for disposal. No “tipping” fees or charges will be assessed to the Contractor for disposal of material generated from work associated with this project.

3.2 General Earthwork

Earthwork Operations shall conform to the following requirements, where applicable, unless otherwise noted in these Technical Specifications and MPWSS:

- A. The Contractor shall be solely responsible for the satisfactory completion of all earthwork in accordance with the Plans and Technical Specifications.
- B. Equipment used in the excavation, transport, stockpiling, processing, placement and compaction of all materials used in earthwork construction will be standard-of-practice grading machinery of known specifications suitable for performing the required work in a timely and efficient manner.
- C. All material considered by the Engineer to be unsuitable for use in the construction of the composite liner system components shall be removed. All materials incorporated as part of compacted fill must be inspected and placement must be observed by the Engineer.
- D. All clearing, grubbing, stripping, and site preparation for the Project shall be accomplished to the satisfaction of the Engineer prior to placement of fill material.

- E. The ground surface prepared to receive fill shall be moisture conditioned and graded until it is uniform and free from uneven features which may prevent uniform compaction. The ground surface to receive fill shall be brought to at least 2 percent above optimum moisture content, mixed as required, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. The prepared surface shall be firm and unyielding. Prior to fill placement, the ground surface to receive fill shall be inspected by the Engineer.
- F. Fill material shall be placed in thin, horizontal (parallel to the bottom floor of the landfill) lifts with a maximum uncompacted thickness not to exceed 12 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition in each layer. In areas of excess lift thickness, regrading of the surface to the maximum lift thickness will be completed prior to proceeding with compaction in that area.
- G. The minimum in-place compaction for all fill materials shall be 90 percent of the maximum dry density as determined by ASTM D1557. The moisture content of compacted embankment fill shall be at ± 2 percent of optimum moisture content for the specified material.

The required compaction for the low permeability material shall be a minimum of 92 (for 1st pad) and 95-percent (for 2nd pad) relative compaction (ASTM D1557) at 2 to 4 percent above optimum moisture content. Regardless, of the source, it is the responsibility of the Contractor to dry, transport, screen, moisture condition, process, place and compact low permeability material from the locations identified within the contract documents, to meet the performance requirements of this project.
- H. Stockpile and Topsoil Fill material shall be compacted to a minimum of 85-percent of the maximum dry density as determined by ASTM D1557 as described in Tables 1 and 2.
- I. Where tests by the Contractor indicate that the moisture content or density of any layer of fill, or portion thereof, is below the Project requirements, the particular layer or portion thereof will be reworked until the required moisture/density has been attained. The moisture/density of the reworked fill will be verified by re-testing by the Contractor's qualified Geotechnical Testing Firm. No additional fill shall be placed over an area until the prior fill has been tested horizontally and vertically and meets the requirements of these Technical Specifications to the satisfaction of the Engineer.
- J. Where work is interrupted by heavy rains, fill operations shall not be resumed until observations and field tests by the Contractor's Geotechnical Engineer indicate the moisture content and density of the in-place fills and/or materials intended for placement are within the limits previously specified. This requirement does not preclude the Contractor from disking or aerating excessively wet areas to enhance drying.
- K. As determined by the Engineer, fill over cut slopes shall be properly keyed through top soils, colluvium, or creep material into firm material. All transitions shall be stripped of all loose soils prior to placing fill.
- L. Throughout construction, all excavation and/or fill areas shall be graded to provide positive drainage to appropriate collection/transport structures and to prevent ponding of water. Surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site.
- M. The Contractor shall assume all responsibility for damage to the installed containment system components arising from sequencing and location of haul routes.

3.3 Unclassified Excavation

The Contractor shall complete all excavations as indicated on the Plans, as directed by the Engineer, and as specified herein in order to achieve an adequate foundation for installation of the composite liner system. Unauthorized excavation below the design subgrade will not be permitted.

Excavated material shall be transported to the designated fill areas (embankment fill or stockpile) indicated on the Plans.

3.4 Scarification and Recomposition of Existing Ground Surface

The existing surface designated to receive embankment fill material shall be scarified to a depth of 6 to 8 inches, moisture conditioned to within $\pm 2\%$ of optimum moisture content and compacted in place to at least 90 percent relative compaction in accordance with ASTM D1557.

The toe of fill slopes shall be keyed into native materials. The keyways shall have a minimum width of 15 feet, be excavated to a depth of 1 foot at the toe, and sloped back at 2% into the existing slope. Fill placed adjacent to native slopes shall be benched into competent material to ensure stability. Fill slopes shall be constructed with an overbuild and subsequently trimmed back to the final design grades.

3.5 Embankment Fill

Material generated from the excavation shall be incorporated into the embankment fill, in accordance with the requirements of Section 2.1, Materials and Section 3.3, above. The Contractor is advised that screening, rock picking, or selective excavation will be required to meet the maximum particle size requirements for Embankment Fill. Oversize material shall be moved and stockpiled by the Contractor at a location specified by the Engineer or Owner and as described in the Plans.

3.6 Stockpile

The Contractor shall place unclassified excavation material designated for stockpile in the designated areas as shown on the Plans and as directed by the Engineer. The Slopes of all stockpile shall be track walked, during and after placement, to minimize soil erosion from wind and/or inclement weather.

Stockpile shall be graded to always provide positive drainage and the Contractor shall implement erosion control measures for the stockpile(s) in accordance with the Plans.

3.7 Demonstration Fill – Low Permeability Test Pad

Two Demonstration Fill/Test Pads will be constructed to evaluate the on-site LPM for future landfill liner construction and the Contractor's equipment and methods for constructing and maintaining the integrity of the future/proposed LPM barrier layer.

The Contractor shall construct the Test Pad using the same earthwork equipment and Execution Specifications used for typical earthwork construction. Soil sampling will be performed by the ~~Contractor's~~ Owner/Engineer's Geotechnical Consultant during and after construction of the Test Pad(s) to provide data regarding soil properties obtainable using the proposed design and construction methods. ~~All criteria for Test Pad construction, including material processing, amount of compaction, moisture content, etc., will be the same as those required and anticipated for actual liner construction.~~ The Owner/Engineer will retain a qualified Geotechnical Consultant and laboratory to perform all required material testing, including but not limited to

[continuous observation, proctor, gradation, moisture-density \(compaction\), and permeability testing.](#)

The purpose of the Test Pads is to:

- 1) Evaluate the performance of typical earthwork construction equipment to be used for soil blending (if necessary), processing, placement and maintaining the LPM layer under actual construction conditions;
- 2) Evaluate the performance of the constructed LPM through laboratory and field tests;
- 3) Compare field (BAT) and laboratory permeability test results; and
- 4) Develop a database of test results and performance standards prior to full-scale (future) liner construction in order to substantiate the Construction Specifications.

Each Test Pad will measure roughly 25 feet by 50 feet and will consist of a 26-inch-thick section of LPM, placed on the designated test pad area. The Test Pad shall be constructed using methods, materials, and equipment to be employed during construction of an actual compacted soil material layer. Processed low-permeability materials will be placed 6- to 8-inch lifts. Construction will be continuously observed and tested by the [Owner/Engineer's Contractor's](#) Geotechnical Consultant. One (1) Test Pad shall be placed at a minimum 92% relative compaction per ASTM D 1557 and one (1) test pad shall be placed at a minimum 95% relative compaction per ASTM D 1557 both test pads at +2 to +4 % above optimum moisture condition.

Minimum testing requirements for each Test Pad construction will include:

1. Full-time observation (continuous);
2. Density tests (ASTM D1556, or D6938) taken at a rate of at least one (1) test per 10 cubic yards of fill placed or one (1) per 8-inches of fill thickness. At a minimum, two (2) in-place moisture/density tests will be completed;
3. At least one (1) maximum density tests (ASTM D1557) will be completed;
4. Two (2) laboratory permeability tests on relatively undisturbed samples (ASTM D5084) will be conducted; and
5. One (1) Atterberg Limit tests (ASTM D4318) and one (1) grain-size analyses (ASTM D422) will be completed.

Prior to construction of the demonstration fill, the Contractor shall submit for the review of the Engineer, the proposed location of the demonstration fill area, the equipment to be used, the methods to be employed for processing and placement, and the Contractor's proposed moisture maintenance program.

[The Contractor shall coordinate all testing activities with the Owner's Geotechnical Consultant and shall provide safe access and any assistance reasonably required to perform the testing. If test pad\(s\) or associated materials fail to meet the specified requirements, the Contractor shall, at no additional cost to the Owner, reprocess materials, reconstruct test pad\(s\), or provide additional test pad\(s\) as necessary to achieve specification compliance.](#)

[No additional compensation will be made for delays, rework, or standby time associated with failed tests, inadequate preparation, or lack of coordination by the Contractor.](#)

3.8 Earthwork Tolerances

Grades shall be cut/filled to a uniform plan in conformance with the lines and grades indicated on the Plans and per Table 2 of this section of the Specifications.

3.9 Field Quality Control

1. **Testing:** Testing shall be the responsibility of the Contractor and shall be performed by an approved geotechnical testing laboratory qualified to perform such tests and approved by Engineer. Tests conforming to ASTM D698 or D1557, shall be made by the Contractor's Geotechnical Engineer or his representative on each soil type found in the areas prepared to receive fill and in the soil to be used for fill. Field Density tests shall be made by the Geotechnical Engineer or his representative in accordance with ASTM D1556 or ASTM D2922 and ASTM D3017 on the areas prepared to receive fill and on each layer of compacted fill. Testing shall be the responsibility of the CONTRACTOR and shall be performed at no additional cost to the OWNER. When ASTM D2922 is used, the calibration curves shall be checked and adjusted if necessary by the procedure described in ASTM D2922, paragraph "ADJUSTING CALIBRATION CURVE". ASTM D2922 results in a wet unit weight of soil and when using this method, ASTM D3017 shall be used to determine the moisture gauges along with density calibration checks as described in ASTM D3017. ASTM D2937 shall be used only for soft, fine-grained, cohesive soils. At least one test shall be performed on the compacted backfill. More tests shall be performed if in the judgment of the Inspector or Engineer the compactive effort of the Contractor will not result in the specified density.
2. **Testing Frequency:** Field density tests shall be performed by the Contractor's qualified Geotechnical Consultant as prescribed in Table 1 CQA Testing as part of this section of the Technical Specifications.

4.0 BASIS OF PAYMENT

Payment for this work shall be in accordance with the Special Provisions and shall include full payment for all work described in the Technical Specifications.

ITEM	UNIT
Clearing and Grubbing (Excavation and Stockpile Area)	Lump Sum
Unclassified Excavation to Embankment Fill	Cubic Yard
Unclassified Excavation/Transport to Stockpile	Cubic Yard
LPM Test Pads	Each

TABLE 1A- CQA FREQUENCY TESTING

TEST TYPE	EMBANKMENT FILL ⁽²⁾	STOCKPILE
Moisture Density-Relation (D1557) ⁽¹⁾	≈10,000 CY	100,000
Particle Size (D6913)	≈10,000 CY	---
In-Place Moisture-Density (D6938 or D2937)	500 CY	(Note 5)
Clod Size	Continuous Visual Observation	
<p><u>Notes:</u></p> <ol style="list-style-type: none"> 1. Perform one (1) (minimum) test per material quantity indicated and one (minimum) test per visual change in material during unclassified excavation to fill(s). 2. Perform, at minimum, one (1) (minimum) in-place density and water content (ASTM D6938) test per day of embankment fill placement. 3. At the discretion of the Geotechnical Engineer, perform, one (1) (minimum) Sand Cone Test (ASTM D1556) and Moisture Content (ASTM D2216) for every ten (10) nuclear density tests performed for <u>Embankment Fill ONLY</u>. 4. Perform one (1) minimum full moisture-density relation curve for <u>ALL</u> materials. 5. The outer two 2 feet of stockpile shall be tested at a frequency of one (1) test per 10,000 square feet (+1100 SY) of finished deck/slope. Stockpile density testing can be increased/decreased at the discretion of the Engineer or Construction Manager. 		

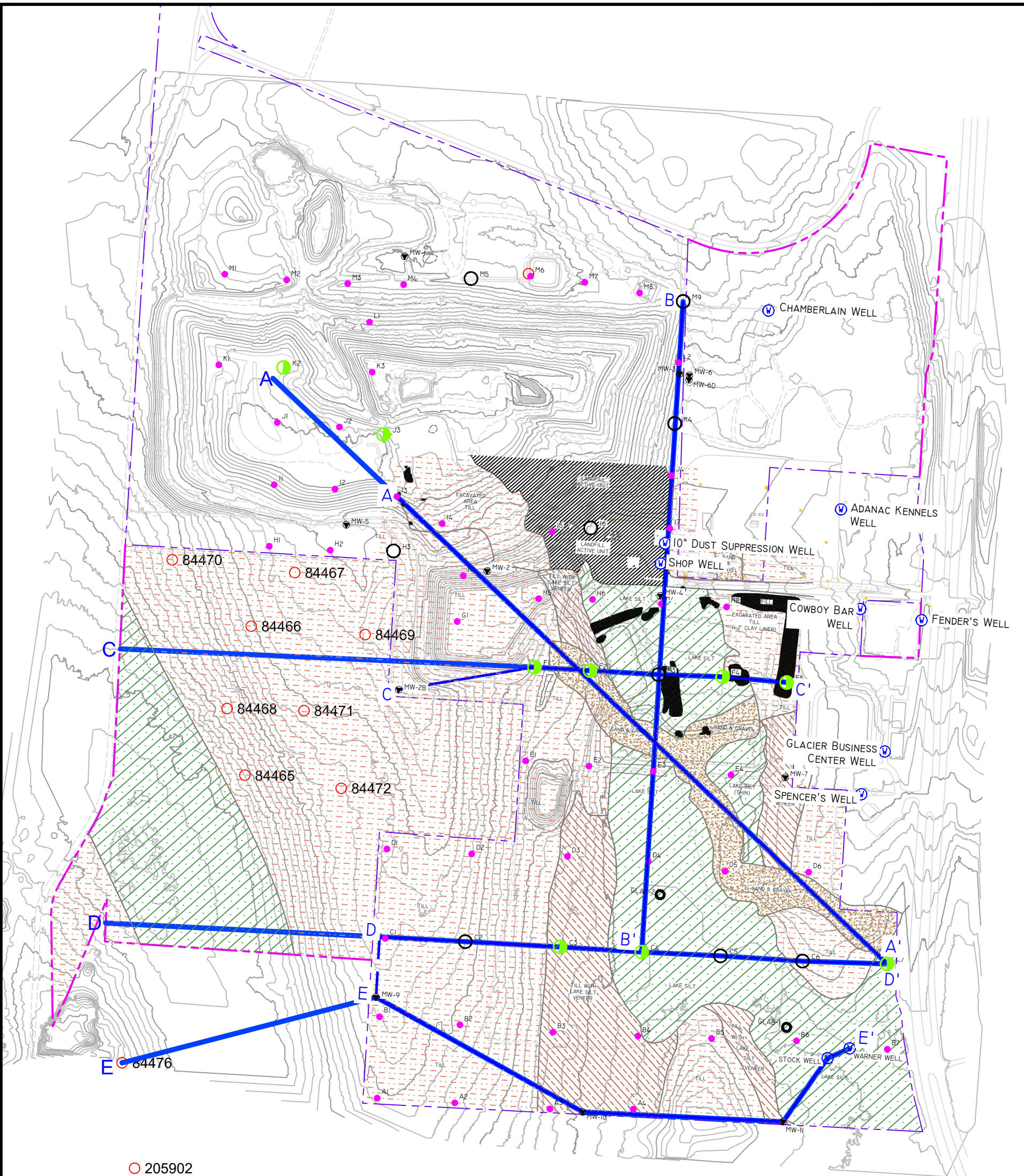
TABLE 2– PLACEMENT AND COMPACTION

ITEM	EMBANKMENT FILL	STOCKPILE	LPM
Loose Lift Thickness ⁽¹⁾ (Inches)	12 (max)	12 (max)	8 (max)
Moisture Content	±2% of optimum	(Note 3)	+2-4% of optimum
Percent Relative Compaction (Minimum)	90%	85%	92% and 95%
Compaction Test (ASTM)	D1557	D1557	D1557
Finish Grade Tolerance ⁽²⁾ (Feet)	±0.2 Floor/Bench ±0.5 Slopes	(Note 4)	N/A
<u>Notes:</u> <ol style="list-style-type: none"> 1. Thinner lifts may be required to obtain adequate compaction. 2. Provided adequate drainage is maintained and minimum specified thickness is placed. 3. Moisture condition for dust control during stockpile placement. Placement and Compaction requirements to be tested for top 2 feet only, for all stockpiles. 4. Contractor to place Stockpile material to minimum gradients for surface water drainage and adhere to limitations (access, fences, existing structures, etc.) as described in the plans. 			

END OF SECTION 02300



ATTACHMENT 4
SITE GEOLOGY EXHIBIT AND LIMITED BORING LOGS



○ 205902



SCALE
 0 (In Feet) 500

LEGEND

- EXISTING PROPERTY BOUNDARY
- LICENSED BOUNDARY EXPANSION

PRELIMINARY TEST AND MONITORING SITES
 (FLATHEAD COUNTY LANDFILL PRELIMINARY SITE CHARACTERIZATION PLAN, PLATE 4)

- MW-7 DEEP MONITORING WELL (250'+)
- SHALLOW BORE HOLE (20-40')
- DEEP BORE HOLE (40'+)
- BACKHOE PIT
- ⊙ DOMESTIC WELL
- SOIL BORING LOCATION (LWC, 2004)
- CROSS SECTION LOCATION
- PROPERTY LINE PER TD&H

GEOLOGIC LEGEND
 (MORRISON-MAIERLE/CSSA HYDROGEOLOGICAL REPORT, PLATE IIB, OCTOBER 06, 1992)

- ▨ TILL WITH LAKE SILT VENEER
- ▨ TILL
- ▨ LAKE SILT
- ▨ SAND & GRAVEL
- ▨ FILL
- ▨ ACTIVE LANDFILL UNIT

FLATHEAD COUNTY
 SOLID WASTE DISTRICT

SITE GEOLOGY

FIGURE
7



PROJECT NUMBER 210054.011	BORING NUMBER SHEET 1 OF 2
SOIL BORING LOG	

PROJECT Flathead County Solid Waste District LOCATION MW-11s
 DRILLING CONTRACTOR O'Keefe Environmental Drilling (D. Crowley)
 DRILLING METHOD AND EQUIPMENT Hollow Stem Auger
 WATER LEVELS None encountered START 6-16-04 08:00 FINISH 6-16-04 LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
0-3.7					Silty loam, brown, moist, topsoil.	
3.7-5.7			2.0	10-14-19	Firm to stiff, dry-sl.moist, sl.plastic, tan-green, silt, (ML).	Very easy drilling.
8.7-10.7			2.0	14-13-24	Stiff, dry-wet, (layered), nonplastic, tan, sand & silt, (SM-ML).	2 moist layers 9.5-9.8, 10.3-10.5.
13.7-15.7			1.7	6-13-20	Firm-stiff, sl.moist-moist, layered-nonplastic, tan sand & silt, (SM-ML), plastic, gray clay w/20-30-% gravel, (CL-CH).	Layered silt & till.



PROJECT NUMBER 210054.011	BORING NUMBER SHEET 2 OF 2
SOIL BORING LOG	

PROJECT Flathead County Solid Waste District LOCATION MW-11S
 DRILLING CONTRACTOR O'Keefe Environmental Drilling (D. Crowley)
 DRILLING METHOD AND EQUIPMENT Hollow Stem Auger
 WATER LEVELS None encountered START 6-16-04 FINISH 6-16-04 LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
18						
20	18.7-20.7		1.5	14-50/5	Hard, dry, sl.-mod plastic, subangular, tan-gray, gravelly clay, (CL-Ch), till.	Hard drilling till
22						Easier drilling at 22 ft, some moisture, moist clay/silt cuttings.
24	23.7-25.7		1.5	23-27-50/5	Stiff-hard, sl.-mod, sl.plastic, angular, tan-gray, gravelly clay, (CL), till.	
26						
28						
30	28.7-30.7		2.0	43-40-42	Very stiff-hard, dry-sl.moist, layered silt & gravel; silt-non-sl.plastic, tan,-gray, gavelly slit, (ML); gravel-gray, nonplastic, silty gravel, (GM), till.	
32						Total Depth: 32 feet



PROJECT NUMBER
210054.011

BORING NUMBER
MW-9 SHEET 1 OF 7

SOIL BORING LOG

PROJECT FCSWD Landfill Expansion LOCATION SW expansion area.
 EXTENSION _____ DRILLING CONTRACTOR O'keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Dual Rotary-Air Foremost DR 24
 WATER LEVELS _____ START 8/15/04 FINISH 8/16/04 LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
0-5.0	1			Silt w/gravel and sand, loose, nonplastic, angular, gray-tan, TILL, (ML), sl. moist.	Drilling w/air No water added 07:00	
5.0-10.0	1			Bouldery silt w/gravel as above, gray limestone boulder.	Large boulder 8'-10' slow drilling	
10.0-15.0	1			Silt w/sand, gravel (30%) and occasional cobbles to 3", sl. Plastic, angular, gray-tan, TILL, (ML), sl. moist.	Thru boulders, some cobbles	
15.0-20.0	1			As above.	Easy drilling 07:30	
20.0-25.0	1			Silt w/sand, gravel (10%) and clay as above, gray, TILL, (ML).		
25.0-30.0	1			As above.		
30.0-35.0	1			Silty, sandy and gravel (50% or more), gray, TILL; (GM-ML).	Small boulder at 32-32.5'	
35.0-40.0	1			Silty, sandy and gravel (50%), gray, TILL, (GM-ML).	Cobble-boulder at 38' 08:15	
40.0-45.0	1			Clayey, sandy silt w/occasional gravel, gray, slight-moderate plastic, angular, TILL, (ML-CL), clasts to 1/2", slightly moist.		



PROJECT NUMBER
210054.011

BORING NUMBER
MW-9 SHEET 2 OF 7

SOIL BORING LOG

PROJECT FCSWD Landfill Expansion LOCATION SW expansion area.
 EXTENSION _____ DRILLING CONTRACTOR O'keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Dual Rotary-Air
 WATER LEVELS _____ START 8/15/04 FINISH 8/16/04 LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
45.0-50.0	1			As above, gravel to 1".		
50.0-55.0	1			As above, gravel to 1/2".		
55.0-60.0	1			Clayey gravel, slight -moderate plastic, angular, gray-brown, TILL, (GM-GC), slightly moist.	Small boulder at 59' 08:45	
60.0-65.0	1			Clayey silty sandy gravel, slightly plastic, angular, gray-brown, TILL, (GM-GC), clasts to 1 1/2" (30% fines), dry-slightly moist.		
65.0-70.0	1			As above, more fines (40%), TILL.		
70.0-75.0	1			As above, gray limestone, boulder at 73 and 74', TILL.		
75.0-80.0	1			As above, clayey silty sandy gravel, gray limestone boulders/cobbles at 76' and 79'.	09:45	
80.0-85.0	1			Gravel and cobbles (10% fines), moderately plastic, tan, subangular, dry.		
85.0-90.0	1			As above, more fines (20%), brown, moderately plastic, TILL, slightly moist.	88' cobbles	



PROJECT NUMBER 210054.011	BORING NUMBER MW-9	SHEET 3	OF 7
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION SW expansion area.
 DRILLING CONTRACTOR O'keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Dual Rotary-Air
 WATER LEVELS START 8/15/04 FINISH 8/16/04 LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
90.0-95.0	1				As above, more fines (30%), (GC).	
95.0-100.0	1				Silt w/clay, sand, gravel (to 1/2" subangular), brown, moderately plastic, TILL, (ML), moist.	
100-105	1				Silt w/clay, sand and gravel (40%), brown, moderately plastic, (ML), slightly moist.	
105-110	1				As above, 30% angular gravel to 3/4".	
110-115	1				As above, 50% angular gravel to 1" and boulders, (ML-GC), TILL.	Boulder 112'-114'
115-120	1				As above.	
120-125	1				Silt w/clay, sand, gravel (30%), brown, moderately plastic, (ML), slightly moist-wet.	
125-130	1				As above.	
130-135	1				Clayey, silty, sandy gravel (70% clasts to 1" angular, subrounded), nonplastic, brown, TILL, (GM), slightly moist-dry.	



PROJECT NUMBER 210054.011	BORING NUMBER MW-9	SHEET 4	OF 7
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION SW expansion area.
 DRILLING CONTRACTOR O'keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Dual Rotary-Air
 WATER LEVELS START _____ FINISH _____ LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
135-140	1				Silt w/clay, gravel (30%), moderately plastic, brown, TILL, (ML), slightly moist.	
140-145	1				As above, TILL.	
145-150	1				As above, less gravel (10%), TILL, (ML).	
150-155	1				Gravel and sand, (10-20% fines), subrounded clasts to 1/2", outwash, (GM), dry-slightly moist.	
155-160	1				Sand and gravel, subrounded to rounded clasts to 1 1/5", brown-dk brown, outwash, (SW-GW), slightly moist.	13:00
160-165	1				Clayey, sandy gravel (20-30% fines), subrounded, clasts to 1 1/2", TILL, (GM), dry-slightly moist.	
165-170	1				Silt w/clay, sand, gravel (30% clasts subrounded to 1"), moderately plastic, TILL, (ML), dry-slightly moist.	
170-175	1				Clayey silt w/gravel (30% clasts to 1/2"), slightly-moderately plastic, brown-red, TILL, (ML-CL), moist-very moist.	
175-180	1				As above, (gravel 20%), TILL, (ML-CL).	



PROJECT NUMBER 210054.011	BORING NUMBER MW-9	SHEET 5	OF 7
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION SW expansion area.
 DRILLING CONTRACTOR O'keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Dual Rotary-Air
 WATER LEVELS START 8/15/04 FINISH 8/16/04 LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
180-185	1			Clayey silt w/gravel, (40% to ¾"), slightly plastic, brown-red, TILL, (ML-GM), very moist.	8/16/04 @12:00 Blew hole to check for water before drilling, dry-no water.	
185-190	1			As above.		
190-195	1			As above.		
195-200	1			As above, except very moist to wet.		
200-205	1			Clayey gravel, angular-subrounded, to 1.5", brown, moderately plastic fines, TILL, (GC), wet.	1-2 gpm at 199-205'	
205-210	1			As above, less water.		
210-215	1				No recovery	
215-220	1			Clayey silt, gravel, subangular, brown, slightly-non plastic, TILL, (GM), wet.	Poor recovery, clay binding in hole, no free water	
220-225	1			As above, poor recovery.	Little water after standing.	



PROJECT NUMBER
210054.011

BORING NUMBER
MW-9 SHEET 6 OF 7

SOIL BORING LOG

PROJECT LOCATION FCSWD Landfill Expansion

LOCATION SW expansion area.

DRILLING CONTRACTOR O'keefe Environmental Drilling

DRILLING METHOD AND EQUIPMENT Dual Rotary-Air

WATER LEVELS START 8/15/04 FINISH 8/16/04 LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
230 235 240	225-240	1			Clayey gravel-gravelly clay, moderately plastic, angular, brown, TILL, (GC-CL), wet.	Poor recovery, all cuttings come at end of casing joint – no water during drilling, but some after standing 20 minutes.
245 250 255 260	240-260	1			As above.	Poor recovery.
265	260-280	1			As above, sample is washed of fines by drilling water.	Poor recovery – adding water.



PROJECT NUMBER 210054.011	BORING NUMBER MW-9	SHEET 7	OF 7
------------------------------	-----------------------	------------	---------

SOIL BORING LOG

PROJECT FCSWD Landfill Expansion LOCATION SW expansion area.
 DRILLING METHOD AND EQUIPMENT Dual Rotary-Air DRILLING CONTRACTOR O'keefe Environmental Drilling
 WATER LEVELS _____ START 8/15/04 FINISH 8/16/04 LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
280-285	1			Gravel w/clay, subrounded-rounded, likely TILL-alluvium interface.	20 gpm over 280-300'	
290-300	1			Sandy gravel to 1", subrounded-rounded, Alluvium, (GW), wet.	10-20 gpm.	
300-310	1			Sandy gravel, subrounded-rounded, clasts to 1", wet.	10-20 gpm.	
310-319	1			As above.		
319-329.10'				Screen: 319-309.10' 0.10 slot Sch 80 pvc Sand: 319-229' Bentonite slurry to surface.	TD = 319'	
329.10'-329.10'				Development pumping w/ 193' bgs at 11 gpm		



PROJECT NUMBER 210054.011	BORING NUMBER MW-10	SHEET 1	OF 6
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION South-central expansion boundary
 E LOCATION TOC 3046.99 DRILLING CONTRACTOR O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Dual Air Rotary Foremost DR24
 WATER LEVELS _____ START 8/18/04 12:10 FINISH 8/19/04 LOGGER Noble/Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
0						Start @ 12:10
5					Clayey silt w/gravel, (ML), tan, firm, plastic, gravel 10%, clay 20%, Silt 70%, moist.	Drilling w/air only, no water.
10	5'				Sandy silt, (ML), tan, 70% silt, 30% sand, slightly moist.	
15	11'				Gravel w/silt, (GM), clasts pebble to cobble, gravel 60%, silt 40%, dry.	
20	20'				Silt w/gravel and sand, (ML), gray-brown, hard, silt 50%, gravel 30%, sand 20%, TILL, moist.	
25	25'				As above.	
30	30'				As above. Boulder 4' diameter. 31-35' - black chips, limestone.	Drilling much more rapid. Very dusty. Very dusty, very slow drilling rate.
35	35'				Sand w/silt and gravel, (SM), brown, soft, 50% sand, 20% gravel, 30% silt, moist.	
40						14:10 connection at 40'.



PROJECT NUMBER 210054.011	BORING NUMBER MW-10	SHEET 2	OF 6
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION South-central expansion boundary
 E LOCATION TOC 3046.99 DRILLING CONTRACTOR O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Foremost DR24
 WATER LEVELS _____ START 8/18/04 12:10 FINISH 8/19/04 LOGGER R. Noble

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
46'					Silty w/clay and gravel, tan to light brown, hard, TILL, dry.	
51'					51-53' - Boulder - siltite chips.	
53'					Silt w/gravel, (ML), light brown, dense, TILL, dry. 54' - as above-moist. 55' - a.a.-dry.	
60'					Silt w/gravel, (ML), light brown, dense, TILL, dry. 66' - a.a.-moist.	Very consistent drilling.
75'					Clay, (CL), dark gray, firm, nonplastic, moist.	Major color change.
79'					Clay w/gravel, (ML), brown, firm to dense, nonplastic, TILL, moist.	



PROJECT NUMBER 210054.011	BORING NUMBER MW-10	SHEET 3	OF 6
SOIL BORING LOG			

PROJECT LOCATION FCSWD Landfill Expansion LOCATION South-central expansion boundary
 E ECTION TOC 3046.99 DRILLING CONTRACTOR O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Foremost DR24
 WATER LEVELS START 8/18/04 12:10 FINISH 8/19/04 LOGGER R. Noble

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
91'					Gravel, (GM), w/silt and sand, clasts to 1", well rounded, very moist - no dust.	
95	94'				Clay w/gravel, (ML), brown, firm to dense, nonplastic, TILL, moist.	
100					100' - a.a very consistent.	Major color change.
105	101'				Clayey silt, (ML-CL), w/clasts of few gravels, red-brown, soft, nonplastic, very moist.	
110					a.a.	
115						
120						
125						
130						



PROJECT NUMBER 210054.011	BORING NUMBER MW-10	SHEET 4	OF 6
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION South-central expansion boundary
 ELEVATION TOC 3046.99 DRILLING CONTRACTOR O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Foremost DR24
 WATER LEVELS _____ START 8/18/04 12:10 FINISH 8/19/04 LOGGER R. Noble

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
138'					Clay, (CL), w/silt, red-brown, turning to clay balls, slight ribbons, very moist.	
140	140-145	1			Clayey gravel-gravelly clay-silt, nonplastic, brown, (GM-ML), TILL, wet.	8/19/04 – water in hole after standing overnight.
145	145-150	1			Gravelly silty clay, slightly plastic, brown, subrounded gravel 20%, (CL), TILL, very moist.	
150	150-155	1			 As above.	
	155-160	1				
	160-165	1				
	165-170	1				
	170-175	1				
	175-180	1				
	180-185	1				
	185-190	1				
	190-195	1				
200	195-200	1				
205	200-205	1			Clayey gravel to gravelly clay, brown, plastic, (GM-CL), TILL, wet.	Poor recovery.
210						205-210 no recovery.
215	210-215	1			As above, samples not representative as clay not returned until water added.	Poor recovery, adding water.



PROJECT NUMBER 210054.011	BORING NUMBER MW-10	SHEET 5	OF 6
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION South-central expansion boundary
 ELEVATION TOC 3046.99 DRILLING CONTRACTOR O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Foremost DR24
 WATER LEVELS _____ START 8/18/04 12:10 FINISH 8/19/04 LOGGER R. Noble

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
225 230 235	220-238	1			As above, may be starting alluvium at 238'	Poor recovery.
240 245	240-245	1			Clayey gravel.	5 gpm.
250 255	245-260				Mix of clay and gravel to 2", Alluvium/TILL interface?	More clay at 248', less water and poorer recovery.
260	260-265				Rounded gravel to 1".	Distinct color change at 258' w/rounded gravel to 2".



PROJECT NUMBER 210054.011	BORING NUMBER MW-10	SHEET 36	OF 6
SOIL BORING LOG			

PROJECT LOCATION: FCSWD Landfill Expansion South-central expansion boundary
 ECTION: TOC 3046.99 DRILLING CONTRACTOR: O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT: Foremost DR24
 WATER LEVELS: START 8/18/04 12:10 FINISH 8/19/04 LOGGER R. Noble

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
265-270					Rounded gravel to 2", becoming more clayey at 268' and recovery stopped.	10-20 gpm more clay at 268'
270-280						Poor recovery 270-280', adding water.
280-300					Clayey gravel, rounded to 2".	Minor water.
300-320					As above	
						TD=318'

Backfill 270' w/sand
 Sand pack: 318-250'
 Screen: 270-260';
 0.01 slot sch 80 pvc
 Bentonite slurry to surface.
 Development pumping w/ 224' bgs at 1.5 gpm



PROJECT NUMBER 210054.011	BORING NUMBER MW-11	SHEET 1	OF 6
SOIL BORING LOG			

PROJECT LOCATION: FCSWD Landfill Expansion SE corner expansion area
 IDENTIFICATION: 3038 DRILLING CONTRACTOR: O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT: Dual air rotary Foremost DR24
 WATER LEVELS: START 8/06/04 FINISH 8/11/04 LOGGER: S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
0.0-5.0	1			Silt, brown, lake silt, (ML), slightly moist.	All grab samples in bags – composite of interval.	
5.0-10.0	1			Silt and fine sand, laminated, brown-tan, lake silt, (SM-ML), slightly moist.	Very easy drilling – no water added or encountered.	
10.0-15.0	1			As above.	Very easy drilling – no water added or encountered.	
15.0-20.0	1			As above w/ thin gravelly layers – interbedded till and lake silt.	Very easy drilling – no water added or encountered.	
20.0-25.0	1			Gravelly clay, brown, slightly moist, sl. plastic, angular, TILL (CL-CH).	Very easy drilling – no water added or encountered.	
25.0-30.0				As above, rounded-subrounded gravel, some cobbles.	Very easy drilling – no water added or encountered.	
30.0-35.0				As above.	Very easy drilling – no water added or encountered.	
35.0-40.0				As above, more clay, some cobbles, slightly moist.	Very easy drilling – no water added or encountered.	
40.0-45.0				Gravelly, silty clay, slight-moderately plastic, subangular gravel to 1", (GC-CL), slightly moist-moist, TILL.	Very easy drilling – no water added or encountered.	



PROJECT NUMBER 210054.011	BORING NUMBER MW-11	SHEET 2	OF 6
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION SE corner expansion area
 DRILLING CONTRACTOR O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Dual Rotary
 WATER LEVELS START 8/6/04 FINISH _____ LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6" -6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
45.0-50.0					As above, more sandy.	Very easy drilling - no water added or encountered.
50.0-55.0	1				As above, more clayey, TILL.	
55.0-60.0	1				As above	
60.0-65.0	1				As above.	
65.0-70.0	1				Clayey, sandy gravel, brown, some sand lenses, nonplastic-slightly plastic, TILL (GM-CL), slightly moist-moist.	
70.0-75.0	1				As above.	
75.0-80.0	1				Clayey, sandy gravel, brown, slightly plastic, TILL, (GC-CL), slightly moist-moist.	
80.0-85.0	1				As above.	
85.0-90.0	1				As above, slightly more clay.	



PROJECT NUMBER 210054.011	BORING NUMBER MW-11 SHEET 3 OF 6
SOIL BORING LOG	

PROJECT FCSWD Landfill Expansion LOCATION SE corner expansion area
 EL ELEVATION _____ DRILLING CONTRACTOR O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Dual Rotary
 WATER LEVELS _____ START 8/6/04 FINISH _____ LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
90.0-95.0	1				Silty sand w/gravel, brown, subangular-subrounded to 1", (SM), slightly moist.	
95.0-100.0	1				As above.	
100-105	1				Clayey, loamy w/gravel (10%) to 1/2" clasts, subrounded, slightly plastic, brown-red, (CL), slightly moist.	
105-110	1				Clayey, silty sand w/gravel (1/4-1/2", subrounded), slightly-non plastic, brown-red, (SM-ML), slightly moist.	
110-115	1				As above, moist.	
115-120	1				As above, moist.	8/11 SWL = 113.2 bgs
120-125	1				120-122-as above, wet. 122-128-gravel w/clay, loose, nonplastic, subangular, brown, (GM), wet.	1-5 gpm 122-128'
125-130	1				128-130-silty sand w/gravel (subrounded), nonplastic, brown, (SM), moist.	No water.
130-135	1				Gravel w/silty/clay, slightly plastic, subrounded, brown, (GM-GC), moist.	No water.



PROJECT NUMBER 210054.011	BORING NUMBER MW-11	SHEET 4	OF 6
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION SE corner expansion area
 DRILLING METHOD AND EQUIPMENT Dual Rotary DRILLING CONTRACTOR O'Keefe Environmental Drilling
 WATER LEVELS _____ START 8/6/04 FINISH _____ LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
140	135-140	1			Loamy sand w/gravel, nonplastic, subrounded-rounded, brown, (GM-SM), moist, TILL.	
145	140-145	1			As above	
150	145-150	1			As above.	
	150-155	1			As above.	
200	155-160	1			As above, some more clay toward bottom.	
205	160-165	1			Clayey, sandy gravel, slightly plastic, subrounded clasts to 1/2", brown, (GC-SC), moist.	
210	165-170	1			As above, clayey gravel.	
215	170-175	1			Gravelly clay, moderately plastic, brown, TILL, (SC-CL), moist.	
	175-180	1			As above.	



PROJECT NUMBER 210054.011	BORING NUMBER MW-11	SHEET 5	OF 6
SOIL BORING LOG			

PROJECT FCSWD Landfill Expansion LOCATION SE corner expansion area
 ELEVATION _____ DRILLING CONTRACTOR O'Keefe Environmental Drilling
 DRILLING METHOD AND EQUIPMENT Dual Rotary
 WATER LEVELS _____ START 8/6/04 FINISH _____ LOGGER S. Mason

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6" -6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
185	180-185	1			Clayey gravel, fine clasts to 1/4-1/2", brown, nonplastic, (GM), moist.	
190	185-190	1			Clayey gravel, nonplastic, brown, (GM), moist.	
195	190-195	1			As above.	
200	195-200	1			As above, clayey gravel, subrounded, (GM), moist	
205	200-205	1			Gravel w/minor fines, rounded, (GP), moist-wet.	
210	205-210	1			As above, wet.	Water 1-2 gpm
215	210-220	1			Clay w/gravel, moderately plastic, wet, poor recovery, may be some thin saturated gravel seams.	
220	220-225	1			Clean gravel.	Water ~20 gpm.



PROJECT NUMBER
210054.011

BORING NUMBER
MW-11 SHEET 6 OF 6

SOIL BORING LOG

PROJECT LOCATION FCSWD Landfill Expansion

LOCATION SE corner expansion area

DRILLING CONTRACTOR O'Keefe Environmental Drilling

DRILLING METHOD AND EQUIPMENT Foremost DR24

WATER LEVELS START 8/18/04 12:10 FINISH 8/19/04 LOGGER R. Noble

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6"-6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TEST AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)			
230	225-230	1			Gravel w/clay.	Poor recovery.
235	230-235	1			Clay w/gravel.	Adding water, poor recovery.
240	235-240	0			As above	Poor recovery.
245		1				
250	240-260				As above.	Poor recovery w/air, added water to get recovery, formation making little to no water.
255						
260						Water 15-30 gpm TD=279'
	260-280				Gravel, rounded, clasts to 2", (GW-GP), may be sorted in layers.	<div style="border: 1px solid black; padding: 5px;"> 0.010 Screen: 279-269' 10-20 Colorado Sand: 279-259' Hole plug: 259-255' Bent slurry grout to surface Development pumping w/ 190'bgs at 6.5 gpm. </div>