Final Report of
Construction Quality Assurance

For

Phases I and II Closure, Final Cover and Drainage Improvements
Central Maui Landfill
Puunene, Hawaii

Prepared for:

Department of Public Works and Environmental Management
County of Maui
Pulehu Road
Puunene, Maui, Hawaii

Prepared by:

A-Mehr Inc.
23016 Mill Creek Drive
Laguna Hills, California 92653

June 2007

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COUNTY OF MAUI
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
2200 MAIN STREET, SUITE 175
WAILUKU, MAUI, HAWAII 96793

July 3, 2007

Mr. Steven Y.K. Chang, Chief
Solid and Hazardous Waste Branch
State of Hawaii Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

SUBJECT: **CENTRAL MAUI LANDFILL PHASES I AND II**
FINAL COVER AND DRAINAGE IMPROVEMENTS
FINAL REPORT OF CONSTRUCTION QUALITY ASSURANCE

Dear Mr. Chang:

The construction of the final cover and drainage improvements in Phases I and II began in March 2006 and was completed in December 2006. The County of Maui's (County) contractor, Goodfellow Bros., Inc., will continue to maintain the vegetative cover until September 2007, as part of the construction contract. The County's current permit, LF-0091-04, Special Condition III, Item 6, requires that "the permittee shall retain a professional engineer registered in the State of Hawaii...the engineer shall submit a summary report to the Department as to the complete conformity to the plans and specifications as approved". Please find enclosed the Final Report of Construction Quality Assurance (CQA) that summarizes the tasks performed by the County's consultant, A-Mehr, Inc., during CQA monitoring of the project and certification of the construction.

If you have any questions or concerns, please contact Michael Kehano at (808) 357-5460.

Sincerely,

Cheryl K. Okuma

CHERYL K. OKUMA
Director of Environmental Management

Cc: Michael Kehano, SWD
encl.

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1. INTRODUCTION

1.1 Scope

This report summarizes the Construction Quality Assurance (CQA) monitoring activities conducted by A-Mehr, Inc., Laguna Hills, California, for the construction of Phases I & II Final Closure and associated drainage improvements at Central Maui Landfill during the period June 2006 through April 2007. It documents the site preparation and installation of a monolithic final cover over the area, the improvement of the existing Phase I & II Sedimentation Basin and additional drainage improvements.

Phases I & II Final Closure consists of approximately 42.1 acres of final cover area and the associated drainage improvements.

This report was prepared by Ali Mehrazarin, P.E. of A-Mehr, Inc. This report was prepared for Central Maui Landfill, owned and operated by the County of Maui.

1.2 Overview

The Phases I & II Final Closure project area is located in the southwest portion corner of the property parcels on which the Central Maui Landfill is located. The construction work documented in this report required completion of the following activities:

- Reconstruction of leachate Manhole No. 8 and installation of a leachate monitoring and removal riser;.
- Grading a mid slope bench including an asphalt paved drainage ditch;
- Placing and compacting 2 feet thick monolithic final cover;
- Placement of 6-inch thick compost-soil blend over the monolithic final cover;
- Installation of turf reinforced mat in selected areas;
- Revegetation by hydroseeding;
- Construction of a 30-foot-wide paved drainage road bordered by concrete trapezoidal drainage channels;
- Installation of HDPE drainage pipes above and below grade;
- Installation of rip rap at channel discharge to the Sedimentation Basin; and
- Reconstruction of the primary Sedimentation Basin including a concrete spillway discharge structure and asphalt paved discharge channel to the Kalialinui Gulch.

1.3 Organization

This report is organized as follows:

Section 1	Introduction
Section 2	Project Description
Section 3	CQA Program Summary
Section 4	Earthwork CQA Details
Section 5	Drainage Improvement CQA Details
Section 6	Summary and Conclusions

2. PROJECT DESCRIPTION

2.1 Project Elements

The Phases I & II Final Closure project area is located in the southwest portion corner of the property parcels on which the Central Maui Landfill is located.

The primary elements of the project were as follows (quantities are approximate):

- Construction of a leachate collection and removal system manhole riser;
- Placement, compaction, and grading of approximately 136,000 cubic yards of Monolithic Final Cover soils;
- Placement of approximately 34,000 cubic yards of compost-soil blend over the monolithic final cover;
- Installation and maintenance of hydroseeded grass cover over approximately 42 acres;
- Installation of a 20 feet wide mid-slope bench including an aggregate base surface and asphalt-paved ditch;
- Installation and compaction of 8-inch thick aggregate base for asphalt-paved roads;
- Installation and compaction of 4-inch thick asphalt pavement for roads;
- Installation of 10,700 linear feet of asphalt curbs on paved roads;
- Excavation and installation of 2,400 linear feet of concrete trapezoidal channel 2 feet deep x 2 feet bottom width;
- Excavation and installation of 500 linear feet of concrete trapezoidal channel 3 feet deep x 6 feet bottom width;
- Installation of 150 linear feet of 36" corrugated HDPE drainage pipe above and below grade;
- Installation of 190 linear feet of 24" corrugated HDPE drainage pipe above and below grade;
- Installation of 250 linear feet of 18" corrugated HDPE drainage pipe above and below grade;
- Installation of 120 linear feet of 36" corrugated metal pipe culvert;
- Installation of 80 linear feet of 24" corrugated metal pipe culvert;
- Excavation and earthwork to enlarge and improve the primary Sedimentation Basin;
- Installation of rip rap at channel discharge to the Sedimentation Basin; and
- Construction of concrete spillway structure and asphalt paved channel from Sedimentation Basin to the Kalialinui Gulch.

Selected photographs of the construction activities are included in Appendix A.

2.2 Construction Contractors

Goodfellow Brothers, Inc. of Kihei, Hawaii performed all earthwork and construction of related drainage improvements. A-Mehr, Inc. of Laguna Hills, California provided construction quality assurance services for all earthwork construction activities for this project. Fewell Geotechnical

Engineering, LTD, of Kahului, Hawaii, provided soils field and laboratory testing services. Hawaii Geotechnical Consulting, Inc. provided additional soils laboratory testing services.

2.3 Construction Schedule

The earthwork including site preparation, excavation and placement of Monolithic Final Cover occurred from June 2006 through November 2006. Placement of compost-soil blend above the Monolithic Final Cover occurred from October 2006 through November 2006. Drainage improvements began July 2006 and were completed in April 2007. Road construction, including placement of compacted aggregate base and asphalt concrete pavement, occurred from September 2006 through April 2007. Hydroseeding and maintenance of the specified blend of grass seed was conducted from November 2006 through February 2007, and the contractor is responsible for maintenance of the vegetative cover through September 4, 2007.

Construction quality assurance for each of the above-mentioned activities is described in the following sections.

3. CONSTRUCTION QUALITY ASSURANCE (CQA) PROGRAM

3.1 Scope

A-Mehr, Inc. provided Construction Quality Assurance (CQA) services during construction of the Central Maui Landfill Phase I & II Final Closure earthwork and associated drainage improvements from the period June 2006 through April 2007. During this construction period, A-Mehr, Inc. provided CQA personnel on site. Fewell Geotechnical Engineering, LTD, provided supporting field observation and testing services. Fewell Geotechnical and Hawaii Geotechnical Consulting, Inc. provided laboratory testing services.

Construction activities and CQA procedures were conducted in conformance with the Technical Specifications and Construction Quality Assurance Plan for Phases I & II Final Closure, prepared by A-Mehr, Inc, dated November 2005. A copy of this document is contained in Appendix B.

3.1.1 Pre-Construction CQA

The following activities were performed as part of A-Mehr, Inc. pre-construction CQA services:

- Reviewed project documents; and
- Attended pre-construction meetings for the various phases of work.

3.1.2 CQA During Construction

The following activities were performed as part of A-Mehr, Inc. on-site CQA services.

- Visual monitoring of removal of existing temporary cover soil;
- Visual monitoring of pot-holing to establish waste elevations;
- Collecting material evaluation test samples of final cover and forwarding them to the soil testing laboratory for compaction testing;
- Visual monitoring of the moisture conditioning and compaction of soil placed as structural fill and final cover;
- Determination of in-place density, moisture content, and field testing of the final cover and aggregate road base;
- Conducting field permeability testing of monolithic final cover soil;
- Quality assurance surveying for construction of earthwork components;
- Verification that the elevations and the thickness of the earthwork components were consistent with the requirements of project specifications;
- Observing the installation of HDPE and corrugated metal pipes above and below grade and other associated drainage improvements;
- Observing the installation of drainage benches and roads;
- Visual monitoring of compost-soil blend over monolithic final cover; and
- Visual monitoring of application of grass seed by hydro-mulch method.

3.1.3 Final Report and Record Drawings

This final report summarizes the tasks performed by A-Mehr, Inc. during CQA monitoring of the project. Record drawings of the completed project have been prepared and are included in Appendix B.1.

3.2 Personnel

3.2.1 Project Personnel

The following personnel were involved in the project:

Central Maui Landfill, County of Maui
- Mike Kehano, Project Manager
- Mike Souza, General Manager

A-Mehr, Inc.
(Designer and CQA Consultant)
- Ali Mehrazarin, P.E., Principal Engineer and Certifying Engineer
- Glen Odell, Project Manager
- Lee Mehrazarin, CQA Monitor

Fewell Geotechnical Engineering, LTD
(Soil Testing Laboratory and Field CQA Monitoring)
- Timothy Cavanaugh, P.E., Project Manager
- Edwin Menor, CQA Monitor
- Joe Latour, CQA Monitor
- Mike Warmuth, CQA Monitor
- Jolene Garcia, CQA Monitor
- Griffin Marquardt, CQA Monitor

Hawaii Geotechnical Consulting, Inc.
(Soils Laboratory Testing)
- Robert Gibbens, P.E., Principal

Goodfellow Brothers, Inc.
(Contractor)
- Nathan Hexom, Project Manager
- Michael Harrell, Project Manager

4. CQA - LANDFILL FINAL COVER

4.1 Introduction

A-Mehr, Inc. monitored the construction of the final cover components for Phases I & II Final Closure, including the following tasks:

- Construction of a drainage bench approximately midway between the top and bottom of the 100-feet high landfill slope;
- Placement, compaction, and grading of approximately 136,000 cubic yards of Monolithic Final Cover;
- Placement of compacted backfill around leachate collection and removal system manhole;
- Placement of 34,000 cubic yards of compost-soil blend over the Monolithic Final Cover; and
- Initiate the process of establishing vegetative cover on the completed final cover by hydroseeding with an approved mix of grasses at the conclusion of major earthwork.

4.2 Grading Operations

A-Mehr, Inc. CQA monitors observed grading operations throughout the project. Grading consisted of an excavation and replacement operation. Removal of all cover soils over 12 inches above refuse elevation. All debris, roots, grasses, weeds, brush, trees, and other deleterious materials were removed from the areas before grading activities commenced. No disking or mixing of organic material into the soils was allowed. Man-made objects encountered and all organic materials generated during clearing and grubbing activities were removed from the project area.

4.3 Conformance Testing

4.3.1 Introduction

The sampling activities, conformance tests methods, and comparison of conformance test results as required in the project specifications are described in the following sections.

4.3.2 Sampling

Samples were collected on site for the construction fill material for laboratory testing. The following samples were collected:

- 14 Bulk samples for modified moisture-density laboratory testing

The frequency of testing for earthwork materials met or exceeded the frequency required by project specifications. Table 1 presents a summary of the required and actual testing frequencies. The laboratory test results on earthwork material samples conformed to the requirements of the project specifications and our recommendations.

4.3.3 Laboratory Conformance Tests and Methods

The following test methods were used for conformance testing of the earthwork materials:

- Moisture Content (ATSM 2216);
- Laboratory determination of compaction (ASTM D1557);
- Field moisture and density (ASTM D2922, D1556, or 2167); and
- Laboratory hydraulic conductivity tests (ASTM D5084) on undisturbed samples obtained from constructed Monolithic Final Cover.

Moisture-density relationship tests were performed for the final cover and structural fill materials for use in field density testing quality assurance activities. The laboratory test results are summarized in Table 2 and the laboratory reports are included in Appendix C.

The laboratory hydraulic conductivity tests on undisturbed samples obtained from constructed Monolithic Final Cover were conducted to ensure compliance with the specified permeability. The laboratory test results are summarized in Table 2 and the laboratory reports are included in Appendix C.

4.4 Soil Placement

Monolithic Final Cover was placed over approximately 42.1 acres of the project area. A-Mehr, Inc. observed that all soil placement occurred as prescribed by the technical specifications.

Monolithic Final Cover materials were observed to be free of debris. It was placed and compacted in 8-inch thick, loose lifts. The top six inches of cover were compacted by proof rolling, all other layers were compacted to 90 percent of maximum dry density.

Approximately 136,000 cubic yards of soil was placed and compacted to a minimum thickness of 2 feet over the underlying waste, with a resulting average thickness of 2.4 feet. An uncompacted 6-inch thick layer of a compost-soil blend was placed above the compacted final cover to achieve the final grade contour and provide the vegetative layer.

Materials were placed in accordance with the plans and specifications. The quality assurance testing of the Monolithic Final Cover soil consisted of density and moisture content testing to verify that all soil was compacted to a minimum of 90 percent relative compaction as required by the project specifications.

Field density and moisture content measurements were made using the Nuclear Gauge method (ASTM D2922). Moisture content was determined by nuclear methods (ATSM 2216). Field density and moisture content measurements were compared with results of laboratory compaction tests (ASTM D1557).

When density test results indicated a relative compaction less than 90 percent, the earthwork contractor either reworked or replaced the unacceptable soil. A retest was then performed to confirm that the specified moisture and compaction were achieved.

A total of 218 field density and moisture content tests were performed on monolithic final cover soil. Test results are summarized in Table 3. Test locations are shown in Figures 1 through 7.

Moisture content (ATSM 2216) and laboratory compaction (ATSM 1557) tests were performed on an average of one test per 9,700 cubic yards of compacted soil, for a total of 14 tests. This frequency exceeds the required minimum frequency of one test per 10,000 cubic yards. Test results can be found in Table 2.

Laboratory hydraulic conductivity tests (ASTM D5084) were performed on an average of one test per 17,000 cubic yards of compacted soil, for a total of 7 tests. This frequency exceeds the required minimum of one test per 20,000 cubic yards. Laboratory hydraulic conductivity test results can be found in Table 2. In addition to the laboratory hydraulic conductivity tests, four (4) BAT in-situ hydraulic conductivity tests were conducted, with the results shown in Table 5.

4.5 Final Cover Thickness

Following placement and compaction of the Monolithic Final Cover, a program involving test pits was undertaken to verify the final cover thickness met or exceeded the required 2 feet. The results of the test pit program verified the Monolithic Final Cover was placed and compacted to an average of 2.4 feet above refuse, exceeding the minimum cover thickness of 2 feet.

5. CQA – LEACHATE COLLECTION AND REMOVAL MANHOLE RISER

A-Mehr, Inc. monitored the reconstruction of the leachate Manhole No. 8, and construction of a new leachate collection and removal manhole riser. The tasks performed to construct the manhole riser portion of the project included the following:

- Excavation of refuse from around the existing leachate drain pipe.
- Construction of a 12-inch thick steel reinforced concrete slab foundation for an 18-inch diameter perforated HDPE vertical inlet pipe.
- Installation of the 18-inch diameter perforated HDPE vertical inlet pipe and backfill with granular drainage layer.
- Construction of a 24-inch thick steel reinforced concrete slab foundation for a 24-inch diameter reinforced concrete pipe manhole riser.
- Installation of the 24-inch diameter reinforced concrete pipe manhole riser to the elevation of the adjacent refuse fill.
- Backfill manhole riser with compacted refuse.
- Fabricate and install a removable cover for the riser.

Construction of the leachate collection and removal manhole riser was performed in accordance with the technical specifications.

6. CQA – ROAD CONSTRUCTION

A-Mehr, Inc. monitored the construction of the roads and paved drainage benches that were part of the Phase I & II Final Closure project. Road base aggregate was tested to ensure relative compaction of 95 percent, as determined by ATSM 1557. A summary of test results can be found in Table 4. Twenty-seven (27) test locations were distributed uniformly throughout the area where base was installed, test locations are shown on Figure 7.

Construction of the roads was performed in accordance with the technical specifications.

7. CQA – SEDIMENTATION BASIN AND DRAINAGE IMPROVEMENTS

A-Mehr, Inc. monitored the construction of the drainage improvements for Phases I and II Final Closure. The tasks performed to construct the drainage improvements for the project included the following:

- Excavation and installation of 2,400 linear feet of concrete trapezoidal channel 2 feet deep x 2 feet bottom width;
- Excavation and installation of 500 linear feet of concrete trapezoidal channel 3 feet deep x 6 feet bottom width;

- Installation of 150 linear feet of 36" corrugated HDPE drainage pipe above and below grade;
- Installation of 190 linear feet of 24" corrugated HDPE drainage pipe above and below grade;
- Installation of 120 linear feet of 36" corrugated metal pipe culvert;
- Installation of 80 linear feet of 24" corrugated metal pipe culvert;
- Excavation of 3,980 cubic yards of soil and placement of 880 cubic yards of structural fill at the Sedimentation Basin;
- Installation of rip rap at channel discharge to the Sedimentation Basin;
- Construction of concrete spillway and asphalt paved discharge channel from the outlet of Sedimentation Basin to the Kalialinui Gulch; and
- Re-grading the small basin at the northeast corner of the closed landfill to improve drainage and eliminate potential ponding of surface water above refuse.

Construction of drainage improvements was performed in accordance with the technical specifications.

8. SUMMARY AND CONCLUSIONS

Construction of Phases I & II Final Closure of Central Maui Landfill was substantially completed in April 2007. Phases I & II Final Closure consists of approximately 42.1 acres of unlined waste areas and associated drainage improvements.

Construction of the Phases I & II Final Closure Monolithic Final Cover and was completed in conformance with all requirements of HAR 11-58.1-7 and approved design plans. Construction occurred during the period June 2006 through April 2007. During the execution of the project, A-Mehr, Inc, provided qualified CQA personnel on site to monitor construction of all the work.

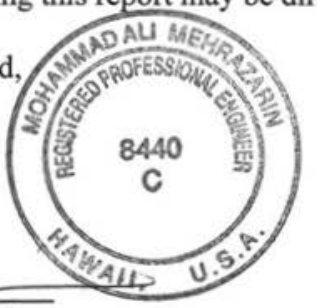
Throughout construction of Phases I & II Final Closure and associated drainage improvements, A-Mehr, Inc. verified that construction quality assurance testing was performed on the construction materials at the frequencies required in the project. Also, A-Mehr, Inc. verified that any condition identified as not conforming to the project specification requirements was re-tested.

Based on A-Mehr, Inc. observations during construction of the Central Maui Landfill Phases I & II Final Closure and associated drainage improvements, and on our review of the test results, the project was constructed in general accordance with the project plans, specifications, subsequent addenda, and our recommendations. As constructed, it meets all applicable requirements of HAR 11-58.1-17, the approved Closure and Post-Closure Plan for Central Maui Landfill, and approved design plans and specifications.

Any questions regarding this report may be directed to the undersigned at (949) 206-0157.

Respectfully submitted,

A-Mehr, Inc.



M. Ali Mehrazarin, P.E.
Certifying Engineer

FIGURES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GRAPHIC SCALE 1"=200'
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Legend:
340 Existing Contour Lines
360 Design Final Grades Contours
T-28 Density Test Locations
Existing Structures
Existing Roads
Existing Limit of Waste
Limit of Work
Existing Fence Line
A-Mehr, Inc.
Central Maul Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Density Test Locations Map
1/5/2006 Topography
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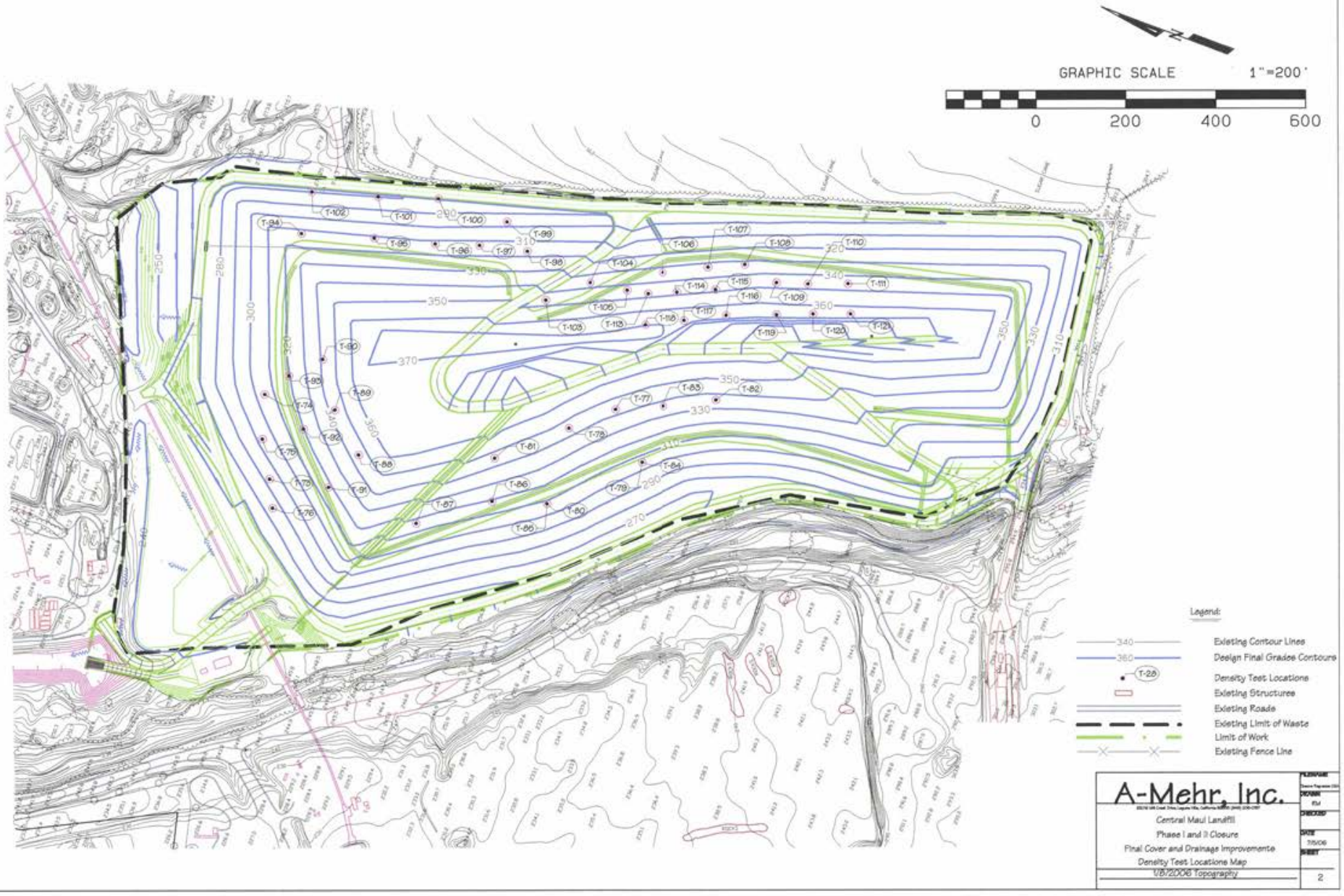
SHEET 1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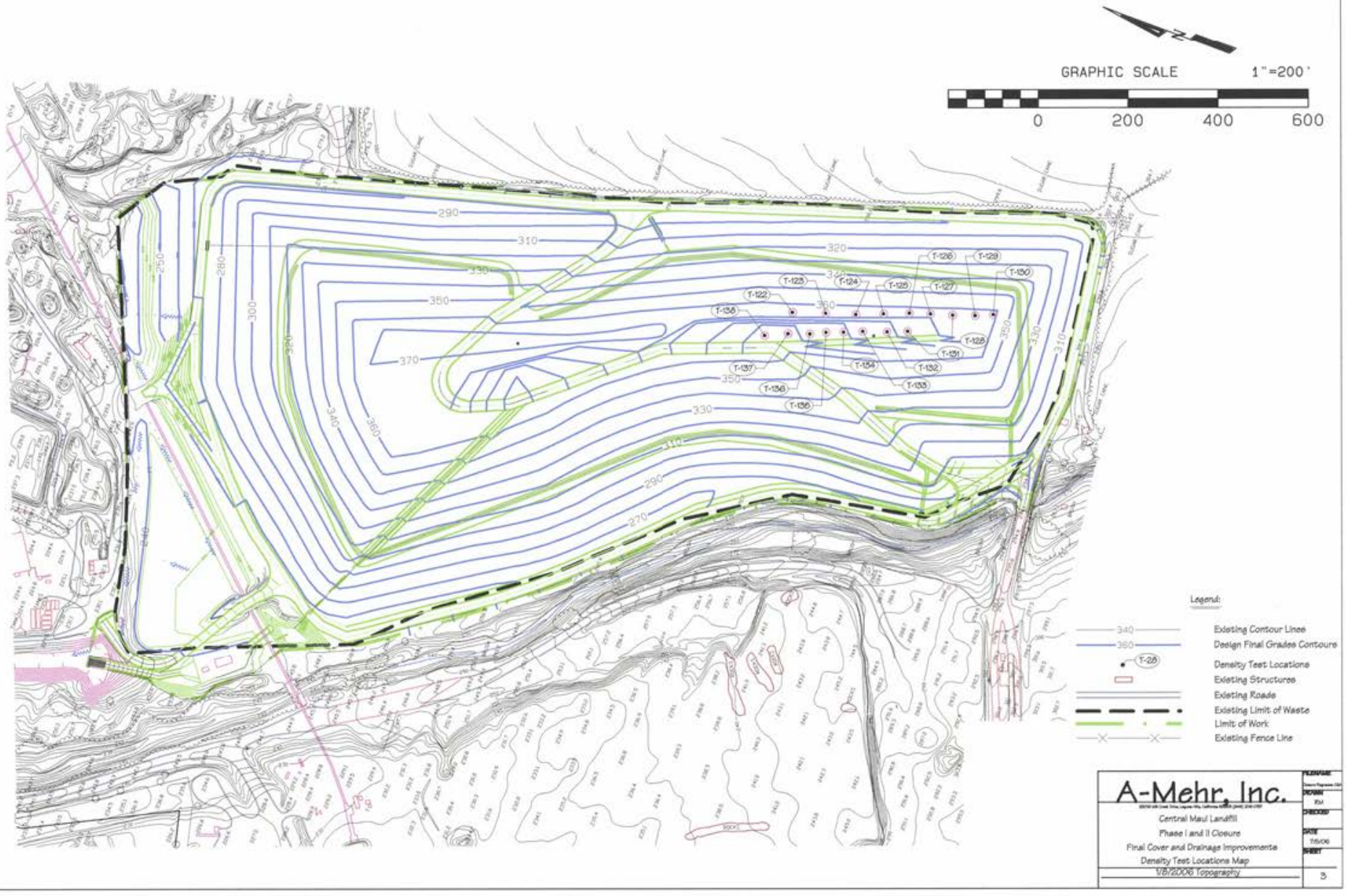
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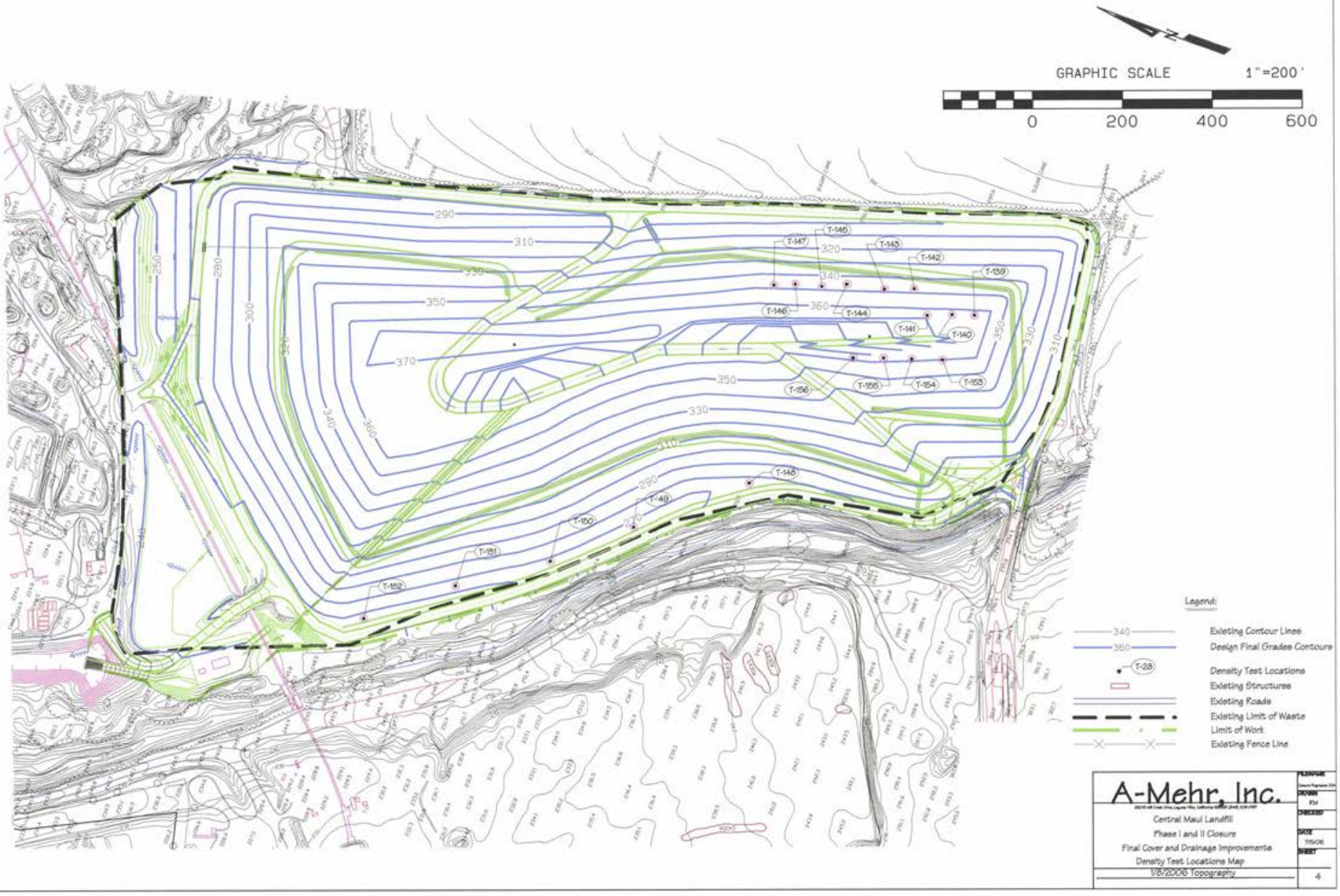
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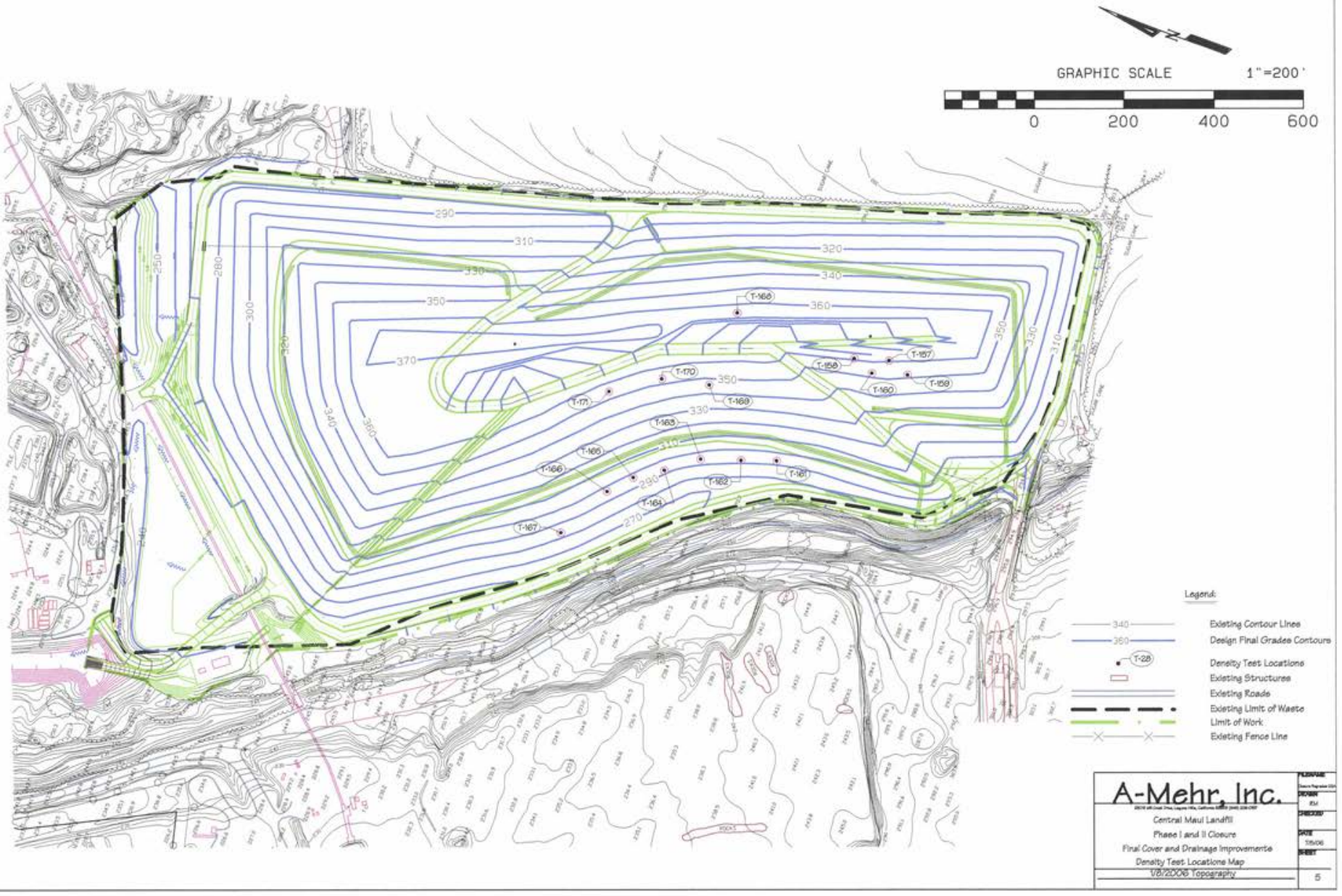
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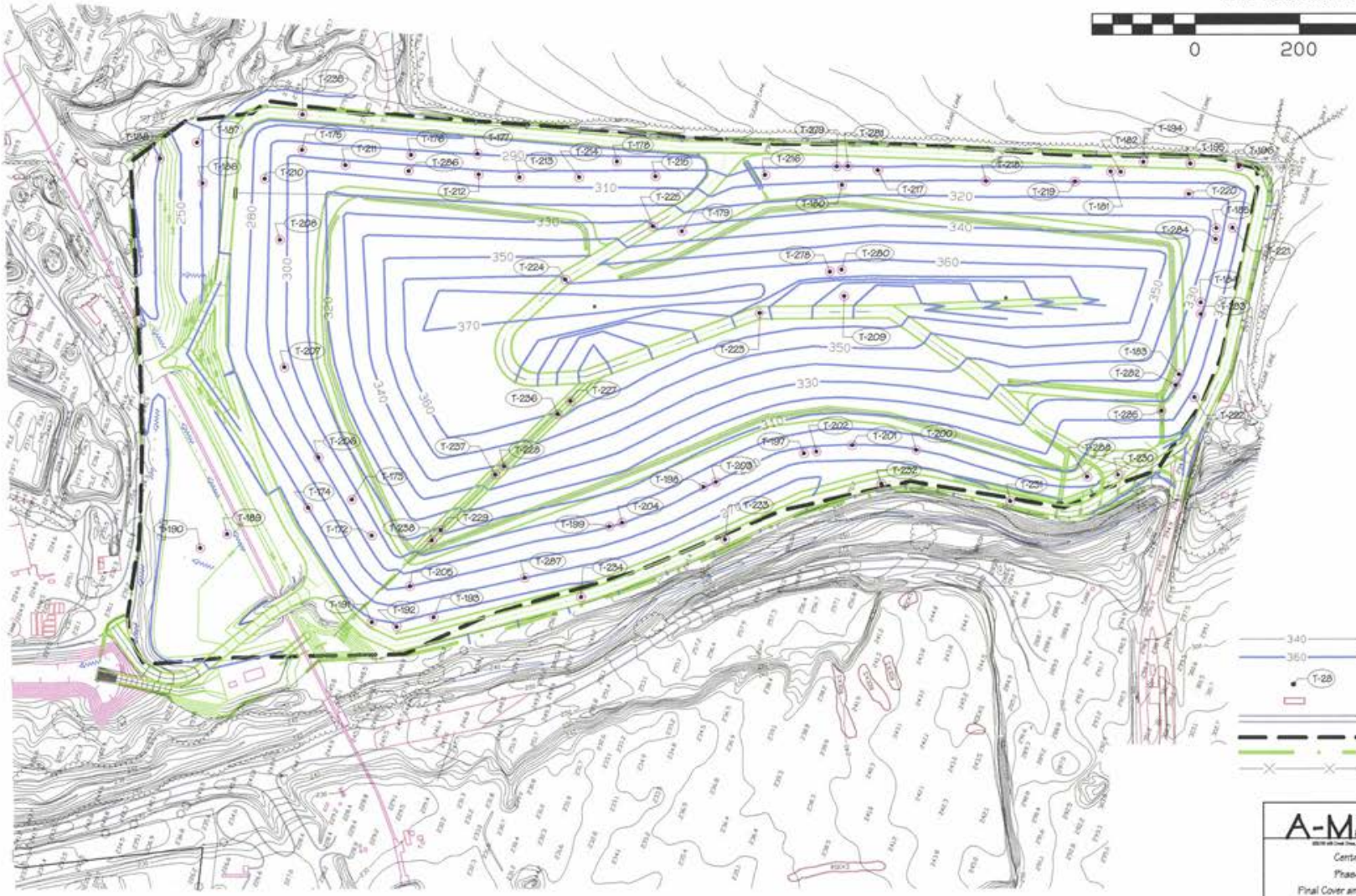

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Density Test Locations Map
08/2006 Topography

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SHEET: 6


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TABLES

CENTRAL MAUI LANDFILL
PHASES I & II FINAL COVER
TABLE 1
SUMMARY OF TESTING FREQUENCIES

DESCRIPTION	TEST TYPE	TEST STANDARD	TEST FREQUENCY (per CY placed)		NUMBER OF TESTS		Passing Criteria
			REQUIRED	ACTUAL	REQUIRED	ACTUAL	
FINAL COVER PLACEMENT							
136,000 cubic yards	Modified Moisture-Density Relations (Proctor)	ASTM D1557	10,000	9,700	14	14	n/a
	Moisture Content (%)	ASTM D2216	10,000	9,700	14	14	0 to 4 percent
	In-Place Density (% compaction)	ASTM D2922	1,000	620	136	218	90% of maximum
	Laboratory Hydraulic Conductivity	ATSM D5084	20,000	17,000	7	8	$k \leq 1 \times 10^{-5}$ cm/s
ROAD BASE	Modified Moisture-Density Relations	ATSM D1557	1 test	1 test	1	1	n/a
45,300 cubic yards	In-Place Density (% compaction)	ASTM D2922	N/A	1,900	N/A	27	95% of maximum

CENTRAL MAUI LANDFILL
TABLE 2
PHASES I & II FINAL COVER
SUMMARY OF MONOLITHIC FINAL COVER LABORATORY TEST RESULTS

REPORT DATE	DESCRIPTION	SAMPLE NO	OPTIMUM MOISTURE & DENSITY (ATSM D1557)		ATTERBERG LIMITS (ATSM D4318)			Hydraulic Conductivity (ASTM D5084) (cm/sec)	SOIL CLASSIFICATION
			OPTIMUM MOISTURE (%)	MAX, DRY DENSITY (LB/CU. FT.)	LL	PL	PI		
2/15/2006	RED BROWN SANDY CLAY	Bulk No. 1	33.5	88.0	67	33	34	7.9 x 10-8	CL
2/15/2006	DARK BROWN CLAYEY SAnD	Bulk No. 2	22.9	103.0	52	24	28	3.1 x 10-6	SC
2/22/2006	DARK BROWN SILTY CLAY	Bulk No. 3	28	85.0	62	29	33	4.5 x 10-8	CH
7/27/2006	BROWN CLAYEY SILT (MH)	A	27	96.0	-	-	-	-	-
7/27/2006	BROWN SILTY CLAY (CH)	B	30	87.0	-	-	-	-	-
7/27/2006	BROWN SILTY CLAY (CH)	C	31	86.0	-	-	-	-	-
7/27/2006	BROWN CLAYEY SILT (MH)	D	24	106.0	-	-	-	-	-
7/27/2006	REDDISH BROWN CLAYEY SILT (MH)	E	23	109.0	-	-	-	-	-
7/27/2006	DARK BROWN CLAYEY SILT (MH)	G	25	104.0	-	-	-	-	-
7/27/2006	DARK BROWN CLAYEY SILT (MH)	H	27	98.0	-	-	-	-	-
7/27/2006	DARK BROWN CLAYEY SILT (MH)	I	26	99.0	-	-	-	-	-
7/27/2006	BROWN CLAYEY SILT (MH)	J	26	98.0	-	-	-	-	-
7/27/2006	BROWN CLAYEY SILT (MH)	K	26	99.0	-	-	-	-	-
7/26/2006	DARK BROWN CLAYEY SILT	L	26	90.0	-	-	-	-	-
7/28/2006	DARK BROWN CLAYEY SILT	M	26	94.5	-	-	-	-	-
8/3/2006	BROWN CLAYEY SILT	N	25.2	102.0	-	-	-	-	-
8/9/2006	REDDISH BROWN CLAYEY SILT	O	27	98.5	-	-	-	-	-
10/5/2006	MFC UNDISTURBED SAMPLE	ST-1	-	-	-	-	-	1.7 x 10-6	-
1/8/2007	MFC UNDISTURBED SAMPLE	SB-1	-	-	-	-	-	2.4 x 10-6	-
1/8/2007	MFC UNDISTURBED SAMPLE	SB-2	-	-	-	-	-	3.4 x 10-6	-
1/8/2007	MFC UNDISTURBED SAMPLE	SB-3	-	-	-	-	-	1.1 x 10-6	-
1/8/2007	MFC UNDISTURBED SAMPLE	SB-4	-	-	-	-	-	5.7 x 10-7	-
1/21/2007	MFC UNDISTURBED SAMPLE	SB-5	-	-	-	-	-	6.1 x 10-6	-
1/21/2007	MFC UNDISTURBED SAMPLE	SB-6	-	-	-	-	-	1.1 x 10-6	-
1/21/2007	MFC UNDISTURBED SAMPLE	SB-7	-	-	-	-	-	9.4 x 10-6	-

CENTRAL MAUI LANDFILL
PHASES I & II FINAL COVER
TABLE 3
SUMMARY OF FIELD DENSITY TEST INFORMATION - MONOLITHIC FINAL COVER

DATE	TEST NUMBER	RETEST NUMBER	LOCATION & DESCRIPTION	ELEVATION (FT)	SOIL DESCRIPTION	PROBE DEPTH (INCHES)	WET DENSITY (PCF)	DRY DENSITY (PCF)	MOISTURE (PCF)	MOISTURE (%)	PROCTOR (PCF)	% COM-PACTION	PASS OR FAIL	CQA TECH	COMMENTS
06/14/06	T-1		AC PAVED ROAD	294.5	SILTY CLAY	6"	125.5	102.0	23.5	23.00	105.5	97	PASS	TC	
06/14/06	T-2		AC PAVED ROAD	292	SILTY CLAY	6"	126.0	105.0	21.0	20.00	105.5	100	PASS	TC	
06/14/06	T-3		AC PAVED ROAD	360	SILTY CLAY	6"	122.2	101.0	21.2	21.00	105.5	96	PASS	TC	
06/14/06	T-4		AC PAVED ROAD	360	SILTY CLAY	6"	127.7	106.4	21.3	20.00	105.5	101	PASS	TC	
06/15/06	T-5		TOP ROAD	FG-2	CLAYEY SILT	6"	121.0	100.0	21.0	21.00	108.5	92	PASS	TC	
06/16/06	T-6		TOP ROAD	FG	CLAYEY SILT	6"	121.5	103.0	18.5	18.00	108.5	95	PASS	TC	
06/16/06	T-7		TOP ROAD	FG	CLAYEY SILT	6"	123.5	100.4	23.1	23.00	108.5	93	PASS	TC	
06/16/06	T-8		TOP ROAD	FG	CLAYEY SILT	6"	131.1	114.0	17.1	15.00	108.5	105	PASS	TC	
06/16/06	T-9		TOP ROAD	FG	CLAYEY SILT	6"	133.3	112.0	21.3	19.00	108.5	103	PASS	TC	
06/18/06	T-10		CHANK	FSG	CLAYEY SILT	6"	118.6	98.0	20.6	21.00	108.5	90	PASS	TC	
06/18/06	T-11		CHANK	FSG	CLAYEY SILT	6"	119.2	97.7	21.5	22.00	108.5	90	PASS	TC	
06/18/06	T-12		CHANK	FSG	CLAYEY SILT	6"	119.6	98.0	21.6	22.00	108.5	90	PASS	TC	
06/20/06	T-13		WEST SIDE ROAD	2.5 OF FILL	CLAYEY SILT	6"	126.0	100.0	26.0	26.00	105.5	95	PASS	TC	
06/20/06	T-14		WEST SIDE ROAD	2.5 OF FILL	CLAYEY SILT	6"	122.1	94.0	28.1	29.90	96.0	98	PASS	TC	
06/20/06	T-15		WEST SIDE ROAD	2.5 OF FILL	CLAYEY SILT	6"	111.3	92.0	19.3	21.00	96.0	96	PASS	TC	
06/20/06	T-16		WEST SIDE ROAD	2.5 OF FILL	CLAYEY SILT	6"	117.6	98.0	19.6	20.00	96.0	102	PASS	TC	
06/20/06	T-17		TOP OF FILL SLOPE TEST	+ 6" OF FILL	CLAYEY SILT	6"	95.6	79.0	16.6	21.00	86.0	92	PASS	TC	
06/21/06	T-18		SLOPE AREA SOUTHWEST	FSG - 1.5'	CLAYEY SILT	6"	98.8	76.0	22.8	30.00	87.0	87	FAIL	TC	
06/21/06	T-19		SLOPE AREA SOUTHWEST	FSG - 1.5'	CLAYEY SILT	6"	101.9	79.0	22.9	29.00	87.0	91	PASS	TC	
06/21/06	T-20		SLOPE AREA SOUTHWEST	FSG - 1.5'	CLAYEY SILT	6"	97.5	85.0	25.5	30.00	87.0	98	FAIL	TC	
06/21/06	T-21		SLOPE AREA SOUTHWEST	FSG - 1.5'	CLAYEY SILT	6"	95.6	76.0	22.8	30.00	87.0	87	FAIL	TC	
06/22/06	T-22	T-18	SLOPE AREA SOUTHWEST	FSG - 1.5'	SILTY CLAY	6"	110.0	84.0	26.0	31.00	87.0	97	PASS	TC	
06/22/06	T-23	T-20	SLOPE AREA SOUTHWEST	FSG - 1.5'	SILTY CLAY	6"	104.0	80.0	24.0	30.00	87.0	92	PASS	TC	
06/22/06	T-24	T-21	SLOPE AREA SOUTHWEST	FSG - 1.5'	SILTY CLAY	6"	111.4	85.0	26.4	31.00	87.0	98	PASS	TC	
06/22/06	T-25		SLOPE AREA SOUTHWEST	FSG - 1.5'	SILTY CLAY	6"	110.0	84.0	26.0	31.00	87.0	97	PASS	TC	
06/22/06	T-26		SLOPE AREA SOUTHWEST	FSG - 1.5'	SILTY CLAY	6"	109.2	84.0	25.2	30.00	87.0	97	PASS	TC	
06/22/06	T-27		SLOPE AREA SOUTHWEST	FSG - 1.5'	SILTY CLAY	6"	110.5	85.0	25.5	30.00	87.0	98	PASS	TC	
06/22/06	T-28		SLOPE AREA SOUTHWEST	FSG - 1.5'	SILTY CLAY	6"	100.9	77.0	23.9	31.00	87.0	89	FAIL	TC	
06/23/06	T-29	T-28	SLOPE AREA SOUTHWEST	FSG - 1.5'	SILTY CLAY	6"	109.2	79.7	29.5	37.00	96.0	83	FAIL	TC	
06/23/06	T-30		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	109.6	80.6	29.0	36.00	96.0	84	FAIL	TC	
06/23/06	T-31	T-29	SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	109.0	86.5	22.5	26.00	96.0	90	PASS	TC	
06/23/06	T-32	T-30	SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	117.3	90.9	26.4	29.00	96.0	95	PASS	TC	
06/23/06	T-33		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	118.5	93.3	25.2	27.00	96.0	97	PASS	TC	
06/23/06	T-34		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	112.9	89.6	23.3	26.00	96.0	93	PASS	TC	
06/26/06	T-35		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	120.0	90.2	29.8	33.00	96.0	94	PASS	TC	
06/26/06	T-36		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	115.9	87.8	28.1	32.00	96.0	91	PASS	TC	

DATE	TEST NUMBER	RETEST NUMBER	LOCATION & DESCRIPTION	ELEVATION (FT)	SOIL DESCRIPTION	PROBE DEPTH (INCHES)	WET DENSITY (PCF)	DRY DENSITY (PCF)	MOISTURE (PCF)	MOISTURE (%)	PROCTOR (PCF)	% COM-PACTION	PASS OR FAIL	CQA TECH	COMMENTS
06/26/06	T-37		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	111.7	87.3	24.4	28.00	96.0	91	PASS	TC	
06/26/06	T-38		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	120.8	95.9	24.9	26.00	105.0	91	PASS	TC	
06/26/06	T-39		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	115.3	91.5	23.8	26.00	96.0	95	PASS	TC	
06/27/06	T-40		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	90.8	75.0	15.8	21.00	87.0	86	FAIL	TC	retested on 6/28 and passed
06/27/06	T-41		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	100.0	77.5	22.5	29.00	87.0	89	FAIL	TC	retested on 6/28 and passed
06/27/06	T-42		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	109.9	85.2	24.7	29.00	87.0	98	PASS	TC	
06/27/06	T-43		SLOPE AREA SOUTHWEST	FG - 1.5'	SILTY CLAY	6"	110.8	83.3	27.5	33.00	87.0	96	PASS	TC	
06/27/06	T-44		SLOPE AREA SOUTHWEST	FG	SILTY CLAY	6"	108.2	83.9	24.3	29.00	87.0	96	PASS	TC	
06/27/06	T-45		SLOPE AREA SOUTHWEST	FG	SILTY CLAY	6"	110.7	87.2	23.5	27.00	87.0	100	PASS	TC	
06/27/06	T-46		SLOPE AREA SOUTHWEST	FG	SILTY CLAY	6"	99.4	78.9	20.5	26.00	87.0	91	PASS	TC	
06/27/06	T-47		SLOPE AREA SOUTHWEST	FG	SILTY CLAY	6"	94.6	75.7	18.9	25.00	87.0	87	FAIL	TC	
06/28/06	T-48		SLOPE AREA SOUTHWEST	FG	SILTY CLAY	6"	101.3	78.5	22.8	29.00	87.0	90	PASS	TC	
06/28/06	T-49	T-47	SLOPE AREA SOUTHWEST	FG	SILTY CLAY	6"	104.3	79.0	25.3	32.00	87.0	91	PASS	TC	
06/28/06	T-50		SLOPE AREA SOUTHWEST	FG	SILTY CLAY	6"	113.2	87.1	26.1	30.00	87.0	100	PASS	TC	
06/28/06	T-51		SLOPE AREA SOUTHWEST	FG	SILTY CLAY	6"	112.2	87.0	25.2	29.00	87.0	100	PASS	TC	
06/28/06	T-52		SLOPE AREA SOUTHWEST	FG	SILTY CLAY	6"	113.9	91.1	22.8	25.00	87.0	105	PASS	TC	
06/29/06	T-53		SLOPE AREA NORTH	FG-1'-0"	SILTY CLAY	6"	101.4	78.0	23.4	30.00	87.0	90	PASS	TC	
06/29/06	T-54		SLOPE AREA NORTH	FG-1'-0"	SILTY CLAY	6"	104.8	83.2	21.6	26.00	87.0	96	PASS	TC	
06/29/06	T-55		SLOPE AREA NORTH	FG-1'-0"	SILTY CLAY	6"	102.0	81.6	20.4	25	87.0	94	PASS	TC	
06/29/06	T-56		SLOPE AREA NORTH	FG-1'-0"	SILTY CLAY	6"	99.6	78.4	21.2	27	87.0	90	PASS	TC	
06/29/06	T-57		SLOPE AREA NORTH	FG-1'-0"	SILTY CLAY	6"	91.6	73.9	17.7	24	87.0	85	FAIL	TC	
06/29/06	T-58	T-57	SLOPE AREA NORTH	FG-1'-0"	SILTY CLAY	6"	119.1	97.6	21.5	22	105.5	93	PASS	TC	
06/29/06	T-59		SLOPE AREA NORTH	FG-2.5'	SILTY CLAY	6"	106.8	84.1	22.7	27	87.0	97	PASS	TC	
06/29/06	T-60		SLOPE AREA NORTH	FG-2.5'	SILTY CLAY	6"	108.7	87.7	21.0	24	87.0	101	PASS	TC	
06/29/06	T-61		SLOPE AREA EAST	FG-2.5'	SILTY CLAY	6"	97.4	76.7	20.7	27	105.5	73	FAIL	TC	
06/29/06	T-62	T-61	SLOPE AREA EAST	FG-2.5'	SILTY CLAY	6"	104.7	86.5	18.2	21	87.0	99	PASS	TC	
06/29/06	T-63		SLOPE AREA EAST	FG-2.5'	SILTY CLAY	6"	106.0	86.2	19.8	23	87.0	99	PASS	TC	
06/29/06	T-64		SLOPE AREA EAST	FG-2.5'	CLAYEY SILT	6"	98.3	79.3	19.0	24	87.0	91	PASS	TC	
06/29/06	T-65		SLOPE AREA EAST	FG-2.5'	CLAYEY SILT	6"	98.2	79.8	18.4	23	87.0	92	PASS	TC	
06/29/06	T-66		SLOPE AREA EAST	FG-2.5'	CLAYEY SILT	6"	99.9	78.7	21.2	27	87.0	90	PASS	TC	
06/29/06	T-67		SLOPE AREA EAST	FG-2.5'	CLAYEY SILT	6"	101.4	81.1	20.3	25	87.0	93	PASS	TC	
07/11/06	T-68		SLOPE AREA EAST	FG	SILTY CLAY	6"	134.0	104.7	29.3	28	87.0	120	PASS	TC	
07/11/06	T-69		SLOPE AREA EAST	FG	SILTY CLAY	6"	96.9	79.4	17.5	22	87.0	91	PASS	TC	
07/11/06	T-70		SLOPE AREA EAST	FG	SILTY CLAY	6"	101.9	82.2	19.7	24	87.0	94	PASS	TC	
07/11/06	T-71		SLOPE AREA EAST	FG	SILTY CLAY	6"	92.5	75.8	16.7	22	87.0	87	FAIL	TC	Retested on 7/13 and passed
07/11/06	T-72		SLOPE AREA EAST	FG	SILTY CLAY	6"	93.7	75.6	18.1	24	87.0	87	FAIL	TC	Retested on 7/13 and passed
07/12/06	T-73		SLOPE AREA NORTH	FG-2'	SILTY CLAY	6"	117.1	92.2	24.9	27	96.0	96	PASS	TC	
07/12/06	T-74		SLOPE AREA NORTH	FG-2'	SILTY CLAY	6"	97.4	80.5	16.9	21	87.0	93	PASS	TC	
07/12/06	T-75		ROADWAY	FG	SILTY CLAY	6"	117.6	97.2	20.4	21	96.0	101	PASS	TC	
07/12/06	T-76		SLOPE AREA NORTH	FG-2'	SILTY CLAY	6"	101.8	79.5	22.3	28	87.0	91	PASS	TC	
07/13/06	T-77		SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	100.4	79.7	20.7	26	87.0	92	PASS	TC	

DATE	TEST NUMBER	RETEST NUMBER	LOCATION & DESCRIPTION	ELEVATION (FT)	SOIL DESCRIPTION	PROBE DEPTH (INCHES)	WET DENSITY (PCF)	DRY DENSITY (PCF)	MOISTURE (PCF)	MOISTURE (%)	PROCTOR (PCF)	% COM-PACTION	PASS OR FAIL	CQA TECH	COMMENTS
07/13/06	T-78		SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	107.8	86.2	21.6	25	87.0	99	PASS	TC	
07/13/06	T-79		SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	94.6	76.9	17.7	23	87.0	88	FAIL	TC	
07/13/06	T-80		SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	86.8	72.9	13.9	19	87.0	84	FAIL	TC	
07/13/06	T-81		SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	104.1	81.3	22.8	28	87.0	93	PASS	TC	
07/13/06	T-82		SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	100.3	79.6	20.7	26	87.0	91	PASS	TC	
07/13/06	T-83		SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	97.5	80.6	16.9	21	87.0	93	PASS	TC	
07/13/06	T-84	T-79	SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	99.9	79.9	20.0	25	87.0	92	PASS	TC	
07/13/06	T-85	T-80	SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	95.6	79.0	16.6	21	87.0	91	PASS	TC	
07/13/06	T-86	T-72	SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	109.6	89.1	20.5	23	87.0	102	PASS	TC	
07/13/06	T-87	T-71	SLOPE AREA NORTHEAST	FG	SILTY CLAY	6"	99.4	78.9	20.5	26	87.0	91	PASS	TC	
07/14/06	T-88		SLOPE AREA NORTH	FG	SILTY CLAY	6"	103.7	82.3	21.4	26	87.0	95	PASS	TC	
07/14/06	T-89		SLOPE AREA NORTH	FG	SILTY CLAY	6"	100.8	83.3	17.5	21	87.0	96	PASS	TC	
07/14/06	T-90		SLOPE AREA NORTH	FG	SILTY CLAY	6"	95.2	78.7	16.5	21	87.0	90	PASS	TC	
07/14/06	T-91		SLOPE AREA NORTH	FG-2'	SILTY CLAY	6"	97.3	78.5	18.8	24	87.0	90	PASS	TC	
07/14/06	T-92		SLOPE AREA NORTH	FG-2'	SILTY CLAY	6"	104.6	85.0	19.6	23	87.0	98	PASS	TC	
07/14/06	T-93		SLOPE AREA NORTH	FG-2'	SILTY CLAY	6"	102.4	81.9	20.5	25	87.0	94	PASS	TC	
07/14/06	T-94		SLOPE AREA NORTH	FG	SILTY CLAY	6"	104.6	85.0	19.6	23	87.0	98	PASS	TC	
07/14/06	T-95		SLOPE AREA NORTH	FG	SILTY CLAY	6"	98.3	78.6	19.7	25	87.0	90	PASS	TC	
07/14/06	T-96		SLOPE AREA NORTH	FG	SILTY CLAY	6"	104.3	84.1	20.2	24	87.0	97	PASS	TC	
07/14/06	T-97		SLOPE AREA NORTH	FG	SILTY CLAY	6"	97.5	75.6	21.9	29	87.0	87	FAIL	TC	
07/14/06	T-98	T-97	SLOPE AREA NORTH	FG	SILTY CLAY	6"	100.2	78.3	21.9	28	87.0	90	PASS	EM	
07/14/06	T-99		SLOPE AREA NORTH	FG	SILTY CLAY	6"	102.8	82.2	20.6	25	87.0	94	PASS	TC	
07/14/06	T-100		SLOPE AREA NORTH	FG	SILTY CLAY	6"	113.0	89.0	24.0	27	87.0	102	PASS	TC	
07/14/06	T-101		SLOPE AREA NORTH	FG	SILTY CLAY	6"	108.5	86.1	22.4	26	87.0	99	PASS	TC	
07/14/06	T-102		SLOPE AREA NORTH	FG	SILTY CLAY	6"	99.4	78.9	20.5	26	87.0	91	PASS	TC	
07/17/06	T-103		SLOPE AREA EAST	FG-1'-0"	SILTY CLAY	6"	107.6	84.7	22.9	27	87.0	97	PASS	EM	
07/17/06	T-104		SLOPE AREA EAST	FG-1'-0"	SILTY CLAY	6"	107.8	88.4	19.4	22	96.0	92	PASS	EM	
07/17/06	T-105		SLOPE AREA EAST	FG-1'-0"	SILTY CLAY	6"	106.7	84.7	22.0	26	87.0	97	PASS	EM	
07/17/06	T-106		SLOPE AREA EAST	FG-0.5'	SILTY CLAY	6"	102.9	81.7	21.2	26	87.0	94	PASS	EM	
07/17/06	T-107		SLOPE AREA EAST	FG-0.5'	SILTY CLAY	6"	109.0	84.5	24.5	29	87.0	97	PASS	EM	
07/17/06	T-108		SLOPE AREA EAST	FG-1.5'	SILTY CLAY	6"	101.6	79.4	22.2	28	87.0	91	PASS	EM	
07/18/06	T-109		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	119.0	96.0	23.0	24	96.0	100	PASS	EM	
07/18/06	T-110		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	114.9	91.9	23.0	25	96.0	96	PASS	EM	
07/18/06	T-111		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	110.6	87.1	23.5	27	96.0	91	PASS	EM	
07/18/06	T-112		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	109.4	86.8	22.6	26	96.0	90	PASS	EM	
07/18/06	T-113		SLOPE AREA EAST	FG	CLAYEY SILT	6"	113.1	87.0	26.1	30	96.0	91	PASS	EM	
07/18/06	T-114		SLOPE AREA EAST	FG	CLAYEY SILT	6"	112.5	84.6	27.9	33	87.0	97	PASS	EM	
07/18/06	T-115		SLOPE AREA EAST	FG	CLAYEY SILT	6"	101.6	80.6	21.0	26	87.0	93	PASS	EM	
07/18/06	T-116		SLOPE AREA EAST	FG	CLAYEY SILT	6"	112.5	87.9	24.6	28	96.0	92	PASS	EM	
07/18/06	T-117		SLOPE AREA EAST	FG	CLAYEY SILT	6"	101.9	82.2	19.7	24	87.0	94	PASS	EM	
07/18/06	T-118		SLOPE AREA EAST	FG	CLAYEY SILT	6"	99.4	79.5	19.9	25	87.0	91	PASS	EM	

DATE	TEST NUMBER	RETEST NUMBER	LOCATION & DESCRIPTION	ELEVATION (FT)	SOIL DESCRIPTION	PROBE DEPTH (INCHES)	WET DENSITY (PCF)	DRY DENSITY (PCF)	MOISTURE (PCF)	MOISTURE (%)	PROCTOR (PCF)	% COM-PACTION	PASS OR FAIL	CQA TECH	COMMENTS
07/19/06	T-119		SLOPE AREA EAST	FG-1'-0"	CLAYEY SILT	6"	111.0	88.8	22.2	25	96.0	93	PASS	EM	
07/19/06	T-120		SLOPE AREA EAST	FG-1'-0"	CLAYEY SILT	6"	111.5	89.9	21.6	24	96.0	94	PASS	EM	
07/19/06	T-121		SLOPE AREA EAST	FG-1'-0"	CLAYEY SILT	6"	113.1	91.2	21.9	24	96.0	95	PASS	EM	
07/20/06	T-122		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	105.8	83.3	22.5	27	87.0	96	PASS	EM	
07/20/06	T-123		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	108.7	84.9	23.8	28	87.0	98	PASS	EM	
07/20/06	T-124		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	114.2	89.2	25.0	28	96.0	93	PASS	EM	
07/20/06	T-125		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	107.7	88.3	19.4	22	96.0	92	PASS	EM	
07/20/06	T-126		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	114.5	88.1	26.4	30	96.0	92	PASS	EM	
07/20/06	T-127		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	102.8	78.5	24.3	31	87.0	90	PASS	EM	
07/20/06	T-128		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	114.7	86.9	27.8	32	96.0	91	PASS	EM	
07/20/06	T-129		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	111.9	88.1	23.8	27	96.0	92	PASS	EM	
07/20/06	T-130		SLOPE AREA EAST	FG-1.5'	CLAYEY SILT	6"	110.9	88.0	22.9	26	96.0	92	PASS	EM	
07/24/06	T-131		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	101.2	86.5	14.7	17	96.0	90	PASS	EM	
07/24/06	T-132		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	108.2	90.9	17.3	19	96.0	95	PASS	EM	
07/24/06	T-133		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	95.0	81.2	13.8	17	87.0	93	PASS	EM	
07/24/06	T-134		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	90.5	78.0	12.5	16	87.0	90	PASS	EM	
07/24/06	T-135		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	103.3	85.4	17.9	21	87.0	98	PASS	EM	
07/24/06	T-136		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	104.1	87.5	16.6	19	96.0	91	PASS	EM	
07/24/06	T-137		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	109.7	91.1	18.6	20	96.0	95	PASS	EM	
07/24/06	T-138		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	100.9	87.0	13.9	16	96.0	91	PASS	EM	
07/25/06	T-139		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	100.2	85.6	14.6	17	87.0	98	PASS	EM	
07/25/06	T-140		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	102.7	88.5	14.2	16	96.0	92	PASS	EM	
07/25/06	T-141		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	102.1	86.5	15.6	18	96.0	90	PASS	EM	
07/25/06	T-142		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	103.7	88.6	15.1	17	96.0	92	PASS	EM	
07/25/06	T-143		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	105.6	89.5	16.1	18	96.0	93	PASS	EM	
07/25/06	T-144		EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	104.8	88.1	16.7	19	96.0	92	PASS	EM	
07/25/06	T-145		EASTERN FLANK	FG-1'-0"	CLAYEY SILT	6"	100.8	85.4	15.4	18	87.0	98	PASS	EM	
07/25/06	T-146		EASTERN FLANK	FG-1'-0"	CLAYEY SILT	6"	111.3	91.2	20.1	22	96.0	95	PASS	EM	
07/25/06	T-147		EASTERN FLANK	FG-1'-0"	CLAYEY SILT	6"	106.4	82.5	23.9	29	87.0	95	PASS	EM	
07/27/06	T-148		SLOPE AREA WEST TOE	FG	CLAYEY SILT	6"	107.0	89.2	17.8	20	99.0	90	PASS	EM	
07/27/06	T-149		SLOPE AREA WEST TOE	FG	CLAYEY SILT	6"	106.4	89.4	17.0	19	99.0	90	PASS	EM	
07/27/06	T-150		SLOPE AREA WEST TOE	FG-2'	CLAYEY SILT	6"	114.7	91.0	23.7	26	99.0	92	PASS	EM	
07/27/06	T-151		SLOPE AREA WEST TOE	FG-2'	CLAYEY SILT	6"	109.9	86.5	23.4	27	99.0	87	FAIL	EM	
07/28/06	T-152	T-151	SLOPE AREA WEST TOE	FG-2'	CLAYEY SILT	6"	111.8	88.6	23.2	26	99.0	90	PASS	EM	
07/31/06	T-153		SOUTHWEST FLANK	FG-0.5'	CLAYEY SILT	6"	93.0	75.9	17.1	23	87.0	87	FAIL	EM	
07/31/06	T-154		SOUTHWEST FLANK	FG-0.5'	CLAYEY SILT	6"	105.0	85.4	19.6	23	99.0	86	FAIL	EM	
07/31/06	T-155		SOUTHWEST FLANK	FG-0.5'	CLAYEY SILT	6"	110.5	80.2	30.3	38	96.0	84	FAIL	EM	
07/31/06	T-156		SOUTHWEST FLANK	FG-0.5'	CLAYEY SILT	6"	95.2	74.1	21.1	29	87.0	85	FAIL	EM	
08/01/06	T-157	T-153	SOUTHWEST FLANK	FG-0.5'	CLAYEY SILT	6"	117.5	89.8	27.7	31	99.0	91	PASS	EM	
08/01/06	T-158	T-154	SOUTHWEST FLANK	FG-0.5'	CLAYEY SILT	6"	109.7	85.4	24.3	29	94.0	91	PASS	EM	
08/02/06	T-159	T-155	SOUTHWEST FLANK	FG-0.5'	CLAYEY SILT	6"	116.6	92.4	24.2	26	96.0	96	PASS	EM	

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08/02/06	T-160	T-156	SOUTHWEST FLANK	FG-0.5'	CLAYEY SILT	6"	112.7	86.2	26.5	31	87.0	99	PASS	EM	
08/02/06	T-161		SOUTHWEST FLANK	FG-1.0'	CLAYEY SILT	6"	121.8	95.0	26.8	28	99.0	96	PASS	EM	
08/02/06	T-162		SOUTHWEST FLANK	FG-1.0'	CLAYEY SILT	6"	115.5	91.1	24.4	27	99.0	92	PASS	EM	
08/03/06	T-163		LOWER WESTERN FLANK	FG-1.0'	CLAYEY SILT	6"	114.2	89.9	24.3	27	94.0	96	PASS	EM	
08/03/06	T-164		LOWER WESTERN FLANK	FG-1.0'	CLAYEY SILT	6"	115.4	89.3	26.1	29	94.0	95	PASS	EM	
08/04/06	T-165		LOWER WESTERN FLANK	FG-0.5'	CLAYEY SILT	6"	114.6	87.9	26.7	30	94.0	94	PASS	EM	
08/04/06	T-166		LOWER WESTERN FLANK	FG-0.5'	CLAYEY SILT	6"	114.5	88.0	26.5	30	94.0	94	PASS	EM	
08/08/06	T-167		LOWER WESTERN FLANK	FG-0.5'	CLAYEY SILT	6"	108.6	86.2	22.4	26	94.0	92	PASS	EM	
08/09/06	T-168		TOP EASTERN FLANK	FG-0.5'	CLAYEY SILT	6"	109.1	86.0	23.1	27	94.0	91	PASS	EM	
08/10/06	T-169		TOP WESTERN FLANK	FG-0.5'	CLAYEY SILT	6"	110.8	84.5	26.3	31	94.0	90	PASS	EM	
08/10/06	T-170		TOP WESTERN FLANK	FG-0.5'	CLAYEY SILT	6"	107.3	84.2	23.1	27	94.0	90	PASS	EM	
08/10/06	T-171		TOP WESTERN FLANK	FG-0.5'	CLAYEY SILT	6"	112.3	89.1	23.2	26	94.0	95	PASS	EM	
08/16/06	T-172		MIDDLE NORTHWEST	FG-0.5'	CLAYEY SILT	6"	121.7	93.4	28.3	30	98.5	95	PASS	EM	
08/16/06	T-173		MIDDLE NORTHWEST	FG-0.5'	CLAYEY SILT	6"	122.7	95.0	27.7	29	98.5	96	PASS	EM	
08/21/06	T-174		LOWER NORTHWEST	FG-0.5'	CLAYEY SILT	6"	112.7	88.3	24.4	28	98.5	90	PASS	EM	
08/22/06	T-175		LOWER NORTHEAST	FG-0.5'	CLAYEY SILT	6"	108.5	82.4	26.1	32	87.0	95	PASS	EM	
08/23/06	T-176		LOWER NORTHEAST	FG-0.5'	CLAYEY SILT	6"	113.0	85.1	27.9	33	94.0	91	PASS	EM	
08/24/06	T-177		LOWER ENE	FG-0.5'	CLAYEY SILT	6"	112.4	86.5	25.9	30	94.0	92	PASS	EM	
08/25/06	T-178		LOWER ENE	FG-0.5'	CLAYEY SILT	6"	110.7	84.8	25.9	31	94.0	90	PASS	EM	
08/28/06	T-179		MIDDLE EAST	FG-0.5'	CLAYEY SILT	6"	109.2	84.5	24.7	29	94.0	90	PASS	EM	
08/29/06	T-180		LOWER EAST	FG-0.5'	CLAYEY SILT	6"	118.3	88.5	29.8	34	94.0	94	PASS	EM	
08/30/06	T-181		LOWER ESE	FG-0.5'	CLAYEY SILT	6"	104.2	80.2	24.0	30	94.0	85	FAIL	EM	Retested 9/1 (T-182) and passed
09/01/05	T-182	RT - 181	LOWER ESE	FG-0.5'	CLAYEY SILT	6"	110.7	84.8	25.9	31	94.0	90	PASS	EM	
09/05/06	T-183		LOWER SSW	FG-0.5'	CLAYEY SILT	6"	98.5	77.1	21.4	28	87.0	89	FAIL	EM	See T-282 for re-test
09/05/06	T-184		LOWER SOUTH	FG-0.5'	CLAYEY SILT	6"	104.4	83.9	20.5	24	87.0	96	PASS	EM	Failed on moisture - retested @ T-283
09/05/06	T-185		LOWER SSE	FG-0.5'	CLAYEY SILT	6"	96.7	79.1	17.6	22	87.0	91	PASS	EM	Failed on moisture - retested @ T-284
09/06/06	T-186		LOWER NORTH	FG-0.5'	CLAYEY SILT	6"	107.4	81.7	25.7	32	87.0	94	PASS	EM	
09/06/06	T-187		LOWER NORTH	FG-0.5'	CLAYEY SILT	6"	108.3	85.4	22.9	27	94.0	91	PASS	EM	
09/06/06	T-188		LOWER NORTH	FG-0.5'	CLAYEY SILT	6"	106.6	84.3	22.3	26	94.0	90	PASS	EM	
09/07/06	T-189		NEAR LEACHATE MH	FG-0.5'	CLAYEY SILT	6"	109.1	84.9	24.2	29	94.0	90	PASS	EM	
09/07/06	T-190		NEAR LEACHATE MH	FG-0.5'	CLAYEY SILT	6"	108.8	85.3	23.5	28	94.0	91	PASS	EM	
09/11/06	T-191		LOWER WEST CORNER	FG-0.5'	CLAYEY SILT	6"	110.9	82.9	28.0	34	87.0	95	PASS	EM	
09/11/06	T-192		LOWER WEST CORNER	FG-0.5'	CLAYEY SILT	6"	107.8	82.9	24.9	30	87.0	95	PASS	EM	
09/11/06	T-193		LOWER WEST CORNER	FG-0.5'	CLAYEY SILT	6"	119.7	89.1	30.6	34	94.0	95	PASS	EM	
09/12/06	T-194		LOWER RO ESE	FG-1.0'	CLAYEY SILT	6"	111.5	84.5	27.0	32	94.0	90	PASS	EM	
09/12/06	T-195		LOWER RO SSE	FG-1.0'	CLAYEY SILT	6"	114.1	87.5	26.6	30	94.0	93	PASS	EM	
09/12/06	T-196		LOWER RO SE	FG-1.0'	CLAYEY SILT	6"	120.2	92.8	27.4	30	94.0	99	PASS	EM	
09/13/06	T-197		LOWER WEST FLANK	FG-0.5'	CLAYEY SILT	6"	105.0	85.1	19.9	23	94.0	91	FAIL	EM	
09/13/06	T-198		LOWER WEST FLANK	FG-0.5'	CLAYEY SILT	6"	96.1	75.7	20.4	27	94.0	81	FAIL	EM	
09/13/06	T-199		LOWER WEST FLANK	FG-0.5'	CLAYEY SILT	6"	99.7	80.3	19.4	24	94.0	85	FAIL	EM	
09/14/06	T-200		LOWER WSW	FG-0.5'	CLAYEY SILT	6"	125.4	100.7	24.7	25	108.5	93	PASS	EM	
09/14/06	T-201		LOWER WSW	FG-0.5'	CLAYEY SILT	6"	120.8	93.9	26.9	29	102.0	92	PASS	EM	
09/14/06	T-202	T-197	LOWER SW	FG-0.5'	CLAYEY SILT	6"	121.7	95.7	26.0	27	102.0	94	PASS	EM	
09/14/06	T-203	T-198	LOWER WSW	FG-0.5'	CLAYEY SILT	6"	121.0	97.3	23.7	24	108.5	90	PASS	EM	
09/14/06	T-204	T-199	LOWER WEST	FG-0.5'	CLAYEY SILT	6"	122.4	95.4	27.0	28	102.0	94	PASS	EM	
09/14/06	T-205		LOWER WEST	FG-0.5'	CLAYEY SILT	6"	126.6	102.7	23.9	23	108.5	95	PASS	EM	
09/14/06	T-206		LOWER WNW	FG-0.5'	CLAYEY SILT	6"	123.0	95.4	27.6	29	102.0	94	PASS	EM	
09/14/06	T-207		LOWER ???	FG-0.5'	CLAYEY SILT	6"	115.5	87.4	28.1	32	94.0	93	PASS	EM	

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09/14/06	T-208		LOWER WNW	FG-0.5'	CLAYEY SILT	6"	116.4	86.0	30.4	35	94.0	91	PASS	EM	
09/19/06	T-209		TOP MIDDLE	FG-0.5'	CLAYEY SILT	6"	109.7	85.9	23.8	28	94.0	91	PASS	EM	
09/19/06	T-210		LOWER NORTH	FG-0.5'	CLAYEY SILT	6"	109.9	87.2	22.7	26	94.0	93	PASS	EM	
09/19/06	T-211		LOWER NE	FG-0.5'	CLAYEY SILT	6"	115.0	90.4	24.6	27	94.0	96	PASS	EM	
09/19/06	T-212		LOWER ENE	FG-0.5'	CLAYEY SILT	6"	108.4	84.7	23.7	28	94.0	90	PASS	EM	
09/19/06	T-213		LOWER ENE	FG-0.5'	CLAYEY SILT	6"	114.6	90.7	23.9	26	94.0	96	PASS	EM	
09/19/06	T-214		LOWER EAST	FG-0.5'	CLAYEY SILT	6"	110.6	87.1	23.5	27	94.0	93	PASS	EM	
09/19/06	T-215		LOWER EAST	FG-0.5'	CLAYEY SILT	6"	112.6	88.7	23.9	27	94.0	94	PASS	EM	
09/20/06	T-216		LOWER EAST	FG-0.5'	CLAYEY SILT	6"	110.5	87.3	23.2	27	94.0	93	PASS	EM	
09/20/06	T-217		LOWER ESE	FG-0.5'	CLAYEY SILT	6"	110.1	85.5	24.6	29	94.0	91	PASS	EM	
09/20/06	T-218		LOWER ESE	FG-0.5'	CLAYEY SILT	6"	116.9	92.8	24.1	26	94.0	99	PASS	EM	
09/20/06	T-219		LOWER ESE	FG-0.5'	CLAYEY SILT	6"	110.4	85.1	25.3	30	94.0	91	PASS	EM	
09/20/06	T-220		LOWER SE	FG-0.5'	CLAYEY SILT	6"	117.1	91.9	25.2	27	94.0	98	PASS	EM	
09/20/06	T-221		LOWER SE	FG-0.5'	CLAYEY SILT	6"	110.9	84.5	26.4	31	94.0	90	PASS	EM	
09/20/06	T-222		LOWER SOUTH	FG-0.5'	CLAYEY SILT	6"	114.2	89.5	24.7	28	94.0	95	PASS	EM	
09/21/06	T-223		TOP ROAD	FG-1'	CLAYEY SILT	6"	106.5	87.2	19.3	22	94.0	93	PASS	EM	
09/22/06	T-224		AC ROAD EAST H	FSG-1'	CLAYEY SILT	6"	104.8	85.2	19.6	23	94.0	91	PASS	EM	
09/22/06	T-225		AC ROAD EAST M	FSG-1'	CLAYEY SILT	6"	105.6	85.5	20.1	24	94.0	91	PASS	EM	
09/22/06	T-226		AC ROAD EAST L	FSG-1'	CLAYEY SILT	6"	105.9	86.0	19.9	23	94.0	91	PASS	EM	
09/19/06	T-227		ROAD "R"	FG-1'	CLAYEY SILT	6"	97.3	79.6	17.7	22	94.0	85	FAIL	EM	See T-236 for re-test
09/19/06	T-228		ROAD "R"	FG-1'	CLAYEY SILT	6"	102.1	80.7	21.4	27	94.0	86	FAIL	EM	See T-237 for re-test
09/19/06	T-229		ROAD "R"	FG-1'	CLAYEY SILT	6"	107.4	81.0	26.4	33	94.0	86	FAIL	EM	See T-238 for re-test
09/19/06	T-230		LOWER WEST ROAD	FBC'	CLAYEY SILT	6"	148.3	141.9	6.4	5	146.0	97	PASS	EM	
09/20/06	T-231		LOWER WEST ROAD	FBC'	CLAYEY SILT	6"	149.1	144.3	4.8	3	146.0	99	PASS	EM	
09/20/06	T-232		LOWER WEST ROAD	FBC'	CLAYEY SILT	6"	149.6	142.2	7.4	5	146.0	97	PASS	EM	
09/20/06	T-233		LOWER WEST ROAD	FBC'	CLAYEY SILT	6"	145.7	138.2	7.5	5	146.0	95	PASS	EM	
09/20/06	T-234		LOWER WEST ROAD	FBC'	CLAYEY SILT	6"	143.9	140.1	3.8	3	146.0	96	PASS	EM	
09/20/06	T-235		PERIMETER RD 36-100	FBC'	CLAYEY SILT	6"	146.3	141.5	4.8	3	146.0	97	PASS	EM	
09/28/06	T-236	T-227	ROAD "R" - subgrade	FG-14	CLAYEY SILT	6"	114.8	88.0	26.8	30	94.0	94	PASS	EM	
09/28/06	T-237	T-228	ROAD "R" - subgrade	FG-14	CLAYEY SILT	6"	117.2	87.6	29.6	34	94.0	93	PASS	EM	
09/28/06	T-238	T-229	ROAD "R" - subgrade	FG-14	CLAYEY SILT	6"	119.7	88.9	30.8	35	94.0	95	PASS	EM	
11/15/06	T-278		EASTSIDE OF SLOPE	FG	CLAYEY SILT	6"	103.2	80.0	23.2	29	94.0	85	FAIL	JL	See T-280 for re-test
11/15/06	T-279		EASTSIDE OF SLOPE	FG	CLAYEY SILT	6"	101.1	79.0	22.1	28	94.0	84	FAIL	JL	See T-281 for re-test
11/20/06	T-280	T-278	EASTSIDE OF SLOPE - erosions	FG-1	CLAYEY SILT	6"	113.1	89.5	23.6	26	94.0	95	PASS	EM	
11/20/06	T-281	T-279	EASTSIDE OF SLOPE - erosions	FG-1	CLAYEY SILT	6"	109.7	85.4	24.3	28	94.0	91	PASS	EM	
11/21/06	T-282	T-183	LOWER SSW	FG-0.5	CLAYEY SILT	6"	105.5	81.0	24.5	30	87.0	93	PASS	EM	
11/21/06	T-283	T-184	LOWER SOUTH	FG-0.5	CLAYEY SILT	6"	113.4	86.8	26.6	31	87.0	100	PASS	EM	
11/21/06	T-284	T-185	LOWER SSE	FG-0.5	CLAYEY SILT	6"	111.3	84.2	27.1	32	87.0	97	PASS	EM	
11/28/06	T-285		SOUTHWEST DRAINAGE	FG-1	CLAYEY SILT	6"	120.7	95.6	25.1	26	94.0	102	PASS	EM	

CENTRAL MAUI LANDFILL
PHASES I & II FINAL COVER
TABLE 4
ROAD BASE FIELD DENSITY TEST INFORMATION

DATE	TEST NUMBER	RETEST NUMBER	LOCATION & DESCRIPTION	ELEVATION (FT)	SOIL DESCRIPTION	PROBE DEPTH (INCHES)	WET DENSITY (PCF)	DRY DENSITY (PCF)	MOISTURE	MOISTURE (%)	PROCTOR (PCF)	COM-PACTION %	PASS OR FAIL	CQA TECH	COMMENTS
09/22/06	T-239		PERIMETER RD 45+00	FBC +-	Ameron Untreated Base		150.9	143.3	7.6	5.3	146.0	98	PASS	EM	
09/22/06	T-240		PERIMETER RD 48+00	FBC +-	Ameron Untreated Base		149.3	142.6	6.7	4.7	146.0	98	PASS	EM	
09/22/06	T-241		PERIMETER RD 51+00	FBC +-	Ameron Untreated Base		148.0	142.7	5.3	3.7	146.0	98	PASS	EM	
10/18/06	T-242		PERIMETER RD 23+00	FBC +-	Ameron Untreated Base		143.2	138.4	4.8	3.5	146.0	95	PASS	LM	
10/18/06	T-243		PERIMETER RD 26+00	FBC +-	Ameron Untreated Base		143.6	140.1	3.5	2.5	146.0	96	PASS	LM	
10/18/06	T-244		PERIMETER RD 29+00	FBC +-	Ameron Untreated Base		147.0	143.6	3.4	2.4	146.0	98	PASS	LM	
10/18/06	T-245		PERIMTER RD 32+00	FBC +-	Ameron Untreated Base		145.6	142.7	2.9	2.0	146.0	98	PASS	LM	
10/18/06	T-246		PERIMETER RD 39+00	FBC +-	Ameron Untreated Base		143.4	139.5	3.9	2.8	146.0	96	PASS	LM	
10/18/06	T-247		PERIMETER RD 42+00	FBC +-	Ameron Untreated Base		142.5	138.5	4.0	2.9	146.0	95	PASS	LM	
10/18/06	T-248		PERIMETER RD 54+00	FBC +-	Ameron Untreated Base		145.2	141.7	3.5	2.5	146.0	97	PASS	LM	
10/18/06	T-249		PERIMETER RD 57+00	FBC +-	Ameron Untreated Base		143.7	137.9	5.8	4.2	146.0	94	PASS	LM	
10/30/06	T-250		TOP OF SLOPE RD	TOB	Ameron Untreated Base		150.2	143.0	7.2	5.0	146.0	98	PASS	JL	
10/30/06	T-251		TOP OF SLOPE RD	TOB	Ameron Untreated Base		147.7	142.0	5.7	4.0	146.0	97	PASS	JL	
10/30/06	T-252		TOP OF SLOPE RD	TOB	Ameron Untreated Base		150.2	143.0	7.2	5.0	146.0	98	PASS	JL	
10/30/06	T-253		TOP OF SLOPE RD	TOB	Ameron Untreated Base		148.7	139.0	9.7	7.0	146.0	95	PASS	JL	
10/30/06	T-254		TOP OF SLOPE RD	TOB	Ameron Untreated Base		153.4	142.0	11.4	8.0	146.0	97	PASS	JL	
10/30/06	T-255		TOP OF SLOPE RD	TOB	Ameron Untreated Base		150.2	143.0	7.2	5.0	146.0	98	PASS	JL	
10/30/06	T-256		TOP OF SLOPE RD	TOB	Ameron Untreated Base		151.9	142.0	9.9	7.0	146.0	97	PASS	JL	
10/30/06	T-257		TOP OF SLOPE RD	TOB	Ameron Untreated Base		153.4	142.0	11.4	8.0	146.0	97	PASS	JL	
10/30/06	T-258		PERIMETER RD 37+00	TOB	Ameron Untreated Base		-	-	-	7.0	-	-	PASS	JL	Moisture check only
10/30/06	T-259		PERIMETER RD 38+50	TOB	Ameron Untreated Base		-	-	-	8.0	-	-	PASS	JL	"
10/30/06	T-260		PERIMETER RD 40+00	TOB	Ameron Untreated Base		-	-	-	7.0	-	-	PASS	JL	"
10/30/06	T-261		PERIMETER RD 41+50	TOB	Ameron Untreated Base		-	-	-	7.0	-	-	PASS	JL	"
10/30/06	T-262		PERIMETER RD 43+00	TOB	Ameron Untreated Base		-	-	-	8.0	-	-	PASS	JL	"
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10/30/06	T-266		PERIMETER RD 49+00	TOB	Ameron Untreated Base		-	-	-	7.0	-	-	PASS	JL	"
10/30/06	T-267		PERIMETER RD 50+50	TOB	Ameron Untreated Base		-	-	-	8.0	-	-	PASS	JL	"
10/30/06	T-268		PERIMETER RD 52+00	TOB	Ameron Untreated Base		-	-	-	8.0	-	-	PASS	JL	"
10/30/06	T-269		PERIMETER RD 53+50	TOB	Ameron Untreated Base		-	-	-	7.0	-	-	PASS	JL	"
10/30/06	T-270		PERIMETER RD 55+00	TOB	Ameron Untreated Base		-	-	-	5.0	-	-	PASS	JL	"
10/30/06	T-271		PERIMETER RD 56+50	TOB	Ameron Untreated Base		-	-	-	7.0	-	-	PASS	JL	"
10/30/06	T-272		PERIMETER RD 58+00	TOB	Ameron Untreated Base		-	-	-	8.0	-	-	PASS	JL	"
10/31/06	T-273		TOP OF SLOPE RD	TOB	Ameron Untreated Base		151.9	142.0	9.9	7.0	146.0	97	PASS	JL	
10/31/06	T-274		TOP OF SLOPE RD	TOB	Ameron Untreated Base		146.0	139.0	7.0	5.0	146.0	95	PASS	JL	
10/31/06	T-275		TOP OF SLOPE RD	TOB	Ameron Untreated Base		149.8	142.0	7.8	5.5	146.0	97	PASS	JL	
10/31/06	T-276		ROAD "R"	TOB	Ameron Untreated Base		153.2	143.0	10.2	7.1	146.0	98	PASS	JL	
10/31/06	T-277		ROAD "R"	TOB	Ameron Untreated Base		147.6	139.0	8.6	6.2	146.0	95	PASS	JL	

CENTRAL MAUI LANDFILL
TABLE 5
PHASES I & II FINAL COVER

SUMMARY OF MONOLITHIC FINAL COVER
IN-SITU HYDRAULIC CONDUCTIVITY (BAT) TEST RESULTS

SAMPLE/TEST DESIGNATION	LOCATION	HYDRAULIC CONDUCTIVITY (cm/sec)
BAT-1	Mid Slope Bench, South	5.23×10^{-8}
BAT-2	Northeast Slope	1.07×10^{-8}
BAT-3	Northeast Slope	1.07×10^{-8}
BAT-4	Top Deck	2.07×10^{-8}

APPENDIX A
Photos

Photo 1 Excavation of leachate collection/drainage pipe to permit installation of new leachate collection and removal manhole riser.

Photo 2 Steel-reinforced concrete foundation slab and 18-inch diameter perforated HDPE vertical inlet pipe with geotextile filter fabric wrapping. Note existing leachate drain pipe in foreground.

Photo 3 Placement of drainage rock backfill around 18-inch HDPE vertical inlet pipe.

Photo 4 Installation of reinforcement steel and construction of concrete form in preparation to pour concrete foundation slab for the 24-inch diameter concrete manhole riser.

Photo 5 Foundation slab with forms removed. Worker preparing concrete manhole riser pipe for receipt of next segment of pipe.

Photo 6 Excavation around newly installed 24-inch diameter concrete manhole riser pipe and foundation backfilled with compacted refuse.

Photo 7 Relocating and regarding waste and interim cover soils to create drainage bench/road prior to placement of MFC soils.

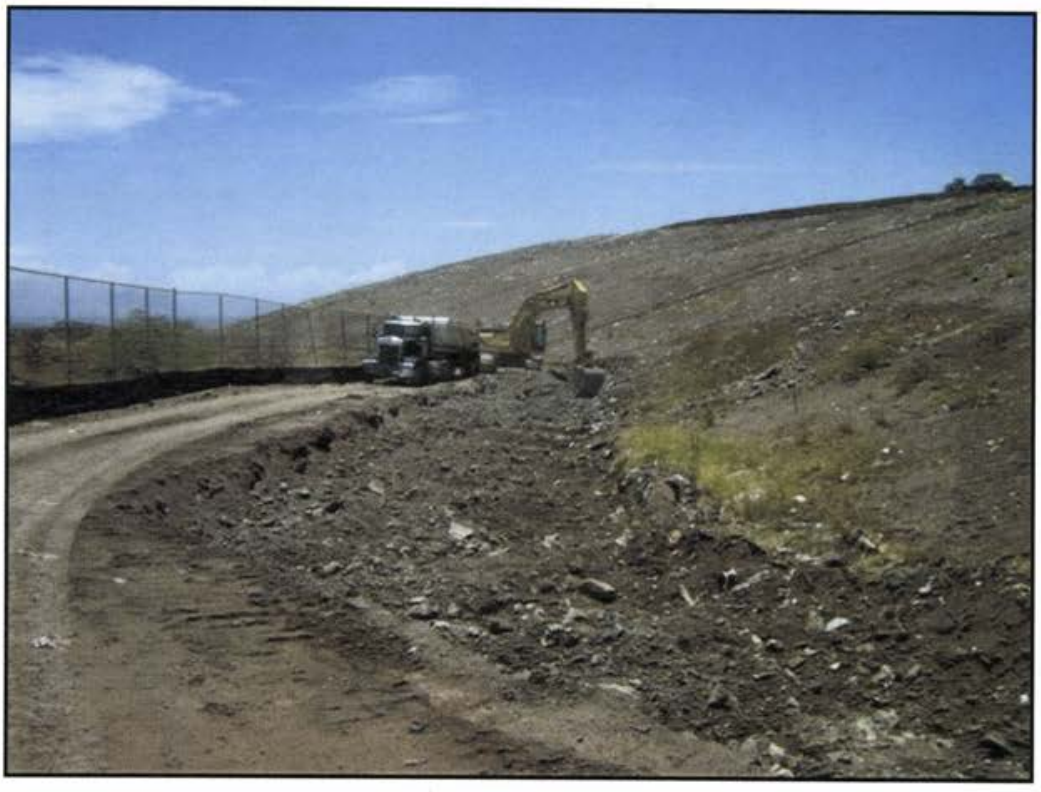


Photo 8 Excavating waste and interim cover soils to accommodate MCF soils and concrete trapezoidal drainage channel along perimeter road.

Photo 9 Relocating and regrading waste and interim cover soils to create drainage bench/road prior to placement of imported MFC soils.

Photo 10 Grading and compacting of imported MFC soils.

Photo 11 Graded and compacted MFC soils placed over perimeter road.

Photo 12 MFC soils placed, compacted, and rough graded on road from top of landfill to east side perimeter road

Photo 13 Placement and grading of MFC soils on upper portion of west slope.

Photo 14 Grading and compaction of MFC soils on the top deck of the landfill

Photo 15 CQA monitor conducting field density and moisture content measurement on the compacted MFC soil using the Nuclear Gauge method (ASTM D2922).

Photo 16 Completed MFC on top deck of landfill awaiting placement of soil-compost layer.

Photo 17 Completed MFC on top deck of landfill awaiting placement of soil-compost layer. Note aggregate base placed and compacted in preparation for asphalt concrete pavement.

Photo 18 Surveying location of test pit for verification of Monolithic Final Cover (MFC) thickness.

Photo 19 Measuring thickness of Monolithic Final Cover (MFC) at test pit location.

Photo 20 Surveying location of completed test pit for verification of Monolithic Final Cover (MFC).

Photo 21 Completed MFC on upper portion of west slope.

Photo 22 Completed concrete trapezoidal drainage channel along paved perimeter road.

Photo 23 Installation of asphalt paved V-ditch along aggregate base surfaced landfill road. Note substantial vegetative establishment on the landfill cover.

Photo 24 Inlet to overside drain from mid-slope bench asphalt V-Ditch

Photo 25 Overside drain HDPE pipe discharges to east perimeter drainage road

Photo 26 East perimeter drainage road with curbs and reconstructed fence

Photo 27 Collection point mid-slope bench and top deck drainage

Photo 28 Collection point for perimeter channels and top deck drainage

Photo 29 Main drainage discharge to stilling basin

Photo 30 Drainage from stilling basin to main sedimentation basin

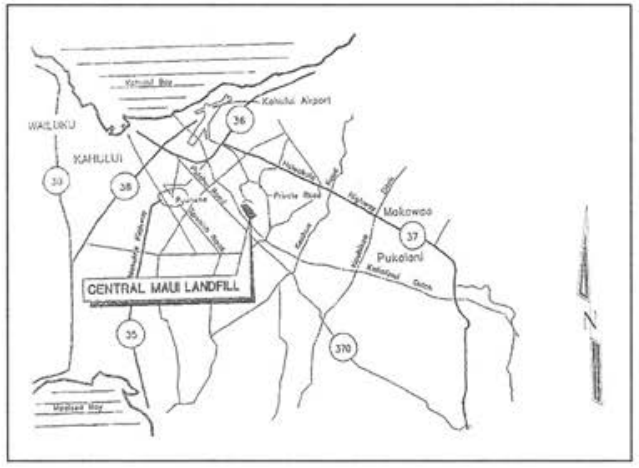
APPENDIX B.1

DRAWINGS

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements

As-Built

Sheet Number	Sheet Title
1	General Notes and Abbreviations
2	Key Plan & Existing Topography
3	Overall Site Grading & Drainage Plan
4	Horizontal Control, Grading & Drainage Plan
5	Horizontal Control, Grading & Drainage Plan
6	Horizontal Control, Grading & Drainage Plan
7	℄ Road Profile (Station 10+00 thru 35+00)
8	℄ Road Profile (Station 35+00 thru 62+48.89)
9	Detail A
10	Details
11	Details
12	Details
13	Details
14	Basin Improvements
15	Basin Details



Vicinity Map

Prepared by:

A-Mehr, Inc.
23016 Mill Creek Drive
Laguna Hills, CA 92653
(949) 206-0157

5/24/07

This work was prepared by me
or under my supervision

Project Engineer

Ali Mehrazarin, PE

M. Ali Mehrazarin 5/24/07
date

Owner:

County of Maui
Department of Public Works

Wailuku, Hawaii 96703

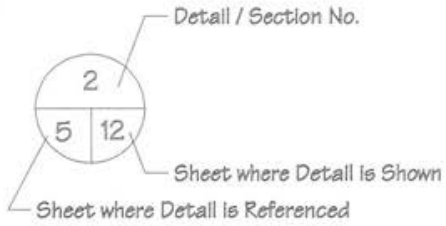
ABREVIATIONS:

AC	ASPHALTIC CONCRETE
AB	AGGREGATE BASE
BVC	BEGIN VERTICAL CURVE
℄	CENTERLINE
CONC	CONCRETE
DET	DETAIL
DIA	DIAMETER
E	EASTING / EAST
EL/Elev	ELEVATION
EXIST	EXISTING
EVC	END VERTICAL CURVE
FG	FINISHED GRADE
FS	FINISHED SURFACE
GB	GRADE BREAK
HDOT	HAWAII DEPARTMENT OF TRANSPORTATION
HORIZ	HORIZONTAL
INV.	INVERT
L	LENGTH
MFC	MONOLITHIC FINAL COVER
Min	MINIMUM
MO	MIDDLE ORDINATE
N	NORTHING / NORTH
PC	POINT OF CURVATURE
POVC	POINT ON VERTICAL CURVE
PI	POINT OF INTERSECTION
PRVC	POINT OF REVERSE VERTICAL CURVE
PT	POINT OF TANGENCY
PVI	POINT OF VERTICAL INTERSECTION
R	RADIUS
RD	ROAD
S	SOUTH / SLOPE
SECT	SECTION
STA	STATION
T	TANGENT LENGTH
TYP	TYPICAL
VC	LENGTH OF VERTICAL CURVE
VERT	VERTICAL
W	WEST
WWF	WELDED WIRE FABRIC

General Notes:

1. Contractor's health and safety program shall include a designated Landfill Gas Safety Monitor as provided in the Project Specifications, Section 01400.
2. Asphalt paved drainage channels and roads shall be constructed according to HDOT Standard Specifications, Section 703 (Aggregate Base) and Section 401 (Asphalt Concrete Pavement).
3. Aggregate base shall conform to HDOT Section 703.17 (1 ½ inch maximum) and aggregate in asphalt concrete shall conform to HDOT Section 703.09 for mix No. III.
4. Subgrades shall be compacted to 90% relative compaction as determined by ASTM D1557. Aggregate base shall be compacted to 95% relative compaction. Subgrade and aggregate base shall be finished by rolling with a smooth drum roller.
5. Corrugated HDPE drainage pipe shall conform to AASHTO Designation M294 Type S smooth interior wall corrugated polyethylene pipe, or as approved by Engineer. Corrugated steel drainage pipe shall conform to HDOT Standard Specifications Section 702.02.
6. Concrete shall be normal weight concrete with a 28-day compressive strength of 3,000 psi.

Detail Convention:



A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
General Notes and Abbreviations

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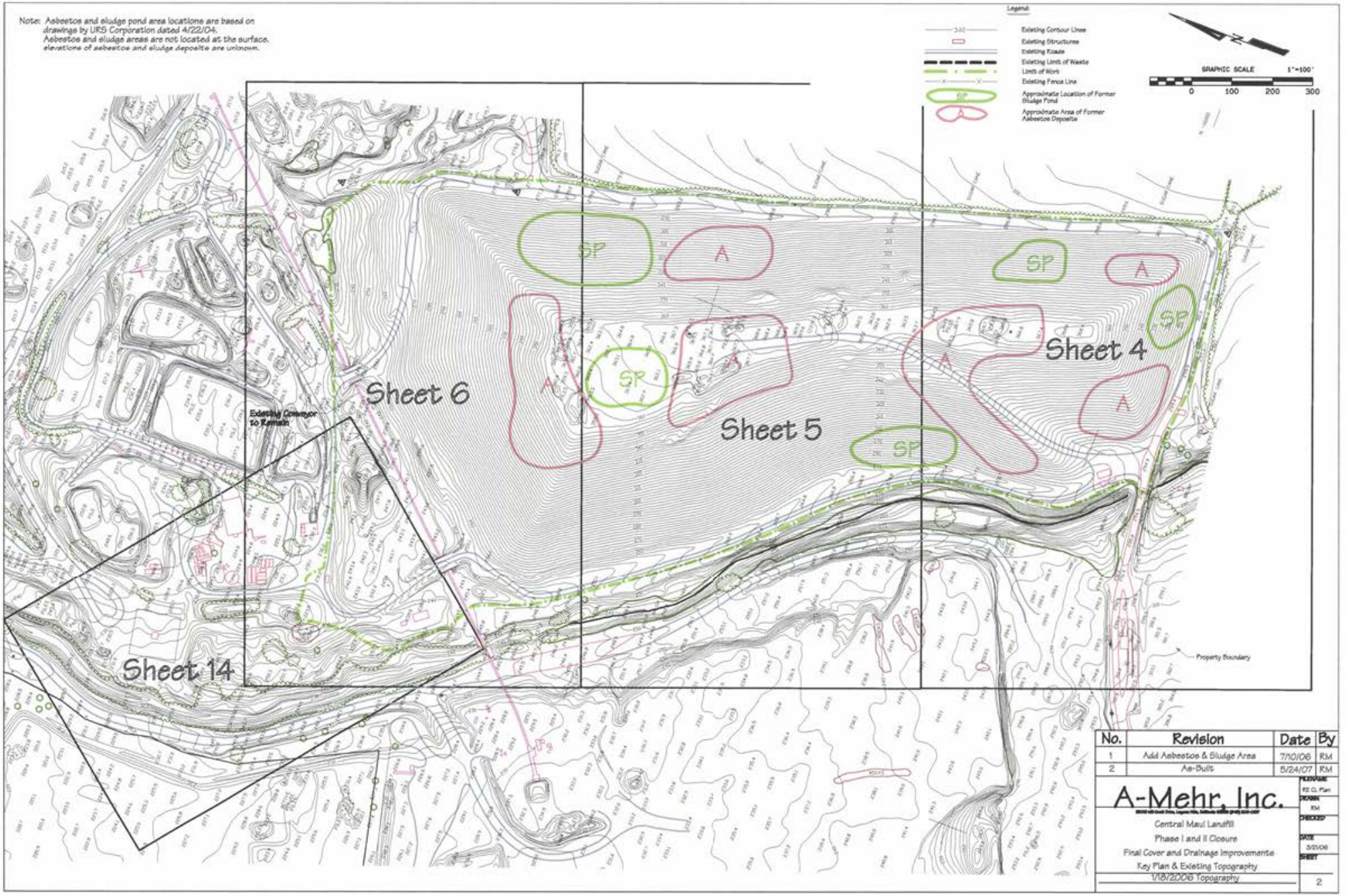
SHEET: 1

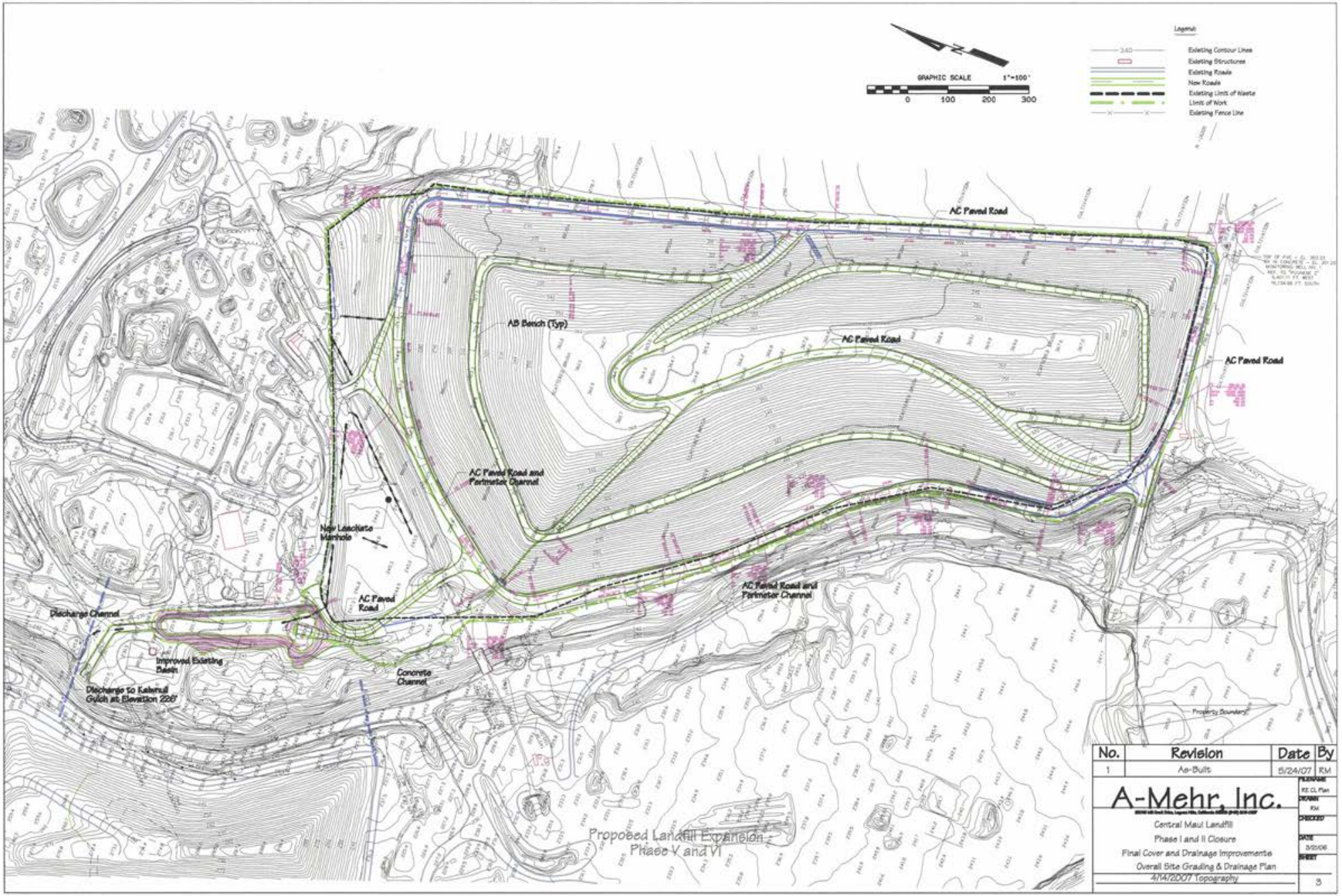


No.	Revision	Date	By
1	Add Asbestos & Sludge Area	7/10/06	RM
2	As-Built	5/24/07	RM

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Key Plan & Existing Topography
1/18/2006 Topography

FILENAME	RE CL Plan
DRAWN	RM
CHECKED	
DATE	3/21/06
SHEET	2



No.	Revision	Date	By
1	As-Built	5/24/07	RM

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Overall Site Grading & Drainage Plan
4/14/2007 Topography

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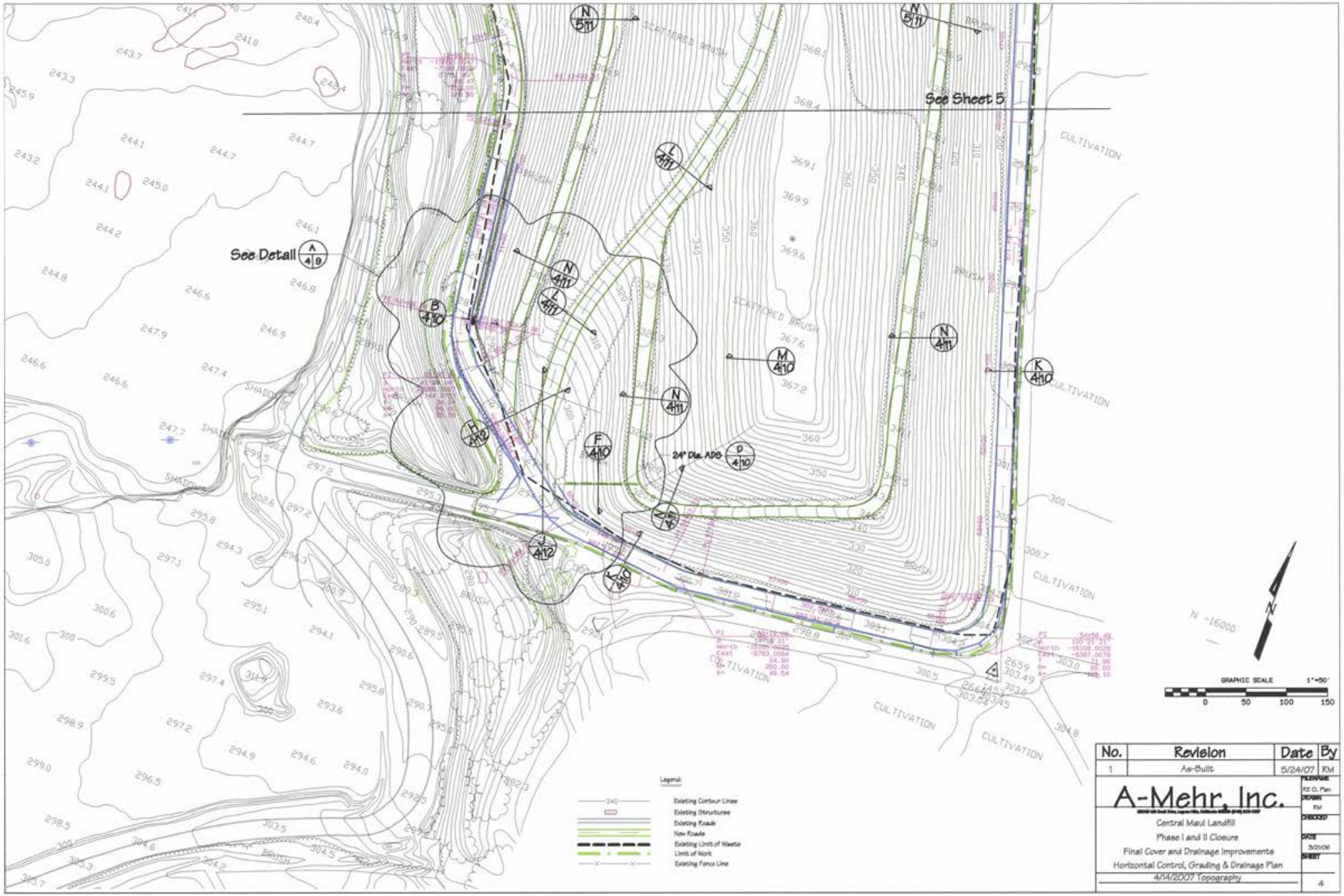
DRAWN: RM
CHECKED:
DATE: 3/23/06
SHEET: 3



No.	Revision	Date	By
1	As-Built	5/24/07	RM

A-Mehr, Inc.

Central Maul Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Horizontal Control, Grading & Drainage Plan
4/14/2007 Topography

FILENAME: FZ CL Plan
DRAWN: KM
CHECKED:
DATE: 5/23/08
SHEET: 4

No.	Revision	Date	By
1	As-Built	5/24/07	RM

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Horizontal Control, Grading & Drainage Plan
4/14/2007 Topography

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DRAWN: RM
CHECKED:
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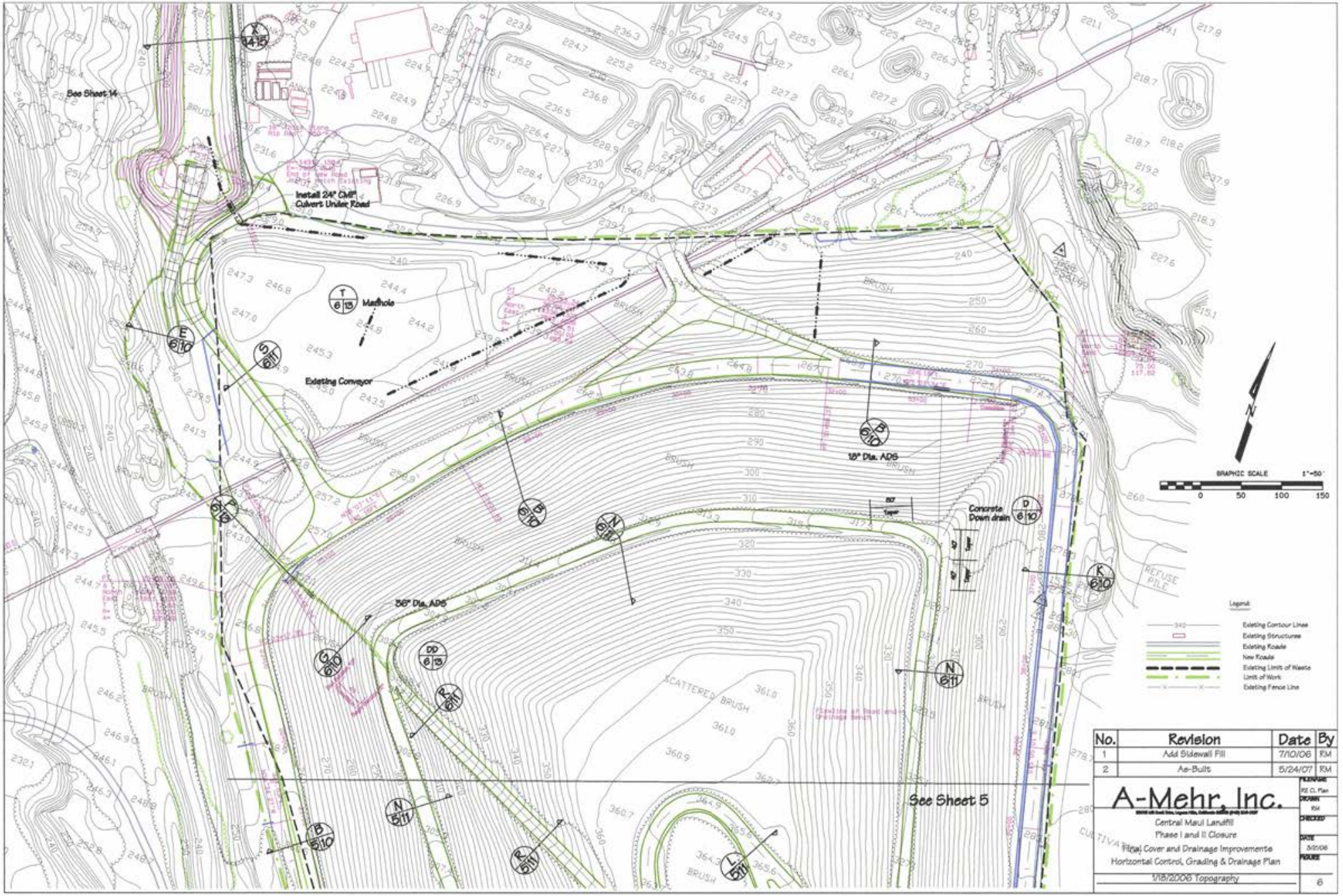
SHEET: 5



No.	Revision	Date	By
1	Add Sidewall Fill	7/10/06	RM
2	As-Built	5/24/07	RM

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Horizontal Control, Grading & Drainage Plan
1/18/2006 Topography

FILENAME	PZ CL Plan
DRAWN	RM
CHECKED	
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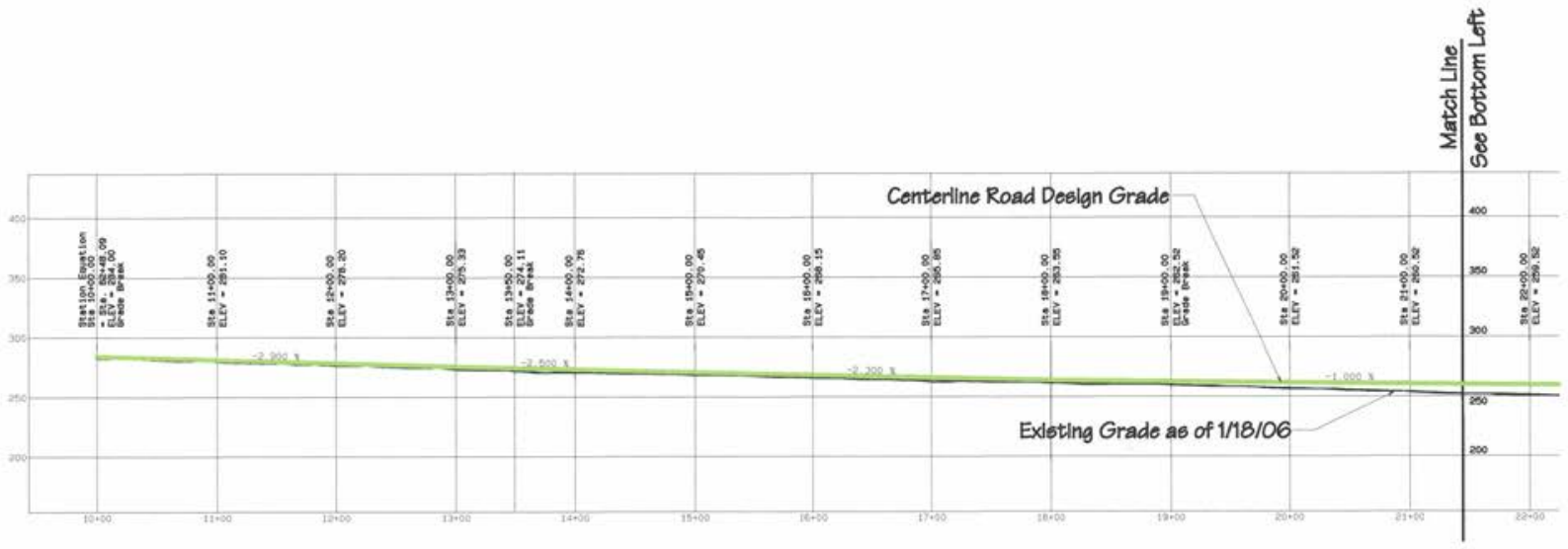
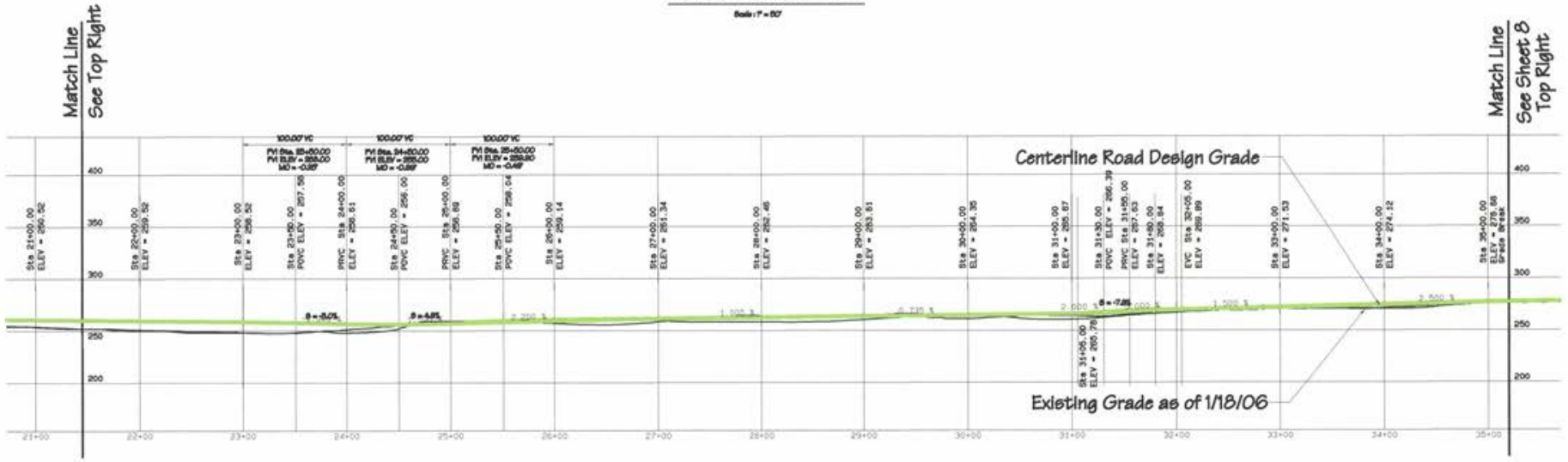
FIGURE	6



Centerline Road Profile

Scale: 1" = 50'



Centerline Road Profile

Scale: 1" = 50'

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Ç Road and Drainage Profile

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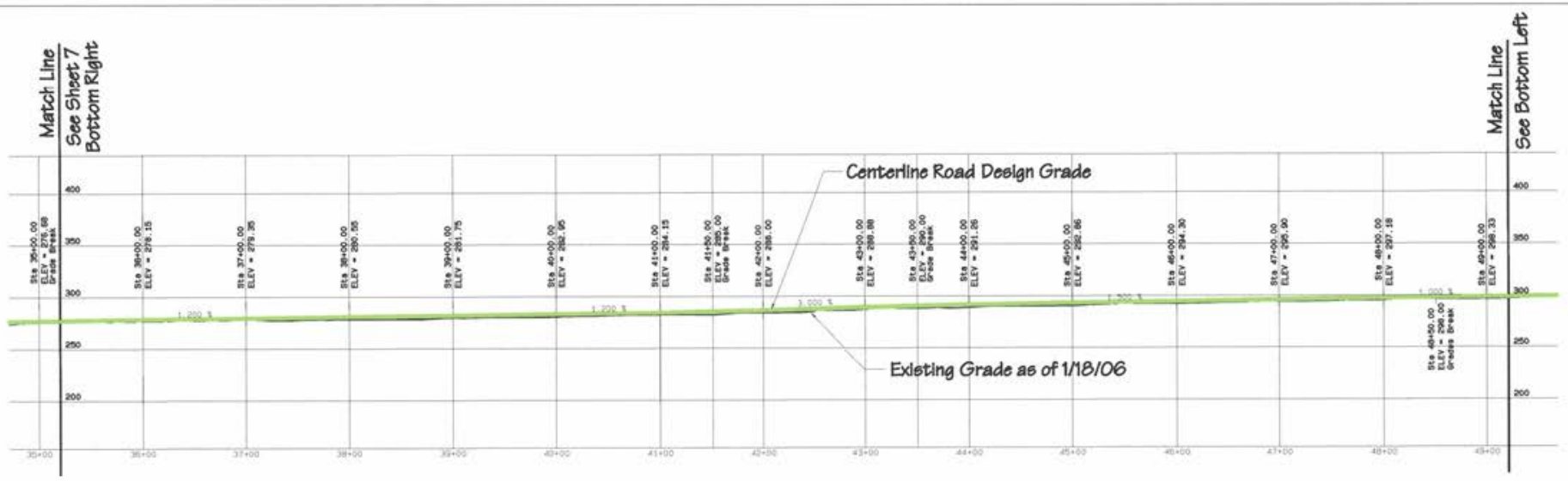
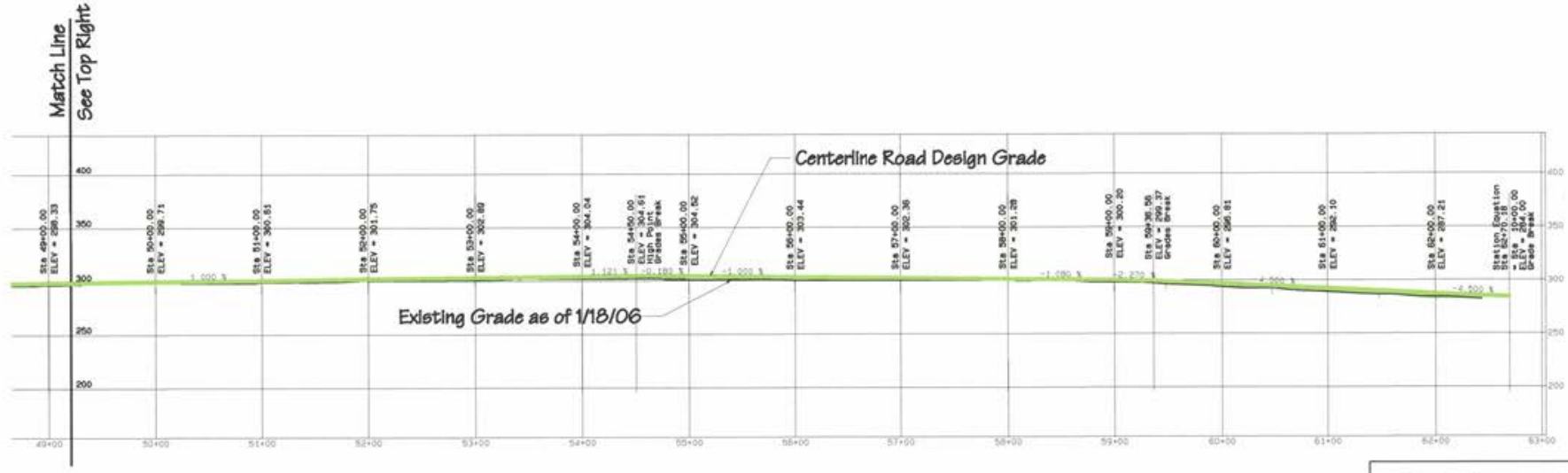
CHECKED	
DATE	5/21/06
Sheet	7



Centerline Road Profile

Scale: 1" = 50'



Centerline Road Profile

Scale: 1" = 50'

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Road and Drainage Profile

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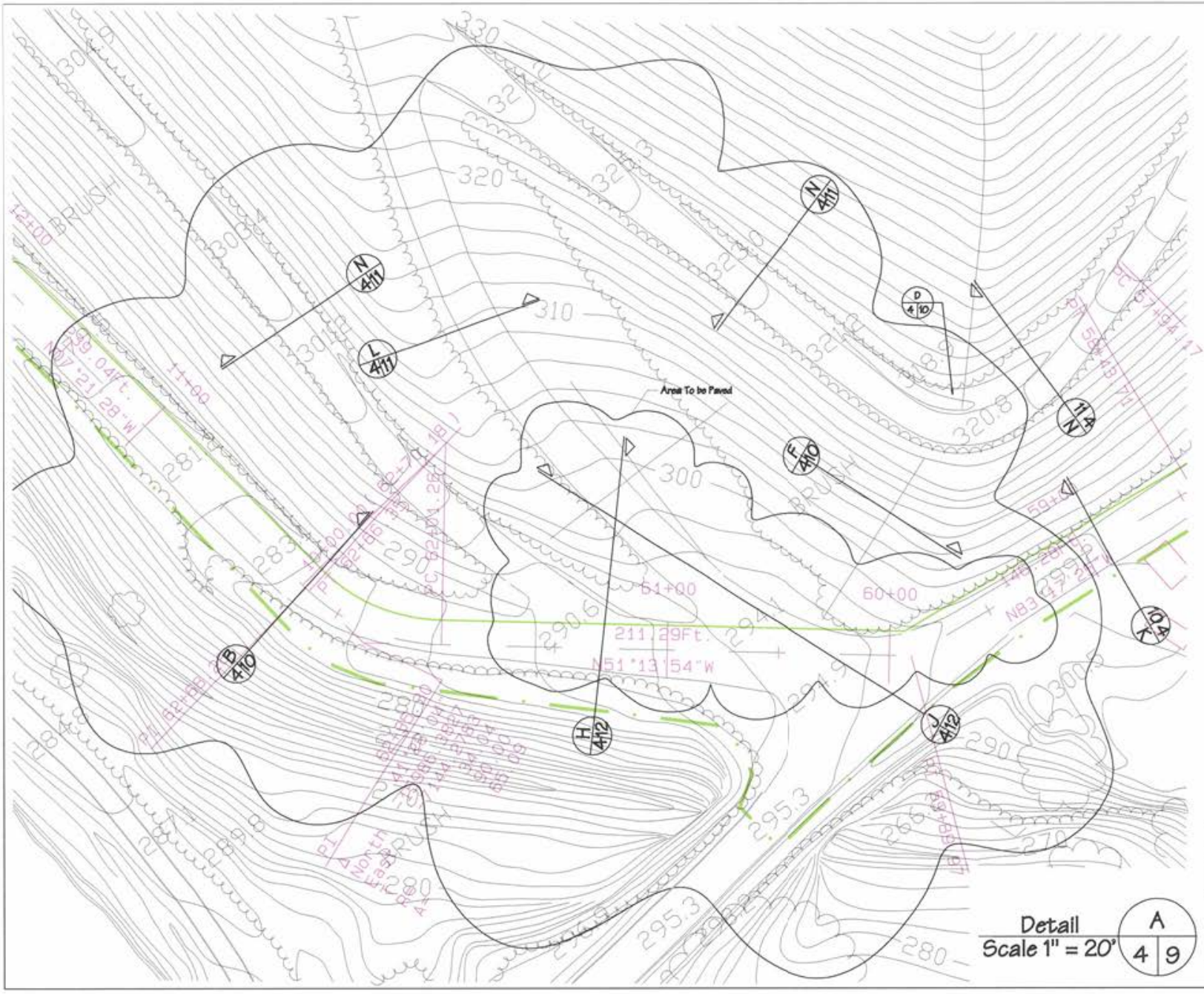

Detail
Scale 1" = 20'

A
4 | 9

No.	Revision	Date	By
1	As-Built	5/24/07	KM

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Detail A
4/14/2007 Topography

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CHECKED:
DATE: 3/21/08
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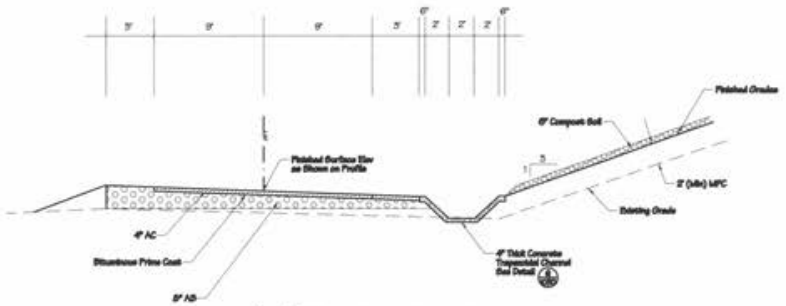

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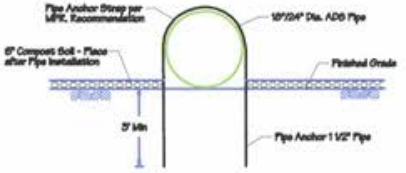

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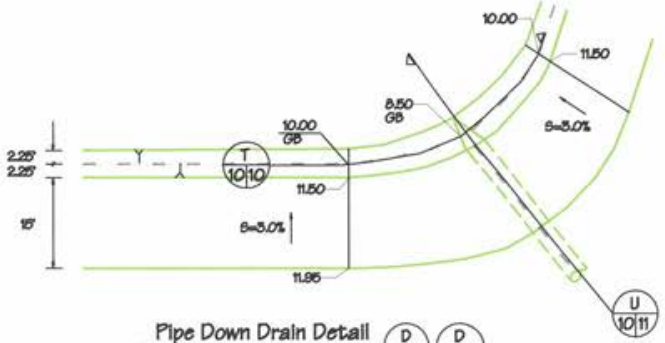
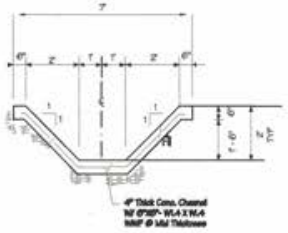


Pipe Down Drain Detail D 4|10 D 5|10



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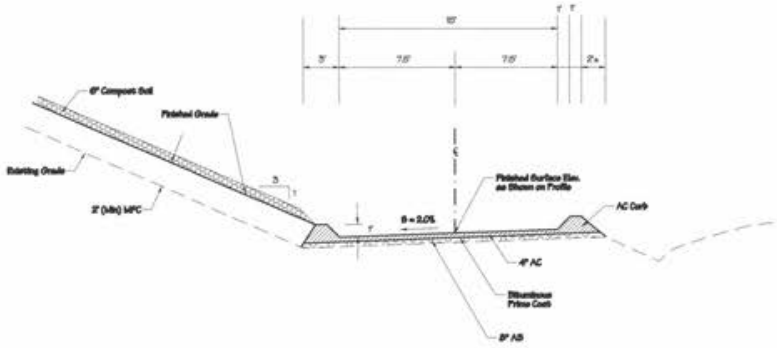

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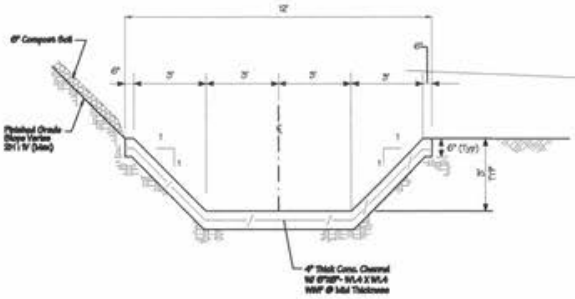

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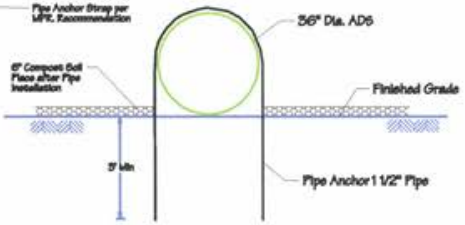

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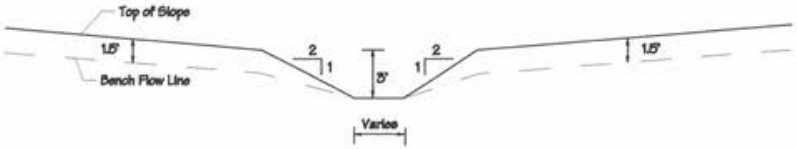

Section T 10|10

No.	Revision	Date	By
1	As-Built	5/24/07	KM

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Details

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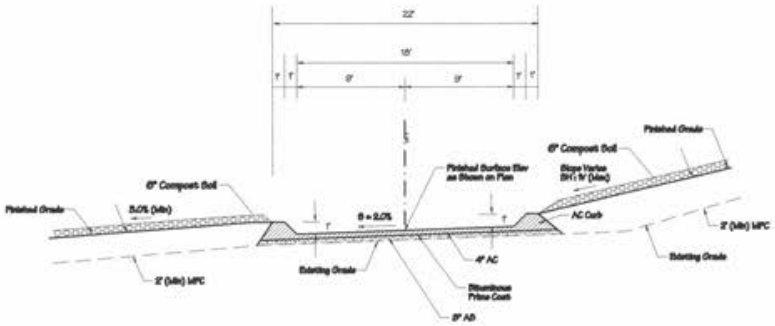
DRAWN: KM
CHECKED:
DATE: 3/21/06
SHEET: 10



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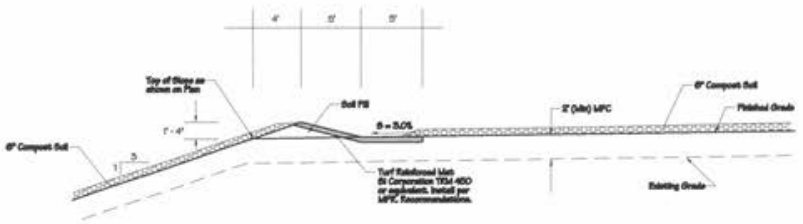

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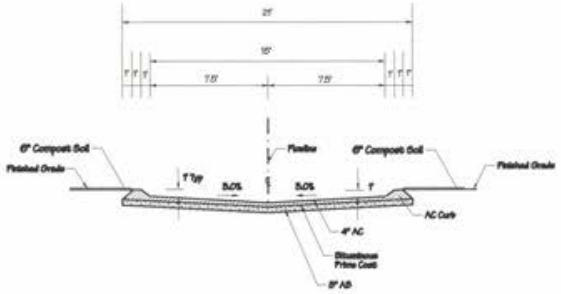

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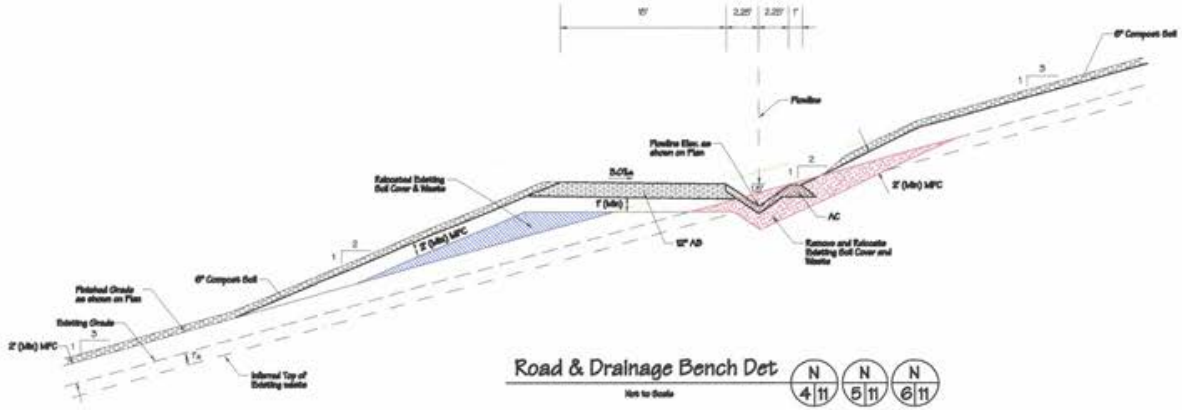

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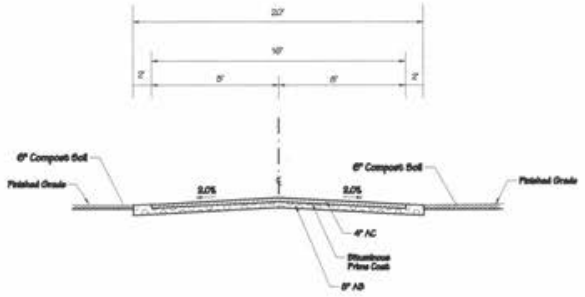

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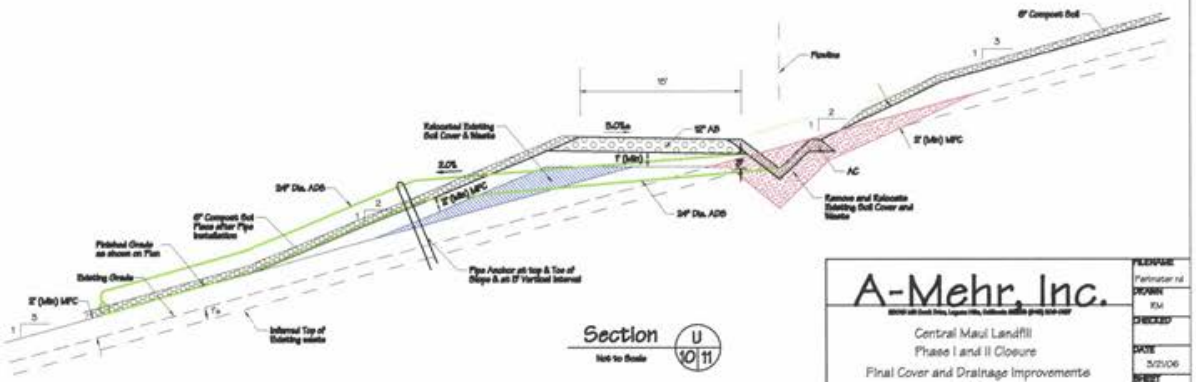

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A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Details

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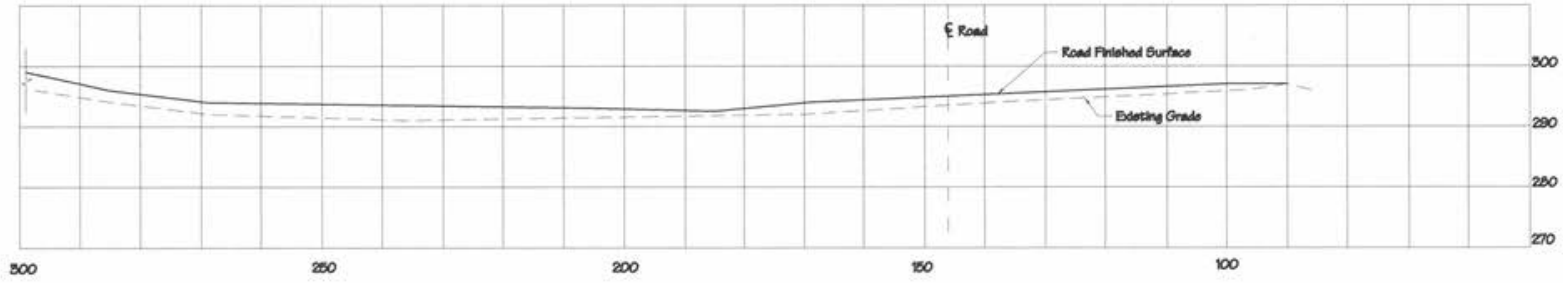
CHECKED	
DATE	5/21/08
SHEET	11



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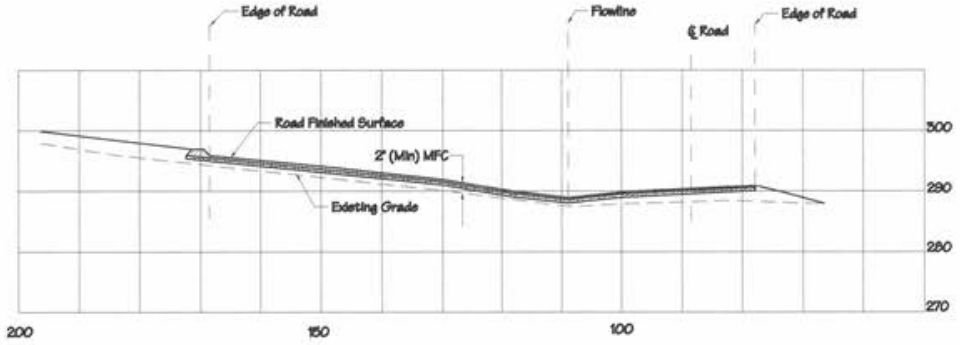

Section H
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A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Details

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DATE	3/21/06
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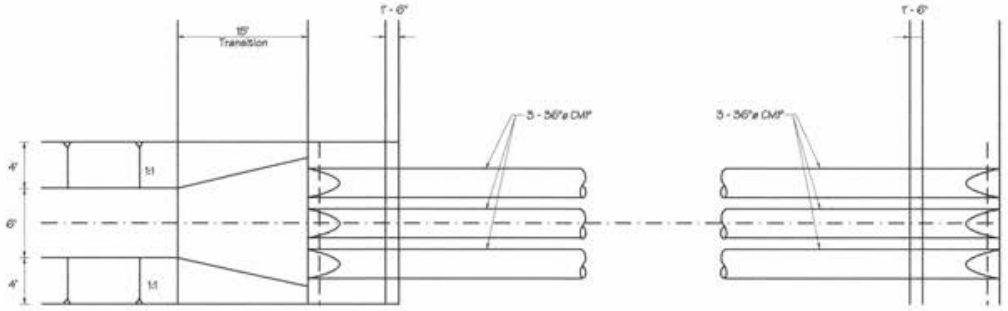

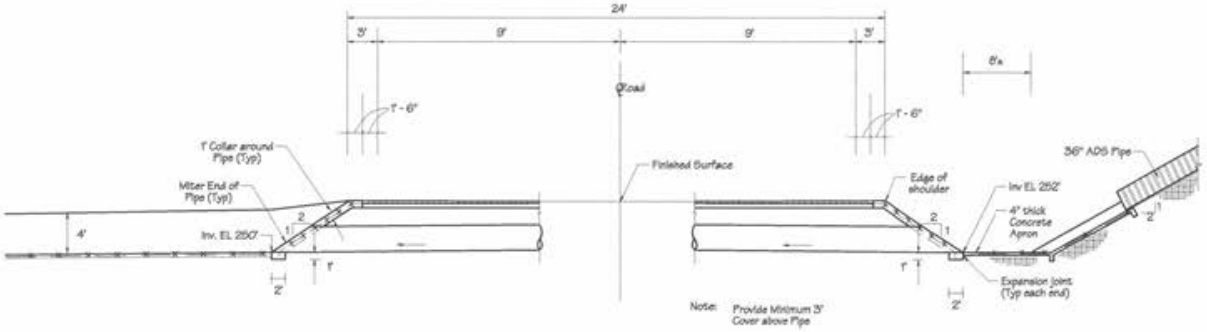

P 6|13 Road Crossing Detail
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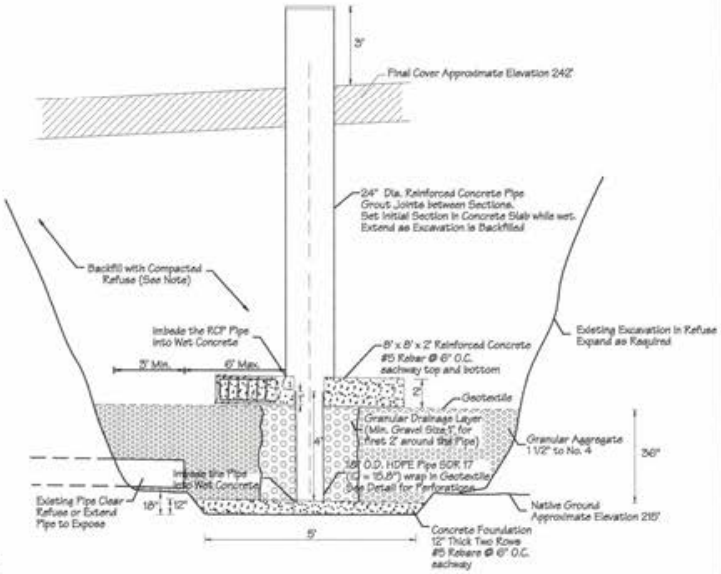
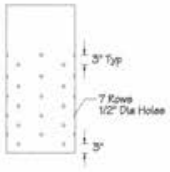


T 6|13 New Manhole #4
(Not to Scale)



HDPE Pipe Perforation
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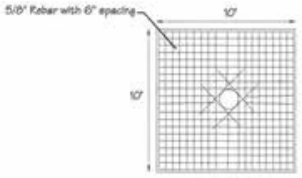
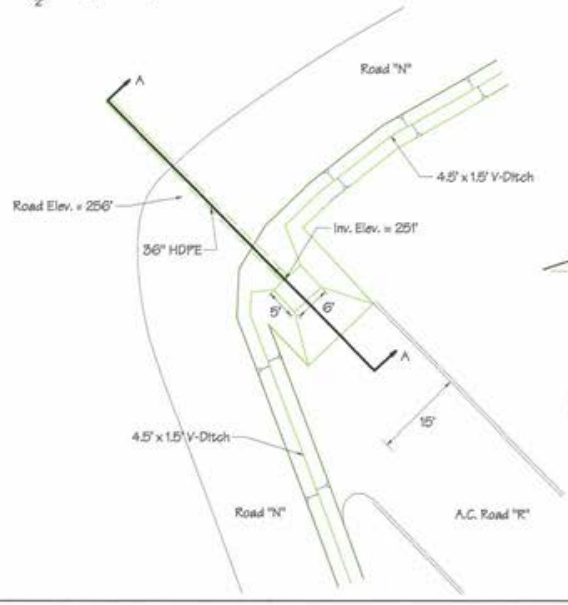
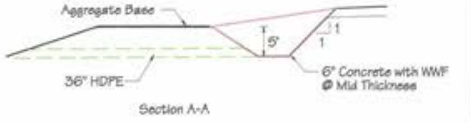


REBAR DETAIL

Note: Backfill Excavation with Alternative 1ft Thick Layers of Refuse and Soil Compact each Soil Layer using Vibratory Compactor.





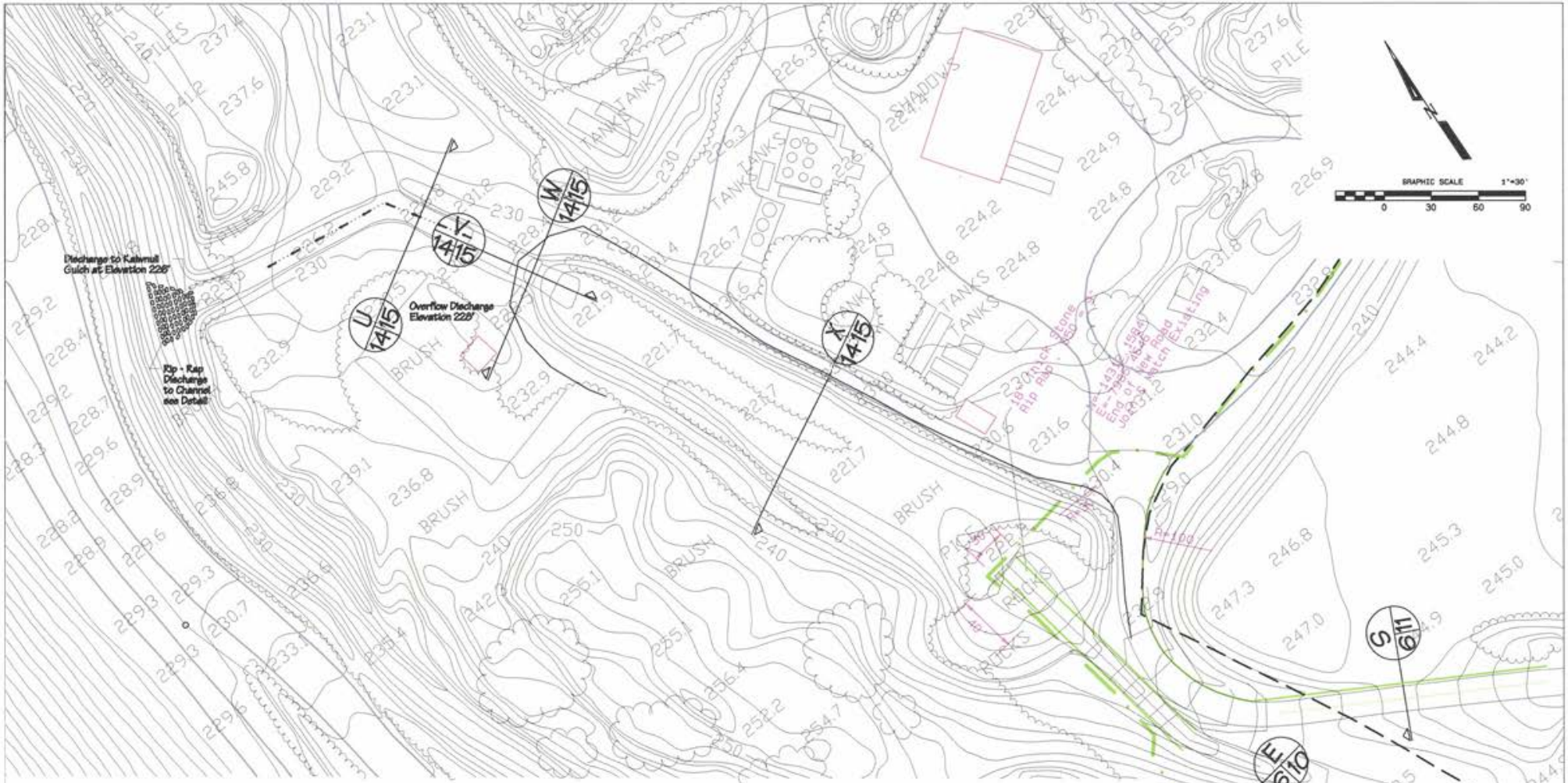
Section A-A

DD 6|13 Catch Basin At Road Crossing
(Not to Scale)

A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Details

FILENAME	Perimeter.rd
DRAWN	KM
CHECKED	
DATE	3/21/08
SHEET	13



Note:

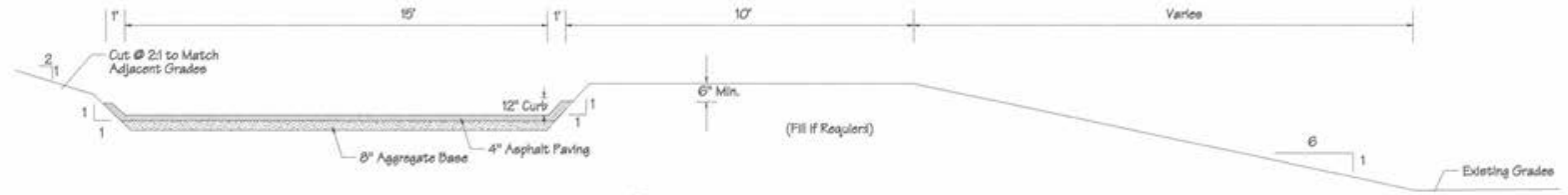
1. Rip - Rap shall have Median Diameter 9"
2. Grub Vegetation from Area to reinstall Rip-Rap
3. Excavate Approx. 12" from Streambed Bottom
4. Place Rock in Channel Bottom and Slope
5. Grout in Place with Concrete. Pave Final 4' of Channel with Concrete.

No.	Revision	Date	By
1	As-Built	5/24/07	RM

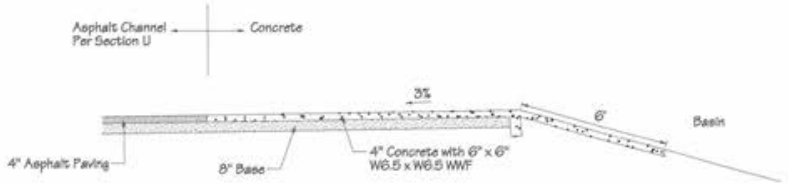
A-Mehr, Inc.

Central Maui Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Basin Improvements
4/14/2007 Topography

FILENAME	Fentmeter.rvt
DRAWN	RM
CHECKED	
DATE	8/01/06
FIGURE	14

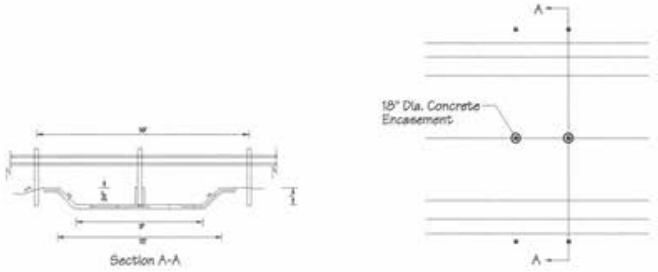


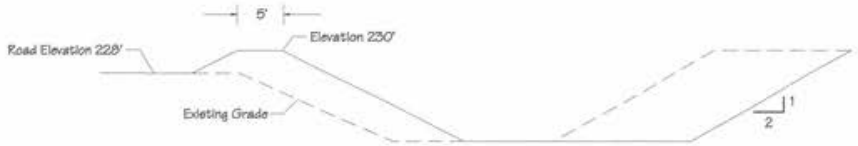
U 14|15 Basin Outfall Channel
(Not to Scale)



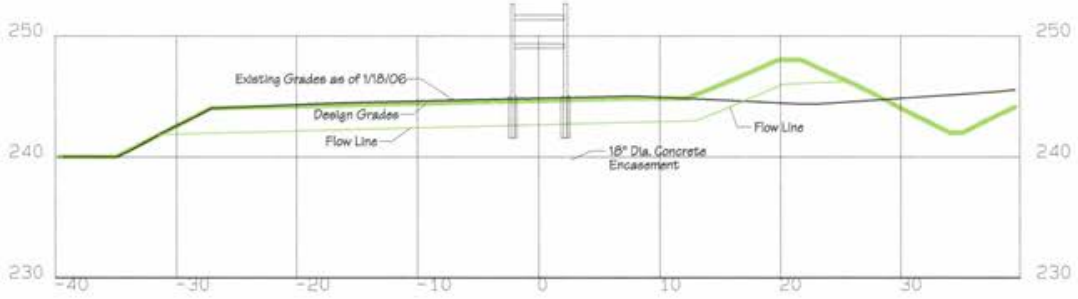
V 14|15 Overflow Structure
(Not to Scale)

W 14|15 Overflow Structure
(Not to Scale)





X 14|15 Basin Reconstruction (Typical)
(Not to Scale)



Drainage Channel Under Conveyor

A-Mehr, Inc.

Central Maul Landfill
Phase I and II Closure
Final Cover and Drainage Improvements
Basin Details

FILENAME Perimeter.rd
DRAWN KM
CHECKED
DATE 3/21/06
SHEET 15

APPENDIX B.2

SPECIFICATIONS AND CQA PLAN

TECHNICAL SPECIFICATIONS & CONSTRUCTION QUALITY ASSURANCE PLAN

FOR

CENTRAL MAUI LANDFILL PHASES I & II CLOSURE FINAL COVER AND DRAINAGE IMPROVEMENTS

Prepared for

COUNTY OF MAUI
Department of Public Works and Environmental Management
Solid Waste Division
1 Main Plaza
220 Main Street, Suite 225
Wailuku, Hawaii 96793

Prepared by

A-MEHR, INC
23016 Mill Creek Drive
Laguna Hills, CA 92653

October 2005

TECHNICAL SPECIFICATIONS & CQA PLAN

CLOSURE CAP AND DRAINAGE IMPROVEMENTS
CENTRAL MAUI LANDFILL PHASES I AND II

TABLE OF CONTENTS

ADMINISTRATIVE SECTIONS 1010-1090
OMITTED FOR BREVITY

SECTION 1100
MOBILIZATION

1100.01 Description.

Mobilization includes preparatory work and operations necessary for the :

(1) movement of personnel, equipment, and supplies to the project site;
(2) acquisition of falsework materials;
(3) establishment of offices, buildings and other facilities excluding field office and project site laboratories, necessary for work on the project; and
(4) costs incurred on operations that must be performed before starting work on the various items on the project site.
(5) Performance and payment bond premiums for contract work excluding force account items, allowances, and extra work amount.

1100.02 Applicability.

The maximum bid allowed for this item is an amount not to exceed 10% of the sum of all items excluding the bid price of this item, microcomputer system, field office and project site laboratories, allowances, cellular phone, furnishing drilled shaft drilling equipment, vehicles, and force account items.

The Engineer will reduce the indicated amount to the allowable maximum if the proposal shows an amount over the allowable maximum. The Engineer will adjust the "Sum Of Contract Items" to reflect such reduction. The Engineer will use the "Sum Of Contract Items" adjusted as if the bidder submitted its proposal in the amounts as reduced and adjusted.

1100.03 Method of Measurement.

Mobilization will be paid on a lump sum basis. Measurement for payment will not apply.

1100.04 Basis of Payment.

The Engineer will pay for the accepted mobilization on a contract lump sum basis. Payment will be full compensation for the work prescribed in this section and the contract documents.

The Engineer will pay for the following pay item when included in the proposal schedule:

Pay Item	Pay Unit
Mobilization (Not to exceed 10% of the sum of all items excluding the bid price of this item, microcomputer system, field office and project site laboratories, allowances, cellular phone, furnishing drilled shaft drilling equipment, vehicles, and force account items)	Lump Sum

The Engineer will make partial payments as follows:

(1) Pay 10% of the amount bid for mobilization when earning 1% of the original contract amount.

(2) Pay 50% of the amount bid for mobilization when earning 2.5% of the original contract amount.

(3) Pay 75% of the amount bid for mobilization when earning 5% of the original contract amount.

(4) Pay 100% of the amount bid for mobilization when earning 10% of the original contract amount.

If the Notice to Proceed is not issued by the time specified in Section 1080.02 – Notice to Proceed (NTP), at no fault of the Contractor, the Contractor may submit paid invoices for the performance and payment bond premiums to the Engineer for full reimbursement under this item. The Engineer will make payment to the Contractor, even if it is before the Notice to Proceed date.

Payment for the performance and payment bonds shall be considered part of the mobilization paid to date and shall be deducted from the 'partial payments' in this section."

**** END OF SECTION 1100 ****

SECTION 1200
FIELD ENGINEERING

PART I GENERAL

(A) Each stage of construction will be surveyed and staked by Contractor in accordance with the Project Drawings.

(B) Contractor will be responsible for protecting survey control and reference points. Contractor shall pay for the costs of an independent surveyor to replace any stakes or control points damaged or removed as a result of the Contractor's activities.

**** END OF SECTION 1200 ****

SECTION 1300
CONSTRUCTION QUALITY CONTROL AND QUALITY ASSURANCE

PART I GENERAL

1300.01 Parties

The parties described below are associated with the ownership, design, supply, manufacture, transportation, installation, and quality assurance of the Work. The definitions, responsibilities, qualifications, and submittals of these parties are outlined in the following subsections.

(A) Project Manager

The Project Manager is the official representative of the Owner, defined as the individual who coordinates construction and quality assurance activities for the project. The Project Manager is responsible for coordination of all construction quality assurance activities, including communications coordination and resolution of all quality assurance issues that arise during construction.

(B) Engineer

The Engineer is the individual and/or firm who prepares the design, including project plans and specifications for the Work. The Engineer is responsible for approving all design and specification changes and making design clarifications necessitated during construction of the Work.

(C) Manufacturer

The Manufacturer is the firm which produces any of the materials or products used in the Work. Each Manufacturer is responsible for the production of its product. In addition, each Manufacturer is responsible for the condition of the product until the material is accepted by the Project Manager upon delivery. Each Manufacturer shall produce a consistent product that meets the project specifications. Each Manufacturer shall provide quality control documentation for its product as required in these Specifications.

(D) Contractor

The Contractor is the firm which performs the site preparation and construction of the final cover and drainage facilities. The Earthwork Superintendent is the individual responsible for the Contractor's field crew. The Earthwork Superintendent may represent the Contractor at all site meetings and acts as the Contractor's spokesman on the project.

The Contractor is responsible for constructing the Work in conformance to the project plan and specifications. The Contractor is responsible for supplying and/or transporting the required earth and granular materials, concrete, piping, and other work, as outlined in the project specifications.

(F) Quality Assurance Consultant

The Quality Assurance Consultant (QAC) is the firm which observes and documents activities related to the quality assurance of the Work on behalf of the Owner.

The term Quality Assurance Engineer (QAE) refers to the engineer employed by the QAC who is personally in charge of the quality assurance work. The personnel of the QAC also include Quality Assurance Monitors (QA Monitors) who are located at the site for construction observation and documentation.

The QAC is responsible for observing and documenting activities related to the quality assurance of the Work. The QAC is responsible for the implementation of the project QAP prepared by the Project Manager. The QAC is also responsible for issuing a final Quality Assurance Report, sealed by a qualified Professional Engineer. Other duties of the QAC shall include overseeing the soil laboratory testing.

The specific duties of the QAC personnel are as follows:

1. The QAE:
   a. Reviews all project plans and specifications.
   b. Reviews other site-specific documentation.
   c. Develops site-specific addenda for quality assurance of soil components with the assistance of the Project Manager as necessary.
   d. Administers the soil portions of the QAP, including assigning and managing all soil quality assurance personnel, reviews all field reports, and provides engineering review of all quality assurance related issues.
   e. Familiarizes himself with all applicable changes to project plans and specifications as issued by the Designer.
   f. Acts as on-site (resident) representative of the QAC.
   g. Familiarizes all QA Monitors with the site and the project QAP.
   h. Assigns QA Monitors to observe and document all activities requiring monitoring.
   i. Attends all quality assurance related meetings, including resolution, pre-construction, daily, weekly meetings.
   j. Reviews the calibration certification of the on-site soil testing equipment.
   k. Manages the preparation of the record drawings.
   l. Reviews the QA Monitors' daily reports, logs, and photographs.

m. Notes any on-site activities that could result in damage to the installed soil components.
n. Reports to the Project Manager, and logs in the daily report, any relevant observations reported by the QA Monitors.
o. Prepares his own daily report.
p. Prepares a daily summary of the soil component quantities estimates installed each day of construction activity.
q. Prepares a weekly summary of soil quality assurance activities at the end of each week of the construction activity.
r. Oversees marking, packaging and shipping of all laboratory test samples.
s. Reviews the results of laboratory testing and makes appropriate recommendations.
t. Recommends the approval of the final soils acceptance to the Project Manager.
u. Designates a QA Monitor to represent the QAE whenever he is absent from the site while operations are ongoing.
v. Reports any unapproved deviations from the QAP to the Project Manager.
w. Maintains field files of all logs and reports.
x. Maintains qualifications of all personnel and calibration of equipment.
y. Prepares the final Quality Assurance Report.

2. The QA Monitor:
   a. Monitors, logs, photographs and/or documents all soil component installation operations. Photographs shall be taken routinely and in critical areas of the installation sequence. These duties shall be assigned by the QAE.
   b. Monitors and documents the following operations for all soil components:
      (1) Material delivery
      (2) Unloading and on-site transport and storage
      (3) Sampling and conformance testing
      (4) Deployment operations
      (5) Condition of the soil components as placed
      (6) Visual observation, by walkover, of the finished soil components
      (7) Sampling and field testing of the finished soil components
      (8) Repair operations, if and when necessary
   c. Conducts soil sampling and testing.
   d. Documents any on-site activities that could result in damage to the constructed soil components. Any problems noted shall be reported as soon as possible to the QAE.

Any differences of the QAC's interpretation of the project plans and specifications from the Contractor's interpretation shall be properly and adequately assessed by the QAC through discussion with the Contractor. If such assessment indicates any actual or suspected work deficiencies, the QAC shall inform the Contractor of these deficiency issues.

(G) Soil Quality Assurance Laboratory

The Soil Quality Assurance Laboratory (QAL) is the firm which conducts tests on soil samples taken from the site. The QAL is responsible for conducting the appropriate laboratory tests as directed by the QAE. The test procedures shall be done in accordance with the test methods outlined in these specifications.

1300.02 Communications

Communications shall be facilitated by the following meetings.

Pre-Construction Meeting

A pre-construction meeting shall be held at the site prior to beginning of the Work. The meeting shall be attended by the Project Manager, Designer, Contractor, QAE, surveyor, and the Owner's technical representative. Specific topics considered for this pre-construction meeting include review of the project QAP for any problems or additions. The responsibilities of each party should also be reviewed and understood clearly. The meeting shall be documented by a person designated at the beginning of the meeting, and minutes shall be transmitted to all parties.

Progress Meetings

Progress meetings shall be held weekly, or as directed by the Project Manager, between the QAE, Contractor's/Installer's Superintendent, Project Manager and any other concerned parties. This meeting shall discuss current progress, planned activities for the next week, issues requiring resolution, and any new business or revisions to the work. The QAE shall log any problems, decisions, or questions arising at this meeting in his weekly report. If any matter remains unresolved at the end of this meeting, the Project Manager shall be responsible for the resolution of the matter and the communication of the decision to the appropriate parties. The Project Manager may require daily progress meetings at his discretion.

**** END OF SECTION 1300 ****

SECTION 1400
HEALTH AND SAFETY

PART 1 GENERAL

1400.01 References

The Contractor shall be familiar with the Safety Guidelines as prepared by the Solid Waste Association of North America (SWANA) National Landfill Gas Committee in December 1983. Copies may be obtained by writing to SWANA,8750 Georgia Avenue, Suite 140, silver Spring, Maryland 20910, telephone number (301) 585-2898.

1400.02 Quality Assurance

Nothing in this Section shall preclude the Contractor from complying with any more stringent requirements of applicable Federal, State, County, Owner and Industry Standards, rules and regulations.

1400.03 Hazardous Site Conditions

The Contractor is advised that the construction of the is project is being performed over and adjacent to buried wastes and refuse. As these buried material decompose anaerobically, they will generate landfill gas (LFG), which normally consists of carbon dioxide (CO2), methane (CH4), and occasionally hydrogen sulfide and other gases, depending on the composition of the buried materials. These gases usually vent to the atmosphere through the cover soil, but may migrate laterally over 1,000 feet to adjacent areas depending on site and weather conditions.

The following landfill and LFG related information is included to assist the Contractor in developing his Safety Program, and is not intended to encompass all steps that may be necessary to protect the workers or to comply with applicable regulations. A copy of the Safety program shall be submitted tot he Owner and to the Engineer for approval seven (7) days prior to beginning construction.

1. Landfill gases usually vent to the atmosphere through the cover soils, but may migrate laterally to adjacent areas depending on site and weather conditions.
2. Landfill have the potential to create hazardous conditions if working conditions are not controlled or recognized. Some of the hazards are:

    a. Fires may start spontaneously from exposed and/or decomposing refuse.
    b. Fires and explosions may occur from the presence of methane gas.

c. Landfill gases may cause an oxygen deficiency in underground trenches, vaults, conduits, and structures.
d. Hydrogen sulfide, a highly toxic and flammable gas, or other toxic gas may be present.
e. Possible caving of trenches and excavations when working over or in refuse fills.
f. Splash hazard associated with landfill leachate and LFG condensate.

1400.04 Safety Monitor

A. The Contractor shall provide a person who will be designated as the LFG Safety Monitor. The Safety Monitor shall be thoroughly trained in rescue procedures, and in the use of safety equipment and gas detectors. He/she shall be present at all times during working hours whenever open trenches or excavations are greater than 2 feet in depth, when refuse is exposed, or when LFG is likely to be present.

B. The Safety Monitor shall have appropriate instruments (detectors) to test for oxygen deficiency and for the presence of methane and hydrogen sulfide gas. A personal gas monitor (such as Lumidor Safety Products PGM13, Gas Tech GX-82, Model 1641, or similar unit(s) shall be available for this purpose. The Safety Monitor shall periodically calibrate the instruments and regularly test the excavation areas and other work space for safe working conditions and ensure the appropriate safety equipment is available at the site.

C. The Safety Monitor shall have the delegated authority to order workers on the project site to comply with the LFG safety requirements. Failure to comply with orders of the Safety Monitor shall be cause for removal of a worker from the project.

1400.05 Safety Program

A. Supplemental to the Contractor's regular safety program, the Contractor shall develop and institute a Site Safely Plan to inform all workers and site visitors of the potential for the presence of methane and other landfill gases, and the importance of safety precautions to ensure the safety of workers and the public. The Contractor shall also instruct all workers and maintain strict control of construction activities to protect and maintain the integrity of the work features as they are installed.

1400.06 Safety Precautions

A. Contractor shall carry a current OSHA trench permit for all trenching and excavation activities greater than five (5) feet in depth.

B. In addition to conforming to the safety rules and regulations of governmental authorities having jurisdiction, the Contractor shall take the following precautionary measures:

1. Periodically during construction, the work space should be monitored for concentrations of methane, oxygen and hydrogen sulfide. Workers shall not be permitted to enter a workspace where there is an oxygen deficiency or a combustible mixture of gases without appropriate protection. Positive fan-forced ventilation to dilute gas mixtures and avoid oxygen deficiency should be provided when work is necessary in any workspace.

2. Smoking shall be prohibited at all times.

3. In the event toxic gases are present at concentrations hazardous to the workers or the general public, the Contractor shall immediately evacuate all persons from the area until the area is determined safe by the Safely Monitor.

4. Soil shall be stockpiled for fire fighting purposes adjacent to the work space in areas of exposed refuse.

5. The use of explosives or firearms shall not be permitted on the site.

6. If refuse is exposed during construction activities, it shall be covered as soon as possible after exposure with at least a 6-inch layer of soil. In no event shall the refuse remain exposed overnight, unless otherwise approved by the Owner/Engineer and/or the local health authorities.

7. If refuse is excavated during construction activities, it shall be disposed of at the Landfill, as directed by the Owner/Engineer. Refuse may be temporarily stockpiled if covered with a 6-inch layer of soil, provided local health authorities approve. Refuse stockpiles shall be removed from the work site before the end of work each day.

8. Arrangements for waste disposal must be coordinated with the Landfill. The cost of hauling and transporting refuse to the working face shall be considered as included in the contract price for the pay item under which the refuse is excavated or generated.

9. No welding shall be permitted in trenches, enclosed areas, or over refuse, unless performed in areas of the site tested and approved by thee Safety Monitor.

10. Combustion engine powered construction equipment used in excavating activities and/or refuse removal operations shall be equipped with vertical exhaust and spark arrestors.

11. Electric motors and controls utilized in excavation areas and in below-ground work spaces shall be explosion-proof.

12. As construction progresses, all pipe openings and valves shall be closed as soon as installed, to prevent the migration of gases through the pipeline systems.

C. If not already included in the standard safety practices, the Contractor shall include Occupational Health and Safety Act (OSHA) training (19 CFR 1910) and the following measures in his safety program:

1. For all excavations and trenches, the Contractor shall comply with OSHA regulation 29 CFR 1926, Subpart P, for trench safety.

2. Inhalation of landfill gases shall be avoided. Such gases or oxygen-deficient air may cause nausea and dizziness, which could lead to accidents. Work upwind of any excavation in refuse where possible, unless the excavation is constantly monitored and declared safe.

3. Workers should avoid contact with exposed refuse, condensate, or leachate. Irritants or hazardous materials may be present.

4. No excavation or drilled hole greater than two feet deep shall be left unattended or left open at any time unless it is securely covered in a safe manner acceptable to the regulatory agency having jurisdiction.

5. Fire extinguishers with a rating of at least A, B, and C shall be available at all times on the site.

6. Startup and shutdown of equipment shall be avoided in areas of exposed refuse.

7. Personnel, when in an open excavation or in the presence of landfill gas, shall be fully clothed with non-sparking cloth, wear shoes with non-metallic soles, and wear a hard hat and safety goggles or glasses. The excavation shall be monitored continuously in a manner satisfactory to the Safety Monitor for the presence of methane, hydrogen and oxygen for the duration that personnel are in an excavation. Workers should immediately vacate an excavation if methane, hydrogen sulfide, or oxygen deficiency is

detected therein, and shall not be permitted to re-enter the excavation until the Safety Monitor has verified that satisfactory precautionary measures for a safe work environment are implemented and that hazardous concentrations of gases are not present.

8. Assembly of construction work shall be performed outside of trenches or excavations. Prefabricated items shall be lowered into excavations. Only final connections may be made within trenches with the necessary precautions stated.

**** END OF SECTION 1400 ****

SECTION 1500
PROJECT RECORD DOCUMENTS

1500.01 Maintenance of Record Documents

A. Contractor shall maintain at the job site one copy of the following Contract Documents for record purposes:

1. Contract Drawings
2. Specifications
3. Addenda
4. Change Orders
5. Owner/Engineer's Field Orders
6. Reviewed Shop Drawings
7. Clarifications or Explanatory Drawings and Specifications
8. Inspection Reports
9. Field Test Records

B. Record documents shall be stored in the field office or other approved location, apart from documents used in the field for construction.

C. Record documents shall not be used for construction purposes.

D. Documents shall be made available at all times for inspection by the Owner / Engineer and their authorized representatives.

1500.02 Record Drawings

A. Project Drawings

1. Contractor shall maintain "as-built" or Record Drawings of all work and subcontracts, continuously as the job progresses. A separate set of prints, for this purpose only, shall be kept at the job site at all times.

2. These drawings shall be kept up-to-date and may be reviewed and approved by the Owner/Engineer prior to approval of monthly progress payments.

3. All deviations from the drawings, exact locations of permanent property markers or monuments, all utilities and services, mechanical and electrical lines, details and other work shall be finally incorporated on the Record Drawings.

4. During the course of construction, actual locations to scale shall be identified on the Record Drawings for all runs of mechanical and electrical work, including all site utilities and services, installed underground, in walls, or otherwise concealed. Deviations from the Contract Drawings shall be shown in detail. All main runs, whether piping, conduit, ductwork, or drain lines shall be located by dimension and elevation.

5. No work shall be permanently concealed until the required information has been recorded.

6. Where the Owner/Engineer's Drawings are not of sufficient size, scale or detail, contractor shall furnish his own drawings for incorporation of details and dimensions.

7. The final set of Record Drawings shall be signed and dated by the Contractor and shall include sufficient record survey data, signed and sealed by a registered land surveyor in the State of California, to sufficiently locate all major fittings and pipe lengths, and shall be delivered to the Owner/Engineer prior to the Owner's acceptance of the Project.

B. Addenda and Change Orders

1. Changes to the Contract Drawings effected by Addenda, Change Orders or Owner/Engineer's Field Orders shall be identified by number and effective date.

2. When revised drawings are issued as the basis of or along with addenda, these revised drawings shall be incorporated into the Record Drawings with appropriate annotation.

C. Shop Drawings

1. One complete set of shop drawings, including manufacturers' printed catalog cuts and data, shall be collected and maintained for record purposes.

1500.03 Record Specifications

A. Project Specifications

1. Information, changes and notes shall be recorded in the specifications in blank areas, such as page margins or the back of opposite pages, or on

separate sheets incorporated into the specifications book. All such information, changes and notes shall be recorded in red.

2. In each section, in an appropriate location, record the manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.

3. The record specifications book shall be complete and shall include all documents and forms listed under Bidding Requirements, Contract Forms, and Terms and Conditions.

4. The record specifications book shall be delivered to the Owner/Engineer prior to the Owner's acceptance of the project.

B. Addenda, Change Orders, and Field Orders

1. All Addenda, Change Orders and Owner/Engineer's Field Orders shall be incorporated into the front of the specifications book in reverse chronological order.

2. In addition, the changes to the specifications effected by Addenda, Change Order of Field Order shall be annotated on the affected page or pages of the specifications, or adjacent thereto.

1500.04 Submittal

A. At completion of the project, and before submitting invoice for final payment, Contractor shall deliver record documents to Owner/Engineer.

B. For project drawings, submit four (4) sets of blueline or blackline prints.

C. Submittal of record drawings shall be accompanied by a transmittal letter containing the following information:

1. Date of submittal.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each record document. Shop drawings may be grouped in basic categories or divisions of work.
5. Certification that each document as submitted is complete and accurate.
6. Signature of Contractor or authorized representative.

**** END OF SECTION 1500 ****

SECTION 1600
DUST CONTROL

PART I - GENERAL

A. This work shall consist of applying water for the alleviation or prevention of dust nuisance. Dust resulting from the Contractor's performance of the work, either inside or outside the work area, shall be controlled by the Contractor. Contractor will not be prevented from applying water for his convenience if he so desires.

B. Contractor shall provide water from an off-site water source as provided in the Special Conditions to the Contract for Construction.

**** END OF SECTION 1600 ****

SECTION 2200
EXCAVATION

PART I - GENERAL

A. Work shall consist primarily of excavating and removing soil and rock as shown on the drawings. Excavation includes removal of existing soil from areas to receive Monolithic Final Cover.

PART II - PRODUCTS (Not used.)

PART III - EXECUTION

A. Identify required lines, levels, contours, and datum.

B. Locate, identify, and protect utilities, groundwater monitoring wells, gas monitoring probes from damage.

C. For excavation beyond the limits of work coordinate with the Engineer.

D. Excavate to lines and grades shown on plans, or as directed by Engineer's representative.

E. When excavating existing soil from areas to receive Monolithic Final Cover, Contractor shall excavate no closer than six (6) inches or farther than twelve (12) inches from the upper surface of the underlying layer of solid waste.

F. Excavate materials to comply with all regulatory requirements and provide a safe working environment.

G. Notify Engineer of unexpected subsurface conditions and discontinue work in the affected area until notified to resume Work.

H. Field inspection will be performed by CQA Consultant.

I. Provide for visual inspection of bearing surfaces.

J. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

*****END OF SECTION 2200*****

SECTION 2205
STRUCTURAL FILL

PART I - GENERAL

A. Work shall consist primarily of processing, moisture conditioning, placing, and compacting soils and/or rock to construct roads, berms and other structures.

B. This Section shall also apply to fill required to achieve acceptable grades for drainage prior to placement of Monolithic Final Cover .

C. The Contractor shall submit sieve analysis results for samples of proposed structural fill material to Project Manager for approval prior to placing fill.

PART II - PRODUCTS

A. Structural fill material shall contain no rocks or clods larger than 2 inches in diameter.

B. Material shall be predominantly free from roots, wood, organic matter, refuse or other deleterious matter.

PART III - EXECUTION

A. Contractor's equipment shall be inspected daily for safety requirements and the equipment shall not leak any oil.

B. Contractor's shall obtain approval from the QAC that area to receive structural fill material is free of debris and is either certified fill or natural undisturbed soil.

C. If required, the general fill material shall be processed such that it does not contain particles exceeding the maximum size established herein.

C. Structural fill shall conform to contours and elevations of the design grades.

D. Contractor shall obtain approval from the Project Manager prior to placing fill in the existing landfill area for the purpose of achieving design grades or acceptable grades for drainage prior to placing Monolithic Final Cover.

E. Contractor's construction method shall not disturb or damage other work.

F. Place and compact materials in loose lifts not exceeding 8 inches in thickness.

G. Finished surface of the structural fill shall be plus 2 inches and minus 2 inches from design grades.

H. The structural fill material shall be compacted to 90 percent relative compaction at a moisture content that is no less than three (3) percent below optimum.

I. The QAC shall conduct the following tests:

1. Moisture content (ASTM D2216)
2. Laboratory compaction (ASTM 1557)
3. Field density (ASTM D2922, D1556 or D2167)

All tests except field density shall be performed at the frequency of an average of one test per 5,000 yd^3 of constructed structural fill. The field density shall be performed at the frequency of an average of one test per 1,000 yd^3 of constructed structural fill. The periodic checks and verification of nuclear density test shall be an average of one sand cone test for every 50 nuclear density tests.

K. The QAC shall verify that the requirements of the project specifications are met. The QAC shall report any nonconformance to the Project Manager. If a defect is identified in the finished general earthwork, the QAC shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the QAC shall determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the QAC deems appropriate. After determining the extent and nature of the defect, the QAC shall promptly notify the Contractor and the Project Manager. A work deficiency meeting shall be held as needed between the Contractor, QAC, Designer, Project Manager and other necessary parties to assess the problem, review alternative solutions, and implement an action plan.

L. The Contractor shall correct all deficiencies to meet the project specifications. If a project specification criteria cannot be met, or unusual weather conditions hinder work, the QAC shall develop and present to the Project Manager suggested solutions for his approval. The QAC shall schedule appropriate re-tests, if any required, when the work defect has been corrected. All re-tests by the QAC must verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency. The QAC shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

PART 4 MEASUREMENT AND PAYMENT

Structural Fill will be paid on the basis of banked (compacted) cubic yards determined by survey as approved by the Project Manager.

**** END OF SECTION 2205 ****

SECTION 2215
MONOLITHIC FINAL COVER

PART I - GENERAL

A. Work shall consist primarily of moisture conditioning, placing, compacting, trimming and protection of Monolithic Final Cover material, as shown on project plans for construction of the final cover.

B. Contractor shall submit the results of Monolithic Final Cover material conformance test results to project manager for approval of the source prior to beginning placement of material. Tests submitted by Contractor shall include:

1. Sieve analysis (ASTM D1140)
2. Laboratory compaction (ASTM 1557)
3. Atterberg Limits (ASTM D4318)
4. Laboratory Hydraulic Conductivity Tests (ASTM D5084)

C. QAC shall conduct the following tests on Monolithic Final Cover during placement:

1. Moisture content (ASTM D2216)
2. Sieve analysis (ASTM D1140)
3. Laboratory compaction (ASTM 1557)
4. Field density (ASTM D2922, D1556 or D2167)
5. Laboratory Hydraulic Conductivity Tests (ASTM D5084) on undisturbed samples obtained from the constructed Monolithic Final Cover

D. Moisture Content and Laboratory Compaction Tests shall be performed at the frequency of an average of one test per 5,000 yd^3 of constructed Monolithic Final Cover. The field density shall be performed at the frequency of an average of one test per 1,000 yd^3 of constructed Monolithic Final Cover. The periodic checks and verification of nuclear density test shall be an average of one sandcone or rubber balloon test for every 50 nuclear density tests.

E. Laboratory Hydraulic Conductivity Tests shall be conducted at the frequency of one test per 20,000 cubic yards of constructed Monolithic Final Cover.

PART II - MATERIAL

A. Monolithic Final Cover soil shall be select fine-grained soils meeting the following gradation requirements:

- 100 percent passing a 1 ½ inch sieve
- A minimum of 25 percent passing a No. 200 screen

B. The hydraulic conductivity of Monolithic Final Cover shall not exceed 1.0 x 10-5 cm/sec when compacted to a minimum of 90 percent of maximum dry density.

PART III - EXECUTION

A. Contractor's equipment shall be inspected daily for safety requirements and the equipment shall not leak any oil.

B. Contractor's construction method shall not disturb or damage other work.

C. Prior to placing any Monolithic Final Cover material over the subgrade consisting of 6 to 12 inches of in-place cover soil, the subgrade shall be moisture-conditioned and compacted in accordance with this Section.

D. Monolithic Final Cover material shall be placed and compacted in 8-inch thick, loose lifts, unless otherwise approved by the CQA Consultant.

E. Monolithic Final Cover material shall be compacted to 90 percent of the maximum dry density and within 0 to 4 percent above the optimum moisture content as determined in accordance with ASTM D1557. The Contractor shall be responsible for all moisture conditioning.

F. Monolithic Final Cover shall generally conform to contours and elevations of the design grades. Variations from design grade shall be smooth and gentle.

G. The compacted thickness of Monolithic Final Cover shall be not less than 24 inches.

PART IV MEASUREMENT AND PAYMENT

A. Monolithic Final Cover shall be paid on the basis of the area in square feet covered by a minimum of 24 inches of Monolithic Final Cover.

B. Any soil material in excess of 24 inches required to be placed in order to achieve design grades or as directed by the Project Manager shall be placed and paid on a cubic yard basis according to Section 2205, Structural Fill.

**** END OF SECTION 2215 ****

SECTION 2230
COMPOST SOIL

PART I - GENERAL

A. Work shall consist primarily of supplying, placing, compacting, trimming and protection of Compost Soil material above Monolithic Final Cover as shown on project plans.

PART II MATERIALS

A. Compost Soil material shall be screened compost material as supplied by Maui Eko Systems from its facility adjacent to Central Maui Landfill.

B. Material shall be subject to approval by Engineer. Contractor is not responsible for quality control of material supplied by Maui Eko Systems.

C. In the event sufficient Compost Soil material is not available, Contractor shall supply the same material used as Monolithic Final Cover and place it in the same manner specified in Part III below.

PART III EXECUTION

A. Contractor shall place Compost Soil using equipment and methods that does not damage the underlying Monolithic Final Cover.

B. Compost Soil shall be placed in a single lift and track-walked to achieve a final thickness not less than six (6) inches.

C. In the event Maui Eko Systems is unable to supply sufficient Compost Soil material to cover the entire project area indicated on the drawings, Contractor shall apply the available Compost Soil material in the following priority order:

- Lower side slopes below the middle bench
- Upper side slopes from the middle bench to top deck
- Top deck of the landfill
- The area north of the Ameron conveyor

PART IV MEASUREMENT AND PAYMENT

A. Compost Soil shall be paid on the basis of square feet of area covered .

B. Alternative pricing on a square foot basis will be applied to substitute material supplied in the event the substitute material is required.

***** END OF SECTION 2230 *****

SECTION 2250
HYDRO-MULCH SEEDING

PART I - GENERAL

A This section describes application of mulch, seed adapted to site, fertilizer and water using hydraulic equipment in designated areas. This section also provides instructions for continuous care and maintenance.

PART II MATERIALS

A. **Seed.** Seed shall be a mix of perennial grasses and not more than 25 percent annual grasses approved by the Hawaii Department of Agriculture for planting in agricultural areas on the Island of Maui. Grass species selected shall be capable of sustaining growth without irrigation once it is established. The seed mix shall be certified to the following properties:

Pure Seed	95% minimum
Crop Seed	1% maximum
Weed	0.5% maximum
Inert Material	5% maximum
Germination	85% minimum

Apply the seeds at the rate of one hundred (100) pounds per acre (minimum) and within twelve (12) months of the date of the certified germination test.

Seed shall comply with Hawaii Administrative Rules Title 4, Subtitle 6, Chapter 67 Seed Rules; shall be certified for compliance by a Hawaii-licensed seed dealer; and shall be purchased from that dealer.

Seed shall be delivered to the project in labeled and sealed containers. Seed and labels shall be subject to testing provisions of the Association of Official Seed Analysts. The Engineer will not accept for use seed that is more than 12 months old from date of certified germination test. Recommendation of seed producer shall be followed in determining quantity of seed to apply per acre.

B. **Fertilizer.** Proper fertilizer shall be used in hydro-mulch mix, depending of condition of soil. The Contractor shall provide a Spoil Analysis Report, if requested by the Engineer, and shall use report to determine quantity and ratio of fertilizer for sustained growth of grass.

C. **Mulch**. Mulch shall be specially processed fiber containing no growth or germination inhibiting components. Recycled mulch material, such as processed newspaper, is allowable if accepted for use by the Engineer. Fibers shall form homogeneous slurry after addition and agitation in hydro-mulch seeder with seed, fertilizer, water and other additives not detrimental to plant growth. When hydraulically sprayed on soil, fibers shall form blotter-like ground cover that readily absorbs water and allows infiltration to underlying soil.

D. **Soil and Mulch Tackifier.** Tackifier used with mulch shall be hydrocolloidal or organic.

E. **Hydrocolloidal Tackifier.** Hydrocolloidal tackifier shall be formulated for use with hydraulically planted grass seed or stolons, alone or in combination with fertilizer, wood fiber mulch, and other accepted additives. Tackifier shall consist of at least three different but complementary hydrocolloids, two of which shall be Glactomannan and Plantago Ovata. Latter component shall have muciloid content of at least 85 percent.

Tackifier shall be applied at rate of 80 pounds per acre, shall be pH stable with fertilizer, and shall hydrate and disperse in mixing tank with water and other materials to form homogeneous slurry. Tackifier shall leave loose, chain-like stabilizing film on surface of soil, allow moisture to percolate into soil during seed germination and seedling growth, and break itself down through microbial action. Tackifier shall not inhibit plant germination or growth.

F. **Organic Tackifier.** Organic tackifier shall be, starch-based tackifier formulated for use with conventional mulches. Active ingredient in tackifier shall be 100 percent derived from plant starch.

Dry powder tackifier shall be blended with insolubilizer. After blending and mixing with water, tackifier shall swell, become sticky, and be suitable for use during heavy rain. Tackifier shall be applied at rate of 80 pounds per acre. Emulsion shall cure on surface of soil and become insoluble. Tackifier shall not inhibit plant germination or growth.

PART III EXECUTION

A. **Seeding.** Apply the seeded mulch within two days after completion of slopes or portion of slope when exposed face attains height of 15 feet. Notify the Engineer not less than 24 hours ahead of hydro-mulch seeding

operation. Do not hydro-mulch until the Engineer inspects and accepts the areas for planting.

The Engineer will inspect slopes to ensure that surface and subsurface water are properly collected and disposed of and areas to be planted are protected from erosion. Upon the Engineer's acceptance for planting, begin hydro-mulch seeding of slopes. Acceptance for planting does not relieve the Contractor of responsibility for repair of slope damage until grassed areas are accepted as described in Subsection Part III (D) - Acceptance.

Place seeded mulch evenly and completely over ground in one application at minimum rate of 1,500 pounds of mulch per acre. Use accepted hydro-mulch seeder with built-in agitation system and operating capacity sufficient for uniform mixing until slurry is pumped out of tank. Equip seeder with distribution and discharge lines large enough to prevent stoppage, and hydraulic discharge spray nozzles that provide uniform distribution of slurry.

In areas that are inaccessible to hydro-mulch seeder, plant by accepted hand methods.

When hydro-mulch seeding is done in conjunction with erosion control matting, install erosion control matting to completion and follow with hydro-mulching within 24 hours.

Water immediately after planting to moisten the soil and mulch. Continue watering as necessary to ensure proper germination and growth. Water in a way that will prevent erosion, using equipment that will not damage planted areas. Replace watering equipment that cause erosion or runoff.

If there is slope erosion or movement of silt, remove displaced material immediately. Restore areas that are eroded to depth greater than two inches of original grade or width greater than three inches.

B. **Planting Period.** Begin planting period immediately after seeding area is accepted by the Engineer. If area has mixture of trees, shrubs, and grass, do not start planting period until all trees, shrubs, and grass have been planted. If only grass is planted, during planting period provide 95 percent coverage with 5-inch tall healthy grass within 90 days. Re-seed areas after 30 days that do not show thorough "catch" in accordance with Subsection Part III (A) - Seeding until the Engineer determines there is satisfactory growth.

C. **Plant Establishment.** Plant establishment is nine months after accepted completion date of planting period. During plant establishment period, water, fertilize, weed, and mow grassed areas with accepted equipment when grass reaches average height of 3 inches. Replace grass the Engineer considers unsuitable, sick, or that are dead. Remove and dispose of trash and debris. Provide insect and disease protection and control.

In addition to fertilizer that is applied during initial hydro-mulch seeding, fertilize plantings at least four times during plant establishment period. Fertilize at rate of not less than 300 pounds per acre per application. Interval between fertilizations shall not be closer than 2-1/2 months. Notify the Engineer 24 hours before applying fertilizer.

The Engineer will credit the Contractor plant establishment days when work is done in accordance with the contract documents and when the Engineer determines that no work is required, regardless of whether the Contractor actually performs plant establishment work. The Engineer will not credit the Contractor with plant establishment days when the Engineer determines that work is necessary but the Contractor fails to adequately perform plant establishment work.

D. **Acceptance.** The Engineer will base acceptance of planted areas on 98 percent coverage of healthy, well established grass, at least 3 inches tall, at the end of plant establishment period. No 100 square foot area shall show more than 2 square feet of bare earth.

PART IV MEASUREMENT AND PAYMENT

A. Hydro-Mulch Seeding shall be paid on the basis of square yards of area covered.

B. Payment will be made as follows:

1. 60 percent of the total upon completion of hydro-mulch seeding;
2. 40 percent in eight equal monthly payments during the plant establishment period; and

3. 10 percent upon final acceptance at the end of the plant establishment period.

***** END OF SECTION 2250 *****

SECTION 2500
ASPHALT CONCRETE PAVING

PART I GENERAL

A. Work shall consist primarily of furnishing, placing and finishing aggregate base and asphalt concrete paving to form roads and drainage channels.

B. The work shall generally conform to HDOT Standard Specifications, Section 401 (Asphalt Concrete Pavement) and Section 703 (Aggregates).

PART II PRODUCTS

A. Aggregate base shall conform to HDOT Standard Specifications Section 703.17 (Aggregate for Subbase) with grading as follows:

Sieve Size	Percent Passing by Weight
2"	100
1 ½ "	90-100
¾ "	50-90
No. 4	15-50
No. 200	0-9

B. Aggregate used in asphalt concrete shall conform to HDOT Standard Specifications Section 703.09 (Aggregate for Hot Plant Mix Bituminous Pavement), Mix No. III.

C. Unless approved otherwise by the Engineer, aggregate base and aggregate used in asphalt concrete shall contain the percentages of crushed glass cullet specified in Section 2550.

PART III EXECUTION

A. Before placing aggregate base, check subgrade as to soundness, outline and contours. Prepare subgrade by smoothing irregularities to obtain an even, uniform surface across the area to be paved. Remove material from any soft or spongy spots and replace with aggregate.

B. Compact the subgrade to 90 percent relative compaction as determined by ASTM D1557. Finish subgrade by rolling with a smooth drum roller.

C. Place aggregate base in layers not exceeding eight (8) inches. Compact to 95 percent relative compaction as determined by ASTM D1557. Finish using a smooth drum vibratory roller.

D. Asphalt concrete shall be mixed, delivered, spread and compacted in accordance with HDOT Standard Specifications Section 401.

**** END OF SECTION 2500 ****

SECTION 2550
CULLET AND CULLET-MADE MATERIALS

2550.01 Cullet and Cullet-Aggregate Mixtures as Construction Materials.

When available, process recycled glass into construction-grade cullet (crushed glass) using methods accepted by the Engineer. Construction-Grade cullet shall have a uniform gradation from fine to coarse. 100% of the material shall pass the 0.375 inch sieve. Blend the processed cullet with the natural aggregates according to Subsections 717.02 - Cullet Materials for Roadway, 717.03 - Cullet Materials for Utility Structures, or 717.04 - Cullet Materials for Drainage Systems.

Cullet content is the percentage at which the Contractor uses the construction-grade cullet with or without the addition of natural aggregates depending on its application(s). The mixture of the materials produced shall be of acceptable gradation as specified for the finished product.

Debris include plastics, papers, and non-ceramic constituents of the cullet. The contract considers debris as deleterious material. Debris shall not exceed values specified for various applications of the processed cullet. Also, the Engineer will not allow hazardous material in the cullet.

Compaction shall comply with the minimum levels, as specified for each particular application, to attain the desired engineering properties in the field.

2550.02 Cullet Materials for Roadways.

Roadway applications include the use of cullet and cullet-aggregate mixtures in base course (untreated or glassphalt concrete base course mix), subbase, and embankments. Use of construction-grade cullet is appropriate depending on cullet percentage. Table 2550-I lists the limits of cullet content and debris levels allowed for cullet use in roadway applications.

TABLE 2550-I - CULLET IN ROADWAY APPLICATIONS

Roadway Applications	Cullet Content (% By Weight)	Maximum Debris Level (% By Weight Of Cullet)
Base Course	10 to 15	0.2
Subbase	10 to 25	0.2
Embankments	10 to 25	0.3

***** END SECTION 2550 *****

SECTION 2600
DRAINAGE FACILITIES

PART I GENERAL

A. The work generally consists of supplying materials and constructing drainage pipes, culverts and related facilities as shown on the plans.

PART II MATERIALS

A. HDPE drainage pipe shall conform to AASHTO Designation: M294 for Type S smooth interior wall corrugated polyethylene pipe, or as approved by Engineer.

B. Corrugated steel drainage pipe shall conform to HDOT Standard Specifications Section 707.02 for zinc-coated corrugated steel pipe. All pipe shall be galvanized steel, 14 gauge (0.079 inch nominal thickness), nominal pitch 2 2/3 inch x ½ inch.

C. Coupling bands, pipe stakes and related hardware for joints and pipe anchors shall conform to HDOT standard specifications and plans.

D. Pipe bedding material shall conform to HDOT Standard Specifications Section 703.16 (B), Bed course Material for Pipe. Sand bedding material shall be subject to approval of Engineer.

E. Backfill material shall be clean natural soil free of debris, foreign objects, rocks larger than 2 inches in maximum dimension, roots and organic materials.

PART III EXECUTION

A. Underground Pipes

1. Excavation of trenches and installation of pipe shall begin at the outlet end of the pipe and proceed upgrade unless otherwise approved by the Engineer. Trenches shall be constructed in compliance with OSHA requirements and shall be wide enough to provided adequate work space.

2. Excavate trenches per plans to a sufficient depth below the specified pipe depth to provide for pipe bedding material. Over-excavate and replace any soft or excessively wet material below the general fill.

3. Place a minimum of four (4) inches of sand bedding in the bottom of the trench. Shape bedding to provide uniform support throughout the length of the pipe. Tamp and compact bedding to provide support under pipe haunches.

4. Place pipe as shown on the plans. Join pipe sections per applicable HDOT specifications.

5. Carefully place and compact backfill to prevent pipe damage. Damaged pipe shall be replaced at Contractor's cost.

6. Follow manufacturer's recommendations for installing pipe.

7. Maintain positive grades. No reverse slopes are allowed at any location.

B. Down Drains

1. New pipe alignment shall be as shown on plans.

2. Each bench crossed by the down drain pipes shall be graded as required at the road crossing location to ensure that the drop inlet will be located at a low point on the bench.

3. Road crossings and drop inlets shall be constructed in such a manner that vehicles may safely use the road way without damaging the inlet structure or pipe.

4. Contractor shall maintain strict compliance with Section 1400 when excavating for road crossings, to ensure safe working conditions when exposing buried refuse. Excavated refuse shall be transported to the Owner's active landfill area for disposal. Only clean soil materials may be used for backfill over pipes.

5. Secure pipe to slope with anchor assemblies supplied by pipe manufacturer or as approved by Engineer. Pipe anchors shall be placed along pipe at intervals not exceeding 25 feet. Pipe stakes shall be 1½ -inch galvanized pipe penetrating a minimum three (3) feet into the subgrade.

**** END SECTION 2600 ****

SECTION 3300
CONCRETE AND SHOTCRETE

PART 1 GENERAL

A. The Contractor shall furnish all labor, materials, tools, transportation, and equipment necessary to install concrete and shotcrete to the limits shown on the Contract Drawings and as specified herein.

PART II MATERIALS

A. Concrete / Shotcrete

1. The Contractor shall provide normal weight concrete and shotcrete with a 28-day compressive strength of 3,000 psi.

2. The water-cement ratio shall not exceed 0.5.

3. Cement shall conform with ASTM C 150 Type II.

4. Aggregates shall conform with ASTM C 33.

5. Water shall be clean, fresh potable water and shall not contain substances deleterious to the concrete.

6. Admixtures shall be submitted to and approved by the Engineer.

B. Reinforcing Steel:

1. Reinforcing steel bars shall be fabricated in accordance with ACI 315 and shall conform with ASTM A 615 Grade 60 deformed bars for all #4 and larger bars.

2. Welded wire fabric. shall conform to the requirements of ASTM A 497. Tie wire shall be a minimum 10 gage annealed wire. Supports and spacers shall be as specified in the CRSI "Manual of Standard Practice."

C. Concrete Accessory Products:

1. Curing materials shall be of the liquid-membrane forming type in

accordance with ASTM C 309, Type 1. These materials shall be clear or translucent with fugitive dye. Cure-seal hardener shall be in accordance with ASTM C 309, Type 1, Class A or B. Acceptable materials are Burke, Spartan-Cote, Euclid Pliocure, or equivalent.

2. Expansion joint filler shall be closed cell copolymer foam plastic material, A.P.S. Cross Linked E.V.A. Foam (APS Supply Company, Beverly, New Jersey) or equivalent. Contractor shall submit proposed material for Engineer's approval.

PART III - EXECUTION

3.1 Shotcrete

A. Excavation for surface-water control ditches and channels shall be to the lines and grades shown on the Contract Drawings or as directed by the Engineer. Materials excavated shall be stockpiled at locations approved by the Owner or representative.

B. Where drainage channels and ditches are to be located in fill, the fill shall be overbuilt and the ditches subsequently excavated into the compacted fill materials to the required lines and grades. The Contractor shall provide sufficient grade check control for locations and gradients of the drain foundations.

C. The foundation, which includes all surfaces on which concrete or shotcrete is to be placed, shall be evenly graded so that no point on the grade surface shall be above the designated plane. If unsuitable material is encountered at the elevation of the foundation, such material shall be removed and disposed of as directed by the Engineer. The resulting space shall be filled with material suitable for the foundation. The foundation areas shall be thoroughly compacted with moisture sufficient to allow a firm foundation and to prevent absorption of water from the concrete or shotcrete; however, foundation areas shall not contain free surface water.

D. Concrete or shotcrete shall be placed, consolidated, finished, and cured in conformance with the requirements of ACI 304 or equivalent standard.

E. After striking off to grade, the concrete/shotcrete shall be hand-floated with wooden floats no less than 4 in. in width and not less than 30 in. in length. The entire surface shall be broomed with a fine-texture hair push

broom to produce a uniform surface. Brooming shall be done when the surface is sufficiently set to prevent deep scarring and shall be accomplished by drawing the broom side down the slope leaving the marks parallel to the flow of water. Concrete/ shotcrete edges shall be trimmed smooth.

F. Expansion joints or weakened plain joints shall be installed transversely along the basin at intervals of 20 ft.

G. Transitions between any two drainage structures are shown on the Contract Drawings or shall be performed as directed by the Engineer.

H. Waterstops must be used in all construction or cold joints and shall be approved by the Engineer.

I. Samples for compressive strength testing for each class of concrete/shotcrete shall be taken not less than once a day nor less than once for each 150 cubic yards of concrete/shotcrete placed. Samples will be cured on-site for 24 hours then delivered to the laboratory for testing in accordance with ASTM C 31 and C 39.

J. Slump tests are required with maximum slump of 5 in. Slump tests shall be perfoffi1ed in accordance with ASTM C 143 at a frequency of 1 test per 1 concrete truck.

K. The minimum shotcrete thickness shall be as shown in the Contract Drawings. The unhardened shotcrete shall be checked for thickness using a probe by the nozzleman or laborer at the time of placement. All low or thin areas shall be corrected by applying additional shotcrete.

3.2 Concrete

A. Design, erect, support, brace and maintain form-work to support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. Construct forms so concrete work is of correct size, shape alignment, elevation and position. Clean forms before placement of concrete, and retighten and brace forms after placement of concrete as required to eliminate mortar leaks and maintain proper alignment

B. Place concrete in conformance with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete", or comparable international standard. During hot weather applications, place concrete in conformance with ACI 305 or equivalent standard for hot weather concrete placement, and the following:

- Cool mixing water as required to maintain mix temperature below 32 ^{c}o at time of placement
- Cool reinforcing steel by covering with water-soaked cloth so that steel temperature does not exceed ambient air temperature immediately before embedment in concrete
- Fog spray forms, reinforcing steel/wire mesh and subgrade just before concrete is placed
- Use water-reducing retarding mixture (Type D)

C. Concrete shall be cured with a liquid membrane-type curing compound, placed in accordance with the manufacturer's application instructions. The use of burlap or other wet covering, plastic sheeting, water proof paper or other covering, or curing with water, is not allowed.

D. Samples for compressive strength testing for each class of concrete/shotcrete shall be taken not less than once a day nor less than once for each 150 cubic yards of concrete/shotcrete placed. Samples will be cured on-site for 24 hours then delivered to the laboratory for testing in accordance with ASTM C 31 and C 39.

E. Slump tests are required with maximum slump of 5 in. Slump tests shall be performed in accordance with ASTM C 143 at a frequency of 1 test per 1 concrete truck.

3.3 Reinforcing Steel

A. Before concrete is placed, reinforcement shall be cleaned of loose rust and other substances that would impair bonds with the concrete. Rust shall be removed to the satisfaction of the Engineer by vigorous rubbing with burlap cloth or wire brushing.

B. Reinforcement shall be placed in accordance with the Contract Drawings and the CRSI "Recommended Practice for Placing Reinforcing Bars." Reinforcement shall be tied securely in place to prevent displacement during placement of concrete. Reinforcing bars and welded wire fabric shall be spliced as indicated by lapping and securely wiring components together. Splices at locations other than those indicated in the Contract Drawings or approved shop drawings shall be subject to the approval of the Engineer and, if allowed, shall conform to the requirements of ACI 318.

C. The Contractor shall notify the Engineer when reinforcing steel is in place so that the Engineer may observe the reinforcing steel prior to placement of concrete for conformance with these Technical Specifications and the Contract Documents. Concrete placed in violation of this requirement may be subject to rejection and removal.

*** * * END SECTION 3300 * * ***

APPENDIX B.3

ADDENDA

CENTRAL MAUI LANDFILL
PHASES I AND II CLOSURE
FINAL COVER AND DRAINAGE IMPROVEMENTS
PROJECT NO. 05-06 / P-29

ADDENDUM NO. 1
November 15, 2005

1. Substitution Alternate 7-Alt A is added to the bid schedule to provide an alternative material for the Compost soil consisting of a blend of 50% by volume the compost material and alternative soil material. Contractor shall include all costs of material supply, blending, delivering and placing the alternative material.

2. Additive Alternate AA-2 Alt A is added to the bid schedule to supply an additional six inches of the 50% blend of compost and soil as provided in Substitution Alternate 7-Alt A.

3. Additive Alternates AA-3 and AA-4 are added to the bid schedule to supply 1,000 man hours of manual labor, and the supply and operation for five (5) weeks of a suitable front-end loader, to pick up litter that may remain on the site as of the Notice to Proceed. The area to be cleaned of loose litter material includes the entire fenced area of the Phase I and II landfill and the adjacent Kalialinui Gulch. The County will supply roll off bins in which the Contractor shall deposit litter, and will transport the bins and litter to the approved disposal site. The number of manhours and duration are the County's best estimate of the maximum level of effort that may be required. This Alternate bid item is exempt from General Conditions Section 1040.07 relative to adjustments in unit prices due to changes in estimated quantities. Unit prices provided in the Contractor's proposal for these Alternatives shall apply to any quantity of labor and equipment supply requested by the Owner for litter pickup.

4. Monolithic Final Cover (MFC) will not be placed under the existing Ameron conveyor. MFC placement shall begin approximately three (3) feet from each side of the conveyor and increase at approximately 3:1 grade to the full two-feet depth. Compost soil will be placed at the required depth and hydroseeded over the MFC material but shall not be placed under the conveyor.

CENTRAL MAUI LANDFILL
PHASES I AND II CLOSURE
FINAL COVER AND DRAINAGE IMPROVEMENTS
PROJECT NO. 05-06 / P-29

ADDENDUM NO. 2
November 23, 2005

1. The bid sheet is revised by addition of Item 19, Turf Reinforced Mat. The estimated quantity is based on a 10-feet wide strip applied to approximately 410 linear feet of the top slope as shown on Drawing Sheet 4.

2. Bid Item 20 is added to the bid sheet to include concrete baffle walls as shown in Detail C on Sheet 10. The walls are installed at two locations designated on Sheet 4 and Sheet 6. Each wall is to be centered in front of the pipe downdrain and is 6 feet long and 4 feet high (including 2 feet below ground).

3. As a matter of clarification, both concrete foundations included in the new Manhole No. 4 are to be included in the unit price for this bid item (Item No. 16). The upper foundation dimensions are 8' x 8' x 2', not 10' x 10' as indicated on the Rebar Detail on Sheet 13.

4. The thickness of the AC paved ditch at the mid-slope bench as shown on Sheet 11 shall be four (4) inches.

5. The length of the concrete overflow structure shown in Detail V on Sheet 15 (Bid Item No. 18) shall be ten (10) feet from the slope transition to the junction with the asphalt paved basin outfall channel, plus 6 feet on the basin slope, for a total length of sixteen (16 feet).

6. Bid Item 21 is added to the bid sheet for the asphalt paved basin outfall channel (Detail U, Sheet 15). The per-foot unit price includes excavation and grading, aggregate base and asphalt paving including a 12" curb. Total finished depth of the channel is nominally 18" below surrounding grade, with a flow-line at a constant gradient from elevation 228' at the basin to 226' at the discharge to Kalinuili Gulch.

7. Bidders are advised that the alignment of the concrete channel discharging into the sedimentation basin (Detail E, Sheet 6/10) will likely require field adjustment where the channel crosses under the Ameron conveyor. This adjustment and any additional effort required to construct the channel under the conveyor are incidental to the unit pricing of the channel in Bid Item 13.

CENTRAL MAUI LANDFILL
PHASES I AND II CLOSURE
FINAL COVER AND DRAINAGE IMPROVEMENTS
PROJECT NO. 05-06 / P-29

ADDENDUM NO. 3
August 1, 2006

1. Due to the documented consistency of materials delivered to the project, the minimum frequency of testing for moisture content and laboratory compaction is reduced to one test per 10,000 cubic yards. Accordingly, the first sentence of Technical Specifications Section 2215, Paragraph I(A)(D) is revised to read as follows:

   Moisture Content and Laboratory Compaction Tests shall be performed at the frequency of an average of one test per 10,000 $yard^3$ of constructed Monolithic Final Cover.

Issued August 1, 2006

F. Glen Odell
A-Mehr, Inc.

APPENDIX C.1

FINAL COVER LABORATORY TEST REPORTS

MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING FLEXIBLE WALL PERMEAMETER ASTM D 5084

falling head test with increasing tailwater level

W.O. 5090-00 General Maui Landfill Received:
Boring: sample: **ST-1** Tested: 10/5-12/06 by NT/BC
Depth: 0-1.5 feet Computed: 10/12/2006 by B.C.
Soil Type: Brown clayey silt
undisturbed specimen
special selection and preparation process:

Specimen before test		Specimen after test	
Length=	3.863 cm	Length=	3.744 cm
X-sectional area=	40.27 cm^2	X-sectional area=	40.27 cm^2
mass=	283.3 g	mass=	283.3 g
		moisture content=	44.9 %
		dry unit weight=	81.0 pcf

Saturation & Consolidation

cell pressure=	55.0 psi	Area of inflow burette=	1.27 cm^2
top back pressure=	50.0 psi	Area of outflow burette=	1.37 cm^2
B-value=	0.90	Type of permeant liquid:	tap water
		Deviation of test:	

back pressure difference= 0.1 psi

date	time	time elapsed (sec.)	top outflow (cm)	bottom inflow (cm)	Temp. (°C)	head (cmH_20)	k (cm/s)	k @ 20°C (cm/s)
10/11/2006	6:23	0	4.9	41.6	25.0	43.7		
10/11/2006	7:35	4320	11.2	35.1	25.0	30.9	4.91E-06	4.3E-06
10/11/2006	8:26	3060	12.2	34.1	25.0	28.9	1.34E-06	1.2E-06
10/11/2006	8:59	1980	13.4	33.0	25.0	26.6	2.56E-06	2.3E-06
10/11/2006	9:26	1620	13.9	32.4	25.0	25.5	1.59E-06	1.4E-06
10/11/2006	10:30	3840	15.5	30.9	25.0	22.4	2.06E-06	1.8E-06

average k of the last 4 readings= 1.7E-06 cm/s @ 20°C

Hawaii Geotechnical Consulting

- Incorporated -

P.O. Box 331223 • Kahului, Hawaii 96733 • Phone (808) 205-1727 • Fax (808) 878-3136

January 8, 2007
File No. 6027.02

Mr. Glen Odell
A-Mehr, Inc.
23016 Mill Creek Drive
Laguna Hills, CA 92653

Subject: **HYDRAULIC CONDUCTIVITY TEST RESULTS**
LOW PERMEABILITY SOIL LINER
CENTRAL MAUI LANDFILL PHASE IV-B
KAHULUI, MAUI, HAWAII

In accordance with your request we have performed a series of hydraulic conductivity tests on samples of the low permeability soil liner for Phase IV-B as well as on samples of the closure cap for Phases I and II. The low permeability soil liner samples were obtained by Hawaii Geotechnical Consulting, Inc. (HGC) using thin walled steel samplers while the closure cap samples were provided to HGC by A-Mehr, Inc. in thin walled Shelby tube samplers. A total of 4 samples have been tested to date of the low permeability soil liner while a total of 4 samples have been tested to date of the closure cap. The approximate locations of the Phase IV-B low permeability soil liner samples are shown on the attached map.

All hydraulic conductivity tests were performed in accordance with ASTM D5084 Method C. The tests were performed using a flexible wall permeameter with de-aired tap water used as a permeant liquid. All samples were tested at an effective stress of 5 pounds per square inch (psi).

The Phase IV-B specifications indicate that the low permeability soil liner shall have a maximum hydraulic conductivity of 1.0×10^{-7} cm/sec. We understand that the closure cap samples must obtain a hydraulic conductivity of no more than 1.0×10^{-5} cm/sec. The results of the hydraulic conductivity tests are summarized below. The test results indicate that all sample tested meet the maximum hydraulic conductivity criteria as defined in the project specifications.

Phase I and II Closure Cap Samples

Test Designation	Location	Elevation (ft)	Approx. In-place Moisture Content (%)	Approx. In-place Dry Density (psf)	Percent Passing No. 200 Sieve (%)	Hydraulic Conductivity (cm/sec)
SB-1	N/A	N/A	32.3	85.0	61	2.4×10^{-6}
SB-2	N/A	N/A	27.7	86.4	73	3.4×10^{-6}
SB-3	N/A	N/A	35.6	70.6	70	1.1×10^{-6}
SB-4	N/A	N/A	29.7	88.0	72	5.7×10^{-7}

Should you have any questions pertaining to any aspect of this letter, or if we can be of further assistance to you, please do not hesitate to contact us.

Respectfully submitted,

HAWAII GEOTECHNICAL CONSULTING, INC.

By Robert M. Gibbens, P.E.
Senior Geotechnical Engineer

Attachment

Copy to Mr. Gary Watanabe, P.E. (Rojac Construction, Fax 808-986-1106)

Hawaii Geotechnical Consulting

- Incorporated -

P.O. Box 331223 • Kahului, Hawaii 96733 • Phone (808) 205-1727 • Fax (808) 878-3136

January 21, 2007
File No. 6027.02

Mr. Glen Odell
A-Mehr, Inc.
23016 Mill Creek Drive
Laguna Hills, CA 92653

Subject: **HYDRAULIC CONDUCTIVITY TEST RESULTS**
LOW PERMEABILITY SOIL LINER
CENTRAL MAUI LANDFILL PHASE IV-B
KAHULUI, MAUI, HAWAII

In accordance with your request we have performed a series of hydraulic conductivity tests on samples of the low permeability soil liner for Phase IV-B as well as on samples of the closure cap for Phases I and II. The low permeability soil liner samples were obtained by Hawaii Geotechnical Consulting, Inc. (HGC) using thin walled steel samplers while the closure cap samples were provided to HGC by A-Mehr, Inc. in thin walled Shelby tube samplers. An additional 1 sample has been tested for the low permeability soil liner (bringing the total to 5 to date) while an additional 3 samples have been tested for the closure cap (bringing the total to 7 to date). The approximate locations of the Phase IV-B low permeability soil liner samples are shown on the attached map.

All hydraulic conductivity tests were performed in accordance with ASTM D5084 Method C. The tests were performed using a flexible wall permeameter with de-aired tap water used as a permeant liquid. All samples were tested at an effective stress of 5 pounds per square inch (psi).

The Phase IV-B specifications indicate that the low permeability soil liner shall have a maximum hydraulic conductivity of 1.0×10^{-7} cm/sec. We understand that the closure cap samples must obtain a hydraulic conductivity of no more than 1.0×10^{-5} cm/sec. The results of the hydraulic conductivity tests are summarized below. The test results indicate that all sample tested meet the maximum hydraulic conductivity criteria as defined in the project specifications.

Phase I and II Closure Cap Samples

Test Designation	Location	Elevation (ft)	Approx. In-place Moisture Content (%)	Approx. In-place Dry Density (psf)	Percent Passing No. 200 Sieve (%)	Hydraulic Conductivity (cm/sec)
SB-5	N/A	N/A	28.1	82.3	68	6.1×10^{-6}
SB-6	N/A	N/A	27.1	70.1	71	1.1×10^{-6}
SB-7	N/A	N/A	26.9	85.6	71	9.4×10^{-6}

In addition to the laboratory testing, a total of 4 sand cone density tests were performed on fill placed during the structural embankment (3 sand cone density tests) as well as during the low permeability soil liner (1 sand cone density test). All sand cone density tests were run in accordance with ASTM D1556. The structural embankment sand cone density tests were performed adjacent to nuclear density tests No. 20 (DFR 6, dated November 9, 2006), No. 64 (DFR 11, dated November 16, 2006), and No. 104 (DFR 16, dated November 24, 2006). The low permeability soil liner sand cone density test was performed adjacent to nuclear density test No. 127 (DFR 27, dated December 21, 2006). The results of the sand cone density tests are summarized below.

Test Location	Sand Cone Density Test		Nuclear Density Test	
	Dry Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Moisture Content (%)
Structural Embankment	110.8	20	110.4	19
Structural Embankment	103.5	23	103.1	24
Structural Embankment	112.5	21	111.2	19
Low Permeability Soil Liner	85.6	31	84.9	30

Should you have any questions pertaining to any aspect of this letter, or if we can be of further assistance to you, please do not hesitate to contact us.

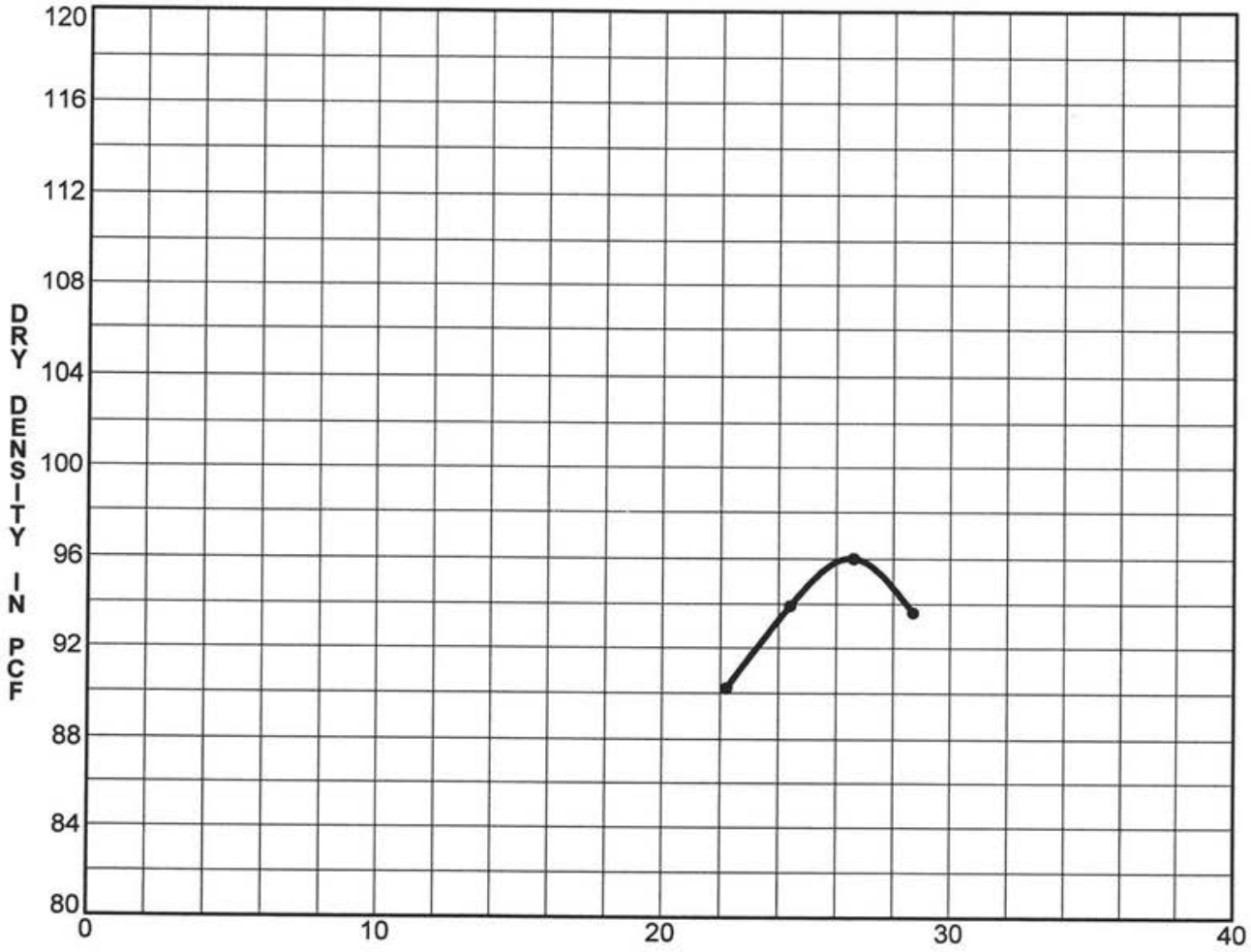
Respectfully submitted,

HAWAII GEOTECHNICAL CONSULTING, INC.

By Robert M. Gibbens, P.E.
Senior Geotechnical Engineer

Attachment

Copy to Mr. Gary Watanabe, P.E. (Rojac Construction, Fax 808-986-1106)



Sample Identification	Classification	Method	Maximum Dry Density	Optimum Moisture Content
● A	Brown Clayey SILT (MH)	ASTM D1557	96 pcf	27%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

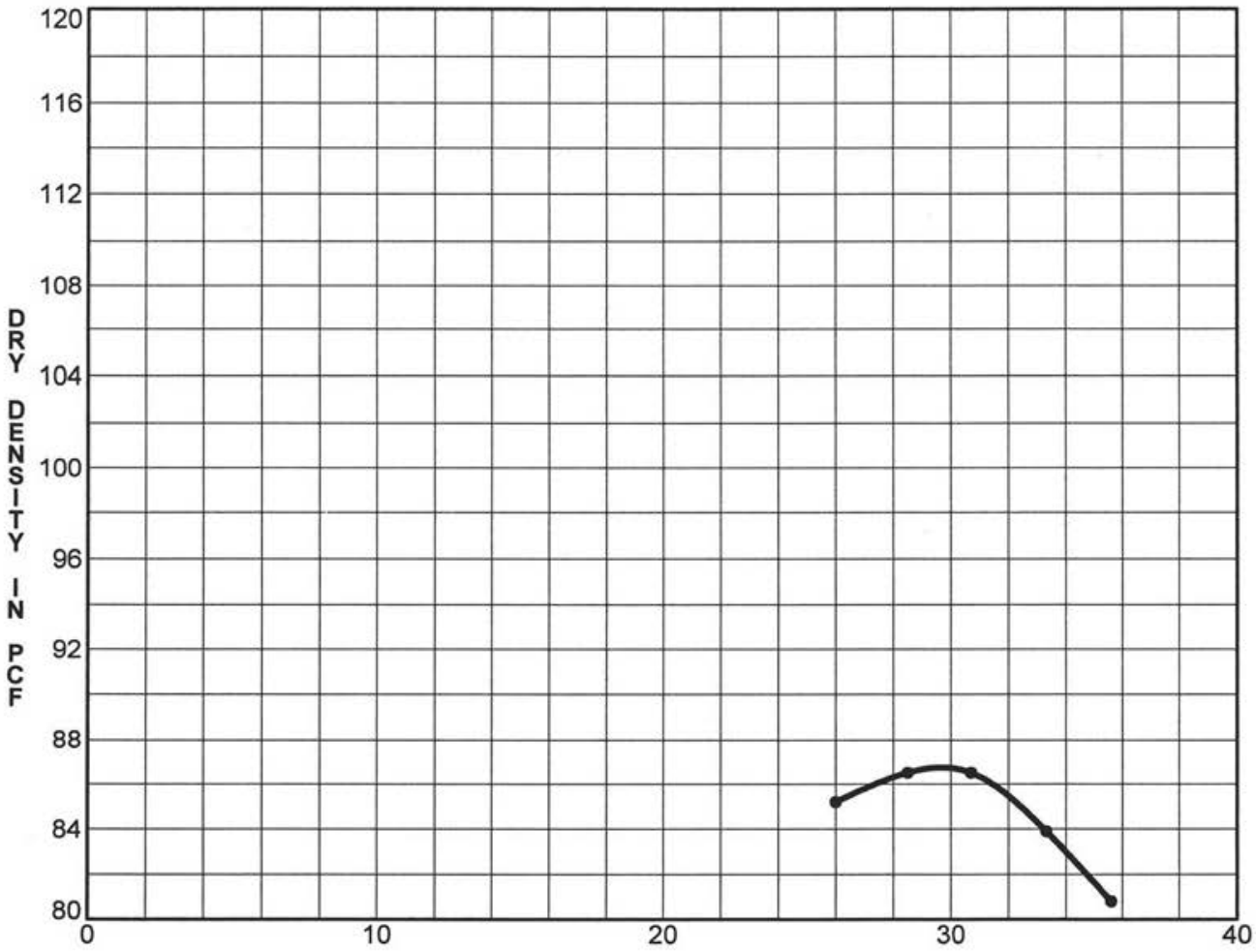
Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 1



Sample Identification	Classification	Method	Maximum Dry Density	Optimum Moisture Content
● B	Brown Silty CLAY (CH)	ASTM D1557	87 pcf	30%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

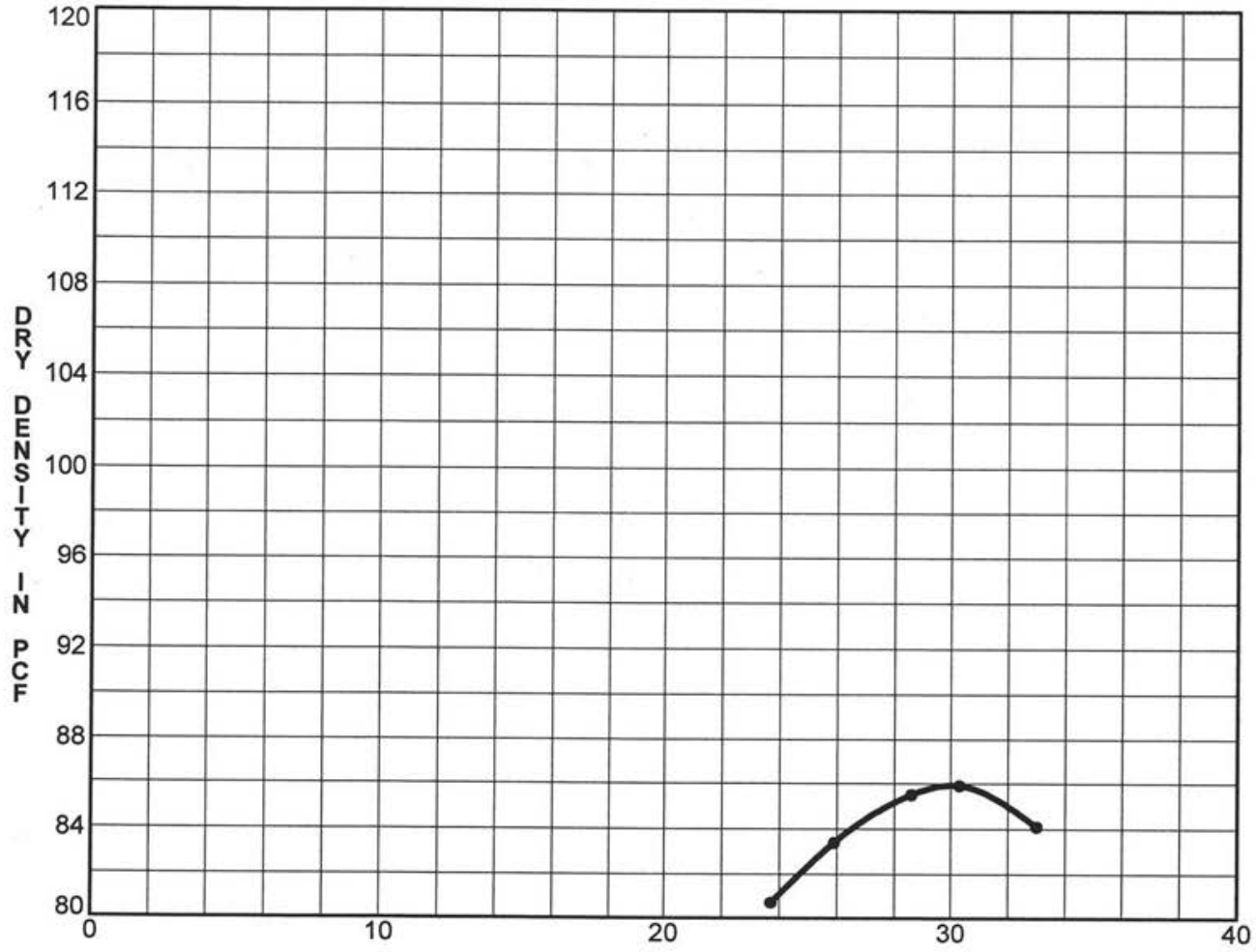
Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 2



Sample Identification	Classification	Method	Maximum Dry Density	Optimum Moisture Content
● C	Brown Silty CLAY (CH)	ASTM D1557	86 pcf	31%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

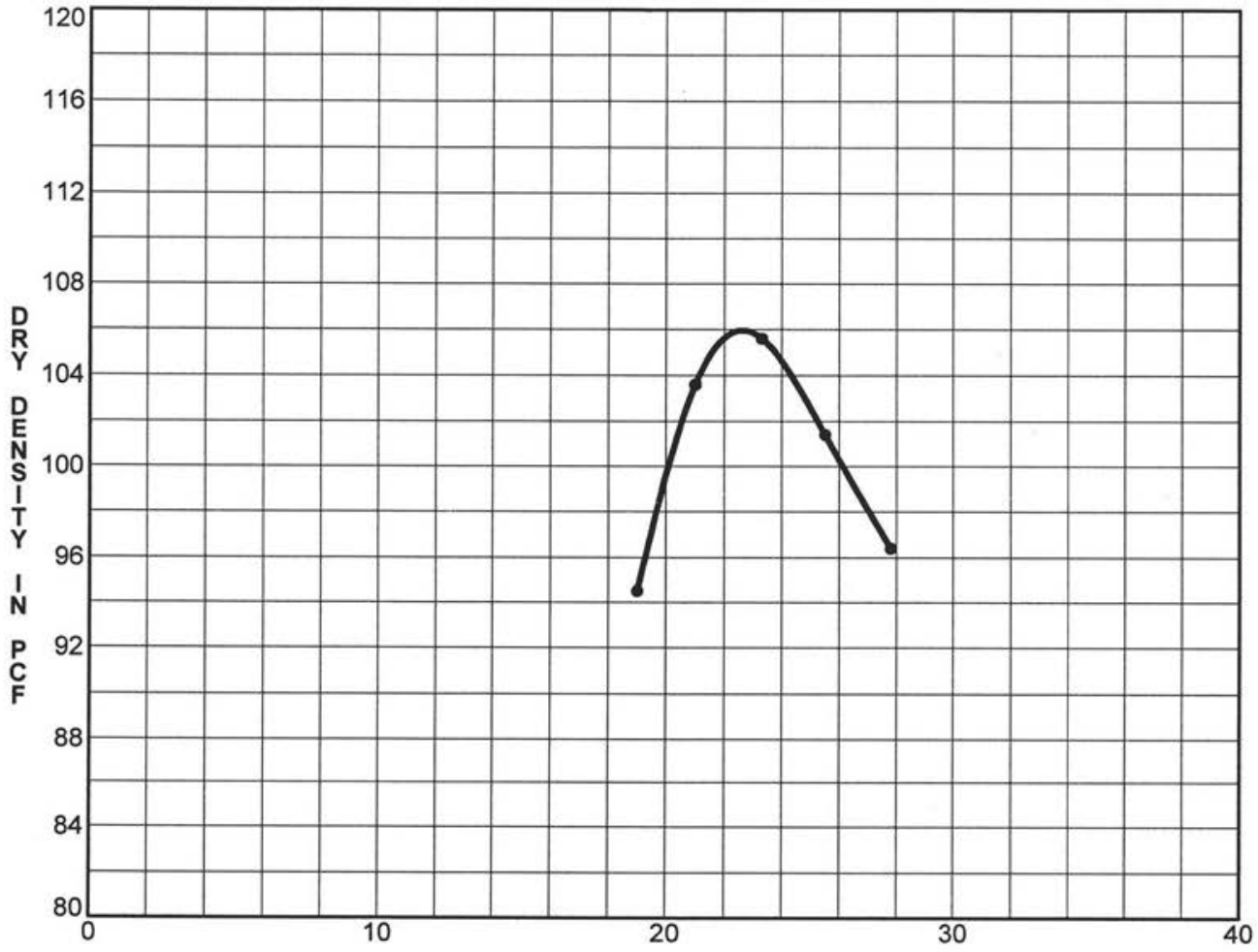
Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 3



Sample Identification	Classification	Method	Maximum Dry Density	Optimum Moisture Content
● D	Brown Clayey SILT (MH)	ASTM D1557	106 pcf	24%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

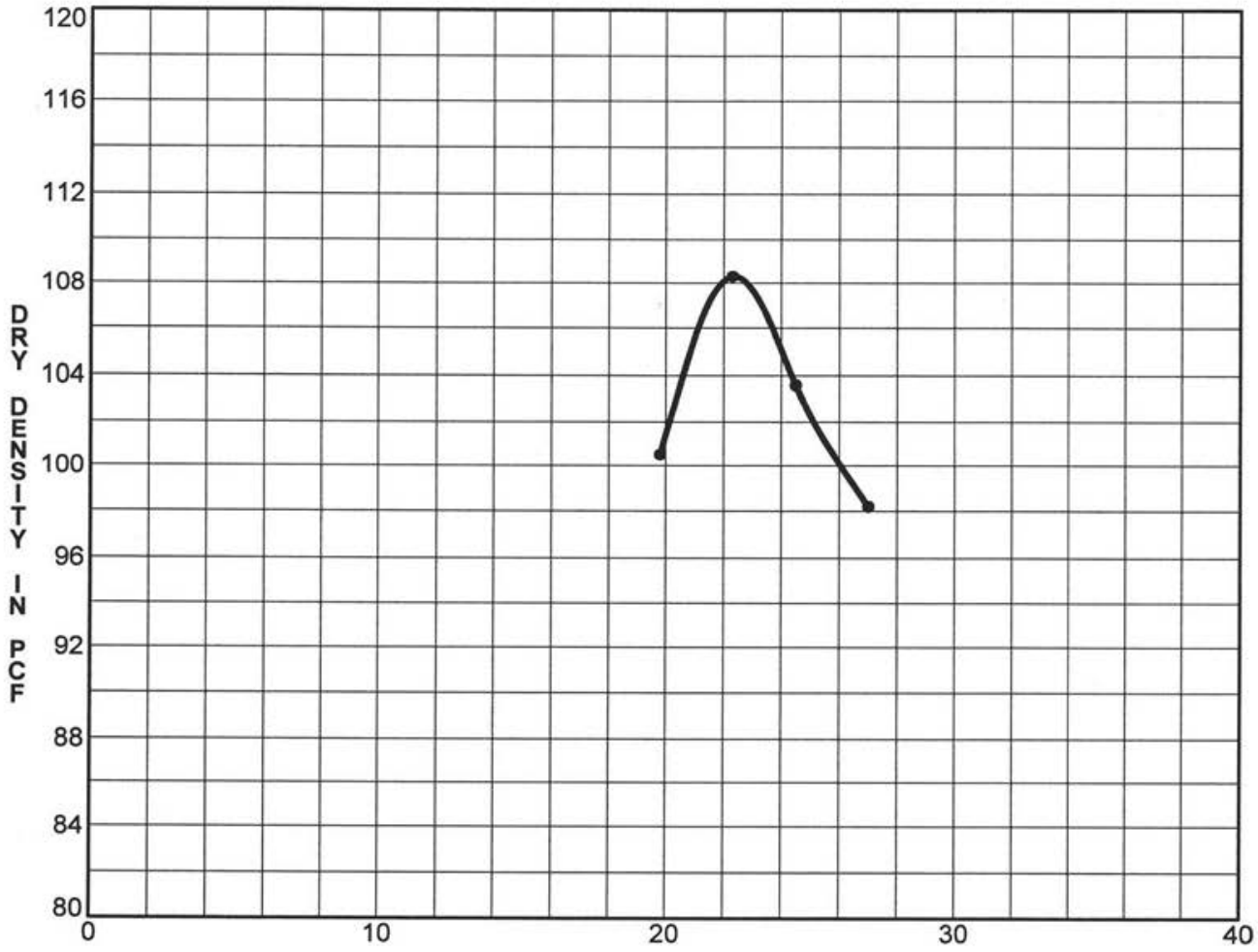
Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 4



Sample Identification	Classification	Method	Maximum Dry Density	Optimum Moisture Content
● E	Reddish Brown Clayey SILT (MH)	ASTM D1557	109 pcf	23%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

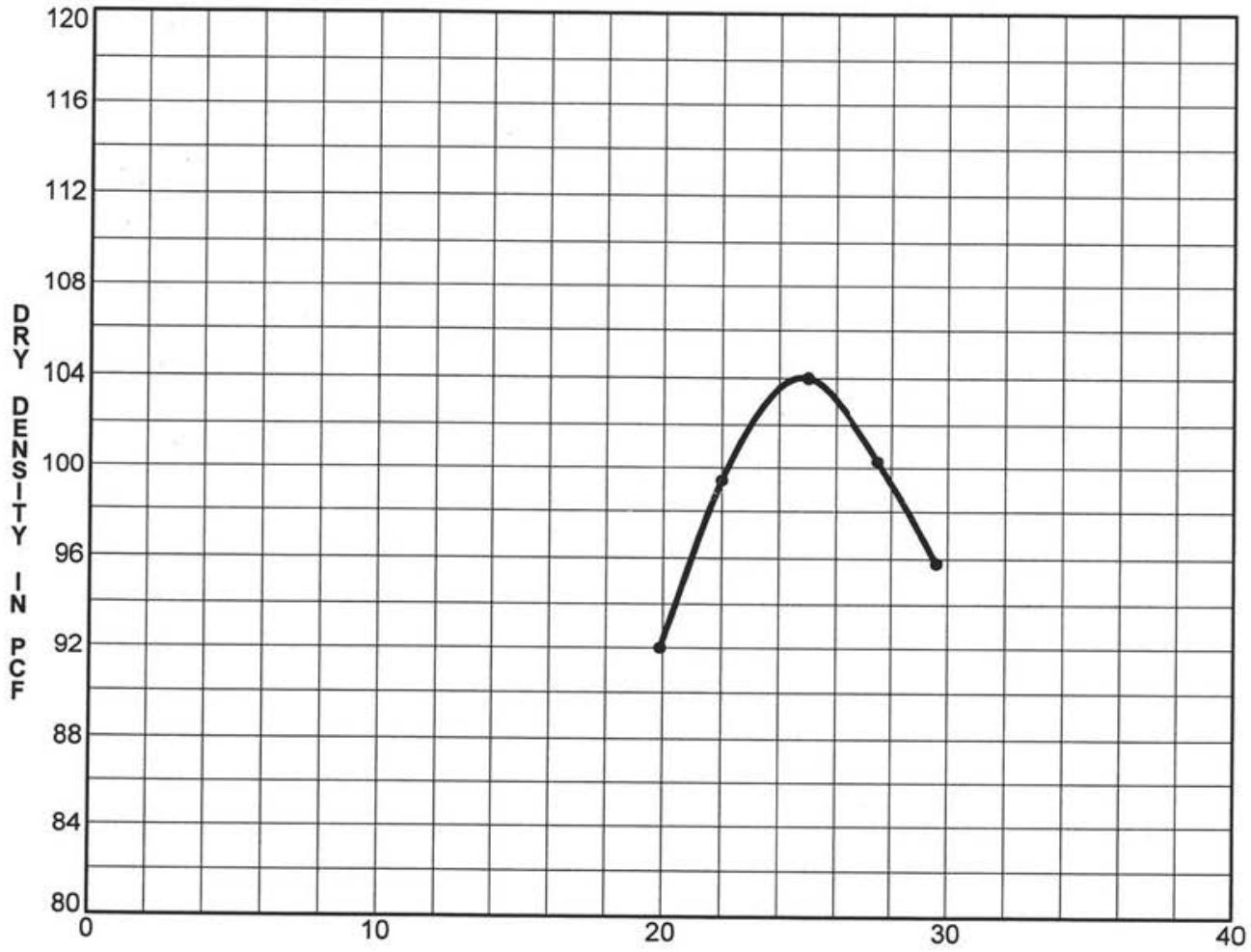
Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 5



Sample Identification	Classification	Method	Maximum Dry Density	Optimum Moisture Content
● G	Dark Brown Clayey SILT (MH)	ASTM D1557	104 pcf	25%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

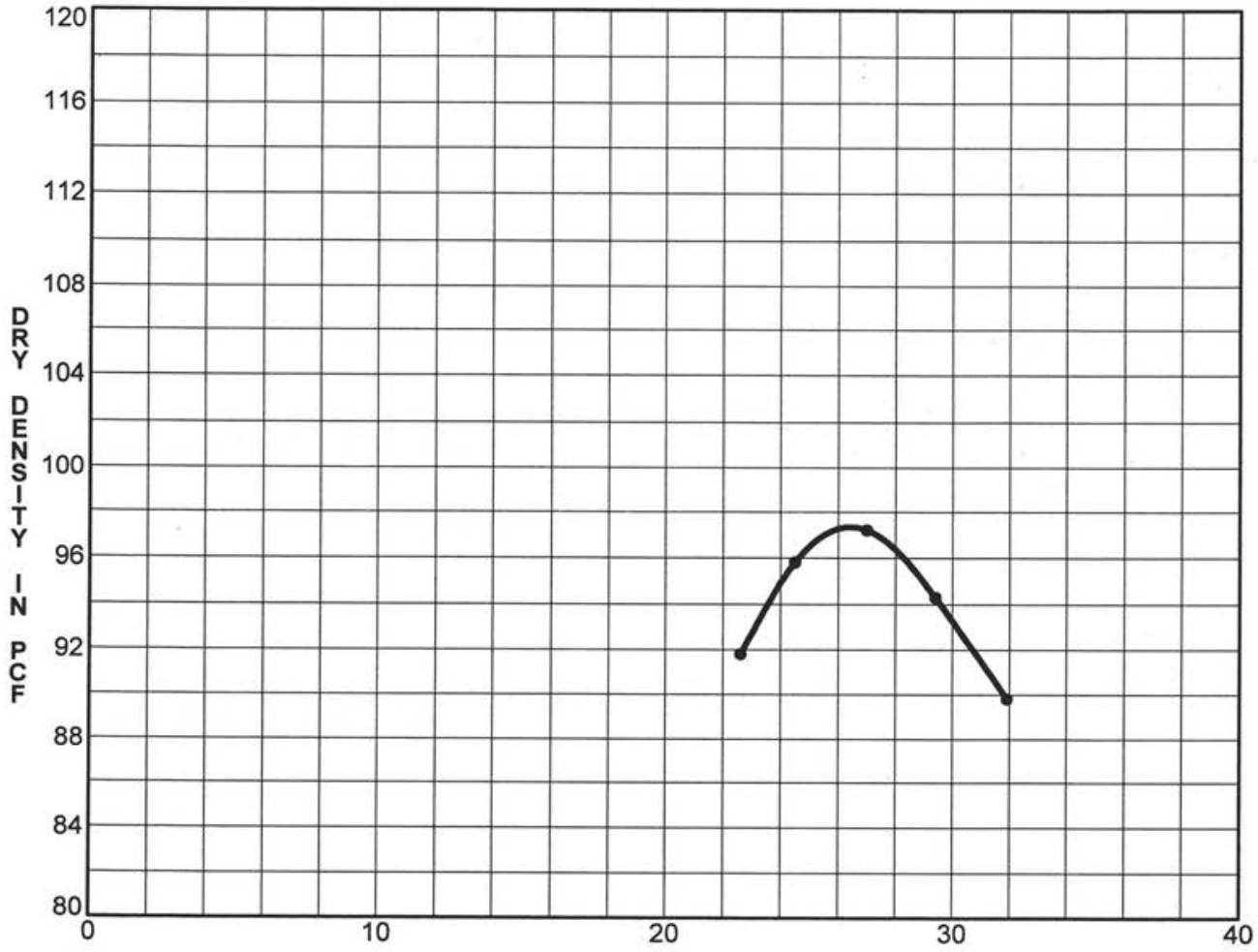
Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 6



Sample Identification	Classification	Method	Maximum Dry Density	Optimum Moisture Content
● H	Dark Brown Clayey SILT (MH)	ASTM D1557	98 pcf	27%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

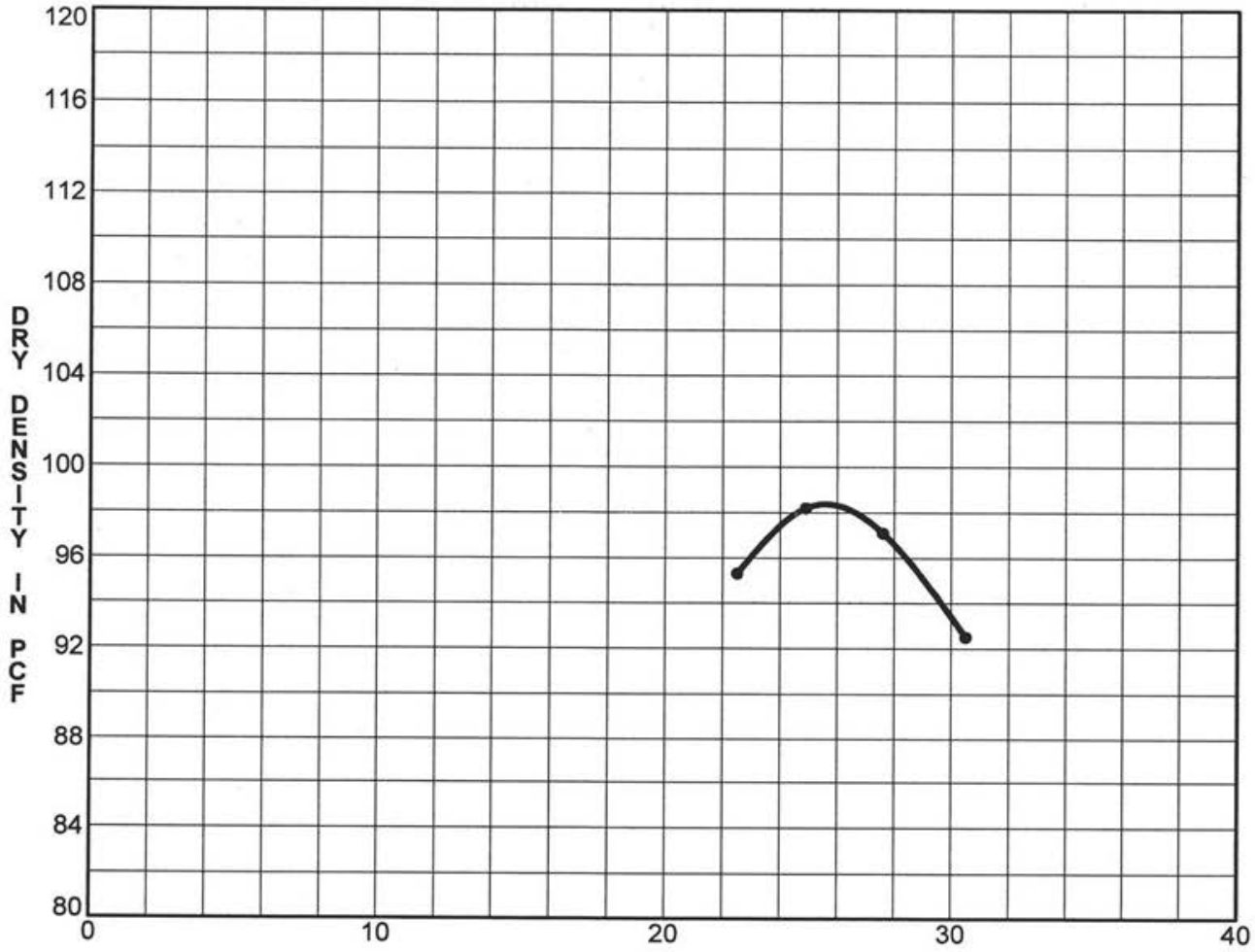
Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 7



Sample Identification	Classification	Method	Maximum Dry Density	Optimum Moisture Content
● I	Dark Brown Clayey SILT (MH)	ASTM D1557	99 pcf	26%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

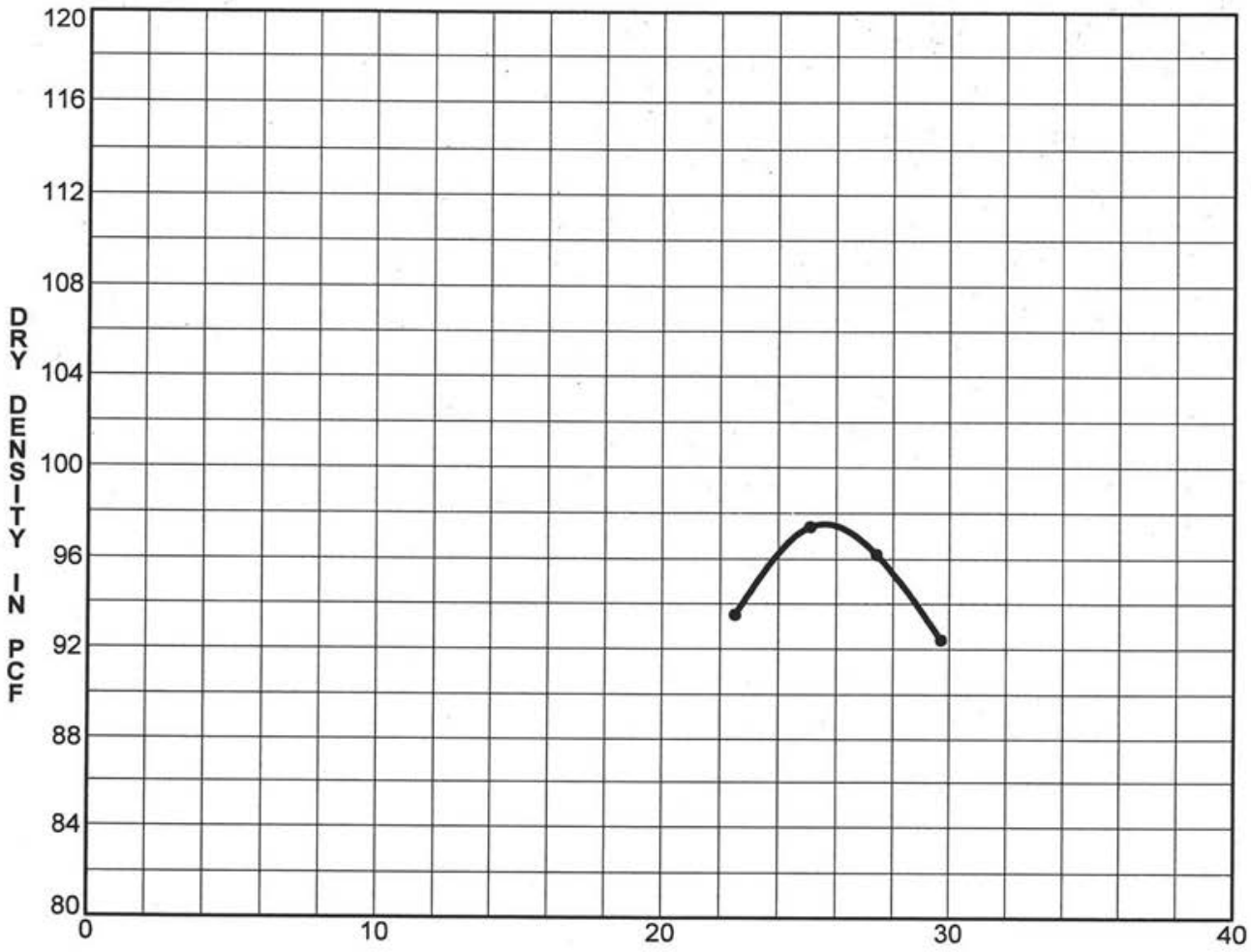
Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 8



Sample Identification	Classification	Method	Maximum Dry Density	Optimum Moisture Content
● J	Brown Clayey SILT (MH)	ASTM D1557	98 pcf	26%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

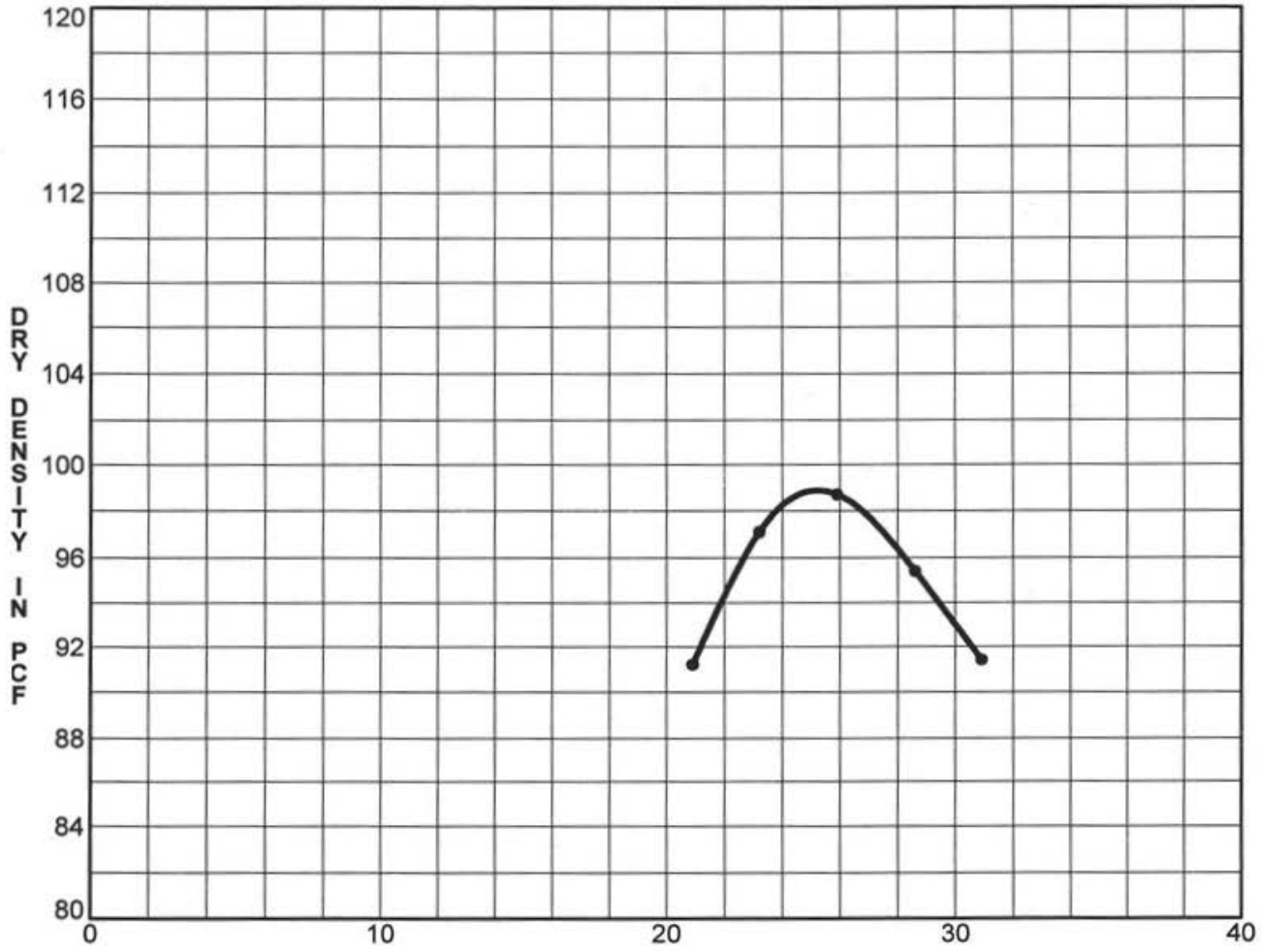
Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 9



Sample Identification		Classification	Method	Maximum Dry Density	Optimum Moisture Content
●	K	Brown Clayey SILT (MH)	ASTM D1557	99 pcf	26%

F.G.E. Ltd.

LABORATORY COMPACTION CURVE

Central Maui Landfill Phase I and II

Puuene, Maui, Hawaii

File: 2667.01

July 2006

Figure 10

LABORATORY COMPACTION TEST

FGE, Ltd.

Test Method: ☐ ASTM D-698- ☐ ASTM D-1557- ☐ AASHTO T-99- ☐ AASHTO T-180- ☐ Other-

Procedure: (A) B C Other

File Number: 26620
Sample ID: L
Prepared By: PS
Ran By: PS
Date: 7/26/02
Checked By: PS

	Notes						
	Water Added (ml)	400	450	500	550	600	Coarse
A	Wt of Mold & Soil (lb)	13.184	13.240	13.234	13.132	12.007	
B	Mold Weight (lb)	9.404	9.404	9.404	9.404	9.404	
C	Soil Weight (lb)	3.780	3.836	3.835	3.728	2.603	
D	Wet Density (pcf)	112.8	114.5	114.5	111.28	107.55	
E	Tare Number	92	27	79	55	42	27
F	Gross Wet Weight (gms)	896.67	536.49	620.92	743.94	534.11	292.93
G	Gross Dry Weight (gms)	773.71	436.69	492.88	574.46	450.38	242.45
H	Tare Weight (gms)	78.49	79.19	76.16	77.50	78.44	79.23
I	Net Dry Weight (gms)	695.22	357.50	416.72	496.96	371.94	163.22
J	Weight of Water (gms)	122.96	99.50	127.54	169.48	83.73	55.48
K	Moisture Content (%)	25.4	27.8	30.6	34.1	22.5	34.0
L	Dry Density (pcf)	89.9	89.6	87.7	83.0	87.8	
M	% of Fine						
N	% of Coarse						
O	Corrected Moisture Content (%)						
P	Corrected Dry Density (pcf)						

Mold Size: ☐ 4-inch ☐ 6-inch

Factors: ☐ f4 = 0.0335 ☐ f6 = 0.0753

Hammer Type: ☐ Manual ☐ Automatic

Rammer Weight: ☐ 5.5 lbs. ☐ 10 lbs.

Drop Height: ☐ 12 inches ☐ 18 inches

Blows per Layer: ☐ 25 ☐ 56

Number of Layers: ☐ 3 ☐ 5

Sieve Size	Wt. Retained	% Retained	Cumulative %
3/4-inch	0 gms	0	0
3/8-inch	0 gms	0	0
No. 4	177 gms	1.8	1.8
< No. 4	9599 gms	98.2	100.0
Total Weight	9776 gms		

Moisture Content (Coarse) %

Specific Gravity (Coarse)

Specific Gravity Determination Method

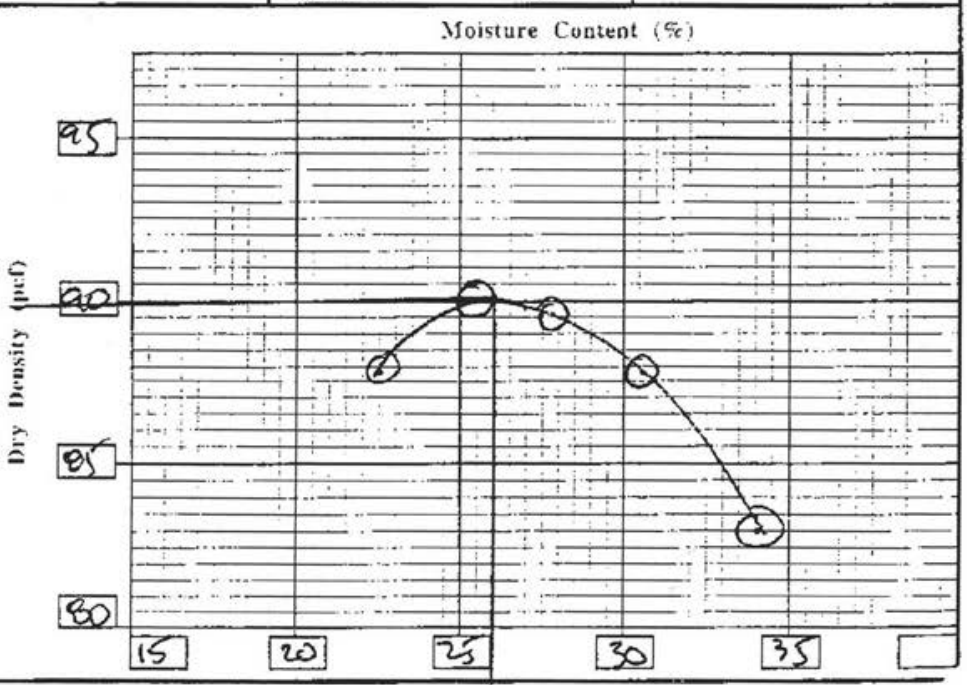
Remarks:
2500 psi
3000 psi

Sample Description:
Brown clayey silt

Source / Location:

Optimum Moisture Content: 26.0 %

Maximum Dry Density: 90.0 pcf



Form "PC-1" (Rev. 4/00)

LABORATORY COMPACTION TEST

FGE, Ltd.

Test Method: ☐ ASTM D-698-____ ☐ ASTM D-1557-____ ☐ AASHTO T-99-____ ☐ AASHTO T-180-____ ☐ Other-____

Procedure: (A) B C Other ____

File Number: 26701
Sample ID: [redacted] M
Prepared By: CC
Ran By: [redacted] CC
Date: 7/28/06
Checked By: ?

	Notes						
	Water Added (ml)	100	60	AR	60	100	Coarse
A	Wt of Mold & Soil (lb)	13.020	13.274	13.365	13.329	13.211	
B	Mold Weight (lb)	9.400	9.402	9.402	9.402	9.402	
C	Soil Weight (lb)	3.620	3.872	3.963	3.926	3.809	
D	Wet Density (pcf)	108.1	115.6	118.3	117.2	113.7	
E	Tare Number	45A	[redacted]18	5A	101	27	92
F	Gross Wet Weight (gms)	780.90	822.97	822.22	817.43	755.14	295.70
G	Gross Dry Weight (gms)	654.73	735.17	504.89	555.59	590.61	248.71
H	Tare Weight (gms)	74.50	[redacted]76.14	75.50	77.54	78.94	78.48
I	Net Dry Weight (gms)	580.23	359.03	429.39	478.05	511.67	170.23
J	Weight of Water (gms)	126.17	87.80	117.83	141.84	164.53	46.99
K	Moisture Content (%)	21.7	24.5	27.43	29.7	32.2	27.6
L	Dry Density (pcf)	88.8	92.9	92.9	90.4	86.0	
M	% of Fine						
N	% of Coarse						
O	Corrected Moisture Content (%)						
P	Corrected Dry Density (pcf)						

Mold Size: ☒ 4-inch ☐ 6-inch

Factors: ☒ f4 = 0.0335 ☐ f6 = 0.0753

Hammer Type: ☐ Manual ☒ Automatic

Rammer Weight: ☐ 5.5 lbs. ☒ 10 lbs.

Drop Height: ☐ 12 inches ☒ 18 inches

Blows per Layer: ☒ 25 ☐ 56

Number of Layers: ☐ 3 ☒ 5

Sieve Size	Wt. Retained	% Retained	Cumulative %
3/4-inch	gms		
3/8-inch	gms		
No. 4	gms		
< No. 4	gms		
Total Weight	gms		

Moisture Content (Coarse) %

Specific Gravity (Coarse)

Specific Gravity Determination Method ____

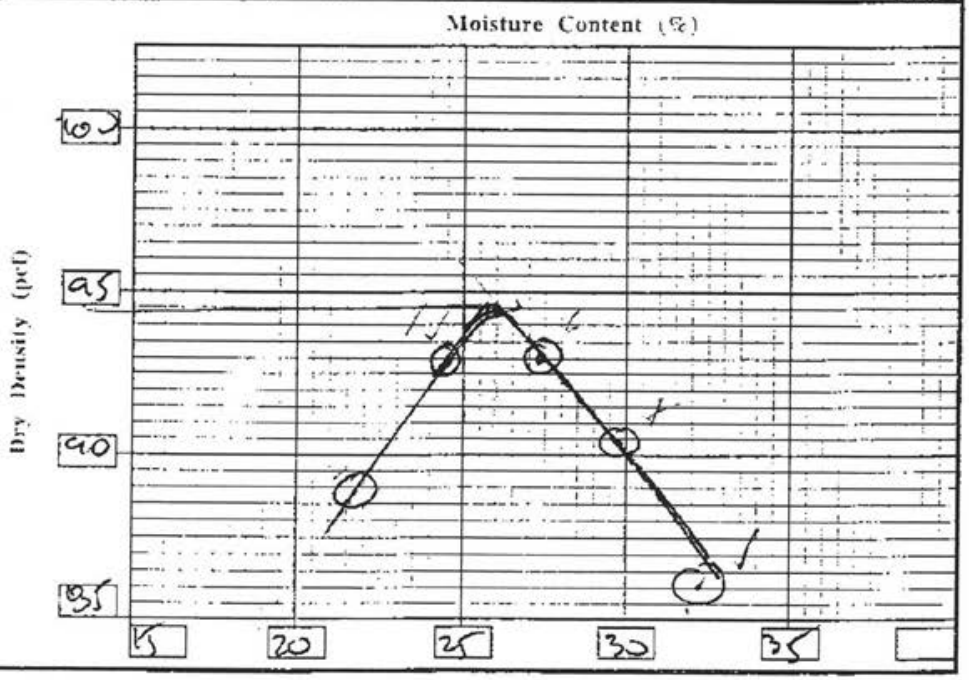
Remarks:
2500 powder
4000 CBR

Sample Description:
Dark Brown
clayey silt

Source / Location:

Optimum Moisture Content
26.0 %

Maximum Dry Density
94.5 pcf



Form 'PC-1' (Rev. 4/00)

LABORATORY COMPACTION TEST

FGE, Ltd.

Test Method: ☐ ASTM D-698-____ ☐ ASTM D-1557-____ ☐ AASHTO T-99-____ ☐ AASHTO T-180-____ ☐ Other-____

Procedure: A (B) C Other ____

File Number: 2667-01
Sample ID: N
Prepared By: CC
Ran By: CC
Date: 8/3/06
Checked By: [illegible]

	Notes					
	Water Added (ml)	AR +60	+120	+180	+240	Coarse
A	Wt of Mold & Soil (lb)	13.357	13.594	13.621	13.462	
B	Mold Weight (lb)	9.400	9.400	9.400	9.400	9.400
C	Soil Weight (lb)	3.957	4.194	4.221	4.062	
D	Wet Density (pcf)	124.1	125.2	126.0	121.3	
E	Tare Number	29	734	GH	13B	92
F	Gross Wet Weight (gms)	979.19	944.33	756.97	617.33	492.59
G	Gross Dry Weight (gms)	765.31	776.70	613.14	494.44	414.31
H	Tare Weight (gms)	79.02	78.54	77.93	77.55	78.44
I	Net Dry Weight (gms) G-H	686.29	698.16	535.21	416.89	335.87
J	Weight of Water (gms) F-G	153.88	167.63	143.78	122.89	78.28
K	Moisture Content (%) J÷I	22.4	24.2	26.9	29.4	23.3
L	Dry Density (pcf) D÷K	96.5	100.8	99.3	93.7	
M	% of Fine					
N	% of Coarse					
O	Corrected Moisture Content (%)					
P	Corrected Dry Density (pcf)					

Mold Size: ☒ 4-inch ☐ 6-inch

Factors: ☒ f4 = 0.0335 ☐ f6 = 0.0753

Hammer Type: ☐ Manual ☒ Automatic

Rammer Weight: ☐ 5.5 lbs. ☒ 10 lbs.

Drop Height: ☒ 12 inches ☒ 18 inches

Blows per Layer: ☒ 25 ☐ 56

Number of Layers: ☐ 3 ☒ 5

Sieve Size	Wt. Retained	% Retained	Cumulative %
3/4-inch	gms		
3/8-inch	gms		
No. 4	gms		
< No. 4	gms		
Total Weight	gms		

Moisture Content (Coarse) %

Specific Gravity (Coarse)

Specific Gravity Determination Method ____

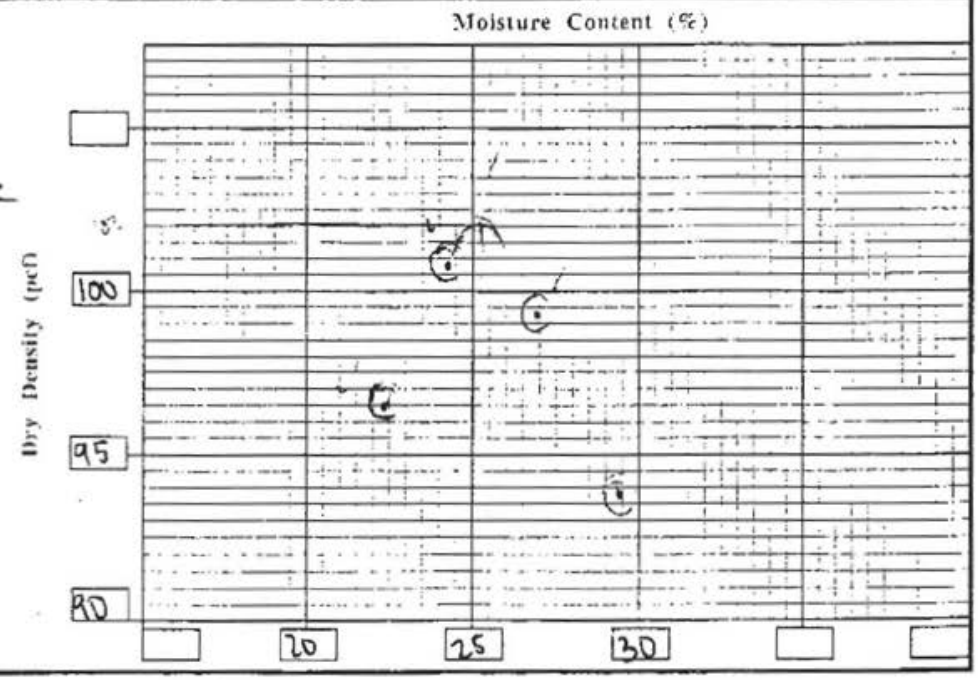
Remarks: 3000 proctor

Sample Description: Brown clayey Silt w/ weathered Gravel Saprolite

Source / Location: <

Optimum Moisture Content: 25.2 %

Maximum Dry Density: 102 pcf



Form "PC-1" (Rev. 4/00)

LABORATORY COMPACTION TEST

FGE, Ltd.

Test Method: ☐ ASTM D-698-____ ☐ ASTM D-1557-____ ☐ AASHTO T-99-____ ☐ AASHTO T-180-____ ☐ Other-____

Procedure: (A) B C Other ____

File Number: 266701
Sample ID: O
Prepared By: CC
Ran By: [illegible]
Date: [illegible]
Checked By: ____

Notes		wo	AR	+60	+120	
Water Added (ml)						Coarse
A Wt of Mold & Soil (lb)		13.100	13.426	13.583	13.489	
B Mold Weight (lb)		9.400	9.400	9.400	9.400	
C Soil Weight (lb)	A - B	3.7	4.03	4.183	4.09	
D Wet Density (pcf)	C ÷ f	110.45	120.18	124.87	122.06	
E Tare Number		29	77	110	GH	S3
F Gross Wet Weight (gms)		574.76	830.85	865.67	698.86	436.19
G Gross Dry Weight (gms)		481.92	678.10	696.13	553.84	362.58
H Tare Weight (gms)		78.95	75.91	78.86	77.97	77.28
I Net Dry Weight (gms)	G - H	402.97	602.19	619.27	475.87	285.3
J Weight of Water (gms)	F - G	92.44	152.75	167.54	143.02	73.61
K Moisture Content (%)	J ÷ I	23.0	25.4	27.0	30.1	25.8
L Dry Density (pcf)	D ÷ I.K	89.8	95.8	98.3	93.8	
M % of Fine						
N % of Coarse						
O Corrected Moisture Content (%)						
P Corrected Dry Density (pcf)						

Mold Size: ☒ 4-inch ☐ 6-inch

Factors: ☒ f4 = 0.0335 ☐ f6 = 0.0753

Hammer Type: ☐ Manual ☒ Automatic

Rammer Weight: ☐ 5.5 lbs. ☒ 10 lbs.

Drop Height: ☐ 12 inches ☒ 18 inches

Blows per Layer: ☒ 25 ☐ 56

Number of Layers: ☐ 3 ☒ 5

Sieve Size	Wt. Retained	% Retained	Cumulative %
3/4-inch	gms		
3/8-inch	gms		
No. 4	gms		
< No. 4	gms		
Total Weight	gms		

Moisture Content (Coarse) %

Specific Gravity (Coarse)

Specific Gravity Determination Method ____

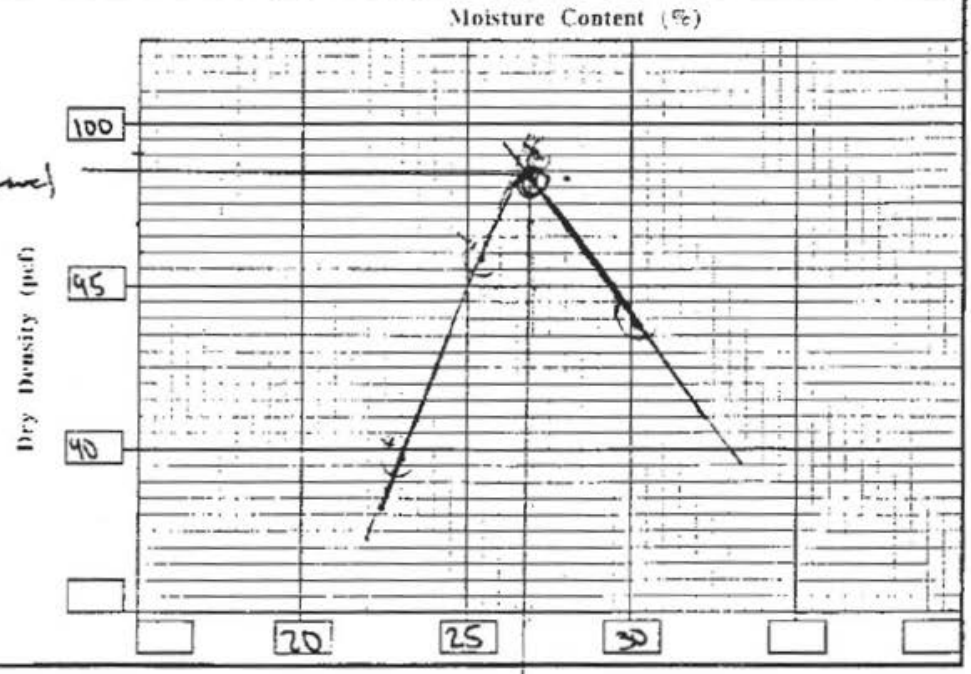
Remarks: 3030 proctor

Sample Description: Reddish Brown Clayey Silt w/ Complete by weathered Granite

Source / Location: ____

Optimum Moisture Content: 22.0 %

Maximum Dry Density: 98.5 pcf



Form TC-1 (Rev. 4/00)

APPENDIX C.2

FINAL COVER FIELD HYDRAULIC CONDUCTIVITY TEST REPORTS

BAT™ Insitu Hydraulic Conductivity Test Data Sheet

Site: Central Maui Landfill
Project: Phase I&II Closure Cup

Location: Mid Slope Bench , South

Test Number:	**BAT-1**	Northing:	-
Date:	12/15/2006	Easting:	-
Tester:	Lee Mehr	Elevation:	285
Depth (m or ft):	-.5'	Test Type:	Outflow
Length (mm):	40	Permeant Type:	Water
Diameter (mm):	30	Initial Temperature (C):	25
Flow Factor (mm):	228.77	Press Calib Factor (m/C):	0
Test Chamber Volume (cm3):	34	Static Pore Pressure (m):	-0.02
Initial Permeant Volume (cm3):	34	Initial Test Pressure (m):	6.48
Initial Gas Volume (cm3):	63	80% Recovery Pressure (m):	1.28
Test Chamber X-Area (cm2):	1.96	Limiting Pressure:	0.5878
Initial Permeant Level (m):	0.39		

12/15/2006 15:37:00 PM

Time:	Pressure:	Temperature:	Hydraulic Conductivity
30	6.45	25	9.53E-08
120	6.42	25.1	6.58E-08
300	6.36	24.9	6.33E-08
600	6.27	24.6	5.94E-08
1200	6.11	24.5	5.19E-08
1800	6	24.6	5.22E-08
2400	5.87	24.3	5.32E-08
3000	5.76	24.4	5.23E-08
3600	5.64	24	3.56E-07
4200	5.51	23.6	-4.03E-07
4800			

Actual Volume Change: 6
Calculated Volume Change: 1.63

Final Calculated Hydraulic Conductivity: **5.23E-08**

Notes:

BAT™ Insitu Hydraulic Conductivity Test Data Sheet

Site: Central Maui Landfill
Project: Phase I&II Closure Cup

Location: Northeast Slope

Test Number:	**BAT-2**	Northing:	-
Date:	12/16/2006	Easting:	-
Tester:	Lee Mehr	Elevation:	265
Depth (m or ft):	-.5'	Test Type:	Outflow
Length (mm):	40	Permeant Type:	Water
Diameter (mm):	30	Initial Temperature (C):	23.3
Flow Factor (mm):	228.77	Press Calib Factor (m/C):	0
Test Chamber Volume (cm3):	34	Static Pore Pressure (m):	-0.02
Initial Permeant Volume (cm3):	34	Initial Test Pressure (m):	7.68
Initial Gas Volume (cm3):	63	80% Recovery Pressure (m):	1.52
Test Chamber X-Area (cm2):	1.96	Limiting Pressure:	1.3672
Initial Permeant Level (m):	0.39		

12/15/2006 15:37:00 PM

Time:	Pressure:	Temperature:	Hydraulic Conductivity
30	7.67	23.1	8.45E-08
120	7.63	23.1	7.26E-08
300	7.56	23.1	4.61E-08
600	7.49	23.7	2.27E-08
1200	7.46	24.6	1.07E-08
1800	7.5	25.1	1.62E-08
2400	7.52	25.9	1.60E-08
3000	7.49	24.8	2.88E-08
3600	7.36	24.5	3.04E-07
4200	7.29	26.2	-4.04E-07
4800			

Actual Volume Change: 0
Calculated Volume Change: 0.89

Final Calculated Hydraulic Conductivity: **1.07E-08**

Notes:

BAT™ Insitu Hydraulic Conductivity Test Data Sheet

Site: Central Maui Landfill
Project: Phase I&II Closure Cup

		Location:	Northeast Slope
Test Number:	**BAT-3**	Northing:	Clay Liner Floor
Date:	12/16/2006	Easting:	
Tester:	Lee Mehr	Elevation:	280
Depth (m or ft):	-.5'	Test Type:	Outflow
Length (mm):	40	Permeant Type:	Water
Diameter (mm):	30	Initial Temperature (C):	25.3
Flow Factor (mm):	228.77	Press Calib Factor (m/C):	0
Test Chamber Volume (cm3):	34	Static Pore Pressure (m):	-0.1
Initial Permeant Volume (cm3):	34	Initial Test Pressure (m):	6.17
Initial Gas Volume (cm3):	63	80% Recovery Pressure (m):	1.154
Test Chamber X-Area (cm2):	1.96	Limiting Pressure:	0.3865
Initial Permeant Level (m):	0.39		

12/15/2006 22:35 Time:	Pressure:	Temperature:	Hydraulic Conductivity
30	6.14	23.1	1.69E-07
120	6.08	23.1	1.12E-07
300	5.99	23.1	3.81E-08
600	5.92	23.7	1.07E-08
1200	5.99	24.6	2.72E-08
1800	6.01	25.1	3.25E-07
2400	6.01	25.9	3.35E-07
3000	5.77	24.8	6.57E-07
3600	5.68	24.5	1.34E-06
4200			
4800			

Actual Volume Change:	0
Calculated Volume Change:	5.82

Final Calculated Hydraulic Conductivity: **1.07E-08**

Notes:

BAT™ Insitu Hydraulic Conductivity Test Data Sheet

Site: Central Maui Landfill
Project: Phase I&II Closure Cup

Location: Top Deck

Test Number:	**BAT-4**	Northing:	Clay Liner Floor
Date:	12/16/2006	Easting:	
Tester:	Lee Mehr	Elevation:	315
Depth (m or ft):	-.5'	Test Type:	Outflow
Length (mm):	40	Permeant Type:	Water
Diameter (mm):	30	Initial Temperature (C):	25.7
Flow Factor (mm):	228.77	Press Calib Factor (m/C):	0
Test Chamber Volume (cm3):	34	Static Pore Pressure (m):	-0.16
Initial Permeant Volume (cm3):	34	Initial Test Pressure (m):	6.42
Initial Gas Volume (cm3):	63	80% Recovery Pressure (m):	1.156
Test Chamber X-Area (cm2):	1.96	Limiting Pressure:	0.5489
Initial Permeant Level (m):	0.39		

12/16/2006 13:05:00 PM

Time:	Pressure:	Temperature:	Hydraulic Conductivity
30	6.39	25.9	2.02E-07
120	6.32	26	6.94E-08
300	6.26	25.8	4.03E-08
600	6.19	25.5	2.07E-08
1200	6.15	26.2	2.33E-08
1800	6.09	24.9	2.37E-08
2400	5.97	24.1	2.24E-08
3000	5.87	24.9	2.30E-08
3600	5.87	24.8	3.17E-07
4200	5.86	25.2	-3.73E-07
4800			

Actual Volume Change: 0
Calculated Volume Change: 1.07

Final Calculated Hydraulic Conductivity: **2.07E-08**

Notes:

APPENDIX D

CONTRACTOR'S MATERIAL CONFORMANCE SUBMITTALS

D.1 Monolithic Final Cover Soil Source Conformance Tests

D.2 Drainage Media for Leachate Collection Manhole

D.3 Road Base Aggregate

D.4 Asphalt Paving Mix

SUMMARY OF LABORATORY TEST RESULTS

Goodfellow Brothers, Inc.
Central Maui Landfill Phases 1&2 Closure
Puunene, Maui, Hawaii

SAMPLE NO.	HC&S Borrow Site Bulk #1 (3.5 – 5.0 feet)	HC&S Borrow Site Bulk #2 (8.0 – 10.0 feet)		
DESCRIPTION	Red brown sandy CLAY (CL)	Dark brown clayey SAND with gravel. (SC)		
GRADING ANALYSIS (ASTM C136 & C117)				
Sieve Size	Percent Passing by Weight (%)		Spec.	
2½"				
2"				
1½"		100	100	
1"		97.8		
¾"		95.2		
#4	100	75.7		
#10	99.8	66.0		
#20	98.4	55.2		
#40	94.8	46.6		
#100	85.6	35.4		
#200	79.6	29.4	25 Min	
ATTERBERG LIMITS (ASTM D 4318)				
Air Dried or Natural	Natural	Natural		
Liquid Limit	67	52		
Plastic Limit	33	24		
Plasticity Index	34	28		
MOISTURE-DENSITY RELATIONS TEST (ASTM D 1557-01)				
Maximum Dry Density, pcf	66.0	103.0		
Optimum Moisture, %	33.5	22.9		
HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS (ASTM D 5084)				
Average k (cm/s)	$7.9X10^{-8}$	$2.1X10^{-6}$	$1X10^{-5}$ Max	

SUMMARY OF LABORATORY TEST RESULTS

HC&S Monolithic Final Cover (MFC)
Puunene Quarry
Puunene, Maui, Hawaii

SAMPLE NO.	Cover Material A			
DESCRIPTION	Dark brown-black silty CLAY with organics. (CH)			

GRADING ANALYSIS (ASTM C136 & C117)

Sieve Size	Percent Passing by Weight (%)			
2½"				
2"				
1½"				
1"				
¾"				
#4	100			
#10	98.9			
#20	95.8			
#40	93.9			
#100	91.1			
#200	88.8			

ATTERBERG LIMITS (ASTM D 4318)

Air Dried or Natural	Natural	Oven Dried to Determine Organic Properties		
Liquid Limit	62	57		
Plastic Limit	29			
Plasticity Index	33			

MOISTURE-DENSITY RELATIONS TEST (ASTM D 1557-01)				
Maximum Dry Density, pcf	85.0			
Optimum Moisture, %	28.0			
SAND EQUIVALENT, %	18			

W.O. 5090-00

February 22, 2006

ASTM D 2419/AASHTO T-176				
HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS (ASTM D 5084)				
Average k (cm/s)	4.5×10^{-8}			

County of Maui Department Of Public Works and Waste Management
Kalana O Maui Building, 6th Floor
200 South High Street
Wailuku, Maui, HI 96793
Attn: Michael Kehano

Submittal # 016c/d Revision 2

Date: 6/6/2006

Contractor: **GOODFELLOW BROS., INC**

Project: **Central Maui Landfill**

This submittal has been checked by this contractor. It is certified correct, complete, and in compliance with contract drawings and specifications.

DATE RECEIVED: 6/6/2006

SPECIFICATION SECTION # 2600

SPECIFICATION PARAGRAPH #: II-D

DRAWING NUMBER: Sheet 13, "New Manhole #4"

SUBCONTRACTOR NAME: N/A

SUPPLIER NAME: Ameron

MANUFACTURER NAME: Ameron

COMMENTS: The following specifications will be used in procuring aggregate draining layer material for the proposed leachate manhole, specifically the 2' area immediately surrounding the 18" HDPE pipe. Geotextile fabric will still be used where specified.

CERTIFIED BY: Michael Harrell

AMERON
HAWAII
Quality Assurance Laboratory
Aggregate Physical Series Report

	MATERIAL					
	4C- ASTM #4					
Date Sampled:	5/06					
Sieve Number	% Pass	Spec.	% Pass	Spec.	% Pass	Spec.
2	100	100				
1 1/2	97	90-100				
1	49	20-55				
3/4	13	0-15				
1/2	1.3					
3/8	1.2	0-5				
AASHTO T 96 (500 Rev)	14					

Remarks:

David Cabral
Technical Services Supervisor

County of Maui Department Of Public Works and Waste Management
Kalana O Maui Building, 6th Floor
200 South High Street
Wailuku, Maui, HI 96793
Attn: Michael Kehano

Submittal #009

Date: 4/27/2006

Contractor: **GOODFELLOW BROS., INC**

Project: **Central Maui Landfill**

This submittal has been checked by this contractor. It is certified correct, complete, and in compliance with contract drawings and specifications.

DATE RECEIVED: 4/27/06

SPECIFICATION SECTION # 2500

SPECIFICATION PARAGRAPH #: II-A

DRAWING NUMBER: N/A

SUBCONTRACTOR NAME: N/A

SUPPLIER NAME: Ameron

MANUFACTURER NAME: Ameron

COMMENTS: These specifications apply to the 12" AB as well as the 8" AB sub-asphaltic base course layer(s).

Please review and comment.

CERTIFIED BY: Michael Harrell

AMERON
HAWAII
Quality Assurance Laboratory
Aggregate Physical Series Report

	MATERIAL					
	UTB					
Date Sampled:	2/06					
Sieve Number	% Pass	Spec.				
2	100	100				
1 1/2	100	90-100				
1	93					
3/4	81	50-90				
1/2	69					
3/8	60					
4	39	25-50				
AASHTO T11	4.2	3-9				
AASHTO T 96	14	0-50				
HWY-TC 4	5%	0-25				
AASHTO T 176	69	>35				
AASHTO T 90	Nonplastic	0-6				

Remarks:

David Cabral
Technical Services Supervisor

County of Maui Dept. Of Public Works and Waste Management
Kalana O Maui Building, 6th Floor
200 South High Street
Wailuku, Maui, HI 96793
Attn: Michael Kehano

Date: 6/7/2006 **Submittal #: 20, Asphalt Paving and Mix design**

CONTRACTOR: **GOODFELLOW BROS., INC**
PROJECT: **Central Maui Landfill Phase I and II Closure**

DATE RECEIVED: 6/7/2006
SPEC SECTION #: 2500
SPEC PARAGRAPH #: Part II
DRAWING NUMBER: N/A
SUBCONTRACTOR: N/A
SUPPLIER: Rimrock Paving Co.
MANUFACTURER: Rimrock Paving Co.

COMMENTS: Goodfellow Brothers Inc. submits that the following material specifications meet or exceed the current designs called out for asphaltic concrete paving material.

Table of Contents: (TOC)

CERTIFIED BY: Michael Harrell

This submittal has been checked by this contractor. It is certified correct, complete, and in compliance with contract drawings and specifications. Please review and comment.

Rimrock Paving Company

381 HUKU LI'I PLACE, SUITE 201 • P.O. BOX 220 • (808) 875-4589 • FAX (808) 874-5696 • KIHEI, MAUI, HAWAII 96753

TO: Goodfellow Jobsite Trailer~ R&T Park DATE: May 24, 2006

ATTN: Mike Harrell/Cost Engineer Rimrock Job No. 5787

FROM: Lucia Gouveia / Office Manager

SUBJECT: CENTRAL MAUI LANDFILL GBI/6449

We are transmitting the following:				VIA:	
	CONTRACT	XX	SUBMITTALs see below	XX	ENCLOSED
	PLANS		PURCHASE ORDER#		SEPARATE COVER
	SPECIFICATIONS		CHANGE ORDER #	XX	MAIL interoffice
	SHOP DRAWINGS		WORK ORDER #		MESSENGER
	BROCHURES				PICK-UP
	SAMPLES				
	ESTIMATES				

DESCRIPTION

1) Mix Design for Mix V
2) Certification for PG64-16
3) Certification for SS-1H

These are transmitted as checked below:			
XX	APPROVAL		
	APPROVED AS SUBMITTED		
	APPROVED AS NOTED		
	REVISE & RESUBMIT		
XX	YOUR INFORMATION		
XX	AS REQUESTED		
	REVIEW & COMMENT		
	SIGNATURE		
XX	YOUR FILES		
	QUOTATION		

CC: file

Remarks

Construction Engineering Labs

96-1173 Waihona St., Unit B-7, Pearl City, Hawaii 96782
Ph: 808-455-1612 • Ph2: 800-772-1910
Fax: 808-455-1384 • Email: cel-admin@hawaii.rr.com

ASPHALTIC CONCRETE MIX DESIGN
Transmittal Form

Project: Mix Submittal
Contract No.:
Prime Contractor: Rimrock Paving
Subcontractor:
Asphaltic Concrete Mix Type: State V
Source of Aggregate: Rimrock Maui
Work Order No.: 05057

AGGREGATE SIZE	MIX PERCENTAGE
3-COARSE	____ %
3-PINE	____ %
CHIPS	50 %
4-FINE	50 %
SAND (SP)	____ %
MINERAL FILLER	____ %

MINIMUM LAYDOWN TEMP: 250 f
ASPHALT CEMENT: PG 64-16
ASPHALT SOURCE: CHEVRON
METHOD OF DESIGN: MARSHALL
NUMBER OF BLOWS: 75 PER SIDE
ASPHALT CEMENT CONTENT.: 6.2 TOTAL WEIGHT OF MIX
6.6 DRY WEIGHT OF AGGREGATE

Attachments:

(X) Mix formula (Screen Combination Sheet - A.C.)
(X) Test Property Curves
(X) Computation of Mix Properties
( ) Aggregate Qualification Test Results
(X) Gradation Chart

CONSTRUCTION ENGINEERING LABS, INC.

BY: Ronald A. Pickering II
ITS: Vice President Operations

April 24 2006
DATE

AGGREGATE GRADATION & BLENDING SHEET

Project: Mix Submittal
Plant: Rimrock Maui
Date: 4/6/06

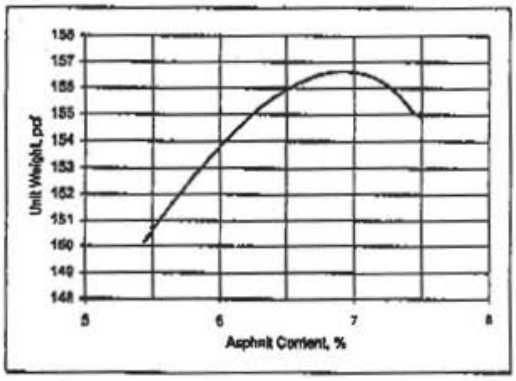
W.O. No.: 05057
Mix Type: State V
Notes:

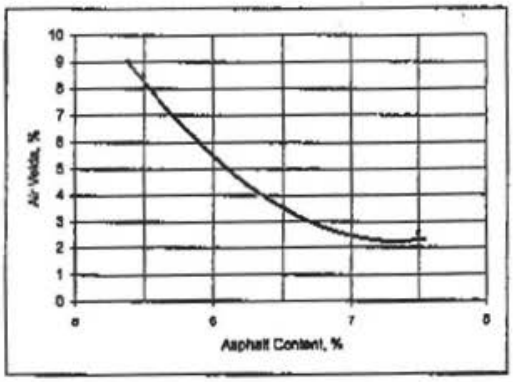
Sieve Size		1 1/4"	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
Material	Percent Used	Percent Passing											
Chips	30	100	100	100	100	87	19	2	0.8	0	0	0	0
4 Fine	70	100	100	100	100	100	99.5	70	42	27	18	12	9
	0	0	0	0	0	0	0	0	0				
	0	0	0	0	0	0	0	0	0	0	0	0	0
Combined Gradation		100	100	100	100	96	75	50	30	19	13	8	6
Specifications (Low)		100	100	100	100	80	55	35	22	14	8	6	4
Specifications (High)		100	100	100	100	100	75	52	38	26	20	15	8
Tolerance		+/- 7	+/- 7	+/- 7	+/- 7	+/- 7	+/- 7	+/- 4	+/- 4	+/- 4	+/- 4	+/- 4	+/- 2

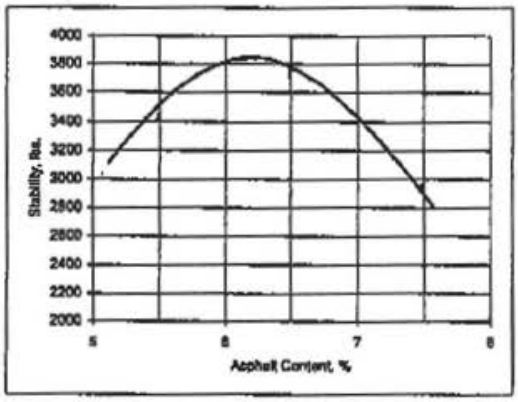
Test Property Curves

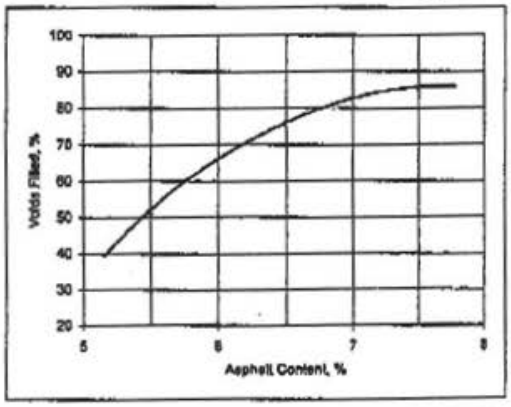
Asphalt Content (T.W.M.)		5.5	6.5	7.5	
Unit Weight , pcf		150.7	156.0	155.0	
Air Voids (T.W.M.), %		8.4	3.5	2.6	
V.M.A., %		17.0	15.0	16.4	
Voids Filled, %		51	76	84	
Stability, lbs.		3412	3784	2945	
Flow, 1/100in.		11	13	15	

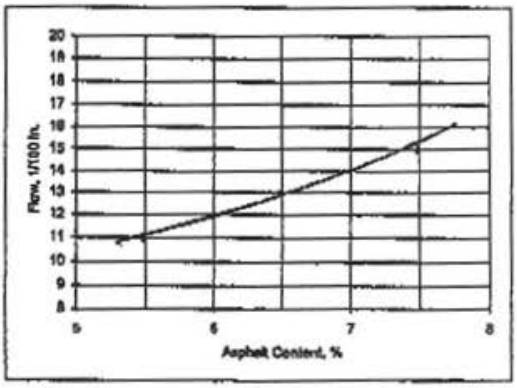
Optimum Asphalt Content = 6.2% T.W.M.
= 6.6% D.W.A.

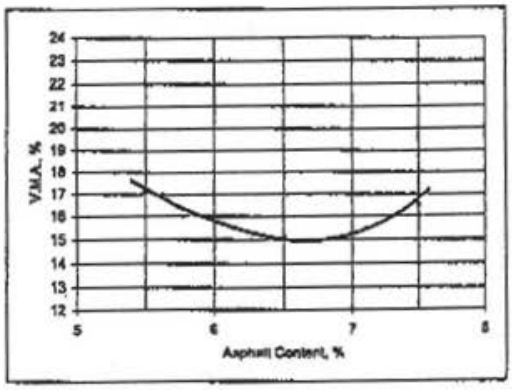






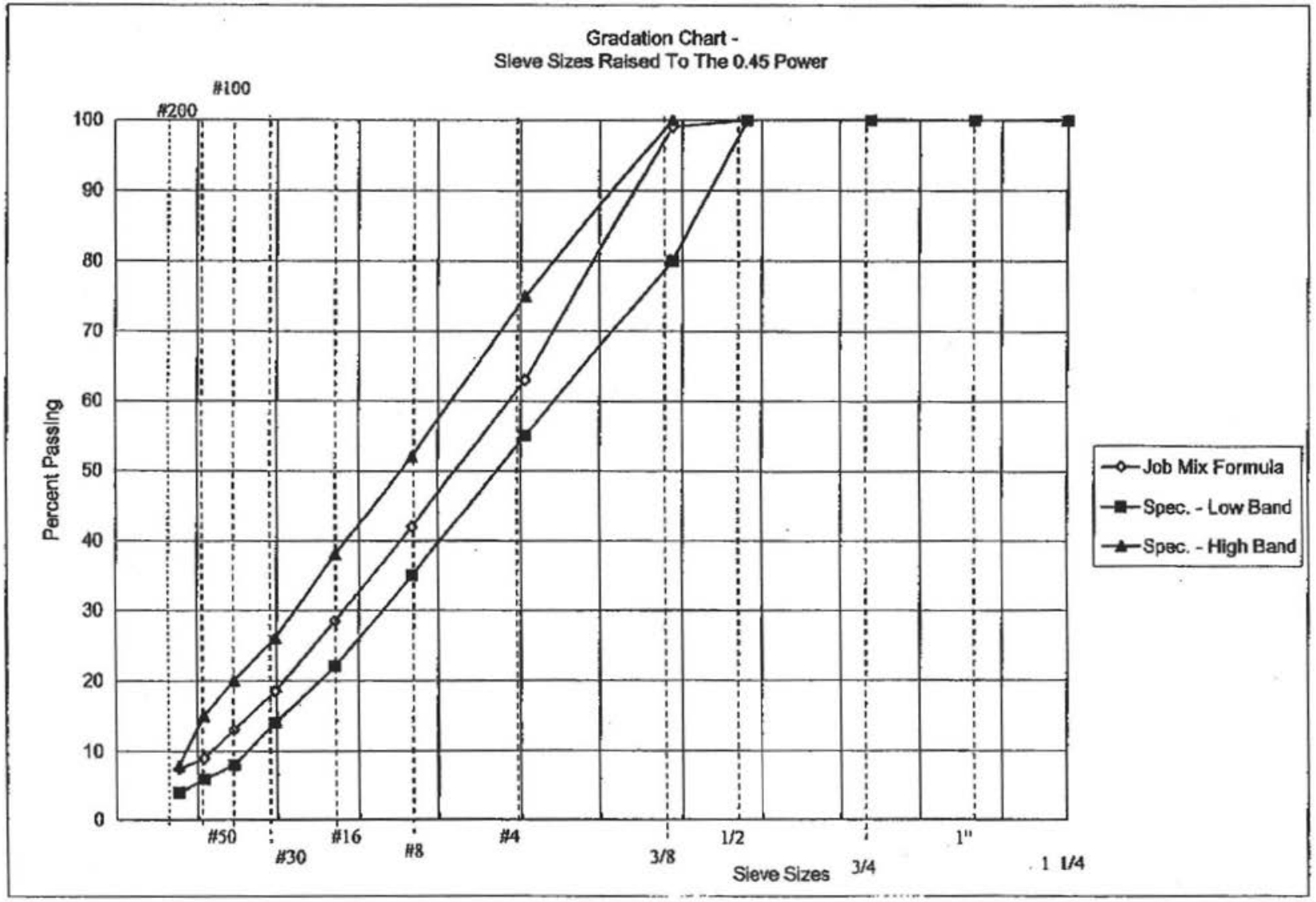






Marshall Mix Design Properties

Project: Mix Submittal							W.O. No.: 05057						Date: 4/24/06		
Description of Blend: Chips 50% , 4 Fine 50% ,							Plant: Rimrock Maui						Mix Type: State V		
Sample	Asphalt	Wt. in Air	Wt. in	Wt. SSD	Volume	BSG	Unit Wt.	Maximum	A.C. By	Air Voids	VMA	Voids	Measured	Corrected	Flow
I.D.	Content	(g)	Water (g)	(g)	(cc)		(pcf)	(Rice)	Volume (%)	(%)	(%)	Filled	Stability	Stability	(1/100 in.)
1	5.5	1130.7	667.9	1136.7	468.8	2.412		2.635					3251	3569	11
2		1197.8	713.0	1208.5	495.5	2.417							3133	3255	11
3		1154.3	681.0	1159.4	478.4	2.413							3227	3472	10
Avg.					480.9	2.415	150.7		13.020	8.4	17.0	51	3192	3412	11
1	6.5	1231.5	743.0	1231.9	488.9	2.519		2.592					3604	3795	12
2		1221.8	730.0	1222.9	492.9	2.479							3509	3665	13
3		1154.2	700.0	1161.0	461.0	2.504							3486	3893	13
Avg.					480.9	2.500	156.0		15.934	3.5	15.0	76	3533	3784	13
1	7.5	1154.8	690.9	1154.9	464.0	2.489		2.550					2756	3058	16
2		1139.3	682.0	1139.3	457.3	2.491							2638	2970	15
3		1208.1	721.2	1209.6	488.4	2.474							2662	2806	15
Avg.					469.9	2.485	155.0		18.269	2.6	16.4	84	2686	2945	15
Gse = 2.9030327															


Gradation Chart -
Sieve Sizes Raised To The 0.45 Power
#100
#200
100
90
80
70
60
50
40
30
20
10
0
Percent Passing
#50
#30
#16
#8
#4
3/8
1/2
3/4
1"
1 1/4
Sieve Sizes
Job Mix Formula
Spec. - Low Band
Spec. - High Band

Tesoro Hawaii Corporation
91-325 Komohana Street, Kapolei, HI 96707
Phone: (808)547-3932 Fax: 547-3939

TESORO

Certificate of Quality #18056

Product:	**PG Binder, PG 64-16**	**Report Date:**	**March 22, 2006**
Crude Source:	**Oriente, Arab Extra Light, Hungo**		

Tank Number:	**TK-513**
Sample Date:	**7-MAR-2006**
Date Tested:	**7-MAR-2006**
Sample ID#:	**580237**

Method	Test	Specs	Result
D70/T228	Specific Gravity, 77/77 Deg.F	Report	1.016
D92/T48	Flash Point, COC.	230 min	321 Deg.C
D4402/T316	Rotational Viscosity, 135C	3 max	0.455 Pa.s
D2171/T202	Viscosity @ 140 F, 300mm Hg	Report	3132 poise
T315	Dynamic Shear, G*/sin d, 64C, Orig.	1.00 min	2.065 kPa
D2872/T240	Rolling Thin Film Oven Test:		
D2872/T240	Mass loss after RTFO	1.00 max	0.253 wt%
Calculation	Estimated Viscosity @ 140 F, After Loss	Report	9083 poise
T315	Dynamic Shear, G*/sin d, 64C, RTFO	2.20 min	5.769 kPa
D6521/R28	Pressure Aging Vessel, 100C:		
T315	Dynamic Shear, G* sin d, 28C, PAV	5000 max	2780 kPa
D6648/T313	Bending Beam, Creep Stiffness (S), -6C	300 max	86.0 MPa
D6648/T313	Bending Beam, m-Value, -6C	0.300 min	0.338

PG Testing performed by ITS Caleb Brett, Essington, PA

The above tests meet AASHTO M-320 Certification

Approved: _____
Barry Y. Toshi
Laboratory Supervisor

Binder [redacted]

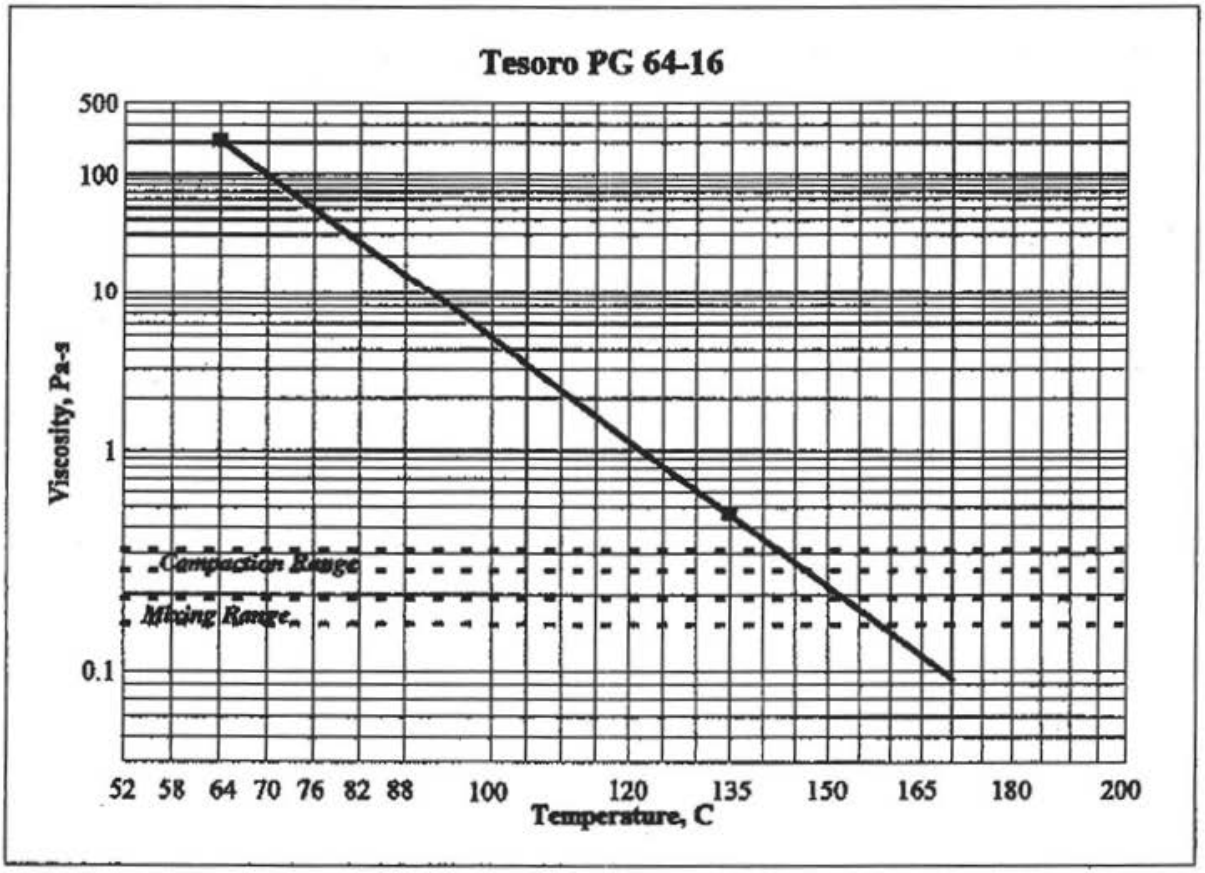
Temp (C)	Viscosity (cp)
[redacted]	

Mixing Temperature Range, C	155 - 158
Compaction Temperature Range, C	142 - 147
Mixing Temperature Range, F	307 - 317
Compaction Temperature Range, F	288 - 296

DSR (*Do not enter if using two RV measurements*)

Temperature, C [redacted]

G*/sin δ (kPa) [redacted] (program multiplies kPa @ 10 rad/sec by 100 to convert to Pa-s)



Chevron Products Company
91-480 Malakole Street
Kapolei, HI 96707
Phone No. 808 682-3141
Fax No. 808 682-2375

Chevron

Rimrock Paving
P.O. Box 220
Kihei, Maui, HI 96753

Gentlemen:

This is to certify that our product, Bituminis Emulsified Asphalt SS-1H complies with the requirements of ASTM D977 and AASHTO M-140. Test results of Batch 2006 00010 enclosed.

If you have any questions please feel free to contact me.

Sincerely,

Keith Takekawa
Territory Manager

State of Hawaii

County of Honolulu

Subscribed and sworn/affirmed to before me this 19 day of May,

2006, by Keith Takekawa.

DEBRA H. OKUHARA-KIM ★ NOTARY PUBLIC ★ STATE OF HAWAII L.S.

Debra H. Okuhara-Kim - Notary Public

My Commission Expires: November 28, 2008

CHEVRON PRODUCTS COMPANY
HAWAII

SLOWSET
EMULSION ASPHALT SS 1-H

Certificate of Analysis

Sampled : 04/12/2006 07:00:00
Batch Finished: 04/14/2006 05:20:58
Report Generated: 04/14/2006 05:40:55

Predictive Model Number: N/A
Batch No: SLOWSET_2006_00010
Vessel: TANK-184
Samples: 106886

Method	Description	Unit of Measure	Result	Specification
D44	Sieve Test	%	0.01	MAX 0.10
D88	Saybolt Viscosity Furol @77F	cSt	25.8	20 - 100
D244	Storage Stability 24 Hours	%	0.3	MAX 1.0
D244	Residue by Distillation	%	60.4	MIN 57
D5	Penetration	mm	57.0	50 - 120

I certify that above material meets prescribed requirements.

JASON PANG — 4/14/2006 05:41:07

Company Representative — Date/Time

Comments:
Spec. Comments: