DESIGN REPORT

CENTRAL MAUI LANDFILL
PHASE III

Prepared for

COUNTY OF MAUI
Department of Environmental Management
Solid Waste Division
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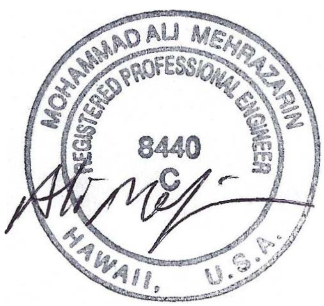
CERTIFICATION

This is to certify that the Phase III landfill is designed to meet and exceed the State and Federal regulations and the disposal area of the Phase III landfill that overlays the existing Phase II closed landfill area also meets and exceeds the overall performance of an impermeable liner as defined in Hawaii Administrative Rules (HAR) 11-58.1-3, and therefore, satisfies the functional requirements of HAR 11-58.1-14(b)(1) and (2).



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1. INTRODUCTION

This report presents the Phase III disposal area design drawings along with the technical analysis, associated technical specifications, and construction quality assurance documents. This report has been prepared for submittal to the Hawaii Department of Health (HDOH) as support for requested approval of design plans and specifications for the initial construction work in Phase III. The report is organized in the following sections:

Design drawings and technical specifications are contained in Appendix A and Appendix B, respectively.

2. AREA DESCRIPTION

The Phase III area will encompass approximately 16.8 acres of composite lined disposal area located immediately north of the closed Phase II landfill. As a result of the immediate proximity of the existing closed Phase II landfill, Phase III refuse fill will overlay approximately 11.3 additional acres of the adjacent Phase II slope. The total area to receive refuse fill in the Phase III development is approximately 28.1 acres. Figures 4 and 5, Appendix A illustrate the proposed Phase III subgrade and liner grade design.

The 11.3 acres area of Phase II that will receive additional fill during the operation of Phase III is the north facing slope of the Phase II refuse. The overlay onto the Phase II slope is necessary to provide positive drainage from the Phase II and Phase III areas, to ensure operational efficiency, and provide maximum disposal capacity to the County. Total net disposal capacity of Phase III, including the Phase II slope overlay, is approximately 2,972,064 cubic yards (cy). The portion of the capacity located over the Phase II slope is approximately 1,036,262 cy, which represents 35% of the total capacity.

The affected Phase II slope is capped with a final closure cover installed in 2007 and presently slopes at an average of 23% to the north and toward the proposed Phase III lined area. The Phase II final closure cover consists of (from top to bottom):

- 0.5-foot low permeability vegetative soil cover,
- Average of 2.4-foot low permeability soil (average of 3.2×10^{-6} cm/s), and
- Foundation layer (minimum 1 foot)

The County intends to initially develop approximately one half of the Phase III liner (Phase III-A) in early 2020. Phase III-B, the remaining area, will be developed as disposal needs require. Disposal capacity and projected operational life is discussed in later sections of this report. Figures 14 and 15, Appendix A illustrate the phased refuse fill plan for the Phase III area.

3. CONFORMANCE WITH PERMIT AND REGULATORY REQUIREMENTS

The Phase III disposal area will be constructed in accordance with the requirements of Hawaii Administrative Rules Title 11, Section 58.1; 40 CFR Part 258 (Subtitle D); and site-specific permits. Disposal operations in the newly constructed Phase III area will begin after issuance of a revised Solid Waste Management Permit from the HDOH.

3.1 Solid Waste Permit Requirements

The current Solid Waste Management Permit LF-0074-13 contains the following offset distance requirements applicable to MSW disposal activities:

> *"MSW disposal activities shall not occur within buffer areas, a minimum 150 feet from the property line along Pulehu Road, minimum 1000 feet from the property line along any present or future urban area, and minimum 80 feet of any agricultural area…"*

All portions of the Phase III disposal area are in compliance with these offset requirements.

3.2 HAR 11-58.1 Requirements

The proposed Phase III disposal area located immediately north of the Phase II limits of MSW fill, approximately 16.8 acres, is defined as a new MSW landfill unit.

HAR 11-58.1-14(b) states the following liner design requirements:

> *(b) The design shall either:*
>
> *(1) Ensure that the concentration values listed in Table 1, which is incorporated by reference, or Hawaii Administrative Rules, title 11, chapter 20, whichever is*

more stringent, will not be exceeded in the uppermost aquifer at the relevant point of compliance, as specified by the director under subsection (e); or

(2) Include a composite liner as described in subsection (c)and a leachate collection system that is designed and constructed to maintain less than a thirty-centimeter depth of leachate over the liner.

The floor and slope liner of the Phase III disposal area will be constructed with a liner and leachate collection system consistent with the prescriptive liner referenced in HAR 11-58.1-14(b)(2).

The base liner design for the portion of the Phase III refuse disposal capacity located over the existing refuse footprint of the closed Phase II landfill slope will incorporate the existing final cover system in combination with planned improvements to the Phase II slope which will provide protections to underlying groundwater consistent with the requirements of HAR 11-58.1-14(b)(1). The combination of the existing final cover system, the overall positive slope of the area, and the planned improvements to the Phase II slope prior to placement of refuse, as described in subsequent sections, coupled with the performance of the existing final cover, lack of observed leachate generation in the closed Phase I/II areas, evaluation of current site groundwater conditions, and the arid environment of the site will provide protection of the underlying groundwater resources in a manner that is equivalent to or exceeds that of an impermeable liner as defined by HAR 11-58.1-3.

HAR 11-58.1-3 provides the following definition of “permeability’:

"Permeability" means the ease with which a porous material allows liquid or gaseous fluids to flow through it. For water, this is usually expressed in units of centimeters per second and termed hydraulic conductivity. Soils and synthetic liners with a permeability for water of 1 x 10^{-7} cm/sec or less may be considered impermeable. (emphasis added)

This definition provides that liners with a permeability of 1 x 10^{-7} cm/sec or less are effectively impermeable, and by definition, will provide the groundwater protections as outlined in the previously noted HAR 11-58.1-14(b)(1). Thus, any combination of conditions that equal or exceed the performance of such liners will also provide the required protections.

The following sections of this report will demonstrate the combination of existing final cover conditions and planned improvements to the Phase II slope prior to placement of refuse will perform in a manner that exceeds the performance of an “impermeable” soil liner with a permeability of 1 x 10^{-7} cm/sec.

4. LINER AND LEACHATE COLLECTION SYSTEMS

4.1 Phase III Disposal Area

The Phase III disposal area of 16.8 acres, located immediately north of the Phase II limits of refuse,will be constructed with a prescriptive HAR 11-58.1-14/Subtitle D composite liner system and leachate collection sump, consistent with the liner and sumps installed in the Phase IVB/V and V-B Extension disposal areas. The liner subgrade on the Phase III floor is designed with a minimum of 2 percent slope toward the central leachate collection trench, which is graded with a minimum 1 percent slope toward the leachate collection sump. Figure 5, Appendix A illustrates the Phase III liner grades and LCRS trench design.

The Phase III liner will be constructed up to and tied into the edge of the Phase II refuse abutting the Phase III area development along approximately 1,600 feet of common boundary.

4.1.1 Liner System

The Phase III liner system will be constructed of the following components, listed from bottom to top:

<u>Floor Areas</u>

- Prepared native ground, excavated to design grades, to provide foundation support for the overlying containment system components;
- A minimum 24-inch thick low-permeability soil barrier layer, with an average saturated hydraulic conductivity of no greater than 1.0×10^{-7} cm/s;
- 80-mil thick textured high-density-polyethylene (HDPE) geomembrane, textured both sides;
- Non-woven 16 oz/sy geotextile fabric to serve as a cushion and drainage layer placed above the geomembrane;
- A minimum 12-inch thick leachate collection granular drainage layer, with a hydraulic conductivity of greater than 1.0 cm/s, with a perforated pipe along low points to collect and convey liquids to the leachate sump;
- Non-woven 16 oz/sy geotextile filter fabric placed above the LCRS granular drainage layer; and
- A minimum 24-inch thick protective (operations) soil layer.

<u>Perimeter Sideslope Areas</u>

- Prepared native ground, excavated to design grades of 2:1 (horizontal:vertical) slopes, to provide foundation support for the overlying liner system components;
- A minimum 24-inch thick low-permeability soil barrier layer, with an average saturated hydraulic conductivity of no greater than 1.0×10^{-7} cm/s;
- 80-mil thick textured high density polyethylene (HDPE) geomembrane, textured on

the bottom and smooth on top;

- Non-woven 16 oz/sy geotextile fabric to serve as a cushion and drainage layer placed above the geomembrane;
- A protective, UV resistant, flexible membrane rain cap; and
- A minimum 24-inch thick protective (operations) soil layer.

Figures 8 and 9, Appendix A illustrate the proposed Phase III liner design.

4.1.2 Leachate Collection and Removal System

The Phase III liner system is designed to drain to a new leachate collection and removal system (LCRS) sump, sized to service the entire Phase III lined area and the disposal capacity located above the adjacent Phase II slope. The Phase III LCRS sump will be located in the north/northwest corner of Phase III-A. As noted previously, the floor is graded to drain to a central northerly oriented LCRS trench which drains to the LCRS sump. The entire lined floor is covered with a 12-inch thick gravel drainage layer which conveys leachate to the 12-inch deep collection trench filled with gravel and an 8-inch diameter perforated HDPE pipe which will convey leachate to the sump.

The adjacent Phase II slope, which will receive additional refuse fill during the Phase III operation, will be graded and improved, as described in subsequent sections, to convey leachate that may be generated in this area to the LCRS system in the Phase III area.

The Phase III LCRS sump will be equipped with a vertical riser pipe system similar to that of Phase IV-B and Phase V-B Extension. A pumping system with automatic controls will be installed in the Phase III LCRS sump riser to maintain leachate levels on the liner at less than 12 inches. Figure 10, Appendix A illustrates the sump design details and the LCRS riser design.

4.2 Phase II Slope Improvements

To provide for protection of underlying groundwater resources equivalent to an impermeable liner, improvements will be made to the existing Phase II slope prior to placement of additional refuse during the operational life of the Phase III disposal area. These improvements will provide for enhanced drainage of leachate, that may be generated within the refuse fill placed over the Phase II final cover, to be directed to the leachate collection and removal system (LCRS) in the adjacent Phase III lined area.

To ensure positive drainage of leachate from the Phase II slope to the Phase III LCRS, the existing Phase II slope will be modified to provide for a positive slope in all areas. Most areas of the existing Phase II slope ranges in grade from 25% to 35%, however some areas, such as bench roads, are flatter. Portions of the slope graded at less than 10% will be modified by placement of additional compacted soil fill. In areas that will receive additional soil fill, where there are existing paved roads and/or concrete ditches, the roads and ditches will be removed prior to placement of additional soil fill. The resulting overall slope will average no less than 24%. Figure 4, Appendix A illustrates the existing Phase II grades and the proposed slope grade modifications described.

Two feet of compacted low permeability soil, equivalent to the Phase II final cover low permeability soil layer, will be placed over the areas of the slope receiving additional soil fill. Along the perimeter of areas receiving additional soil fill, the additional low permeability soil layer will be tied into the low permeability soil layer of the existing Phase II final cover to provide a continuous low permeability layer across the entire prepared Phase II slope area. The entire prepared Phase II slope, within the Phase III refuse limits, will slope towards the Phase III liner/LCRS where any leachate generated within the overlying refuse fill will be managed.

Above the regraded Phase II slope, a 2-foot thick lateral drainage/protective soil layer, consisting of highly permeable (k = 8 cm/s) crushed rock, will be placed over the 11.3 acres area of the affected Phase II slope. This highly permeable drainage layer placed above the existing low permeability final cover soil in combination with the regraded slope will provide an efficient means to direct and convey any leachate generated within the refuse placed over the Phase II slope to the leachate collection and removal system (LCRS) in the adjacent Phase III lined area where it will be managed. Detail 4, Figure 9, Appendix A illustrates the Phase II slope improvements.

4.2.1 Performance Analysis of Phase II Slope Improvements

4.2.1.1 HELP Model Analysis

As previously discussed, HAR 11-58.1 defines a 2-foot thick soil liner with a permeability of 1×10^{-7} cm/sec as effectively impermeable. Further, the regulations require leachate head over any liner be maintained at less than 30 centimeters (12 inches). For purposes of performance evaluation and comparison, the percolation rate for a 2-foot thick soil liner (permeability of 1×10^{-7} cm/sec) with a head of 12 inches can be calculated, and that percolation rate is 18.5 cf/acre/day.

To determine the acceptability of the performance of the proposed Phase II slope improvements, the rate of leakage, measured in cubic feet/acre/day (cf/acre/day), is compared to the above noted percolation rate for an impermeable liner. The performance of the Phase II slope improvements is analyzed using the USEPA Hydrologic Evaluation of Landfill Performance (HELP) Model. The model, using local weather data and project specific input, representing the Phase II refuse, Phase II final cover, proposed slope improvements, Phase III refuse, and Phase III final cover, calculates the water balance of the various layers of soil and refuse modeled, leachate head on low permeability layers, and leakage from the base of the landfill.

The HELP model was used to evaluate the performance of the Phase II slope improvements for two periods of time. The first period of time evaluates the operational period of the landfill before final cover is installed for Phase III area. In the case of Phase III, the operational period is projected to be approximately 10 years. The second time period modeled is the 30-year post closure period following installation of final cover.

The results of the HELP model analysis for the 10-year operational period and the 30-year post closure period is summarized in Table 1. Appendix C contains a summary report of the HELP Model analysis. To provide context and comparison to the benefits provided by the 2 components of the Phase II slope improvements, the table provides the modeled performance of the Phase II slope in two conditions. The first is the performance of the existing slope conditions. The second is the performance of the slope with the combination of additional grading and application of the 2-foot thick lateral drainage/protective soil layer. The HELP model results are also compared to the percolation rate for a 2-foot thick soil liner with a permeability of 1 x 10^{-7} cm/sec, defined in HAR 11-58.1 as impermeable liner. As summarized in the table, the overall performance of the proposed Phase II slope improvements provide protection that exceeds the performance of an impermeable liner.

Table 1 – HELP Model Analysis Results

Period of Model Analysis	Liquid Head on Phase II Final Cover Low Permeability Layer (inches)		Rate of Leakage Through Base of Phase II Refuse (cf/acre/day)		Impermeable Liner - Rate of Percolation (cf/acre/day)	Phase II Slope Improvements Exceed Performance of Impermeable Liner?	Factor by which Phase II Exceeds Impermeable Liner Performance
	Existing Phase II Slope	Phase II Slope with 2' Lateral Drainage/ Protective Layer	Existing Phase II Slope*	Phase II Slope with 2' Lateral Drainage/ Protective Layer			
Operational - 10 Years	0.000	0.000	0.0148	0.0148	18.5	Yes	1250
Post Closure - 30 Years	0.027	0.038	0.2208	0.0649	18.5	Yes	285

* -Please note the existing final cover with no additional improvement also meets the regulatory definition of impermeable liner of 18.5 cf/acre/day.

The HELP model analysis of the Phase II slope utilizes the permeability of the final cover low permeability layer in its current non-loaded condition. In its service as final cover, the low permeability layer is located on top of the landfill and is overlain by a 0.5-foot vegetative soil layer, and is essentially not loaded or subject to compression. After the implementation of the Phase II slope improvements and the placement of refuse over the area, the low permeability layer will be subject to compaction and compression, and under such conditions the permeability of the layer will improve (decrease). Therefore, the actual performance of the Phase II slope will be better than the results presented in Table 1.

4.2.1.2 Contaminant Fate and Transport Modeling

Contaminant fate and transport modeling activities were conducted to determine if the proposed Phase II slope improvements in combination with the underlying site specific geologic and hydrogeologic conditions will provide protection of the underlying groundwater resources in a manner that is equivalent to or exceeds that of an impermeable liner as defined by HAR 11-58.1-3.

The contaminant fate and transport model simulations were completed using Version 1.51 of the commercially-available software package MULTIMED for Windows (Allison Geosciences, Inc., 2005). The modeling activities for the CML Phase II slope incorporated MULTIMED's Subtitle D restrictions and settings. This was done to facilitate subsequent evaluation of the modeling results by allowing general comparison of modeling procedures and results to other landfill facilities.

The modeling results indicate the proposed Phase II slope improvements will provide protection of the underlying groundwater resources in a manner that is equivalent to or exceeds that of an impermeable liner as defined by HAR 11-58.1-3. For the Point of Compliance (POC) well (well located 150 meters from the waste footprint) the dilution attenuation factor (DAF) was 132.3 and the calculated concentrations for the modeled groundwater parameters were less than their MCLs.

Appendix G contains the complete contaminant fate and transport modeling report.

4.2.2 Phase II Leachate Collection and Removal System – Manhole 4

The existing Manhole 4 leachate sump, which is connected to a leachate collection system located at the base of the Phase I and Phase II refuse, is located near the northwest edge of the Phase II slope. This manhole, its foundation and riser were reconstructed during the Phase I and II final closure project using a design similar to that used for the LCRS sumps in Phase IV-B and Phase V-B Extension. This manhole will be preserved and maintained during the development and operation of the Phase III disposal area. The reinforced concrete vertical riser pipe will be extended as refuse fill is placed to the design grades in the surrounding area. The County will continue to monitor the manhole for leachate and remove leachate as it is generated throughout the operational and post closure period of Phase III. To prevent air intrusion into the landfill through the manhole, the riser will be sealed with a gasketed cover or other means. The manhole seal will be designed to accommodate the monitoring of leachate and landfill gases in the manhole. The seal will also accommodate the expeditious pumping of leachate as required.

5. SLOPE STABILITY AND SEISMIC IMPACT ANALYSIS

HAR 11-58.1-13(e) establishes the following criteria:

> *"New MSWLF units and lateral expansions shall not be located in seismic impact zones, unless the owner or operator demonstrates to the director that all containment structures, including liners, leachate collection systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.*
>
> *"Seismic impact zone" means an area with a ten per cent or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a per cent of the earth's gravitational pull (g), will exceed 0.10g in two hundred fifty years.*

"Lithified earth material" is defined in USEPA regulations Subtitle D, Section 258.14 as "all rock, including all naturally occurring and naturally formed aggregates or masses of minerals or small particles of older rock that formed by crystallization of magma or by induration of loose sediments".

The United States Geological Survey (USGS) has classified the island of Maui in UBC Seismic Zone 2B, defined as having a 10% probability of exceeding a peak ground acceleration of 0.15 g in 50 years. According to USGS seismic hazard maps and data, the peak horizontal ground acceleration expected to occur with a probability of ten percent in 250 years is 0.36 g. Therefore, Maui is located within a seismic impact zone and a seismic impact study must be conducted to demonstrate the landfill is designed to withstand the maximum horizontal acceleration.

The Phase III disposal area landfill slopes and containment system design has been analyzed to demonstrate they will resist the maximum horizontal acceleration anticipated at the site. Using the design final grades, the stability of the final landfill slopes were evaluated using PCSTABL5M a computer-based analytical program that computes static and pseudo-static factors of safety for the selected critical slope cross-sections. The critical slope cross-sections selected and analyzed pass through the lined Phase III disposal area including the portion of the Phase II slope that will receive additional refuse. The analysis found for all of the cross-sections the static factor of safety exceeds 1.5 and the pseudo-static factor of safety exceeds 1.0, the generally accepted critical value for static and pseudo-static slope stability. Also, there will be no permanent deformation of the liner system during the design seismic event. Appendix D contains the slope stability report.

6. SETTLEMENT

It is a well understood phenomenon that landfilled refuse will undergo secondary settlement after its initial placement. This settlement is dependent upon a number of factors, including but not limited to characteristics of landfilled waste, compaction achieved during initial placement, overall waste depth, loading of landfilled waste with subsequent waste lifts or other materials such as soil stockpiles, and time.

The refuse to be placed in the Phase III disposal area, including the Phase II slope, will also be subject to secondary settlement, as will the existing Phase II refuse.

Since the completion of the final closure cover on the Phase II slope in 2007 through to the current, the County has monitored settlement of the closed area through periodic visual inspections and with annual aerial topographic surveys. To date, no incidents of differential settlement have been observed in the Phase II area. Roads and drainage benches located in the portion of the Phase II slope that is to receive Phase III refuse have maintained their slope and have continued to perform as intended and are evidence of the uniform settlement process occurring in the area. Comparison of the 2007 and 2018 topographic maps of the area indicate the overall slope settlement during this time period has been uniform and averages approximately 0.2 inches of settlement per 1 foot horizontal run.

Under the load of additional refuse fill placed during the operational life of Phase III, it is expected the Phase II slope would continue to settle relatively uniformly over the length of the slope. With settlement, the Phase II slope will gradually flatten and any such flattening will enhance overall slope stability of the refuse fill.

The steep Phase II side slopes that the new landfill will be constructed with the proposed Phase II slope improvements are an ideal combination of a low permeability layer and drainage layer that can effectively function as a liner system and LCRS that will protect underlying groundwater, while also able to accommodate the anticipated settlement of the Phase II slope. The compacted soil layer (low permeability layer), unlike geomembrane layers, can move and settle with the underlying refuse while maintaining its integrity. Under load, the soil layer will continue to be compressed and will “self-heal” and close any cracks or fissures due to this compressive force. The 2-foot thick lateral drainage/protective soil layer of crushed rock placed above the compacted soil layer will provide enhanced stability and drainage of leachate off the Phase II slope and into the Phase III LCRS system.

7. INCREMENTAL LANDFILL DEVELOPMENT AND OPERATIONS

The County intends to incrementally develop the Phase III liner area, located immediately to the north of the Phase II, in two segments, Phases III-A (approximately 8.5 acres) and III-B (approximately 8.3 acres). The first Phase, III-A, is anticipated to be constructed in early 2020. Phase III-B, the remaining area, is projected to be developed in 2022.

The portions of the Phase II slope that are to receive additional refuse during the Phase III operational life will be improved through a combination of slope modification and addition of a lateral drainage/protective soil layer. Refuse placement in the Phase III area will be conducted in a manner consistent with County practices implemented in other active disposal cells. Refuse will be placed in continuous horizontal lifts across the lined/prepared area at an average thickness of approximately 15 feet. The top deck of each lift will be built with a modest cross fall of approximately 2 to 3% for drainage.

Upon completion of the base liner for each of the two phases, the initial refuse layer will be placed over the protective soil layer in accordance with permit conditions to ensure protection of the liner system. The entire base liner and sideslope liner of the Phase III for each segment will be completely covered with refuse within the first 2 to 3 horizontal refuse lifts.

As each horizontal refuse lift is completed, a portion of the Phase II slope will receive refuse. Prior to placement of refuse against the Phase II slope, the County will implement the previously discussed slope improvements including slope modification and addition of a lateral drainage/protective soil layer. As the placement of refuse against the Phase II slope will occur intermittently over the operational life of the Phase III disposal area, the County will construct the Phase II slope improvements in vertical increments at a frequency dictated by the rate of disposal capacity utilization. As the slope improvements are essentially earthwork tasks it is appropriate to construct these improvements in increments periodically such that it limits the time the improved areas will be exposed to the effects of the sun, wind and rain.

Each increment of the Phase II slope improvements will be constructed to an average vertical height of approximately +/- 15 feet, consistent with the average refuse lift. The length of slope to which the improvements will apply will typically reflect the maximum width of the refuse lift that can be accommodated by the limits of exterior slopes and/or the liner. The height of slope improvements will be adjusted as necessary to accommodate operational needs. Each increment of improvement will include, as needed, compacted soil fill to provide positive drainage, installation of 2 feet of compacted low permeability soil over all areas receiving soil fill, tie-in of the newly placed low permeability soil to the existing Phase II final cover low permeability soil layer. Over the prepared slope, the 2-foot lateral drainage/protective soil layer will be added in a continuous layer across the slope.

The lowest section of lateral drainage/protective soil layer will be directly connected to the LCRS drainage layer in the adjacent Phase III liner area. Upon completion of the disposal area, this connection between the Phase II slope lateral drainage/protective soil layer and the Phase III LCRS drainage layer will be a continuous zone measuring approximately 1,600 feet in length. Each successive vertical increment of the Phase II slope improvements will provide a continuous connection of the drainage layer from each vertical increment to the next.

To protect exposed areas of the Phase II slope lateral drainage layer from rain and minimize the potential for leachate generation as a result of rain, each section of drainage layer installed on the slope will be protected with a layer of sacrificial rain cap constructed with a reinforced flexible membrane, similar to materials used as rain caps in prior disposal cells. The rain cap will extend over the entire lateral drainage layer and overlap onto the Phase III liner and LCRS permitting any condensate trapped under the rain cap to drain to the Phase III LCRS. The rain cap will not be removed from the slope but will be retained during refuse placement to provide a further measure of protection and capacity to direct leachate off the sloped area and into the Phase III LCRS. Appendix E contains manufacturer and installation literature for a rain cap material that would be appropriate for the described use; this or an equivalent material is proposed.

Another benefit of the incremental construction of the Phase II slope improvements is the ability to monitor the condition of the slope as it is loaded. If settlement of the slope is noted prior to installation of the next vertical section of Phase II lateral drainage layer, the area of settlement will be corrected by placement of compacted soil to provide adequate slope, and addition of low permeability soil tied into the surrounding Phase II final cover and overlapped onto the rain cap of the prior incremental section of slope improvements. After such corrections, the lateral drainage layer and rain cap will be installed as previously described.

To facilitate collection and control of landfill gas on the Phase II slope, horizontal landfill gas collectors will be constructed with the lateral drainage/protective soil layer, as discussed in the following section.

8. LANDFILL GAS COLLECTION AND MONITORING

8.1 Landfill Gas Collection

Provisions for future extension of the landfill gas collection system will be incorporated into Phase III by placement of horizontal collectors on the floor of the lined disposal area at intervals of approximately 100 feet prior to placement of the first lift of waste. The collectors will be constructed of perforated 4" HDPE pipes placed in a 12-inch deep gravel bed located within the upper 12 inches of the protective soil layer (above the LCRS drainage layer). The perforated collectors on the floor will be connected to a future collection header, located around the perimeter of the Phase III liner, via lengths of 4-inch diameter solid HPDE pipe and control valves. Figure 7, Appendix A illustrates the horizontal gas collector layout.

As waste placement operations progress within the Phase III area, including the overlay area of the Phase II slope, additional horizontal gas collectors will be installed to expand the influence of collection system. Horizontal collectors consisting of perforated HDPE pipe will be installed in the lateral drainage layer on the Phase II slope prior to waste placement over the drainage layer. Based on the average slope and the typical refuse lift height of 15 feet, these horizontal collectors will be installed with horizontal spacing of approximately 150 feet and vertical spacing of approximately 30 to 40 feet. These collectors will facilitate collection of gas from both the existing Phase II refuse and the Phase III refuse. These additional collectors will also be connected to the perimeter gas collection header. The collection header will be tied into the existing landfill gas collection system and all collected gas will be managed in the existing landfill gas flare.

8.2 Landfill Gas Monitoring Probes

Existing gas probes GP-1, GP-2, and GP-10 are located within the footprint of the Phase III area which will necessitate their relocation prior to construction of the new disposal area. The existing probes will be decommissioned prior to construction of the Phase III liner and replacement probes (GP-1R, GP-2R, GP-10R) will be installed at the perimeter of the new disposal area consistent in spacing, depth, and number of monitoring zones as the existing gas probe network in place around Phases I, II, IV, and V. Figure 3, Appendix A illustrates the existing gas monitoring probe network in the vicinity of the Phase III project. Figure 4, Appendix A illustrates the locations for the probes that will replace those located within the grading limits of the Phase III project.

9. GROUNDWATER MONITORING WELLS

Existing groundwater monitoring wells MW-2 and MW-3 are located within the grading limits of the Phase III area development, but will be retained and preserved. Figures 3 and 4, Appendix A illustrate the locations of wells MW-2 and MW-3. The Phase III design incorporates engineered fill around the wells to permit construction of the perimeter drainage/access road. The wells will be clearly marked and protected during placement of fill and the well casings will be extended to project above the completed engineered fill. Upon completion of fill placement, a new protective casing, slab, and bollards will be installed for MW-2. MW-3, as it is projected to be located within the perimeter access road will be equipped with a flush mounted, traffic-rated, and water tight well completion to protect the well and maintain it for ongoing monitoring.

10. ROADS AND DRAINAGE

The Phase III project includes development of drainage/access roads along the perimeter of Phase III to provide vehicular access to the disposal area and provide a drainage conduit for stormwater runoff from the Phase III area as well as the existing Phase I/II area. The Phase III perimeter drainage/access road will be extended to the northwest from the Phase III area to connect to the existing site access road and the existing Phase IV-A stormwater basin located immediately to the northeast of the Phase IV-A disposal area.

10.1 Perimeter Access and Drainage Roads

The existing perimeter drainage/access roads located along the perimeter of the Phases I/II area will be extended along the west and east sides to connect to the Phase III perimeter drainage/access roads. The Phase III east and west perimeter drainage/access roads will be located immediately adjacent to the Phase III liner anchor trench. The Phase III east and west drainage/access roads will extend around the perimeter of Phase III and merge into a single drainage/access road that will project to the northwest and connect to the existing site access road near the northeast corner of Phase IVA. Figures 4 through 7, Appendix A illustrate the Phase III east and west perimeter drainage/access roads. Figures 17 and 18, Appendix A illustrate the Phase

III east and west perimeter drainage/access roads and the projection of the merged road to the Phase IV-A stormwater basin.

The Phase III east and west perimeter drainage/access roads will be 25 feet wide, paved with asphalt, and have a cross slope of approximately 3%. At the edge of the pavement, adjacent to the liner anchor trench, there will be an asphalt curb and berm running along the road. On the opposite side of the road, at the edge of the pavement, there will be a K-rail running along the road. The K-rail segment joints and bottom will be grouted/sealed to create a continuous and water tight barrier along the length of the road. The paved roadway between the curb and K-rail creates a paved channel that will function as a drainage corridor for stormwater runoff. Runoff will flow along the road alignment to the point where they merge into a single road/channel. Detail 6, Figure 11, Appendix A illustrates the cross-section details of the east and west perimeter drainage/access roads.

The drainage/access road, that will project to the northwest from Phase III and connect to the existing site access road near the northeast corner of Phase IV-A, will convey runoff from Phases I/II and the Phase III area to the existing Phase IV-A stormwater basin. This drainage/access road will be 26 feet wide. Along the edge of road, on both sides, there will be a K-rail. The paved roadway between the two K-rails, which will be sealed/grouted in similar fashion as previously described, will function as a drainage corridor with capacity adequate to convey stormwater runoff collected on the east and west perimeter drainage/access roads to the Phase IV-A basin. Detail 7, Figure 11, Appendix A illustrates the cross-section detail of this portion of the drainage/access road. At the point this new drainage/access road approaches the edge of the Phase IV-A basin, a drainage transfer structure, consisting of a box culvert and a traffic-rated open grate cover (similar to a cattle crossing) will be installed across the road. The open grate, which will be flush with the road surface and provide for a continuous road surface for vehicular traffic, will permit water flow on the drainage/access road to flow into the box culvert which will discharge into the Phase IV-A basin. A concrete lined channel will be constructed from the box culvert outlet into the basin to convey water from the box culvert to the basin bottom. Figure 12, Appendix A illustrates the drainage inlet/road crossing structure.

The Phase III east and west drainage/access roads will be graded with a minimum 1.4 percent slope to provide positive flow of stormwater throughout the alignment. Each of the perimeter drainage/access road structures (east and west drainage/access roads) have a design capacity of at least 189 cubic feet per second (cfs). The estimated stormwater runoff from the future Phase III area final cover grades and the existing closed Phases I/II landfill areas during a 50-year storm is 284.4 cfs. This total flow will be distributed evenly (approximately 142 cfs) between the east and west drainage/access roads both of which have a flow capacity of no less than 189 cfs, which exceeds the required capacity of 142 cfs.
Appendix F contains the Drainage Report providing the hydrological analysis.

11. CAPACITY AND OPERATIONAL LIFE

The net volumetric capacity of Phase III is estimated as follows:

Area Description	Capacity (cy)
Phase III-A (8.5 acres of liner)	792,519
Phase III-B (8.3 acres of liner)	2,179,545
Total Disposal Capacity	2,972,064

Based on anticipated waste intake volumes and the facility's historical airspace utilization factor, the Phase III Area, is projected to provide approximately 8 years of operational life.

Combining the Phase III disposal capacity with the existing constructed disposal capacity, the overall projected site life is estimated to be approximately 12 years or year 2030. Table 2 presents the projected disposal capacity, estimated annual disposal capacity utilization, and the projected timeframes for the construction of Phase III-A and Phase III-B.

Table 2 – Projected Capacity, Annual Capacity Utilization, & Cell Construction Schedule

Year	Beginning Capacity (CY)	Cell Constructed	Additional Capacity (CY)	Projected Capacity Utilization (CY) (b)	Projected Ending Capacity (CY)
2018 (a)	457,674	V-B Extension	694,504	299,269	852,909
2019	852,909			303,758	549,152
2020	549,152	Phase III-A	792,519	308,010	1,033,661
2021	1,033,661			312,322	721,338
2022	721,338	Phase III-B	2,179,545	316,695	2,584,189
2023	2,584,189			321,129	2,263,060
2024	2,263,060			325,624	1,937,436
2025	1,937,436			329,857	1,607,578
2026	1,607,578			334,146	1,273,433
2027	1,273,433			338,489	934,943
2028	934,943			342,890	592,053
2029	592,053			347,347	244,706
2030	244,706			351,516	-106,810

Notes:

(a) Remaining constructed capacity as of 5-13-2018 topographic survey.

(b) Airspace utilization based on projected annual disposal tonnage growth rates presented in the CML Master Plan.

(c) Projected operational life for the combined capacity of the existing constructed capacity plus the Phase III capacity is approximately 12 years, as of May 13, 2018. Calculated operational end date for this disposal capacity is 3rd Quarter 2030.

12. EARTHWORK REQUIREMENTS

The Phase III lined disposal area will be prepared by excavation, grading, and placement of engineered structural fill to achieve the design grades for liner subgrade and drainage/access roads that will service the Phase III area. Estimated earthwork quantities are:

Excavation	153,100 cubic yards
Structural Fill	112,100 cubic yards
Net Excavation	41,000 cubic yards

Currently, portions of the Phase III disposal area is occupied by the composting operation. Prior to the initiation of development of the first phase of liner (Phase III-A), the composting operational area will be reorganized and relocated into the future Phase III-B area. Prior to the development of the Phase III-B liner, the compost operation will be relocated to another location (location to be determined).

The quantity of soil fill to be placed over the existing Phase II slope, as discussed previously in Section 4.2, is estimated to be approximately 36,500 cubic yards.

APPENDIX A

DESIGN DRAWINGS

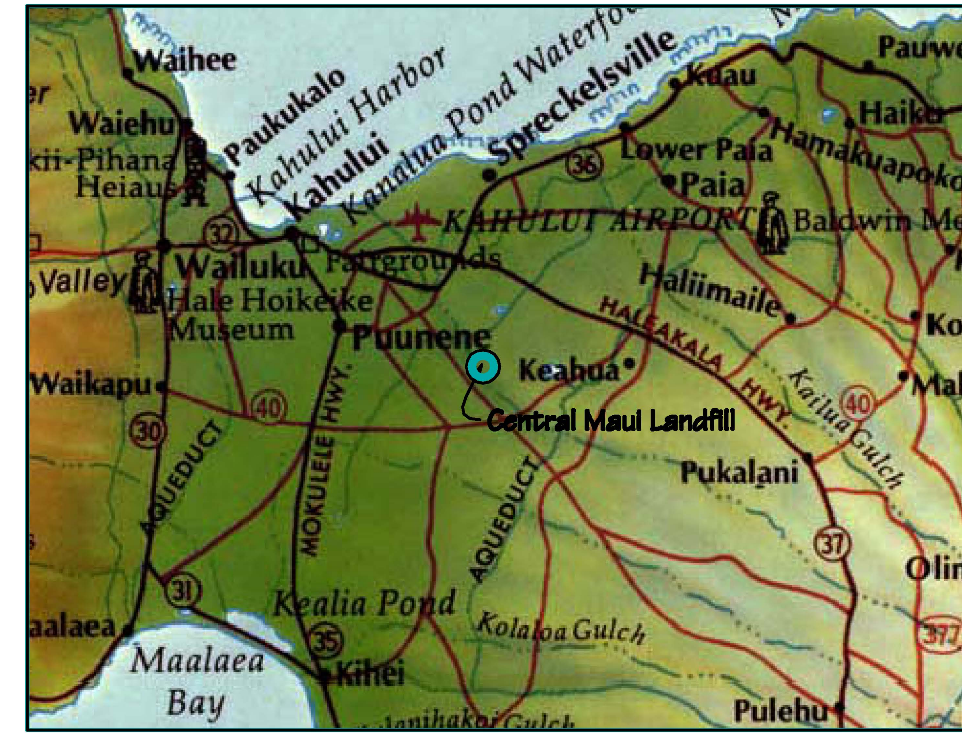
Central Maui Landfill
Puunene, Hawaii
Phase III And Related Improvements

Prepared by:

A-Mehr, Inc.
23016 Mill Creek Drive
Laguna Hills, CA 92653
(949) 206-0157
1/30/19

Owner:

County of Maui
Department of Environmental Management
Solid Waste Division
2200 Main Street, Suite 225
Wailuku, Hawaii 96793



Vicinity Map

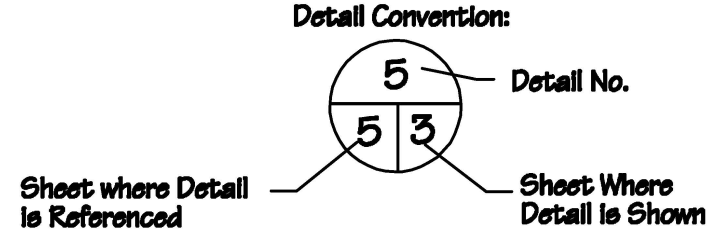
This work was prepared by me or under my supervision

Project Engineer:

Ali Mehrazarin, P.E.

Date

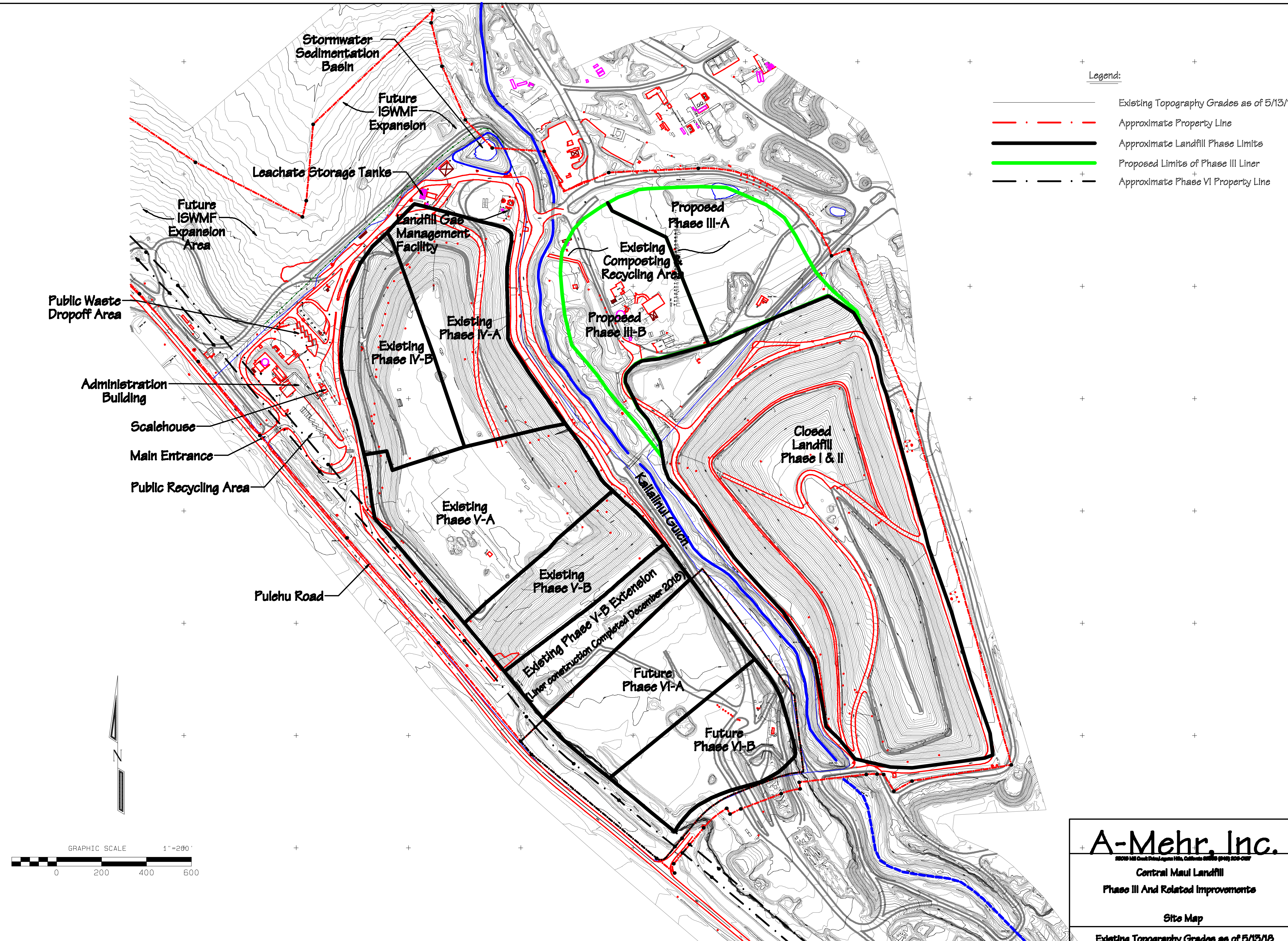
Detail Convention:



Approved by:

Director of
Environmental Management
2200 Main Street, Suite 100
Wailuku, Hawaii 96793

Date



A-Mehr, Inc.

Central Maui Landfill

Phase III And Related Improvements

Site Map

Existing Topography Grades as of 5/13/18

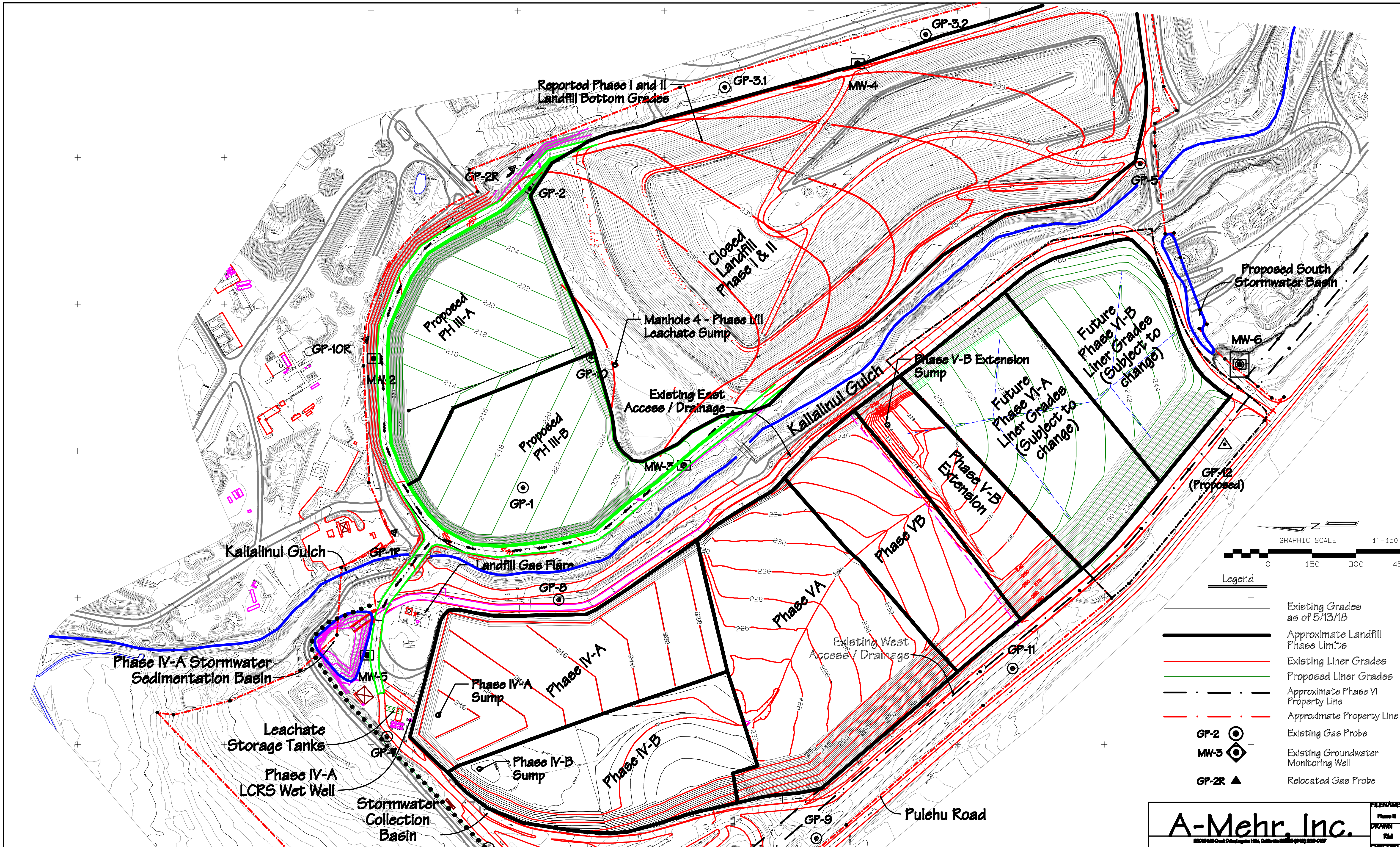
FILENAME Phase III

DRAWN RM

CHECKED

DATE 1/17/19

SHEET 1



Notes:

1. Proposed Phase III disposal area will be developed in two increments, Phase III-A and Phase III-B.

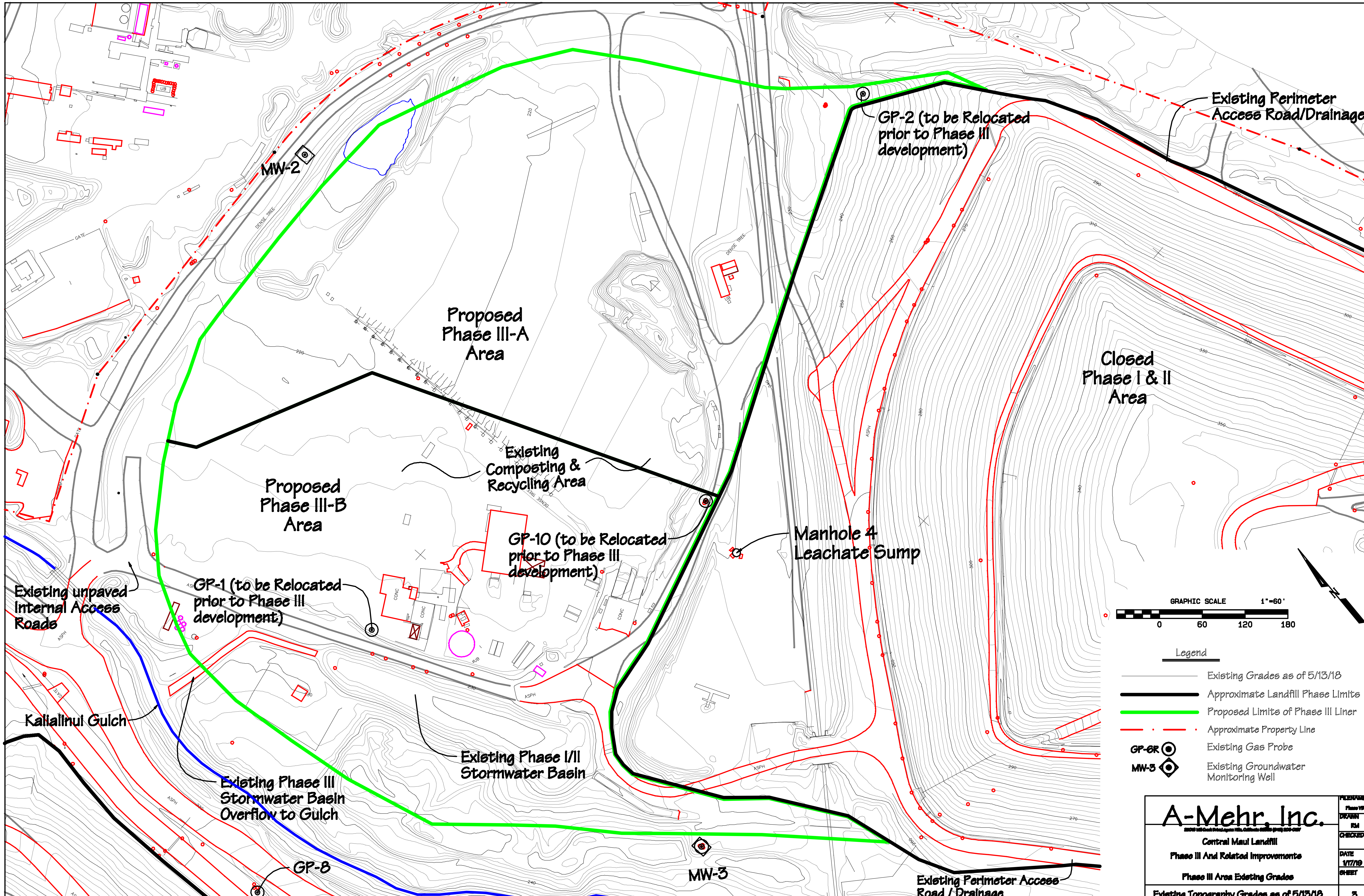
A-Mehr, Inc.

Central Maui Landfill

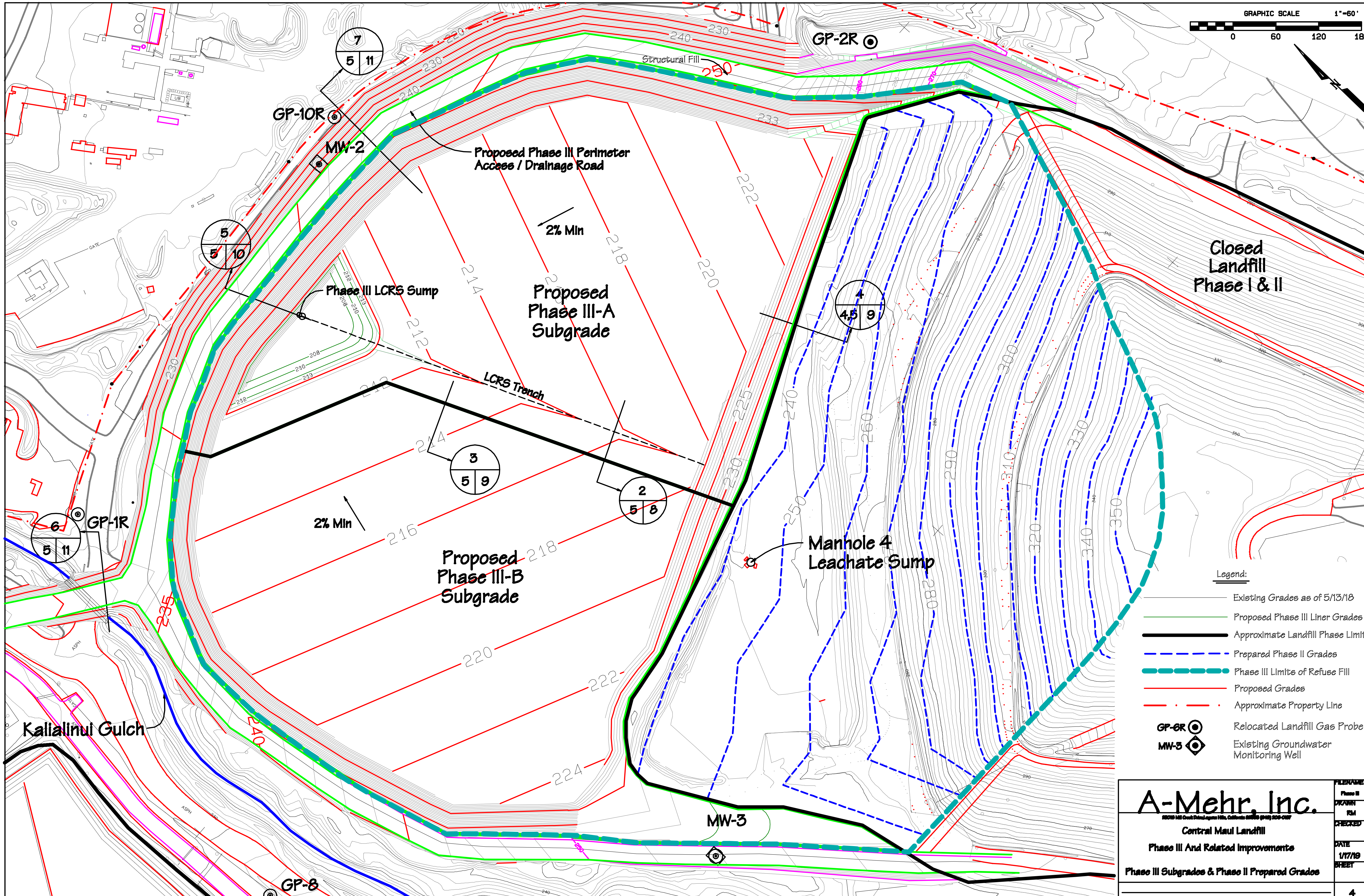
Phase III And Related Improvements

Existing (Phases IV and V), Proposed (Phase III) and Future Expansion (Phase VI) Liner Grades

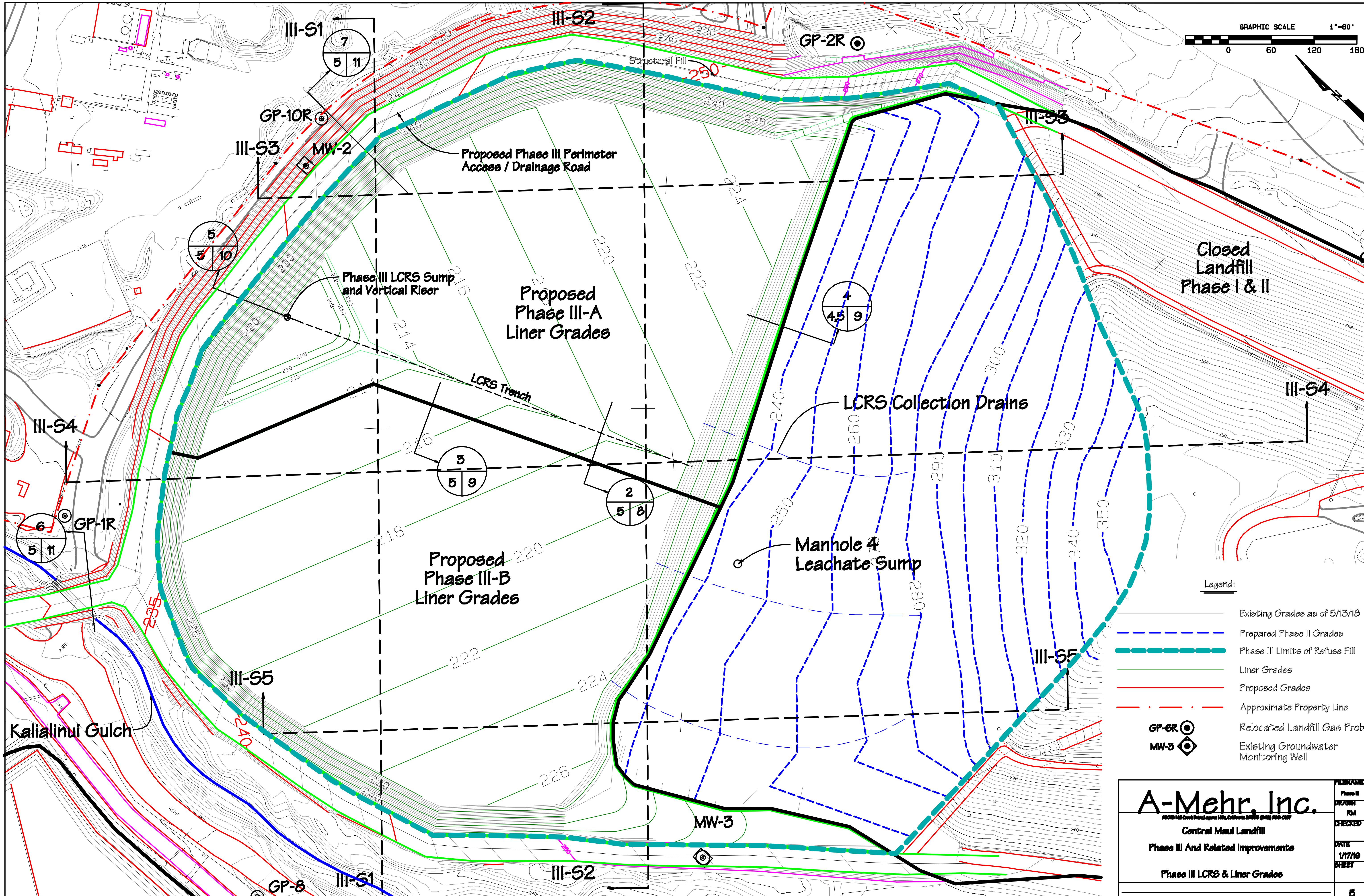
FILENAME	Phase III
DRAWN	RM
CHECKED	
DATE	1/17/19
SHEET	2



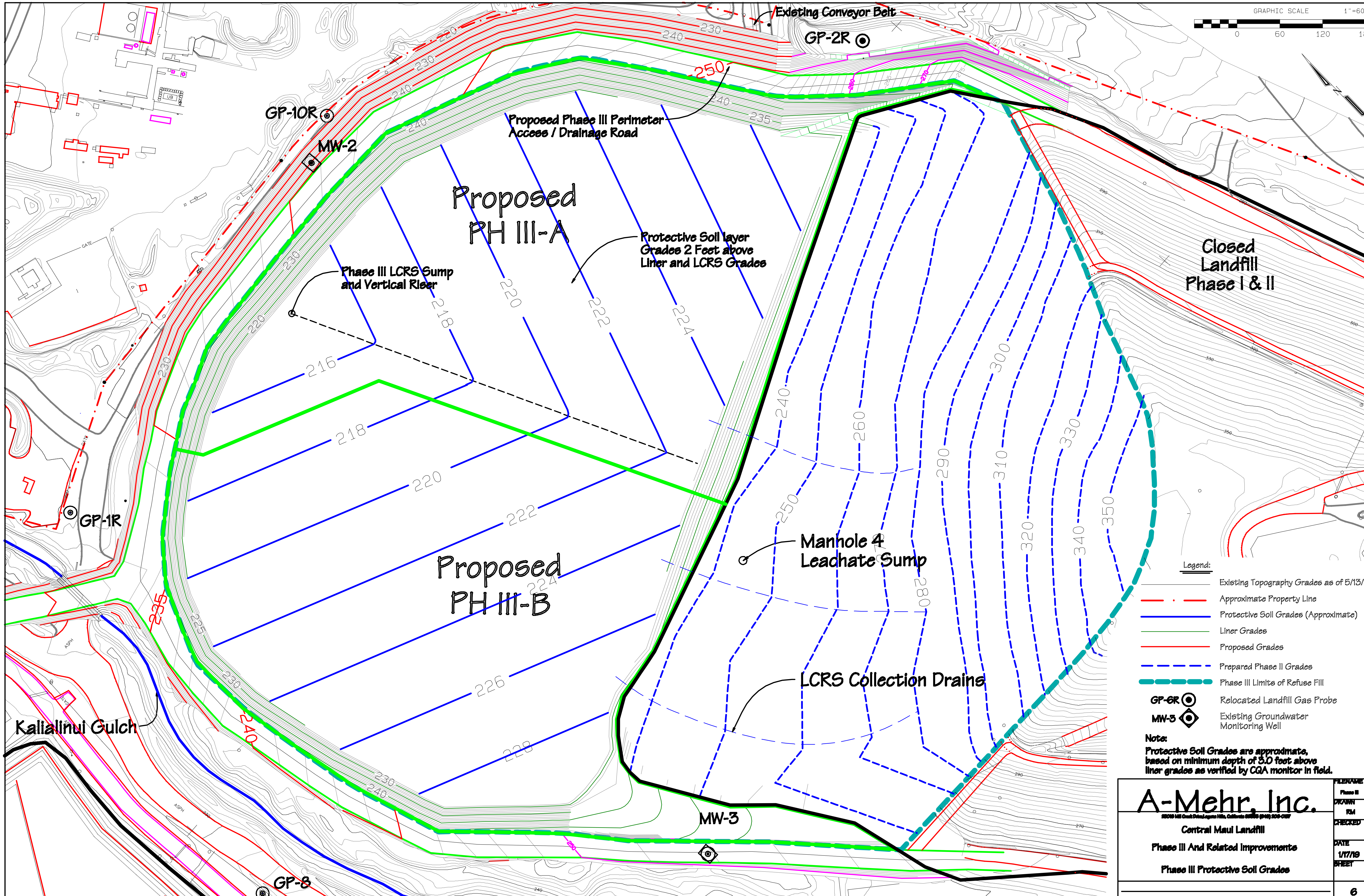
Existing Perimeter Access Road/Drainage
GP-2 (to be Relocated prior to Phase III development)
MW-2
Proposed Phase III-A Area
Closed Phase I & II Area
Existing Composting & Recycling Area
Proposed Phase III-B Area
GP-10 (to be Relocated prior to Phase III development)
Manhole 4 Leachate Sump
Existing unpaved Internal Access Roads
GP-1 (to be Relocated prior to Phase III development)
Kailalinui Gulch
Existing Phase I/II Stormwater Basin
Existing Phase III Stormwater Basin Overflow to Gulch
GP-8
MW-3
Existing Perimeter Access Road / Drainage
GRAPHIC SCALE 1"=60'
0
60
120
180
Legend
Existing Grades as of 5/13/18
Approximate Landfill Phase Limits
Proposed Limits of Phase III Liner
Approximate Property Line
GP-6R
Existing Gas Probe
MW-3
Existing Groundwater Monitoring Well
A-Mehr, Inc.
Central Maui Landfill
Phase III And Related Improvements
Phase III Area Existing Grades
Existing Topography Grades as of 5/13/18
FILENAME
DRAWN
RM
CHECKED
DATE
1/17/19
SHEET
3



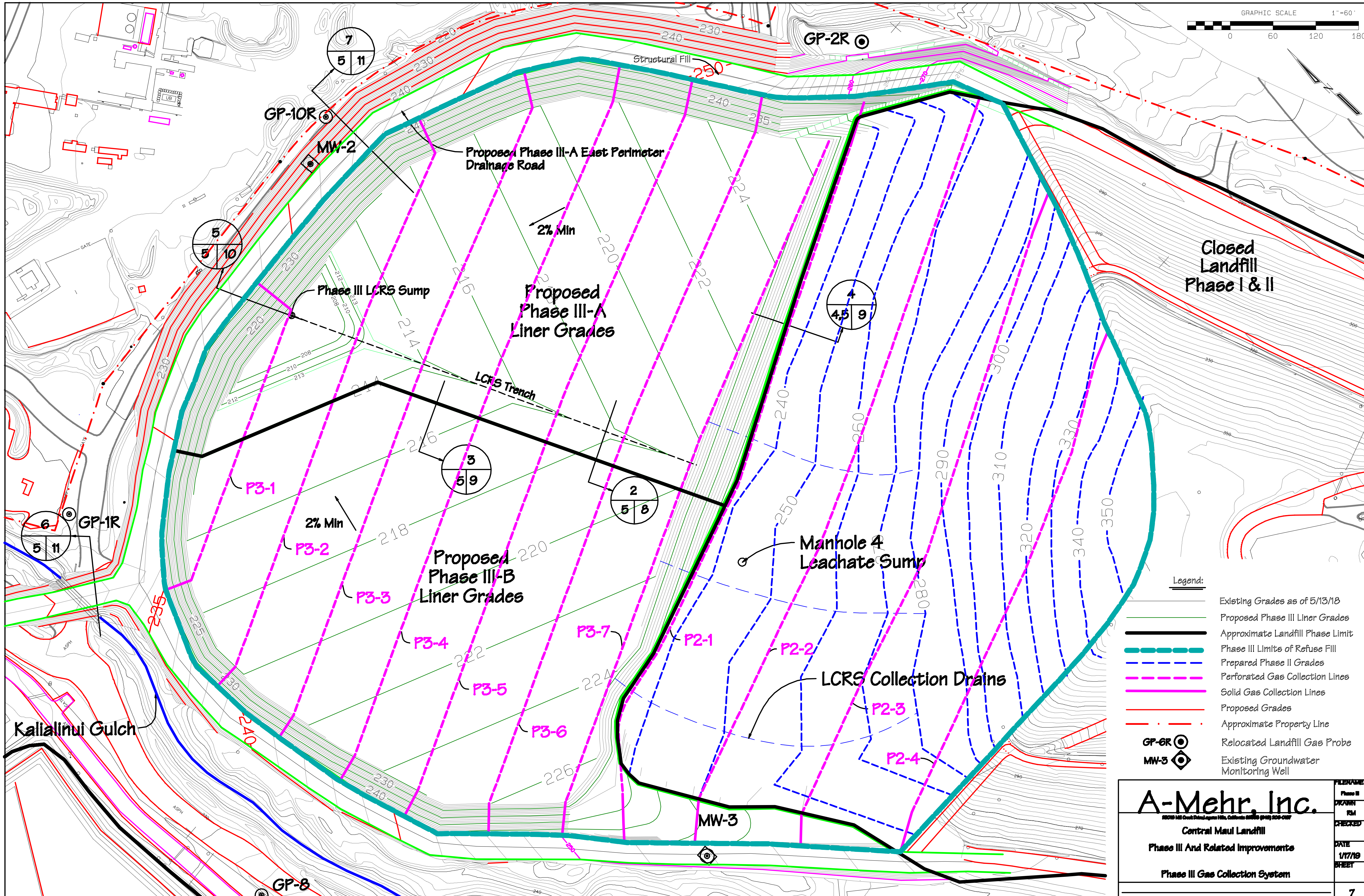
GRAPHIC SCALE 1"=60'
0 60 120 180
N
GP-2R
Structural Fill
GP-10R
MW-2
Proposed Phase III Perimeter Access / Drainage Road
2% Min
Phase III LCRS Sump
LCRS Trench
Proposed Phase III-A Subgrade
Closed Landfill Phase I & II
Proposed Phase III-B Subgrade
2% Min
GP-1R
Manhole 4 Leachate Sump
Kalialinui Gulch
MW-3
GP-8
Legend:
Existing Grades as of 5/13/18
Proposed Phase III Liner Grades
Approximate Landfill Phase Limits
Prepared Phase II Grades
Phase III Limits of Refuse Fill
Proposed Grades
Approximate Property Line
GP-6R Relocated Landfill Gas Probe
MW-3 Existing Groundwater Monitoring Well
A-Mehr, Inc.
Central Maui Landfill
Phase III And Related Improvements
Phase III Subgrades & Phase II Prepared Grades
FILENAME Phase III
DRAWN RM
CHECKED
DATE 1/17/19
SHEET 4



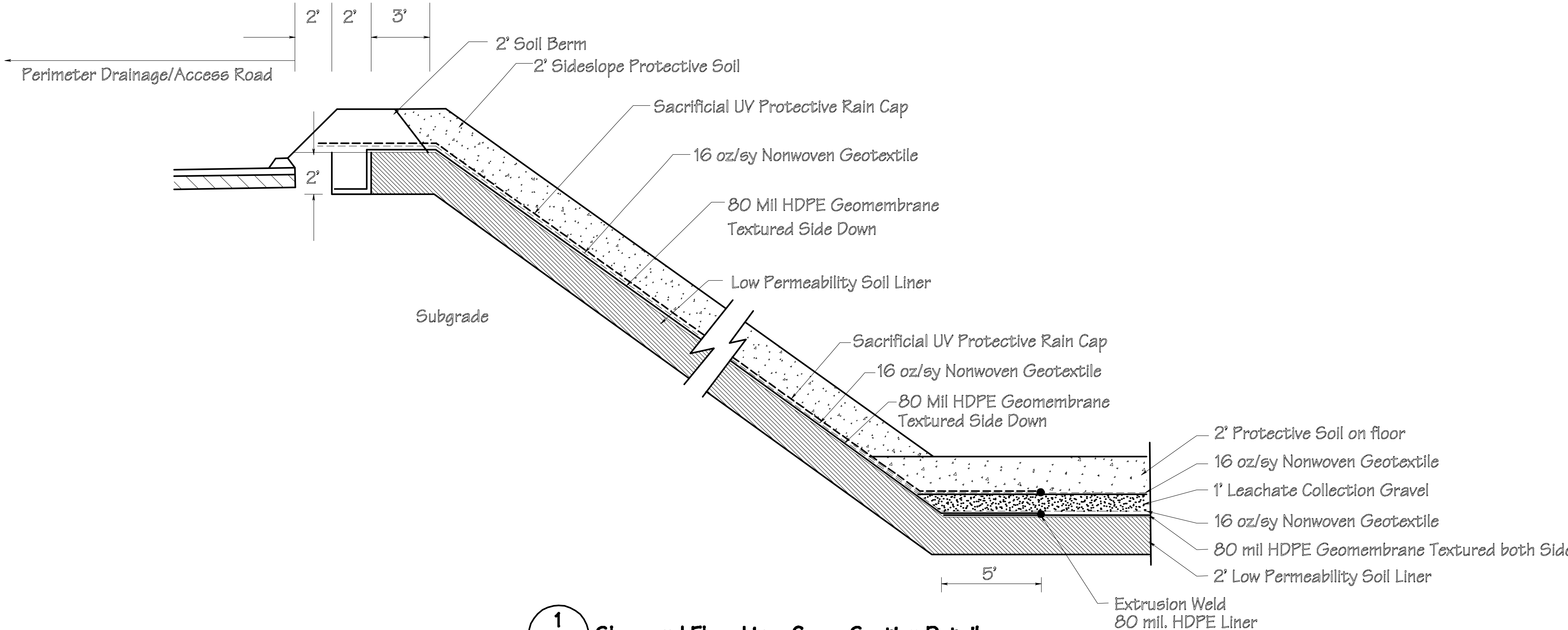
III-S1
III-S2
GP-2R
GRAPHIC SCALE 1"=60'
0 60 120 180
Structural Fill
GP-10R
III-S3
MW-2
Proposed Phase III Perimeter Access / Drainage Road
III-S3
Closed Landfill Phase I & II
Phase III LCRS Sump and Vertical Riser
Proposed Phase III-A Liner Grades
LCRS Trench
LCRS Collection Drains
III-S4
III-S4
GP-1R
Manhole 4 Leachate Sump
Proposed Phase III-B Liner Grades
Kalialinui Gulch
III-S5
III-S5
MW-3
GP-8
III-S1
III-S2
Legend:
Existing Grades as of 5/13/18
Prepared Phase II Grades
Phase III Limits of Refuse Fill
Liner Grades
Proposed Grades
Approximate Property Line
GP-6R Relocated Landfill Gas Probe
MW-3 Existing Groundwater Monitoring Well
A-Mehr, Inc.
Central Maui Landfill
Phase III And Related Improvements
Phase III LCRS & Liner Grades
FILENAME
DRAWN
CHECKED
DATE
1/17/19
SHEET
5



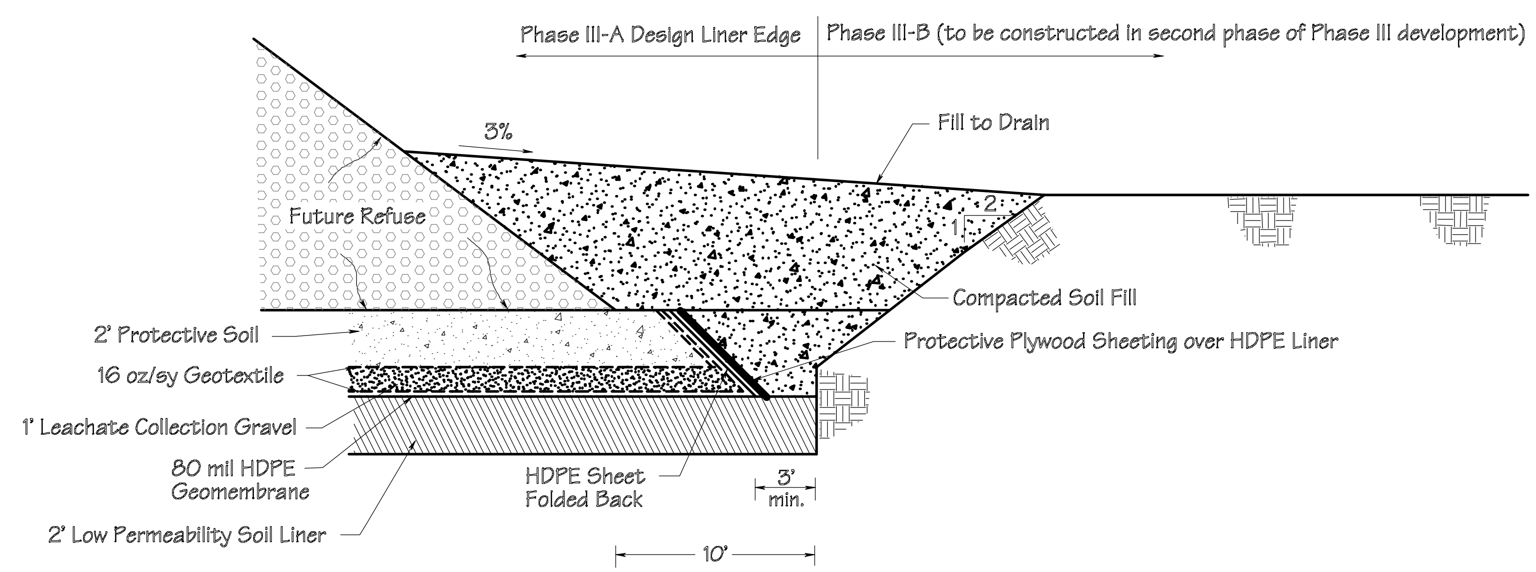
Existing Conveyor Belt
GRAPHIC SCALE 1"=60'
0 60 120 180
GP-2R
GP-10R
MW-2
Proposed Phase III Perimeter Access / Drainage Road
Proposed PH III-A
Protective Soil layer Grades 2 Feet above Liner and LCRS Grades
Phase III LCRS Sump and Vertical Riser
Closed Landfill Phase I & II
Proposed PH III-B
Manhole 4 Leachate Sump
LCRS Collection Drains
GP-1R
Kalialinui Gulch
MW-3
GP-8
Legend:
Existing Topography Grades as of 5/13/18
Approximate Property Line
Protective Soil Grades (Approximate)
Liner Grades
Proposed Grades
Prepared Phase II Grades
Phase III Limits of Refuse Fill
GP-6R Relocated Landfill Gas Probe
MW-3 Existing Groundwater Monitoring Well
Note:
Protective Soil Grades are approximate, based on minimum depth of 3.0 feet above liner grades as verified by CQA monitor in field.
A-Mehr, Inc.
Central Maui Landfill
Phase III And Related Improvements
Phase III Protective Soil Grades
FILENAME Phase III
DRAWN RM
CHECKED
DATE 1/17/19
SHEET 6



GRAPHIC SCALE 1"=60'
0 60 120 180
GP-2R
GP-10R
MW-2
Structural Fill
Proposed Phase III-A East Perimeter Drainage Road
2% Min
Phase III LCRS Sump
Proposed Phase III-A Liner Grades
LCRS Trench
Closed Landfill Phase I & II
P3-1
P3-2
P3-3
P3-4
P3-5
P3-6
P3-7
P2-1
P2-2
P2-3
P2-4
GP-1R
Proposed Phase III-B Liner Grades
Manhole 4 Leachate Sump
LCRS Collection Drains
Kalialinui Gulch
MW-3
GP-8
Legend:
Existing Grades as of 5/13/18
Proposed Phase III Liner Grades
Approximate Landfill Phase Limit
Phase III Limits of Refuse Fill
Prepared Phase II Grades
Perforated Gas Collection Lines
Solid Gas Collection Lines
Proposed Grades
Approximate Property Line
GP-6R Relocated Landfill Gas Probe
MW-3 Existing Groundwater Monitoring Well
A-Mehr, Inc.
Central Maui Landfill
Phase III And Related Improvements
Phase III Gas Collection System
DATE 1/17/19
SHEET 7



1 | 4,5 | 8 **Slope and Floor Liner Cross Section Detail**



2 | 4,5 | 8 **Phase III-A Temporary Liner Termination**

A-Mehr, Inc.

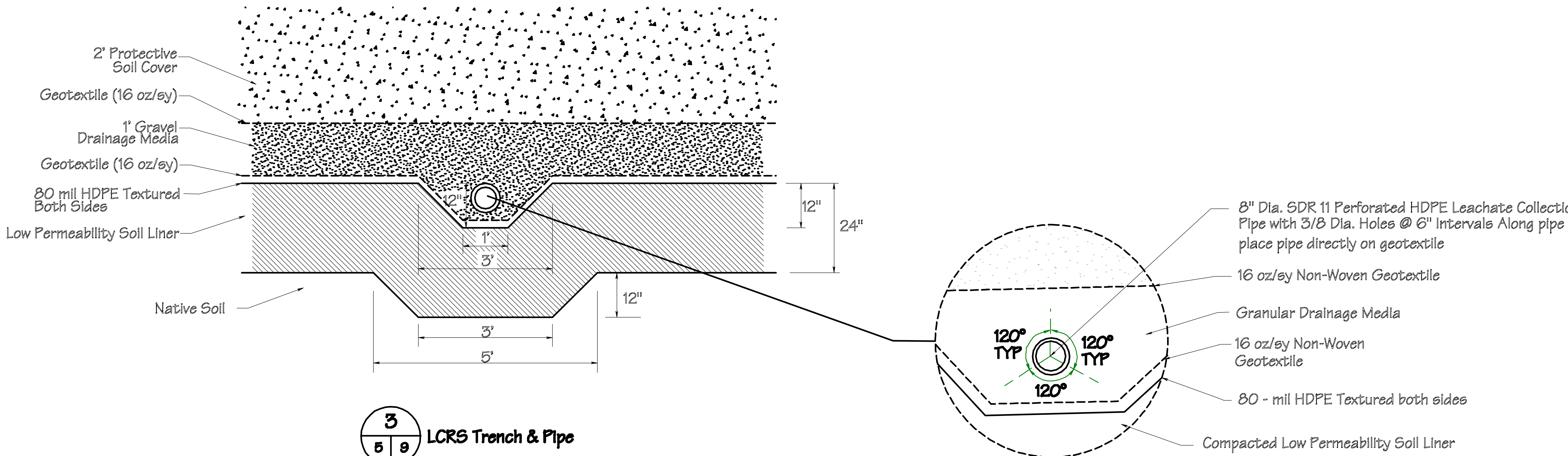
25016 Mill Creek Drive, Laguna Hills, California 92653 (949) 206-0157

Central Maui Landfill

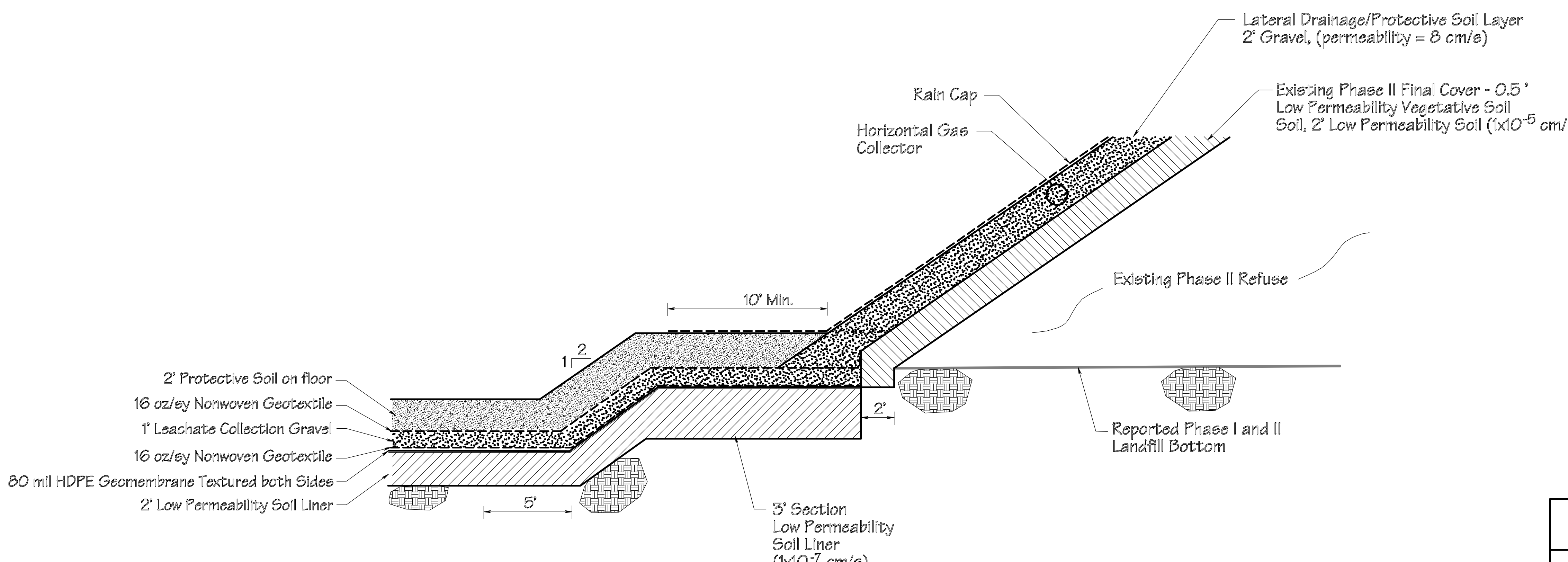
Phase III And Related Improvements

Liner Details 1

FILENAME	Phase III
DRAWN	RM
CHECKED	
DATE	1/17/19
SHEET	8



3 | 5 | 9 **LCRS Trench & Pipe**



4 | 4,5 | 9 **Proposed Phase III Tie-in to Closed Phase II and Phase II Slope Improvements**

Notes: Preparation of Phase II slope entailing slope regrade (as necessary), placement of 2 foot lateral drainage/protective soil layer, and rain cap will be completed incrementally as refuse fill advances vertically up the slope in average lift height of ± 15 feet. Horizontal gas collectors will be installed at vertical intervals of approximately 30 to 50 feet and average horizontal offset of approximately 150 feet.
Slope improvements, lateral drainage/protective cover soil layer, and rain cap will be installed to top of Phase II slope.

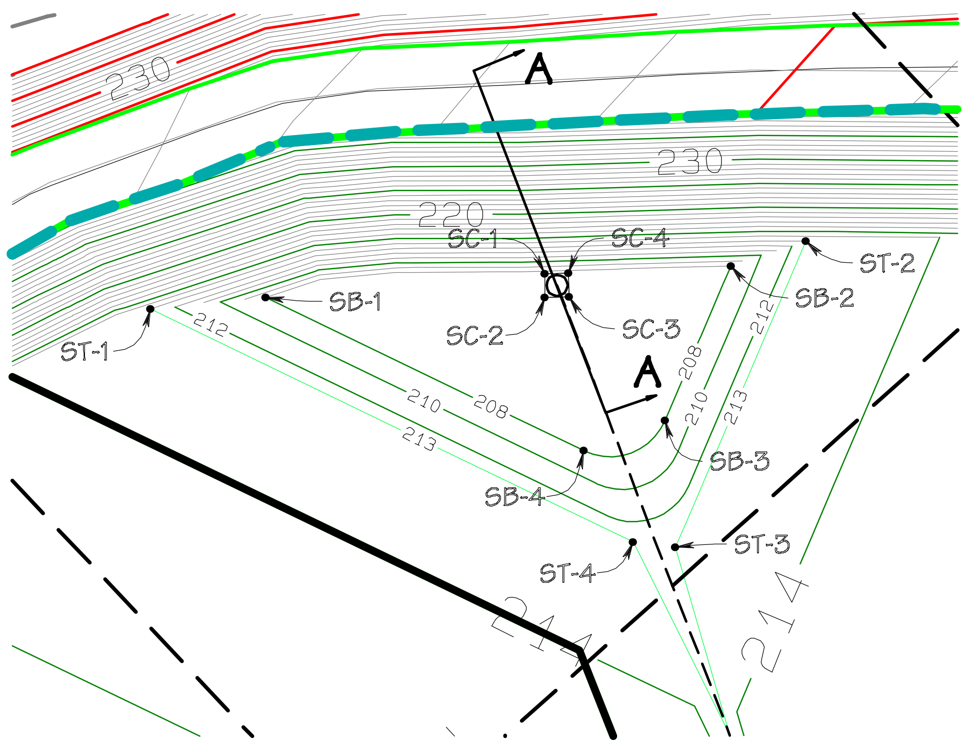
A-Mehr, Inc.

Central Maui Landfill

Phase III And Related Improvements

Liner Details 2

FILENAME	Phase III
DRAWN	RM
CHECKED	
DATE	1/17/19
SHEET	9

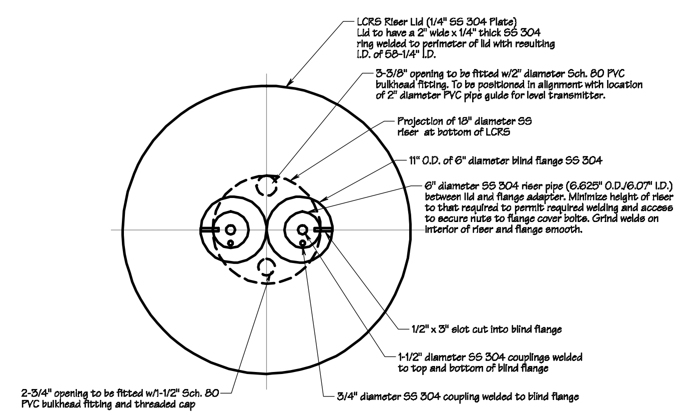


Phase III LCRS Sump

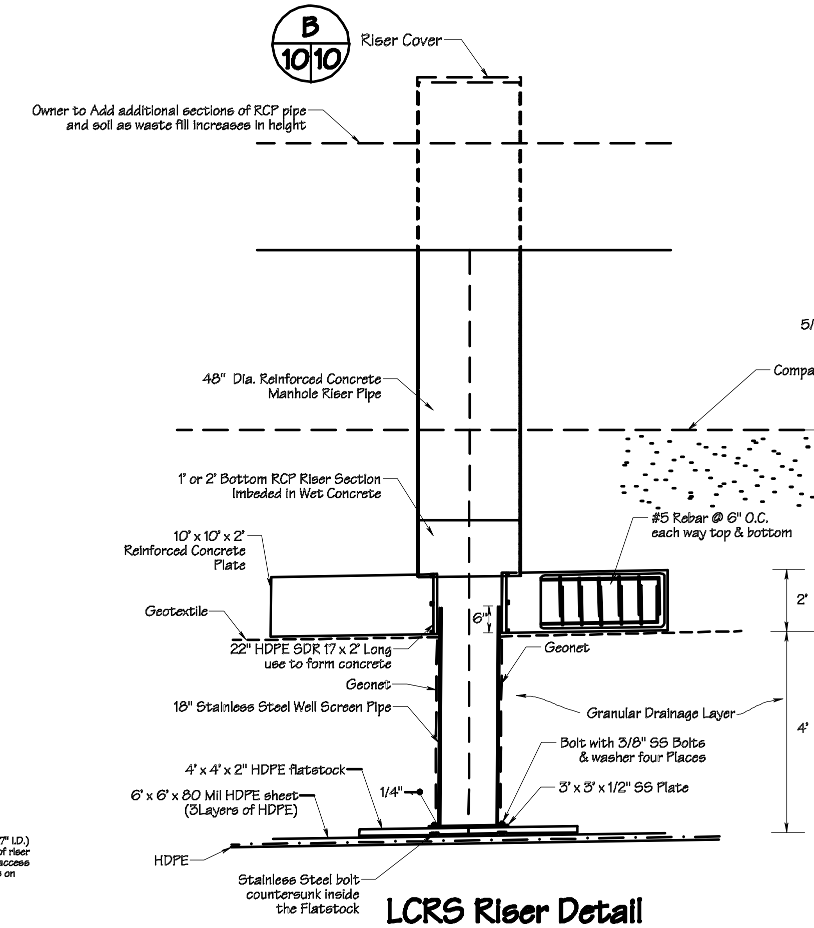
GRAPHIC SCALE 1"=40'
0 40 80 120

Control Points of LCRS Sump and Berm

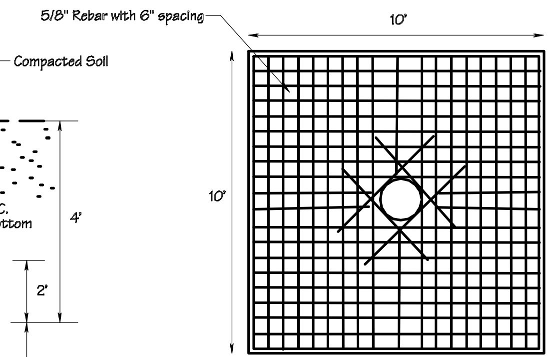
Name	North	East	Elev
SB-1	-13633.7450	-7983.0225	208.00
SB-2	-13621.0189	-7789.2092	208.00
SB-3	-13685.3153	-7816.8438	208.00
SB-4	-13697.9261	-7850.7193	208.00
ST-1	-13638.4602	-8031.0925	213.00
ST-2	-13610.8475	-7757.8672	213.00
ST-3	-13738.1209	-7812.4737	213.00
ST-4	-13735.8517	-7830.0633	213.00
SC-1	-13624.0504	-7866.8432	207.50
SC-2	-13634.0487	-7866.6625	207.50
SC-3	-13633.8681	-7856.6642	207.50
SC-4	-13623.8697	-7856.8448	207.50



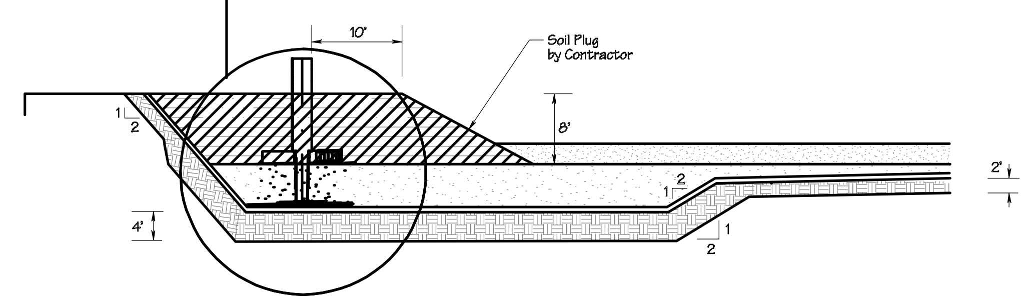
B
10 | 10
Leachate Riser Cover



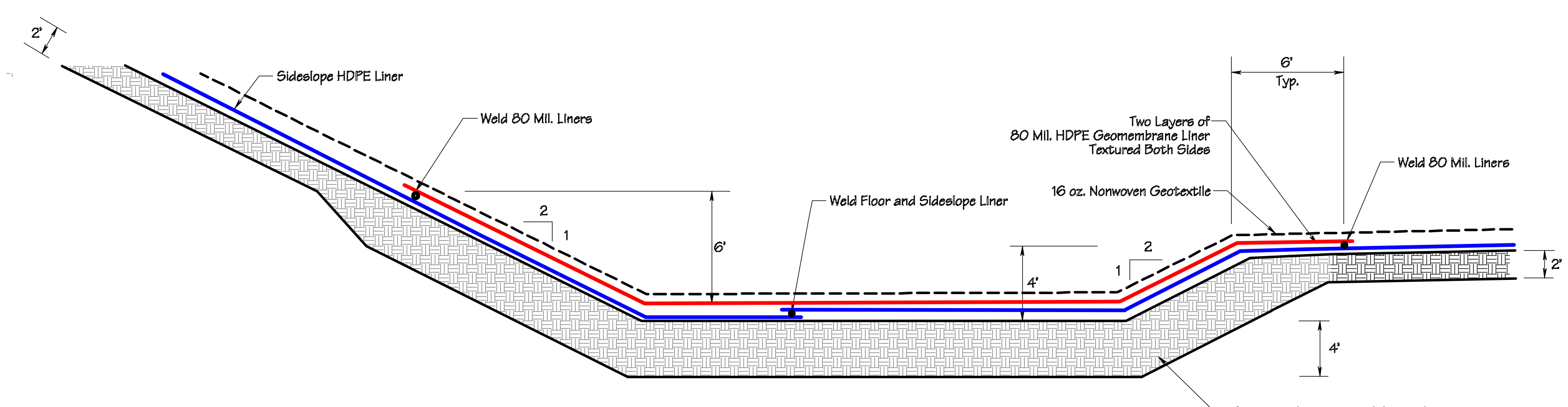
LCRS Riser Detail
(Not to Scale)



Reinforced Concrete Plate Rebar Detail
(Plan View)



A
10 | 10
New LCRS Sump and Berm with Initial Soil Plug



5
4,5 | 10
Leachate Collection Sump (Profile)

5 0 5 10
SCALE IN FEET

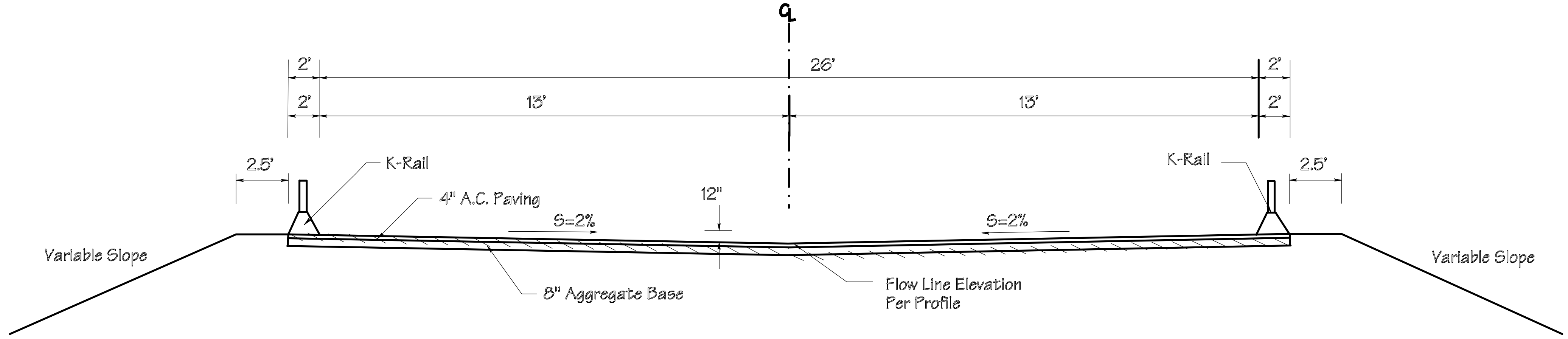
A-Mehr, Inc.
[illegible address line]

Central Maui Landfill

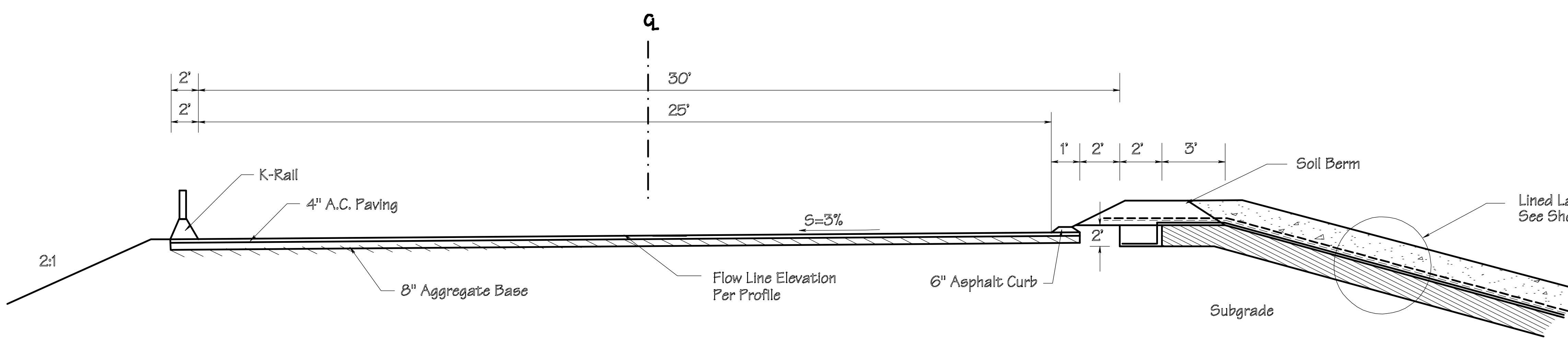
Phase III And Related Improvements

Leachate Sump Details

FILENAME	Maui ph 3A
DRAWN	RM
CHECKED	
DATE	7/6/15
FIGURE	10

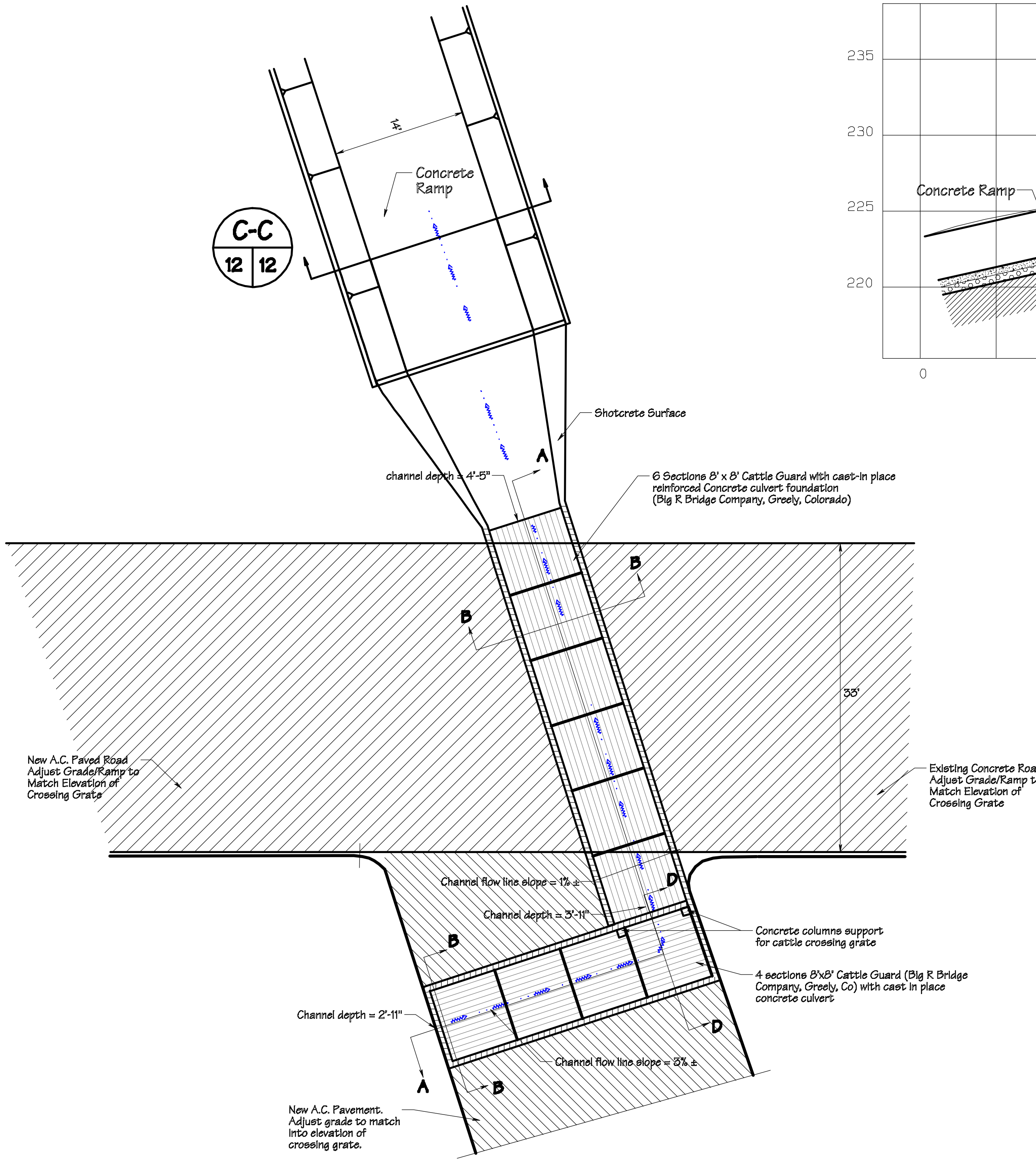


6 / 5 | 11 **Drainage Road**

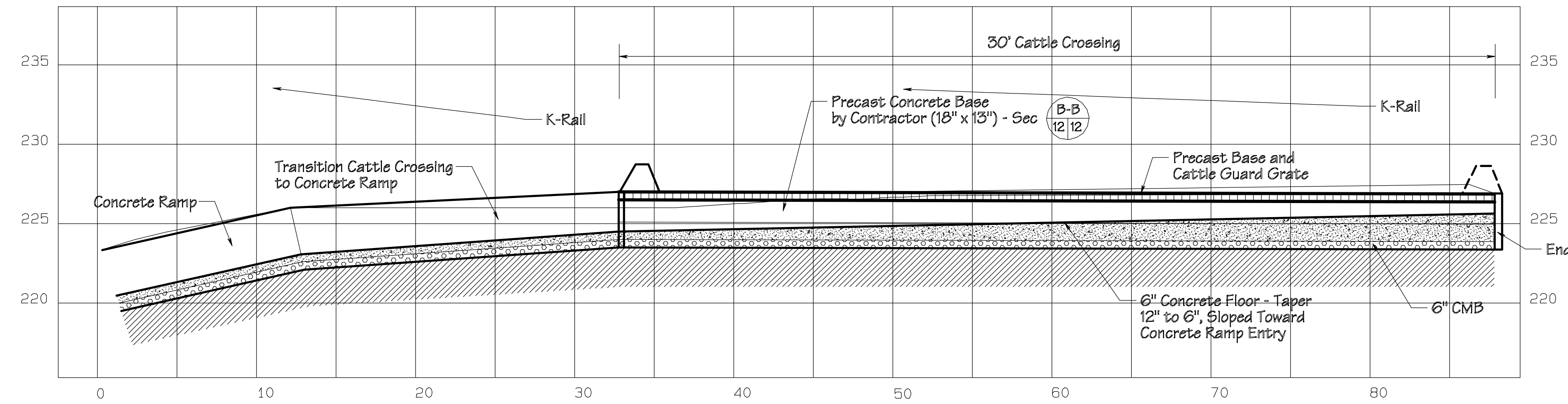


7 / 5 | 11 **Perimeter Drainage/Access Road**

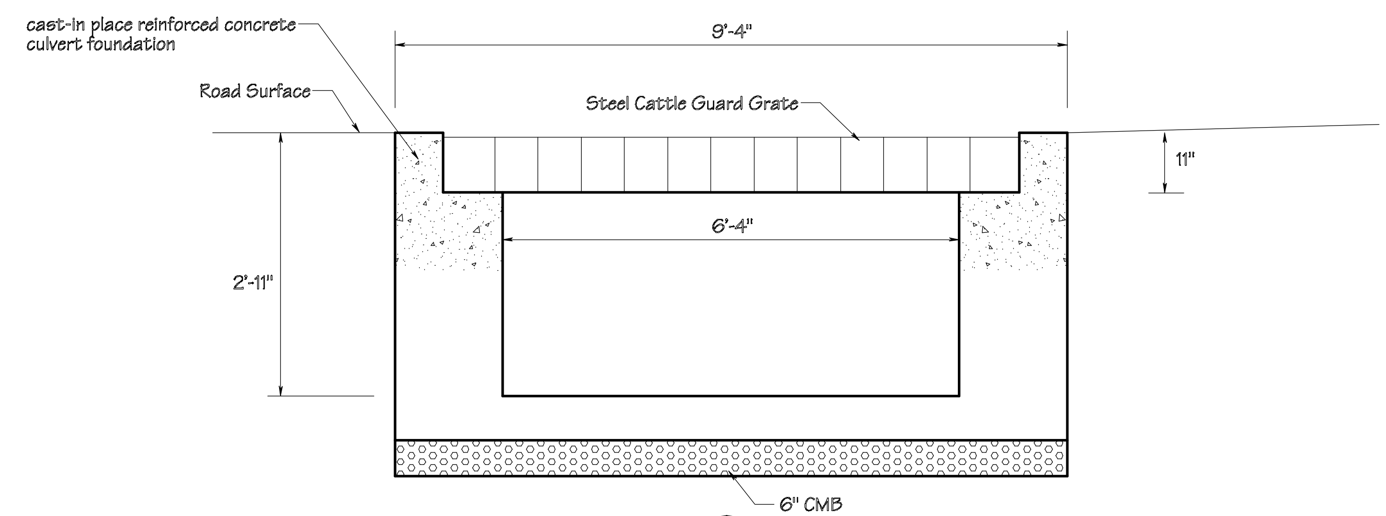
A-Mehr, Inc.	FILENAME: Phase III
	DRAWN: RM
Central Maui Landfill	CHECKED
Phase III And Related Improvements	DATE: 7/6/18
Perimeter Drainage/Access Road Details	SHEET: 11



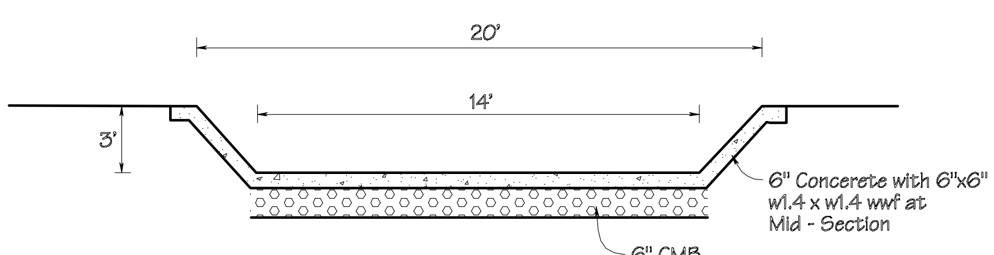
8
17,18 | 12
Drainage Road Cattle Crossing



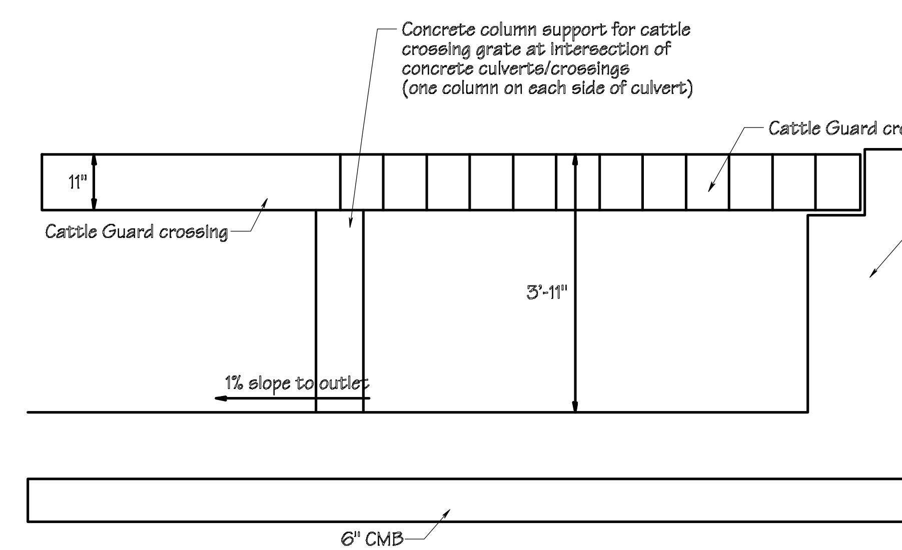
A-A
12 | 12



B-B
12 | 12



C-C
12 | 12
Concrete Ramp



D-D
12 | 12

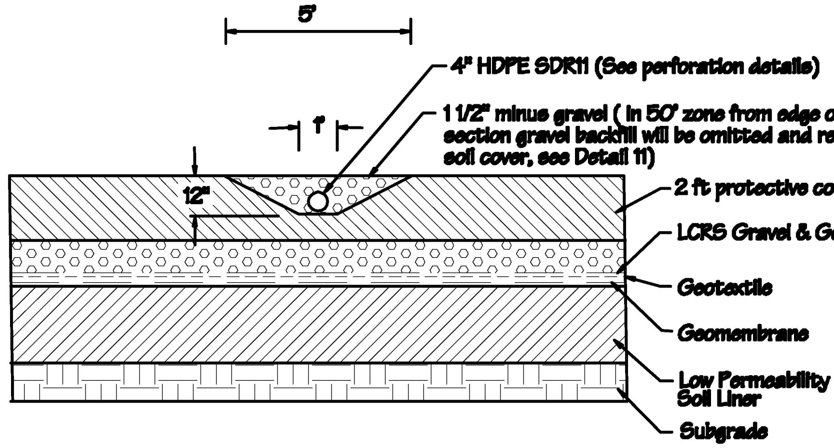
A-Mehr, Inc.

Central Maui Landfill

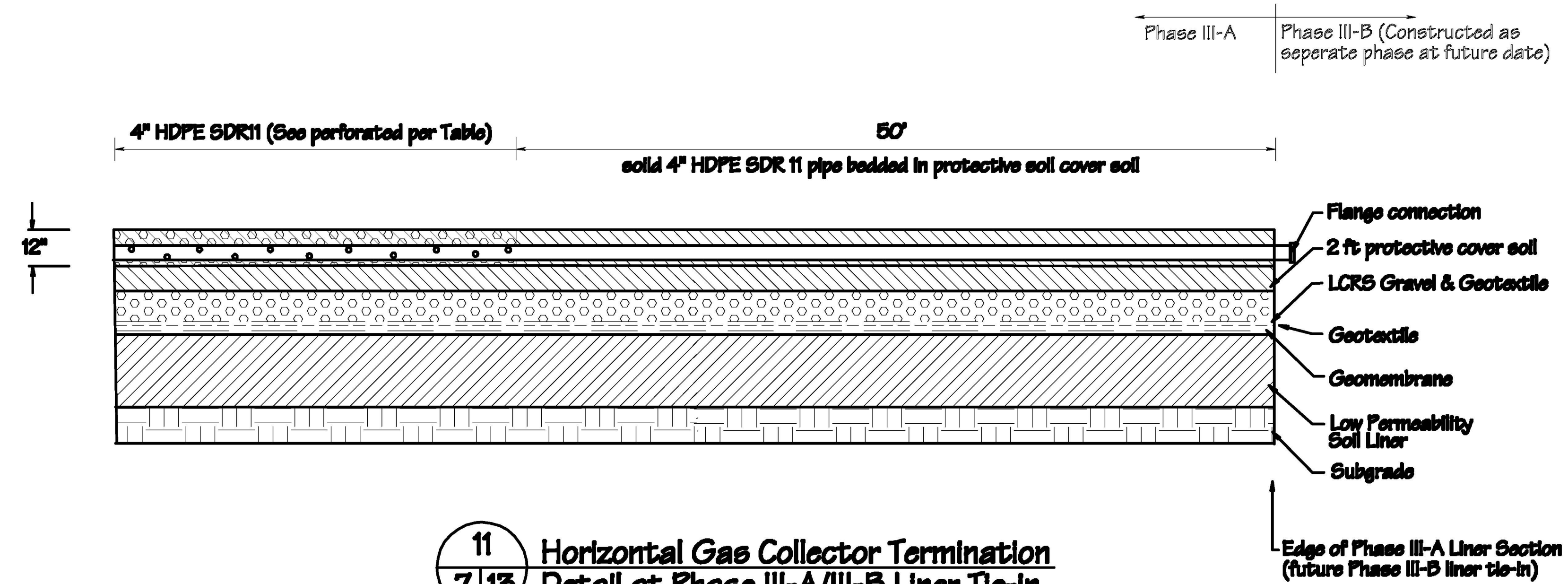
Phase III And Related Improvements

Drainage Details

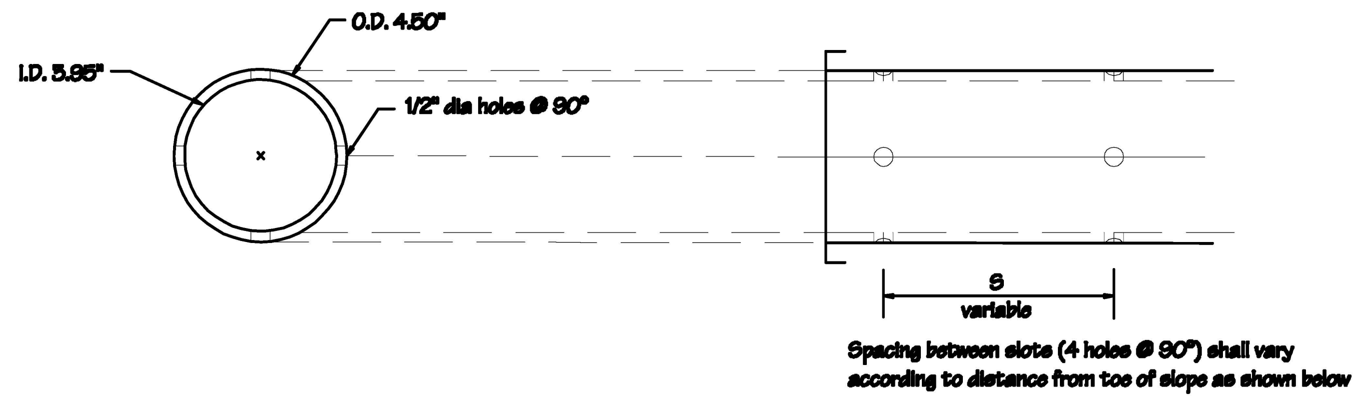
FILENAME	Phase III
DRAWN	RM
CHECKED	
DATE	7/6/18
SHEET	12



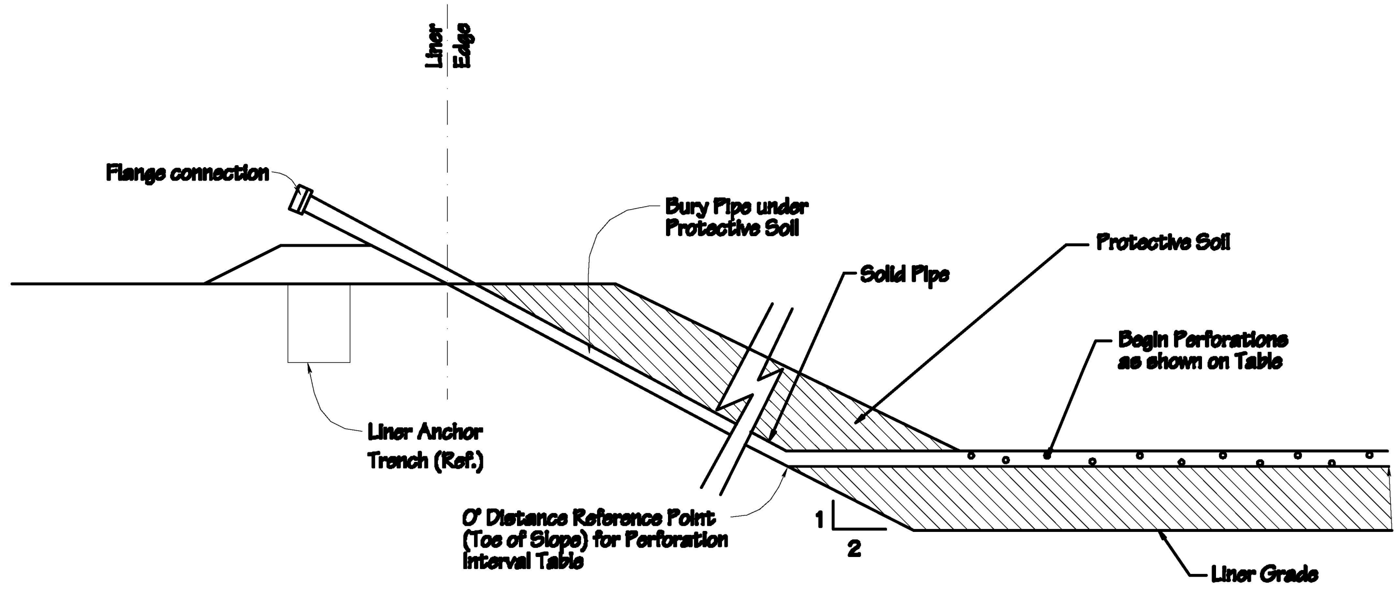
9 | 7 | 13 Horizontal Gas Collector



11 | 7 | 13 Horizontal Gas Collector Termination Detail at Phase III-A/III-B Liner Tie-in



4" HDPE SDR 11 Perforation Details



10 | 7 | 13 Gas Collector Termination (Typical)

Phase III Horizontal Gas Collector - Perforation Schedule

Phase III Floor Gas Collector Perforation Intervals - Measured From Toe Of Slope

		Collector Identification Number						
		P3-1	P3-2	P3-3	P3-4	P3-5	P3-6	P3-7
Total Collector Length (ft) (a)		406	770	920	990	1020	1010	1000
East Side Perforation Schedule								
Total Length, East Side (ft) (b)		203	385	460	495	510	505	500
No Perforations, East side	From (c)	0	0	0	0	0	0	0
	To	50	50	50	50	50	50	50
Total Perforated Length (ft)		153	335	410	445	460	455	450
Spacing S=20"	From	50	50	50	50	50	50	50
	To	96	151	173	184	188	187	185
Spacing S=13"	From	96	151	173	184	188	187	185
	To	127	218	255	273	280	278	275
Spacing S=8"	From	127	218	255	273	280	278	275
	To	157	285	337	362	372	369	365
Spacing S=5"	From	157	285	337	362	372	369	365
	To	180	335	399	428	441	437	433
Spacing S=3"	From	180	335	399	428	441	437	433
	To	203	385	460	495	510	505	500
West Side Perforation Schedule								
Total Length, West Side (ft) (b)		203	385	460	495	510	505	500
No Perforations, West side	From	406	770	920	990	1020	1010	1000
	To (d)	356	720	870	940	970	960	950
Total Perforated Length (ft)		153	335	410	445	460	455	450
Spacing S=20"	From	356	720	870	940	970	960	950
	To	310	620	747	807	832	824	815
Spacing S=13"	From	310	620	747	807	832	824	815
	To	280	553	665	718	740	733	725
Spacing S=8"	From	280	553	665	718	740	733	725
	To	249	486	583	629	648	642	635
Spacing S=5"	From	249	486	583	629	648	642	635
	To	226	435	522	562	579	573	568
Spacing S=3"	From	226	435	522	562	579	573	568
	To	203	385	460	495	510	505	500

Phase II Slope Gas Collector Perforation Intervals - Measured From Outside Edge Of Slope (h)

		Collector Identification Number			
		P2-1	P2-2	P2-3	P2-4
Total Collector Length (ft) (e)		406	770	920	990
East Side Perforation Schedule					
Total Length, East Side (ft) (b)		203	385	460	495
No Perforations, East side	From (f)	0	0	0	0
	To	50	50	50	50
Total Perforated Length (ft)		153	335	410	445
Spacing S=20"	From	50	50	50	50
	To	96	151	173	184
Spacing S=13"	From	96	151	173	184
	To	127	218	255	273
Spacing S=8"	From	127	218	255	273
	To	157	285	337	362
Spacing S=5"	From	157	285	337	362
	To	180	335	399	428
Spacing S=3"	From	180	335	399	428
	To	203	385	460	495
West Side Perforation Schedule					
Total Length, West Side (ft) (b)		203	385	460	495
No Perforations, West side	From	406	770	920	990
	To (g)	356	720	870	940
Total Perforated Length (ft)		153	335	410	445
Spacing S=20"	From	356	720	870	940
	To	310	620	747	807
Spacing S=13"	From	310	620	747	807
	To	280	553	665	718
Spacing S=8"	From	280	553	665	718
	To	249	486	583	629
Spacing S=5"	From	249	486	583	629
	To	226	435	522	562
Spacing S=3"	From	226	435	522	562
	To	203	385	460	495

(a) Total collector length is total length of pipe located on cell floor between the east side and west side lined slopes.

(b) Perforation spacings are based on distance from vaccum source, which is each end of pipe. Therefore each collector is split into east and west sides of equal length for design of perforation spacing.

(c) Distance zero represents the east side toe of slope as illustrated on Sheet 7; location where steeper side slope transitions to the flatter floor slope along the gas collector pipe horizontal run.

(d) Distance presented represents the point on pipe at toe of west side slope as measured along length of pipe from east side toe and as illustrated on Sheet 7; location where steeper side slope transitions to the flatter floor slope along the gas collector pipe horizontal run.

(e) Total collector length is total length of pipe located on Phase II slope between the east side limit of Phase III refuse and west side limit of Phase III refuse.

(f) Distance zero represents the east side limit of Phase III refuse as illustrated on Sheet 7.

(g) Distance presented represents the point on the pipe at the west side limit of Phase III refuse as measured along the length of pipe from east side limit of Phase III refuse, as illustrated on Sheet 7.

(h) Final locations of Phase II slope collectors maybe adjusted to account for operational field conditions.

A-Mehr, Inc.

Central Maui Landfill

Phase III And Related Improvements

Horizontal Gas Collector Details

FILENAME	DRAWN	CHECKED	DATE	FIGURE
Maui ph VIA	RM		1/17/19	13