State of Utah

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Department of
Environmental Quality

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Executive Director

DIVISION OF WASTE MANAGEMENT
AND RADIATION CONTROL
Scott T. Anderson
Director

March 22, 2017

Rob Richards, General Manager
ROC Landfill Holding, LLC
P.O. Box 1889
Salt Lake City, Utah 84110-1889

RE: Intermountain Regional Class V Landfill Permit

Dear Mr. Richards:

Enclosed is the solid waste permit for the Intermountain Regional Class V Landfill that reflects the approved permit modification addressing new landfill floor elevations, leachate collection system and changes to the final grade for the closure cap. These changes are addressed in the enclosed permit and Attachments 1 and 2.

If you have questions, please call Doug Taylor at (801) 536-0240.

Sincerely,

Scott T. Anderson, Director
Division of Waste Management and Radiation Control

STA/DT/kl

Enclosures: Landfill Permit (DSHW-2011-015512)
Permit Attachment 1 (DSHW-2016-014885)
Permit Attachment 2 (DSHW-2016-014884)

c: Ralph Clegg, EHS, MPA, Director, Utah County Health Department
Bryce C. Larsen, MPA, LEHS, Environmental Health Director, Utah County Health Department
Gordon Jones, HAL Engineers

DSHW-2017-002193

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UTAH DIVISION OF WASTE MANAGEMENT AND RADIATION CONTROL
SOLID WASTE PERMIT

ROC-Intermountain Regional MSW
CLASS V LANDFILL

Pursuant to the provisions of the *Utah Solid and Hazardous Waste Act*, Title 19, Chapter 6, Part 1, Utah Code Annotated (UCA) 1953, as amended (the Act) and the *Utah Solid Waste Permitting and Management Rules*, Utah Administrative Code (UAC) R315-301 through 320 adopted thereunder, a Permit is issued to

ROC Fund Landfill Holdings, LLC
as owner and operator
(Permittee)

to own, construct, and operate the ROC-Intermountain Regional MSW Landfill located at and around the surrounding vicinities of the West half of Section 16, Township 7 South, Range 2 West, Salt Lake Base and Meridian, Utah County, Utah as shown in the Permit Application (Division Tracking # 2011-00272) that was determined complete on February 2, 2011 (tracking # 2011-00153); and the Permit Modification (Division Tracking # 2016-014059) that was determined complete on December 6, 2016 (Tracking # 2016-014881). The complete spectrum of geographic sections, township, and range coordinates can be found in the permit application.

The Permittee is subject to the requirements of UAC R315-301 through 320 and the requirements set forth herein.

All references to UAC R315-301 through 320 are to regulations that are in effect on the date that this Permit becomes effective.

This Permit shall become effective: March 8, 2011.

This Permit shall expire at midnight: March 8, 2021.

Closure Cost Revision Date: March 8, 2016.

Signed this 8th day of March 2011.

Modification signed this 22nd day of March, 2017

Scott T. Anderson, Director
Utah Division of Waste Management and Radiation Control

FACILITY OWNER/OPERATOR INFORMATION

LANDFILL NAME:	ROC-Intermountain Regional MSW Landfill
OWNER NAME:	ROC Fund Landfill Holdings, LLC
OWNER ADDRESS:	P. O. Box 1889, Salt Lake City, Utah 84110-1889
OWNER PHONE NO.:	801-403-7651
OPERATOR NAME:	ROC Fund Landfill Holdings, LLC
OPERATOR ADDRESS:	P. O. Box 1889, Salt Lake City, Utah 84110-1889
OPERATOR PHONE NO.:	801-403-7651
TYPE OF PERMIT:	Class V Landfill
PERMIT NUMBER:	1102
LOCATION:	West half of Section 16, Township 7 South, Range 2 West, SLBM, Utah County (and all other geographical coordinates as outlined in the application); Lat. 40° 13' 2.31", Long. 112° 4' 5.89".
DIRECTIONS TO FACILTY:	Location of site is at 800 South Allen Ranch Road (18150 West) in Fairfield, Utah 84013. Access routes considered to the landfill are from Highway 73, then South on 18150 West, then East on 800 South to Allen Ranch Road on the South side of the Town of Fairfield, Utah.
PERMIT HISTORY:	Permit issued March 8, 2011 Permit Modification approved on March 20, 2017 addressed redesign of the landfill floor, leachate collection system, and closure cap.

PERMIT REQUIREMENTS

Permit as used in this document is defined in UAC R315-301-2(55).

The application, *ROC Fund Landfill Holdings, LLC Class V Landfill Permit Application,* Tracking Number 2011.00272, as deemed complete on the date shown on the signature page of this Permit, is hereby incorporated by reference into this Solid Waste Permit and shall be referred to as the "Permit Application" throughout this Permit. All representations made in the Permit Application are part of this Permit and are enforceable under UAC R315-301-5(2). The Permit Application shall become part of the operating record of the Landfill. Where differences in wording exist between this Permit and the application, the wording of this Permit supersedes that of the application.

This Permit consists of the signature page, Facility Owner Information section, sections I through V and the Permit Application as defined above.

By this Permit to own and operate, the Permittee is subject to the following conditions.

I. GENERAL COMPLIANCE RESPONSIBILITIES

A. General Operation

The Permittee shall operate the landfill in accordance with all applicable requirements of UAC R315-302 and 303, for a Class V landfill, that are in effect as of the date of this Permit unless otherwise noted in this Permit. Any permit noncompliance or noncompliance with any applicable portions of UCA 19-6-101 through 123 and applicable portions of UAC R315-301 through 320 constitutes a violation of the Permit or applicable statute or rule and is grounds for appropriate enforcement action, permit revocation, modification, or denial of a permit renewal application.

B. Acceptable Waste

This Permit is for the disposal of non-hazardous solid waste that may include:

1. Municipal solid waste;
2. Commercial waste;
3. Industrial waste;
4. Construction/demolition waste;
5. Special waste as allowed by UAC R315-315 and authorized in section III-I of this Permit and limited by this section; and

6. Conditionally exempt small quantity generator hazardous waste as specified in UAC R315-303-4(7)(a)(i)(B) and PCB's as specified by UAC R315-315-7(2).

C. Prohibited Waste

1. Hazardous waste as defined by UAC R315-1 and R315-2;

2. Containers larger than household size (five gallons) holding any liquid, non-containerized material containing free liquids or any waste containing free liquids in containers larger than five gallons; or

3. PCB's as defined by UAC R315-301-2, except as allowed in Section IB (Acceptable Waste) of this Permit

Any prohibited waste received and accepted for treatment, storage, or disposal at the facility shall constitute a violation of this Permit, of UCA 19-6-101 through 123 and of UAC R315-301 through 320.

D. Inspections and Inspection Access

The Permittee shall allow the Director of the Utah Waste Management and Radiation Control or an authorized representative of the Board, or representatives from the Utah County Health Department, to enter at reasonable times and:

1. Inspect the landfill or other premises, practices or operations regulated or required under the terms and conditions of this Permit or UAC R315-301 through 320;

2. Have access to and copy any records required to be kept under the terms and conditions of this Permit or UAC R315-301 through 320;

3. Inspect any loads of waste, treatment facilities or processes, pollution management facilities or processes, or control facilities or processes required under this Permit or regulated under UAC R315-301 through 320; and

4. Create a record of any inspection by photographic, videotape, electronic, or any other reasonable means.

E. Noncompliance

If monitoring, inspection, or testing indicates that any permit condition or any applicable rule under UAC R315-301 through 320 may be or is being violated, the Permittee shall promptly make corrections to the operation or other activities to bring the facility into compliance with all permit conditions or rules.

In the event of any noncompliance with any permit condition or violation of an applicable rule, the Permittee shall promptly take any feasible action reasonably necessary to correct the noncompliance or violation and mitigate any risk to the human health or the environment. Actions may include eliminating the activity causing the noncompliance or violation and containment of any waste or contamination using barriers or access restrictions, placing of warning signs, or permanently closing areas of the facility.

The Permittee shall document the noncompliance or violation in the operating record, on the day the event occurred or the day it was discovered. Permittee shall notify the Director of the Division of Waste Management and Radiation Control by telephone within 24 hours, or the next business day following documentation of the event. Permittee shall give written notice of the noncompliance or violation and measures taken to protect human health and the environment within seven days of Director notification.

Within thirty days of the documentation of the event, the Permittee shall submit to the Director a written report describing the nature and extent of the noncompliance or violation and the remedial measures taken or to be taken to protect human health and the environment and to eliminate the noncompliance or violation. Upon receipt and review of the assessment report, the Director may order the Permittee to perform appropriate remedial measures including development of a site remediation plan for approval by the Director.

In an enforcement action, the Permittee may not claim as a defense that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with UAC R315-301 through 320 and this Permit.

Compliance with this Permit does not constitute a defense to actions brought under any other local, state, or federal laws. This Permit does not exempt the Permittee from obtaining any other local, state or federal permits or approvals required for the facility operation.

The issuance of this Permit does not convey any property rights, other than the rights inherent in this Permit, in either real or personal property, or any exclusive privileges other than those inherent in this Permit. Nor does this Permit authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations including zoning ordinances.

The provisions of this Permit are severable. If any provision of this Permit is held invalid for any reason, the remaining provisions shall remain in full force and effect. If the application of any provision of this Permit to any circumstance is held invalid, its application to other circumstances shall not be affected.

F. Revocation

This Permit is subject to revocation if any condition of this Permit is not being met. The Permittee shall be notified in writing prior to any proposed revocation action and such action shall be subject to all applicable hearing procedures established under UAC R315-12 and the *Utah Administrative Procedures Act*.

As part of the revocation the Director shall exercise the option to require payment of funds under the financial assurance mechanism held by the Director.

G. Attachment Incorporation

Attachments to the Permit Application are incorporated by reference into this Permit and are enforceable conditions of this Permit, as are documents incorporated by reference into the attachments. Language in this Permit supersedes any conflicting language in the attachments or documents incorporated into the attachments.

II. DESIGN AND CONSTRUCTION

A. Design and Construction

The Permittee shall construct any landfill cell, sub-cell, run-on diversion system, runoff containment system, waste treatment facility, or final cover in accordance with the equivalent design submitted in accordance with Attachments #1 and #2 and in accordance with the Utah Solid Waste Permitting and Management Rules (UAC R315-301 thru 320). Any future municipal solid waste cells at the current landfill site shall be constructed with liners and leachate collections systems as required in UAC R315-303-3. Construction of any new disposal cell or area will require submittal of design plans and drawings and a construction quality assurance/quality control plan and modification of this Permit and is subject to the requirements of UAC R315-311-2.

Prior to construction of any landfill cell, sub-cell, engineered control system, waste treatment facility, or final cover, the Permittee shall submit construction design drawings and a Construction Quality Control and Construction Quality Assurance (CQC/CQA) Plan to the Director for approval. Buildings do not require approval. The Permittee shall construct any landfill cell, sub-cell, cell liner, engineered control system, waste treatment facility, and the final cover in accordance with the design drawings and CQC/CQA Plans submitted and approved by the Director.

Subsequent to construction the Permittee shall notify the Director of completion of construction of any landfill cell, sub-cell, engineered control system, waste treatment facility, or final cover. Landfill cells may not be used for treatment or disposal of waste until all CQC/CQA documents and construction related documents including as-builts are approved by the Director. The Permittee shall submit as-built drawings for each construction event that are signed and sealed by an engineer registered in the State of Utah.

The Permittee shall notify the Director of any proposed incremental closure, placement of any part of the final cover, or placement of the full final cover. Construction of any portion of the final cover shall be considered as a separate construction event and shall be approved separately from any other construction or expansion of the landfill. Design approval must be received from the Director prior to construction and must be accompanied by a CQC/CQA Plan, for each construction season where incremental or final closure is performed.

A qualified party, independent of the owner shall perform the quality assurance function on cover or liner components, cover components, and other testing as required by the approved CQC/CQA Plan. The results must be submitted as part of the as-built drawings to the Director.

All engineering drawings submitted to the Director must be stamped and approved by a professional engineer with a current registration in Utah.

If ground water is encountered during excavation of the landfill, the Director shall be notified immediately, and a contingency plan implemented or alternative construction design developed and submitted for approval.

B. Run-On Control

Drainage channels and diversions shall be constructed as specified in the Permit Application and maintained at all times to effectively prevent runoff from the surrounding area from entering the landfill.

C. Equivalent Design

This facility has been proposed and is approved for an equivalent design which uses a geosynthetic clay liner in place of the liner required by UAC R315-303-3(3)(a)(ii). The Director has determined that a geosynthetic clay liner is equivalent to the liner required by UAC R315-303-3(3)(a)(ii).

III. LANDFILL OPERATION

A. Operations Plan

The Operations Plan included in the Permit Application shall be kept onsite at the landfill or at the location designated in section III-K of this Permit. The landfill shall be operated in accordance with the operations plan. If necessary, the facility owner may modify the Operations Plan, provided that the modification meets all of the requirements of UAC R315-301 through 320, is as protective of human health and the environment as that approved in the Permit Application, and is approved by the Director as a minor modification under UAC R315-311-2(1)(a)(xiii). Any modification to the Operations Plan shall be noted in the operating record.

Any modification to the Operations Plan shall be submitted to the Director for approval and is considered a minor permit modification in compliance with UAC R315-311-2(1)(a)(xiii) unless the Director determines the change should be subject to public comment under UAC R315-311-2(1)(b).

B. Security

The Permittee shall operate the Landfill so that unauthorized entry to the facility is restricted. All facility gates and other access routes shall be locked during the time the landfill is closed. At least 2 persons employed by the Permittee shall be at the landfill during all hours that the landfill is open. Fencing and any other access controls as shown in the Permit Application shall be constructed to prevent access of persons or livestock by other routes.

C. Training

Permittee shall provide training for on-site personnel in landfill operation, including waste load inspection, hazardous waste identification, and personal safety and protection.

D. Burning of Waste

Intentional burning of solid waste is prohibited and is a violation of UAC R315-303-4(2)(b). All accidental fires shall be extinguished as soon as reasonably possible.

E. Daily Cover

The solid waste received at the landfill shall be completely covered at the end of each working day with a minimum of six inches of earthen material.

An alternative daily cover material may be used when the material and operation meets the requirements of UAC R315-303-4(4)(b) through (d) or when the alternative daily cover meets the requirement of UAC R315-303-4(4)(e).

F. Ground Water Monitoring

The Permittee shall monitor the ground water underlying the landfill in accordance with the Ground Water Monitoring Plan and the Ground Water Monitoring Quality Assurance/Quality Control Plan contained in the Permit Application. If necessary, the facility owner may modify the Ground Water Monitoring Plan and the Ground Water Monitoring Quality Assurance/Quality Control Plan, provided that the modification meets all of the requirements of UAC R315-301 through 320 and is as protective of human health and the environment as that approved in the Permit Application, and is approved by the Director as a minor modification under UAC R315-311-2(1)(a). Any modification to the Ground Water Monitoring Plan and the

Ground Water Monitoring Quality Assurance/Quality Control Plan shall be noted in the operating record. Plan changes that are found by the Director to be less protective of human health or the environment than the approved plan are a major modification and are subject to the requirements of UAC R315-311.

G. Gas Monitoring

The Permittee shall monitor explosive gases at the landfill in accordance with the Gas Monitoring Plan contained in the Permit Application and shall otherwise meet the requirements of UAC R315-303-3(5). If necessary, the Permittee may modify the Gas Monitoring Plan, provided that the modification meets all of the requirements of UAC R315-301 through 320 and is as protective of human health and the environment as that approved in the Permit Application, and is approved by the Director as a minor modification under UAC R315-311-2(1). Any modification to the Gas Monitoring Plan shall be noted in the operating record. Plan changes that are found by the Director to be less protective of human health or the environment than the approved plan are a major modification and are subject to the requirements of UAC R315-311.

If the concentrations of explosive gases at any of the facility structures, at the property boundary, or beyond the property boundary ever exceed the standards set in UAC R315-303-2(2)(a), the Permittee shall immediately take all necessary steps to ensure protection of human health and notify the Director. Within seven days of detection, place in the operating record the explosive gas levels detected and a description of the immediate steps taken to protect human health. Implement a remediation plan that meets the requirements of UAC R315-303-3(5)(b) and shall submit the plan to, and receive approval from, the Director prior to implementation.

H. Waste Inspections

The Permittee shall visually inspect incoming waste loads to verify that no wastes other than those allowed by this permit are disposed in the landfill. A complete waste inspection shall be conducted at a minimum frequency of 1 % of incoming loads, but no less than one complete inspection per day. Loads to be inspected shall be selected on a random basis. The operating record shall contain documentation that each load is received under a contract approved by the Director.

All loads suspected or known to have one or more containers capable of holding more than five gallons of liquid shall be inspected to ensure that each container is empty.

All loads that the operator suspects may contain a waste not allowed for disposal at the landfill shall be inspected.

Complete random inspections shall be conducted as follows:

1. The operator shall conduct the random waste inspection at the working face or an area designated by the operator.

2. Loads subjected to complete inspection shall be unloaded at the designated area;

3. Loads shall be spread by equipment or by hand tools;

4. A visual inspection of the waste shall be conducted by personnel trained in hazardous waste recognition and recognition of other unacceptable waste; and

5. The inspection shall be recorded on an appropriate form. The form shall be placed in the operating record at the end of the operating day

I. Disposal of Special Wastes

If a load of incinerator ash is accepted for disposal it shall be transported in such a manner to prevent leakage or the release of fugitive dust. The ash shall be completely covered with a minimum of six inches of material, or use other methods or material, if necessary, to control fugitive dust. Ash may be used for daily cover when its use does not create a human health or environmental hazard.

Animal carcasses may be disposed in the landfill working face and shall be covered with other solid waste or earth by the end of the operating day in which they are received. Alternatively, animal carcasses may be disposed in a special trench or pit prepared for the acceptance of dead animals. If a special trench is used, animals placed in the trench shall be covered with six inches of earth by the end of each operating day.

J. Self Inspections

The Permittee shall inspect the facility to prevent malfunctions and deterioration, operator errors, and discharges that may cause or lead to the release of wastes or contaminated materials to the environment or create a threat to human health or the environment. These general inspections shall be completed no less than quarterly and shall cover the following areas: Waste placement, compaction, cover; cell liner; leachate collection system; fences and access controls; roads; run-on/run-off controls; ground water monitoring wells; final and intermediate cover; litter controls; and records. A record of the inspections shall be placed in the daily operating record on the day of the inspection. Areas needing correction, as noted on the inspection report, shall be corrected in a timely manner. The corrective actions shall be documented in the daily operating record.

K. Recordkeeping

The Permittee shall maintain and keep on file at the filed office on site, a daily operating record and other general records of landfill operation as required by UAC R315-302-2(3). The landfill operator, or other designated personnel, shall date and sign the daily operating record at the end of each operating day. Each record to be kept shall contain the signature of the appropriate operator or personnel and the date signed.

1. The daily operating record shall include the following items:

    a. The number of loads of waste and the weights or estimates of weights or volume of waste received each day of operation and recorded at the end of each operating day;

    b. Major deviations from the approved plan of operation recorded at the end of the operating day the deviation occurred;

    c. Results of other monitoring required by this Permit recorded in the operating record on the day of the event or the day the information is received;

    d. Records of all inspections conducted by the Permittee, results of the inspections, and corrective actions taken shall be recorded in the record on the day of the event.

2. The general record of landfill operations shall include the following items:

    a. A copy of this Permit including the Permit Application;

    b. Results of inspections conducted by representatives of the Utah Division of Waste Management and Radiation Control and/or representatives of the Utah County Health Department when forwarded to the Permittee;

    c. Closure and Post-closure care plans;

    d. Records of employee training; and

    e. Results of groundwater monitoring; and

    f. Results of landfill gas monitoring.

L. <u>Reporting</u>

The Permittee shall prepare and submit, to the Director, an Annual Report as required in UAC R315-302-2(4). The Annual Report shall include: the period covered by the report, the annual quantity of waste received, an annual update of the financial assurance mechanism, any leachate analysis results, all ground water

monitoring results, the statistical analysis of ground water monitoring results, the results of gas monitoring, the quantity of leachate pumped, and all training programs completed.

M. Roads

All access roads within the landfill boundary that are used for transporting waste to the landfill for disposal shall be improved or maintained as necessary to assure safe and reliable all-weather access to the disposal area.

N. Litter Control

The landfill owner or operator shall minimize litter resulting from operations of the landfill. In addition to the litter control plans found in Appendix A Section 8.2 of the Permit Application, the owner and operator shall implement the following procedures when high wind conditions are present.

a. Reduce the size of the tipping face;

b. Reduce the number of vehicles allowed to discharge at the tipping face at one time;

c. Orient vehicles to reduce wind effects on unloading and waste compaction;

d. Reconfigure tipping face to reduce wind effect;

e. Use portable and permanent wind fencing as needed; and

f. Should high winds present a situation that the windblown litter cannot be controlled, the owner and operator shall cease operations of the landfill until the winds diminish.

IV. CLOSURE REQUIREMENTS

A. Closure

Final cover of the landfill shall be in accordance with Attachments #1 and #2. The final cover shall meet, at a minimum, the standard design for closure as specified in the UAC (R315-303-3(4)) plus sufficient cover soil or equivalent material to protect the low permeability layer from the effects of frost, desiccation, and root penetration. A quality assurance plan for construction of the final landfill cover shall be submitted to the Director, and approval of the plan shall be received from the Director prior to construction of any part of the final cover at the landfill. A

qualified person not affiliated with the landfill owner shall perform permeability testing on the recompacted clay placed as part of the final cover.

B. Title Recording

The Permittee shall meet the requirements of UAC R315-302-2(6) by recording a notice with the Utah County Recorder as part of the record of title that the property has been used as a landfill. The notice shall include waste disposal locations and types of waste disposed.

C. Post-Closure Care

Post-closure care at the closed landfill shall be done in accordance with the Post-Closure Care Plan contained in the Permit Application. Post-closure care shall continue until all waste disposal sites at the landfill have stabilized and the finding of UAC R315-302-3(7)(c) is made.

D. Financial Assurance

A financial assurance mechanism that meets the requirements of UAC R315-309, covering closure and post-closure care costs shall be proposed by the Permittee, submitted to the Director, and Director approval received prior to receipt of waste. The Permittee, prior to receipt of waste, shall establish the approved mechanism and fund it as required. The financial assurance mechanism(s) shall be adequately maintained to provide for the cost of closure at any stage or phase or anytime during the life of the landfill or the permit life, whichever is shorter, and shall be fully funded within ten years of the date waste is first received at the landfill. The Permittee shall keep the approved financial assurance mechanism in effect and active until closure and post-closure care activities are completed and the Director has released the facility from all post-closure care requirements.

The Permittee shall notify the Director of the establishment of the approved financial assurance mechanism and shall receive acknowledgment from the Director that the established mechanism complies with the approved method.

E. Financial Assurance Annual Update

An annual revision of closure and post-closure costs for inflation and financial assurance funding as required by R315-309-2(2), shall be submitted to the Director as part of the annual report.

F. Closure Cost and Post-Closure Cost Revision

The Permittee shall submit a complete revision of the closure and post-closure cost estimates by the Closure Cost Revision Date listed on the signature page of this Permit any time the facility is expanded, any time a new cell is constructed, or any time a cell is expanded.

V. ADMINISTRATIVE REQUIREMENTS

A. Permit Modification

Modifications to this Permit may be made upon application by the Permittee or by the Director. The Permittee shall be given written notice of any permit modification initiated by the Director.

B. Permit Transfer

This Permit may be transferred to a new permittee or new permittees by meeting the requirements of the permit transfer provisions specified in UAC R315-310-11.

C. Expansion

This Permit is for a Class V Landfill. The permitted landfill shall operate according to the design and Operation Plan described and explained in the Permit Application. Any expansion of the current footprint designated in the description contained in the Permit Application, but within the property boundaries designated in the Permit Application, shall require submittal of plans and specifications to the Director. The plans and specifications shall be approved by the Director prior to construction.

Any expansion of the landfill facility beyond the property boundaries designated in the description contained in the Permit Application shall require submittal of a new permit application in accordance with the requirements of UAC R315-310.

Any addition to the acceptable wastes described in Section 1B shall require submittal of all necessary information to the Director and the approval of the Director. use the following for all landfill unless a PCB bulk product approval has been given Acceptance for PCB bulk product waste under UAC R315-315-7(3)(b) can only be done after submittal of the required information to the Director and modification of Section IC of this Permit.

D. Expiration

Application for permit renewal shall be made at least six months prior to the expiration date, as shown on the signature (cover) page of this Permit. If a timely renewal application is made and the permit renewal is not complete by the expiration date, this Permit shall continue in force until renewal is completed or denied.

E. Status Notification

Twenty four months from the date of this Permit the Director shall be notified in writing of the status of the construction of this facility unless construction is

complete and operation has commenced. If construction has not begun within 24 months the Permittee shall submit adequate justification to the Director as to the reasons that construction has not commenced. If no submission is made or the submission is judged inadequate by the Director, this Permit shall be revoked

F. Construction Approval and Request to Operate

The Permittee shall meet each of the following conditions prior to receipt of waste:

1. The Permittee shall notify the Director, prior to acceptance of waste, that all the requirements of this Permit have been met and all required facilities, structures and accounts are in place as required.
2. The Permittee shall submit to the Director, for approval, documentation that all local zoning requirements and local government approvals have been obtained for operation of this landfill.

3. The Permittee shall submit to the Director, prior to the construction of any portion of the landfill; including offices, fences, and gates; documentation that the Permittee owns or has a lease that allows this property to be used as a landfill.

File: - Permit: #1102

Attachments

Attachment 1 –Landfill Design and Engineering

Attachment 2 –Design Drawings

Attachment 1

CHAPTER 1 - INTRODUCTION

Intermountain Regional Landfill (IRL) is interested in pursuing a more efficient design of their Class V landfill by achieving a better balance between total required cut and fill. With this goal in mind, IRL requested that Hansen, Allen & Luce, Inc. (HAL) perform a complete redesign of the floor and closure cap within the previously approved landfill footprint while maintaining the same maximum height requirement of 100 feet above the existing topography. This report provides a summary of background information associated with the design of the landfill floor and closure cap, proposed design modifications to other associated features, and results from the engineering calculations for the proposed modifications. The engineering calculations are included to provide a basis for approval of a permit modification from the Utah Division of Waste Management and Radiation Control (DWMRC).

The proposed permit modification includes the following design modifications:

1. Floor elevations and leachate collection system, including sumps and leachate withdrawl pipes.
2. Closure cap final grade, including access, benches for runoff and erosion control, downspout drainage piping to remove runoff from the top of the closure cap and benches.

Locations and configurations of some other on-site facilities to support landfill operations were also modified to provide a general concept layout plan regarding the types of facilities needed. These facilities include a potential leachate management pond, parking areas, and soil stockpile areas. The locations, sizes and configurations of these facilities are not critical to the design requirements associated with the landfill and its closure. Therefore, it is understood that the types and locations of proposed support facilities may be modified from those presented herein.

CHAPTER 2 – MODIFIED LANDFILL FLOOR DESIGN

This chapter presents the general layout and design concept of the landfill floor systems, which includes more specific information for the leachate collection and removal system components and runoff/run-on containment. References to the permit drawings in Appendix A, geotechnical report in Appendix B, the original slope stability and settlement analysis completed by HDR in Appendix C, and calculations provided in Appendices D and E should be noted throughout this chapter.

PREVIOUS DESIGN AND CURRENT LANDFILL STATUS

The original design of the landfill was completed by HDR, Inc. and presented in a design engineering report dated November 2010 that was included in the permit application as Part 3. The original capacity of the facility was listed as 27,000,000 cubic yards. As of June of 2016, several cell construction projects covering approximately 20 acres have been completed in the western portion of what was previously referred to as Cell 1 and Cell 2 in the original permit drawings.

GENERAL LAYOUT AND DESIGN

The redesign of the facility consists of a landfill area formed by incised embankments along all sides of the facility with a floor system concept very similar to the previous design. The facility has three main cells with each containing its own leachate collection system, sump and leachate withdrawal system. In order to improve on the previous design concept, the floor elevations were raised to reduce the amount of excavation required. The floor slope was reversed for the undeveloped portion of Cell 1 and taken to the north in order to minimize excavation and provide an accessible location for a leachate sump and withdrawal system. The other two cells function very similarly to the previous design with the only major change being the elevations. Cells 2 and 3 are both similar in design which drain down the center of the cell to a sump located on the far east end of the cell floor. Cell 1 differs because it includes the 20 acre area that has already been developed. Cell 1 needed to be altered because the previous design placed the floor trajectory toward the east which would have made the excavation much deeper.

The overall capacity above the protective soil cover material placed above the lining system is about 28.9 million cubic yards, slightly more than the previous design. This does not include the final cover system. The design modification maintains the previous horizontal footprint and makes grade adjustments to the floor and closure cap that do not increase the overall height above existing topography (100 feet) and actually decreases the maximum height from floor to the top of the closure cap. The slight increase in capacity was not the intent of this modification and also cannot be attributed to either horizontal or vertical expansion. The increase is a byproduct of a change in the geometry of the waste mound that produces a more favorable cut/fill balance while maintaining the original design constraints.

FLOOR ELEVATIONS AND SLOPES

The floor elevations were raised significantly from the previous design to decrease the amount of cut required for the facility. This resulted in the distance to ground water being much greater than the minimum 5 feet as required in R315-302-2(e). The bottom liner has a 2% slope, consistent with the previously approved design and with R315-303-3-3a(ii) that specifies

minimum liner slopes. The slope of the leachate collection system piping was set at a minimum of 1% but ranged to as high as 2% in some areas.

As part of the original Technical and Engineering Report completed by HDR in 2010, a slope stability analysis and settlement analysis entitled "Slope Stability and Settlement Evaluation" was completed and included as Appendix C. This evaluation included a review of the site conditions, static, pseudo-static stability and deformation analyses, and settlement and liner strain. The modified design has maximum cut slopes and maximum fill slopes that are equal to or less than those considered for the stability and seismic analyses completed by HDR. Therefore, the geometry of the design is considered acceptable from a stability standpoint based on the previous evaluation, which is found in this report in Appendix C.

The differential settlement and liner strain calculations were updated due to the modification of the overall closure geometry and changes to the leachate collection piping slopes. This update was necessary to ensure that the leachate collection system would maintain a positive slope toward the sump given differential settlement once final waste grade has been reached. A summary of the results are found in Appendix D.

LINING SYSTEM

A composite lining system is proposed for the landfill disposal area consisting of a Geosynthetic Clay Liner (GCL) overlain by a 60-mil HDPE geomembrane liner. This system was approved as part of the permit issued in 2011 and has been used on each landfill construction project to date.

An extra GCL and 60-mil HDPE geomembrane are proposed for placement in the sump areas directly above the GCL and HDPE geomembrane placed across the rest of the cell area. This extra GCL and geomembrane provide added protection against leakage in the sump areas which is the most vulnerable area for leakage to occur. Geosynthetic materials placed on interior slopes of the landfill area will consist of reinforced GCL and textured HDPE geomembrane liner. Geosynthetic materials placed across the cell floor may be unreinforced GCL with a smooth HDPE geomembrane.

Geosynthetic Clay Liner (GCL)

Hydraulic equivalency of the geosynthetic clay liner was included as part of the original permit application and was approved by the Executive Secretary as required by UAC R315-503-3(3)(a)(ii) as stated in the current permit.

HDPE Geomembrane Liner

HDPE geomembrane is proposed for use as the synthetic liner system above the GCL. The floor area will consist of 60-mil smooth HDPE geomembrane and the interior slopes will consist of 60-mil textured HDPE geomembrane to increase slope stability for materials placed on the side slopes above the HDPE geomembrane.

LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS)

A leachate collection and removal system (LCRS) will be constructed consisting of a geocomposite (geonet bonded to a geotextile) placed directly over the HDPE geomembrane liner. The geocomposite on the floor will be a single sided geocomposite on the floor and a double sided geocomposite on the side slope. Perforated leachate conveyance pipes surrounded by gravel will be placed along the collection areas where the floor surfaces come

together with additional conveyance collection pipes provided at specified intervals. The leachate will then be directed to the leachate sumps for removal.

HELP Model

The Environmental Protection Agency's (EPA) Hydrologic Evaluation of Landfill Performance (HELP) model is a quasi-two-dimensional hydrologic computer model used for conducting water balance analyses of landfills, cover systems and other solid waste containment systems. The model accepts weather, soil and design data, and uses solution techniques that account for the effects of surface storage, snowmelt, runoff, infiltration, evapotranspiration, vegetative growth, soil moisture storage, lateral subsurface drainage, leachate recirculation, unsaturated vertical drainage, and leakage through soil, geomembrane and/or composite liners.

The evaporation and solar radiation values for the modeling effort were obtained from default data contained within the HELP model software corresponding to the Salt Lake area. The precipitation and average temperature data used in the model came from the data reported in the Western Regional Climate Center database for Fairfield, Utah.

Five layers were defined in the HELP model corresponding to municipal waste material, soil cover, geocomposite, HDPE geomembrane and GCL to represent the open cell area. An additional three layers were added above the waste consisting of HDPE geomembrane, soil cover material and the erosion protection layer to represent closed portions of the landfill. Model default data were used to define the physical properties of the individual design layers. Leachate quantities were generated for the landfill under the following conditions: no waste, waste thicknesses of 10 feet, 50 feet, 100 feet, 121 feet and at closure. These different depths of waste were used to simulate leachate production at various stages of landfill development. Table 2-1 provides the leachate quantity values generated by the HELP model that were the basis for the LCRS design.

TABLE 2-1
HELP MODEL GENERATED LEACHATE RATES

Waste Height (feet)	Peak Daily Leachate	Annual Average Leachate
	(inch)	(inches)
No Waste	0.204	0.134
10	0.161	0.571
50	0.157	0.571
100	0.160	0.571
121	0.158	0.571
Closure	0.001	0.013

Geocomposite

A geocomposite will be placed above the HDPE liner to collect and convey leachate from the floor area to the leachate conveyance pipes that convey the leachate to the sumps for removal. The geonet component of the geocomposite was designed based on the peak daily leachate rate of 0.162 inches/day. The design of the geonet was completed based upon a one-foot wide section of geonet over the longest flow path for the facility. The longest one-foot wide flow path is 460 feet from the leachate conveyance pipe to the upper end of the surface at its longest

reach. This will provide the longest flow path and a typical design that can be applied to all areas of the floor.

The longest flow path for each cell is presented in Table 2-2. "Designing with Geosynthetics", by Robert Koerner, suggest several safety factors that should be applied to the leachate rate to obtain a design capacity for the geocomposite. These safety factors include: 1) creep deformation of the geonet 2) biological clogging of the geonet and 3) chemical clogging of the geonet. Therefore, a total safety factor of 4.5 was used for the design of the geocomposite. Applying this resulting safety factor to the leachate rate gives the design transmissivity requirement presented in Table 2-2.

TABLE 2-2
REQUIRED PROPERTIES FOR GEOCOMPOSITE

Cell	Longest Flow Path	Peak Daily Flow	Transmissivity Requirement
1	426 ft	5.7 ft^3/ft-day	1.38×10^{-3} m^2/sec
2	418 ft	5.6 ft^3/ft-day	1.36×10^{-3} m^2/sec
3	460 ft	6.2 ft^3/ft-day	1.49×10^{-3} m^2/sec

Geotextile Filter Fabric

Geotextile will be used as part of the geocomposite above the HDPE liner and around the leachate conveyance piping on the cell floor in order to provide a filter layer between the soil cover and the LCRS. Gradation properties of the native soil were provided by Applied Geotechnical Engineering Consultants (AGEC) and used for the calculations.

TABLE 2-3
REQUIRED PROPERTIES FOR GEOTEXTILE FILTER FABRIC

Property	Standard
Equivalent Opening	≤ 0.22 mm
Permeability	≥ 1.35×10^{-2} cm/sec
Grab Tensile Strength	≥ 90 lbs

Leachate Conveyance Pipes

The leachate conveyance pipes are designed to be placed along the valley of the cell floors that are formed by the intersection of the planar surfaces of the floor. Additional leachate pipes along the toes at the north and eastern ends as well as along the planar surfaces of the floor at specified spacing are also included to provide for adequate drainage given the assumed limitations of the geocomposite. These leachate collection pipes receive leachate from the geocomposite and convey the leachate to the sumps for removal.

The maximum leachate rate calculated using the HELP model was applied to the maximum width and length of floor area where leachate will be collected in the geocomposite for each planned leachate pipe. The contributing area for each leachate pipe varies due to different factors, including cell layout, especially the difference between Cell 1 and Cells 2 and 3. The

peak leachate rate of 0.161 inches/day for the cell floor and 0.124 inches/day for the slopes was applied to each contributing area.

Eighty percent of the maximum flow depth in the pipe was assumed for the actual capacity for each pipe using Manning's equation with a Manning's n roughness value of 0.016. A detailed breakdown of the capacity calculations for each leachate pipe is provided in Appendix E.

Landfill Leachate Withdrawal Pipes

Leachate withdrawal pipes were evaluated for wall crushing, wall buckling, and ring deflection using published procedures. Overburden loadings were determined based on the loading over the low point at the sump at closure. The calculations for the determination of pipe's ability to withstand wall crushing, wall buckling, and deflection are found in Appendix E. It was found that the 24-inch HDPE leachate withdrawal pipes specified in the drawings provide sufficient strength under the ultimate load.

Leachate Pond

Leachate will generally be contained and managed within the landfill where the sumps will be pumped when necessary and the leachate will be either used for dust control or placed in active phases of the landfill where leachate containment is provided. Currently, leachate production levels are far below the levels that would be anticipated according to the HELP model predictions. Leachate production rates will be tracked in order to provide a basis for the sizing of the leachate pond. When management of leachate production levels approaches the capacity of the facility to contain the leachate within lined areas, a leachate pond will be designed to be located in the northeast corner of the property as depicted in the permit drawings.

The leachate pond lining system will include a composite secondary (bottom) lining system constructed of GCL overlain by a 60-mil HDPE membrane. A leak detection and removal system consisting of a geonet, a sump and a leachate withdrawal pipe will be placed above the secondary lining system. A primary (upper) lining system consisting of a 60-mil HDPE geomembrane will be placed above the leak detection system above which the leachate will be stored.

RUNOFF CONTAINMENT

Precipitation runoff from the waste material in open areas of the landfill will be contained and managed within the lined landfill area. Containment areas may be formed on waste surfaces and/or by maintaining waste set-back areas where runoff water will be contained between the top of lined embankment and the waste mound. Sufficient capacity will be maintained in these areas to contain runoff from the 25-year 24-hour precipitation event as required by the regulations.

GROUNDWATER MONITORING WELLS

Groundwater monitoring wells were installed prior to the first construction phase at the facility. This permit modification does not include any modifications to the existing groundwater monitoring wells. Since the landfill footprint has not be modified, no changes to the groundwater monitoring well locations should be required.

GEOTECHNICAL INVESTIGATION

A geotechnical study was completed by Earthtec Testing and Engineering, P.C. dated October 13, 2006. Based on that study, HDR Engineering, Inc., who were responsible for the original permit application submitted in 2010, completed the slope stability, seismicity and settlement evaluations. The proposed design modifications do not go outside of the parameters considered as part of HDR's slope stability and settlement evaluation. The maximum cut slope evaluated by HDR was based on a maximum of 50 feet whereas the modified design has a maximum cut slope of 37 feet. The maximum fill slope evaluation completed by HDR was based on a maximum waste fill height of 130 feet and 100 feet above existing grade (although the design only had 80 feet of height over existing grade) at the toe whereas the modified design has a maximum height of 126 feet and maintains the 100 feet above grade with the same 4H:1V slopes as the original design. The maximum operational fill slope evaluated by HDR was 130 feet at a 3H:1V slope which is consistent with the height of 126 feet achieved under the modified design.

The differential settlement calculations were revised due to the change in the geometry of the closure cap and floor which was completed using the same methodology used in the original evaluation completed by HDR. Those calculations are found in Appendix D.

CHAPTER 3 – MODIFIED CLOSURE DESIGN

This section presents the general layout and design concept for the landfill closure system. The geometry of the closure design was modified in order to offset the airspace capacity lost from below existing grade due to the reconfiguration of the floor elevations. This allows for a more efficient use of the available footprint.

GENERAL LAYOUT AND DESIGN

The final waste mound with the overlying layers of daily cover material provides the subgrade for the final closure system. The final cover system for the modified design is consistent with the final cover system that was approved as part of the original permit application in 2010. The cover system consists of 18 inches of intermediate cover, a textured 60-mil HDPE liner followed by 2 feet of final soil cover. The two feet of cover material includes soil fill and an erosion protection layer consisting of native vegetation. A discussion of the erosion protection measures is provided in Chapter 4.

Closure Slopes

Waste mounding and the overlying closure cap extends up on a 4H:1V slope from the top of the floor embankment slopes around the perimeter of the landfill area. An intermediate bench (25 feet wide) is designed into the 4H:1V slopes to provide for intermediate storm water collection and conveyance necessary for erosion protection on the slopes around the facility. The waste mound and closure cap rise to an elevation of about 100 feet above the top of the west cut slope. The waste mound and closure cap then break grade to a 2 percent slope extending to the east. The north, south and east slopes extend upward on 4H:1V slopes from the top of the incised embankments to intersect with the top surface as it extends east on the 2 percent slope.

Sub-Surface Drainage

Some storm water may infiltrate through the cover system and collect on the surface of the HDPE membrane. A drainage system consisting of a perforated drain pipe will be installed underneath the storm water containment berm on the east side of the top of the waste mound. The drain pipes are placed in drain rock with a geotextile wrap around the drain rock. These pipes are provided to drain water that is conveyed along the HDPE liner before it reaches the side slope. Additional perforated drain pipes will be placed under the intermediate bench located on the 4H:1V slopes and will be conveyed to either the downspout pipes directly or run parallel to the downspouts in a separate solid pipe to the exterior toe of the landfill on the east side.

STORM WATER MANAGEMENT

The storm water management system consists of a 2 percent slope at the top of the landfill that directs precipitation runoff from the top surface of the closure cap toward the east. Runoff is then collected and directed to storm water downspouts using a storm water containment berm that directs water to inlet boxes and into parallel 18-inch storm drain pipes. The downspouts convey the storm water from the top of the closure cap to the exterior toe that discharges into an energy dissipation basin where it will then exit the property to the east.

The intermediate bench is located on the 4H:1V perimeter slopes of the closure cap primarily to shorten the length of the 4H:1V slope for erosion control purposes. The intermediate bench also provides storm water conveyance that is collected at inlet boxes and to parallel 18-inch diameter downspout pipes located at the northeast and southeast corners. The storm water management system associated with the closure cap is designed for the 25-year 24-hour precipitation event. Design of the storm water management system, including the hydrology, hydraulic design of the downspout pipes and erosion control is presented in more detail in Chapter 4.

STABILITY

The stability of the closure cap design was originally evaluated by HDR based on information provided in a geotechnical investigation completed by EarthTec Engineering. Although the geometry of the closure cap is changed from the original design, the design parameters are all within the values used for the prior evaluation, including maintaining the exterior slopes at 4H:1V and keeping the overall height of the slope within 100 feet vertical from the base of the slope. The maximum cut slope was also maintained below the height contemplated during the previous evaluation. Because the current design is not outside of the parameters used in the original slope stability evaluation, the previous evaluation is incorporated by reference for use in the modified design.

CHAPTER 4 – STORM WATER MANAGEMENT

A diversion channel/berm will be constructed to manage storm water from the tributary area to the west of the facility. A berm on the top of the closure cap as well as an intermediate bench will convey storm water to downspouts that will take the water off the closure cap. A hydrologic analysis was completed in order to determine peak flow rates to use for the design of the channels, downspouts and erosion control.

HYDROLOGY

Hydrologic calculations were completed for the tributary area to the landfill and the closure cap to determine peak runoff for design purposes. The Soil Conservation Service (SCS) curve number methodology was used in conjunction with the Army Corps of Engineers HEC-HMS hydrology model to predict the peak flows.

Off-Site Run-On Storm Water

Storm water that originates from outside of the landfill facility will need to be diverted in order to prevent water from entering the facility and from eroding the base of the closure cap.

Methodology. Storm drainage diversions extending to the north and south on the western edge of the landfill property will collect and convey storm flows around the facility. Tributary areas to the diversions were delineated based on USGS topographical maps.

Curve numbers were determined based on the hydrologic soil type and soil vegetative cover. The hydrologic soil type is a general indication of the soil's infiltration capacity. Soils are assigned a hydrologic soil type of A, B, C or D by the Natural Resource Conservation Service (NRCS). Soils of hydrologic soil type A have the highest infiltration rate, and therefore produce the least amount of runoff. Soils of hydrologic soil type D have the lowest infiltration rate, and therefore produce the highest amount of runoff. Most of the soils within the tributary area are hydrologic soil type C or D with smaller portions of B and A type soils. The soil vegetation cover and conditions were assumed based on information provided from a custom soil resource report for Fairfield-Nephi Area, Utah and Tooele Area, Utah and verified with a field visit. The cover conditions were combined with the hydrologic soil type to produce a curve number based on Table 2-2d of Technical Release 55 "Urban Hydrology of Small Watersheds" (TR-55). The entire tributary area was combined in one subbasin where an area weighted curve number was applied to the total area.

The lag times (T_L), defined as the time to the hydrograph peak, were calculated by using the time of concerntration (T_C) and the equation $T_L - 0.6T_C$. The time of concentration was calculated using the criteria found in Worksheet 3 in TR-55.

The SCS Type II distribution was used to model a 24-hour 25-year storm, consistent with the requirement of R315-305-4-3(a). The rainfall amount was taken toward the higher elevations of the tributary area from the "Point Precipitation Frequency Estimates from NOAA Atlas 14".

The magnitude of the area tributary to the landfill site is large enough to warrant the use of a reduction of the precipitation value due to the likelihood of the full amount of the storm affecting the whole region decreases with an increase of tributary area. The factor is based on

information from the Salt Lake City Hydrology Manual. According to the manual, a 24-hour event has an areal reduction factor of:

$$ARF = 0.01(100 - 2*Area^{0.46}) \text{ where}$$

$$Area = \text{Total Tributary Area, } 6.69 \text{ mi}^2$$

$$ARF = 0.95$$

This reduction factor was applied to the tributary area for run-on calculation purposes.

Peak Design Flow. Hydrologic calculations presented above were used to generate a peak flow of 61 cubic feet per second (cfs) for the run-on from the tributary area to the west of the facility. The calculations and summary of methodology and results are presented in Appendix F.

On-Site Run-Off Storm Water

Storm water will need to be conveyed off the landfill facility in order to protect the integrity of the closure cap.

Methodology. Delineation of the subbasins from the closure cap, shown in the figure included in Appendix F, was based on the cell closure cap design discussed in Chapter 3. Each subbasin is designed to drain either directly off of the closure cap or to a downspout that conveys flow away from the facility.

A curve number was determined based on the hydrologic soil type C found at the facility and assumed to be used as part of the cover system. The cover type was assumed to be similar to a dirt road in order to account for the period before vegetation becomes fully established. The cover conditions were combined with the hydrologic soil type to produce a curve number of 87 based on Table 2-2a of TR-55.

The lag times for each subbasin were calculated using Worksheet 3 in TR-55 with a minimum lag time of 5 minutes being applied to subbasins where the calculated value was less than 5 minutes.

The SCS Type II Distribution was used with the 25-year 24-hour storm, consistent with the requirement of R315-305-4-3(b). The rainfall amount was taken from the "Point Precipitation Frequency Estimates from NOAA Atlas 14" based on a location defined at the center of the landfill facility. The value of the 25-year 24-year event is 1.74 inches.

Peak Design Flows. The hydrologic analysis presented above was used to generate peak design flows for each of the subbasins defined for the closure cap and for the downspout piping located at points along the east side of the closure cap. The calculations and summary of methodology and results are presented in Appendix F.

HYDRAULIC DESIGN OF CHANNELS

The peak flow rates based on the hydrology discussed above provided the basis for the design of the drainage conveyances. An existing run-on diversion channel on the west side of the property has been constructed based on the design provided in the original design. This channel/berm will be extended to the south as construction of the landfill continues to ensure that run-on is directed around the facility.

DOWNSPOUT DESIGN

Hydrologic calculations for run-off described above were used to design the downspouts. The design is based on a combined peak flows ranging from 23 cfs for the northeast bench downspout to 28.5 cfs for the northeast top downspout.

Downspout sizes were determined used inlet control conditions and selecting the size and head water depth requirement using the orifice equation. Inlet control conditions were assumed because at peak flow supercritical flow in the system on the 4H:1V slopes and the elevation differences between the inlet and outlet ends of the downspout pipes will not allow for outlet conditions to control.

The downspout pipes were sized based on calculations provided in Appendix F. Two 18-inch pipes in parallel are to be installed for each of the four downspout locations. The headwater depth requirements are provided within the inlet boxes below the grating with additional depth and freeboard provided by the grading of the benches and the berm height on the top of the closure cap.

EROSION PROTECTION

Long term options to provide erosion protection generally consist of establishing vegetation or by placing a stone mulch. In this case, the establishment of vegetation is the selected erosion protection method. Procedures presented in "Erosion and Sedimentation in Utah – A Guide for Control", a Utah-specific publication, were used to determine the adequacy of the vegetative system. The detailed calculations are found in Appendix G. According to the calculations, a native vegetative cover of approximately 30% on the 4H:1V slopes will provide adequate protection against erosion and the top of the closure cap with the 2% slope provides adequate protection due to the minimal slope, although vegetation will be established there as well.

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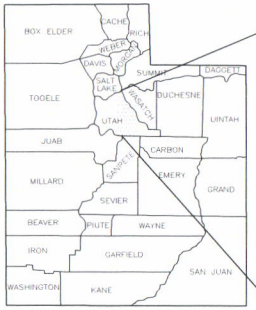
Attachment 2

INTERMOUNTAIN REGIONAL LANDFILL

2016 PERMIT MODIFICATION DRAWINGS

OCTOBER 2016



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FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02100 - LF REDESIGN\CAD\WORKING\G-1 COVER 16 FT NORTH.DWG
FILE DATE: 10.26.2016 09:52:56 (CAH)

GENERAL NOTES

NOTES:

1. COORDINATES PROVIDED ARE BASED ON THE MODIFIED STATE PLANE NAD 83 COORDINATE SYSTEM. (GROUND DATUM)
2. PROMPT NOTIFICATION SHALL BE PROVIDED TO THE STATE HISTORIC PRESERVATION OFFICE UPON DISCOVERY OF ANY ARCHEOLOGICAL OR BURIAL FINDINGS.
3. MONITORING WELLS SHALL BE PROTECTED FROM DAMAGE DURING CONSTRUCTION.
4. ALL AREAS TO BE CLEARED AND GRUBBED OF VEGETATION AND OTHER DEBRIS PRIOR TO FILL PLACEMENT.
5. SUBGRADES FOR FILLS TO BE MOISTURE CONDITIONED AND RECOMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D-698 PRIOR TO FILL PLACEMENT.
6. ALL FILL MATERIAL TO BE COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D-698.
7. DRAWINGS ARE INTENDED FOR PERMIT PURPOSES ONLY. THEY ARE NOT INTENDED FOR CONSTRUCTION. DETAILED DRAWINGS AND SPECIFICATIONS SHALL BE PROVIDED FOR EACH PHASE OF CONSTRUCTION.

INDEX OF DRAWINGS

SHEET NO.

GENERAL

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G-2 GENERAL NOTES & LEGEND
G-3 OVERALL SITE PLAN

LANDFILL

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LEACHATE CONVEYANCE & REMOVAL SYSTEM (LCRS)

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LS-2 LCRS DETAILS
LS-3 SUMP PLAN & SECTIONS
LS-4 SUMP PLANS & SECTIONS
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LS-6 LEACHATE WITHDRAWAL SYSTEM DETAILS

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PHASING

PH-1 PHASING DETAILS

CLOSURE

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DRAINAGE SYSTEM

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DS-2 DOWNSPOUT DETAILS

SECTION & DETAIL IDENTIFICATION

SECTION IDENTIFICATION

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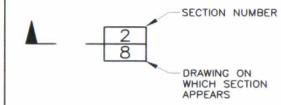

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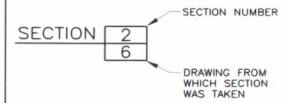

DETAIL IDENTIFICATION

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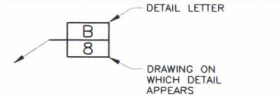
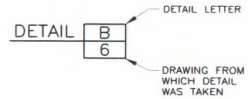


ON DRAWING NO. 8, THIS DETAIL IS IDENTIFIED AS:

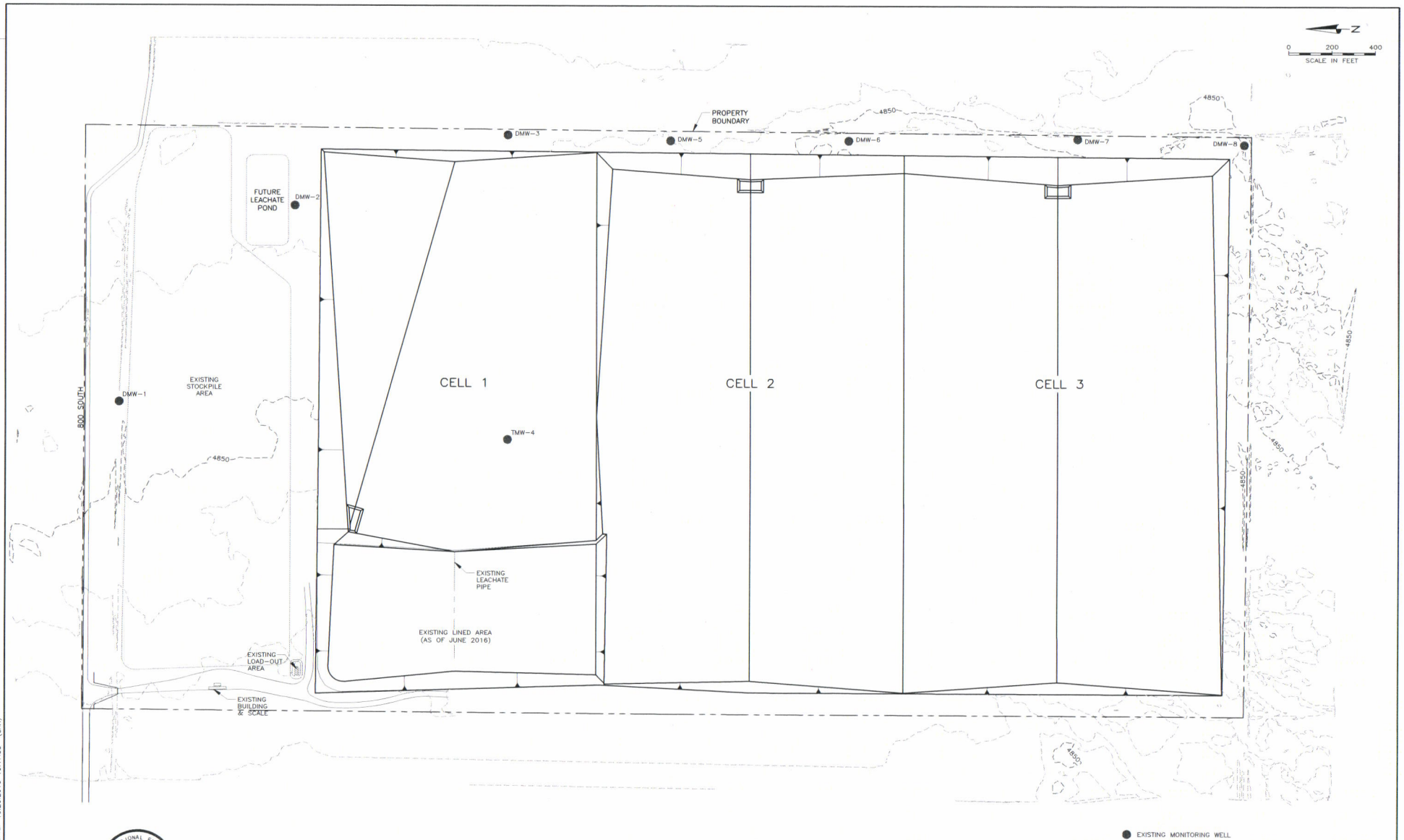


NOTES:

1. IF SECTION AND DETAILS ARE SHOWN ON THE SAME DRAWING AS SECTION CUTS AND SECTION OR DETAIL CALL-OUTS DRAWING NUMBER IS REPLACED BY A LINE.
2. DETAIL LETTERS "I" AND "O" NOT USED.

TABLE OF ABBREVIATIONS

C.C.	CENTER TO CENTER	N.	NORTHING COORDINATE
℄	CENTER LINE	N.T.S.	NOT TO SCALE
CLR.	CLEAR	O.C.	ON CENTER
CPE	CORRUGATED POLYETHYLENE	OD	OUTSIDE DIAMETER
DIA.	DIAMETER	OZ.	OUNCE
E.	EASTING COORDINATE	PC	POINT OF CURVE
EL.	ELEVATION	PCPE	PERFORATED CORRUGATED POLYETHYLENE
FL	FLOW LINE	PI	POINT OF INTERSECTION
GCL	GEOSYNTHETIC CLAY LINER	PL	PLATE
HDPE	HIGH DENSITY POLYETHYLENE	PT	POINT OF TANGENT
ID	INSIDE DIAMETER	SCPE	SMOOTH WALL CORRUGATED POLYETHYLENE
INV EL.	INVERT ELEVATION	SDR	STANDARD DIMENSION RATIO
MAX.	MAXIMUM	STA.	STATION
MIN.	MINIMUM	TYP.	TYPICAL



FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02 100 - LF REDESIGN\CAD\WORKING\G-3 SITE PLAN.DWG
FILE DATE: 10.26.2016 10:17:35 (CAH)

HANSEN ALLEN & LUCE INC. ENGINEERS

PROFESSIONAL ENGINEER CONRAD JONES No. 5048470-2202 STATE OF UTAH

PROJECT ENGINEER

DESIGNED	TGA
DRAFTED	CAH
CHECKED	GLJ
DATE	OCTOBER 2016

NO.	DATE	REVISIONS	BY	APVD
3				
2				
1				

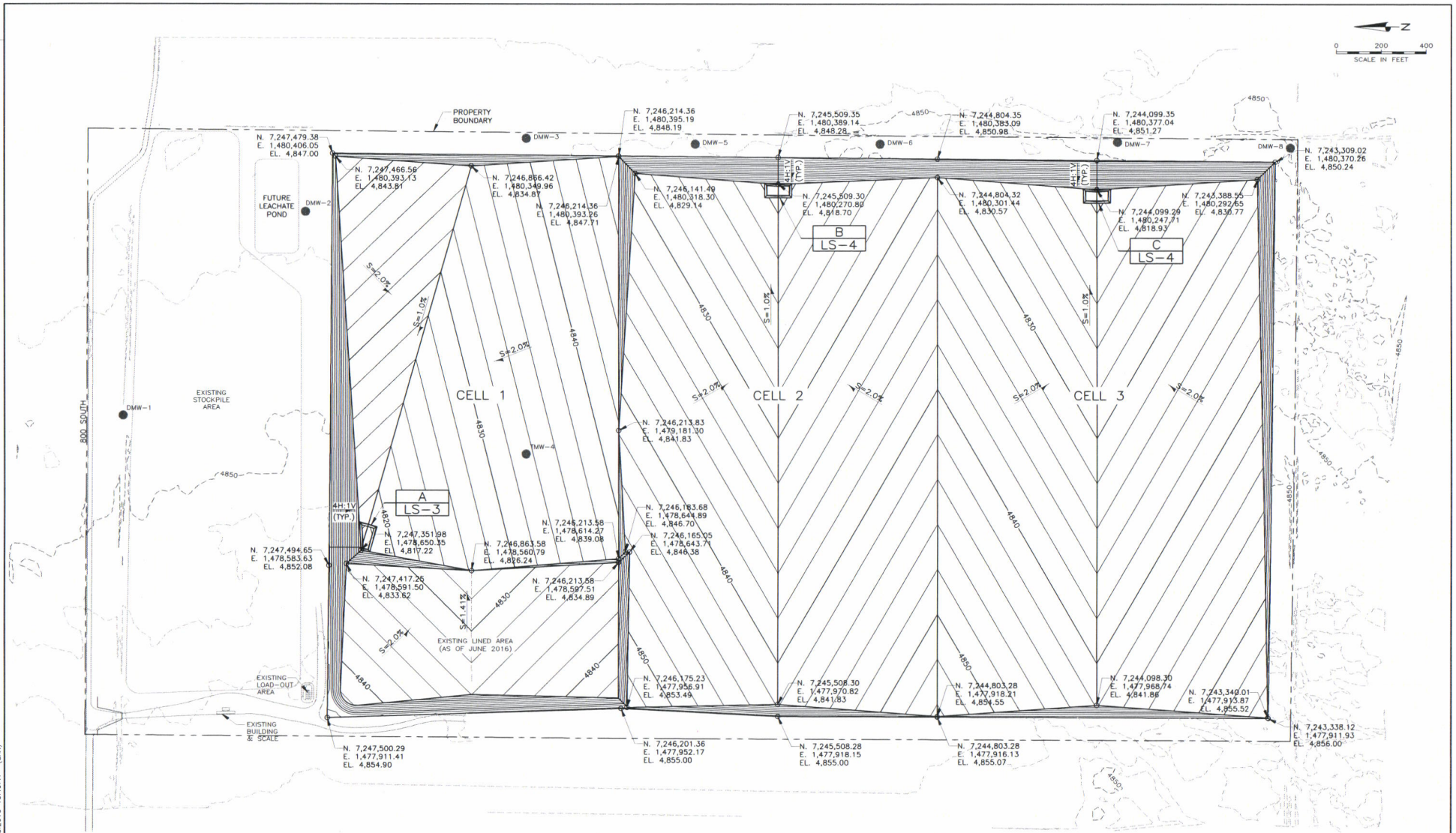
SCALE: AS SHOWN

INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
GENERAL
OVERALL SITE PLAN

SHEET G-3

373-02-100



FILE NAME: PROJECTS\373 – INTERMOUNTAIN REGIONAL LANDFILL\02.100 – LF REDESIGN\CAD\WORKING\LF-1 FLOOR PLAN.DWG
FILE DATE: 10.26.2016 10:19:47 (CAH)

HANSEN ALLEN & LUCE ENGINEERS

PROFESSIONAL ENGINEER — GORDON L. JONES — No. 5048475-2202 — STATE OF UTAH

PROJECT ENGINEER

DESIGNED TGA	3				
DRAFTED CAH	2				
CHECKED GLJ	1				
DATE OCTOBER 2016	NO.	DATE	REVISIONS	BY	APVD.

SCALE: AS SHOWN

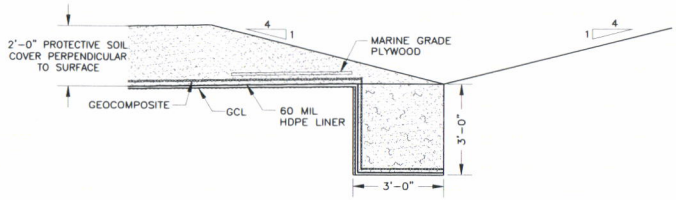
INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION LANDFILL CELL FLOOR PLAN

SHEET LF-1

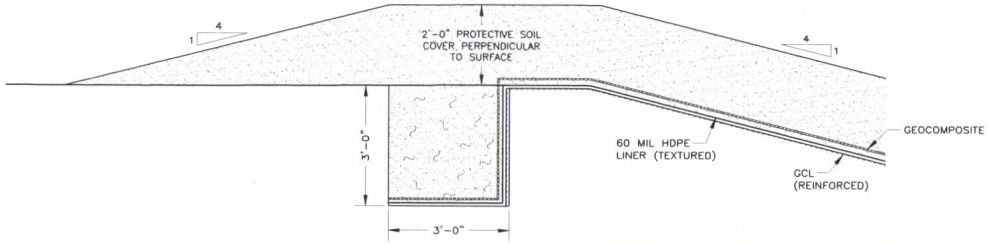
373-02-100

10/07



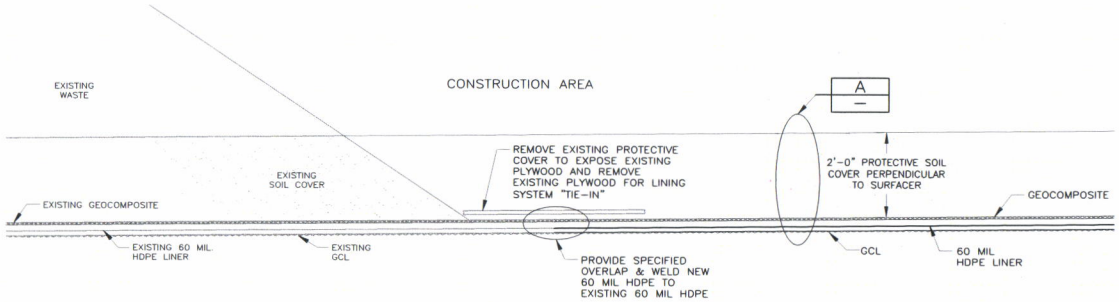
TYPICAL FLOOR LINER TERMINATION TRENCH

N.T.S.



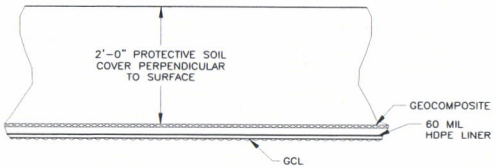
TYPICAL TOP SLOPE SECTION

N.T.S.



TYPICAL "TIE-IN" SECTION

N.T.S.



TYPICAL CELL FLOOR LINER SYSTEM SECTION

A
—

N.T.S.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\LF-2 LINER TIE IN DETAILS.DWG
FILE DATE: 10.26.2016 10:21:21 (CAH)

HANSEN ALLEN & LUCE INC. ENGINEERS

PROFESSIONAL ENGINEER CONCORL JONES No. 5548470-2202 STATE OF UTAH

PROJECT ENGINEER

DESIGNED	TGA
DRAFTED	CAH
CHECKED	GLJ
DATE	OCTOBER 2016

NO.	DATE	REVISIONS	BY	APVD.
3				
2				
1				

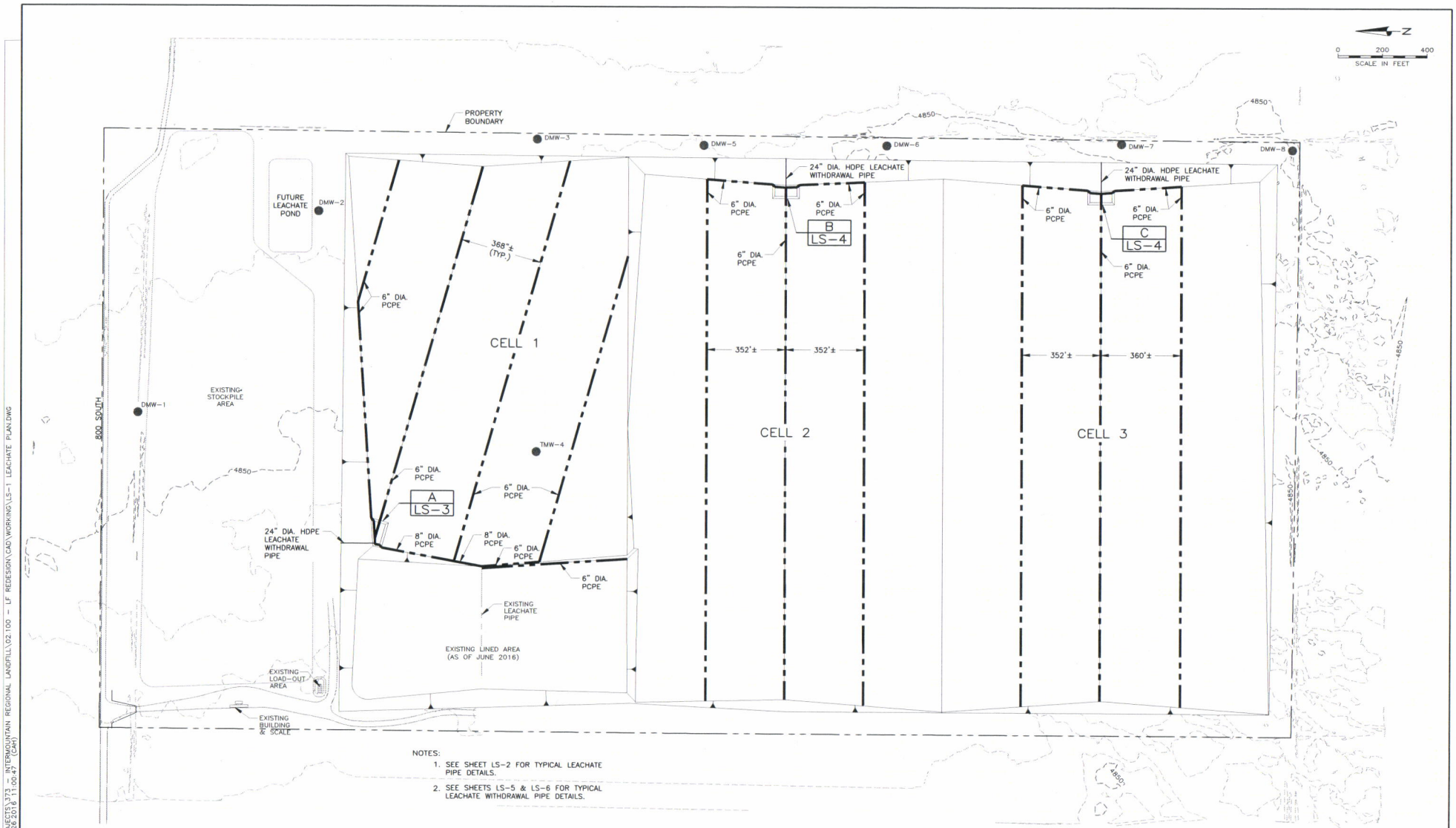
SCALE: AS SHOWN

INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
LANDFILL
LINER "TIE-IN" DETAILS

SHEET LF-2

373-02-100



NOTES:

1. SEE SHEET LS-2 FOR TYPICAL LEACHATE PIPE DETAILS.
2. SEE SHEETS LS-5 & LS-6 FOR TYPICAL LEACHATE WITHDRAWAL PIPE DETAILS.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\LS-1 LEACHATE PLAN.DWG
FILE DATE: 10.26.2016 11:00:47 (CAH)

HANSEN ALLEN & LUCE ENGINEERS

PROFESSIONAL ENGINEER — GORDON L. JONES — No. 5048470-2202 — STATE OF UTAH

PROJECT ENGINEER

DESIGNED TGA
DRAFTED CAH
CHECKED GLJ
DATE OCTOBER 2016

NO.	DATE	REVISIONS	BY	APVD.
3				
2				
1				

SCALE: AS SHOWN

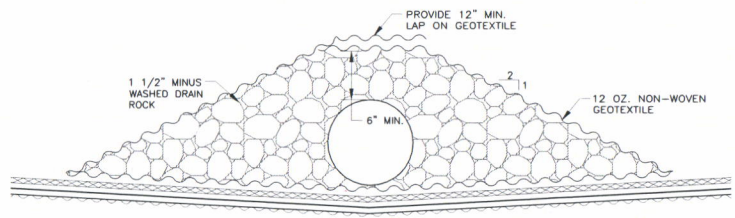
INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
LCRS
LEACHATE PIPE PLAN

SHEET LS-1
373-02-100

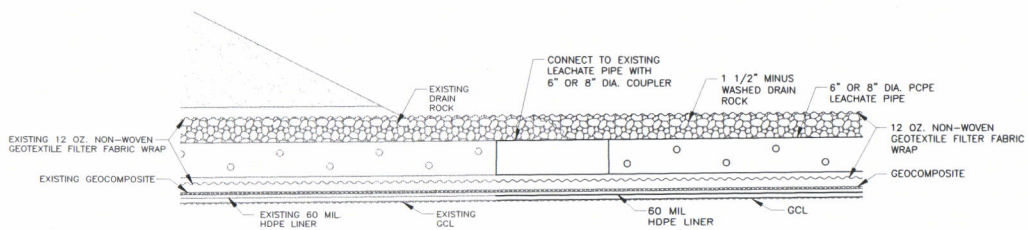
NOTES:

1. 1 1/2" MINUS WASHED DRAIN ROCK TO BE PLACED AROUND ALL PCPE PIPE AND CPE PIPE MATERIALS. A MINIMUM COVER OF 6 INCHES TO BE PROVIDED OVER PIPES.
2. PCPE REFERS TO PERFORATED CORRUGATED POLYETHYLENE PIPE.
3. FLOOR CONFIGURATION ALONG LEACHATE PIPE ALIGNMENT WILL VARY.



TYPICAL LEACHATE CONVEYANCE PIPE WRAP DETAIL

N.T.S.

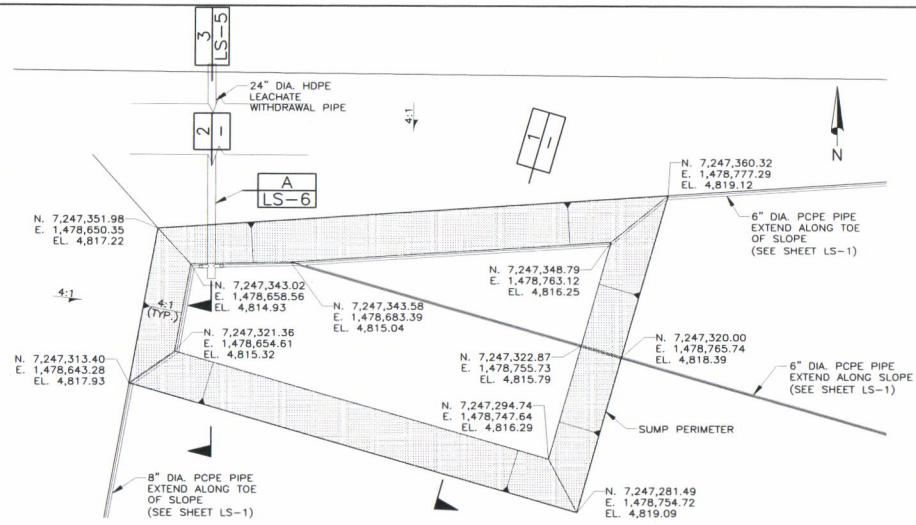


LEACHATE CONVEYANCE "TIE-IN" DETAIL

N.T.S.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\LS-2 LINER AND LCRS SECTIONS.DWG
FILE DATE: 10.26.2016 11:02:58 (CAH)

HANSEN ALLEN & LUCE inc. ENGINEERS	PROFESSIONAL ENGINEER GORDON L. JONES No. 5048470-2202 STATE OF UTAH	DESIGNED TGA	3					SCALE AS SHOWN	INTERMOUNTAIN regional landfill	2016 PERMIT MODIFICATION LCRS LCRS DETAILS	SHEET LS-2
		DRAFTED CAH	2								
		CHECKED GLJ	1								
	PROJECT ENGINEER	DATE OCTOBER 2016	NO.	DATE	REVISIONS	BY	APVD.				373-02-100

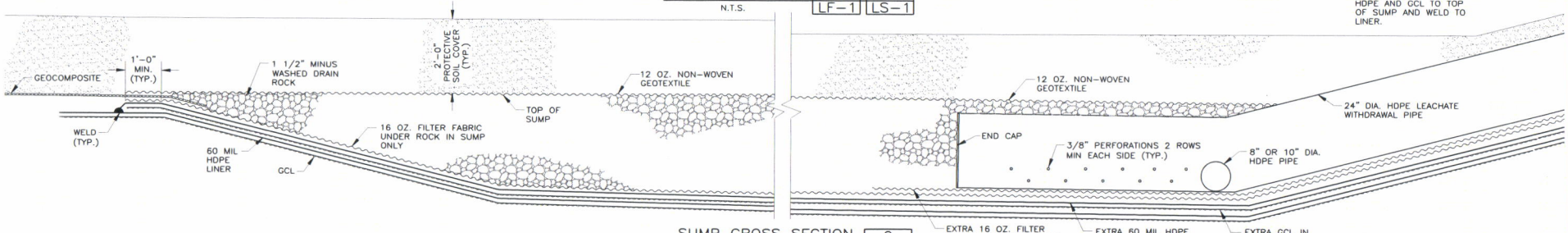


NOTES:

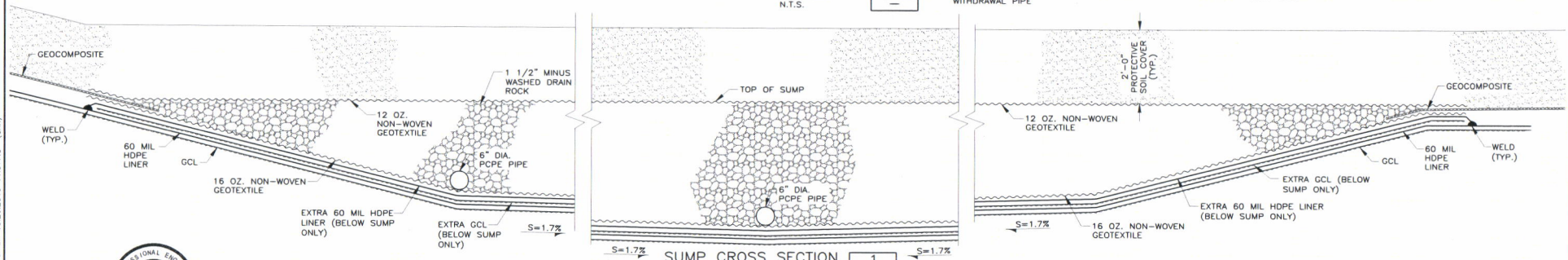
1. FILL ENTIRE SUMP WITH 1 1/2" MINUS WASHED DRAIN ROCK TO TOP OF SUMP.
2. PCPE REFERS TO PERFORATED CORRUGATED POLYETHYLENE PIPE.
3. SEE SHEET LS-2 FOR PCPE PIPE LCRS DETAILS.

SUMP PLAN VIEW A/LF-1 A/LS-1
N.T.S.

NOTE:
EXTEND EXTRA 60 MIL. HDPE AND GCL TO TOP OF SUMP AND WELD TO LINER.



SUMP CROSS SECTION 2/—
N.T.S.



SUMP CROSS SECTION 1/—
N.T.S.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\LS-3 SUMP PLAN.DWG
FILE DATE: 10.26.2016 11:07:43 (CAH)

HANSEN ALLEN & LUCE ENGINEERS

PROFESSIONAL ENGINEER GORDON L. JONES No. 5148470-2202 STATE OF UTAH

PROJECT ENGINEER

DESIGNED TGA	3				
DRAFTED CAH	2				
CHECKED GLJ	1				
DATE OCTOBER 2016	NO.	DATE	REVISIONS	BY	APVD

SCALE: AS SHOWN

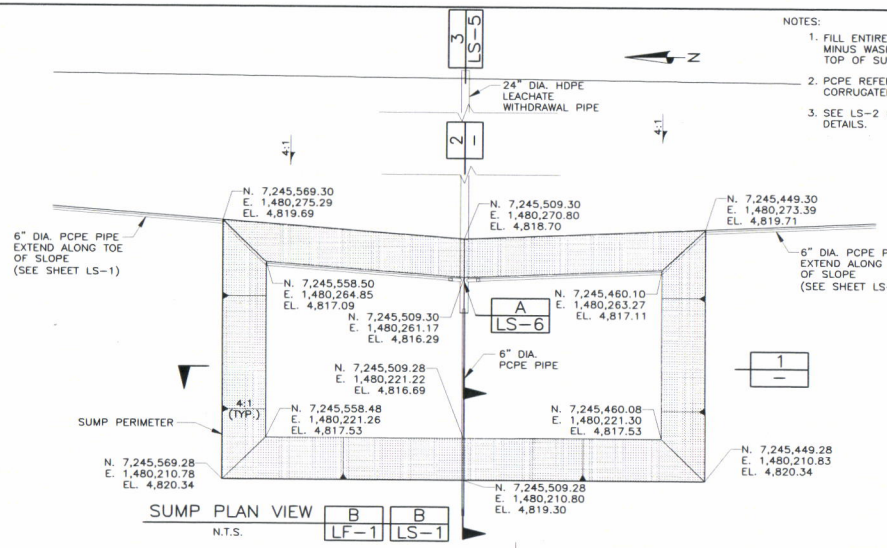
INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
LCRS
SUMP PLAN & SECTIONS

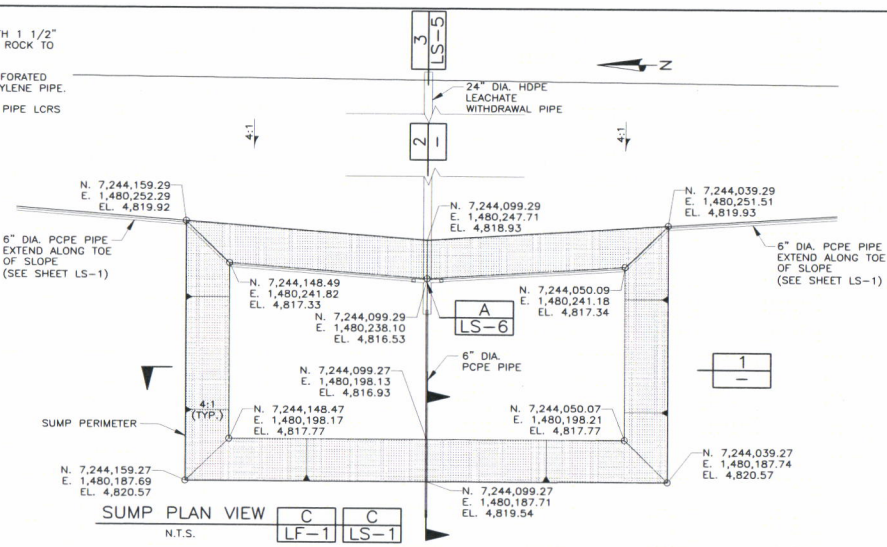
SHEET LS-3
373-02-100

NOTES:

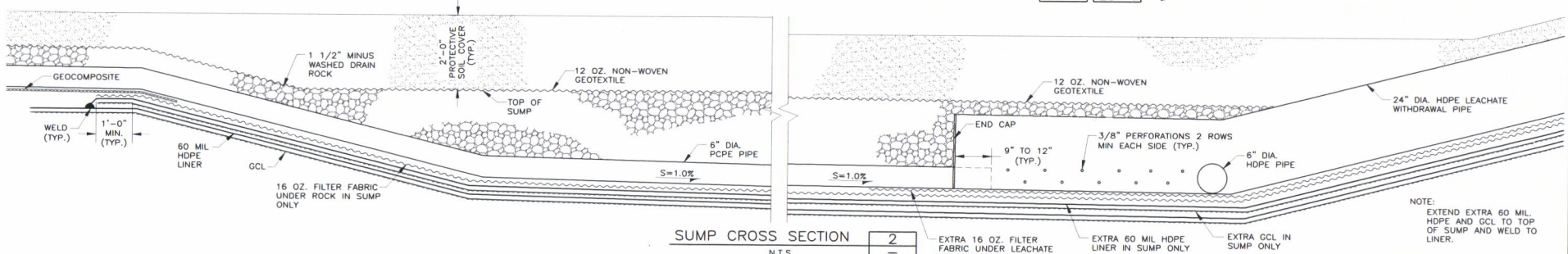
1. FILL ENTIRE SUMP WITH 1 1/2" MINUS WASHED DRAIN ROCK TO TOP OF SUMP.
2. PCPE REFERS TO PERFORATED CORRUGATED POLYETHYLENE PIPE.
3. SEE LS-2 FOR PCPE PIPE LCRS DETAILS.



SUMP PLAN VIEW B LF-1 B LS-1
N.T.S.

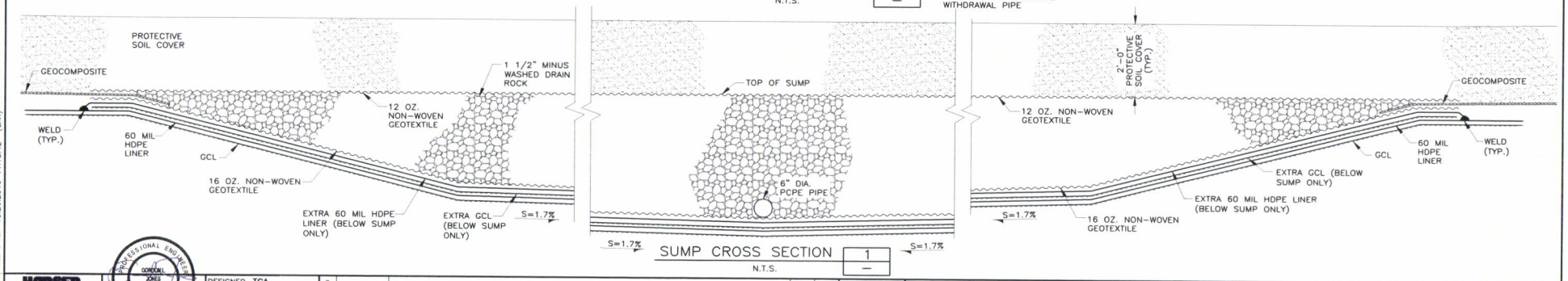


SUMP PLAN VIEW C LF-1 C LS-1
N.T.S.



NOTE:
EXTEND EXTRA 60 MIL. HDPE AND GCL TO TOP OF SUMP AND WELD TO LINER.

SUMP CROSS SECTION 2 —
N.T.S.



SUMP CROSS SECTION 1 —
N.T.S.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\LS-4 SUMP PLANS.DWG
FILE DATE: 10.26.2016 11:18:42 (CAH)

HANSEN ALLEN & LUCE inc ENGINEERS

PROFESSIONAL ENGINEER GORDON L. JONES No. 5048470-2202 STATE OF UTAH

PROJECT ENGINEER

DESIGNED	TGA
DRAFTED	CAH
CHECKED	GLJ
DATE	OCTOBER 2016

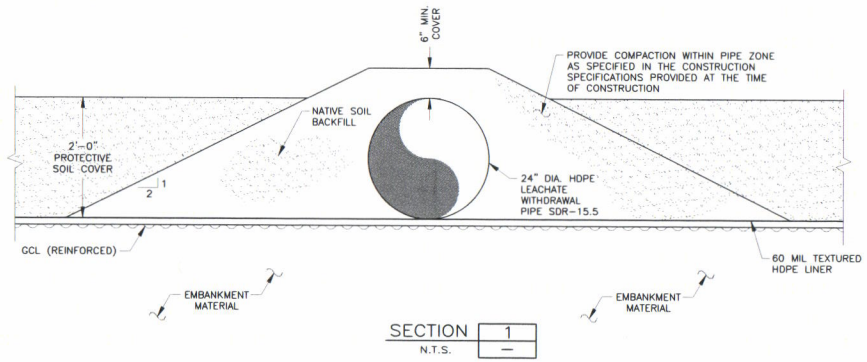
NO.	DATE	REVISIONS	BY	APVD.
3				
2				
1				

SCALE: AS SHOWN

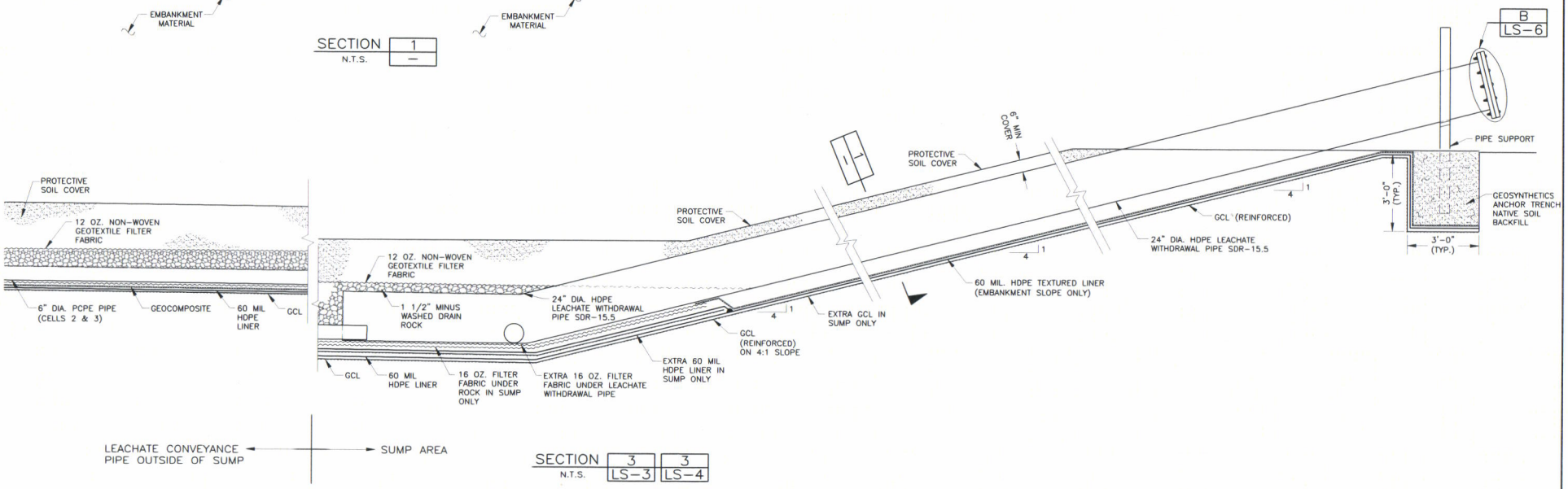
INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
LCRS
SUMP PLANS & SECTIONS

SHEET LS-4
373-02-100



SECTION 1 / — N.T.S.



SECTION 3 / LS-3 | 3 / LS-4 N.T.S.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\LS-5 SUMP SECTION PIPE.DWG
FILE DATE: 10.26.2016 11:22:22 (CAH)

HANSEN ALLEN & LUCE inc. ENGINEERS

PROFESSIONAL ENGINEER GORDON L. JONES No. 5048470-2202 STATE OF UTAH

PROJECT ENGINEER

DESIGNED TGA
DRAFTED CAH
CHECKED GLJ
DATE OCTOBER 2016

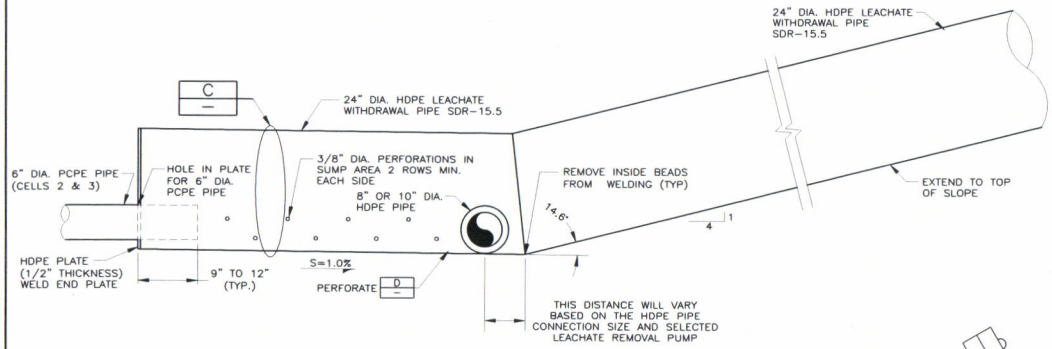
NO.	DATE	REVISIONS	BY	APVD.
3				
2				
1				

SCALE AS SHOWN

INTERMOUNTAIN regional landfill

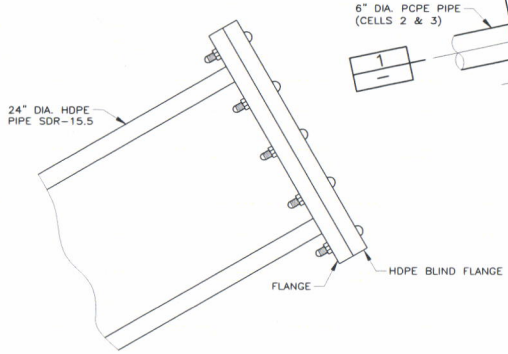
2016 PERMIT MODIFICATION
LCRS
LEACHATE WITHDRAWAL PIPE SECTIONS

SHEET LS-5
373-02-100



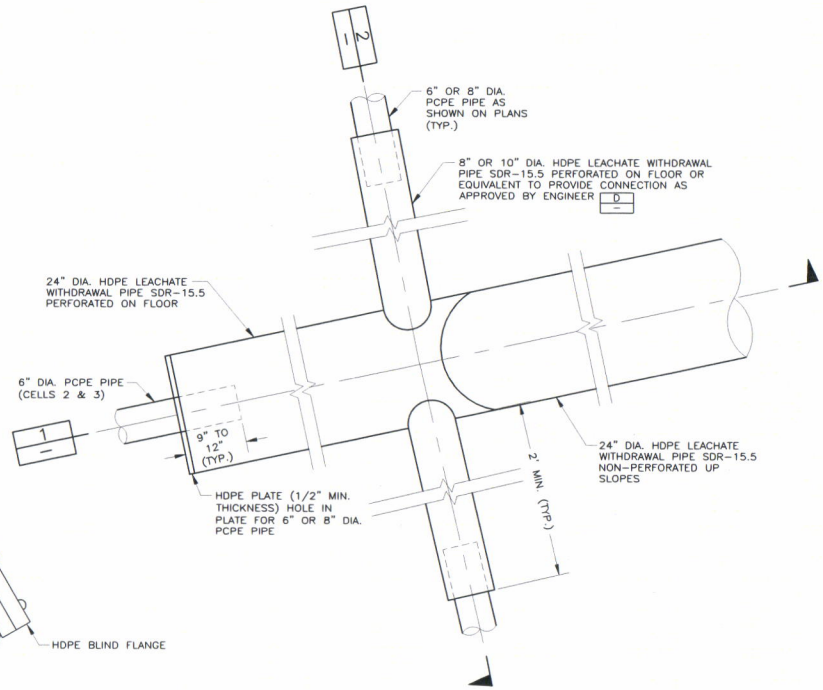
LEACHATE WITHDRAWAL PIPE SECTION 1 —

N.T.S.



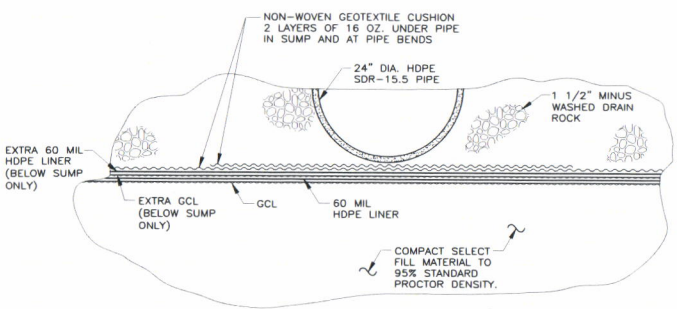
24" DIA. HDPE CAP DETAILS B LS-5

N.T.S.



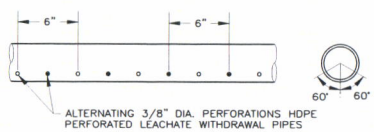
LEACHATE WITHDRAWAL PIPE DETAIL A LS-3 A LS-4

N.T.S.



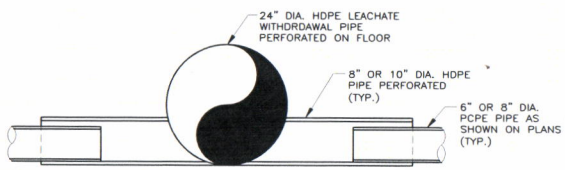
DETAIL C

4" = 1'-0" —



PERFORATION DETAIL D

N.T.S.



CROSS SECTION 2 —

N.T.S.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\LS-6 LEACHATE WITHDRAWAL SYSTEM DETAILS.DWG
FILE DATE: 10.26.2016 11:25:43 (CAH)

HANSEN ALLEN & LUCE INC ENGINEERS

PROFESSIONAL ENGINEER GORDON L. JONES No. 5049470-2202 STATE OF UTAH

PROJECT ENGINEER

DESIGNED TGA	3					
DRAFTED CAH	2					
CHECKED GLJ	1					
DATE OCTOBER 2016	NO.	DATE	REVISIONS	BY	APVD.	

SCALE AS SHOWN

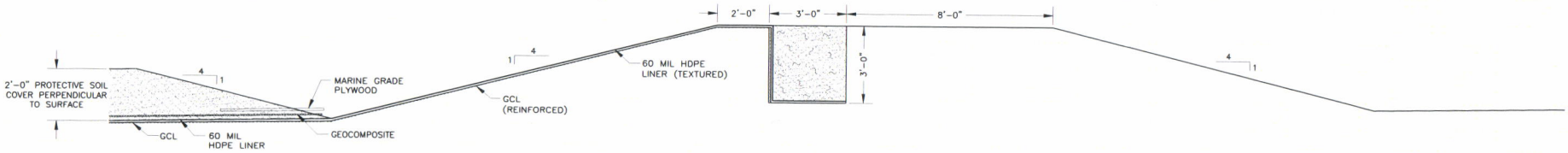
INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
LCRS
LEACHATE WITHDRAWAL SYSTEM DETAILS

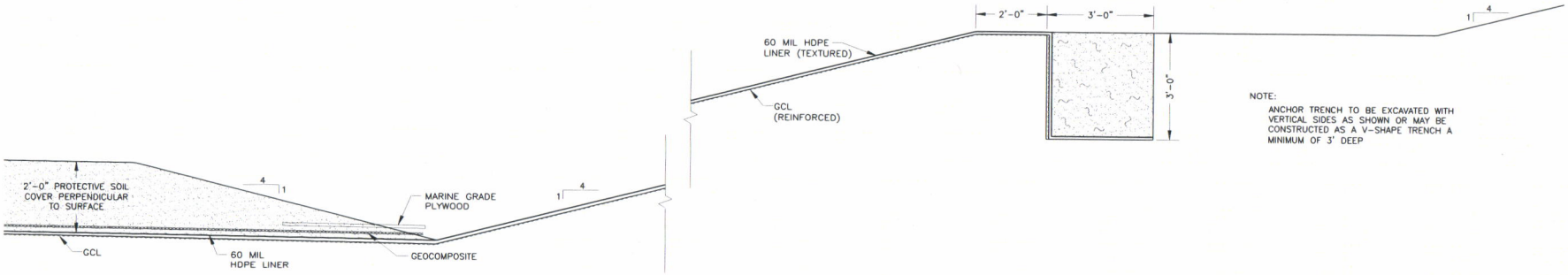
SHEET LS-6

373-02-100

10/07

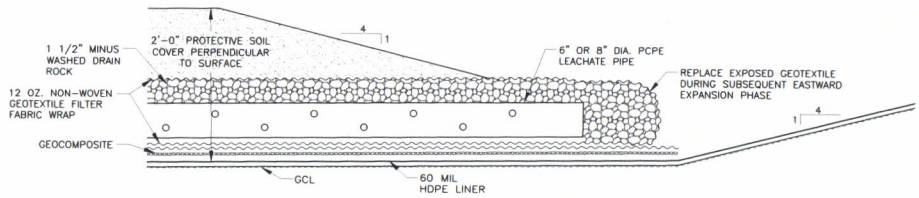


TYPICAL SOUTH TEMPORARY CONTAINMENT BERM DETAIL
FOR CELLS 2 & 3 AS CELL EXPANSION PROGRESSES



NOTE:
ANCHOR TRENCH TO BE EXCAVATED WITH VERTICAL SIDES AS SHOWN OR MAY BE CONSTRUCTED AS A V-SHAPE TRENCH A MINIMUM OF 3' DEEP.

TYPICAL EAST TEMPORARY EMBANKMENT DETAIL FOR CELLS
2 & 3 AS CELL EXPANSION PROGRESSES



LEACHATE CONVEYANCE PIPE TERMINATION AT EAST EMBANKMENT DETAIL

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02100 - LF REDESIGN\CAD\WORKING\PH-1 PHASING SECTIONS.DWG
FILE DATE: 10.26.2016 11:36:34 (CAH)

HANSEN ALLEN & LUCE INC. ENGINEERS

PROFESSIONAL ENGINEER GORDON L. JONES No. 5048470-2202 STATE OF UTAH

PROJECT ENGINEER

DESIGNED TGA	3				
DRAFTED	2				
CHECKED GLJ	1				
DATE OCTOBER 2016	NO.	DATE	REVISIONS	BY	APVD.

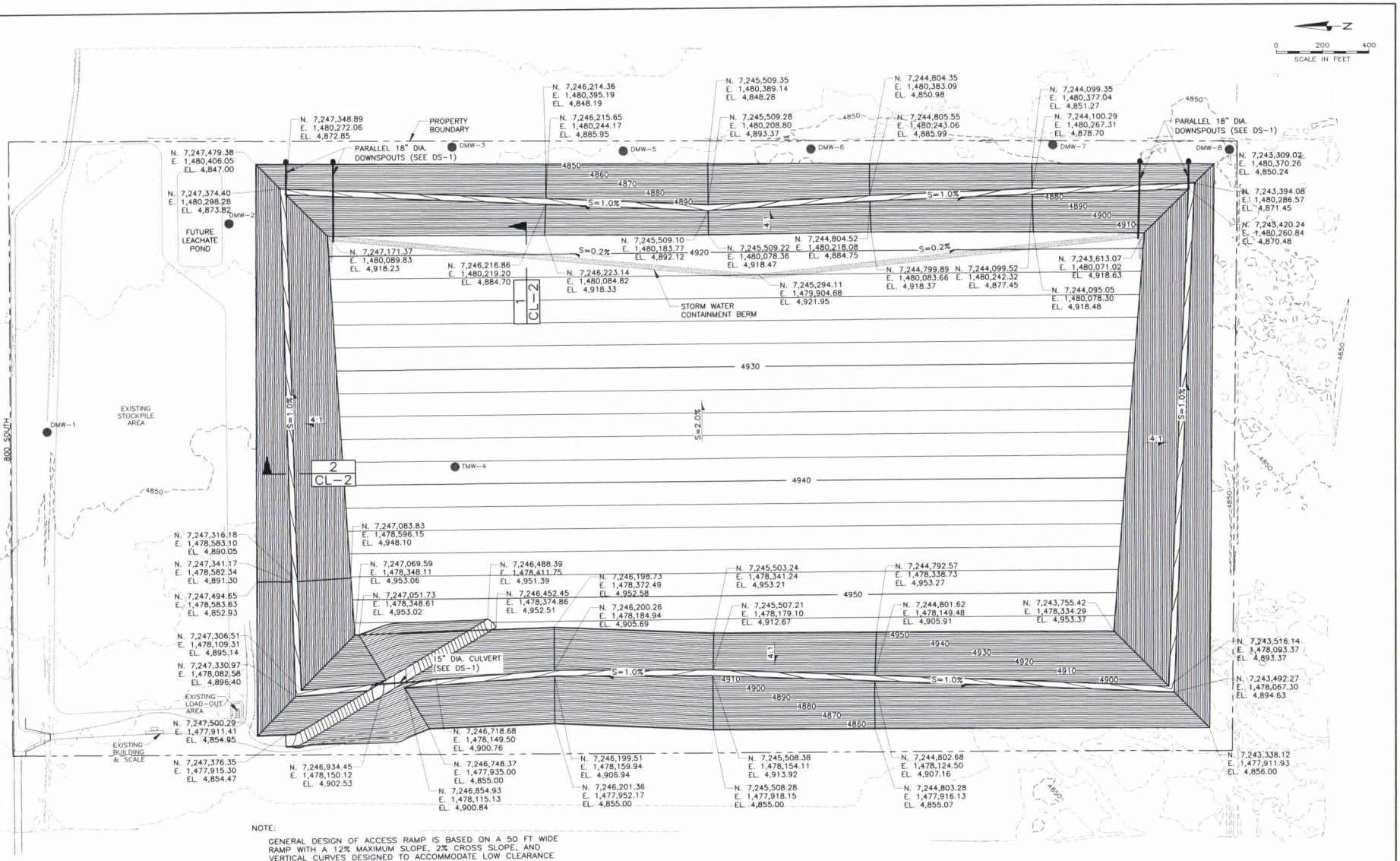
SCALE NOT TO SCALE

INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
LANDFILL
PHASING DETAILS

SHEET PH-1

373-02-100



NOTE:

GENERAL DESIGN OF ACCESS RAMP IS BASED ON A 50 FT WIDE RAMP WITH A 12% MAXIMUM SLOPE, 2% CROSS SLOPE, AND VERTICAL CURVES DESIGNED TO ACCOMMODATE LOW CLEARANCE TRAILERS WITH A MEASURE LOADED CLEARANCE OF 8" (MEASURED BY LANDFILL EMPLOYEES). DETAILS NOT PRESENTED IN THIS DRAWING WILL BE PROVIDED AT THE TIME OF CONSTRUCTION.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\CL-1 FINAL CLOSURE PLAN.DWG
FILE DATE: 10.26.2016 12:29 PM (CAH)

HANSEN ALLEN & LUCE INC. ENGINEERS

PROFESSIONAL ENGINEER — CORTON JONES No. 5048470-2202 — STATE OF UTAH

PROJECT ENGINEER

DESIGNED	TGA	3		
DRAFTED	CAH	2		
CHECKED	GLJ	1		
DATE	OCTOBER 2016	NO.	DATE	REVISIONS

BY | APVD

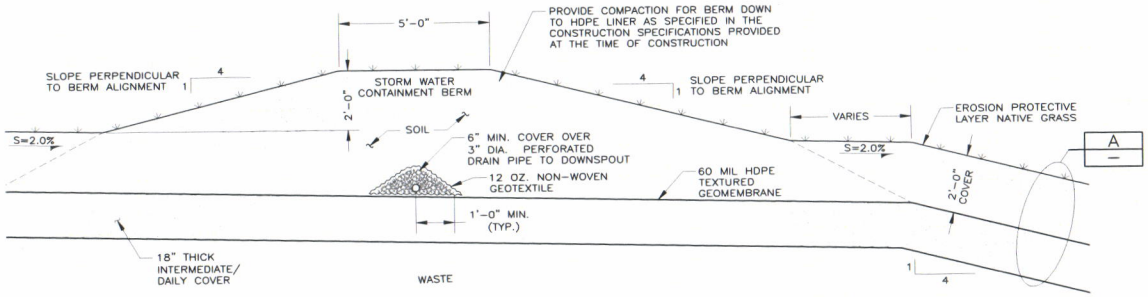
SCALE: AS SHOWN

INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
CLOSURE
FINAL CLOSURE PLAN

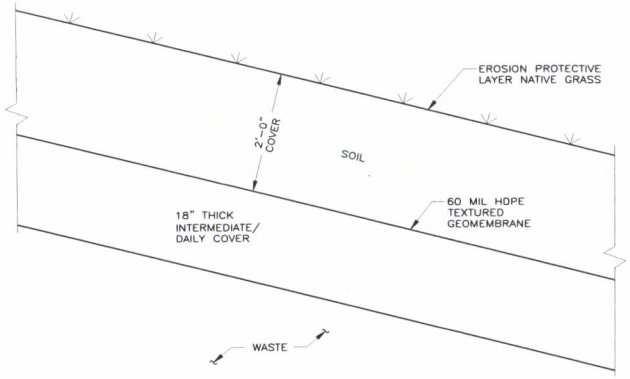
SHEET CL-1

373-02-100



STORM WATER CONTAINMENT BERM SECTION 1 / CL-1

N.T.S.

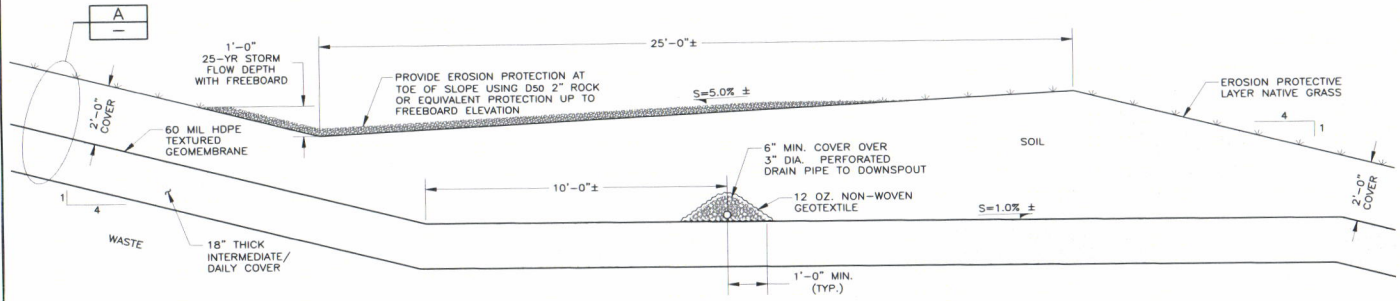


TYPICAL CLOSURE CAP LAYER DETAIL A / —

N.T.S.

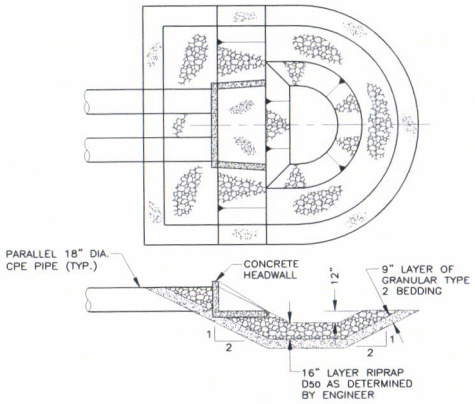
NOTES:

1. DRAIN PIPES UNDER STORM WATER CONTAINMENT BERMS AND UNDER BENCH DRAINAGE CHANNELS TO TIE INTO DOWN SPOUT INLET BOXES.



TYPICAL CLOSURE CAP BENCH DRAINAGE CHANNEL SECTION 2 / CL-1

N.T.S.



TYPICAL 18" DIA. PIPE OUTLET DETAIL A / DS-1 A / DS-2

N.T.S.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\CL-2 CLOSURE CAP DETAILS.DWG
FILE DATE: 10.26.2016 13:00:13 (CAH)

HANSEN ALLEN & LUCE INC. ENGINEERS

PROFESSIONAL ENGINEER — GORDON L. JONES — No. 5048470-2202 — STATE OF UTAH

PROJECT ENGINEER

DESIGNED	TGA
DRAFTED	CAH
CHECKED	GLJ
DATE	OCTOBER 2016

NO.	DATE	REVISIONS	BY	APVD.
3				
2				
1				

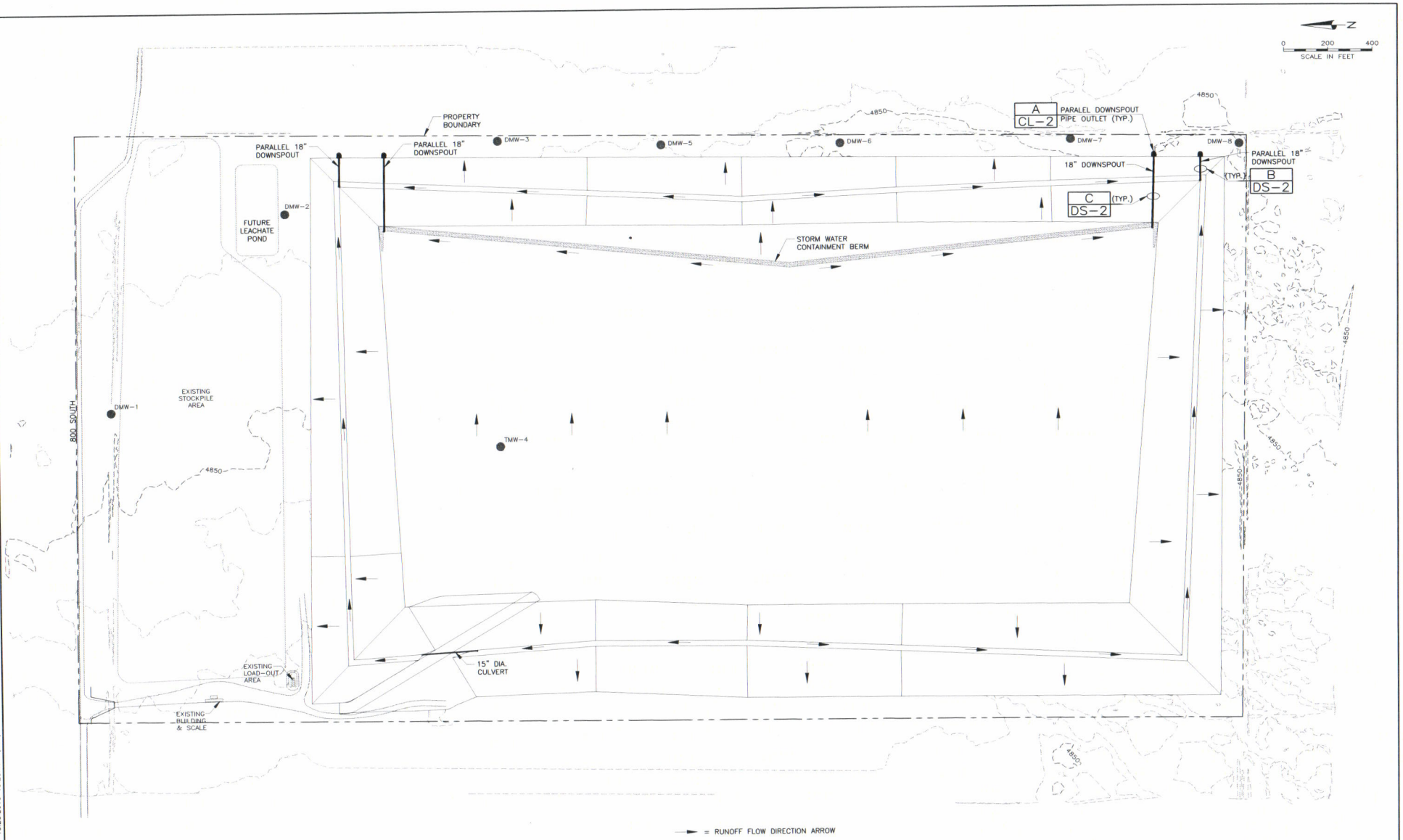
SCALE: AS SHOWN

INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
CLOSURE
SECTIONS & DETAILS

SHEET CL-2

373-02-100



FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\DS-1 DOWNSPOUT DRAINAGE.DWG
FILE DATE: 10.26.2016 13:28:49 (CDUT)

HANSEN ALLEN & LUCE INC. ENGINEERS

PROFESSIONAL ENGINEER — GORDON L. JONES — No. 5048470-2202 — STATE OF UTAH

PROJECT ENGINEER

DESIGNED TGA	3				
DRAFTED CAH	2				
CHECKED GLJ	1				
DATE OCTOBER 2016	NO.	DATE	REVISIONS	BY	APVD.

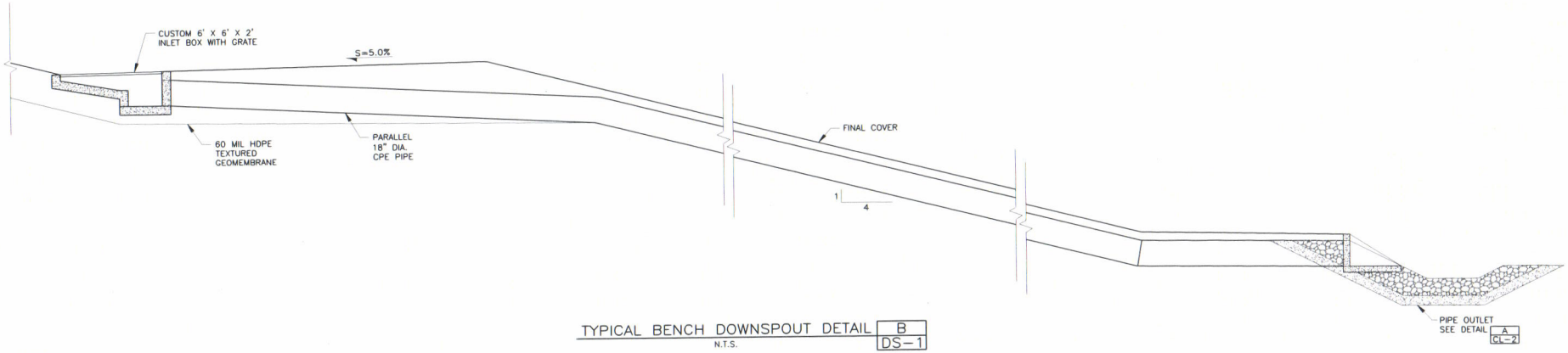
SCALE: AS SHOWN

INTERMOUNTAIN regional landfill

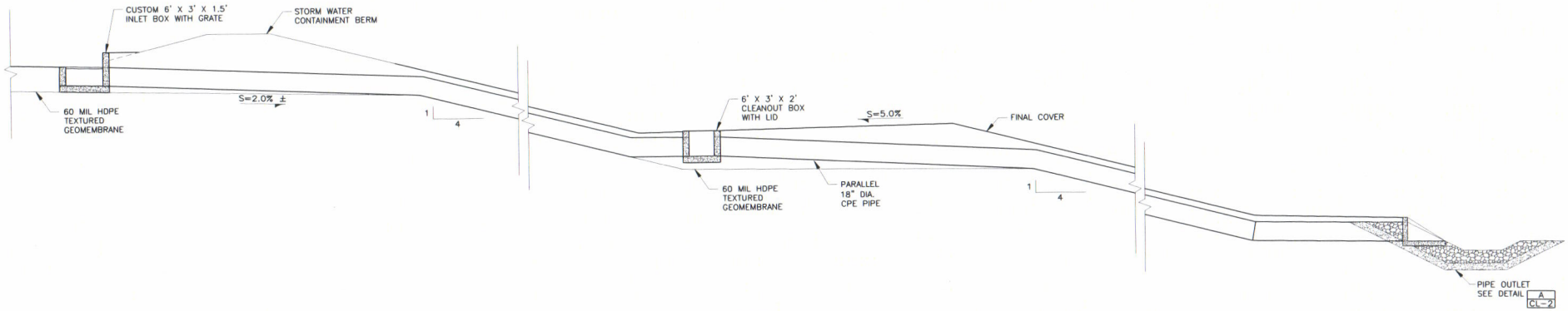
2016 PERMIT MODIFICATION
DRAINAGE SYSTEM
DOWNSPOUT DRAINAGE PLAN

SHEET DS-1

373-02-100



TYPICAL BENCH DOWNSPOUT DETAIL B / DS-1
N.T.S.



TYPICAL TOP DOWNSPOUT DETAIL C / DS-1
N.T.S.

FILE NAME: PROJECTS\373 - INTERMOUNTAIN REGIONAL LANDFILL\02.100 - LF REDESIGN\CAD\WORKING\DS-2 DOWNSPOUT SECTION.DWG
PLOT DATE: 10/26/2016 1:34:34 PM (CAH)

HANSEN ALLEN & LUCE ENGINEERS

PROFESSIONAL ENGINEER — GORDON L. JONES — No. 5048470-2202 — STATE OF UTAH

PROJECT ENGINEER

DESIGNED	TGA
DRAFTED	CAH
CHECKED	GLJ
DATE	OCTOBER 2016

NO.	DATE	REVISIONS	BY	APVD.
3				
2				
1				

SCALE: AS SHOWN

INTERMOUNTAIN regional landfill

2016 PERMIT MODIFICATION
DRAINAGE SYSTEM
DOWNSPOUT DETAILS

SHEET DS-2
373-02-100