# NM1-63

# Permit Application Vol 3

## Part 1 of 8

## 10/12/16

**STATE OF NEW MEXICO**
**DIRECTOR OF OIL CONSERVATION DIVISION**

**IN THE MATTER OF THE APPLICATION OF OWL LANDFILL SERVICES, LLC FOR A SURFACE WASTE MANAGEMENT FACILITY PERMIT**

# APPLICATION FOR PERMIT
# OWL LANDFILL SERVICES, LLC

## OCTOBER 2016

## VOLUME III: ENGINEERING DESIGN AND CALCULATIONS

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**OWL LANDFILL SERVICES, LLC**

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## 1.0 INTRODUCTION

OWL Landfill Services, LLC (OWL) is proposing to permit, construct, and operate a "Surface Waste Management Facility" for oil field waste processing and disposal services. The proposed OWL Facility is subject to regulation under the New Mexico (NM) Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility has been designed in compliance with the requirements of 19.15.36 NMAC, and will be constructed, operated, and closed in compliance with a Surface Waste Management Facility Permit issued by the OCD.

The OWL Facility is one of the first designed to the new more stringent standards that, for instance, mandate double liners and leak detection for land disposal. The new services that OWL will provide fill a necessary void in the market for technologies that exceed current OCD requirements.

### 1.1 Site Location

The OWL site is located approximately 22 miles northwest of Jal, adjacent to the south of NM 128 in Lea County, NM. The OWL site is comprised of a 560-acre ± tract of land located within a portion of Section 23, Township 24 South, Range 33 East, Lea County, NM (**Figure IV.1.1**). Site access will be provided on the south side of NM 128. The coordinates for the approximate center of the OWL site are Latitude 32.203105577 and Longitude -103.543122319 (surface coordinates).

## 1.2 Description

The OWL Surface Waste Management Facility will comprise approximately 500 acres of the 560-acre site, and will include two main components: an oil field waste Processing Area and an oil field waste Landfill Disposal Area, as well as related infrastructure. Oil field wastes are anticipated to be delivered to the OWL Facility from oil and gas exploration and production operations in southeastern NM and west Texas. The Permit Plans (**Attachment III.1.A**) identify the locations of the Processing Area and Landfill Disposal Area.

# 2.0 DESIGN CRITERIA

This Section, "Engineering Design" is provided as a summary of the engineering design elements for the OWL Landfill and Processing Facility. The Engineering Design has been developed in accordance with the Oil and Gas Rules. More specifically, 19.15.36.17.A NMAC requires an "Engineering Design Plan" for evaporation, storage, treatment and skimmer ponds. In addition, the construction standards for these facilities are also addressed in compliance with 19.15.36.17.B NMAC.

Engineering requirements specific to landfills as referenced in 19.15.36.14.C-F NMAC, including landfill design standards, liner specifications, requirements for the soil component of composite liners, and the leachate collection and removal system are addressed herein. The Engineering Design also addresses the requirements of 19.15.36.13.M NMAC pertaining to the control of run-on and runoff from the 25-year, 24 hour design storm (**Volume III.4** and **Permit Plans, Attachment III.1.A**).

Compliance with the design standards is demonstrated on the **Permit Plans** listed in **Table III.1.1**, which are sealed by Mr. I. Keith Gordon, P.E., of Gordon Environmental, Inc., a New Mexico Professional Engineer with extensive experience in geotechnical engineering and waste containment design employing geosynthetics. The **Permit Plans** are provided for reference in **Attachment III.1.A** as 11 x 17 inch (in.) plots and are also submitted as "D" size sealed plots (i.e., 24 x 36 in.) as part of this Application for Permit. The design of the OWL facility is preliminary. Construction Plans and specifications for each major element will be submitted to OCD in advance of construction.

**Table III.1.1**
**List of Permit Plans**
**OWL Landfill Services, LLC**

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## 3.0 LANDFILL DESIGN STANDARDS

The proposed OWL Surface Waste Management Facility will comprise approximately 500 acres of the 560-acre site as shown on the **Permit Plans, Sheet 3 (Attachment III.1.A**). The OWL Landfill Disposal Area footprint will be approximately 224.3 acres ± in size with a depth from the top of the approximately 20-foot (ft) north perimeter screening berm to the base grades of approximately 3 ft below grade on the north end and from approximately natural grade; to the base grades of approximately 60 ft below grade on the south end. The base grades of the Landfill are in excess of 100 ft from groundwater. The Landfill consists of seven independent cells (Cells 1 through 7), each having an independent double liner leachate collection system, cleanout risers (upgradient and downgradient), and collection sump/extraction riser located at the south end (**Permit Plans, Sheet 4**). The OWL Processing Facility Area footprint will be approximately 81.1 acres ± in size.

### 3.1 Liner System

A double liner and leak detection system design is proposed for the OWL Landfill. An alternate liner system is being proposed that meets the requirements of 19.15.36.14.C NMAC demonstrated as equivalent in the United States Environmental Protection Agency (USEPA)

Hydrologic Evaluation of Landfill Performance (HELP) Model (**Volume III.4**) and has a demonstrated track record for long-term waste containment performance. The liner system consists of, from top to bottom:

- 24-in. protective soil/leachate drainage layer (on-site soils with permeability $\geq 4.2 \times 10^{-5}$ cm/sec)
- 60-mil HDPE primary liner
- 200-mil HDPE geonet leak detection layer
- 60-mil HDPE secondary liner
- Geosynthetic Clay Liner (GCL)
- 6-in. soil compacted subgrade

The liner system is designed to meet the performance requirement of no more than one foot of leachate on the primary liner as required in 19.15.36.14.F NMAC and demonstrated in the HELP Model (**Volume III.4**).

HDPE material is proposed for the leachate collection layer, leak detection layer and liners as HDPE has proven to be the preferred material for waste containment facilities due to its durability and resistance to degradation by waste constituents. **Volume III.6** provides documentation regarding HDPE material compatibility in compliance with 19.15.36.14.D.(2)(a) NMAC.

### 3.2 Leachate Collection and Leak Detection System

The leachate collection system designed for the Landfill consists of an alternate 2-ft protective soil/leachate collection layer consisting of "SP-SM" soil material with a permeability of $\geq 4.2 \times 10^{-5}$ centimeters per second (cm/sec). The leak detection system layer will incorporate a 200-mil geonet specifically prescribed for this application (**Permit Plans)**. With a design transmissivity of $1 \times 10^{-3}$ square meters per second ($m^2$/sec), the geonet will provide fluid flow potential superior to the prescriptive soil leak detection layer of 2 ft of pervious soils (leak detection system - hydraulic conductivity of $1 \times 10^{-5}$ cm/sec or greater) (19.15.36.14.C.(3) NMAC and (leachate collection and removal system – hydraulic conductivity of $1 \times 10^{-3}$ cm/sec or greater) (19.15.36.14.C.(5) NMAC. This fact is demonstrated in the HELP Model (**Volume III.4**).

The leachate collection layer slopes at 2.8% to a 6-in. diameter standard dimension ratio (SDR) 13.5 high density polyethylene (HDPE) perforated leachate collection pipe to the center of the units and is directed at a +2% slope to the leachate collection sumps on the south end of the Landfill Disposal Area (**Permit Plans, Sheet 4**). The leak detection geonet slopes at ±2.8% to the center of the units and is directed at a +2% slope to each of the seven leak detection sumps located on the south end of the Landfill Disposal Area (**Permit Plans, Sheet 4**). Each of the sumps is approximately 2 ft deep and contains ¾-in. to 2.0-in. diameter pre-qualified select aggregate installed on and wrapped in a geotextile cushion placed over the HDPE liners. Classification criteria for the aggregate are specified in the Liner Construction Quality Assurance (CQA) Plan (**Volume II.7**), which state that it not be angular (i.e., sharp edges which could damage the liners) or calcareous (which could degrade over time).

The fluids collected in the leachate collection and leak detection sumps will be monitored and collected by separate 12-in. diameter sidewall riser pipes, that do not penetrate the liners, in compliance with 19.15.36.14.C.(10) NMAC. The piping is demonstrated to resist degradation by the waste constituents as documented in the Geosynthetic Application and Compatibility Documentation (**Volume III.6**).

The leachate collection system pipe will consist of a minimum 6-in. diameter perforated SDR 13.5 HDPE. The leachate collection and leak detection sump riser pipes will consist of a 12-in. diameter, SDR 13.5 HDPE; and will be perforated or slotted for the bottom 2 ft depth within the sump (i.e., 8 ft length at 4:1 slope). HDPE piping has shown superior characteristics for waste containment applications vs. the Schedule (SCH) 80 polyvinylchloride (PVC) specified in the Oil and Gas Rules (**Tables III.1.2**). The piping is demonstrated to resist degradation by the waste constituents as documented in the Geosynthetic Application and Compatibility Documentation (**Volume III.6**).

**TABLE III.1.2**
**HDPE Leachate Collection Pipe**
**OWL Landfill Services, LLC**

| Characteristic | 6-in. Diameter Leachate Collection Pipe | 12-in. Diameter Leachate and Leak Detection Riser Pipes |
|---|---|---|
| | SDR 13.5 HDPE | SDR 13.5 HDPE |
| Dimension Ratio | 13.5 | 13.5 |
| Method of Joining | Welded | Welded |
| Manning's Number (n) | 0.010 | 0.010 |
| Outside Diameter (in.) | 6.625[1] | 12.75[1] |
| Min. Wall Thickness (in.) | 0.491[1] | 0.944[1] |
| Tensile Strength (psi) | 5,000 | 5,000 |
| Modulus of Elasticity (psi) | 135,000 | 135,000 |
| Flexural Strength (psi) | 135,000 | 135,000 |

*Notes:*
*[1]PolyPipe, A-4 (**Attachment III.1.G**)*

The details in the **Permit Plans**, **Sheet 11** reflect the deployment of SDR 13.5 HDPE piping for the leachate collection pipe and leak detection sump riser pipes. HDPE flat stock or four layers of geonet will be placed beneath the perforated pipe section in the sumps to prevent potential liner damage (**Permit Plans**). Solid-wall HDPE piping will extend from above the sumps to the permanent riser terminus shown on the **Permit Plans**.

The entire leachate collection system will be covered by 2 ft of protective soil with a hydraulic conductivity greater than or equal to $\geq 4.2 \times 10^{-5}$ cm/sec. This material is available on-site, allowing for sustainable beneficial use of local resources. The HELP Model, provided in **Volume III.4**, confirms that the design meets the requirements of 19.15.36.14.F NMAC.

The leachate collection system and protective soil cover on the top of the liner system in the Landfill Disposal Area will protect the floor and sidewall liner by providing ballast and blocking sunlight (i.e., UV rays), with the upper sections of sidewall liner secured by the anchor trench as depicted on the **Permit Plans**.

### 3.3 Landfill Final Cover System

The final cover for the top of the Landfill Disposal Area will utilize an alternative cover system consisting of the following layers listed from top down:

- 24-in. soil vegetative (erosion) layer
- 12-in. barrier (infiltration) layer

On-site soils will be used to construct the final cover, and the cap will be placed as the Landfill Disposal Area reaches final grades. The Landfill will have ±6.1H:1V design sideslopes and a top slope of +2%. The final cover was modeled using the HELP Model (**Volume III.4**), and results indicate that percolation through the cover will not exceed that of the bottom liner as required in 19.15.36.14.C.(9) NMAC.

## 4.0 LANDFILL CONSTRUCTION

Construction of the Landfill will be accomplished by constructing individual units within the cells. Detailed Construction Plans and Technical Specifications will be prepared for the proposed OWL Landfill units and submitted to OCD, and select pre-qualified Liner Installation Contractors for quotes. The unit excavation, construction, floor grading/compaction, and geosynthetics installation will be subject to the rigorous CQA standards specified in the Liner CQA Plan (**Volume II.7**).

OCD will be provided a major milestone schedule in advance of major construction at OWL; and will be notified via e-mail or phone at least 3 working days prior to the installation of the primary liner. An Engineering Certification Report, sealed by a Professional Engineer with expertise in geotechnical engineering, landfill construction, and geosynthetics application will be submitted to OCD documenting compliance of completed construction with the Permit, regulatory requirements, industry standards, and the plans and specification.

The Engineering Design, as demonstrated by the Volumetric Calculations (**Volume III.2**) deliberately provides a “sustainable” configuration that does not require the import of off-site soils. The materials equation provides an excess of soils excavated (i.e., cut) and fill for the cover and perimeter berms. The in-situ and on-site fill soil will be further pre-qualified in

accordance with the CQA Plan (**Volume II.7**). At least one Standard Proctor Density test will be conducted in the laboratory for each 5,000 cubic yards of subgrade soils, fill material or a change in subgrade material. These tests will be the basis for field density measurements during construction (i.e., 90% standard Proctor dry density) conducted at a minimum frequency of 4 tests/acre/lift.

The initial sequence of development is planned to involve the excavation of a Unit that will likely include the development of one or more "sub-cells"; typically at the upgradient (i.e., north) end. The Permit Plans show a proposed "Unit 1" configuration that includes the shallowest excavation for a functional initial installation. The design of Unit 1 provides significant capacity; with sufficient excavated soil volume to construct the north and east perimeter berms.

The purpose of the north berm is two-fold: to manage stormwater runon by directing it away from the landfill; and to provide visual and environmental screening from adjacent areas. The east berm also assists with stormwater control; and the east face is also lined as-part of evaporation pond configuration. The berms will be constructed using pre-qualified soils, and compacted to 90% Standard Proctor in maximum 12 in horizontal lifts. Construction of these and future berms will be in accordance with the CQA Plan (**Volume II.7**); and they will serve as the constructed platform for landfill anchor trench installation.

The subgrade surface for the liner will be inspected to confirm the absence of any deleterious materials, abrupt changes in slope, evidence of erosion, etc. The compliance of the completed subgrade construction will be confirmed prior to secondary liner installation, and documented in the Engineering Certification Report and in accordance with the CQA Plan (**Volume II.7**).

A reinforced Geosynthetic Clay Liner (GCL) will be placed on the prepared subgrade. Above the GCL, a 60-mil HDPE secondary liner will be installed for the proposed units and in direct contact with the GCL. Installation of the leak detection system (geonet; geotextile; (or combined geocomposite); sump aggregate and leak detection riser pipes in the sumps will follow. The 60-mil HDPE primary liner, above the leak detection system is overlain by 2-

feet of on-site soils that contains the leachate collection system and serves to protect the double liner system. The installation of all soil and geosynthetic components will meet or exceed the requirements of 19.15.36.14.C NMAC, as detailed in the CQA Plan. Finally, the GCL, secondary HDPE liner, leak detection system components, and primary HDPE liner will be secured in the common anchor trench at the crest of the Landfill sideslope**.** The anchor trench will be carefully backfilled with select on-site soils compacted to 90% of standard Proctor dry density by mechanical and/or hand-tamping devices as required by the CQA Plan. Documentation will be provided in the Engineering Certification Report submitted to OCD upon completion of construction.

## 5.0 POND DESIGN STANDARDS

The designs for the Ponds are identical, except that Pond elevations are staged depending on their site location (**Permit Plans; Attachment III.1.A**). Each pond is approximately 420 ft north-south by 200 ft east-west as measured at the top of the surrounding berms, for a footprint of 2.0 ± acres each. The floor of the ponds is designed with a 2.8% slope to facilitate drainage in the leak detection system to the two sumps in each basin situated on the interior sidewall.

Because each pond berm have a generally uniform top elevation, the 2.8% floor slope creates a pond depth that ranges from a maximum of 12 ft to a minimum of just less than 9 ft. The maximum water depth is designed at the sump locations and does not exceed 8.5 ft. Maintaining a high water elevation of 3,577.5 ft in the Phase I Ponds (northern-most 10 ponds); and 3,574.5 ft in the Phase II Ponds (southern-most 2 ponds); will provide a freeboard in excess of 3.5 ft for each pond, and lined up to 15 ft on the west perimeter. This is more than adequate to meet the 3 ft minimum freeboard standard; while also accommodating the minimal impact potential of rainfall or wave action (**Volume III.9**). The resultant capacity of each pond is approximately 9.5 acre-ft, not including freeboard, below the maximum 10 acre-ft volume prescribed by 19.15.36.17.B(12) NMAC. The normal water surface is marked in each pond to define the available freeboard. **Attachment III.1.F** provides pond capacity calculations.

Section 5.0 (Pond Construction) below and the CQA Plan (**Volume II.7**) provide documentation on the installation of berms, soil subgrade, and geosynthetics. Exceeding the standards specified in 19.15.36.17.B(4) NMAC, both the exterior and interior sidewalls of all of the Ponds have design slopes of 3:1. The top platform of the berms surrounding the Ponds has a minimum design width of 10 ft, which is more than adequate for the 2 ft anchor trench shown on the **Permit Plans**; and to accommodate pipe risers.

### 5.1 Liner System

A double liner and leak detection system design is proposed for each pond. An alternate liner system is being proposed that meets the requirements of 19.15.36.17.B(9) NMAC and has a demonstrated track record for long-term waste containment performance. The pond liner system consists of, from top to bottom:

- 60-mil HDPE primary liner
- 200-mil HDPE geonet leak detection layer
- 60-mil HDPE secondary liner
- GCL under the leak detection sumps
- 6-in. compacted soil subgrade

HDPE material is proposed for the liners and leak detection layer as HDPE has proven to be the preferred material for waste containment facilities due to its durability and resistance to degradation by waste constituents. **Volume III.6** provides documentation regarding HDPE material compatibility in compliance with 19.15.36.17.B(3) NMAC

### 5.2 Leak Detection System

The leak detection system layer designed for the ponds consists of a 200-mil geonet specifically prescribed for these applications (**Permit Plans**). With a design transmissivity of $1 \times 10^{-3}$ $m^2$/sec, the geonet will provide fluid flow potential superior to the prescriptive leak detection layer of 2 ft of pervious soils (19.15.36.17.B(9) NMAC).

The underlying 60-mil HDPE secondary liner, the 200-mil geonet leak detection layer, and the overlaying 60-mil HDPE primary liner, has a design slope at 2% to the 2 leak detection sumps located in each pond (**Permit Plans**). Fluids potentially collected in the leak detection layer, which encompasses the entire footprint for each pond, are directed with the 2% slope

to the leak detection sumps. Each of the sumps will be approximately 2 ft deep, as measured from the secondary liner to the primary liner. The sumps will be filled with nominal ¾-in. to 2.0-in. diameter pre-qualified select aggregate installed on a geotextile cushion placed over the secondary liner. Classification criteria for the aggregate are specified in the CQA Plan (**Volume II.7**), which state that it not be angular (i.e., sharp edges which could damage the liners) or calcareous (which could degrade over time).

The fluids potentially collected in the leak detection sumps will be monitored and removed through a 6-in. diameter, SDR 13.5 HDPE sidewall riser pipes that do not penetrate the liners. The leak detection sump riser pipes will be perforated or slotted for the bottom 2 ft depth within the sump (i.e., 6 ft length at 3:1 slope). HDPE piping has shown superior characteristics for waste containment applications (**Table III.1.3**). The piping is demonstrated to resist degradation by the waste constituents as documented in **Volume III.6**.

**TABLE III.1.3**
**HDPE Sump Riser Pipe**
**OWL Landfill Services, LLC**

| Characteristic | 6-in. Diameter Leak Detection Riser Pipes |
|---|---|
| | SDR 13.5 HDPE |
| Dimension Ratio | 13.5 |
| Method of Joining | Welded |
| Manning's Number (n) | 0.010 |
| Outside Diameter (in.) | 6.625[1] |
| Min. Wall Thickness (in.) | 0.491[1] |
| Tensile Strength (psi) | 5,000 |
| Modulus of Elasticity (psi) | 135,000 |
| Flexural Strength (psi) | 135,000 |

*Notes:*
*[1]PolyPipe, A-4 (**Attachment III.1.G**)*

The details in the **Permit Plans** reflect the deployment of SDR 13.5 HDPE piping for the leak detection sump riser pipes. HDPE flat stock or four layers of geonet will be placed beneath the beveled edge of the perforated risers in the sumps to prevent potential liner damage (**Permit Plans**). Solid-wall HDPE piping will extend from above the sumps to the permanent wellheads shown on **Permit Plans**. The sidewall liners and leak detection geonet will be secured by the anchor trench as depicted on the **Permit Plans.**

## 6.0 POND CONSTRUCTION

Detailed Construction Plans and Technical Specifications will be prepared for the proposed Ponds, and submitted to OCD and select pre-qualified Liner Installation Contractors for quotes. The berm construction, floor grading/compaction, and geosynthetics installation will be subject to the rigorous CQA standards specified in **Volume II.7**.

OCD will be provided a major milestone schedule in advance of construction; and notified via email or phone at least 3 working days prior to the installation of the primary liner in compliance with 19.15.36.17.B(10) NMAC. An Engineering Certification Report, sealed by a Professional Engineer with expertise in geotechnical engineering, will be submitted to OCD documenting compliance of completed construction with the Permit, regulatory requirements, industry standards, and the plans and specification.

The Engineering Design presented on the **Permit Plans** (**Attachment III.1.A**) deliberately provides a "sustainable" and geotechnically suitable configuration that does not require import of off-site soils. The materials equation provides a balance between soils excavation (i.e., pond) and fill for the sidewalls. The in-situ and on-site fill soil will be pre-qualified in accordance with the CQA Plan (**Volume II.7**). At least one standard Proctor dry density test will be conducted in the laboratory for each pond footprint, 5,000 cubic yards (cy) of fill material for berms, or change in subgrade material. These tests will be the basis for field density measurements during construction (i.e., 90% standard Proctor dry density) conducted at a minimum frequency of 4 tests/acre/lift.

Fill for the berms will be placed in horizontal compacted lifts that do not exceed 12 in. in thickness. The subgrade surface will be inspected to confirm the absence of any deleterious materials that may impact the secondary liner system, abrupt changes in slope, evidence of erosion, etc. The compliance of the completed subgrade construction shall be confirmed prior to secondary liner installation, and documented in the Engineering Certification Report.

The double liner and leak detection system design, planned for the ponds, consists of proven technology with a demonstrated track record of long-term waste containment performance. The secondary liner proposed for the ponds, consists of a smooth 60-mil HDPE geomembrane placed in direct contact with a prepared and compacted soil subgrade, certified in accordance with the CQA Plan (**Volume II.7**). The same HDPE material will be used for the primary liner and the geonet for the leak detection layer. HDPE has proven to be the preferred material for waste containment facilities due to its durability and resistance to attack by waste constituents.

**Volume III.6** provides documentation regarding liner and leak detection material compatibility in compliance with 19.15.36.17.B(3) NMAC. An additional layer of 60-mil HDPE (22.5 ft x 40 ft ±) will be welded above the primary Pond liner where active wastewater discharge will occur (**Permit Plans**). This will protect the Pond liner from hydrostatic force, mechanical damage, etc. External discharge lines and leak detection system discharge lines will not penetrate the liner. The CQA Plan (**Volume II.7**) provides the most current technical specifications for the geosynthetics.

Fluid in the Ponds will protect the floor and lower sidewall liner by providing ballast and deflecting sunlight (i.e., UV rays). The upper sections of pond sidewall liner will be secured by the anchor trench. The anchor trench will be carefully backfilled with select on-site soils compacted to 90% of standard Proctor dry density by mechanical and/or hand-tamping devices (per the CQA Plan). Documentation will be provided in the Engineering Certification Report submitted to OCD upon completion of construction.

Although the freeboard zone of the pond sidewall liner will be exposed to the elements, recent research indicates that exposed HDPE in similar environments has a functional longevity in excess of 25 years (**Attachment III.1.B**). GEI has inspected several similar water storage ponds in New Mexico and has found exposed geomembrane liners to be functionally intact well over 25 years.

## 7.0 POND OPERATION

Detailed plans for the operation of the Ponds are prescribed in the Operations, Maintenance, and Inspection Plan (**Volume II.1**). Essentially, it is anticipated that some fluids may accumulate in the leak detection sumps as a result of condensation, construction water, etc. As described in **Volume II.1**, the leak detection sumps will be monitored at least monthly for the presence of fluids, which may be extracted and tested when the level in the sump(s) exceeds 24 in. A reduced monitoring frequency may be proposed to OCD dependent upon historical results. The design of the Ponds allows for isolation of potential leaks into isolated drainage basins, facilitating necessary evaluation or repair by allowing each pond to be emptied.

## 8.0 PROCESS AREA TANK CONTAINMENT

As proposed in this Application, produced water receiving tanks, produced water settling tanks, and the crude oil receiving tanks depicted in **Attachment III.1.C** and oil sales tanks as depicted in **Attachment III.1.D** will be installed in the excavated tank farm as shown on the **Permit Plans**. Detailed operations of the tanks are described in the Operations, Maintenance, and Inspection Plan (**Volume II.1**), and a schematic of the process area is provided in **Attachment III.1.E**. The tanks will be constructed with an underlying, continuous, system which is designed to capture any fluids within the watershed of the tank farm. The design of the processing facilities are preliminary. Construction plans and specifications for each major element will be submitted to OCD in advance of installation.

The secondary containment liner in the tank area is a 30-mil polyester liner (XR-5 8130 Reinforced Geomembrane). The use of the XR-5 8130 Reinforced Geomembrane in the tank area is primarily based on the chemical compatibility and puncture resistance of the material compared to either PVC or HDPE material. The chemical resistance of the XR-5 material exceeds the chemical compatibility of either PVC or HDPE to hydrocarbon products (see Chemical Resistance Chart, Page 13, "Technical Data and Specifications for XR-5", **Attachment III.1.H**). Since PVC material has marginal chemical resistance in a hydrocarbon environment, physical properties of the XR-5 geomembrane (**Attachment III.1.H**) are compared to 60-mil HDPE geomembrane (**Attachment III.1.I**) as shown in

**Table III.1.4**.

The necessary storage capacity for the interconnected tank/containment system will be sufficiently managed by the proposed lined volume of the Ponds constructed in sequence corresponding to market conditions. In the unlikely event of a total failure of all affected storage units, the contents of the tanks will flow into the ponds, which have a lined storage capacity of 884,400 barrels (bbl) ± (excluding freeboard). When the freeboard is included, the storage capacity of the ponds is over 1,714,600 bbl, which results in a net surplus of over 830,200 bbl (i.e., 1.94%). The entire volume of the proposed receiving tanks will be 70,000 bbl, providing a net excess capacity of over 760,200 bbl. Thus, the Ponds will hold the entire volume of the receiving/settling tanks within the required permanent freeboard of 3 ft.

**TABLE III.1.4**
**Physical Properties: XR-5 8130 Reinforced Geomembrane**
**and 60-mil HDPE Geomembrane**
**OWL Landfill Services, LLC**

| Property | XR-5 8130 | 60-mil HDPE |
|---|---|---|
| Thickness | 30-mil | 60-mil |
| Tear Strength | 40 lbs | 42 lbs |
| Puncture Resistance | 275 lbs | 108 lbs |
| Break Strength | 400 lbs/in. | 228 lbs/in. |
| Break Elongation | 25% | 700% |
| Hydrostatic Resistance | 800 psi | > 450 psi |
| Hydraulic Conductivity | $1 \times 10^{-12}$ cm/sec | $2 \times 10^{-13}$ cm/sec |
| Seam Properties | | |
| Shear Strength | 500 lbs | 120 lbs/in. |
| Peel Strength | 40 lbs/2 in. | 91 lbs/in. |

The maximum proposed number of interconnected tanks is five 1,000 bbl tanks for a total of 5,000 bbl. Allowing for an additional 30% capacity will require a minimum of 6,500 bbl of bermed capacity in the tank farm. The containment area is conservatively sized to surround the entire tank farm, which results in a holding capacity of 13,100 bbl, and is 12,100 bbl greater than the capacity of the largest tank (1,000 bbl) and 6,600 bbl greater than the combined connected tank volume, including a 30% factor of safety within the containment area. Therefore the containment area surrounding the receiving/settling tanks is more than sufficient. Included in this Section is a spreadsheet (**Attachment III.1.F**), which identifies

each of the proposed tanks and Evaporation Ponds in this Application. The design of the processing facilities are preliminary. Construction plans and specifications for each major element will be submitted to OCD in advance of installation.

## 9.0 STABILIZATION AND SOLIDIFICATION AREA

The design for the stabilization and solidification (S&S) area relies on many of the Pond design characteristics, except that the S&S area is designed to allow dump trucks and tanker trucks delivering materials that require stabilization and/or solidification to discharge directly into the S&S area from a concrete unloading pad. (**Attachment III.1.A**). The initial S&S design area covers approximately 5-acres and measures 660 ft north-south by 330 ft east-west at the top of the surrounding berms. The floor of this area is designed with a 2% slope to facilitate drainage on the liner and in the leak detection system to collect in a sump situated along the south sidewall of the area.

Because the three perimeter berms have a uniform top elevation, the 2% floor slope creates a pond depth that ranges from a minimum of 5 ft at the unloading pad to a maximum of 20 ft at the sump along the eastern perimeter berm. The bottom liner slope allows for a 5-ft-thick protective and operational cover on the liner. This slope also provides operation capacity for the S&S function proposed for this area while providing the capacity to meet the 3 ft minimum freeboard standard and accommodating the minimal impact potential of rainfall. The resultant capacity of the S&S area is approximately 5.6 acre-ft, not including freeboard, well below the maximum 10 acre-ft volume prescribed by 19.15.36.17.B(12) NMAC. The design of the processing facilities are preliminary. Construction plans and specifications for each major element will be submitted to OCD in advance of installation.

Section 5.0 (Pond Construction) and the CQA Plan (**Volume II.7**) provide documentation on the installation of berms, soil subgrade, and geosynthetics. The standards specified are more conservative those the standards of 19.15.36.17.B(4) NMAC, both the exterior and interior sidewalls of S&S area have design slopes of 3:1. The top platform of the berms surrounding the S&S area has a minimum design width of 10 ft, which is more than adequate for the 2 ft anchor trench.

## 9.1 Liner System

As with the Ponds, the S&S area is designed with a double liner and leak detection system proposing the same alternate liner system that meets the requirements of 19.15.36.17.B(9) NMAC and has a demonstrated track record for long-term waste containment performance. The S&S Area liner system consists of, from top to bottom:

- 5 ft protective soil and operational layer
- 60-mil HDPE primary liner
- 200-mil HDPE geonet leak detection layer
- 60-mil HDPE secondary liner
- GCL under the leak detection sumps
- 6-in. compacted soil subgrade

HDPE material is proposed for the liners and leak detection layer as HDPE has proven to be the preferred material for waste containment facilities due to its durability and resistance to attack by waste constituents. **Volume III.6** provides documentation regarding HDPE material compatibility in compliance with 19.15.36.17.B(3) NMAC

## 9.2 Leak Detection System

The leak detection system layer designed for the S&S area consists of a 200-mil geonet specifically prescribed for these applications. With a design transmissivity of $1 \times 10^{-3}$ $m^2$/sec, the geonet will provide fluid flow potential superior to the prescriptive leak detection layer of 2 ft of pervious soils (19.15.36.17.B(9) NMAC).

The underlying 60-mil HDPE secondary liner, the 200-mil geonet leak detection layer, and the overlaying 60-mil HDPE primary liner, have a design slope at 2% to the leak detection sump located on the eastern berm of the S&S area. Fluids collected in the leak detection layer, which encompasses the entire footprint of the S&S area, are directed with the 2% slope to the leak detection sump. This sump will be approximately 2 ft deep, as measured from the secondary liner to the primary liner. The sump will contain ¾-in. to 2.0-in. diameter pre-qualified select aggregate installed on a geotextile cushion placed over the secondary liner. Classification criteria for the aggregate are specified in the CQA Plan (**Volume II.7**), which state that it not be angular (i.e., sharp edges which could damage the liners) or calcareous (which could degrade over time).

The fluids collected in the leak detection sump will be monitored and removed through a 12-in. diameter, SDR 13.5 HDPE sidewall riser pipe that does not penetrate the liners. The leak detection sump riser pipe will be perforated or slotted for the bottom 2 ft depth within the sump (i.e., 6 ft length at 3:1 slope). HDPE piping has shown superior characteristics for waste containment applications (**Table III.1.3**). The piping is demonstrated to resist degradation by the waste constituents as documented in **Volume III.6**. The details in the **Permit Plans** reflect the deployment of SDR 13.5 HDPE piping for the leak detection sump riser pipe.

HDPE flat stock or four layers of geonet will be placed beneath the perforated pipe section of the riser in the sump to prevent potential liner damage. Solid-wall HDPE piping will extend from above the sump to the permanent riser terminus shown on the **Permit Plans**. The sidewall liners and leak detection geonet will be secured by the anchor trench as depicted on the **Permit Plans**.

### 9.3 Stabilization & Solidification Area Construction

Detailed Construction Plans and Technical Specifications will be prepared for the proposed S&S area, and submitted to OCD and select pre-qualified Liner Installation Contractors for quotes. The design of the processing facilities are preliminary. Construction plans and specifications for each major element will be submitted to OCD in advance of installation. The berm construction, floor grading/compaction, and geosynthetics installation will be subject to the rigorous CQA standards specified in **Volume II.7**.

OCD will be provided a major milestone schedule in advance of construction; and notified via email or phone at least 3 working days prior to the installation of the primary liner in compliance with 19.15.36.17.B(10) NMAC. An Engineering Certification Report, sealed by a Professional Engineer with expertise in geotechnical engineering and geosynthetics design, will be submitted to OCD documenting compliance of completed construction with the Permit, regulatory requirements, industry standards, and the plans and specification.

The Engineering Design presented on the **Permit Plans** (**Attachment III.1.A**) deliberately provides a "sustainable" configuration that does not require import of off-site soils. The materials equation provides a balance between soils excavation (i.e., S&S area) and fill for the sidewalls. The in-situ and on-site fill soil will be pre-qualified in accordance with the CQA Plan (**Volume II.7**). At least one standard Proctor dry density test will be conducted in the laboratory for the S&S area footprint, 5,000 cubic yard (cy) of fill material for berms, or change in subgrade material. These tests will be the basis for field density measurements during construction (i.e., 90% standard Proctor dry density) conducted at a minimum frequency of 4 tests/acre/lift.

Fill for the berms will be placed in horizontal compacted lifts that do not exceed 12 in. in thickness. The subgrade surface will be inspected to confirm the absence of any deleterious materials, abrupt changes in slope, evidence of erosion, etc. The compliance of the completed subgrade construction shall be confirmed prior to secondary liner installation, and documented in the Engineering Certification Report.

The double liner and leak detection system design planned for the S&S area consists of proven technology with a demonstrated track record of long-term waste containment performance. The secondary liner proposed for the area, consists of a smooth 60-mil HDPE geomembrane placed in direct contact with a prepared and compacted soil subgrade, certified in accordance with the CQA Plan (**Volume II.7**). The same HDPE material will be used for the primary liner and the geonet for the leak detection layer. HDPE has proven to be the preferred material for waste containment facilities due to its durability and resistance to attack by waste constituents. **Volume III.6** provides documentation regarding liner and leak detection material compatibility in compliance with 19.15.36.17.B(3) NMAC. Leak detection system discharge lines will not penetrate the liner. The CQA Plan (**Volume II.7**) provides the most current technical specifications for the geosynthetics.

Protective cover and tire chip layer in the S&S area will protect the floor and lower sidewall liner by providing ballast and deflecting sunlight (i.e., UV rays). The upper sections of S&S area sidewall liner will be secured by the anchor trench (**Permit Plans**). The anchor trench will be carefully backfilled with select on-site soils compacted to 90% of standard Proctor

dry density by mechanical and/or hand-tamping devices (per the CQA Plan). Documentation will be provided in the Engineering Certification Report submitted to OCD upon completion of construction.

Although the freeboard zone of the S&S area sidewall liner will be exposed to the elements, recent research indicates that exposed HDPE in similar environments has a functional longevity in excess of 25 years (**Attachment III.1.B**). GEI has inspected similar applications in New Mexico and has found exposed geomembrane liners to be functionally intact well over 25 years.

### 9.4 Stabilization and Solidification Area Operation

Detailed plans for the operation of the S&S area are prescribed in the Operations, Maintenance, and Inspection Plan (**Volume II.1**). To ensure compliance with the capacity limits imposed on the operation of this area, volumes in and out of this area will be tracked to document the volume in processing at any time. Equipment operating within the S&S area may be equipped with Global Positioning System (GPS) equipment (see **Attachment III.1.J** for information on the Computer Aided Earthmoving System provided by Caterpillar) to monitor the location of the equipment relative to the liner system. This system may be implemented to maintain adequate separation of equipment and the liner system during the stabilization and solidification operation. Material that has completed the S&S operation will be relocated to the Landfill for disposal. Solidification material will be excavated from borrow sources within the solid waste management facility.

## 10. FACILITY DRAINAGE DESIGN

The **Permit Plans**, **Attachment III.1.A,** show the stormwater management systems that will be employed to manage both run-on and runoff for the OWL Landfill and Processing Facilities. The design event, pursuant to 19.15.36.13.M NMAC (i.e., 25-year, 24 hour storm) will be managed by a series of drainageways that surround the proposed Ponds, Processes, and Landfill and capture stormwater from other on-site areas.

Stormwater retention and detention basins are planned for installation as shown on the **Permit Plans**; and the Stormwater Management Plan is included in **Volume III.3** that demonstrates the efficacy of the proposed system.

The berms surrounding the Landfill and processing area have a maximum exterior slope of 3:1, and an average height of less than 20 ft, minimizing the potential for soil erosion. The drainageways, retention and detention basins will be regularly inspected and cleaned, as necessary.

**APPLICATION FOR PERMIT**
**OWL LANDFILL SERVICES, LLC**

**VOLUME III: ENGINEERING DESIGN AND CALCULATIONS**
**SECTION 1: ENGINEERING DESIGN**

## ATTACHMENT III.1.A

## PERMIT PLANS

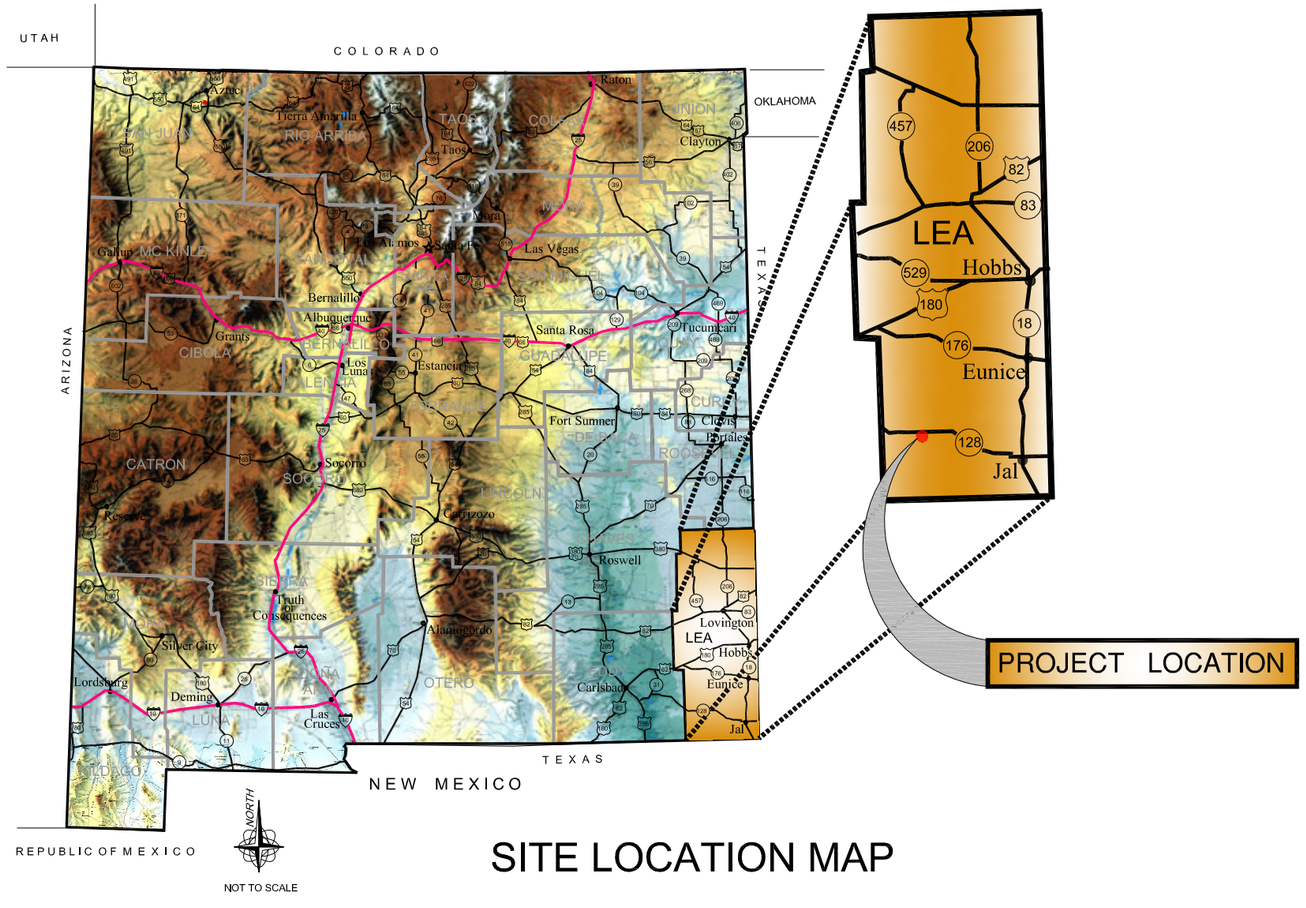
| Sheet No. | Title |
|---|---|
| 1. | Cover Sheet and Drawing Index |
| 2. | Site Plan - Existing Conditions |
| 3. | Site Development Plan |
| 4. | Landfill Base Grading Plan |
| 5. | Landfill Final Grading Plan |
| 6. | Landfill Completion Drainage Plan |
| 7. | Unit 1 Intermediate Grading Plan |
| 8. | Landfill Cross-Sections |
| 9. | Engineering Details |
| 10. | Liner System and Cover Details |
| 11. | Leachate Collection System Details |
| 12. | Processing & Stabilization Area |
| 13. | Evaporation Ponds |
| 14. | Evaporation Pond Details |
| 15. | Tank Management Area Cross-Sections |

# PERMIT PLANS

FOR

# OWL LANDFILL SERVICES, LLC

## LEA COUNTY, NEW MEXICO




SITE LOCATION MAP

NOT TO SCALE

TITLE




I. KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984




COVER SHEET AND DRAWING INDEX

OWL LANDFILL SERVICES, LLC
LEA COUNTY, NEW MEXICO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Consulting Engineers
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Bernalillo, New Mexico, USA
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Fax: 505-867-6991


| | | |
|---|---|---|
| DATE: 09/08/2016 | CAD: 01 COVER.dwg | PROJECT #: 560.01.02 |
| DRAWN BY: DMI | REVIEWED BY: CRK | SHEET 1 of 15 |
| APPROVED BY: IKG | gek@gordonenvironmental.com | |

## LEGEND

- SITE BOUNDARY WITH BEARING AND DISTANCE (559.5 ACRES±)
- SURFACE WASTE MANAGEMENT FACILITY BOUNDARY (500.0 ACRES)
- SOLID WASTE DISPOSAL AREA LIMITS (224.3 ACRES±)
- EXISTING 2FT CONTOUR
- EXISTING 10FT CONTOUR
- EXISTING 2FT DEPRESSION CONTOUR
- EXISTING 10FT DEPRESSION CONTOUR
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING OVERHEAD ELECTRIC LINE
- EXISTING POWER POLE
- EXISTING CULVERT
- BOREHOLE LOCATION
- SURVEY CONTROL POINT
- SITE GRID

NOTES:

1. AERIAL TOPOGRAPHIC SURVEY BY AEROTECH MAPPING INC., 6565 AMERICAN PARKWAY N.E., ALBUQUERQUE, NM 87111 PHONE: (520-561-6537) FAX (505 256-3328) EMAIL: TimBurrows@atmlv.com DATE OF PHOTOGRAPHY: 06-06-2015.
2. SURVEY CONTROL POINTS BY HARCROW SURVEYING, INC., 2314 W. MAIN ST., ARTESIA, NM 88210 PHONE: (575-746-2158).
3. NO WATERCOURSES OR WETLANDS WERE IDENTIFIED ON PROPERTY SEE ATTACHMENT IV.1A

**CONTROL POINT DATA**

| POINT | NORTHING | EASTING | PANEL ELEVATION | DESCRIPTION |
|---|---|---|---|---|
| 7001 | 434845.57 | 782160.25 | 3530.07 | PP-7001 |
| 7002 | 438508.13 | 782138.97 | 3561.67 | PP-7002 |
| 7003 | 442131.34 | 782096.47 | 3600.88 | PP-7003 |
| 7004 | 434859.95 | 785795.31 | 3548.81 | PP-7004 |
| 7005 | 438509.15 | 785767.60 | 3577.54 | PP-7005 |
| 7006 | 442207.86 | 785773.10 | 3598.28 | PP-7006 |
| 7007 | 434883.93 | 789423.36 | 3567.38 | PP-7007 |
| 7008 | 438485.16 | 789417.70 | 3577.60 | PP-7008 |

NOTES:

1. ALL POINTS ARE FLUSH WITH THE GROUND.
2. THE COORDINATES AND ELEVATIONS FOR THE PHOTO CONTROL POINTS ON THE ABOVE REFERENCED PROJECT ARE "MODIFIED (SURFACE) NEW MEXICO STATE PLANE COORDINATES - EAST ZONE, NAD 83 AND HAVE BEEN ADJUSTED USING AN "OPUS" SOLUTION". TO OBTAIN TRUE STATE PLANE GRID COORDINATES, MULTIPLY THE COORDINATES BELOW BY THE PROJECT AVERAGE COMBINED FACTOR CF = 0.99981109648. THE COORDINATES AND ELEVATIONS ARE EXPRESSED IN U. S. SURVEY FEET.

I, KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984



# SITE PLAN – EXISTING CONDITIONS

OWL LANDFILL SERVICES, LLC
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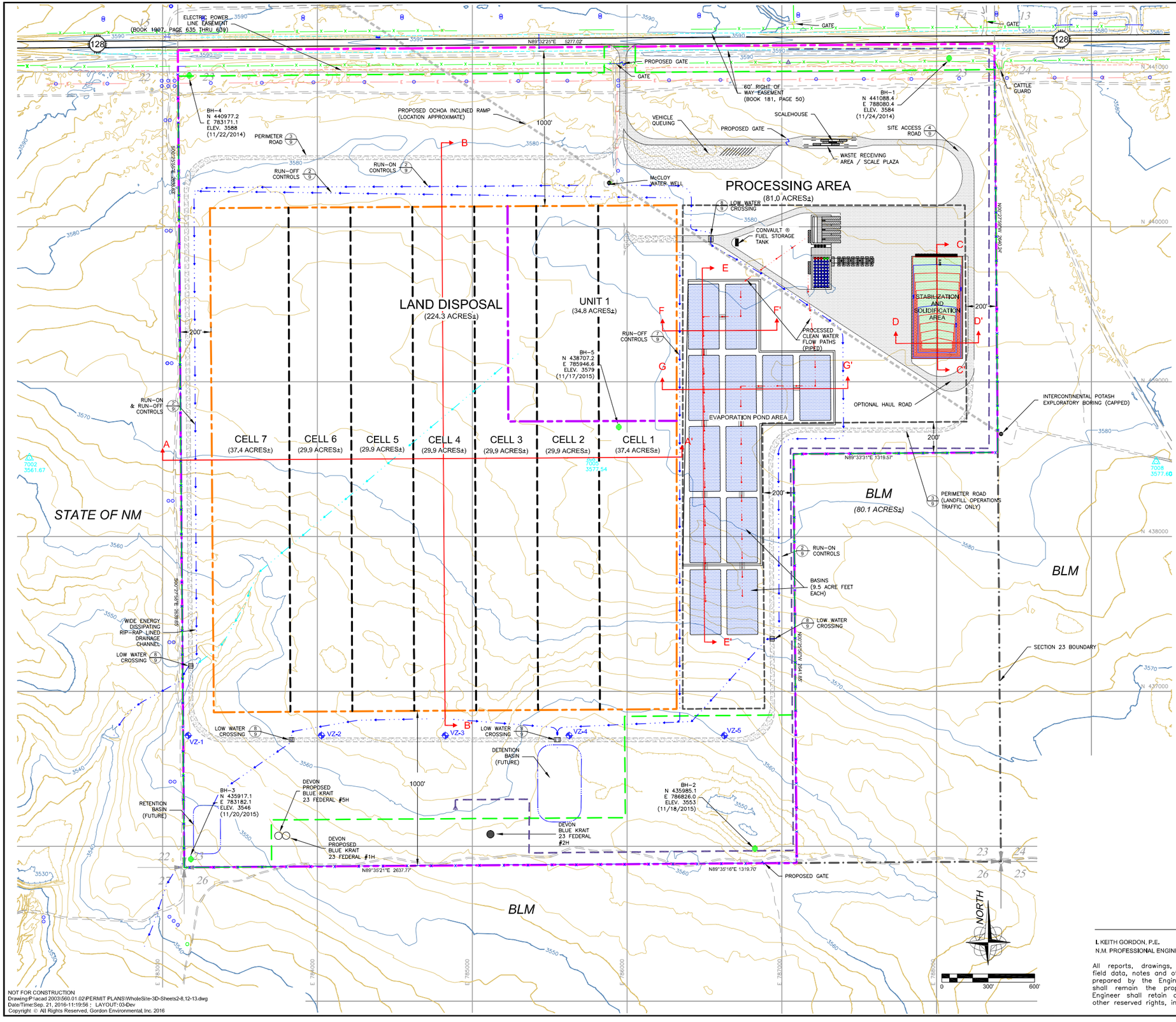
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

| | | |
|---|---|---|
| DATE: 09/08/2016 | CAD: WholeSi-2.DWG | PROJECT #: 560.01.02 |
| DRAWN BY: DMI | REVIEWED BY: CRK | SHEET 2 of 15 |
| APPROVED BY: IKG | gel@gordonenvironmental.com | |




## LEGEND

| | |
|---|---|
| SITE BOUNDARY WITH BEARING AND DISTANCE | (559.5 ACRES±) |
| SURFACE WASTE MANAGEMENT FACILITY BOUNDARY | (500.0 ACRES) |
| SOLID WASTE DISPOSAL AREA LIMITS | (224.3 ACRES±) |
| PROCESSING AREA LIMITS | (81.0 ACRES±) |
| UNIT 1 BOUNDARY | (34.8 ACRES±) |
| CELL BOUNDARY | |
| EXISTING 2FT CONTOUR | |
| EXISTING 10FT CONTOUR | |
| EXISTING 2FT DEPRESSION CONTOUR | |
| EXISTING 10FT DEPRESSION CONTOUR | |
| EXISTING PAVED ROAD | |
| EXISTING UNPAVED ROAD | |
| EXISTING FENCE | |
| EXISTING OVERHEAD ELECTRIC LINE | |
| EXISTING POWER POLE | |
| EXISTING CULVERT | |
| PROPOSED DEVON PIPELINE | |
| PROPOSED UNPAVED ROAD (GRAVEL) | |
| PROPOSED UNPAVED ROAD (SOIL) | |
| PROPOSED 3-STRAND BARBED WIRE FENCE | |
| FINAL DRAINAGE FLOW LINE AND DIRECTION OF FLOW | |
| INTERMEDIATE DRAINAGE FLOW LINE AND DIRECTION OF FLOW | |
| PROPOSED PROCESS WATER FLOW PATHS | |
| PROPOSED VADOSE ZONE MONITORING WELL | |
| BOREHOLE LOCATION | |
| PRODUCED WATER TANK | |
| CRUDE OIL RECOVERY TANK | |
| OIL SALES TANK | |
| CROSS-SECTION LOCATION | |
| SURVEY CONTROL POINT | |
| SITE GRID | |

NOTES:
1. AERIAL TOPOGRAPHIC SURVEY BY AEROTECH MAPPING INC., 6565 AMERICAN PARKWAY N.E., ALBUQUERQUE, NM 87111 PHONE: (520-561-6537) FAX (505 256-3328) EMAIL: TimBurrows@atmlv.com DATE OF PHOTOGRAPHY: 06-06-2015.
2. SURVEY CONTROL POINTS BY HARCROW SURVEYING, INC., 2314 W. MAIN ST., ARTESIA, NM 88210 PHONE: (575-746-2158).
3. THE DESIGN OF THE FACILITIES SHOWN IS PRELIMINARY. CONSTRUCTION PLANS AND SPECIFICATIONS FOR EACH MAJOR ELEMENT WILL BE SUBMITTED TO OCD IN ADVANCE OF INSTALLATION.

**CONTROL POINT DATA**

| POINT | NORTHING | EASTING | PANEL ELEVATION | DESCRIPTION |
|---|---|---|---|---|
| 7001 | 434845.57 | 782160.25 | 3530.07 | PP-7001 |
| 7002 | 438508.13 | 782138.97 | 3561.67 | PP-7002 |
| 7003 | 442131.34 | 782096.47 | 3600.88 | PP-7003 |
| 7004 | 434859.95 | 785795.31 | 3548.81 | PP-7004 |
| 7005 | 438509.15 | 785767.60 | 3577.54 | PP-7005 |
| 7006 | 442207.86 | 785773.10 | 3598.28 | PP-7006 |
| 7007 | 434883.93 | 789423.36 | 3567.38 | PP-7007 |
| 7008 | 438485.16 | 789417.70 | 3577.60 | PP-7008 |

NOTES:
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I, KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984



# SITE DEVELOPMENT PLAN

OWL LANDFILL SERVICES, LLC
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Bernalillo, New Mexico, USA
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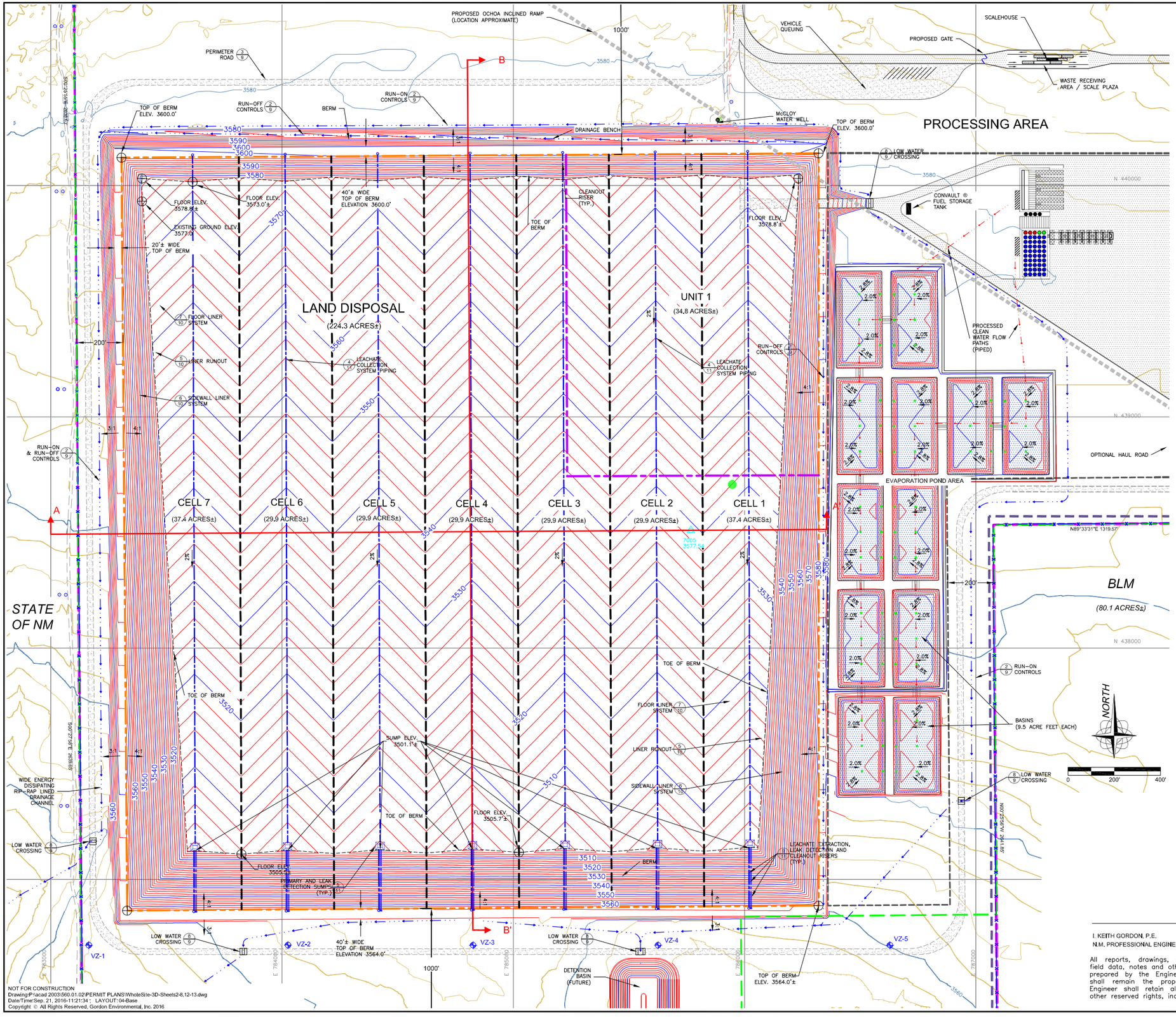
Fax: 505-867-6991

| | | |
|---|---|---|
| DATE: 09/08/2016 | CAD: WholeSI-2.DWG | PROJECT #: 560.01.02 |
| DRAWN BY: ASM | REVIEWED BY: CRK | SHEET 3 of 15 |
| APPROVED BY: IKG | gel@gordonenvironmental.com | |




## LEGEND

- SITE BOUNDARY WITH BEARING AND DISTANCE (559.5 ACRES±)
- SURFACE WASTE MANAGEMENT FACILITY BOUNDARY (500.0 ACRES)
- SOLID WASTE DISPOSAL AREA LIMITS (224.3 ACRES±)
- PROCESSING AREA LIMITS (81.0 ACRES±)
- UNIT 1 BOUNDARY (34.8 ACRES±)
- CELL BOUNDARY
- EXISTING 2FT CONTOUR
- EXISTING 10FT CONTOUR
- EXISTING 2FT DEPRESSION CONTOUR
- EXISTING 10FT DEPRESSION CONTOUR
- EXISTING UNPAVED ROAD
- EXISTING OVERHEAD ELECTRIC LINE
- EXISTING POWER POLE
- PROPOSED 2FT BASE GRADE CONTOUR
- PROPOSED 10FT BASE GRADE CONTOUR
- PROPOSED DEVON PIPELINE
- PROPOSED UNPAVED ROAD (GRAVEL)
- PROPOSED UNPAVED ROAD (SOIL)
- PROPOSED 3-STRAND BARBED WIRE FENCE
- FINAL DRAINAGE FLOW LINE AND DIRECTION OF FLOW
- PROPOSED PROCESS WATER FLOW PATHS
- PROPOSED VADOSE ZONE MONITORING WELL
- LEACHATE COLLECTION SUMP – WITH EXTRACTION, LEAK DETECTION AND CLEANOUT RISER PIPES
- BOREHOLE LOCATION
- PRODUCED WATER TANK
- CRUDE OIL RECOVERY TANK
- OIL SALES TANK
- CROSS-SECTION LOCATION
- SURVEY CONTROL POINT
- SITE GRID

NOTES:

1. AERIAL TOPOGRAPHIC SURVEY BY AEROTECH MAPPING INC., 6565 AMERICAN PARKWAY N.E., ALBUQUERQUE, NM 87111 PHONE: (520-561-6537) FAX (505 256-3328) EMAIL: TimBurrows@atmlv.com DATE OF PHOTOGRAPHY: 06-06-2015.
2. SURVEY CONTROL POINTS BY HARCROW SURVEYING, INC., 2314 W. MAIN ST., ARTESIA, NM 88210 PHONE: (575-746-2158).
3. THE DESIGN OF THE FACILITIES SHOWN IS PRELIMINARY. CONSTRUCTION PLANS AND SPECIFICATIONS FOR EACH MAJOR ELEMENT WILL BE SUBMITTED TO OCD IN ADVANCE OF INSTALLATION.

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| 7005 | 438509.15 | 785767.60 | 3577.54 | PP-7005 |
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| 7007 | 434883.93 | 789423.36 | 3567.38 | PP-7007 |
| 7008 | 438485.16 | 789417.70 | 3577.60 | PP-7008 |

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I. KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984



# LANDFILL BASE GRADING PLAN

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Fax: 505-867-6991

| | | |
|---|---|---|
| DATE: 09/02/2016 | CAD: WholeSi-2.DWG | PROJECT #: 560.01.02 |
| DRAWN BY: ASM | REVIEWED BY: CRK | SHEET 4 of 15 |
| APPROVED BY: IKG | gei@gordonenvironmental.com | |

PROPOSED OCHOA INCLINED RAMP (LOCATION APPROXIMATE)

1000'

VEHICLE QUEUING

PROPOSED GATE

SCALEHOUSE

WASTE RECEIVING AREA / SCALE PLAZA

PERIMETER ROAD (3/9)

RUN-ON CONTROLS (2/9)

RUN-OFF CONTROLS (2/9)

McCLOY WATER WELL

PROCESSING AREA

LOW WATER CROSSING (8/9)

CONVAULT ® FUEL STORAGE TANK

LAND DISPOSAL

(224.3 ACRES±)

UNIT 1

(34.8 ACRES±)

PROCESSED CLEAN WATER FLOW PATHS (PIPED)

RUN-OFF CONTROLS (7/9)

RUN-ON & RUN-OFF CONTROLS (2/9)

CELL 7 (37.4 ACRES±)

CELL 6 (29.9 ACRES±)

CELL 5 (29.9 ACRES±)

CELL 4 (29.9 ACRES±)

CELL 3 (29.9 ACRES±)

CELL 2 (29.9 ACRES±)

CELL 1 (37.4 ACRES±)

EVAPORATION POND AREA

OPTIONAL HAUL ROAD

STATE OF NM

FINAL COVER (6/10)

BLM

(80.1 ACRES±)

RUN-ON CONTROLS (2/9)

BASINS (9.5 ACRE FEET EACH)

LOW WATER CROSSING (8/9)

NORTH

0 200' 400'

WIDE ENERGY DISSIPATING RIP-RAP LINED DRAINAGE CHANNEL

LOW WATER CROSSING (8/9)

LOW WATER CROSSING (8/9)

LOW WATER CROSSING (8/9)

VZ-1

VZ-2

VZ-3

VZ-4

VZ-5

1000'

DETENTION BASIN (FUTURE)

N89°33'31"E 1319.57'

N00°25'55"W 2641.85'

## LEGEND

| | |
|---|---|
| S88° 50' 44.29"E 2647.98' | SITE BOUNDARY WITH BEARING AND DISTANCE (559.5 ACRES±) |
| | SURFACE WASTE MANAGEMENT FACILITY BOUNDARY (500.0 ACRES) |
| | SOLID WASTE DISPOSAL AREA LIMITS (224.3 ACRES±) |
| | PROCESSING AREA LIMITS (81.0 ACRES±) |
| | UNIT 1 BOUNDARY (34.8 ACRES±) |
| | CELL BOUNDARY |
| | EXISTING 2FT CONTOUR |
| 3550 | EXISTING 10FT CONTOUR |
| | EXISTING 2FT DEPRESSION CONTOUR |
| 3550 | EXISTING 10FT DEPRESSION CONTOUR |
| | EXISTING PAVED ROAD |
| | EXISTING UNPAVED ROAD |
| E E | EXISTING OVERHEAD ELECTRIC LINE |
| | EXISTING POWER POLE |
| | PROPOSED 2FT BASE GRADE CONTOUR |
| 3550 | PROPOSED 10FT BASE GRADE CONTOUR |
| | PROPOSED DEVON PIPELINE |
| | PROPOSED UNPAVED ROAD (GRAVEL) |
| | PROPOSED UNPAVED ROAD (SOIL) |
| x x x | PROPOSED 3-STRAND BARBED WIRE FENCE |
| | FINAL DRAINAGE FLOW LINE AND DIRECTION OF FLOW |
| | PROPOSED PROCESS WATER FLOW PATHS |
| VZ-2 | PROPOSED VADOSE ZONE MONITORING WELL |
| | BOREHOLE LOCATION |
| | PRODUCED WATER TANK |
| | CRUDE OIL RECOVERY TANK |
| | OIL SALES TANK |
| | MECHANICAL EVAPORATOR LOCATION |
| A A' | CROSS-SECTION LOCATION |
| 7008 3577.60 | SURVEY CONTROL POINT |
| E 7880000 N 439000 | SITE GRID |

NOTES:

1. AERIAL TOPOGRAPHIC SURVEY BY AEROTECH MAPPING INC., 6565 AMERICAN PARKWAY N.E., ALBUQUERQUE, NM 87111 PHONE: (520-561-6537) FAX (505 256-3328) EMAIL: TIMBURROWS@ATMLV.COM DATE OF PHOTOGRAPHY: 06-06-2015.
2. SURVEY CONTROL POINTS BY HARCROW SURVEYING, INC., 2314 W. MAIN ST., ARTESIA, NM 88210 PHONE: (575-746-2158).
3. THE DESIGN OF THE FACILITIES SHOWN IS PRELIMINARY. CONSTRUCTION PLANS AND SPECIFICATIONS FOR EACH MAJOR ELEMENT WILL BE SUBMITTED TO OCD IN ADVANCE OF INSTALLATION.

**CONTROL POINT DATA**

| POINT | NORTHING | EASTING | PANEL ELEVATION | DESCRIPTION |
|---|---|---|---|---|
| 7001 | 434845.57 | 782160.25 | 3530.07 | PP-7001 |
| 7002 | 438508.13 | 782138.97 | 3561.67 | PP-7002 |
| 7003 | 442131.34 | 782096.47 | 3600.88 | PP-7003 |
| 7004 | 434859.95 | 785795.31 | 3548.81 | PP-7004 |
| 7005 | 438509.15 | 785767.60 | 3577.54 | PP-7005 |
| 7006 | 442207.86 | 785773.10 | 3598.28 | PP-7006 |
| 7007 | 434883.93 | 789423.36 | 3567.38 | PP-7007 |
| 7008 | 438485.16 | 789417.70 | 3577.60 | PP-7008 |

NOTES:
1. ALL POINTS ARE FLUSH WITH THE GROUND.
2. THE COORDINATES AND ELEVATIONS FOR THE PHOTO CONTROL POINTS ON THE ABOVE REFERENCED PROJECT ARE MODIFIED (SURFACE) NEW MEXICO STATE PLANE COORDINATES - EAST ZONE, NAD 83 AND HAVE BEEN ADJUSTED USING AN "OPUS" SOLUTION". TO OBTAIN TRUE STATE PLANE GRID COORDINATES, MULTIPLY THE COORDINATES BELOW BY THE PROJECT AVERAGE COMBINED FACTOR OF = 0.99981059848. THE COORDINATES AND ELEVATIONS ARE EXPRESSED IN U. S. SURVEY FEET.

I, KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984



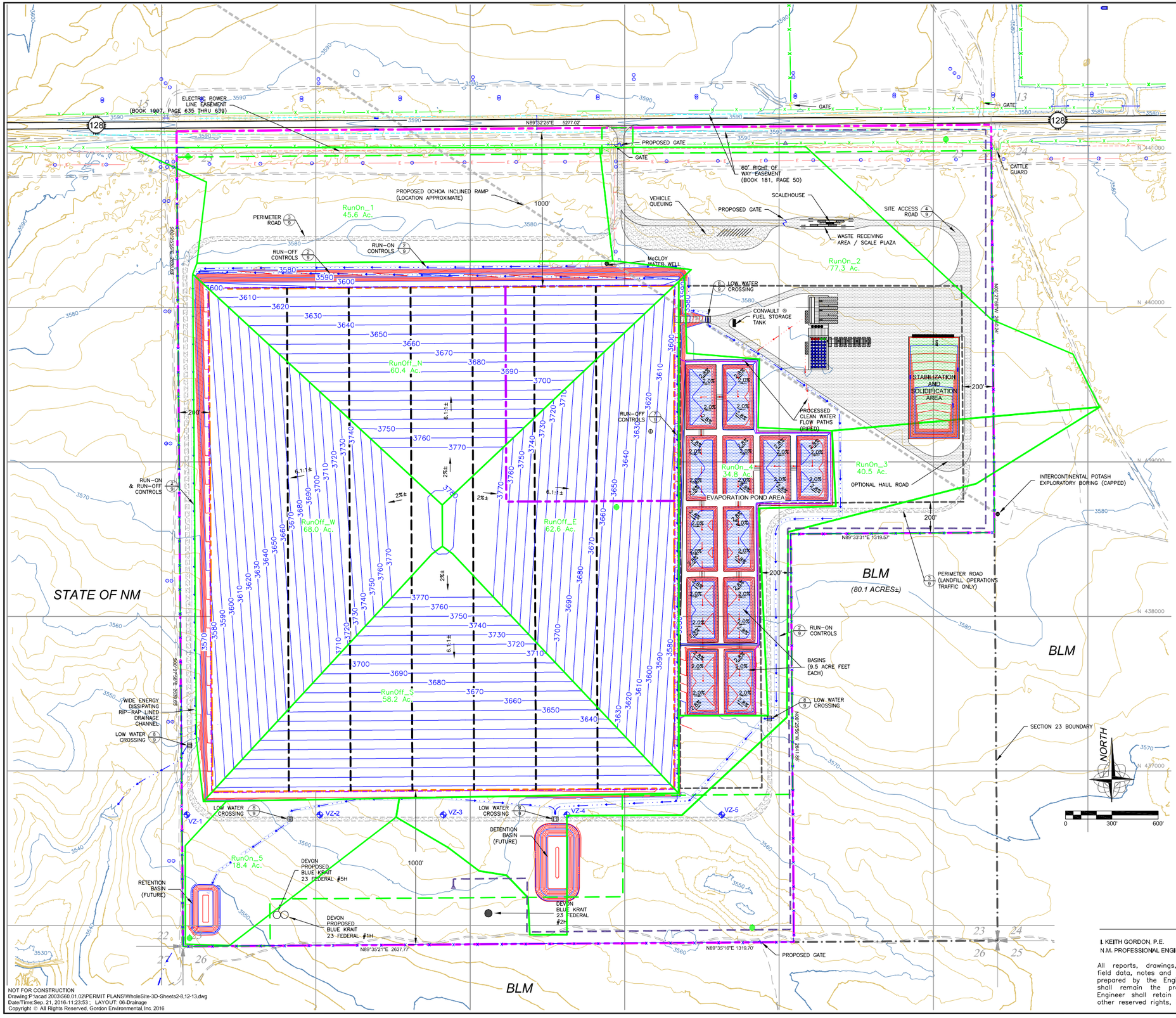
# LANDFILL FINAL GRADING PLAN

OWL LANDFILL SERVICES, LLC
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

| | | |
|---|---|---|
| DATE: 09/08/2016 | CAD: WholeSI-2.DWG | PROJECT #: 560.01.02 |
| DRAWN BY: ASM | REVIEWED BY: CRK | SHEET 5 of 15 |
| APPROVED BY: IKG | gei@gordonenvironmental.com | |

NOT FOR CONSTRUCTION
Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\WholeSite-3D-Sheets2-8,12-13.dwg
Date/Time:Sep. 21, 2016-11:22:33 ; LAYOUT: 05-Final




## LEGEND

| | |
|---|---|
| SITE BOUNDARY WITH BEARING AND DISTANCE | (559.5 ACRES±) |
| SURFACE WASTE MANAGEMENT FACILITY BOUNDARY | (500.0 ACRES) |
| SOLID WASTE DISPOSAL AREA LIMITS | (224.3 ACRES±) |
| PROCESSING AREA LIMITS | (81.0 ACRES±) |
| UNIT 1 BOUNDARY | (34.8 ACRES±) |
| CELL BOUNDARY | |
| EXISTING 2FT CONTOUR | |
| EXISTING 10FT CONTOUR | |
| EXISTING 2FT DEPRESSION CONTOUR | |
| EXISTING 10FT DEPRESSION CONTOUR | |
| EXISTING PAVED ROAD | |
| EXISTING UNPAVED ROAD | |
| EXISTING FENCE | |
| EXISTING OVERHEAD ELECTRIC LINE | |
| EXISTING POWER POLE | |
| EXISTING CULVERT | |
| PROPOSED 2FT BASE GRADE CONTOUR | |
| PROPOSED 10FT BASE GRADE CONTOUR | |
| PROPOSED DEVON PIPELINE | |
| PROPOSED UNPAVED ROAD (GRAVEL) | |
| PROPOSED UNPAVED ROAD (SOIL) | |
| PROPOSED 3-STRAND BARBED WIRE FENCE | |
| FINAL DRAINAGE FLOW LINE AND DIRECTION OF FLOW | |
| PROPOSED PROCESS WATER FLOW PATHS | |
| PROPOSED EXTENT OF LINER – LAND DISPOSAL (INCLUDING ANCHOR TRENCH) | |
| PROPOSED EXTENT OF LINER – EVAPORATION PONDS (INCLUDING ANCHOR TRENCH) | |
| PROPOSED VADOSE ZONE MONITORING WELL | |
| BOREHOLE LOCATION | |
| PRODUCED WATER TANK | |
| CRUDE OIL RECOVERY TANK | |
| OIL SALES TANK | |
| SURVEY CONTROL POINT | |
| SITE GRID | |

NOTES:

1. AERIAL TOPOGRAPHIC SURVEY BY AEROTECH MAPPING INC., 6565 AMERICAN PARKWAY N.E., ALBUQUERQUE, NM 87111 PHONE: (520-561-6537) FAX (505 256-3328) EMAIL: TIMBURROWS@ATMLV.COM DATE OF PHOTOGRAPHY: 06-06-2015.
2. SURVEY CONTROL POINTS BY HARCROW SURVEYING, INC., 2314 W. MAIN ST., ARTESIA, NM 88210 PHONE: (575-746-2158).
3. THE DESIGN OF THE FACILITIES SHOWN IS PRELIMINARY. CONSTRUCTION PLANS AND SPECIFICATIONS FOR EACH MAJOR ELEMENT WILL BE SUBMITTED TO OCD IN ADVANCE OF INSTALLATION.

**CONTROL POINT DATA**

| POINT | NORTHING | EASTING | PANEL ELEVATION | DESCRIPTION |
|---|---|---|---|---|
| 7001 | 434845.57 | 782160.25 | 3530.07 | PP-7001 |
| 7002 | 438508.13 | 782138.97 | 3561.67 | PP-7002 |
| 7003 | 442131.34 | 782096.47 | 3600.88 | PP-7003 |
| 7004 | 434859.95 | 785795.31 | 3548.81 | PP-7004 |
| 7005 | 438509.15 | 785767.60 | 3577.54 | PP-7005 |
| 7006 | 442207.86 | 785773.10 | 3598.28 | PP-7006 |
| 7007 | 434883.93 | 789423.36 | 3567.38 | PP-7007 |
| 7008 | 438485.16 | 789417.70 | 3577.60 | PP-7008 |

NOTES:

1. ALL POINTS ARE FLUSH WITH THE GROUND.
2. THE COORDINATES AND ELEVATIONS FOR THE PHOTO CONTROL POINTS ON THE ABOVE REFERENCED PROJECT ARE MODIFIED (SURFACE) NEW MEXICO STATE PLANE COORDINATES – EAST ZONE, NAD 83 AND HAVE BEEN ADJUSTED USING AN "OPUS" SOLUTION". TO OBTAIN TRUE STATE PLANE GRID COORDINATES, MULTIPLY THE COORDINATES BELOW BY THE PROJECT AVERAGE COMBINED FACTOR OF = 0.99981105864R. THE COORDINATES AND ELEVATIONS ARE EXPRESSED IN U. S. SURVEY FEET.

I, KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984

All reports, drawings, specifications, computer files, field data, notes and other documents and instruments prepared by the Engineer as instruments of service shall remain the property of the Engineer. The Engineer shall retain all common law, statutory and other reserved rights, including the copyright thereto.

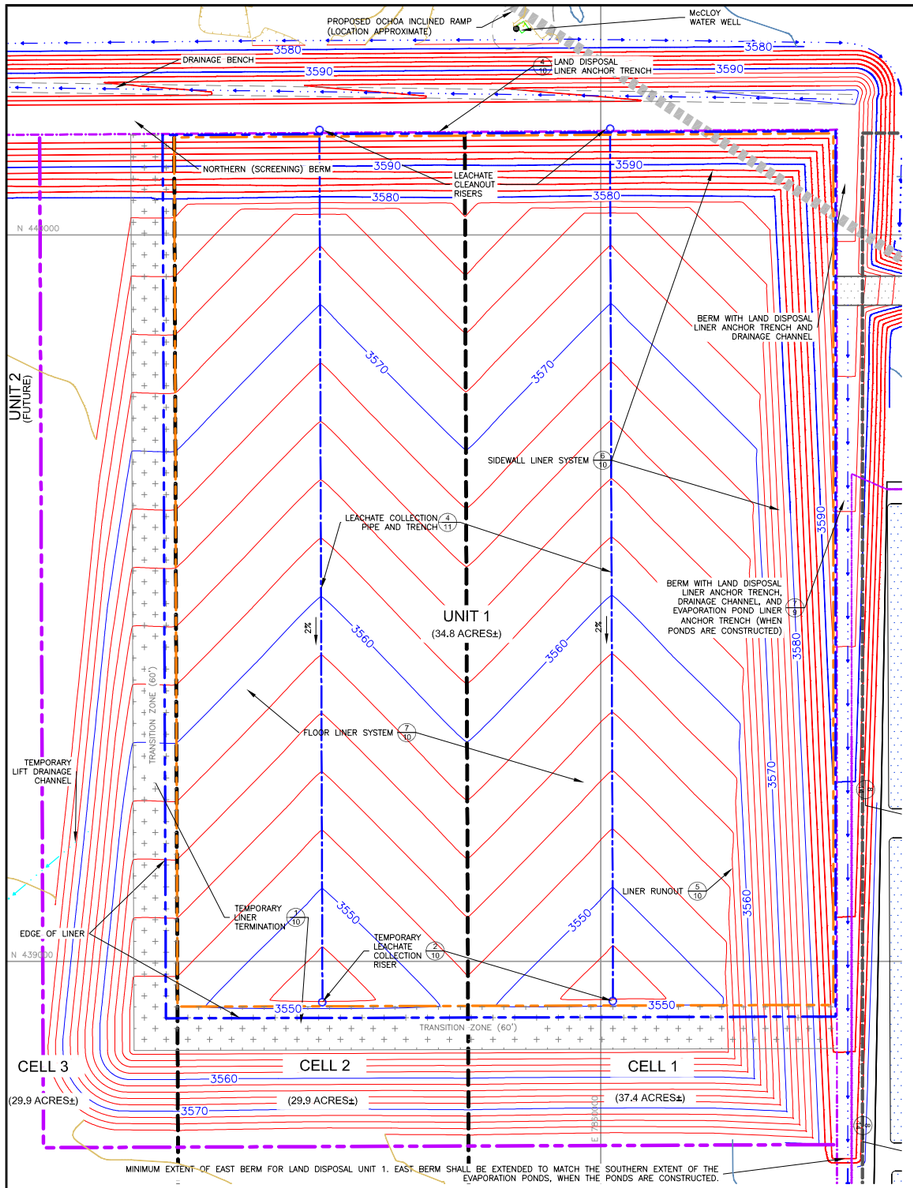
# LANDFILL COMPLETION DRAINAGE PLAN

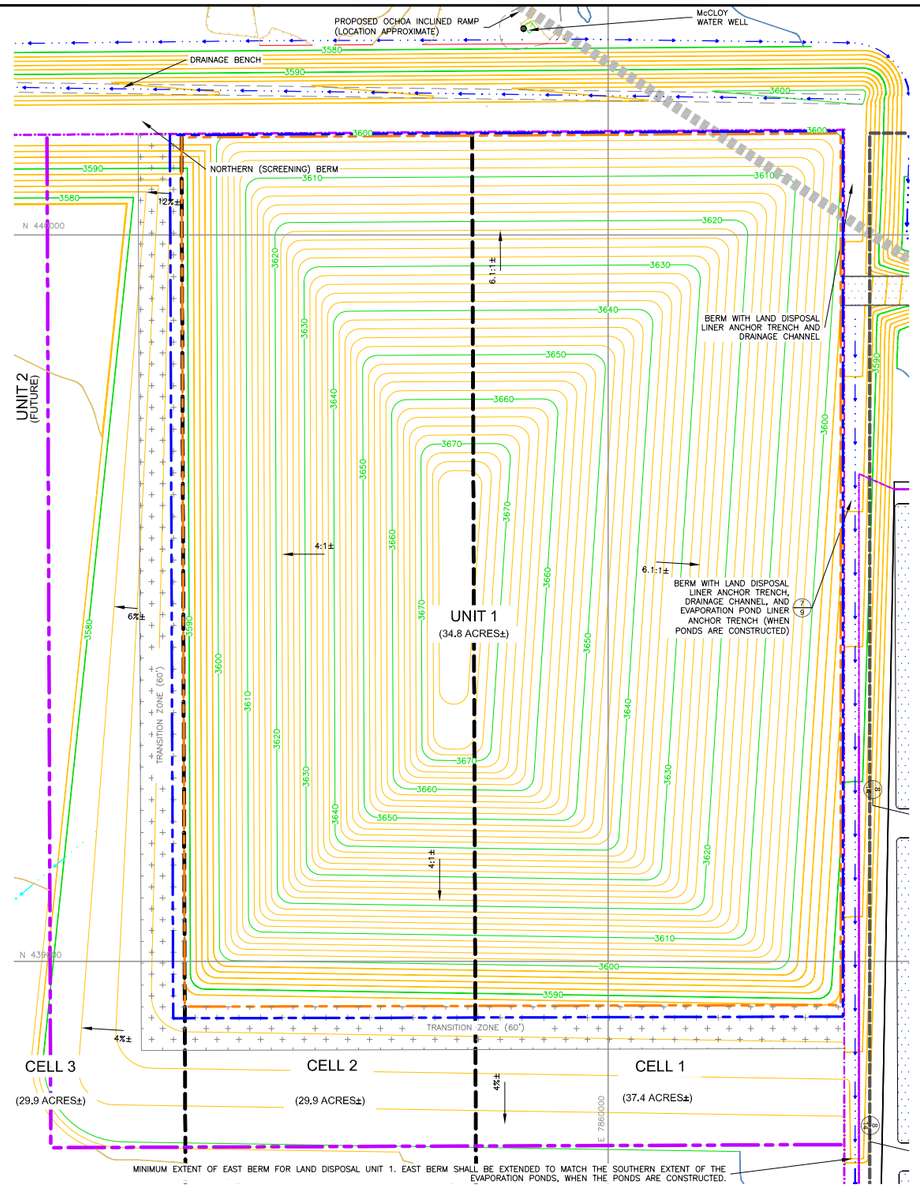
OWL LANDFILL SERVICES, LLC
LEA COUNTY, NEW MEXICO


Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991


| | | |
|---|---|---|
| DATE: 09/08/2016 | CAD: WholeSI-2.DWG | PROJECT #: 560.01.02 |
| DRAWN BY: ASM | REVIEWED BY: CRK | SHEET 6 of 15 |
| APPROVED BY: IKG | gei@gordonenvironmental.com | |

NOT FOR CONSTRUCTION
Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\WholeSite-3D-Sheets2-8,12-13.dwg
Date/Time:Sep. 21, 2016-11:23:53 ; LAYOUT: 06-Drainage




## LEGEND

- SURFACE WASTE MANAGEMENT FACILITY BOUNDARY (500.0 ACRES)
- SOLID WASTE DISPOSAL AREA LIMITS (224.3 ACRES±)
- PROCESSING AREA LIMITS (81.0 ACRES±)
- UNIT 1 BOUNDARY (34.8 ACRES±)
- CELL BOUNDARY
- EXISTING 2FT CONTOUR
- EXISTING 10FT CONTOUR
- EXISTING 2FT DEPRESSION CONTOUR
- EXISTING 10FT DEPRESSION CONTOUR
- PROPOSED 2FT BASE GRADE CONTOUR
- PROPOSED 10FT BASE GRADE CONTOUR
- PROPOSED 2FT EARLY CLOSURE GRADE CONTOUR
- PROPOSED 10FT EARLY CLOSURE GRADE CONTOUR
- INTERMEDIATE DRAINAGE FLOW LINE AND DIRECTION OF FLOW
- FINAL DRAINAGE FLOW LINE AND DIRECTION OF FLOW
- PROPOSED EXTENT OF LINER – LAND DISPOSAL (INCLUDING ANCHOR TRENCH)
- PROPOSED EXTENT OF LINER – EVAPORATION PONDS (INCLUDING ANCHOR TRENCH)
- TRANSITION ZONE
- SITE GRID (E 7880000, N 439000)

NOTES:

1. AERIAL TOPOGRAPHIC SURVEY BY AEROTECH MAPPING INC., 6565 AMERICAN PARKWAY N.E., ALBUQUERQUE, NM 87111 PHONE: (520-561-6537) FAX (505 256-3328) EMAIL: TIMBURROWS@ATMLV.COM DATE OF PHOTOGRAPHY: 06-06-2015.
2. SURVEY CONTROL POINTS BY HARCROW SURVEYING, INC., 2314 W. MAIN ST., ARTESIA, NM 88210 PHONE: (575-746-2158).
3. THE DESIGN OF THE FACILITIES SHOWN IS PRELIMINARY. CONSTRUCTION PLANS AND SPECIFICATIONS FOR EACH MAJOR ELEMENT WILL BE SUBMITTED TO OCD IN ADVANCE OF INSTALLATION.

**CONTROL POINT DATA**

| POINT | NORTHING | EASTING | PANEL ELEVATION | DESCRIPTION |
|---|---|---|---|---|
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| 7002 | 438508.13 | 782138.97 | 3561.67 | PP-7002 |
| 7003 | 442131.34 | 782096.47 | 3600.88 | PP-7003 |
| 7004 | 434859.95 | 785795.31 | 3548.81 | PP-7004 |
| 7005 | 438509.15 | 785767.60 | 3577.54 | PP-7005 |
| 7006 | 442207.86 | 785773.10 | 3598.28 | PP-7006 |
| 7007 | 434883.93 | 789423.36 | 3567.38 | PP-7007 |
| 7008 | 438485.16 | 789417.70 | 3577.60 | PP-7008 |

NOTES:
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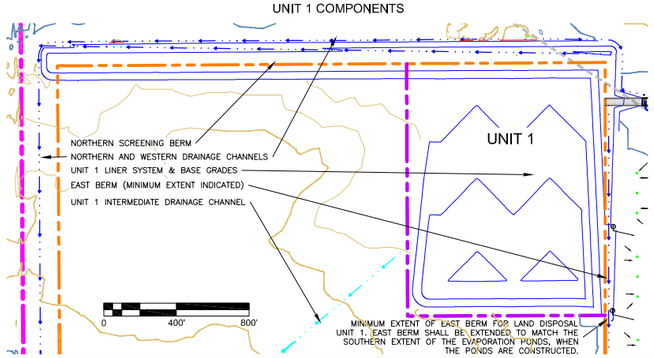
UNIT 1 BASE GRADING PLAN

0 100' 200'

UNIT 1 COMPONENTS




UNIT 1 INTERIM GRADES

0 100' 200'

NORTH

I, KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984



# UNIT 1 INTERMEDIATE GRADING PLAN

OWL LANDFILL SERVICES, LLC
LEA COUNTY, NEW MEXICO

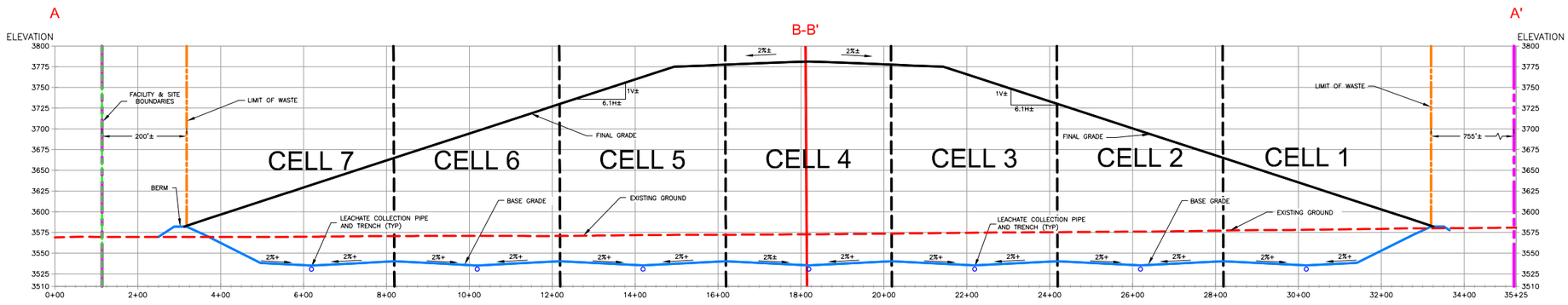
Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

| | | |
|---|---|---|
| DATE: 09/08/2016 | CAD: WholeSi-2.DWG | PROJECT #: 560.01.02 |
| DRAWN BY: ASM | REVIEWED BY: CRK | SHEET 7 of 15 |
| APPROVED BY: IKG | gel@gordonenvironmental.com | |

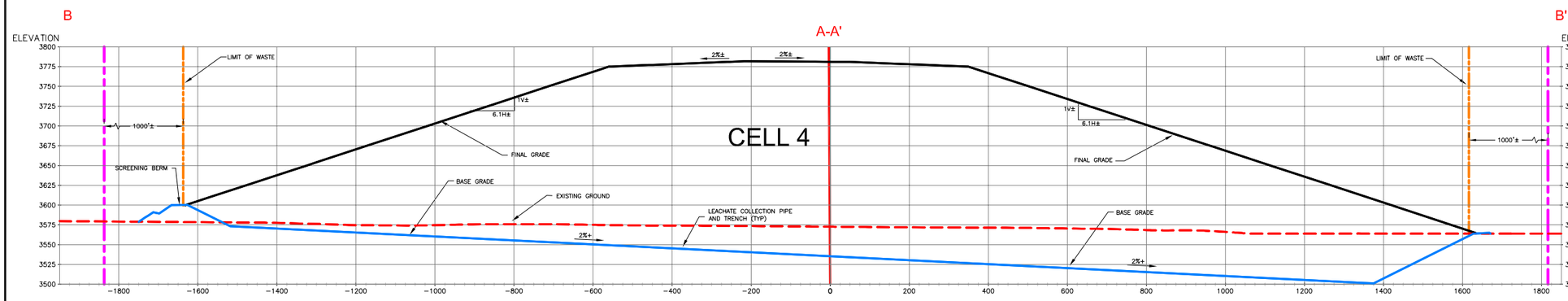
NOT FOR CONSTRUCTION
Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\WholeSite-3D-Sheets2-8,12-13.dwg
Date/Time:Sep. 21, 2016-11:25:08 : LAYOUT: 07-Unit1

## LEGEND

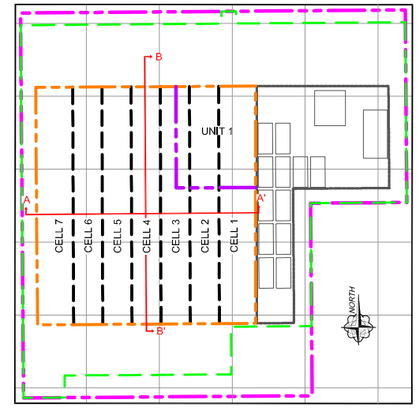
- SITE BOUNDARY (559.5 ACRES±)
- SURFACE WASTE MANAGEMENT FACILITY BOUNDARY (500.0 ACRES)
- SOLID WASTE DISPOSAL AREA LIMITS (224.3 ACRES±)
- CELL BOUNDARY
- EXISTING GRADE
- BASE GRADE
- FINAL GRADE
- A A' CROSS-SECTION LOCATION




1/8 LAND DISPOSAL EAST-WEST SECTION
SECTION A–A'

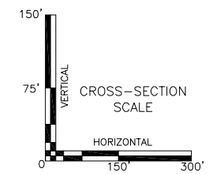



2/8 LAND DISPOSAL NORTH-SOUTH SECTION
SECTION B–B'




KEY MAP
N.T.S.

NOTE:
1. THE DESIGN OF THE FACILITIES SHOWN IS PRELIMINARY. CONSTRUCTION PLANS AND SPECIFICATIONS FOR EACH MAJOR ELEMENT WILL BE SUBMITTED TO OCD IN ADVANCE OF INSTALLATION.




I, KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984



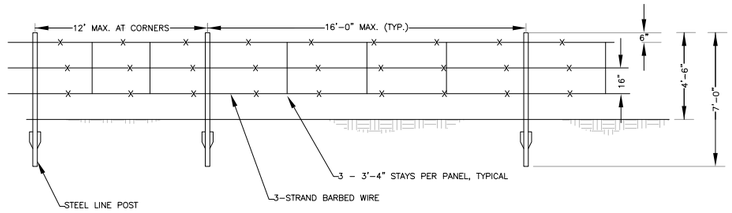
# LANDFILL CROSS-SECTIONS

OWL LANDFILL SERVICES, LLC
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

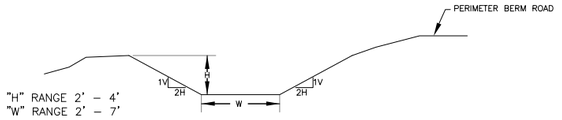
| | | |
|---|---|---|
| DATE: 09/08/2016 | CAD: WholeSi-2.DWG | PROJECT #: 560.01.02 |
| DRAWN BY: ASM | REVIEWED BY: CRK | SHEET 8 of 15 |
| APPROVED BY: IKG | gei@gordonenvironmental.com | |

NOT FOR CONSTRUCTION
Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\WholeSite-3D-Sheets2-8,12-13.dwg
Date/Time:Sep. 21, 2016-11:48:22 ; LAYOUT: 08-X-Sect



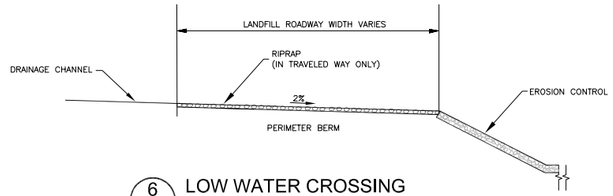

1/9 3-STRAND BARBED WIRE FENCE

NOT TO SCALE



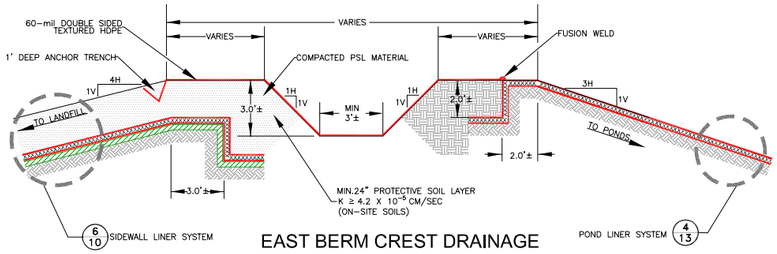

2/9 DRAINAGE CHANNEL TYPICAL SECTION

NOT TO SCALE



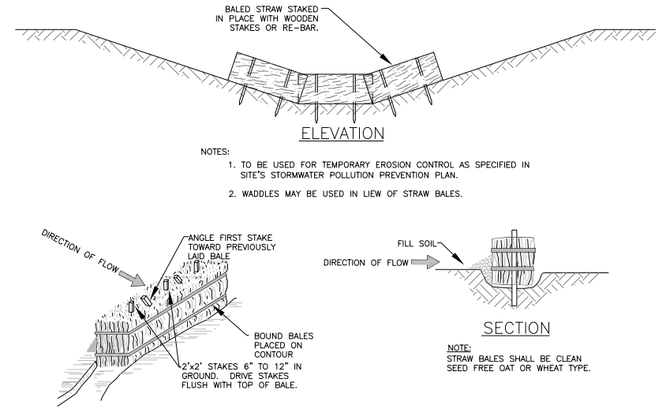

6/9 LOW WATER CROSSING

SECTION C-C' NOT TO SCALE



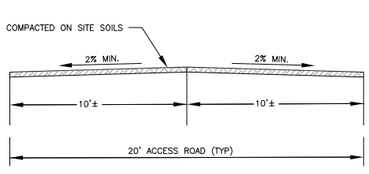

7/9 EAST BERM CREST DRAINAGE SWALE AND ANCHOR TRENCHES

NOT TO SCALE



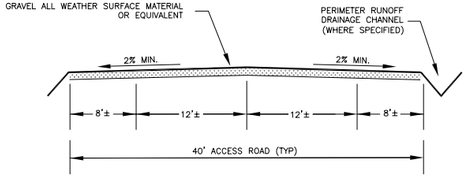

9/9 TYPICAL STRAW BALE SILT CHECK IN PERIMETER DRAINAGE AND LANDFILL ACCESS ROAD CHANNELS

ELEVATION/PLAN VIEW NOT TO SCALE



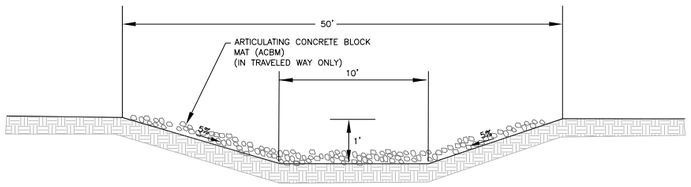

3/9 UNPAVED SOIL ACCESS ROAD

NOT TO SCALE



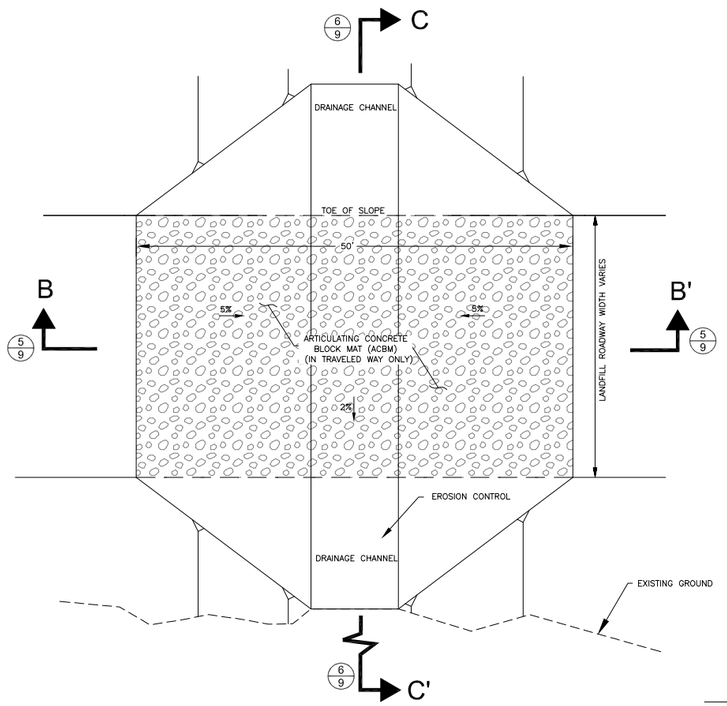

4/9 UNPAVED GRAVEL ACCESS ROAD

NOT TO SCALE



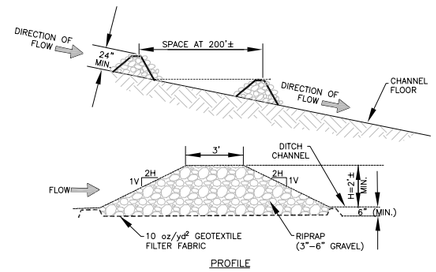

5/9 LOW WATER CROSSING

SECTION B-B' NOT TO SCALE




8/9 LOW WATER CROSSING

PLAN VIEW NOT TO SCALE




10/9 TYPICAL ROCK CHECK DAM IN PERIMETER DRAINAGE AND LANDFILL ACCESS ROAD CHANNELS

NOT TO SCALE

NOT FOR CONSTRUCTION
Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\09 ENGINEERING DET.dwg
Date/Time:Sep. 19, 2016-08:53:20 ; LAYOUT: D (LS)


I, KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984

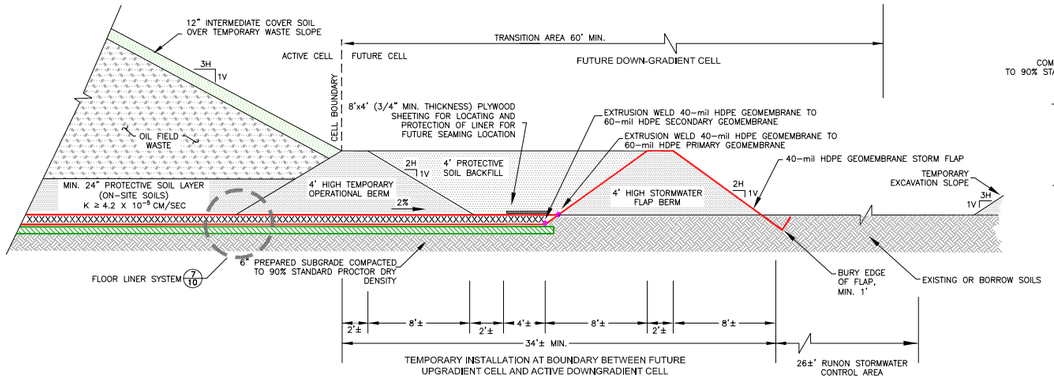


# ENGINEERING DETAILS

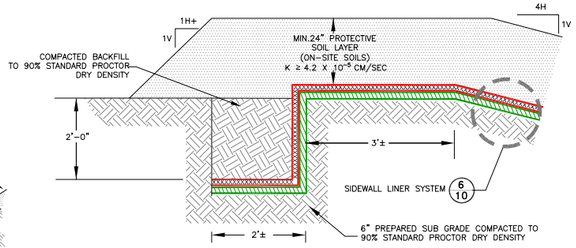
OWL LANDFILL SERVICES, LLC
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

| | | |
|---|---|---|
| DATE: 09/14/2016 | CAD: 08 STORMWATER DET.dwg | PROJECT #: 560.01.02 |
| DRAWN BY: DMI | REVIEWED BY: CRK | SHEET 9 of 15 |
| APPROVED BY: IKG | gel@gordonenvironmental.com | |

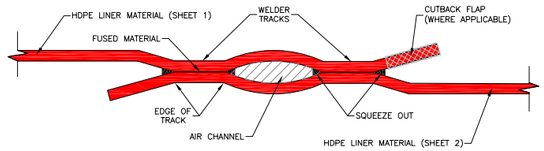



1/10 TYPICAL TRANSITION AREA LINER TERMINATION
NOT TO SCALE



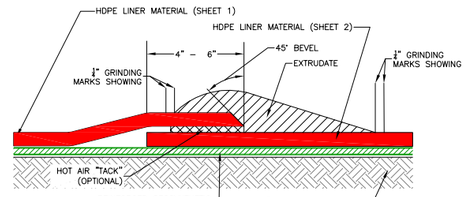

NOTE: COMPACTED SOIL BACKFILL SHALL BE GRADED SO THAT WATER DRAINS AWAY FROM THE ANCHOR TRENCH.

4/10 ANCHOR TRENCH
SECTION VIEW NOT TO SCALE



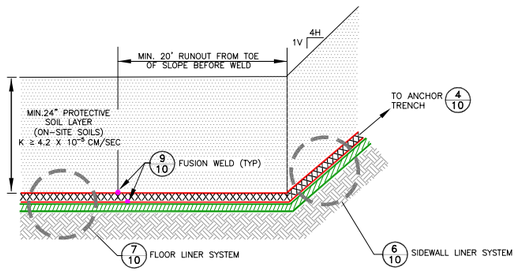

NOTES:
1. BOTH AREAS OF FUSED MATERIAL SHOULD BE VOID OF ANY SEAM LINES
2. EDGE OF TRACKS NOT TO CUT THE LINER
3. AIR CHANNEL SHOULD BE CLEAR
4. BOTH WELDER TRACKS SHALL BE EQUAL WIDTHS
5. SQUEEZE OUT SHOULD BE JUST BARELY VISIBLE IN ALL FOUR (4) LOCATIONS WHEN VIEWED IN THE TEST CROSS-SECTION
6. ALL DOUBLE TRACK FUSION WELDS SHALL BE AIR PRESSURE TESTED

9/10 TYPICAL DOUBLE TRACK FUSION WELD
SECTION VIEW NOT TO SCALE

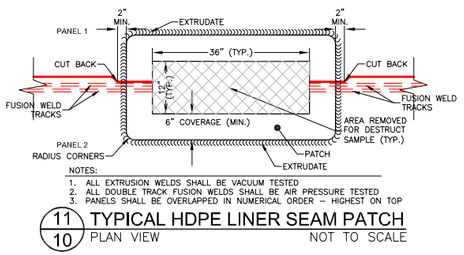



NOTES:
1. ALL EXTRUSION WELDS SHALL BE VACUUM TESTED

10/10 TYPICAL EXTRUSION WELD
SECTION VIEW NOT TO SCALE

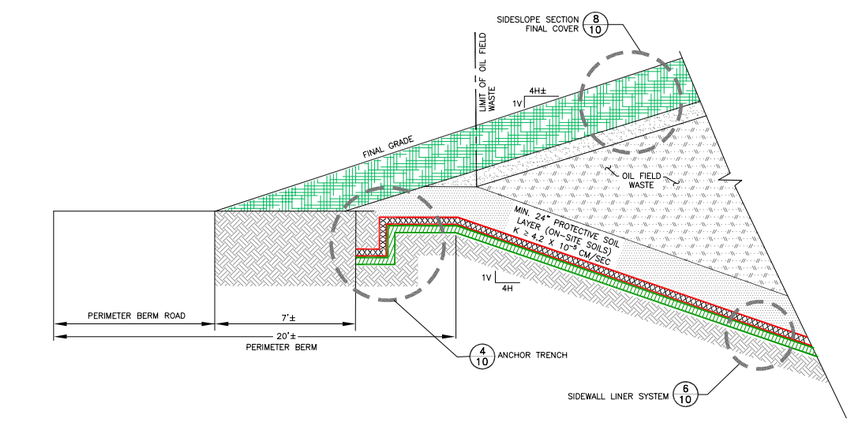



5/10 LINER RUNOUT ON LANDFILL FLOOR
NOT TO SCALE

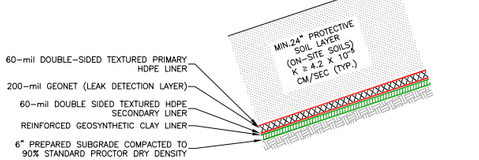



NOTES:
1. ALL EXTRUSION WELDS SHALL BE VACUUM TESTED
2. ALL DOUBLE TRACK FUSION WELDS SHALL BE AIR PRESSURE TESTED
3. PANELS SHALL BE OVERLAPPED IN NUMERICAL ORDER – HIGHEST ON TOP

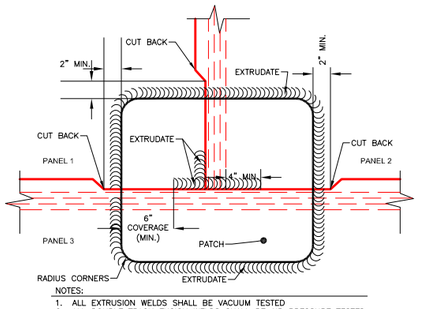
11/10 TYPICAL HDPE LINER SEAM PATCH
PLAN VIEW NOT TO SCALE




2/10 TEMPORARY LEACHATE COLLECTION RISER PIPE
NOT TO SCALE

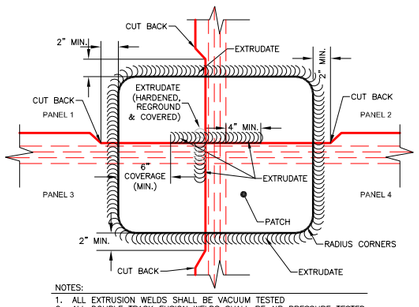



6/10 SIDEWALL LINER SYSTEM
NOT TO SCALE




NOTES:
1. ALL EXTRUSION WELDS SHALL BE VACUUM TESTED
2. ALL DOUBLE TRACK FUSION WELDS SHALL BE AIR PRESSURE TESTED
3. PANELS SHALL BE OVERLAPPED IN NUMERICAL ORDER – HIGHEST ON TOP

12/10 TYPICAL "T" AT BUTT SEAM
PLAN VIEW NOT TO SCALE

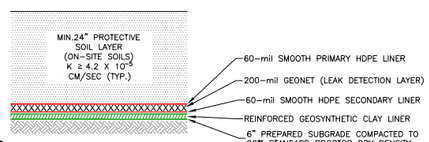



NOTES:
1. ALL EXTRUSION WELDS SHALL BE VACUUM TESTED
2. ALL DOUBLE TRACK FUSION WELDS SHALL BE AIR PRESSURE TESTED
3. PANELS SHALL BE OVERLAPPED IN NUMERICAL ORDER – HIGHEST ON TOP

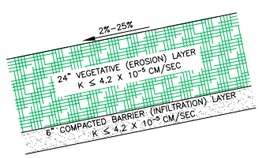
13/10 TYPICAL PATCH AT PANEL END
PLAN VIEW NOT TO SCALE




3/10 PERIMETER BERM AND FINAL COVER TIE-IN
NOT TO SCALE




7/10 FLOOR LINER SYSTEM
NOT TO SCALE




8/10 LANDFILL FINAL COVER SECTION
NOT TO SCALE

I, KEITH GORDON, P.E.
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# LINER SYSTEM AND COVER DETAILS

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213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
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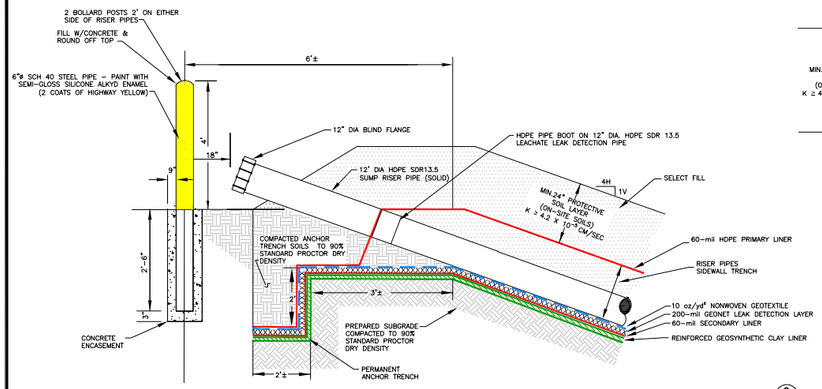
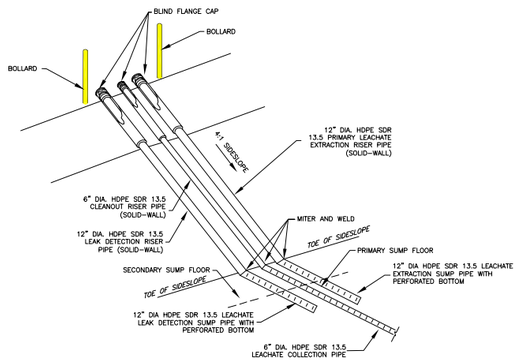
| | | |
|---|---|---|
| DATE: 09/14/2016 | CAD: 10 LINER DET.dwg | PROJECT #: 560.01.02 |
| DRAWN BY: DMI | REVIEWED BY: CRK | SHEET 10 of 15 |
| APPROVED BY: IKG | gel@gordonenvironmental.com | |

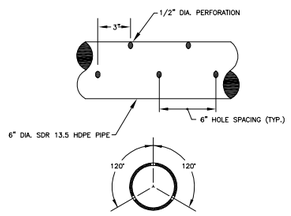
NOT FOR CONSTRUCTION
Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\10 LINER DET.dwg
Date/Time:Sep. 19, 2016-08:55:04



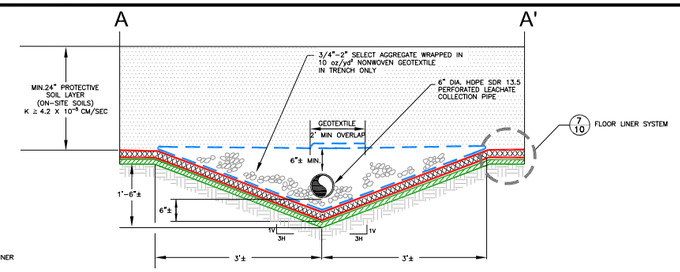

1/11 DOWN GRADIENT RISER PIPE TERMINATION
NOT TO SCALE



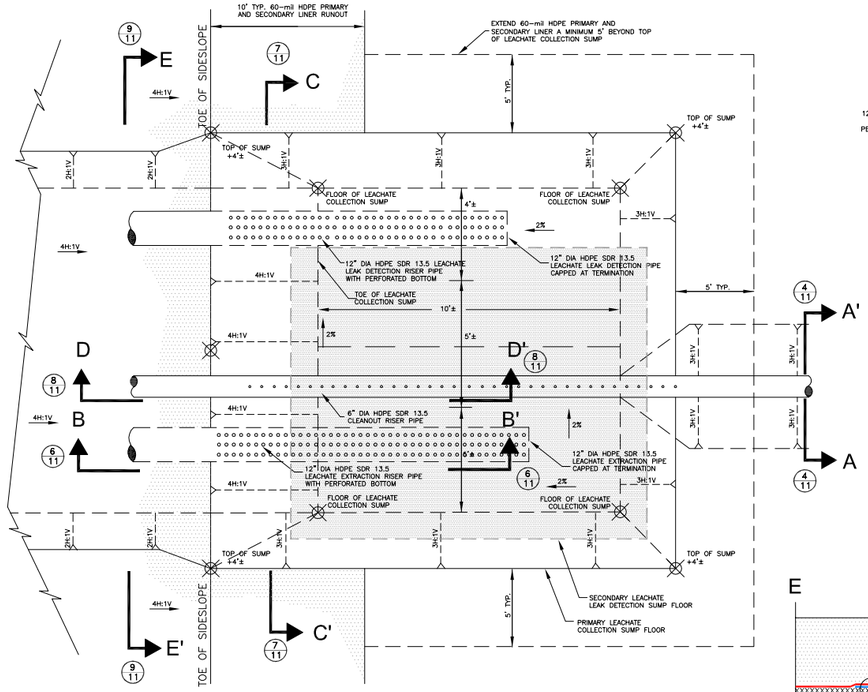

2/11 DOWN GRADIENT SUMP RISER CONFIGURATION SCHEMATIC
NOT TO SCALE



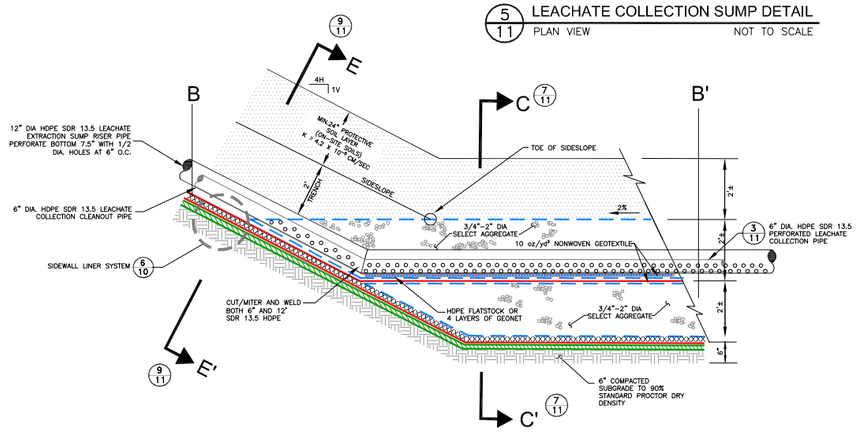

3/11 PERFORATED LEACHATE COLLECTION PIPE
NOT TO SCALE



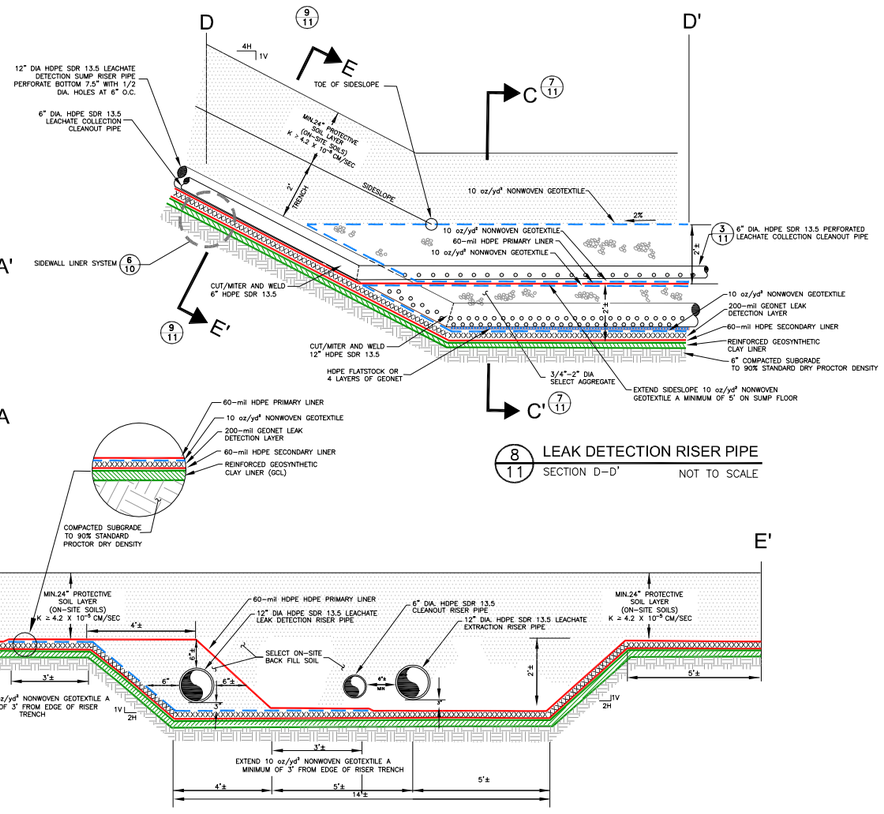

4/11 LEACHATE COLLECTION TRENCH AND PIPE
SECTION A–A' NOT TO SCALE




5/11 LEACHATE COLLECTION SUMP DETAIL
PLAN VIEW NOT TO SCALE



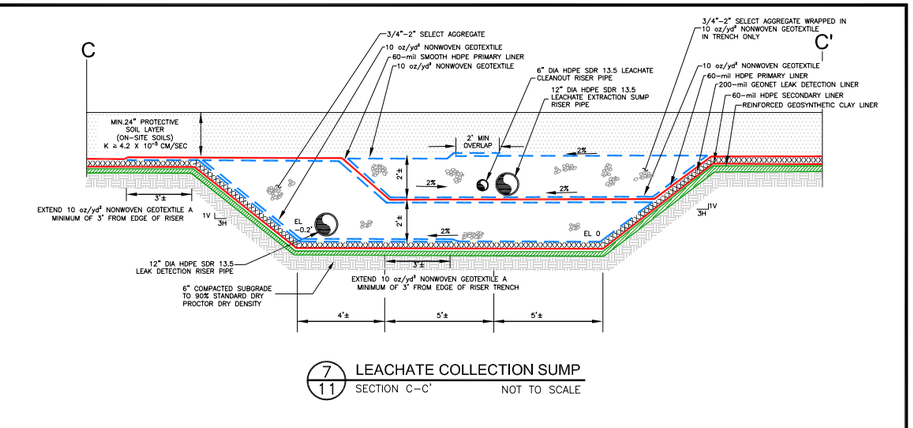

6/11 LEACHATE EXTRACTION RISER PIPE
SECTION B–B' NOT TO SCALE




8/11 LEAK DETECTION RISER PIPE
SECTION D–D' NOT TO SCALE




9/11 LEACHATE COLLECTION SUMP RISER TRENCH
SECTION E–E' NOT TO SCALE




7/11 LEACHATE COLLECTION SUMP
SECTION C–C' NOT TO SCALE

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Drawing:P:\acad 2003\560,01,02\PERMIT PLANS\11 LEACHATE DET.dwg
Date/Time:Sep. 19, 2016-08:56:32


I, KEITH GORDON, P.E.
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# LEACHATE COLLECTION SYSTEM DETAILS

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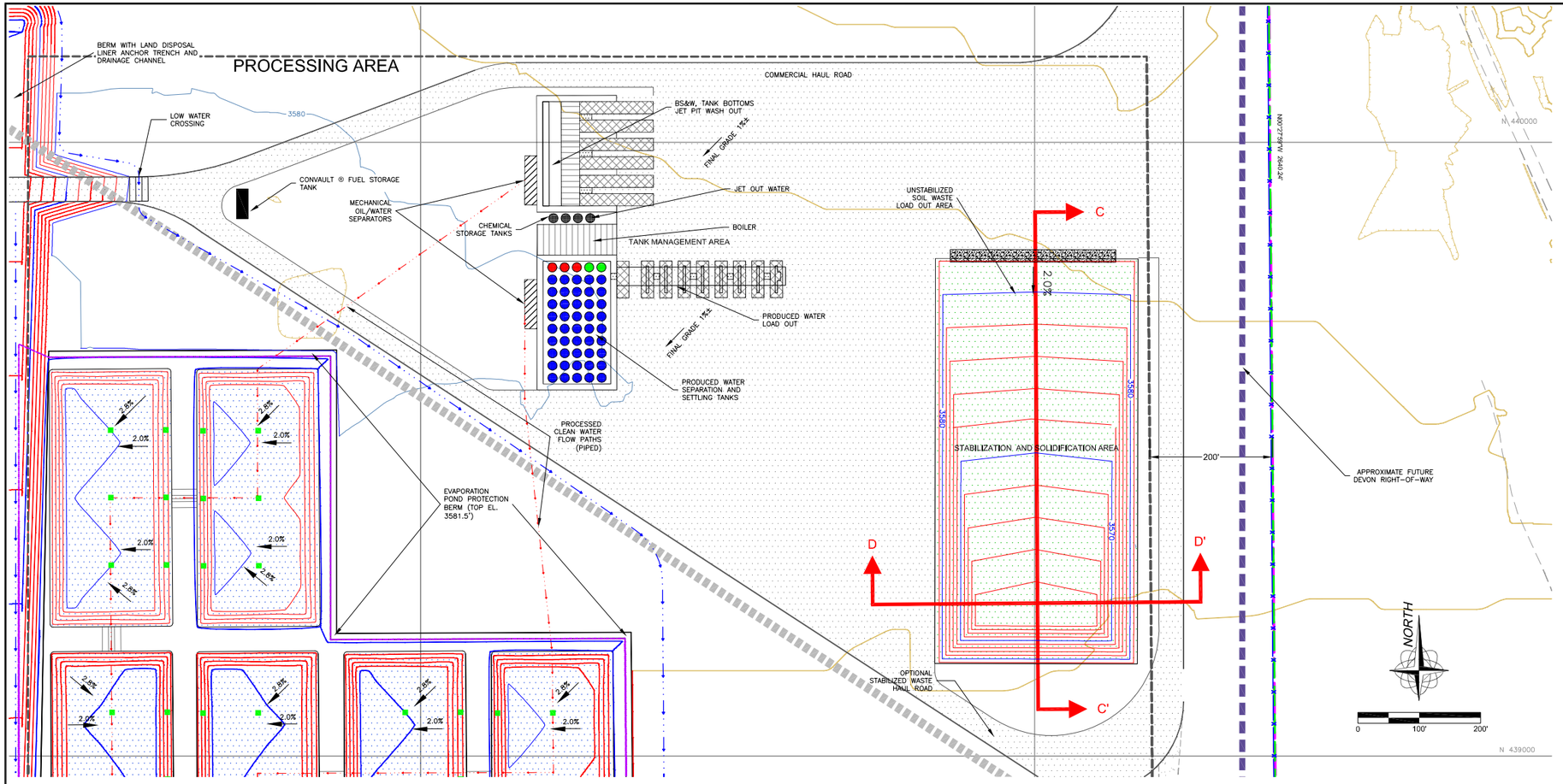
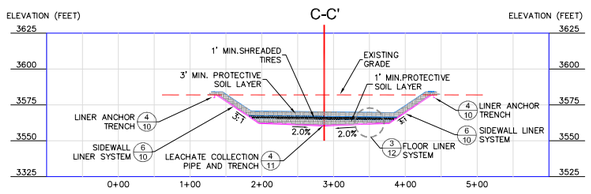
|---|---|---|
| DATE: 09/06/2016 | CAD: 11 LEACHATE DET.dwg | PROJECT #: 560.01.02 |
| DRAWN BY: DMI | REVIEWED BY: CRK | SHEET 11 of 15 |
| APPROVED BY: IKG | gel@gordonenvironmental.com | |

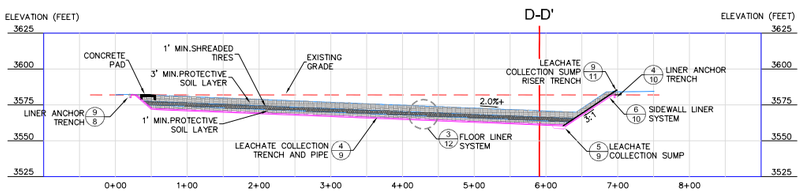



## LEGEND

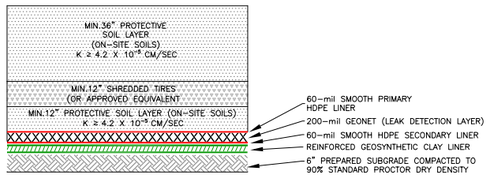
- SITE BOUNDARY WITH BEARING AND DISTANCE (559.5 ACRES±)
- SURFACE WASTE MANAGEMENT FACILITY BOUNDARY (500.0 ACRES)
- SOLID WASTE DISPOSAL AREA LIMITS (224.3 ACRES±)
- PROCESSING AREA LIMITS (81.0 ACRES±)
- UNIT 1 BOUNDARY (34.8 ACRES±)
- CELL BOUNDARY
- EXTENT OF LINER – LAND DISPOSAL (INCLUDING ANCHOR TRENCH)
- EXTENT OF LINER – EVAPORATION PONDS (INCLUDING ANCHOR TRENCH)
- EXISTING 2FT CONTOUR
- EXISTING 10FT CONTOUR
- EXISTING 2FT DEPRESSION CONTOUR
- EXISTING 10FT DEPRESSION CONTOUR
- PROPOSED 2FT BASE GRADE CONTOUR
- PROPOSED 10FT BASE GRADE CONTOUR
- FINAL DRAINAGE FLOW LINE AND DIRECTION OF FLOW
- EXISTING UNPAVED ROAD
- PROPOSED UNPAVED ROAD (GRAVEL)
- PROPOSED UNPAVED ROAD (SOIL)
- PROPOSED 3-STRAND BARBED WIRE FENCE
- PROPOSED PROCESS WATER FLOW PATHS
- PRODUCED WATER TANK
- CRUDE OIL RECOVERY TANK
- OIL SALES TANK
- MECHANICAL EVAPORATOR LOCATION
- CROSS-SECTION LOCATION
- SITE GRID



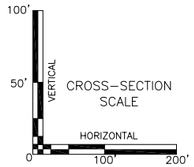

1/12 STABILIZATION AREA EAST-WEST SECTION
SECTION D–D'




2/12 STABILIZATION AREA NORTH-SOUTH SECTION
SECTION C–C'




3/12 FLOOR LINER SYSTEM
NOT TO SCALE




LEGEND

- FINISHED GRADES
- EXISTING GRADE
- 60-MIL HDPE LINER
- 3/12 DETAIL NUMBER / DETAIL LOCATED ON SHEET NUMBER
- D D' CROSS SECTION LOCATION

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# PROCESSING & STABILIZATION AREA

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| | | |
|---|---|---|
| DATE: 09/08/2016 | CAD: WholeSI-2.DWG | PROJECT #: 560.01.02 |
| DRAWN BY: ASM | REVIEWED BY: CRK | SHEET 12 of 15 |
| APPROVED BY: IKG | gel@gordonenvironmental.com | |

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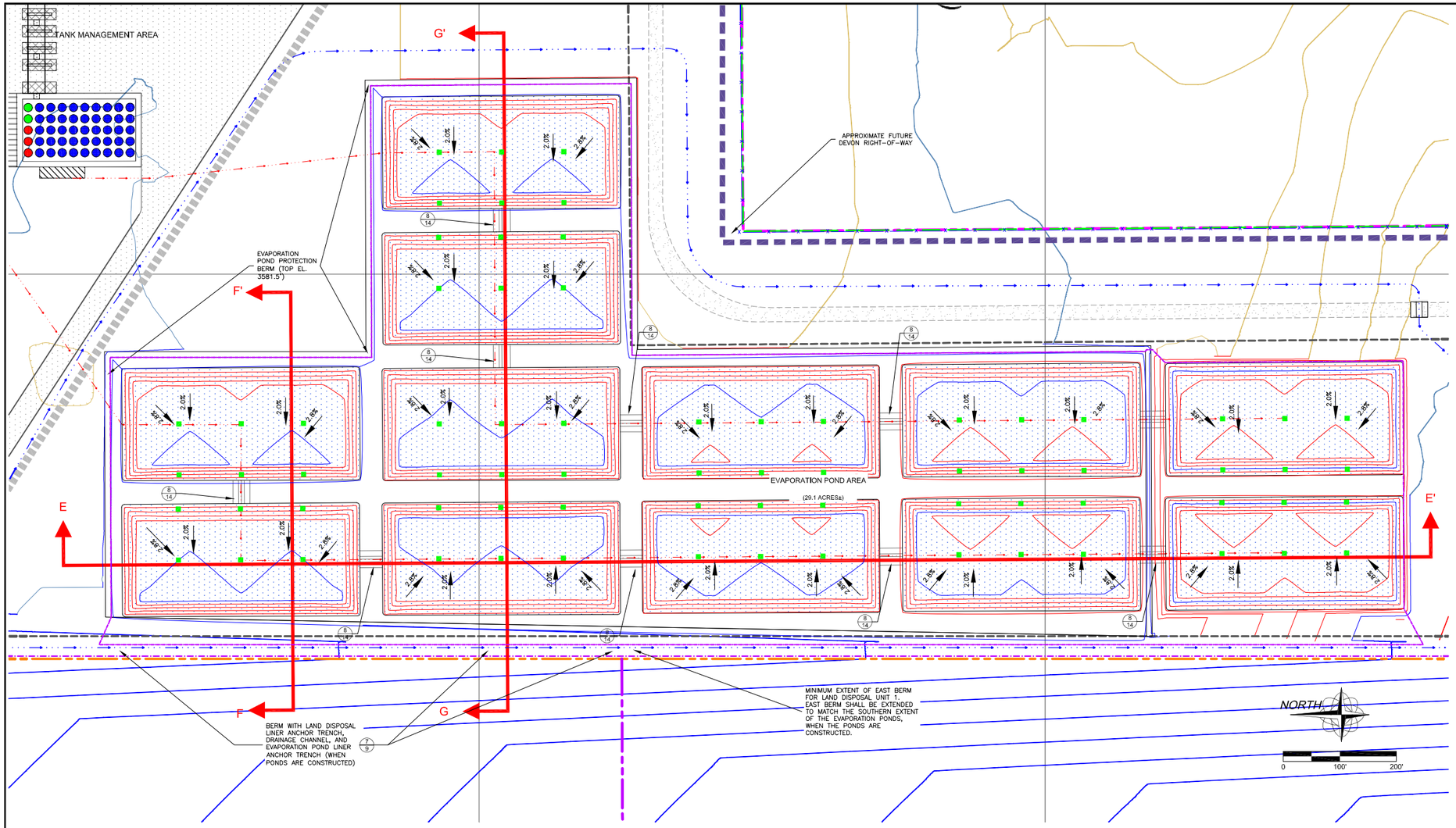
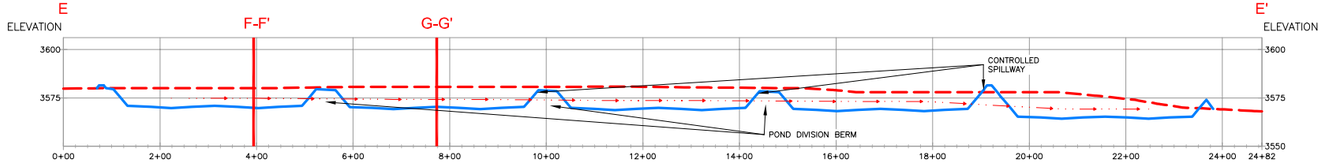
Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\WholeSite-3D-Sheets2-8,12-13.dwg
Date/Time:Sep. 21, 2016-11:26:41 ; LAYOUT: 12-Process

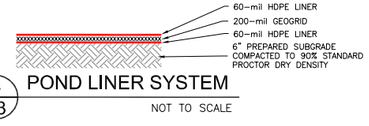



## LEGEND

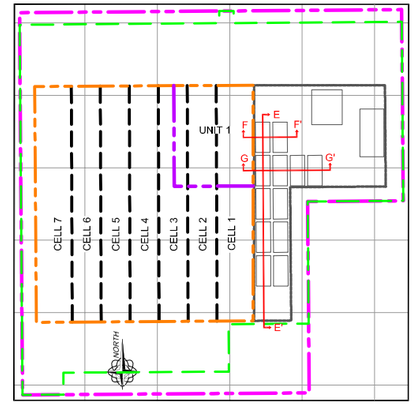
- S88° 50' 44.29"E 2647.98' — SITE BOUNDARY WITH BEARING AND DISTANCE (559.5 ACRES±)
- SURFACE WASTE MANAGEMENT FACILITY BOUNDARY (500.0 ACRES)
- SOLID WASTE DISPOSAL AREA LIMITS (224.3 ACRES±)
- PROCESSING AREA LIMITS (81.0 ACRES±)
- UNIT 1 BOUNDARY (34.8 ACRES±)
- CELL BOUNDARY
- EXTENT OF LINER – LAND DISPOSAL (INCLUDING ANCHOR TRENCH)
- EXTENT OF LINER – EVAPORATION PONDS (INCLUDING ANCHOR TRENCH)
- EXISTING 2FT CONTOUR
- 3550 — EXISTING 10FT CONTOUR
- EXISTING 2FT DEPRESSION CONTOUR
- 3550 — EXISTING 10FT DEPRESSION CONTOUR
- PROPOSED 2FT BASE GRADE CONTOUR
- 3550 — PROPOSED 10FT BASE GRADE CONTOUR
- FINAL DRAINAGE FLOW LINE AND DIRECTION OF FLOW
- EXISTING UNPAVED ROAD
- PROPOSED UNPAVED ROAD (SOIL)
- PROPOSED 3-STRAND BARBED WIRE FENCE
- PROPOSED PROCESS WATER FLOW PATHS
- PRODUCED WATER TANK
- CRUDE OIL RECOVERY TANK
- OIL SALES TANK
- MECHANICAL EVAPORATOR LOCATION
- E E' — CROSS-SECTION LOCATION
- E 7880000 N 439000 — SITE GRID



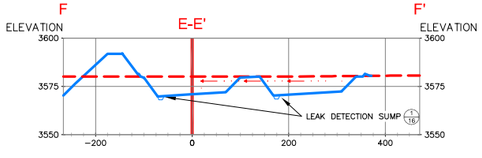

1/13 PONDS NORTH-SOUTH SECTION
SECTION E–E'



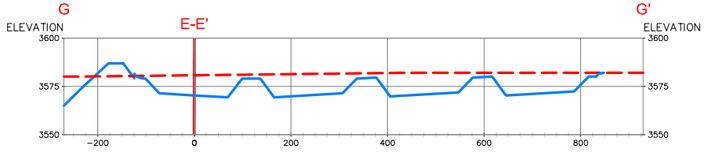

4/13 POND LINER SYSTEM
NOT TO SCALE




KEY MAP
N.T.S.




2/13 PONDS NORTHERN EAST-WEST SECTION
SECTION F–F'




3/13 PONDS SOUTHERN EAST-WEST SECTION
SECTION G–G'

LEGEND
- EXISTING GRADE
- BASE GRADE

150' 75' VERTICAL
CROSS-SECTION SCALE
HORIZONTAL
0 150' 300'

I. KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984

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# EVAPORATION PONDS

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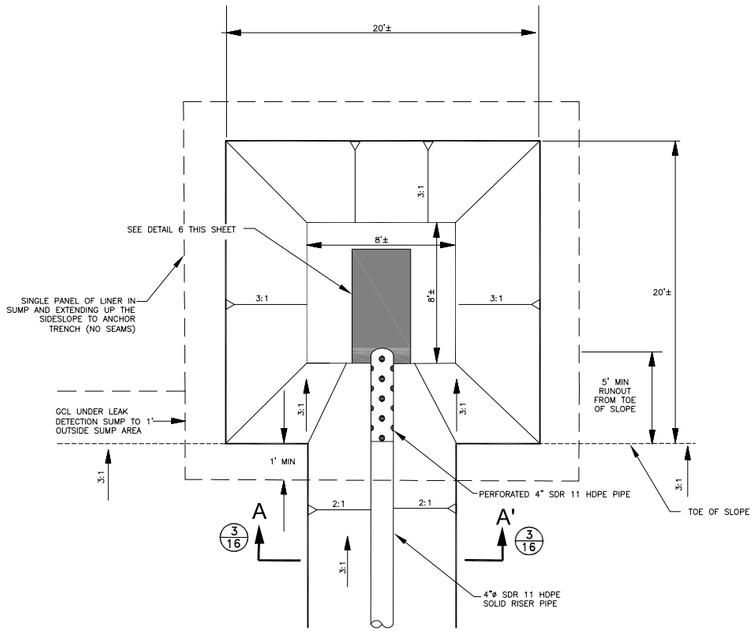
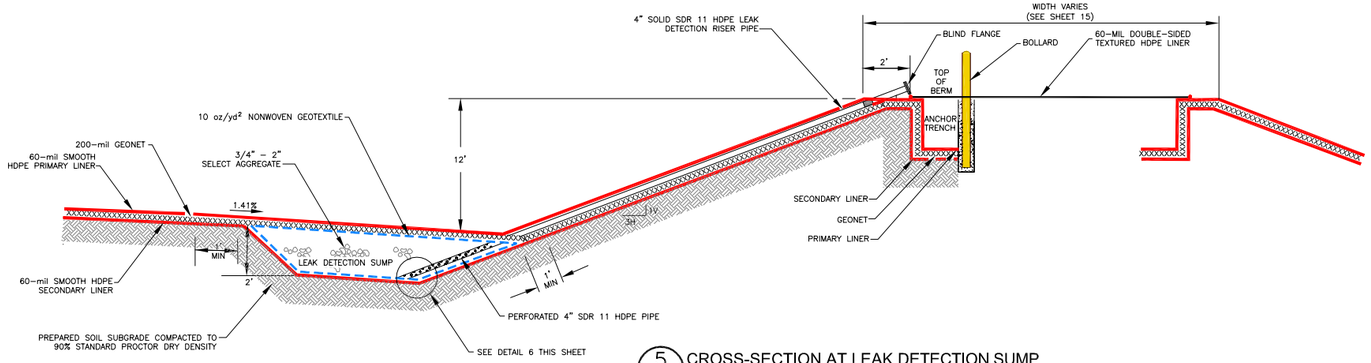
| | | |
|---|---|---|
| DATE: 09/07/2016 | CAD: WholeSI-2.DWG | PROJECT #: 560.01.02 |
| DRAWN BY: ASM | REVIEWED BY: CRK | SHEET 13 of 15 |
| APPROVED BY: IKG | gei@gordonenvironmental.com | |

NOT FOR CONSTRUCTION
Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\WholeSite-3D-Sheets2-8,12-13.dwg
Date/Time:Sep. 21, 2016-11:28:19 : LAYOUT: 13-PondsX-Sect



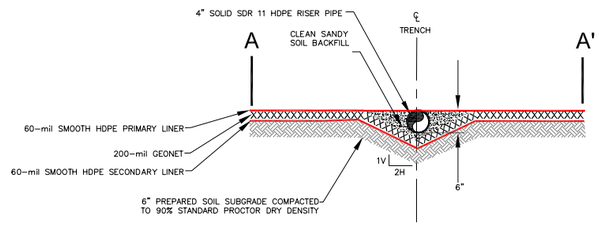

1/14 LEAK DETECTION SUMP

NOT TO SCALE




5/14 CROSS-SECTION AT LEAK DETECTION SUMP

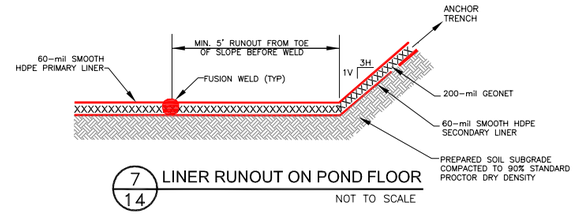
NOT TO SCALE




LEAK DETECTION SUMP RISER PIPE CROSS SECTION A-A'

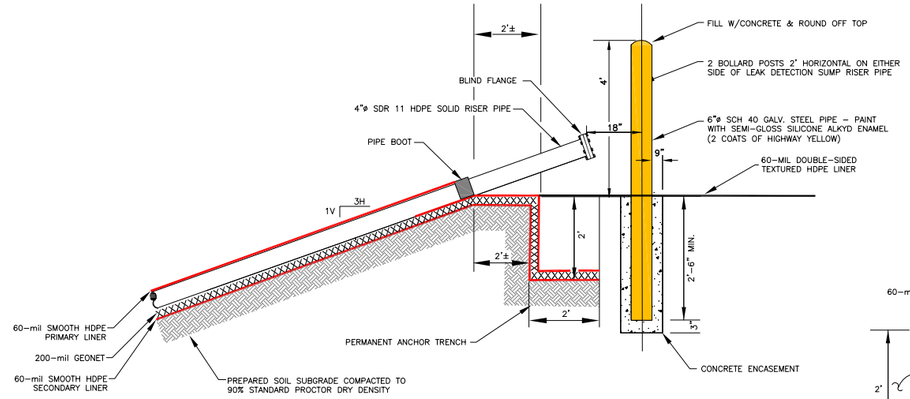
3/14

NOT TO SCALE



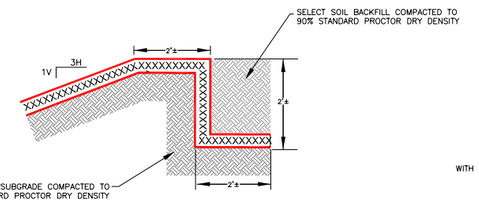

7/14 LINER RUNOUT ON POND FLOOR

NOT TO SCALE



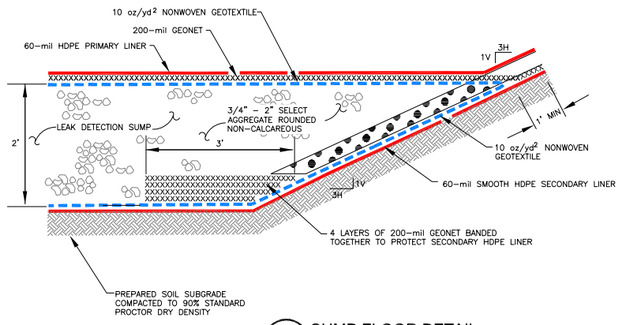

2/14 LEAK DETECTION SUMP RISER PIPE

SECTION VIEW NOT TO SCALE



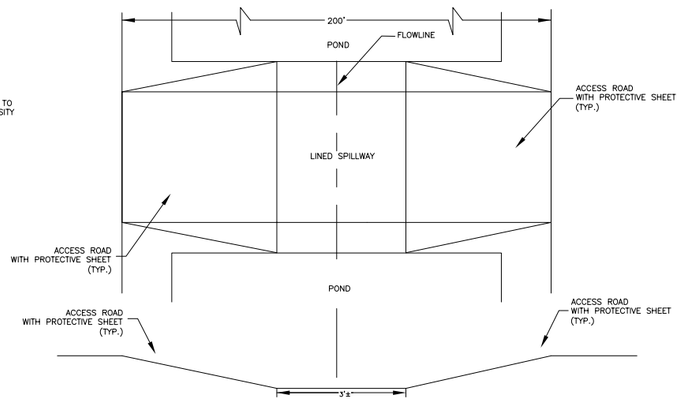

4/14 ANCHOR TRENCH DETAIL

NOT TO SCALE




6/14 SUMP FLOOR DETAIL

NOT TO SCALE




8/14 SPILLWAY PLAN PROFILE

NOT TO SCALE

NOT FOR CONSTRUCTION

Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\14 EVAP POND DET.dwg
Date/Time:Sep. 19, 2016-07:47:48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# EVAPORATION POND DETAILS

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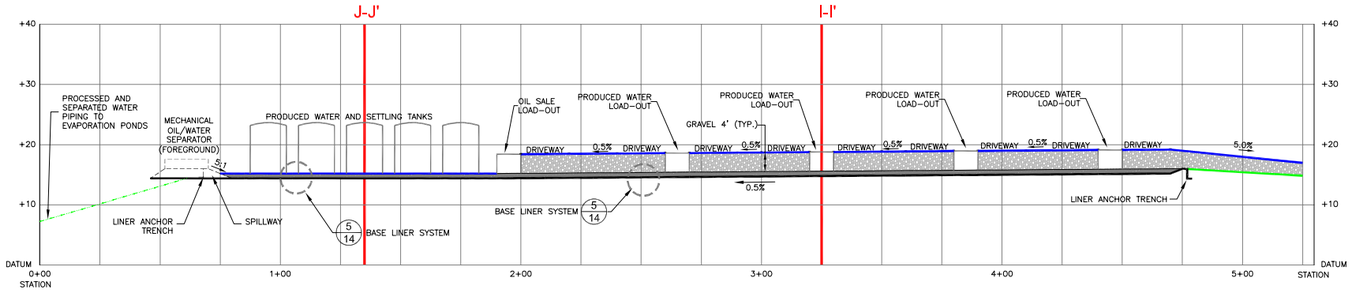
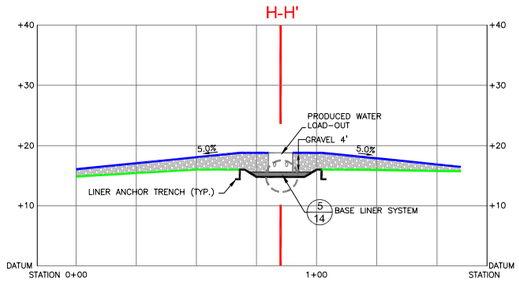
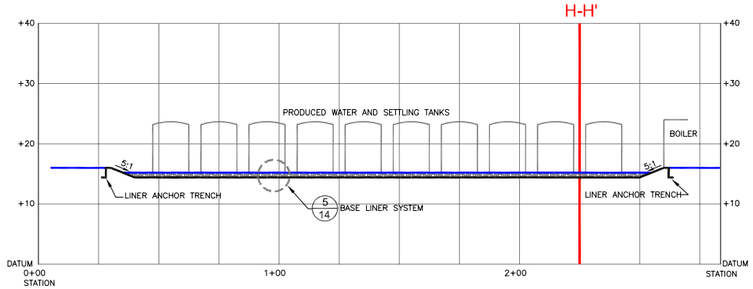
|---|---|---|
| DATE: 09/08/2016 | CAD: 14 EVAP POND DET.dwg | PROJECT #: 560.01.02 |
| DRAWN BY: DMI | REVIEWED BY: CWF | SHEET 14 of 15 |
| APPROVED BY: IKG | gel@gordonenvironmental.com | |



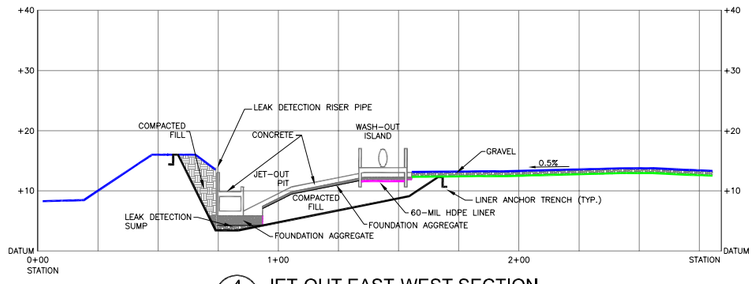

1/14 LOAD-OUT EAST-WEST SECTION
SECTION H–H'




2/14 LOAD-OUT NORTH-SOUTH SECTION
SECTION I–I'



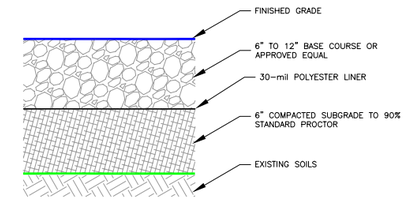

3/14 PRODUCED WATER TANKS NORTH-SOUTH SECTION
SECTION J–J'



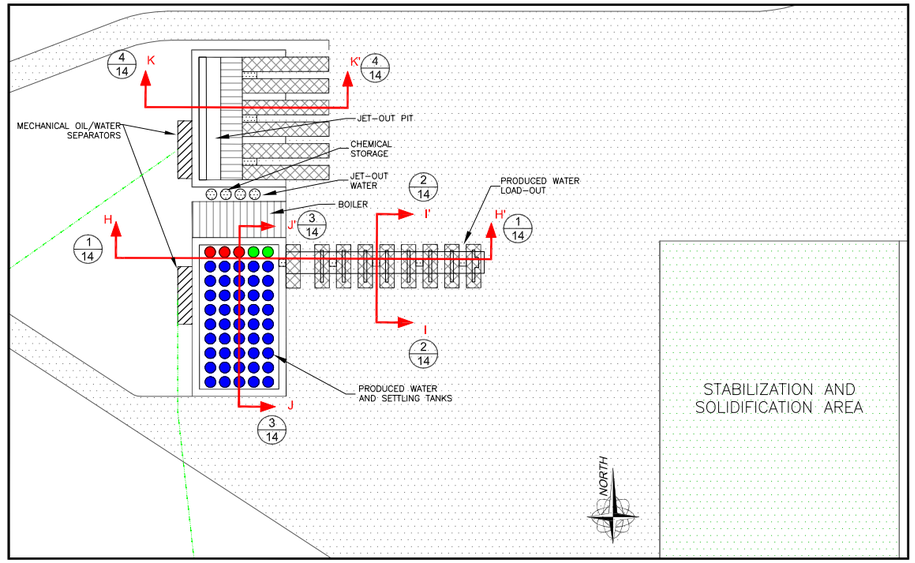

4/14 JET-OUT EAST-WEST SECTION
SECTION K–K'

## LEGEND

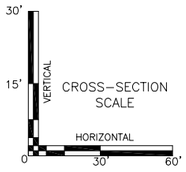
- FINISHED GRADE
- SUBGRADE
- 30-mil POLYESTER LINER
- 60-mil HDPE LINER
- J J' CROSS-SECTION LOCATION
- 5/14 DETAIL NUMBER / SHEET NUMBER




5/14 BASE LINER SYSTEM
NOT TO SCALE




KEY MAP
1"=100'




NOT FOR CONSTRUCTION
Drawing:P:\acad 2003\560.01.02\PERMIT PLANS\15 TANK MANAGEMENT X-SECT.dwg
Date/Time:Sep. 19, 2016-07:49:56 ; LAYOUT: D (LS)


I. KEITH GORDON, P.E.
N.M. PROFESSIONAL ENGINEER NO. 10984



# TANK MANAGEMENT AREA CROSS-SECTIONS

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| | | |
|---|---|---|
| DATE: 09/08/2016 | CAD: 14 PROCESS X-SECT.dwg | PROJECT #: 560.01.02 |
| DRAWN BY: DMI | REVIEWED BY: CRK | SHEET 15 of 15 |
| APPROVED BY: IKG | gek@gordonenvironmental.com | |