CITY OF EDINBURG SOLID WASTE MANAGEMENT

PERMIT AMENDMENT APPLICATION

Part III, Attachment 3

# WASTE MANAGEMENT UNIT DESIGN

## Edinburg Regional Disposal Facility

## Edinburg, Hidalgo County, Texas

## TCEQ Permit MSW-956C

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Golder Associates

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# EXECUTIVE SUMMARY

30 TAC §330.63(d)(4)(G)

This Waste Management Unit Design Report including a Liner Quality Control Plan is prepared under the direction of a licensed professional engineer in accordance with 30 TAC §330.63(d)(4), and applicable sections of 30 TAC, Chapter 330, Subchapter H "Liner System Design and Operation." The Edinburg Regional Disposal Facility (facility) has been designed to safeguard the health, welfare, and physical property of the people and the environment through various design considerations, which include volume and site life calculations, geotechnical analyses, liner design, leachate management, all-weather access, and other operational considerations.

# 1.0 LANDFILL UNITS

## 1.1 All-Weather Operation

30 TAC §30 TAC §330.63(d)(4)(A)

The facility makes provisions for all-weather operation and regularly maintain all-weather roads constructed for access to unloading areas designated for wet-weather operations.

### *1.1.1 Publicly Owned Routes to the Facility*

The facility entrance is located at 8601 Jasman Rd north of FM 2812 and is shared with the City's Type IV Landfill TCEQ Permit MSW-2302. Access to the facility entrance from US Hwy 281 is eastbound on FM 2812 and north onto Jasman Rd. Access roads to the facility entrance are constructed with an asphaltic concrete pavement surface overlaying a limed caliche base.

### *1.1.2 Facility Entrance to Unloading Areas and Interior Access Roads*

Access roads from the gatehouse and scales at the facility entrance to unloading areas and interior access roads are characteristically surfaced with caliche. Other all-weather road building materials such as compacted gravel, crushed stone, asphalt, or concrete may be used by the facility. Interior road locations are depicted on Figure III3-1, Facility Layout Plan.

### *1.1.3 Tracking of Mud Minimization*

As discussed in §4.16.2, Tracking of Mud Minimization of Part IV, Site Operating Plan, the tracking of mud onto public roadways from the facility will be minimized. Traffic leaving the facility will travel southbound on Jasman Road for a quarter-mile to FM 2812. Mud at the facility entrance road and interior access roads will be removed by spraying water from the site water truck, scraping with a site bulldozer or maintainer, using a rotary broom street sweeper, or otherwise deploying site personnel with appropriate on-site materials, tools and equipment. Jasman Road, an asphaltic-concrete-paved road, will be inspected for any tracked mud and associated debris daily. As necessary, mud will be removed from Jasman Road in a similar manner to control the further tracking of mud onto FM 2812. The SM will have authority to implement additional measures (e.g., wheel shakers, wheel washes, etc.) if the preceding measures are not reasonably effective.

## 1.2 Landfill Method

30 TAC §330.63(d)(4)(B)

The pattern of waste disposal will be governed by the area fill disposal method. Landfilling will occur below grade and above grade, depending on the stage of operational development and operational considerations. Initially, filling will occur above grade over the existing constructed fill areas to attain the design top of waste grades. New landfill cells will be developed adjacent to existing filled areas and waste placement operations will continue below grade.

## 1.3 Landfill Unit Elevations

30 TAC §330.63(d)(4)(C)

Figure III3-1, Facility Layout Plan illustrates an outline of the solid waste management units. Waste within Pre-Subtitle D Units 1-4 will either be completely removed and relocated for development of Unit 8 or an Overliner- will be constructed for vertical expansion. Figure III3-2A, Subgrade Layout Plan – Overliner Option depicts the subgrade elevations of the lateral expansion cells within Unit 7 and Overliner. Likewise Figure III3-2B, Subgrade Layout Plan –Unit 8 Option, depicts the subgrade elevations of the lateral expansion cells within Unit 7 and Unit 8. The elevation of deepest excavation (EDE) for the facility is 70 ft-msl located at the bottom of leachate collection sumps for each cell within Units 6, 7, and 8 as depicted on Figures III3-2A and III3-2B.

Figure III3-3, Final Contour Map depicts the maximum final cover elevation of approximately 398 ft-msl. The maximum waste elevation is the final cover elevation minus the thickness of final cover and is dependent on thickness of the final cover lining option used. Part III7, Closure Plan details final cover lining options.

## 1.4 Estimated Rate of Solid Waste Deposition and Operating Life

30 TAC §330.63(d)(4)(D)

Disposal capacity as referenced in 30 TAC §330 Subchapter P is amount of waste that a facility can dispose. Similarly, the EPA defines landfill capacity as the amount of airspace volume. The maximum total disposal capacity of the facility is 85,981,680 cubic yards, and the maximum remaining disposal capacity will be 74,985,458 cubic yards of waste and daily cover, based on the FY 2016 MSW Annual Report. It is anticipated that the rate of waste disposal will reach approximately 1,500,000 tons per year and that the facility will have a site life of approximately 62.8 years. The total disposal capacity and operational life calculations are provided in Appendix III3A, Volume and Site Life Calculations.

As population, economic conditions, and available landfill disposal capacity change within the region, the volume of incoming waste could vary considerably. The facility will maintain quarterly records to document waste acceptance rates. If the rate exceeds the estimated rate and is not due to a temporary occurrence, the City will file a permit modification application consistent with 30 TAC §330.125(h). As provided by rule, the estimated waste acceptance rate is not a limiting parameter of the permit.

## 1.5 Landfill Unit Cross-Sections

30 TAC §330.63(d)(4)(E) & (F)

Figure III3-4A, Fill Cross-Sections Location Map is a map showing a sufficient number of cross-sections across the facility, both latitudinally and longitudinally, so as to accurately depict the existing and proposed depths of all fill areas within the site. These fill cross-sections go through or very near soil borings where boring logs obtained from Part III4B, Soil Boring Logs are shown on the plan profiles, Figures III3-4B – III3-4E, Fill Cross-Sections. These plan profile figures provide an inset key map of the fill cross-section plan and clearly show the following content provided in Table III3-1, Fill Cross-Section Figures III3-4B – III3-4E.

**Table III3-1: Fill Cross-Section Figures III3-4B – III3-4E**

| Plan Profile Content | A – A' | B – B' | C – C' | D – D' |
|---|---|---|---|---|
| Plan Inset Key Map | ✓ | ✓ | ✓ | ✓ |
| Boring Logs | ✓ | ✓ | ✓ | ✓ |
| Top of Levee | ✓ | ✓ | ✓ | ✓ |
| Top of Proposed Fill (Top of Final Cover) | ✓ | ✓ | ✓ | ✓ |
| Maximum Elevation of Proposed Fill | ✓ | ✓ | ✓ | ✓ |
| Top of the Wastes | ✓ | ✓ | ✓ | ✓ |
| Existing Ground | ✓ | ✓ | ✓ | ✓ |
| Bottom of the Excavations (Subgrade) | ✓ | ✓ | ✓ | ✓ |
| Side Slopes of Trenches and Fill Areas | ✓ | ✓ | ✓ | ✓ |
| Gas Vents or Wells | ✓ | | ✓ | |
| Groundwater Monitoring Wells | ✓ | ✓ | ✓ | ✓ |
| Initial and Static Levels of Any Water Encountered | ✓ | ✓ | ✓ | ✓ |
| Compacted Perimeter Berms | ✓ | ✓ | ✓ | ✓ |

Notes: 1. Items not checked are not applicable.
2. Perimeter berm design dimensions shown on figures.

## 2.0 WASTE MANAGEMENT UNIT ENGINEERING ANALYSES

Analyses were performed to assess the performance of the landfill with respect to settlement and slope stability. Each of these analyses is described in detail in the following sections.

## 2.1 Settlement Analysis

Facility floor settlement will occur in Strata I through III. Review of the excavation plan indicates that much of Stratum I will be removed prior to construction of the liner system and that much of the Edinburg Regional Disposal Facility floor will be founded on a thin layer of remaining Stratum I. For this analysis, settlement critical cross-sections are cut through a section of the Edinburg Regional Disposal Facility with the thickest waste above and the most critical subsurface conditions. Intermittent points along the critical cross-section are analyzed for settlement and post-settlement to define slopes. The cross-section location is referred to as Line A, located in Unit 7, Cell 2A and 2B on a north-south direction. The cross-section begins at the facility perimeter and progress toward the facility center where the proposed final elevation is highest.

The settlement analyses indicate that the maximum total settlement will be approximately 4.4 feet and the minimum post-settlement grade on the floor will be 0.6%. The post-settlement grade was used in the leachate header pipe sizing calculations (Appendix III3D-3A).

The post-settlement floor grades will maintain positive drainage and allow the leachate to drain towards the leachate collection system under the conditions analyzed. The results of the settlement analysis are presented in Appendix III3B-1, Settlement Analysis.

## 2.2 Stability Analysis

The results of the stability analyses indicate that the proposed slopes are stable under the conditions analyzed. For each condition analyzed, the minimum calculated factor of safety exceeds the recommended factor of safety.

Based on the Corps of Engineers "Design and Construction of Levees" manual (EM 1110-2-1913), the recommended factors of safety are 1.3 for short-term and 1.5 for long-term conditions, respectively. Short term conditions include:

- Excavated slopes (undrained conditions);
- Sideslopes; and
- Interior waste slopes.

All other conditions are long-term.

Slope stability analyses were performed using limit equilibrium methods to assess the stability of the proposed landfill. In particular, stability of the proposed excavated landfill sideslopes, stability of the protective cover on landfill sideslopes, stability of the interior waste slopes, overall stability of the final filled landfill, and stability of the final cover system were evaluated.

In general, the analyses consist of the following:

- Characterization of the critical cross-section (e.g., the geometry, geology, geosynthetic interfaces, and groundwater conditions).
- Selection of appropriate strength parameters.
- Analysis under anticipated critical conditions.

The analyses are summarized in the following sections.

### 2.2.1 Stability Analysis of Excavated Slopes

A stability analysis was performed to consider potential failure surfaces for excavation of waste management units. The excavation is a 3H:1V slope with a crest elevation of 95 ft-msl and the minimum excavation elevation is 70 ft-msl.

Potential failure surfaces were analyzed and the minimum factor of safety was computed based on limit equilibrium methods following Spencer's and GLE/Morgenstern-Price methods of analysis using SLIDE Version 7.0, an integrated slope stability analysis program for personal computers.

Results from the method providing the least factor of safety is presented Appendix III3B-2A. The factor of safety is 4.2 for the total stress condition and 2.0 for the effective stress condition. These values indicate the excavation slopes will be stable.

### 2.2.2 Stability of Sideslope Liner

A stability analysis was performed to consider potential veneer failure of the sideslope liner. The sideslope is a 3H:1V slope with a crest elevation of 95 ft-msl, a minimum elevation of 70 ft-msl, and a maximum length of 75 ft.

The critical interface on the slope was analyzed and the minimum factor of safety was computed using an infinite slope analysis. Based on a review of the literature and unpublished data on similar materials under similar loading conditions, the critical interface shear strength within the sideslope alternative liner system was estimated to be 24 degrees. According to Appendix III3B-2B-2, the maximum head over the geomembrane is less than the thickness of the geocomposite drainage layer because the double-sided geocomposite drainage layer will have a transmissivity adequate to convey water infiltrating through the protective cover over the maximum sideslope length.

Results from the analysis is presented Appendix III3B-2B. The factor of safety for veneer slope stability is 1.34 with the use of conservative parameters in the analysis. This value indicates the sideslope liner will be stable.

### 2.2.3 Stability of the Interior Waste Slopes

Interior waste slope stability analyses were performed using the limit equilibrium slope stability method to determine the factor of safety against sliding along the liner. Based on a review of the floor grades and filling sequence, it was identified that the interior waste slope in Unit 7, Cells 6B through 9B is the most critical case, where the filling and floor slope occur in the same direction with no buttress effect from existing waste or the floor gradient.

Potential failure surfaces were analyzed and the minimum factor of safety was computed based on limit equilibrium methods following Spencer's and GLE/Morgenstern-Price methods of analysis using SLIDE

Version 7.0, an integrated slope stability analysis program. Two possible waste filling slopes were considered; a continuous 3H:1V temporary waste slope with no benches, and a 3H:1V temporary waste slope with one bench at the middle of the slope. The maximum waste height is conservatively assumed at 400 ft-msl which is greater than the proposed waste thickness. The strength parameters were either conservatively chosen from published studies or based on test results for similar conditions.

Results from the method providing the least factor of safety are presented in Appendix III3B-2C. Under the assumed conservative scenarios, results indicate that the interior waste slope at 3H:1V may be filled up to the final elevation with an acceptable factor of safety. However, to facilitate site operations and to account for any operational uncertainties, a 100-foot wide bench at the midpoint of the 3H:1V interior slope is advised. Slope stability analyses for this condition are also presented in Appendix III3B-2C.

### 2.2.4 Stability of Final Filled Configuration

Final filled configuration stability analyses were performed using limit equilibrium methods to determine the factors of safety against sliding or failure. Based on a review of the design grades, two reasonable worst-case configurations were considered: a section along Unit 7, Cell 2, having 3H:1V excavation sideslopes and 4H:1V final cover slopes to a crest elevation at 400 feet msl; and a section along Unit 7 with similar slopes running west to east along Cells 1B through 5A.

Potential failure surfaces were analyzed and the minimum factor of safety was computed based on limit equilibrium methods following Spencer's and GLE/Morgenstern-Price methods of analysis using SLIDE Version 7.0, an integrated slope stability analysis program for personal computers. The strength parameters are conservatively estimated or based on test results for similar conditions, and the reasonable worst case configuration.

Results from the method providing the least factor of safety are presented in Appendix III3B-2D. Along Section A the factor of safety is 1.9 for block sliding and 2.9 for circular failure. The corresponded factor of safety for Section B is 2.0 for block sliding and 2.9 for circular failure. These values indicate the final-filled configuration will be stable.

### 2.2.5 Stability of Final Cover System

A stability analysis of the final cover liner system was performed using an infinite slope analysis to estimate the potential for sliding to occur following closure of the landfill cells. A worst-case section, consisting of a 1,200-foot long, 25% slope was analyzed. Based on a review of the literature and unpublished data on similar materials under similar loading conditions, the critical interface shear strength within the final cover liner system was estimated to be 21 degrees.

The analyses are included in Appendix III3B-2E and indicate that, provided the geocomposite drainage layer is adequate to convey drainage without building up pore water pressures in the geocomposite, the factor of safety against sliding will be approximately 1.5.

Additional analyses (also included in Appendix III3B-2E) were performed to determine the geocomposite drainage layer transmissivity required to adequately convey surface water infiltration over the maximum final cover slope length. If the minimum measured transmissivity value reported in Appendix III3-2E is not met, the maximum flow length must be reduced (i.e., the geocomposite drainage layer must be "daylighted") in direct proportion to the ratio of the actual measured transmissivity and the required measured transmissivity. A detail depicting "daylighting" is included as detail 4 in Attachment 7, Closure Plan, Figure III7-3A, Conventional Composite Final Cover Details.

## 2.3 Overliner

Waste within Pre-Subtitle D Units 1 – 4 will either be relocated for development of Unit 8 or an overliner will be constructed for vertical expansion. The subgrade of the overliner will be the in-place final cover grades previously permitted and extend to Unit 6 as depicted on Figure III3-9A, Overliner Subgrade Layout. Details of the overliner design are presented on Figures III3-7A, III3-9C, and III3-9D. Overliner design analyses are included in Appendix IIIB-3, Overliner.

### *2.3.1 Settlement*

Appendix III3B-3A, Settlement Analysis demonstrates positive drainage is maintained for the leachate collection and removal system.

Settlement for the overliner system will primarily be the result of compression of the underlying old waste and, to a lesser extent, consolidation of the foundation soil layers due to increased loads from the new waste and final cover placement. Old waste settlement consists of two components: 1) time-dependent secondary compression (or creep), and 2) primary settlement caused by the stress increase from new waste and final cover. Secondary compression within the foundation material will be very small; therefore, only consolidation settlement was evaluated below the landfill.

Settlement below the overliner was estimated and used to determine the post-settlement grades of the overliner. The minimum post-settlement grade in the direction of leachate flow is approximately 0.4 percent; therefore, positive drainage will remain at the end of the 30-year post-closure period.

### *2.3.2 Strain Analysis*

Appendix III3B-3B, Strain Analysis demonstrates the induced tensile strain due to differential settlement of existing waste and the formation of a localized depression beneath the liner system is below the minimum allowable strain of the liner components.

Using settlement results, the difference in liner length between prior and post settlement was analyzed. The evaluation showed the liner will mainly be under compression with liner shortening. A very limited portion will experience a lengthening with a strain of 0.3 percent, well below the allowable strain of 5 percent.

An evaluation of strain in the overliner due to localized depressions (subsidence) near the surface of the old waste was performed, and is included as Appendix III3B-3B, Strain Analysis. A parametric analysis, comparing the diameter of the subsidence area and depth at its center to the allowable strain of the overliner components, indicates that the ratio of depth to diameter is approximately 0.14 for 5 percent strain and 0.20 for 10 percent strain.

Depressions of this magnitude would only be expected if voids or highly compressible material are present immediately below the overliner. To reduce the potential for subsidence below the overliner system, the existing waste will be surcharged by placing at least 20 feet of soil for a minimum 3-month period. The surcharge will collapse voids and compress the underlying material.

### *2.3.3 Stability Analysis*

Final filled configuration stability analyses were performed using limit equilibrium methods to determine the factors of safety against sliding or failure. Based on a review of the design grades, the reasonable worst-case configuration was assumed to consist of a section along the western side of Units 3 and 4, having 4H:1V final cover slopes to a crest and maximum fill elevation of approximately 312.6 ft-msl. Compared to other sections through the pre-Subtitle D area, the chosen section exhibits thicker existing waste. Additionally, the toe of the future waste along the chosen section is less supported by the perimeter berm.

Potential failure surfaces were analyzed and the minimum factor of safety was computed based on limit equilibrium methods following Spencer's and GLE/Morgenstern-Price methods of analysis using SLIDE Version 7.0, an integrated slope stability analysis program for personal computers. The strength parameters are conservatively estimated or based on test results for similar conditions, and the reasonable worst case configuration.

The results from the method providing the least factor of safety is presented Appendix III3B-3C. The factor of safety is 2.0 for block sliding and 3.0 for circular failure. These values indicate the final-filled configuration will be stable.

## 3.0 LINER DESIGN CRITERIA

30 TAC §§330.331(a)(2) & 330.331(b)

The Pre-Subtitle D Units 1 – 4 consist of cells extending to a depth of approximately 15 feet below original ground surface. Some of the cells are reported to include a single geomembrane liner. None of the cells include a leachate collection system. The approximate grades of the Pre-Subtitle D cells are shown on Figure III3B-3A-1.

The liner design for the facility is not composed of “composite liner” components defined by 30 TAC §330.331(b); consisting of at least a 2-foot layer of re-compacted soil with a hydraulic conductivity of no more than 1x10$^{-7}$ cm/s and a 60-mil high density polyethylene (HDPE) geomembrane liner component.

An alternative liner design is currently approved under permit TCEQ Permit MSW-956B for remaining Subtitle D construction and is the liner design to be used for expansion cells in Unit 7 and Unit 8. The alternative liner design consists of, from bottom up, a geosynthetic clay liner (GCL), a 60-mil high-density polyethylene (HDPE) geomembrane liner, double-side geocomposite composed of a geonet bonded to geotextile on both sides, and 2 feet of protective cover soil. The overliner design discussed in §2.3, Overliner will use 60-mil linear low-density polyethylene (LLDPE) instead of HDPE because its elastic properties are better suited for potential waste settlement. Alternative liner details are included on Figure III3-7, Alternative Liner System Details. Overliner design details and cross-sections are shown on Figures III3-9B, III3-9C, and III3-9D.

As discussed in §4.0, Leachate Collection and Removal System (LCRS) is designed to maintain less than a 30-centimeter depth of leachate over the alternative liner system.

Portions of the landfill excavation extend below the seasonal high water table. Consistent with current practice at the site, toe drains and a geocomposite underdrain along the sideslopes will be installed to control groundwater. The underdrain will be maintained and operated until sufficient ballast is in place to resist the uplift pressures below the liner system. The underdrain analyses are included in Appendix III3E-2. The underdrain system layout and details are shown on Figures III3-6A, III3-6B, and III3-8.

## 3.1 Alternative Liner Design

30 TAC §330.335

Alternative liner designs, which must include a leachate management system, may be authorized by the TCEQ if a demonstration by computerized design modeling that the maximum contaminant levels detailed in 30 TAC §330.331, Table 1 will not be exceeded at the point of compliance. At the discretion of the TCEQ, a field demonstration may be required to prove the practicality and performance capabilities of an alternative liner design.

## 3.2 Point of Compliance Demonstration

30 TAC §330.331(a)(1)

The liner design ensures the concentration values listed in Table 1 of 30 TAC §330.331(a)(1) will not be exceeded in the uppermost aquifer at the point of compliance, as determined in 30 TAC §330.403. The alternative liner design was evaluated to demonstrate that it provides a level of groundwater protection that is greater than or equal to the level of protection provided by a "composite liner" system. The evaluation presented in Appendix III3C-1, Point of Compliance Demonstration indicates that substituting the clay component with a geosynthetic clay liner (GCL) will provide a greater or equivalent level of groundwater protection at the facility. In addition, fate and transport modeling performed on the alternative liner system demonstrates that the maximum contaminant levels detailed in 30 TAC §330.331(a)(1) will not be exceeded at the point of compliance as a result of hypothetical leakage through the liner system.

## 3.3 Constructed of Chemically Resistant Materials

30 TAC §330.333(1)

The alternative liner system will be constructed of materials including HDPE (or LLDPE for the overliner system) and polyester or polypropylene are chemically resistant to leachate characteristically generated by municipal solid waste facilities. HDPE or LLDPE materials are used for the geomembrane and polyester or polypropylene materials are used in the geotextile component of the GCL and geocomposite drainage layer.

## 3.4 Liner Design Considerations

30 TAC §330.331(c)

When approving an alternative liner design that ensures the concentration values listed in Table 1 of 30 TAC §330.331(a)(1) will not be exceeded in the uppermost aquifer at the point of compliance, as determined in 30 TAC §330.403, the TCEQ may consider, but is not limited to, the following factors:

- the hydrogeologic characteristics of the facility and surrounding land;
- the climatic factors of the area;
- the volume and physical and chemical characteristics of the leachate;
- the quantity, quality, and direction of flow of groundwater;
- the proximity and withdrawal rate of the groundwater users;
- the availability of alternative drinking water supplies;
- the existing quality of the groundwater, including other sources of contamination and their cumulative impacts on the groundwater and whether groundwater is currently used or reasonably expected to be used for drinking water;
- public health, safety, and welfare effects; and
- practicable capability of the owner or operator.

The alternative liner design is currently approved under permit TCEQ Permit MSW-956B. The aforementioned factors and any factors not addressed in this application shall be provided to the TCEQ upon request to aid in considerations.

## 4.0 LEACHATE COLLECTION AND REMOVAL SYSTEM

30 TAC §§330.331(a)(2) & 330.333

The leachate collection and removal system (LCRS) is designed and constructed to maintain less than a 30-centimeter depth of leachate over the alternative liner system and eliminate potential migration of landfill leachate into groundwater and to meet the requirements of 30 TAC §330.333. The LCRS will collect and remove leachate from the top of the alternative liner, channel leachate to designated leachate collection sumps, and pump leachate from the leachate collection sump into a leachate force main for disposal.

The LCRS drainage layer is comprised of a double-sided geocomposite: a high density polyethylene (HDPE) geonet bonded with geotextile on both sides. The leachate collection system details are presented on Figure III3-8, Leachate Collection and Removal System and Underdrain Details. Leachate is collected from the drainage layers into a leachate collection trench constructed of perforated HDPE piping encased by a drainage aggregate and wrapped in a geotextile filter. The leachate collection trench discharges into leachate collection sumps likewise constructed of drainage aggregate and wrapped in geotextile filter. From with the leachate collection sumps, an HDPE upslope riser pipe houses a pump that removes accumulated leachate from within the leachate collection sumps into a leachate force main for discharge to the public sewer system owned and operated by the City, Permit WQ0010503002, as depicted on Figures III3-5A and III3-5B.

The LCRS is designed and operated to function through the scheduled closure and post-closure care period of the landfill considering the following factors:

- constructed of materials that are chemically resistant to the leachate expected to be generated
- of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying wastes, waste cover materials, and by any equipment used at the landfill
- estimated rate of leachate removal;
- capacity of sumps;
- pipe material and strength, if used;
- pipe network spacing and grading, if used;
- collection sump materials and strength;
- drainage media specifications and performance; and
- demonstration that pipes and perforations will be resistant to clogging and can be cleaned.

## 4.1 Groundwater Inflow

30 TAC §330.337(d)

The LCRS is designed to handle both the leachate generated and the groundwater inflow from materials beneath and lateral to the liner system. Appendix III3D-2, Groundwater Inflow demonstrates the calculated maximum volume of groundwater inflow based on determination of the permeability and potentiometric conditions of the alternative liner system and of the materials surrounding the liner system. Groundwater inflow into the leachate collection system using the alternative liner system is negligible relative to leachate production rates.

## 4.2 Rate of Leachate Removal

30 TAC §330.333(3)(A)

The estimated rate of leachate removal is operationally equivalent to the leachate production rate. The HELP Model (Hydraulic Evaluation of Landfill Performance, US Army Corps of Engineers, Waterways Experiment Station, Version 3.07, November, 1997) was used to determine the leachate production rate (impingement rate) for various conditions during the life of the landfill. A summary of HELP model results is provided in Appendix III3D-1, HELP Model Evaluations. The maximum rate of leachate removal is 962 cf/ac/day.

## 4.3 Drainage Media Specifications and Performance

30 TAC §330.333(F)

Drainage media used in the LCRS include double-sided geocomposite and perforated HDPE header piping encased by a drainage aggregate wrapped in a filter geotextile. Evaluations of performance and required specifications of drainage media are provided in Appendix III3D-3, Drainage Media Specifications and Performance.

### *4.3.1 Constructed of Chemically Resistant Materials*

30 TAC §330.333(1)

The LCRS will be constructed of materials including HDPE, polyester or polypropylene, and drainage aggregate that are chemically resistant to the leachate expected to be generated by municipal solid waste facilities. HDPE materials are used in the geonet component of the double-sided geocomposite drainage layer and piping within the leachate collection trench and leachate collection sump. Drainage material used within the leachate collection trench and leachate collection sump is required to be resistant to carbonate loss. The geotextile component of the double-sided geocomposite drainage layer, leachate collection trench, and leachate collection sump utilize 100-percent continuous-filament polyester or polypropylene.

### 4.3.2 Double-sided Geocomposite Drainage Layer

The double-sided geocomposite drainage media is a high density polyethylene (HDPE) geonet bonded with geotextile on both sides. Appendix III3D-1, HELP Model Evaluation demonstrates the design transmissivity using the impingement rate under the worst case scenario and the maximum lengths and slopes from the subgrade layout plan presented in Figures III3-2A and III3-2B. Also provided are transmissivity specification requirements for the double-sided geocomposite to be used; reduction factors were applied to consider potential long-term creep, chemical clogging, biological clogging, and intrusion of geotextile into the geonet component.

### 4.3.3 Leachate Collection Trench Header Pipe Sizing

The leachate collection trench is a perforated HDPE header pipe encased by a drainage aggregate wrapped in a filter geotextile. Appendix III3D-3A, Header Pipe Sizing evaluates the size of header pipe required to convey the maximum anticipated leachate generated using the maximum impingement rate from the worst case scenario provided by Appendix III3D-1, Help Model Evaluation, the slope of header pipe post-settlement provided by Appendix III3B-1, Settlement, and the maximum contributing area from the subgrade layout plan presented in Figures III3-2A and III3-2B. The header pipe sizing is more than adequate for the maximum leachate generated.

### 4.3.4 Leachate Collection Trench Header Pipe Perforations

Appendix III3D-3B, Header Pipe Perforations evaluates the perforation size required to convey the maximum leachate generated using the maximum leachate generation rate from the worst case scenario provided by Appendix III3D-1, Help Model Evaluation. The inflow rates into the header pipe perforations exceeds the maximum leachate generated.

### 4.3.5 Pipe Material and Strength

30 TAC §§330.333(3)(C) & 330.333(3)(E)

Pipes used in the LCRS are of HDPE material. Appendix III3D-3C, HDPE Pipe Structural Design evaluates the structural integrity of the leachate collection trench header pipes and sump riser pipes to withstand maximum overburden pressures exerted by overlying wastes, waste cover materials, and by any equipment used at the landfill.

The vertical pressures were determined for overburden pressures of the overlying wastes and waste cover materials and for equipment loading over the pipe with 5 feet of waste and 2 feet of protective cover. Overburden pressures were greater than that of equipment loading, thus overburden was used for analysis of structural integrity of the designed HDPE header pipe and sump riser pipe which include wall crushing, wall buckling and ring deflection.

Review of the results shows that both pipes have satisfactory factors of safety against wall crushing and buckling and pipe deflections are lower than the allowable. Therefore the HDPE pipes can withstand the vertical pressure exerted.

### 4.3.6 Sufficient Strength and Thickness

30 TAC §330.333(2)

The leachate collection and removal system (LCRS) will be of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying wastes, waste cover materials, and by any equipment used at the landfill. As previously discussed in the §4.3.5, the HDPE header and riser pipes are of sufficient strength and thickness. The double-sided geocomposite drainage layer and drainage aggregate used in the LCRS have a compressive strength much greater than the vertical pressures calculated in Appendix III3D-3D, HDPE Pipe Structural Design.

### 4.3.7 Drainage Aggregate

Drainage aggregate wrapped in a filter geotextile is used in both the leachate collection trenches and leachate collection sumps. The aggregate used shall consist of durable particles of crushed stone, natural gravel, or light weight aggregate free of silt, clay, or other unsuitable materials and shall have a loss mass due to calcium carbonate of less than 15 percent. To prevent potential clogging of aggregate into the header pipe perforations, the gradation of aggregate shall be such that the ratio of 85 percent size of aggregate to the header pipe perforation size is greater than 1.7.

### 4.3.8 Pipe Perforations Resistant to Clogging

30 TAC §330.33(G)

Pipe perforations will be resistant to clogging because leachate collection pipes are encased by a drainage aggregate with a gradation sizing described in §4.3.4 wrapped in a filter geotextile. The longest length of leachate collection trench as shown on the subgrade layout plans presented in Figures III3-2A and III3-2B is approximately 1900 ft. According to industry standard, the current practice of hydro-jetting can clean header pipes to a distance greater than 2000 ft.

### 4.3.9 Leachate Collection Trench Spacing and Grading

30 TAC §330.333(3)(D)

Leachate collection trenches are graded at 1% along subgrade low lines created from the convergence of 2% floors as shown on the subgrade layout plans presented in Figures III3-2A and III3-2B.

### 4.3.10 Leachate Collection Sump Capacity

30 TAC §330.333(3)(B)

Appendix III3D-4, Sump Capacity Calculations utilizes typical sump dimensions and porosity of the drainage aggregate to determine leachate capacity. The maximum leachate generated, based on the maximum contributing area and the maximum leachate generation rate provided by Appendix III3D-1, Help Model Evaluation was compared to the sump leachate capacity to determine an estimated time to fill the sump. Based on results, the leachate collection sump design provides adequate capacity and cycle time for leachate pumping.

# 5.0 BALLAST AND DEWATERING SYSTEM

30 TAC §330.337(e)

Waste management unit excavations extend below the seasonal high water table resulting in upward or inward hydrostatic forces on the alternative liner. The alternative liner and the waste placed above it will provide the ballast (weight) to protect the liner system from uplift forces from groundwater. To offset hydrostatic uplift during construction, an active dewatering system will be constructed and operated until sufficient ballast is in place.

## 5.1 Ballast

30 TAC §330.337(b)(1)

To offset hydrostatic uplift, the weight of the alternative liner and the waste placed above it will provide the ballast (weight) to protect the liner system from uplift forces from groundwater. The ballast counteracting the hydrostatic forces include the soil materials from the leachate collection system components, the protective cover, waste above the liner and leachate collection system, and the soil materials from the interim cover. The weight of the geosynthetic components of the leachate collection system and any geosynthetic components of the interim cover is considered negligible. Appendix III3E-1, Ballast Calculations demonstrate that the ballast, including waste, offset hydrostatic uplift by a factor greater than 1.5. A Ballast Evaluation Report (BER) must be submitted to the TCEQ when the ballast verification demonstrates that further ballasting or dewatering is no longer necessary as outlined in Appendix III3F §8.3, Ballast Evaluation Report.

## 5.2 Dewatering System

30 TAC §330.337(b)(2)

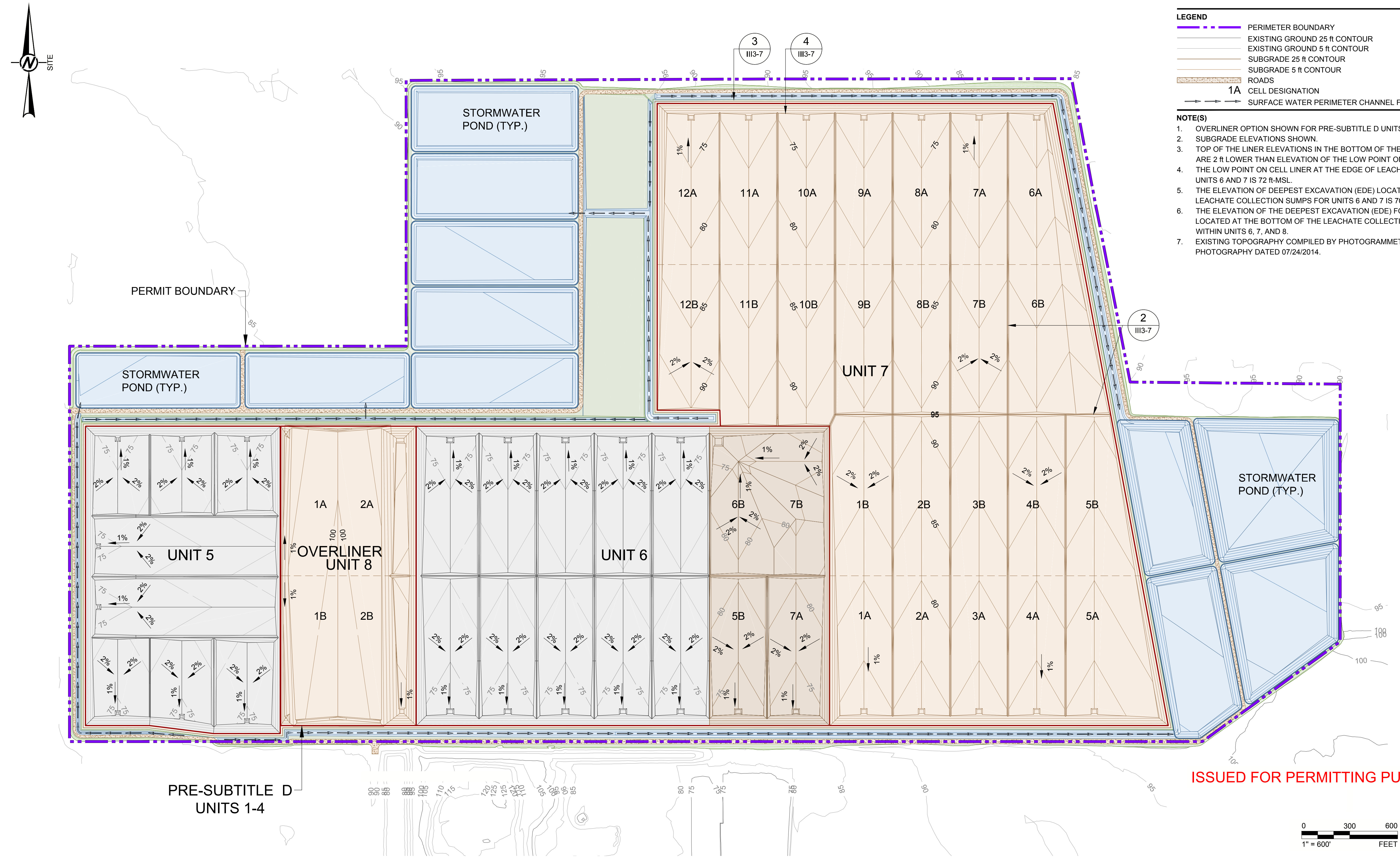
During construction of the alternative liner, groundwater will be controlled by installing an active dewatering system, which includes an underdrain composed of toe drains, a geocomposite along the sideslopes, and an underdrain sump where removed groundwater will be pumped into adjacent drainage perimeter channel. Appendix III3E-2, Dewatering System Calculations estimates groundwater flow into the underdrain using SEEP/W, a 2-dimensional finite element analysis program, using the worst-case scenario and designs the underdrain system to reduce upward or inward hydrostatic forces on the alternative liner to achieve factor of safety greater than 1.2 against uplift. Figures III3-6A, III3-6B, and III3-8 present design layout and details of the dewatering system.

## 6.0 LINER QUALITY CONTROL PLAN

30 TAC §330.339(a)

Appendix III3F, Liner Quality Control Plan (LQCP), is prepared under the direction of a licensed professional engineer by a Professional Engineer, and it shall be the basis for the type and rate of quality control testing performance and reported in the geosynthetic liner evaluation report (GLER) as required in §30 TAC §330.341. The plan provides operating personnel adequate procedural guidance for assuring continuous compliance with groundwater protection requirements. The plan specifies construction methods employing good engineering practices for installation and testing of components of the alternative liner including geosynthetic clay liner (GCL), geomembrane (GM), leachate collection and removal system (LCRS), and protective cover soil. As discussed in §3.1, the alternative liner design does not include at least a 2-foot layer of re-compacted soil with a hydraulic conductivity of no more than $1x10^{-7}$ cm/s; therefore, liner quality control testing procedures for a compacted clay liner are not provided within the LQCP in accordance with 30 TAC §330.339. Also included within the LQCP are special considerations for excavations below the seasonal high groundwater table.

**FIGURES**

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0 300 600
1" = 600' FEET

**LEGEND**

- PERIMETER BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. OVERLINER OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. SUBGRADE ELEVATIONS SHOWN.
3. TOP OF THE LINER ELEVATIONS IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS ARE 2 ft LOWER THAN ELEVATION OF THE LOW POINT ON THE LINER.
4. THE LOW POINT ON CELL LINER AT THE EDGE OF LEACHATE COLLECTION SUMP FOR UNITS 6 AND 7 IS 72 ft-MSL.
5. THE ELEVATION OF DEEPEST EXCAVATION (EDE) LOCATED IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS FOR UNITS 6 AND 7 IS 70 ft-MSL.
6. THE ELEVATION OF THE DEEPEST EXCAVATION (EDE) FOR THE FACILITY IS 70 ft-msl LOCATED AT THE BOTTOM OF THE LEACHATE COLLECTION SUMPS FOR EACH CELL WITHIN UNITS 6, 7, AND 8.
7. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/2014.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
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PROJECT
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**SUBGRADE LAYOUT PLAN**
**OVERLINER OPTION**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | 2 of 19 | III3-2A |

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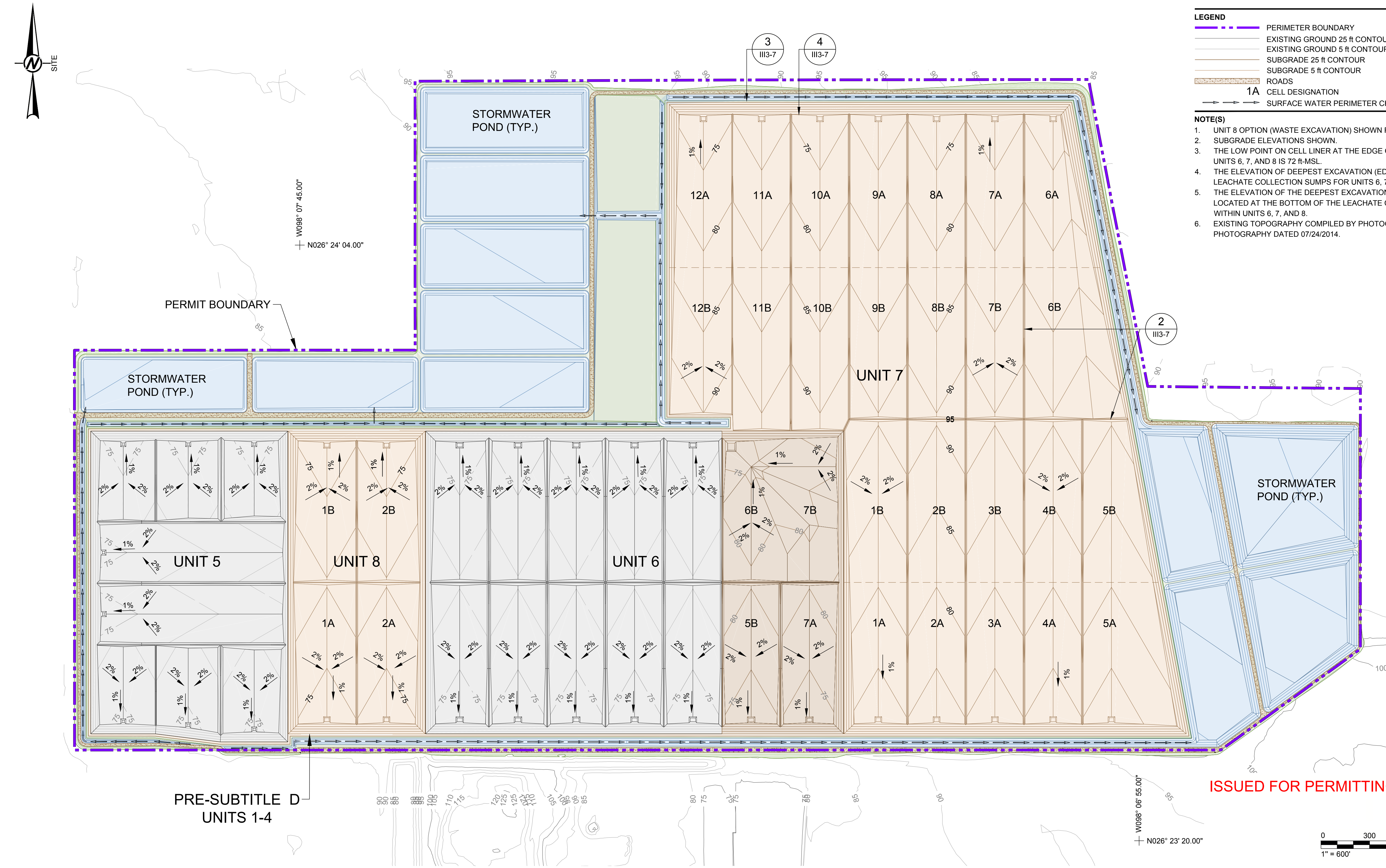
1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B




**LEGEND**

- PERIMETER BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. UNIT 8 OPTION (WASTE EXCAVATION) SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. SUBGRADE ELEVATIONS SHOWN.
3. THE LOW POINT ON CELL LINER AT THE EDGE OF LEACHATE COLLECTION SUMP FOR UNITS 6, 7, AND 8 IS 72 ft-MSL.
4. THE ELEVATION OF DEEPEST EXCAVATION (EDE) LOCATED IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS FOR UNITS 6, 7, AND 8 IS 70 ft-MSL.
5. THE ELEVATION OF THE DEEPEST EXCAVATION (EDE) FOR THE FACILITY IS 70 ft-msl LOCATED AT THE BOTTOM OF THE LEACHATE COLLECTION SUMPS FOR EACH CELL WITHIN UNITS 6, 7, AND 8.
6. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/2014.

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| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
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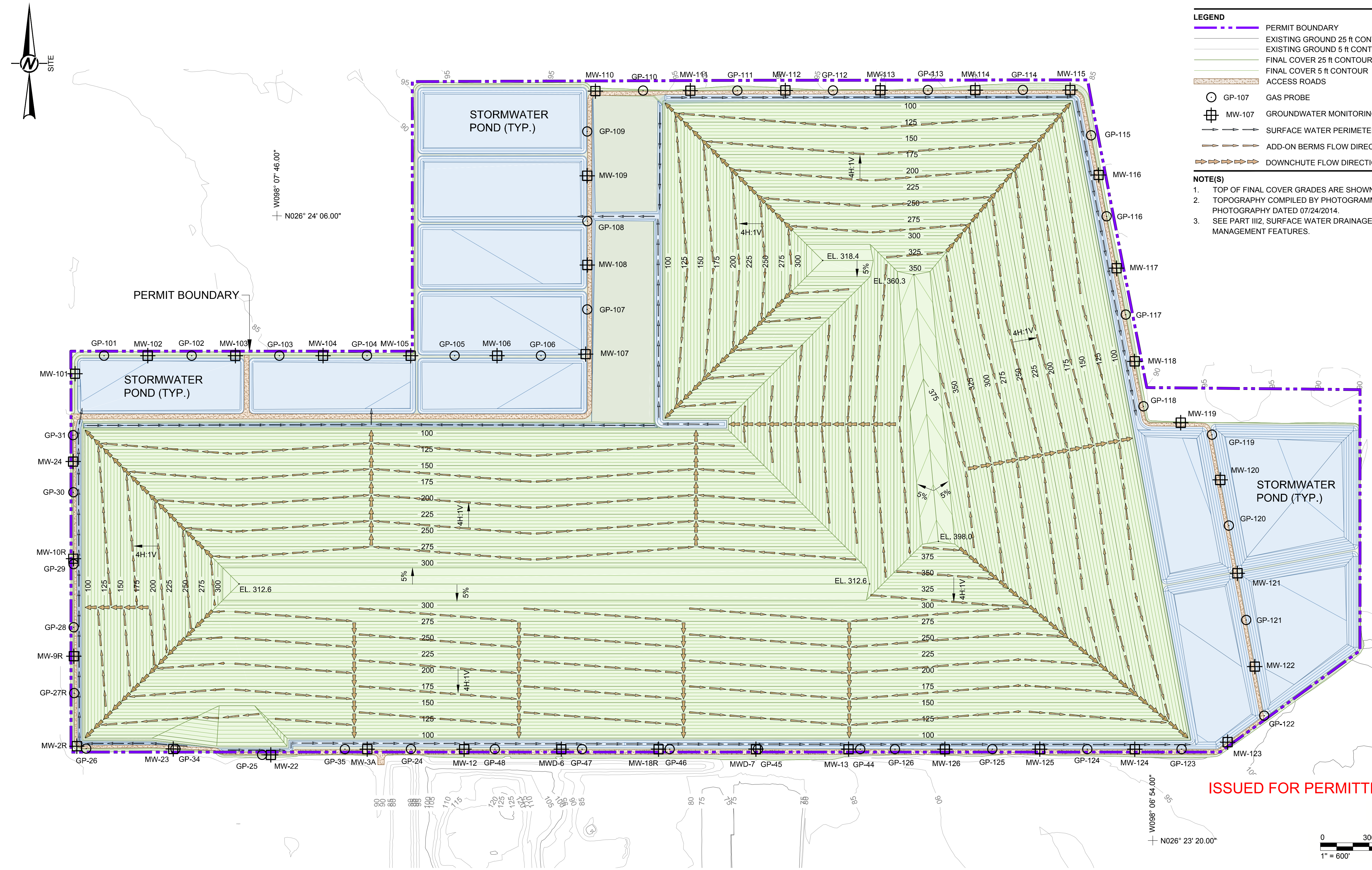
PROJECT
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**SUBGRADE LAYOUT PLAN**
**UNIT 8 OPTION**

| PROJECT NO. | APPLICATION SECTION | REV. | 3 of 19 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | | III3-2B |

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B




**LEGEND**

- PERMIT BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- FINAL COVER 25 ft CONTOUR
- FINAL COVER 5 ft CONTOUR
- ACCESS ROADS
- GP-107 GAS PROBE
- MW-107 GROUNDWATER MONITORING WELL
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION
- ADD-ON BERMS FLOW DIRECTION
- DOWNCHUTE FLOW DIRECTION

**NOTE(S)**

1. TOP OF FINAL COVER GRADES ARE SHOWN ON THIS SHEET.
2. TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/2014.
3. SEE PART III2, SURFACE WATER DRAINAGE REPORT, FOR DETAILS OF STORMWATER MANAGEMENT FEATURES.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
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PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE

**FINAL CONTOUR MAP**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | 4 of 19 | III3-3 |

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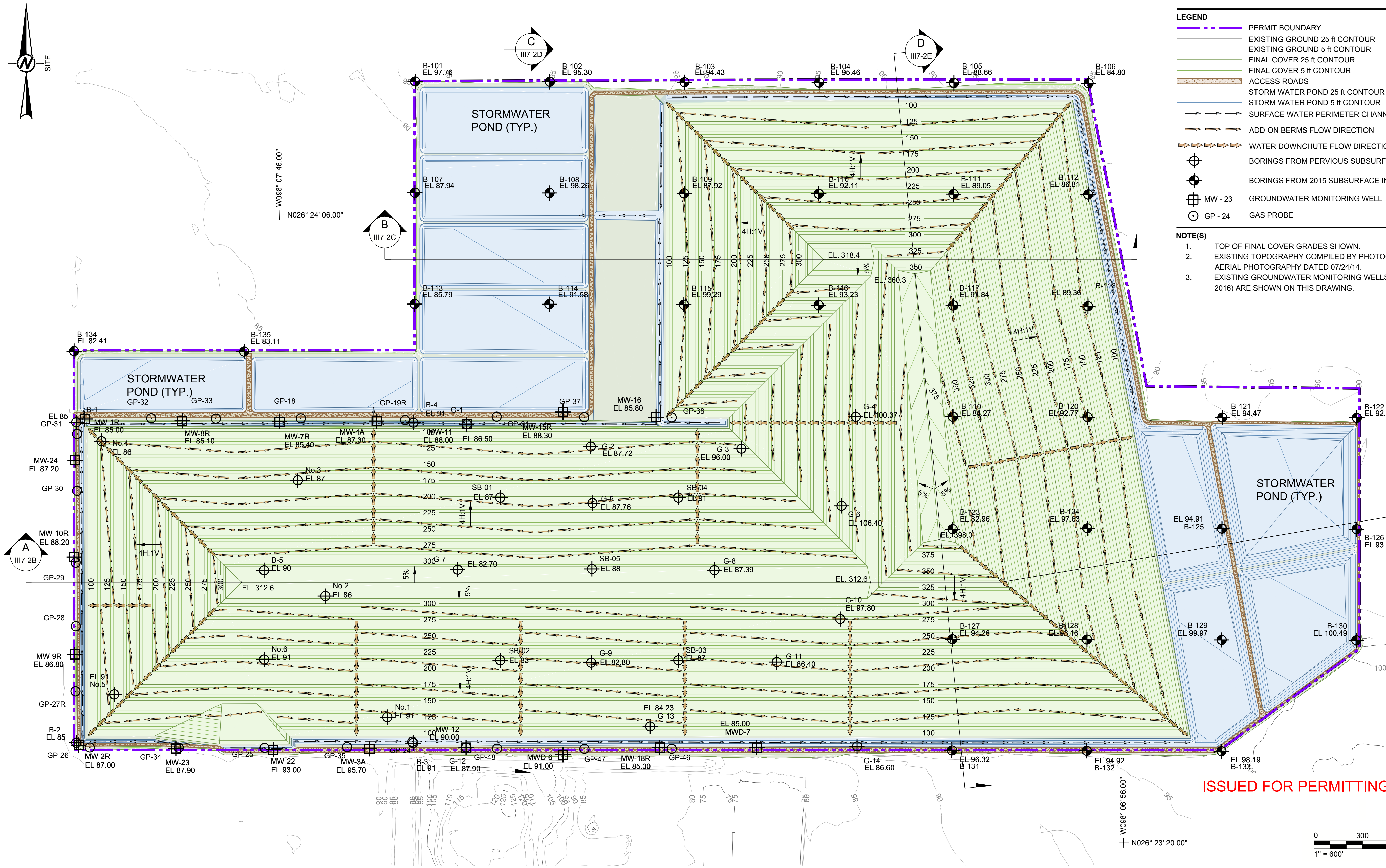


**LEGEND**

- PERMIT BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- FINAL COVER 25 ft CONTOUR
- FINAL COVER 5 ft CONTOUR
- ACCESS ROADS
- STORM WATER POND 25 ft CONTOUR
- STORM WATER POND 5 ft CONTOUR
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION
- ADD-ON BERMS FLOW DIRECTION
- WATER DOWNCHUTE FLOW DIRECTION
- BORINGS FROM PERVIOUS SUBSURFACE INVESTIGATIONS
- BORINGS FROM 2015 SUBSURFACE INVESTIGATIONS
- MW - 23 GROUNDWATER MONITORING WELL
- GP - 24 GAS PROBE

**NOTE(S)**

1. TOP OF FINAL COVER GRADES SHOWN.
2. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/14.
3. EXISTING GROUNDWATER MONITORING WELLS AND GAS PROBES (AS OF OCTOBER 2016) ARE SHOWN ON THIS DRAWING.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
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| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
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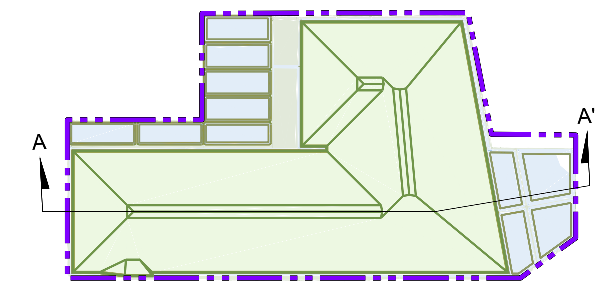
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

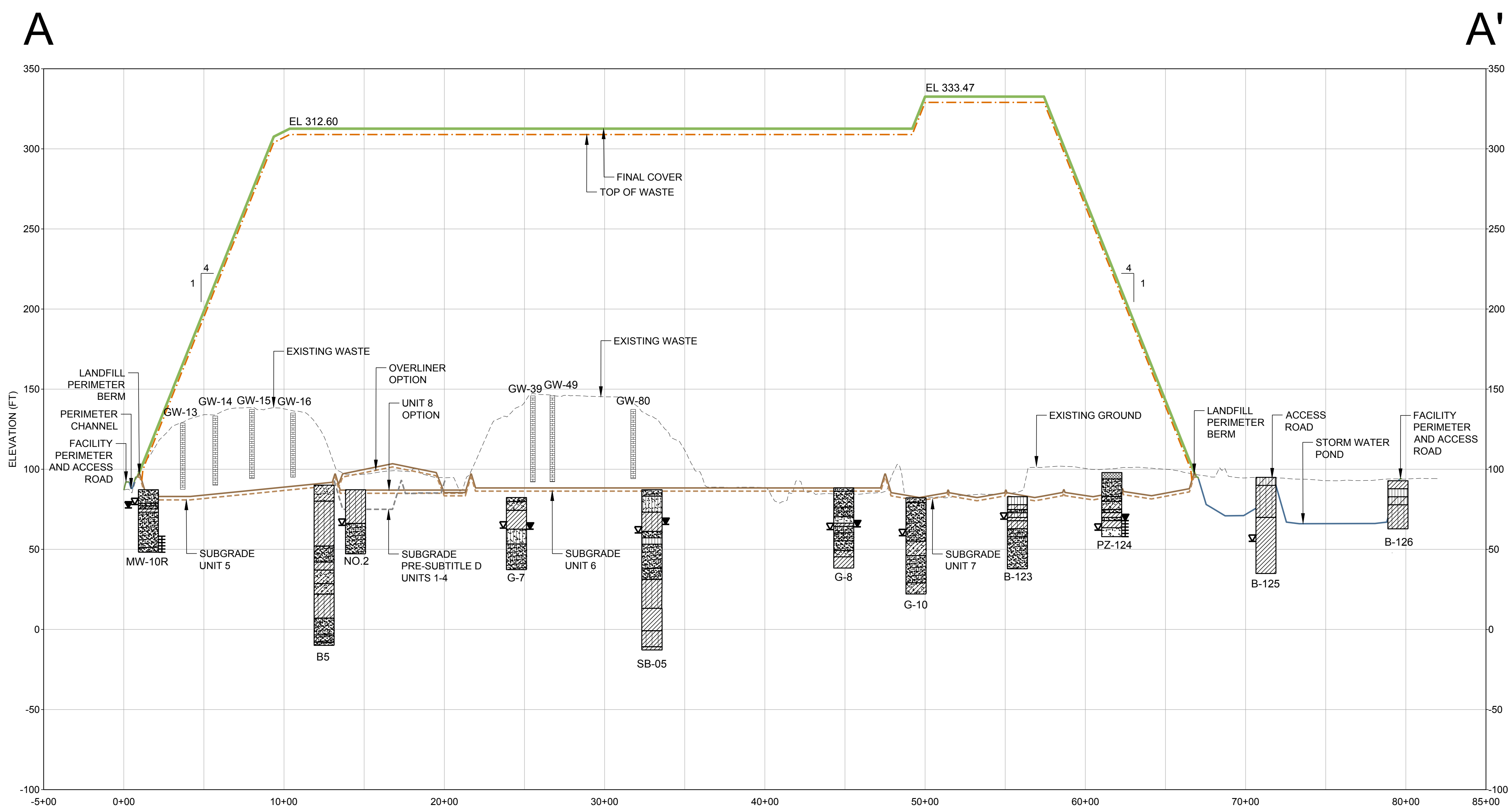
TITLE

**FILL CROSS-SECTIONS LOCATION MAP**

| PROJECT NO. | APPLICATION SECTION | REV. | 5 of 19 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | | III3-4A |

KEY MAP




SCALE 1" = 800'
VERT. SCALE 1" = 80'
A
III3-4B
FILL CROSS-SECTION A

**LEGEND**

- FINAL COVER
- TOP OF WASTE
- EXISTING GRADE
- SUBGRADE
- EXISTING SUBGRADE
- STORM WATER POND AND DITCH
- SILT
- SAND
- CLAY
- SILTY SAND
- SILTY CLAY
- SANDY SILT
- SANDY CLAY
- CLAYEY SAND
- CLAYEY SILT
- SANDY SILTY CLAY
- SILTY CLAYEY SAND
- STATIC WATER LEVEL
- INITIAL WATER LEVEL
- SCREENED INTERVAL

**NOTE(S)**

1. GAS WELL DATA BASED ON INFORMATION FROM DESIGN AND AS BUILT DRAWINGS.
2. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHTOGRAPHY DATED 07/24/2014.
3. THERE ARE NO INITIAL WATER LEVEL DTATA FOR THE BORINGS SHOWN ON THIS CROSS-SECTION. THE INITIAL WATER LEVEL IS THAT LEVEL AT THE TIME OF DRILLING AS REPORTED ON THE BORING LOG. THE STATIC WATER LEVEL IS THAT LEVEL SOMETIME AFTER DRILLING AS REPORTED ON THE BORING LOG.
4. THE SIDESLOPES SHOWN ARE NOMINAL; THE ACTUAL SIDESLOPES ON THESE CROSS-SECTIONS WILL VARY DUE TO THE ANGULAR PROJECTION OF THE SECTIONS.
5. GAS WELL LOCATIONS ARE SHOWN ON III6, LANDFILL GAS MANAGEMENT PLAN, FIGURE III6-3
6. MONITORING WELL LOCATIONS ARE SHOWN ON III3, FILL CROSS-SECTION LOCATION MAP, FIGURE III3-4A.
7. SECTION SHOWN FOR UNIT 8 OPTION IS THROUGH THE INTERCELL BERM.
8. THE ELEVATION OF THE DEEPEST EXCAVATION (EDE) FOR THE FACILITY IS 70 ft-msl LOCATED AT THE BOTTOM OF LEACHATE COLLECTION SUMPS FOR EACH CELL WITHIN UNITS 6, 7, AND 8 AS DEPICTED ON FIGURES III3-2A AND III3-2B.

ISSUED FOR PERMITTING PURPOSES ONLY

0 400 800
1" = 800' FEET

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | JBF | JBF |
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TEXAS REGISTRATION F-2578

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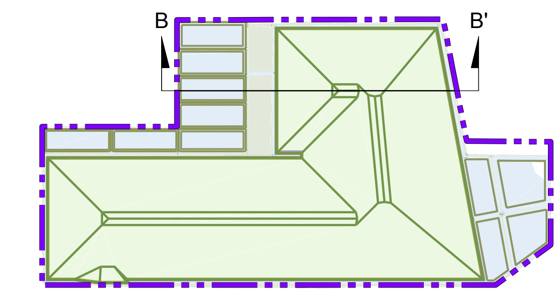
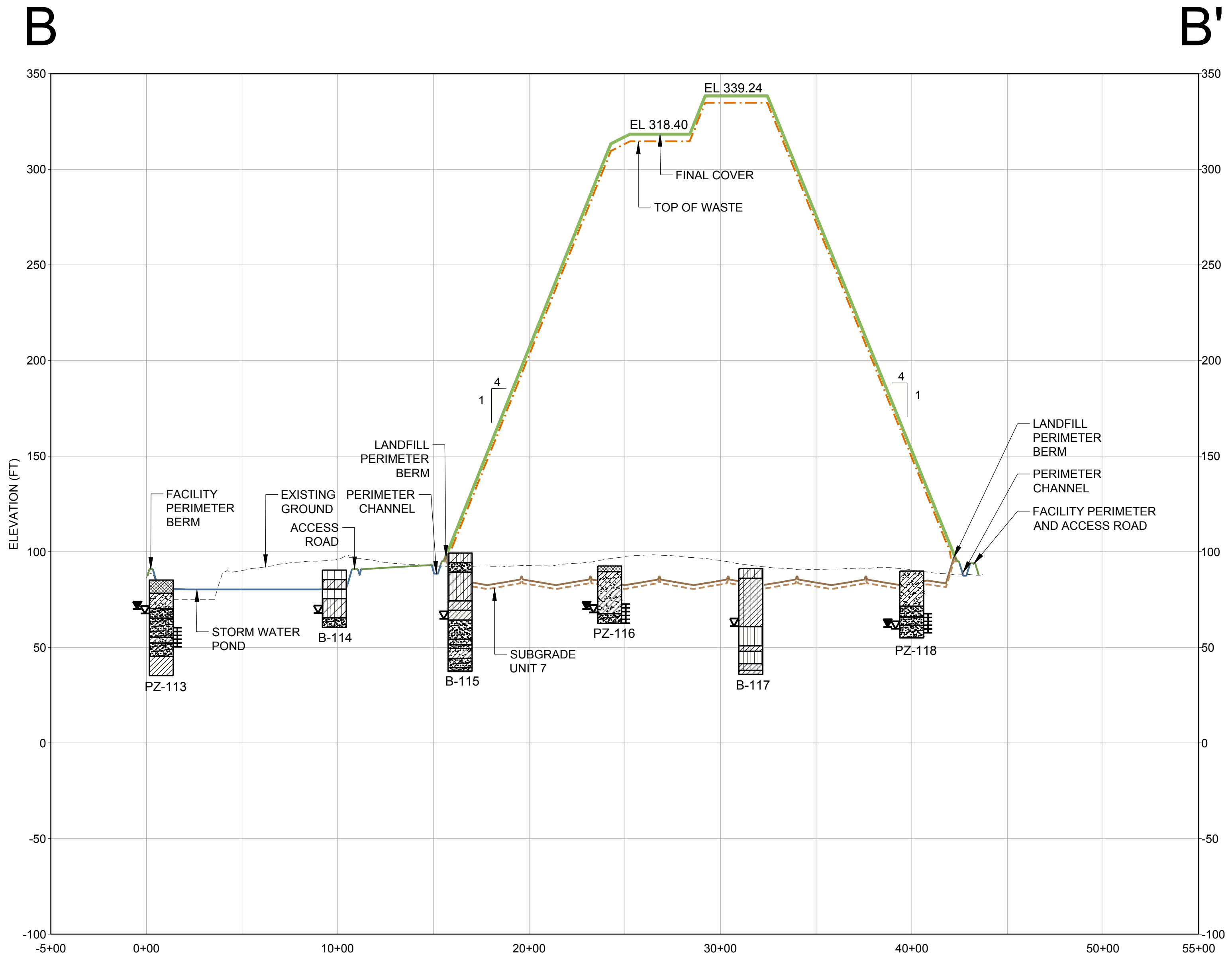
PROJECT
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**FILL CROSS-SECTION A**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | 6 of 19 | III3-4B |

KEY MAP




SCALE 1" = 800'
VERT. SCALE 1" = 80'
B
III3-4C
FILL CROSS-SECTION B

**LEGEND**

- FINAL COVER
- TOP OF WASTE
- EXISTING GRADE
- SUBGRADE
- STORM WATER POND AND DITCH

- SILT
- SAND
- CLAY
- SILTY SAND
- SILTY CLAY
- SANDY SILT
- SANDY CLAY
- CLAYEY SAND
- CLAYEY SILT
- SANDY SILTY CLAY
- SILTY CLAYEY SAND
- STATIC WATER LEVEL
- INITIAL WATER LEVEL
- SCREENED INTERVAL

**NOTE(S)**

1. GAS WELL DATA BASED ON INFORMATION FROM DESIGN AND AS BUILT DRAWINGS.
2. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/2014.
3. THERE ARE NO INITIAL WATER LEVEL DTATA FOR THE BORINGS SHOWN ON THIS CROSS-SECTION. THE INITIAL WATER LEVEL IS THAT LEVEL AT THE TIME OF DRILLING AS REPORTED ON THE BORING LOG. THE STATIC WATER LEVEL IS THAT LEVEL SOMETIME AFTER DRILLING AS REPORTED ON THE BORING LOG.
4. THE SIDESLOPES SHOWN ARE NOMINAL; THE ACTUAL SIDESLOPES ON THESE CROSS-SECTIONS WILL VARY DUE TO THE ANGULAR PROJECTION OF THE SECTIONS.
5. GAS WELL LOCATIONS ARE SHOWN ON III6, LANDFILL GAS MANAGEMENT PLAN, FIGURE III6-3
6. MONITORING WELL LOCATIONS ARE SHOWN ON III3, FILL CROSS-SECTION LOCATION MAP, FIGURE III3-4A.
8. THE ELEVATION OF THE DEEPEST EXCAVATION (EDE) FOR THE FACILITY IS 70 ft-msl LOCATED AT THE BOTTOM OF LEACHATE COLLECTION SUMPS FOR EACH CELL WITHIN UNITS 6, 7, AND 8 AS DEPICTED ON FIGURES III3-2A AND III3-2B.

ISSUED FOR PERMITTING PURPOSES ONLY

0 400 800
1" = 800' FEET

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | JBF | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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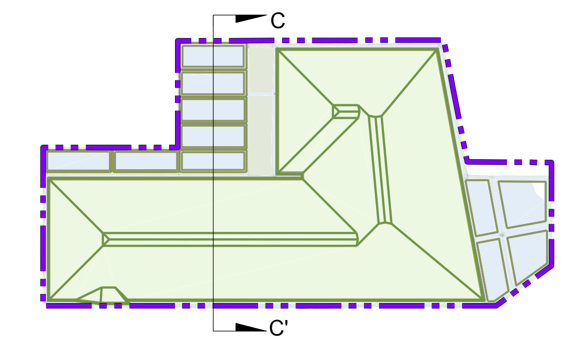
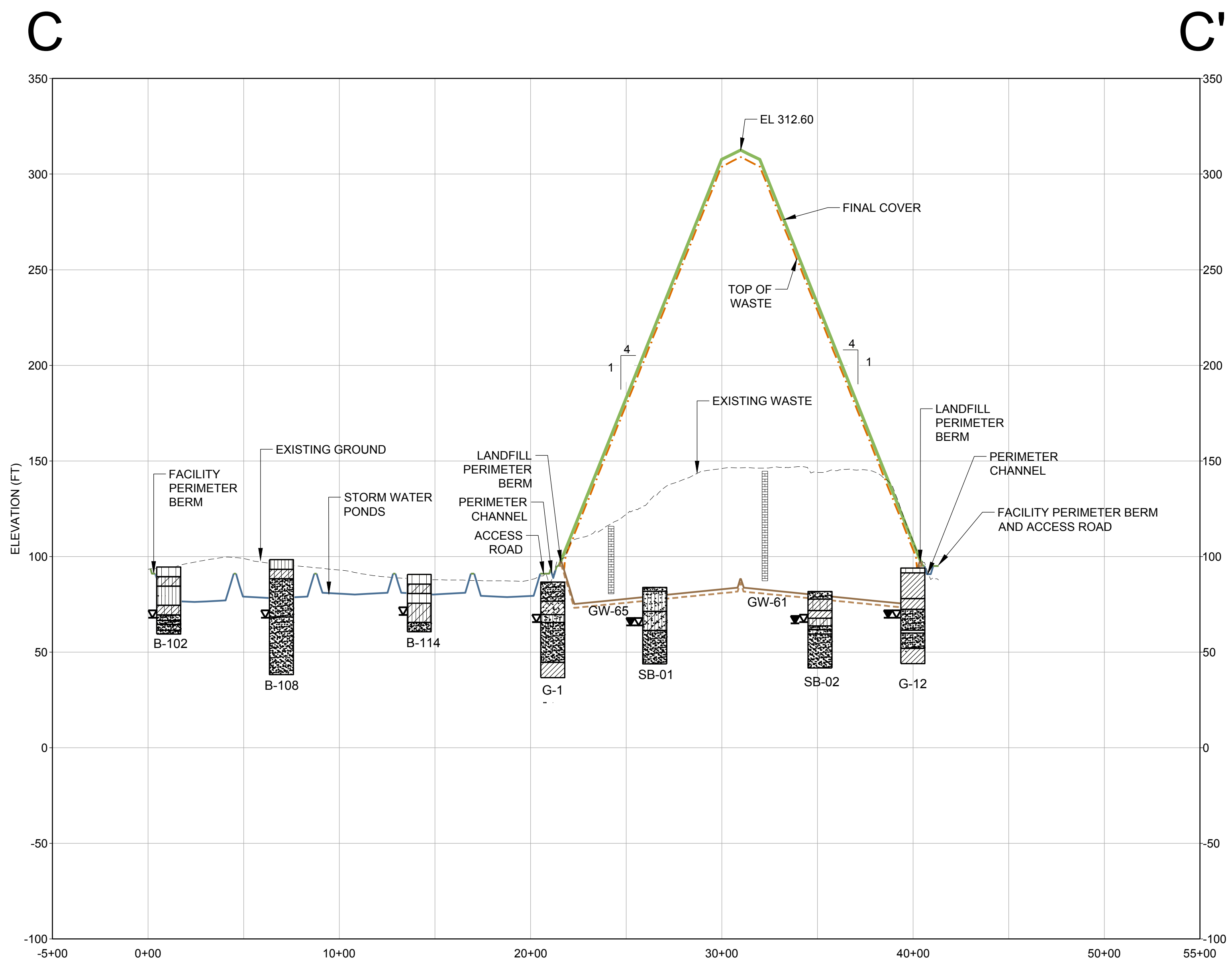
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**FILL CROSS-SECTION B**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | 7 of 19 | III3-4C |

KEY MAP




SCALE 1" = 800'
VERT. SCALE 1" = 80'
C
III3-4D
FILL CROSS-SECTION C

**LEGEND**

- FINAL COVER
- TOP OF WASTE
- EXISTING GRADE
- SUBGRADE
- STORM WATER POND AND DITCH

- SILT
- SAND
- CLAY
- SILTY SAND
- SILTY CLAY
- SANDY SILT
- SANDY CLAY
- CLAYEY SAND
- CLAYEY SILT
- SANDY SILTY CLAY
- SILTY CLAYEY SAND
- STATIC WATER LEVEL
- INITIAL WATER LEVEL
- SCREENED INTERVAL

**NOTE(S)**

1. GAS WELL DATA BASED ON INFORMATION FROM DESIGN AND AS BUILT DRAWINGS.
2. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHTOGRAPHY DATED 07/24/2014.
3. THERE ARE NO INITIAL WATER LEVEL DTATA FOR THE BORINGS SHOWN ON THIS CROSS-SECTION. THE INITIAL WATER LEVEL IS THAT LEVEL AT THE TIME OF DRILLING AS REPORTED ON THE BORING LOG. THE STATIC WATER LEVEL IS THAT LEVEL SOMETIME AFTER DRILLING AS REPORTED ON THE BORING LOG.
4. THE SIDESLOPES SHOWN ARE NOMINAL; THE ACTUAL SIDESLOPES ON THESE CROSS-SECTIONS WILL VARY DUE TO THE ANGULAR PROJECTION OF THE SECTIONS.
5. GAS WELL LOCATIONS ARE SHOWN ON III6, LANDFILL GAS MANAGEMENT PLAN, FIGURE III6-3
6. MONITORING WELL LOCATIONS ARE SHOWN ON III3, FILL CROSS-SECTION LOCATION, FIGURE III3-4A.
8. THE ELEVATION OF THE DEEPEST EXCAVATION (EDE) FOR THE FACILITY IS 70 ft-msl LOCATED AT THE BOTTOM OF LEACHATE COLLECTION SUMPS FOR EACH CELL WITHIN UNITS 6, 7, AND 8 AS DEPICTED ON FIGURES III3-2A AND III3-2B.

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0 400 800
1" = 800' FEET

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | JBF | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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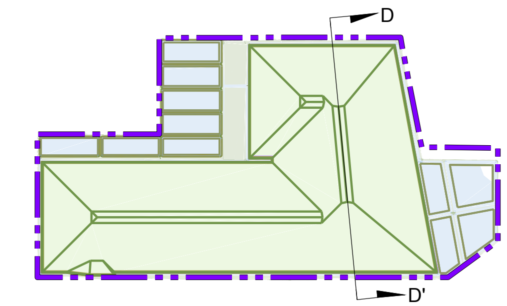
PROJECT
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

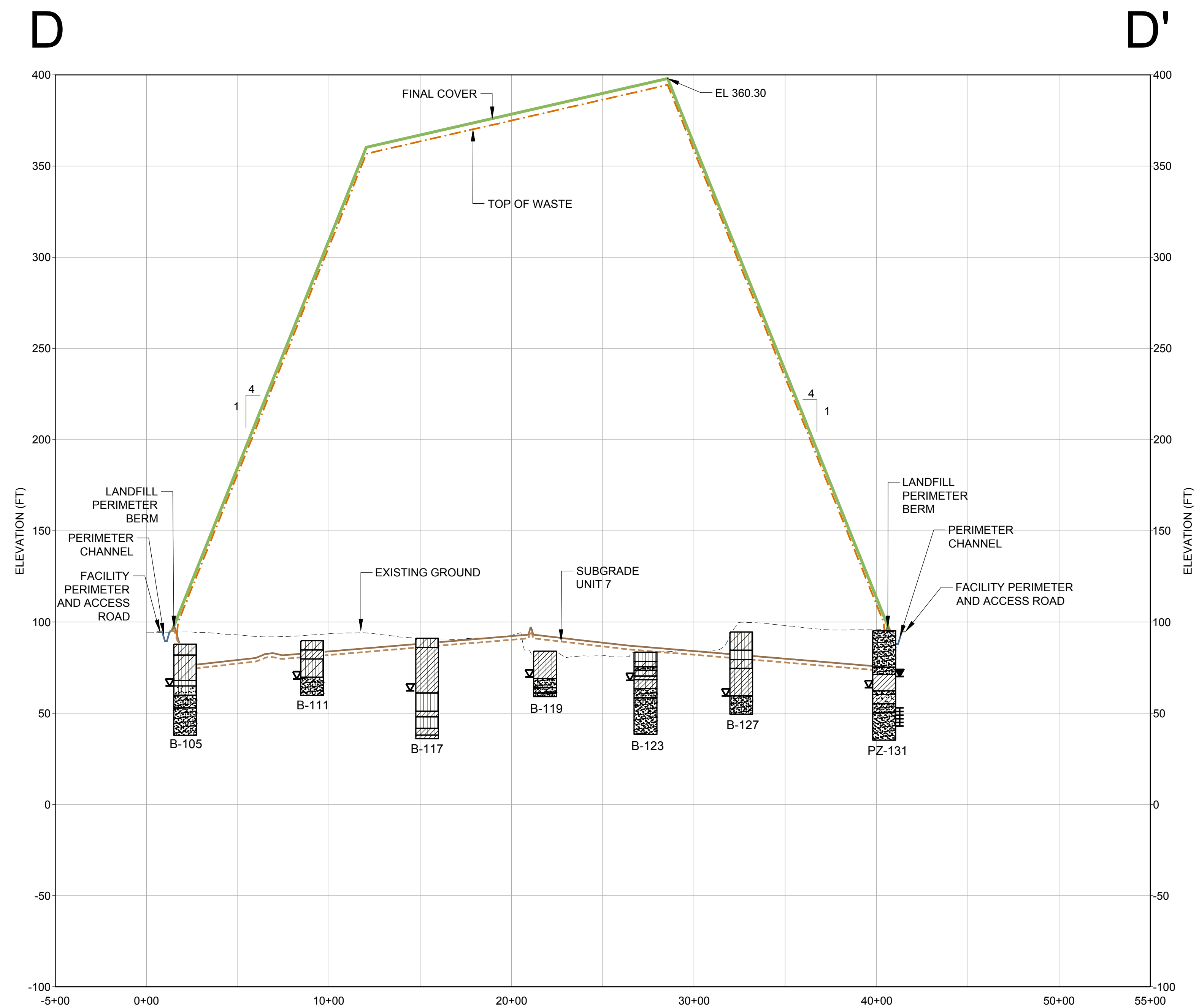
TITLE
**FILL CROSS SECTION C**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | 8 of 19 | III3-4D |

KEY MAP




# D — D'




SCALE 1" = 800' VERT. SCALE 1" = 80' D III3-4E FILL CROSS-SECTION D

**LEGEND**

- FINAL COVER
- TOP OF WASTE
- EXISTING GRADE
- SUBGRADE
- STORM WATER POND AND DITCH

| | |
|---|---|
| SILT | SANDY CLAY |
| SAND | CLAYEY SAND |
| CLAY | CLAYEY SILT |
| SILTY SAND | SANDY SILTY CLAY |
| SILTY CLAY | SILTY CLAYEY SAND |
| SANDY SILT | |

- STATIC WATER LEVEL
- INITIAL WATER LEVEL
- SCREENED INTERVAL

**NOTE(S)**

1. GAS WELL DATA BASED ON INFORMATION FROM DESIGN AND AS BUILT DRAWINGS.
2. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHTOGRAPHY DATED 07/24/2014.
3. THERE ARE NO INITIAL WATER LEVEL DTATA FOR THE BORINGS SHOWN ON THIS CROSS-SECTION. THE INITIAL WATER LEVEL IS THAT LEVEL AT THE TIME OF DRILLING AS REPORTED ON THE BORING LOG. THE STATIC WATER LEVEL IS THAT LEVEL SOMETIME AFTER DRILLING AS REPORTED ON THE BORING LOG.
4. THE SIDESLOPES SHOWN ARE NOMINAL; THE ACTUAL SIDESLOPES ON THESE CROSS-SECTIONS WILL VARY DUE TO THE ANGULAR PROJECTION OF THE SECTIONS.
5. GAS WELL LOCATIONS ARE SHOWN ON III6, LANDFILL GAS MANAGEMENT PLAN, FIGURE III6-3
6. MONITORING WELL LOCATIONS ARE SHOWN ON III3, FILL CROSS-SECTION MAP, FIGURE III3-4A.
8. THE ELEVATION OF THE DEEPEST EXCAVATION (EDE) FOR THE FACILITY IS 70 ft-msl LOCATED AT THE BOTTOM OF LEACHATE COLLECTION SUMPS FOR EACH CELL WITHIN UNITS 6, 7, AND 8 AS DEPICTED ON FIGURES III3-2A AND III3-2B.

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0 400 800
1" = 800' FEET

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | JBF | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | JBF | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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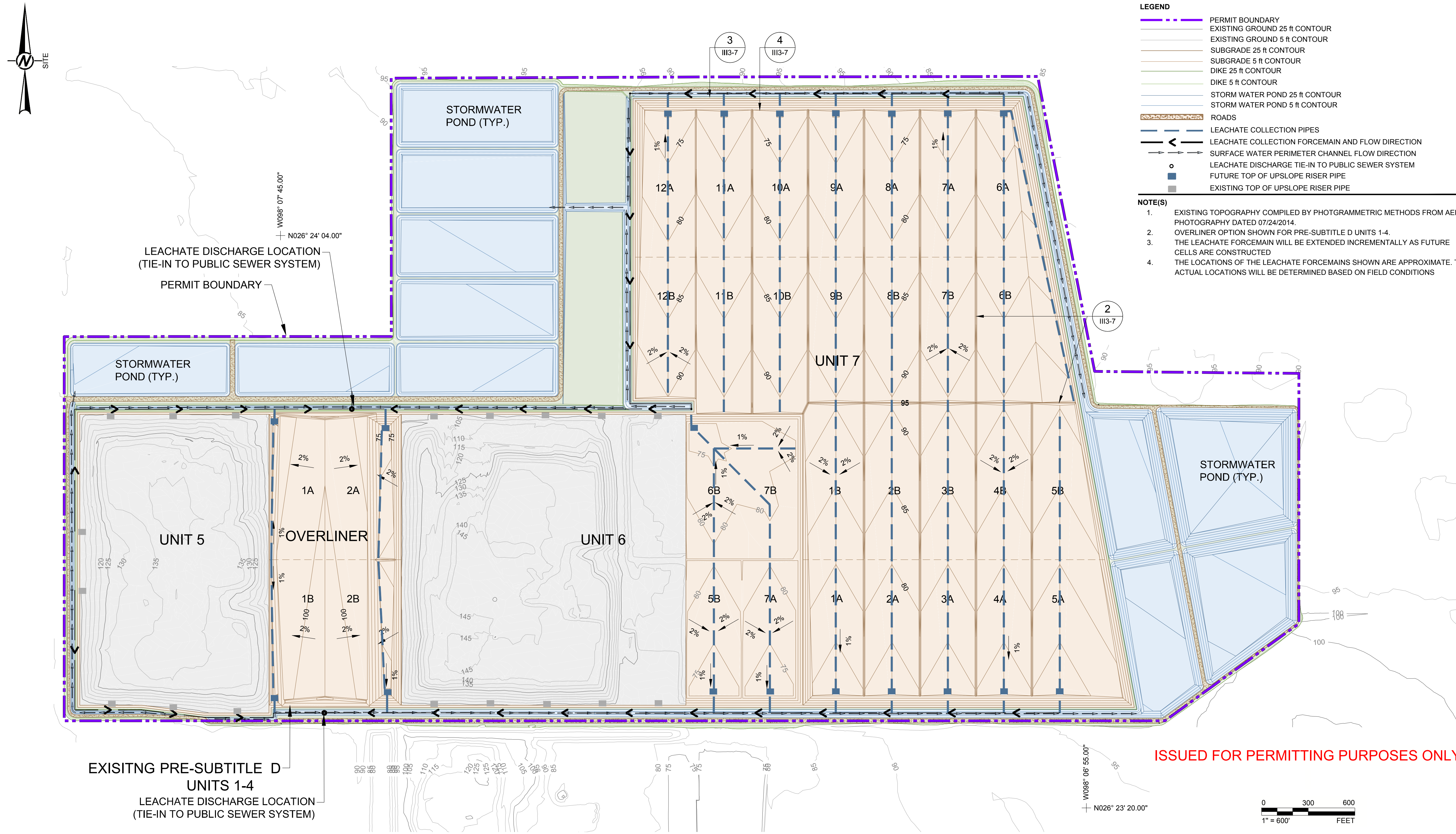
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**FILL CROSS-SECTION D**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | 9 of 19 | III3-4E |




**LEGEND**

- PERMIT BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- DIKE 25 ft CONTOUR
- DIKE 5 ft CONTOUR
- STORM WATER POND 25 ft CONTOUR
- STORM WATER POND 5 ft CONTOUR
- ROADS
- LEACHATE COLLECTION PIPES
- LEACHATE COLLECTION FORCEMAIN AND FLOW DIRECTION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION
- LEACHATE DISCHARGE TIE-IN TO PUBLIC SEWER SYSTEM
- FUTURE TOP OF UPSLOPE RISER PIPE
- EXISTING TOP OF UPSLOPE RISER PIPE

**NOTE(S)**

1. EXISTING TOPOGRAPHY COMPILED BY PHOTGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/2014.
2. OVERLINER OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
3. THE LEACHATE FORCEMAIN WILL BE EXTENDED INCREMENTALLY AS FUTURE CELLS ARE CONSTRUCTED
4. THE LOCATIONS OF THE LEACHATE FORCEMAINS SHOWN ARE APPROXIMATE. THE ACTUAL LOCATIONS WILL BE DETERMINED BASED ON FIELD CONDITIONS

ISSUED FOR PERMITTING PURPOSES ONLY

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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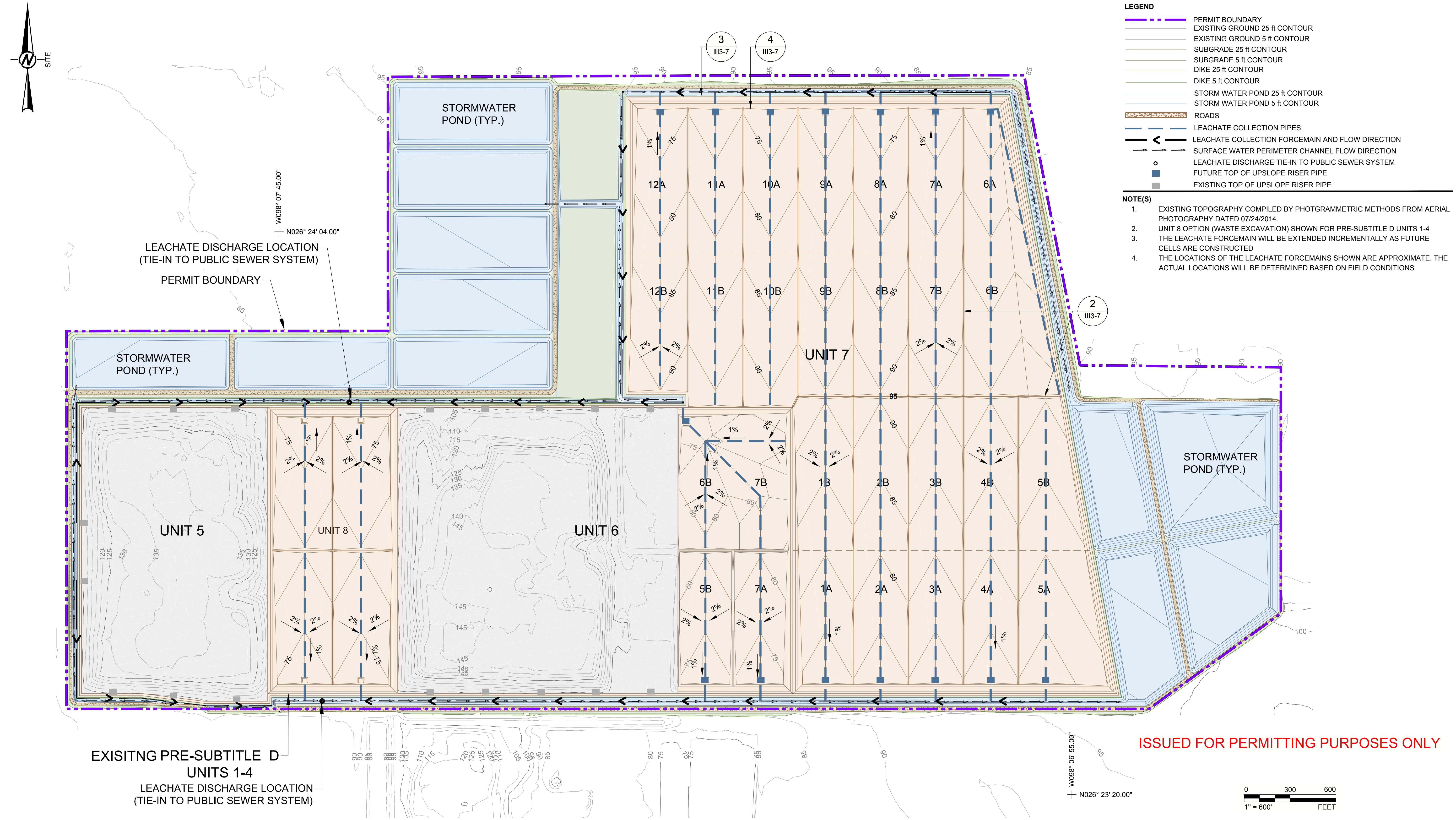
PROJECT
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**LEACHATE COLLECTION SYSTEM DISCHARGE PLAN**
*OVERLINER OPTION*

| PROJECT NO. | APPLICATION SECTION | REV. | 10 of 19 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | | III3-5A |




| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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PROJECT
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**LEACHATE COLLECTION SYSTEM DISCHARGE PLAN**
*UNIT 8 OPTION*

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | 11 of 19 | III3-5B |

Path: \\houston\drafting_2014\1401491 - city of edinburg\PRODUCTION\A - Permit Amendment Application\ | File Name: 1401491A177.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 1 in


**LEGEND**

- PERMIT BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- DIKE 25 ft CONTOUR
- DIKE 5 ft CONTOUR
- STORM WATER POND 25 ft CONTOUR
- STORM WATER POND 5 ft CONTOUR
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION
- ROADS
- TOE DRAIN UNDERDRAIN (SEE FIGURE III3F-5 FOR DETAILS)
- DEWATERING SUMP
- 1A CELL DESIGNATION

**NOTE(S)**

1. OVERLINER OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4
2. SUBGRADE ELEVATIONS SHOWN
3. TOP OF THE LINER ELEVATIONS IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS ARE 2 ft LOWER THAN ELEVATION OF THE LOW POINT ON THE LINER.
4. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/2014.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | AA | AA | MX | JBF |

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PROJECT
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**UNDERDRAIN SYSTEM LAYOUT**
**OVERLINER OPTION**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | 12 of 19 | III3-6A |

1 in
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B


**LEGEND**

- PERMIT BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- DIKE 25 ft CONTOUR
- DIKE 5 ft CONTOUR
- STORM WATER POND 25 ft CONTOUR
- STORM WATER POND 5 ft CONTOUR
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION
- ROADS
- TOE DRAIN UNDERDRAIN (SEE FIGURE III3F-5 FOR DETAILS)
- DEWATERING SUMP
- 1A CELL DESIGNATION

**NOTE(S)**

1. UNIT 8 OPTION (WASTE EXCAVATION) SHOWN FOR PRE-SUBTITLE D UNITS 1-4
2. SUBGRADE ELEVATIONS SHOWN
3. TOP OF THE LINER ELEVATIONS IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS ARE 2 ft LOWER THAN ELEVATION OF THE LOW POINT ON THE LINER.
4. EXISTING TOPOGRAPHY COMPILED BY PHTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/2014.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | AA | AA | MX | JBF |

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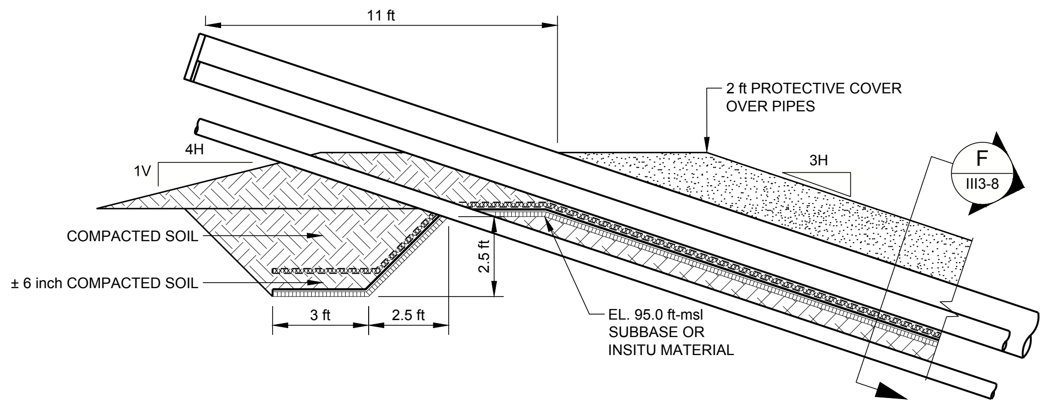
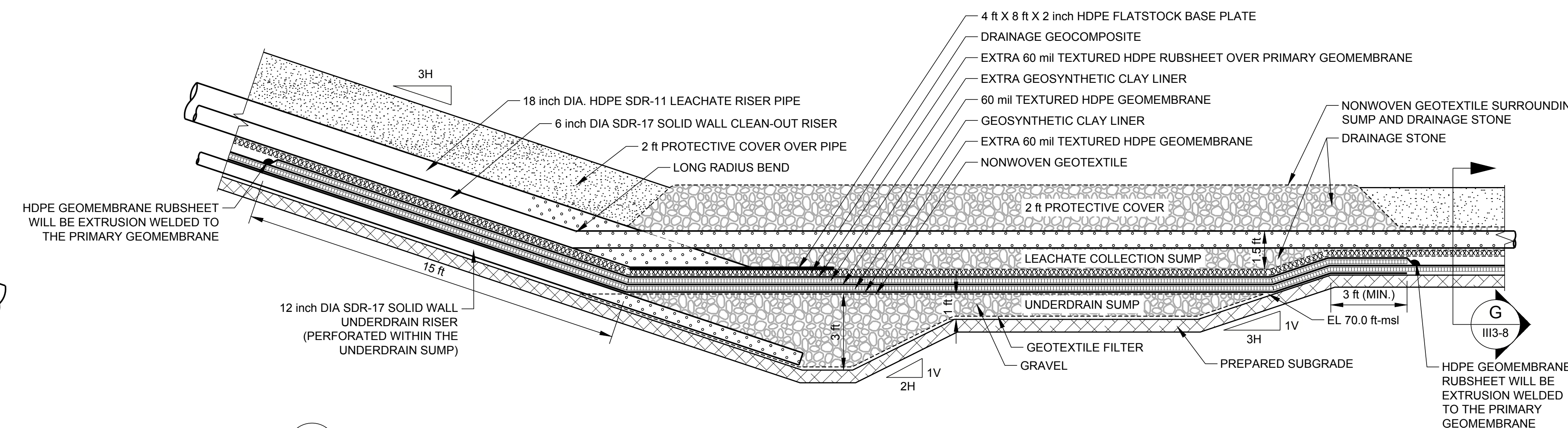
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

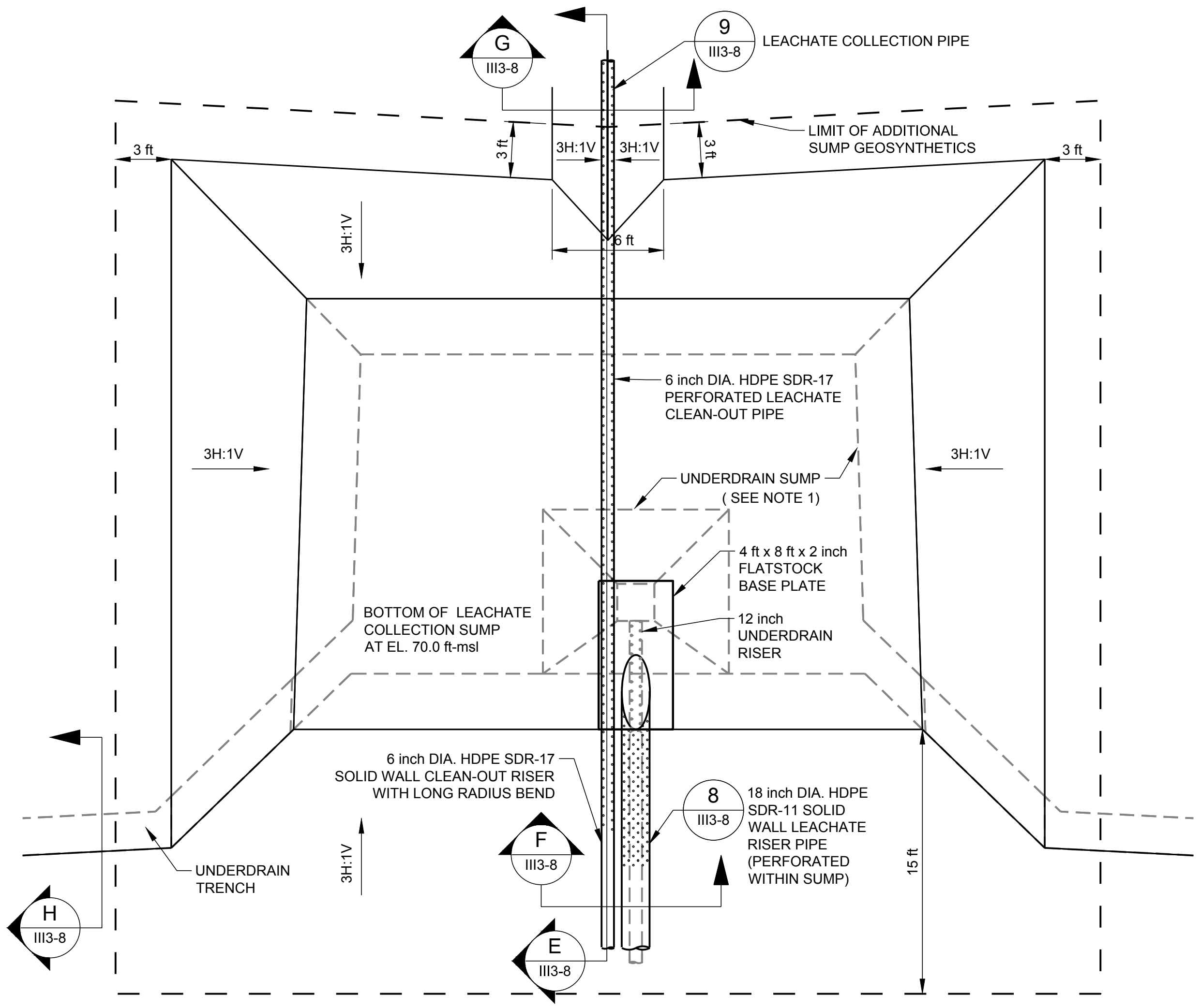
TITLE
**UNDERDRAIN SYSTEM LAYOUT**
*UNIT 8 OPTION*

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 2 | 13 of 19 | III3-6B |

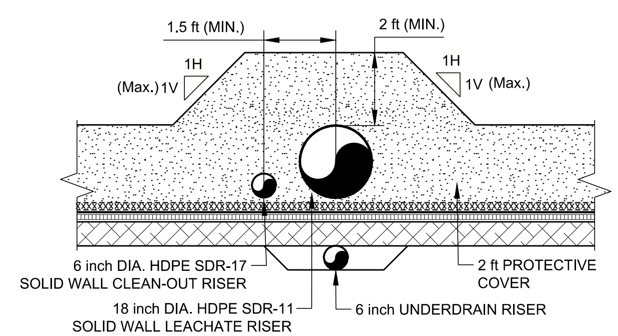


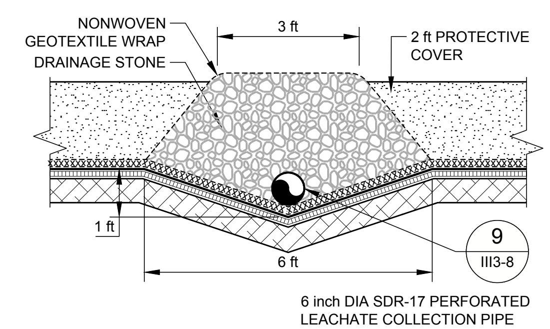

SCALE 1" = 6' E III3-8 LEACHATE COLLECTION AND UNDERDRAIN SUMPS



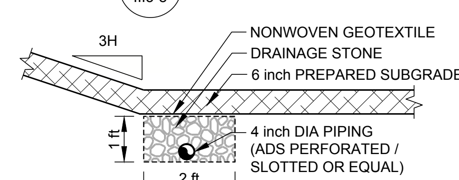

SCALE 1" = 10' 7 III3-8 LEACHATE COLLECTION AND DEWATERING SUMPS



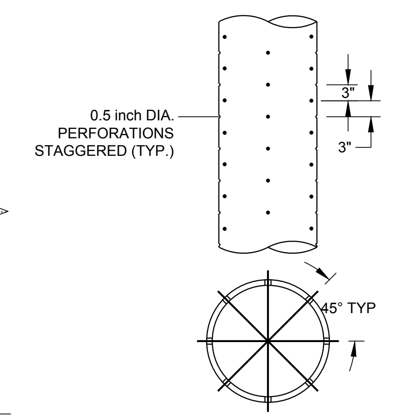

SCALE 1" = 4' F III3-8 SIDESLOPE RISER PIPES



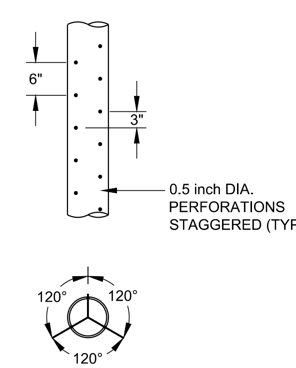

SCALE 1" = 4' G III3-8 LEACHATE COLLECTION TRENCH




SCALE 1" = 4' H III3-8 DEWATERING TRENCH




SCALE 1" = 3' 8 III3-8 LEACHATE COLLECTION SUMP RISER PIPE PERFORATION

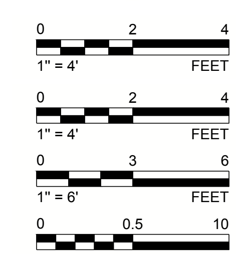



SCALE 1" = 3' 9 III3-8 LEACHATE COLLECTION PIPE PERFORATION

**NOTE(S)**

1. DEWATERING SUMP EXISTS ONLY IN CELLS WITH DEWATERING TOE DRAIN.

ISSUED FOR PERMITTING PURPOSES ONLY




| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
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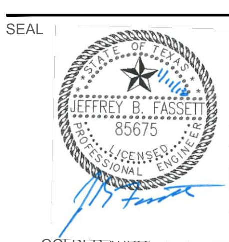


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PROJECT
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**LEACHATE COLLECTION AND REMOVAL SYSTEM AND UNDERDRAIN DETAILS**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3 | 1 | 15 of 19 | III3-8 |

# APPENDIX III3A

# VOLUME AND SITE LIFE CALCULATIONS

**APPENDIX III3A-1**

**VOLUME CALCULATIONS**

## VOLUME CALCULATIONS

Made by: JCW
Checked by: CEI
Reviewed by: JBF

### 1.0 SUMMARY

The table below summarizes total disposal capacity (i.e. airspace) for each cover option for the landfill expansion.

| **Total Airspace (CY)** | | **Construction Options** | |
|---|---|---|---|
| | | *Overliner* | *Unit 8* |
| **Final Cover Options** | *Standard* | 84,997,400 | 84,831,321 |
| | *Alternative* | 85,981,680 | 85,815,599 |

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### 2.0 OBJECTIVE

To determine the airpsace gained from the expansion of Edinburg Regional Disposal Facilty for two options for the Pre-Subtitle D Units 1 through 4: construction of an overliner above existing Units 1 - 4, and relocation of existing Pre-Subtitle D waste and construction of Unit 8. In addition, three final cover options outlined in Part III7, Closure Plan are considered in the volume calculation.

### 3.0 GIVEN

Approved TCEQ Permit MSW-956B final cover grades and composite lining system grades, expansion design top of waste grades and top of composite lining system grades, and total airspace for approved TCEQ Permits MSW-956A and MSW-956B.

### 4.0 METHOD

Use AutoCAD Civil 3D, a civil engineering software, to compare the expansion top of waste grades to the top of permitted waste grades combined with expansion top of composite lining system grades.

### 5.0 CALCULATIONS

#### 5.1 Previously Approved Airspace Capacities

| Permit | Capacity (CY) | Description |
|---|---|---|
| 956A | 1,027,858 | Pre-Subtitle D Units 1-4 |
| 956B | 16,734,913 | Addition of Units 5 and 6 |

#### 5.2 Expansion Airspace Gained

To determine the expansion volume gained, two surface models are compared: bottom of waste surface developed by combining top of approved TCEQ Permit MSW-956B waste surfaces with expansion top of protective cover surface, and expansion top of waste surfaces.

### *5.2.1 Construction of Overliner option*

Comparison of developed bottom of waste surface (combination of expansion protective cover grades including Overliner with TCEQ Permit MSW-956B waste grades) to expansion top of waste grades (developed from expansion final cover grades and thicknesses of the final cover options).

| Final Cover | Thickness (ft) | Capacity (CY) |
|---|---|---|
| Standard | 3.5 | 68,262,487 |
| Alternative | 2 | 69,246,767 |

### *5.2.2 Relocation of Pre-Subtitle D waste and construction of Unit 8 option*

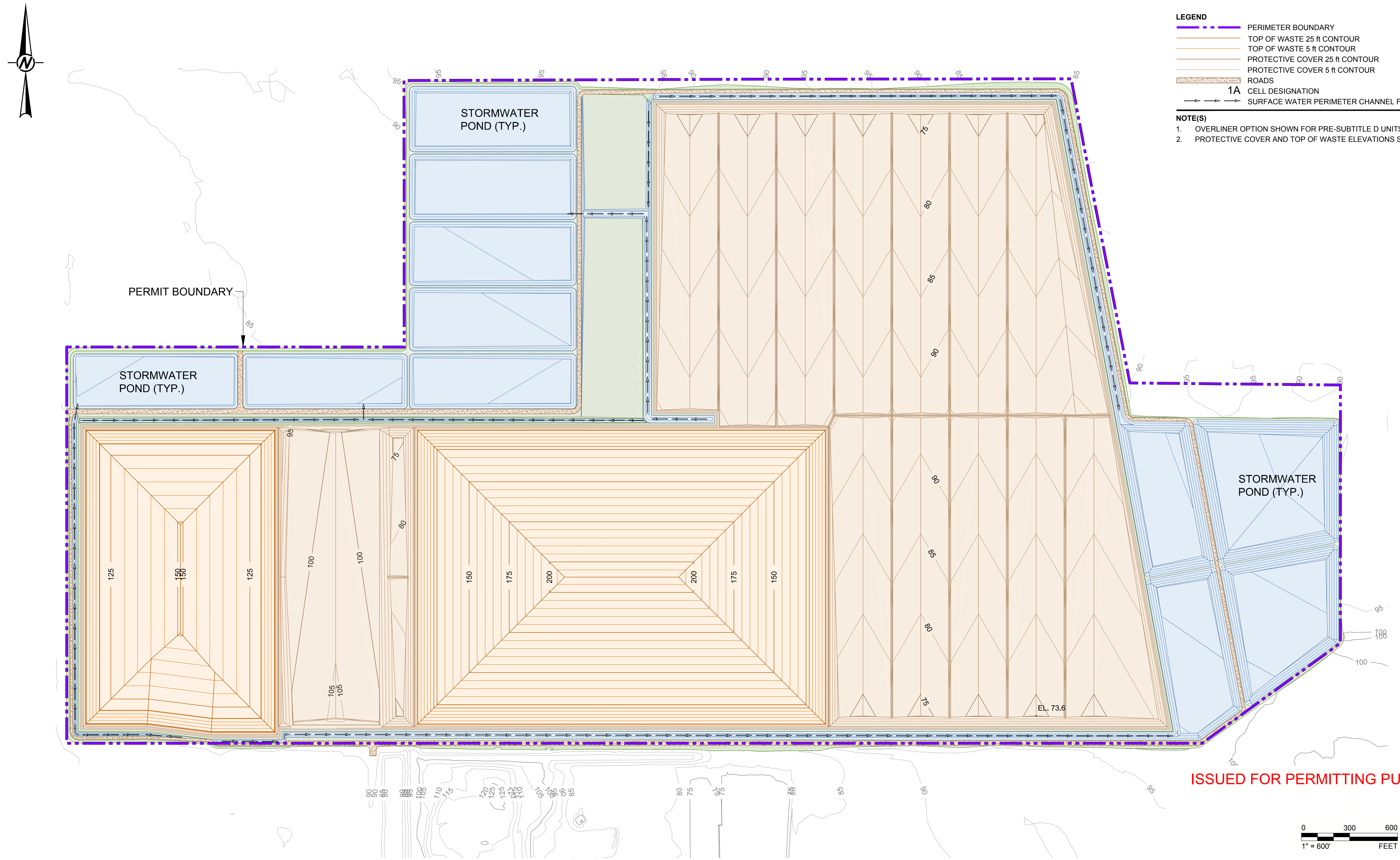
Comparison of developed bottom of waste surface (combination of expansion protective cover grades including Unit 8 with TCEQ Permit MSW-956B waste grades) to expansion top of waste grades (developed from expansion final cover grades and thicknesses of the final cover options). Please note that airspace gained will be reduced by volume of completey removed and relocated Pre-Subtile D waste.

| Final Cover | Thickness (ft) | Volume (CY) | Capacity (CY) |
|---|---|---|---|
| Standard | 3.5 | 69,124,266 | 68,096,408 |
| Alternative | 2 | 70,108,544 | 69,080,686 |

## 6.0 CONCLUSION

The total airspace capacity is the sum of TCEQ Permit MSW-956B and expansion airspace gained.

| Total Airspace (CY) | | Construction Options | |
|---|---|---|---|
| | | *Overliner* | *Unit 8* |
| **Final Cover Options** | *Standard* | 84,997,400 | 84,831,321 |
| | *Alternative* | 85,981,680 | 85,815,599 |




**LEGEND**

- PERIMETER BOUNDARY
- TOP OF WASTE 25 ft CONTOUR
- TOP OF WASTE 5 ft CONTOUR
- PROTECTIVE COVER 25 ft CONTOUR
- PROTECTIVE COVER 5 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. OVERLINER OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. PROTECTIVE COVER AND TOP OF WASTE ELEVATIONS SHOWN.

ISSUED FOR PERMITTING PURPOSES ONLY

0 300 600
1" = 600' FEET

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | MX | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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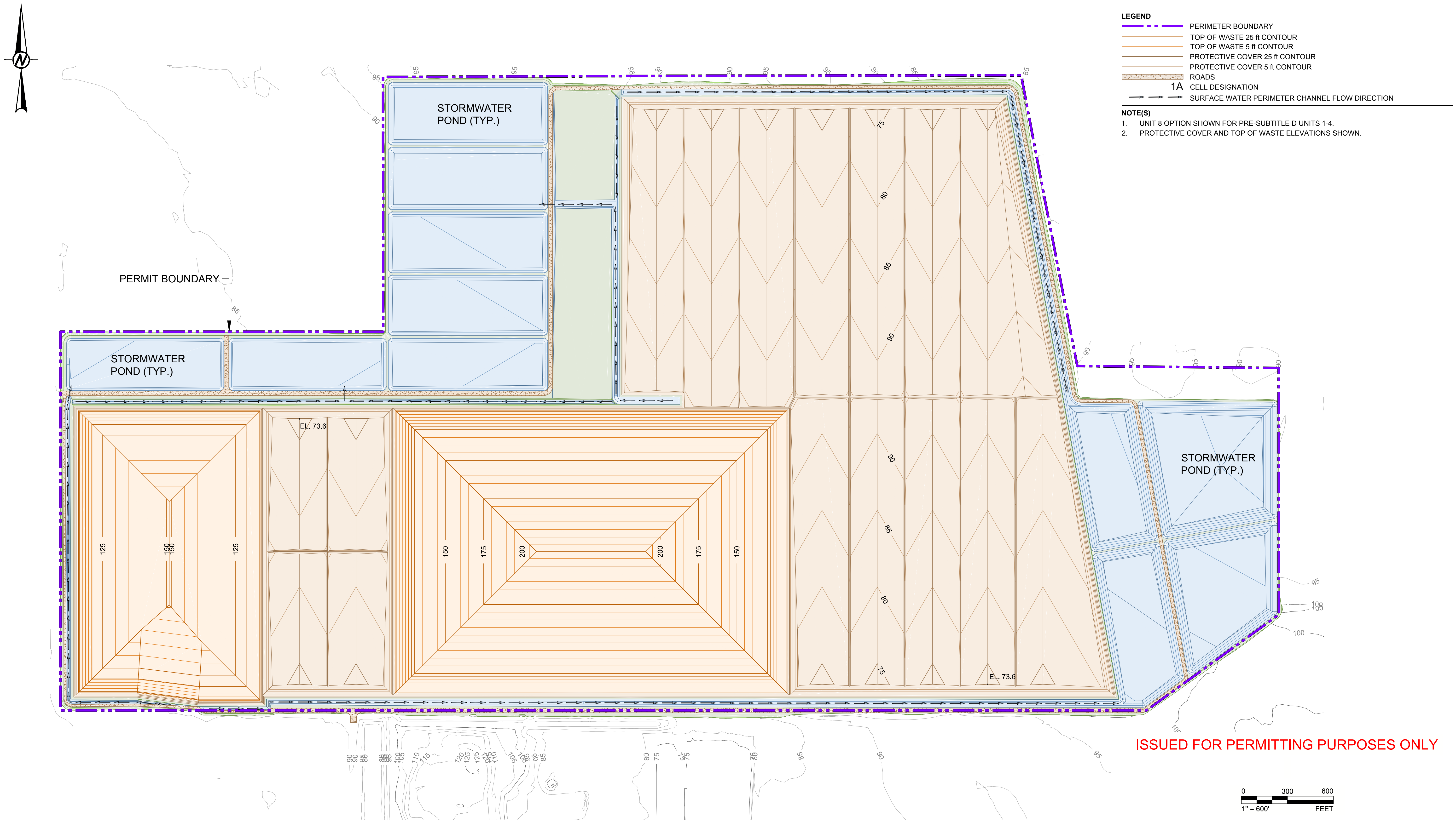
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**BOTTOM OF WASTE LAYOUT**
**OVERLINER OPTION**

| PROJECT NO. | APPLICATION SECTION | REV. | 1 of 4 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3A-1 | 2 | | III3A-1-1 |

1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B




**LEGEND**

- PERIMETER BOUNDARY
- TOP OF WASTE 25 ft CONTOUR
- TOP OF WASTE 5 ft CONTOUR
- PROTECTIVE COVER 25 ft CONTOUR
- PROTECTIVE COVER 5 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. UNIT 8 OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. PROTECTIVE COVER AND TOP OF WASTE ELEVATIONS SHOWN.

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0 300 600
1" = 600' FEET

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
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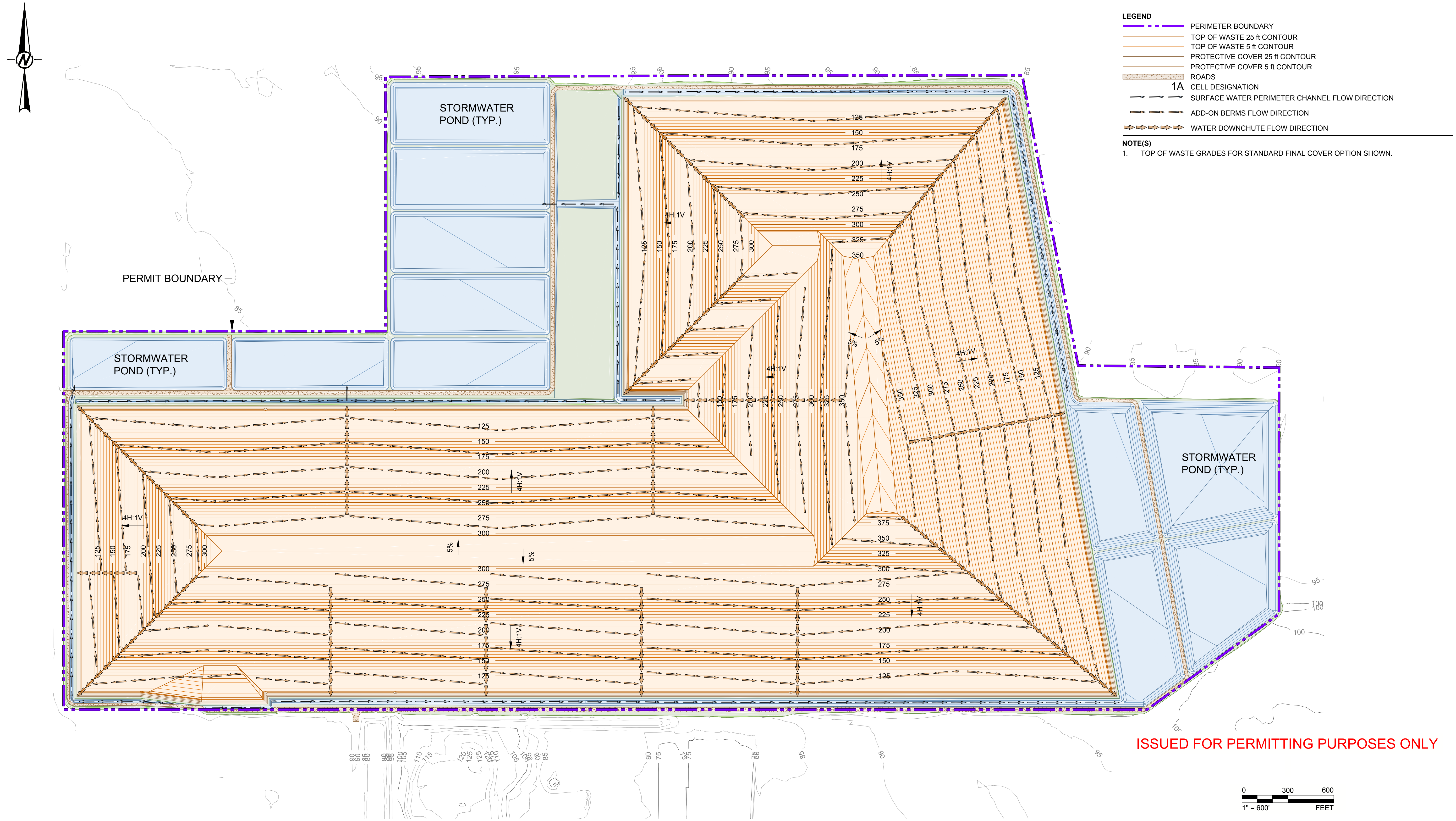
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**BOTTOM OF WASTE LAYOUT**
**UNIT 8 OPTION**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3A-1 | 2 | 2 of 4 | III3A-1-2 |




**LEGEND**

- PERIMETER BOUNDARY
- TOP OF WASTE 25 ft CONTOUR
- TOP OF WASTE 5 ft CONTOUR
- PROTECTIVE COVER 25 ft CONTOUR
- PROTECTIVE COVER 5 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION
- ADD-ON BERMS FLOW DIRECTION
- WATER DOWNCHUTE FLOW DIRECTION

**NOTE(S)**

1. TOP OF WASTE GRADES FOR STANDARD FINAL COVER OPTION SHOWN.

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0 300 600
1" = 600' FEET

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | MX | JBF |
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EDINBURG, HIDALGO COUNTY, TEXAS

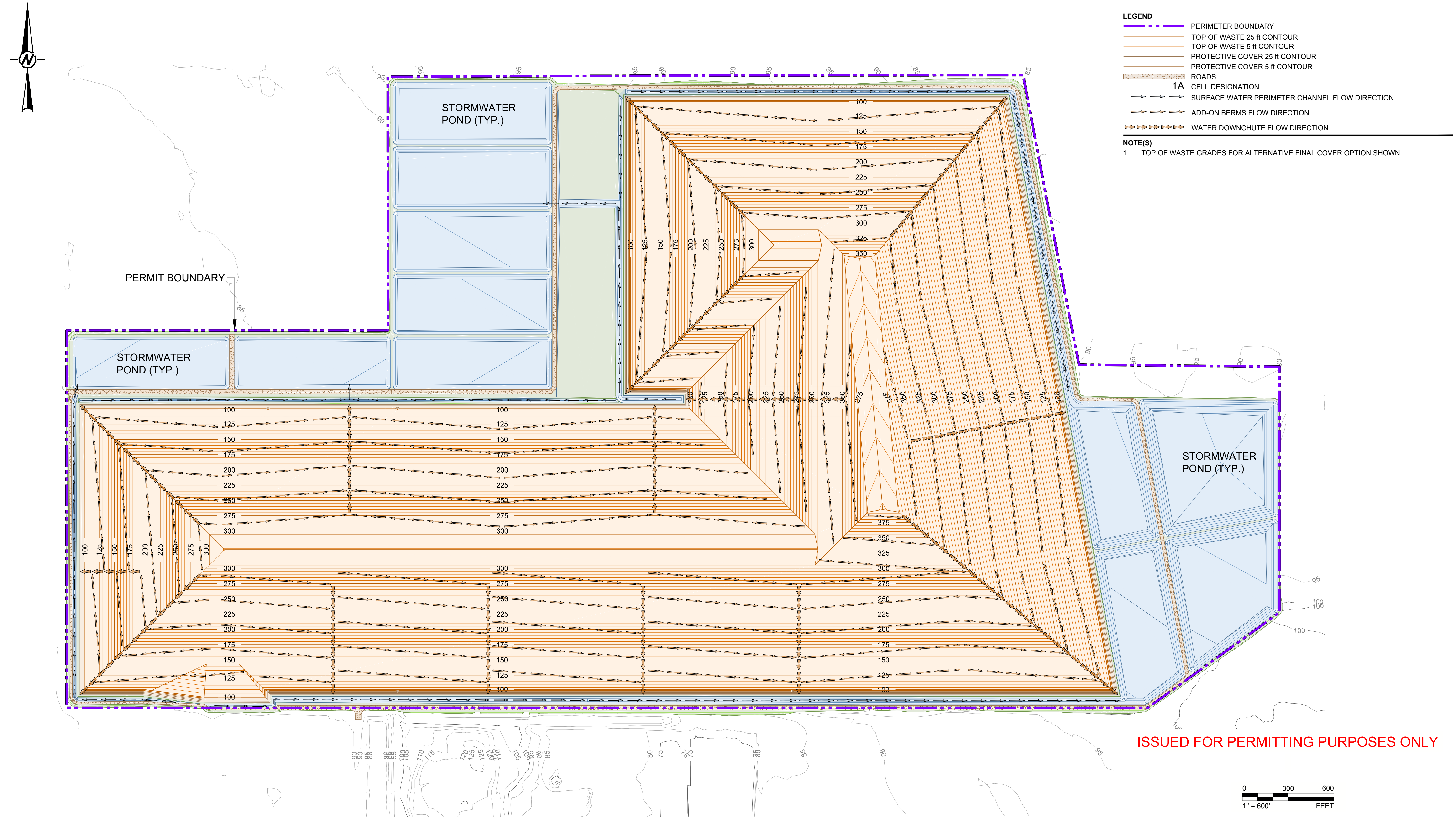
TITLE

**TOP OF WASTE LAYOUT**
**STANDARD FINAL COVER OPTION**

| PROJECT NO. | APPLICATION SECTION | REV. | 3 of 4 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3A-1 | 2 | | III3A-1-3 |

Path: \\houston\drafting_2014\1401491 - city of edinburg\PRODUCTION\A - Permit Amendment Application | File Name: 1401491A196.dwg | Last Edited By: tbookout Date: 2017-11-02 Time:5:09:20 PM | Printed By: creland Date: 2018-01-11 Time:8:58:38 PM

1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B




**LEGEND**

- PERIMETER BOUNDARY
- TOP OF WASTE 25 ft CONTOUR
- TOP OF WASTE 5 ft CONTOUR
- PROTECTIVE COVER 25 ft CONTOUR
- PROTECTIVE COVER 5 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION
- ADD-ON BERMS FLOW DIRECTION
- WATER DOWNCHUTE FLOW DIRECTION

**NOTE(S)**

1. TOP OF WASTE GRADES FOR ALTERNATIVE FINAL COVER OPTION SHOWN.

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|---|---|---|---|---|---|---|
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EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**TOP OF WASTE LAYOUT**
**ALTERNATIVE FINAL COVER OPTION**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3A-1 | 2 | 4 of 4 | III3A-1-4 |

1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

**APPENDIX III3A-2**

**SITE LIFE CALCULATIONS**

## SITE LIFE CALCULATIONS

Made by: CEI
Checked by: MX
Reviewed by: JBF

### 1.0 SUMMARY

The site life is: 62.8 yrs or until Jun 2079


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### 2.0 OBJECTIVE

To determine the anticipated site life based on airspace volume calculations, current disposal capacity (i.e. airspace) consumed, estimated waste receipts, and projected growth rates.

### 3.0 GIVEN

| **FY 2015 Annual Report MSW-956B** | **Date 8/31/2016** |
|---|---|
| Current annual waste receipt | 494,319 tons |
| Compacted waste density | 1215 lbs/CY |
| Total Airspace | 16,734,913 CY |
| Remaining Capacity | 5,738,691 CY |
| Airspace Consumed | 10,996,222 CY |

| **Total Airspace** | | **Construction Options** | |
|---|---|---|---|
| | | *Overliner* | *Unit 8* |
| **Final Cover Options** | *Prescriptive* | 84,997,400 | 84,831,321 |
| | *Alternate* | 85,981,680 | 85,815,599 |

### 4.0 ASSUMPTIONS

| | |
|---|---|
| Growth Rate | 1.75% |
| Compacted in-place waste density | 1,500 lbs/CY |

### 5.0 CALCULATIONS

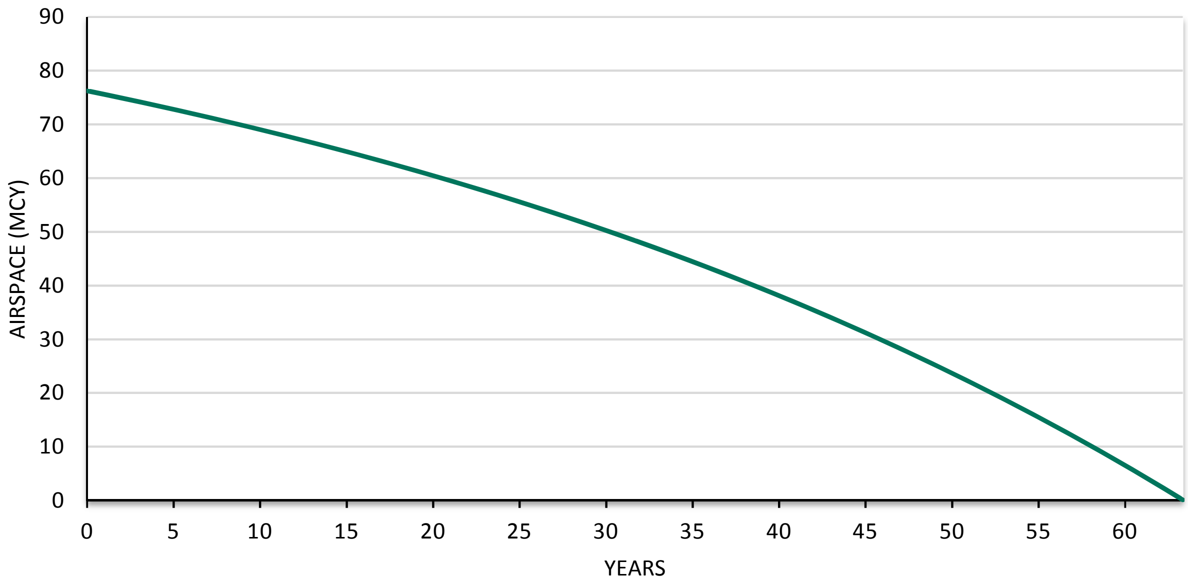
The site life, number of years to consume total airspace, can be determined by solving the following equation:

$$A_T = \sum_n A_C(1+R)^n$$

where

| | | | |
|---|---|---|---|
| $A_T$ = | Total remaining airspace | $A_T$ = | 74,985,458 CY |
| $A_C$ = | Initial annual airspace consumed | $A_C$ = | 659,092 CY/yr |
| R = | Growth Rate | R = | 1.0175 |
| *n* = | Site life in years | *n* = | **62.8** years |

## SITE LIFE


AIRSPACE (MCY)
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
55
60
YEARS

# APPENDIX III3B

## WASTE MANAGEMENT UNIT DESIGN ANALYSES

# APPENDIX III3B-1

# SETTLEMENT ANALYSIS


**LEGEND**

- PERIMETER BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. OVERLINER OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. SUBGRADE ELEVATIONS SHOWN.
3. TOP OF THE LINER ELEVATIONS IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS ARE 2 ft LOWER THAN ELEVATION OF THE LOW POINT ON THE LINER.
4. LOW POINT ON CELL LINER AT THE EDGE OF SUMP IS 72 ft-msl IN UNIT 7.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | MX | JBF |
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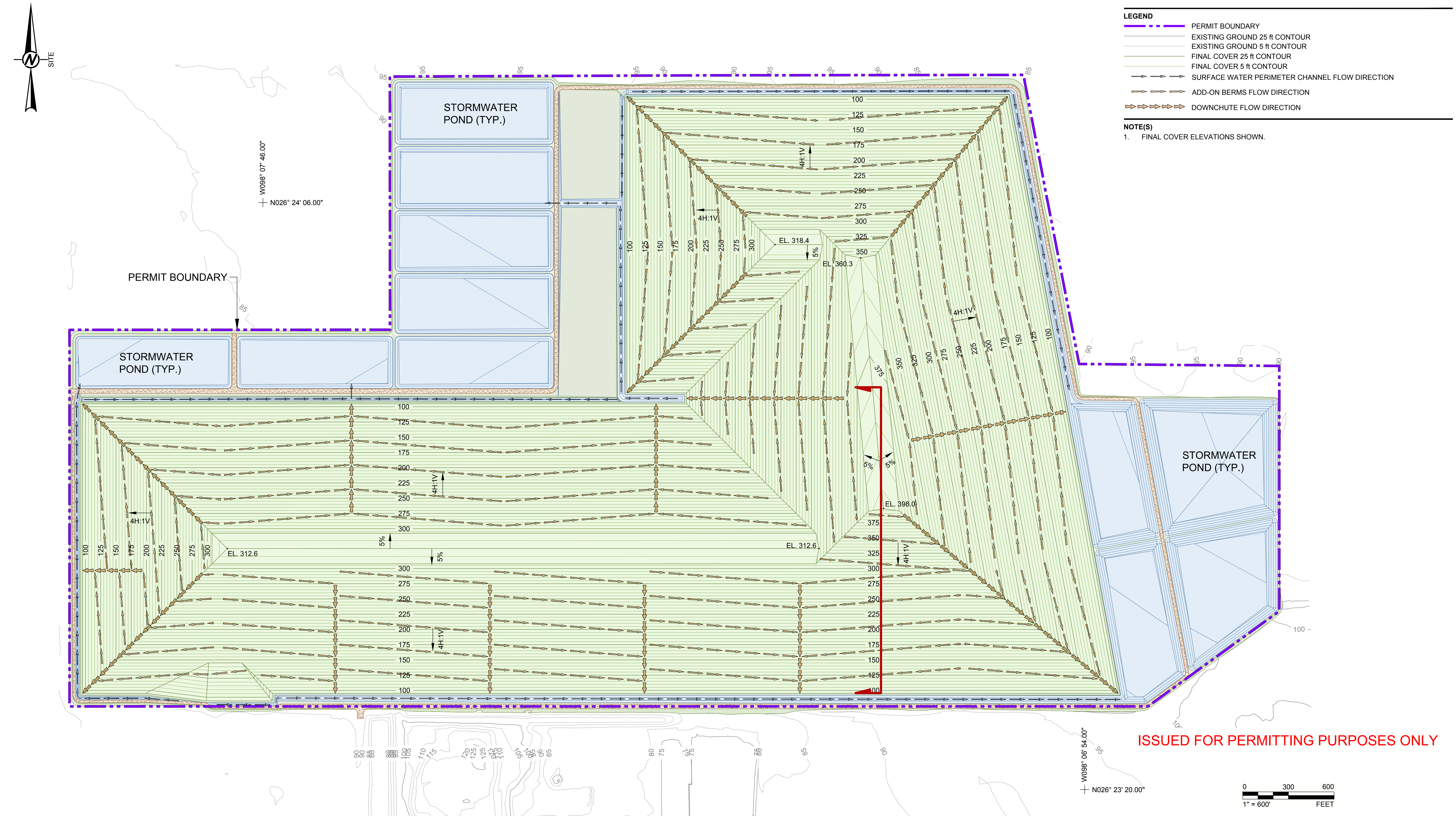
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE

**SETTLEMENT ANALYSIS**
**SUBGRADE LAYOUT**

| PROJECT NO. | APPLICATION SECTION | REV. | 1 of 2 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3B-1 | 2 | | III3B-1-1 |

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TITLE
**SETTLEMENT ANALYSIS** *FINAL CONTOUR MAP*

| PROJECT NO. | APPLICATION SECTION | REV. | 2 of 2 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3B-1 | 2 | | III3B-1-2 |

**APPENDIX III3B-2**

**STABILITY ANALYSIS**

# APPENDIX III3B-2A

# EXCAVATION STABILITY


**LEGEND**

- PERIMETER BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. OVERLINER OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. SUBGRADE ELEVATIONS SHOWN.
3. TOP OF THE LINER ELEVATIONS IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS ARE 2 ft LOWER THAN ELEVATION OF THE LOW POINT ON THE LINER.
4. LOW POINT ON CELL LINER AT THE EDGE OF SUMP IS 72 ft-msl IN UNIT 7.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
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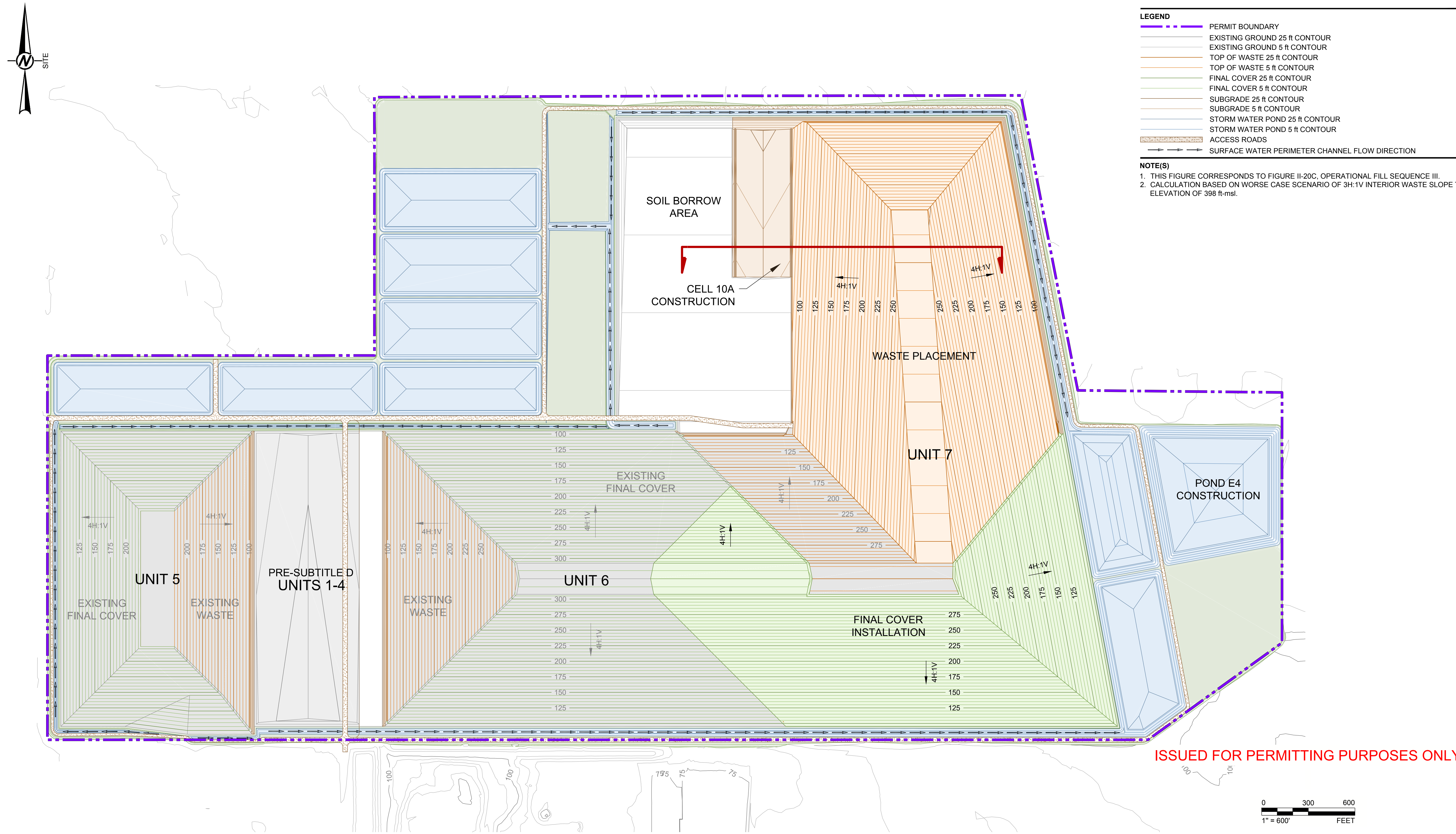
TITLE
**EXCAVATION STABILITY**
**SUBGRADE LAYOUT**

| PROJECT NO. | APPLICATION SECTION | REV. | 1 of 1 FIGURE |
|---|---|---|---|
| 1401491 | III3B-2A | 2 | III3B-2A-1 |




**LEGEND**

- PERMIT BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- TOP OF WASTE 25 ft CONTOUR
- TOP OF WASTE 5 ft CONTOUR
- FINAL COVER 25 ft CONTOUR
- FINAL COVER 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- STORM WATER POND 25 ft CONTOUR
- STORM WATER POND 5 ft CONTOUR
- ACCESS ROADS
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. THIS FIGURE CORRESPONDS TO FIGURE II-20C, OPERATIONAL FILL SEQUENCE III.
2. CALCULATION BASED ON WORSE CASE SCENARIO OF 3H:1V INTERIOR WASTE SLOPE TO ELEVATION OF 398 ft-msl.

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0 300 600
1" = 600' FEET

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
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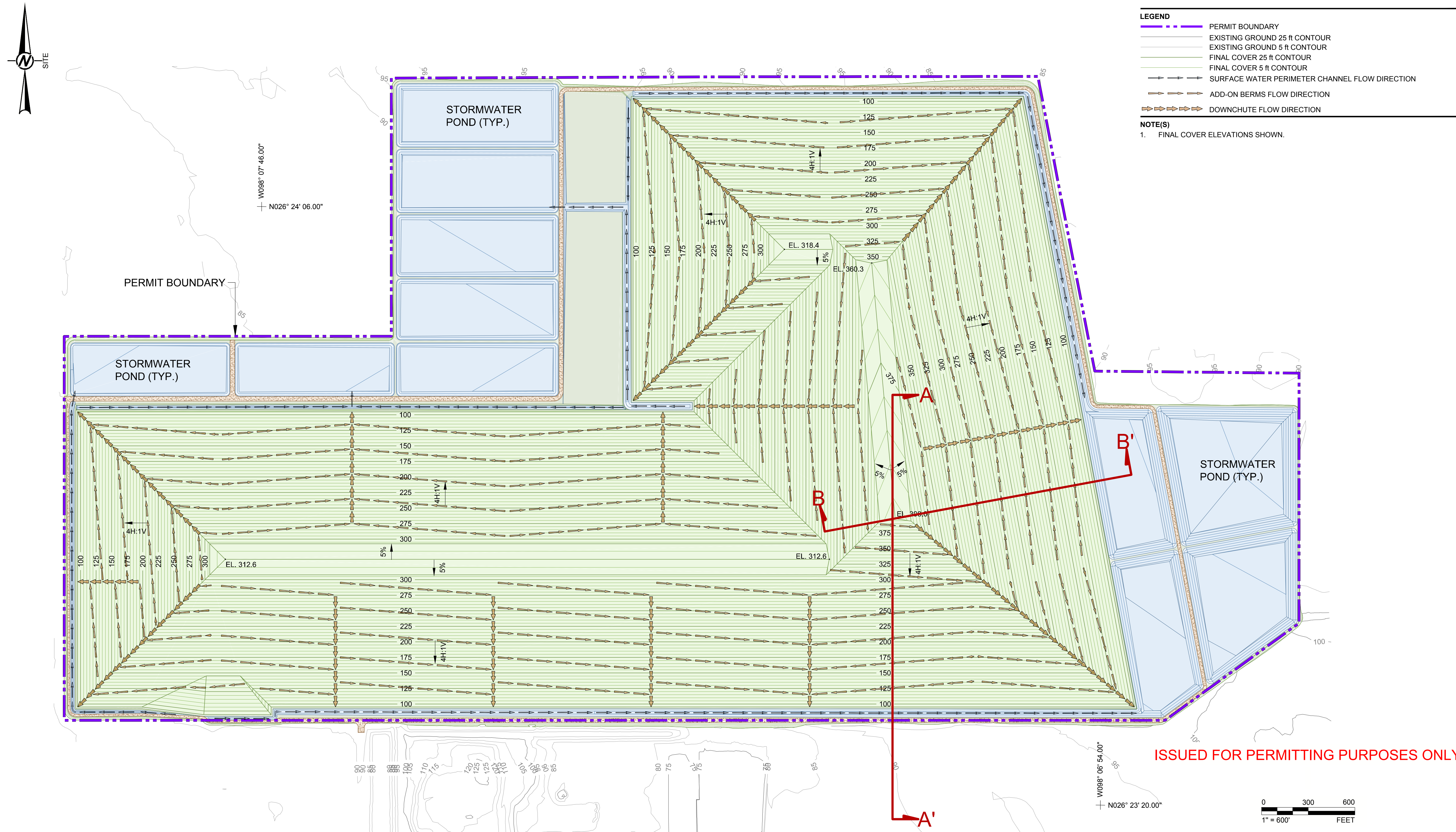
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**INTERIOR WASTE SLOPE STABILITY**
**OPERATIONAL FILL SEQUENCE III**

| PROJECT NO. | APPLICATION SECTION | REV. | 1 of 1 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3B-2C | 2 | | III3B-2C-1 |

**APPENDIX III3B-2D**

**FINAL-FILLED CONFIGURATION STABILITY**




**LEGEND**

- PERMIT BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- FINAL COVER 25 ft CONTOUR
- FINAL COVER 5 ft CONTOUR
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION
- ADD-ON BERMS FLOW DIRECTION
- DOWNCHUTE FLOW DIRECTION

**NOTE(S)**

1. FINAL COVER ELEVATIONS SHOWN.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | MX | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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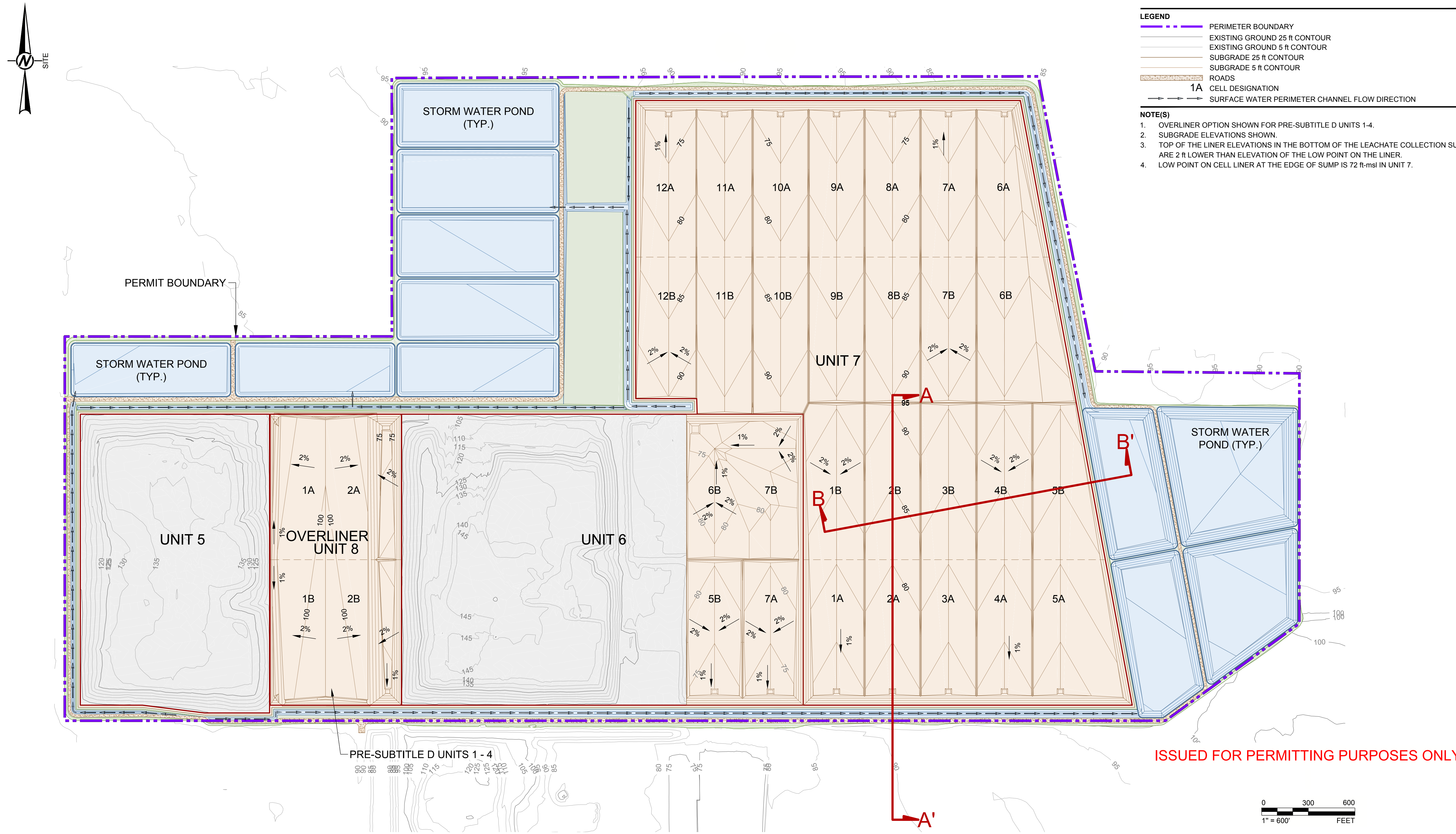
PROJECT
EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**FINAL FILLED CONFIGURATION STABILITY** *SUBGRADE LAYOUT*

| PROJECT NO. | APPLICATION SECTION | REV. | 1 of 2 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3B-2D | 2 | | III3B-2D-1 |




**LEGEND**

| | |
|---|---|
| | PERIMETER BOUNDARY |
| | EXISTING GROUND 25 ft CONTOUR |
| | EXISTING GROUND 5 ft CONTOUR |
| | SUBGRADE 25 ft CONTOUR |
| | SUBGRADE 5 ft CONTOUR |
| | ROADS |
| 1A | CELL DESIGNATION |
| | SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION |

**NOTE(S)**

1. OVERLINER OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. SUBGRADE ELEVATIONS SHOWN.
3. TOP OF THE LINER ELEVATIONS IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS ARE 2 ft LOWER THAN ELEVATION OF THE LOW POINT ON THE LINER.
4. LOW POINT ON CELL LINER AT THE EDGE OF SUMP IS 72 ft-msl IN UNIT 7.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | MX | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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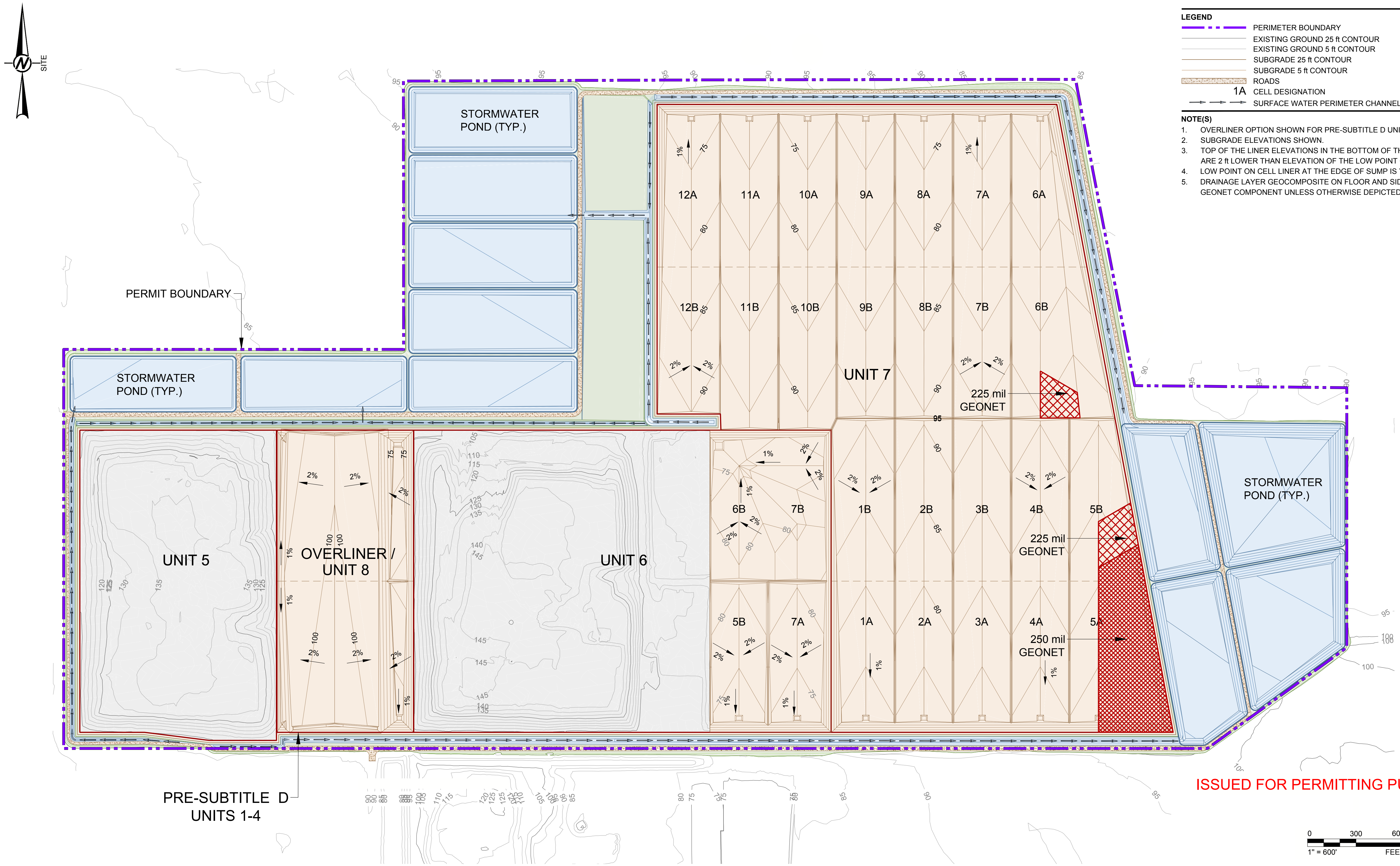
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**FINAL FILLED CONFIGURATION STABILITY**
**FINAL CONTOUR MAP**

| PROJECT NO. | APPLICATION SECTION | REV. | 2 of 2 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3B-2D | 2 | | III3B-2D-2 |

# APPENDIX III3D-1

# HELP MODEL EVALUATION




**LEGEND**

- PERIMETER BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. OVERLINER OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. SUBGRADE ELEVATIONS SHOWN.
3. TOP OF THE LINER ELEVATIONS IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS ARE 2 ft LOWER THAN ELEVATION OF THE LOW POINT ON THE LINER.
4. LOW POINT ON CELL LINER AT THE EDGE OF SUMP IS 72 ft-msl IN UNIT 7.
5. DRAINAGE LAYER GEOCOMPOSITE ON FLOOR AND SIDESLOPES WILL HAVE A 200 mil GEONET COMPONENT UNLESS OTHERWISE DEPICTED.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**HELP MODEL EVALUATION**
**SUBGRADE LAYOUT**

| PROJECT NO. | APPLICATION SECTION | REV. | 1 of 1 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3D-1 | 2 | | III3D-1-1 |

**APPENDIX III3E-1**

**SUFFICIENT BALLAST CALCULATIONS**


**LEGEND**

- PERIMETER BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- SEASONAL HIGH GROUNDWATER 5 ft CONTOUR
- SEASONAL HIGH GROUNDWATER 1 ft CONTOUR
- 1A CELL DESIGNATION
- 13 BALLAST EVALUATION POINT
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. SUBGRADE ELEVATIONS SHOWN.
2. LOW POINT ON CELL LINER AT THE EDGE OF SUMP IS 72 ft-msl.
3. SEASONAL HIGH GROUNDWATER ELEVATIONS AS OF DECEMBER 2016.
4. REQUIRED WASTE THICKNESS CALCULATIONS WILL NEED TO BE UPDATED IF SEASONAL GROUNDWATER ELEVATIONS INCREASE.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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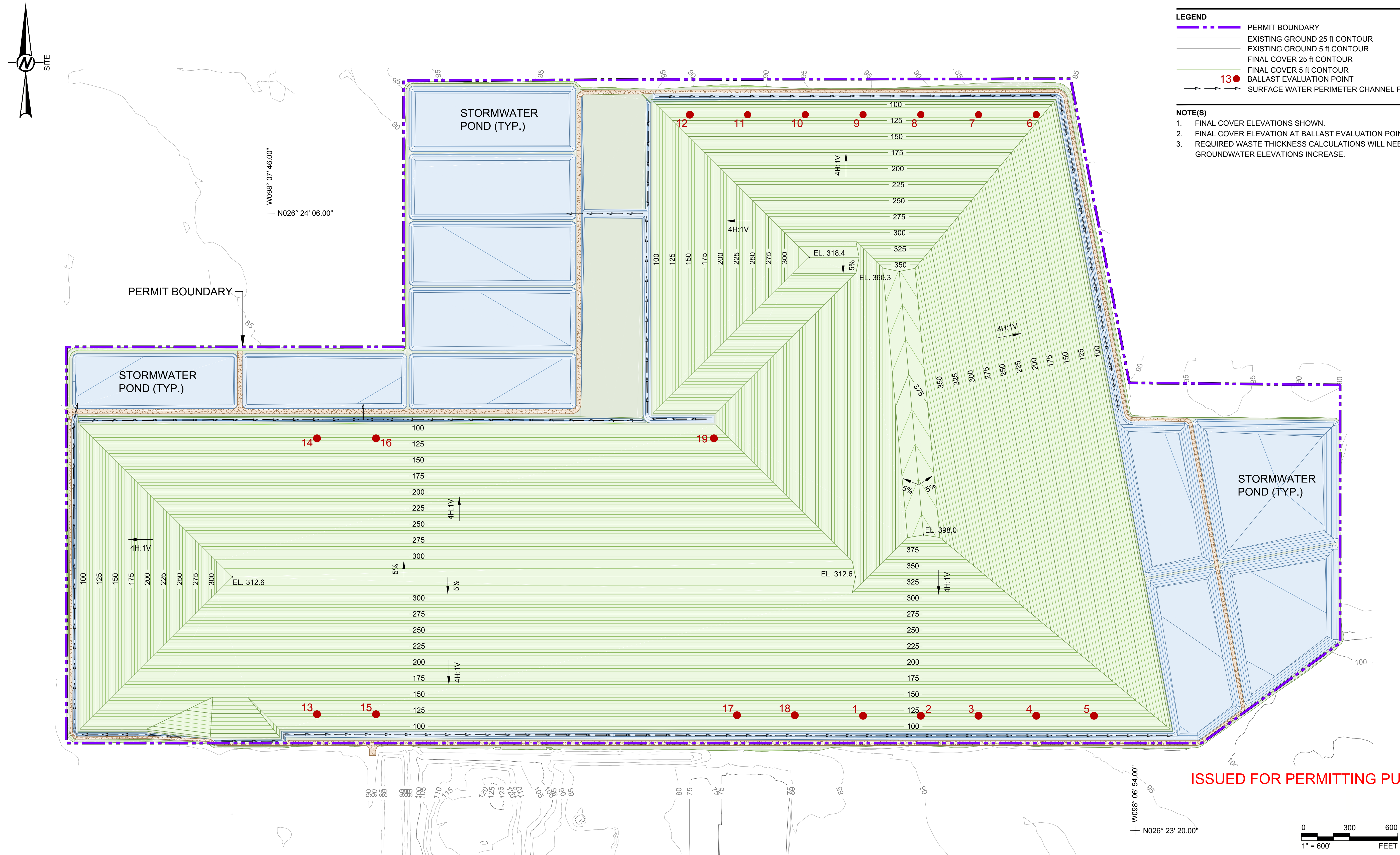
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**SUFFICIENT BALLAST EVALUATION**
**SUBGRADE LAYOUT**

| PROJECT NO. | APPLICATION SECTION | REV. | | FIGURE |
|---|---|---|---|---|
| 1401491 | III3E-1 | 2 | 1 of 2 | III3E-1-1 |




**LEGEND**

- PERMIT BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- FINAL COVER 25 ft CONTOUR
- FINAL COVER 5 ft CONTOUR
- 13 ● BALLAST EVALUATION POINT
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. FINAL COVER ELEVATIONS SHOWN.
2. FINAL COVER ELEVATION AT BALLAST EVALUATION POINT IS 120 ft-msl.
3. REQUIRED WASTE THICKNESS CALCULATIONS WILL NEED TO BE UPDATED IF SEASONAL GROUNDWATER ELEVATIONS INCREASE.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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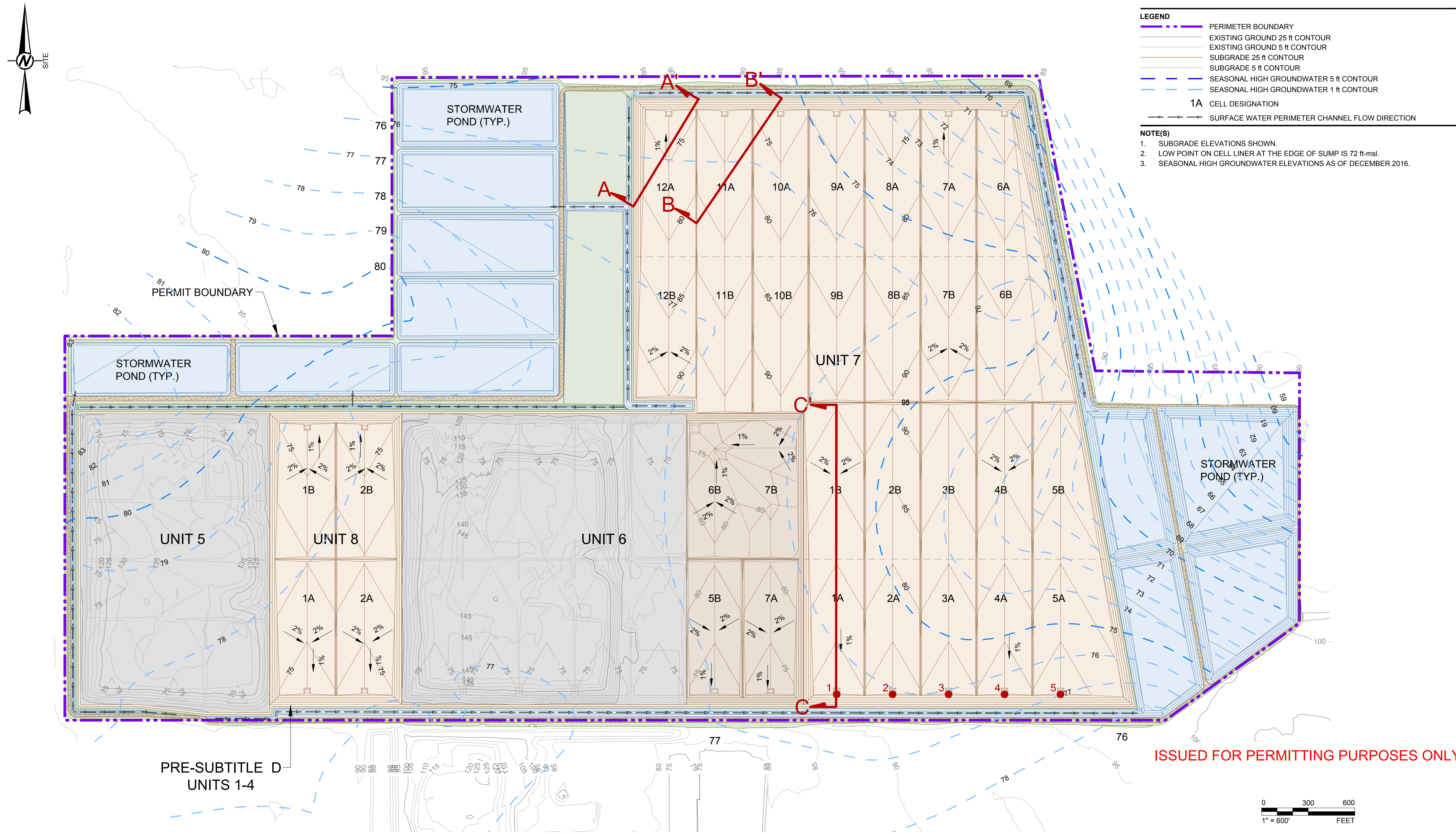
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**SUFFICIENT BALLAST EVALUATION**
**FINAL CONTOUR MAP**

| PROJECT NO. | APPLICATION SECTION | REV. | 2 of 2 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3E-1 | 2 | | III3E-1-2 |

**APPENDIX III3E-2A**

**UNDERDRAIN SEEPAGE CALCULATION**




**LEGEND**

- PERIMETER BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- SEASONAL HIGH GROUNDWATER 5 ft CONTOUR
- SEASONAL HIGH GROUNDWATER 1 ft CONTOUR
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. SUBGRADE ELEVATIONS SHOWN.
2. LOW POINT ON CELL LINER AT THE EDGE OF SUMP IS 72 ft-msl.
3. SEASONAL HIGH GROUNDWATER ELEVATIONS AS OF DECEMBER 2016.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | MX | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | AA | MX | JBF |

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EDINBURG, HIDALGO COUNTY, TEXAS

TITLE

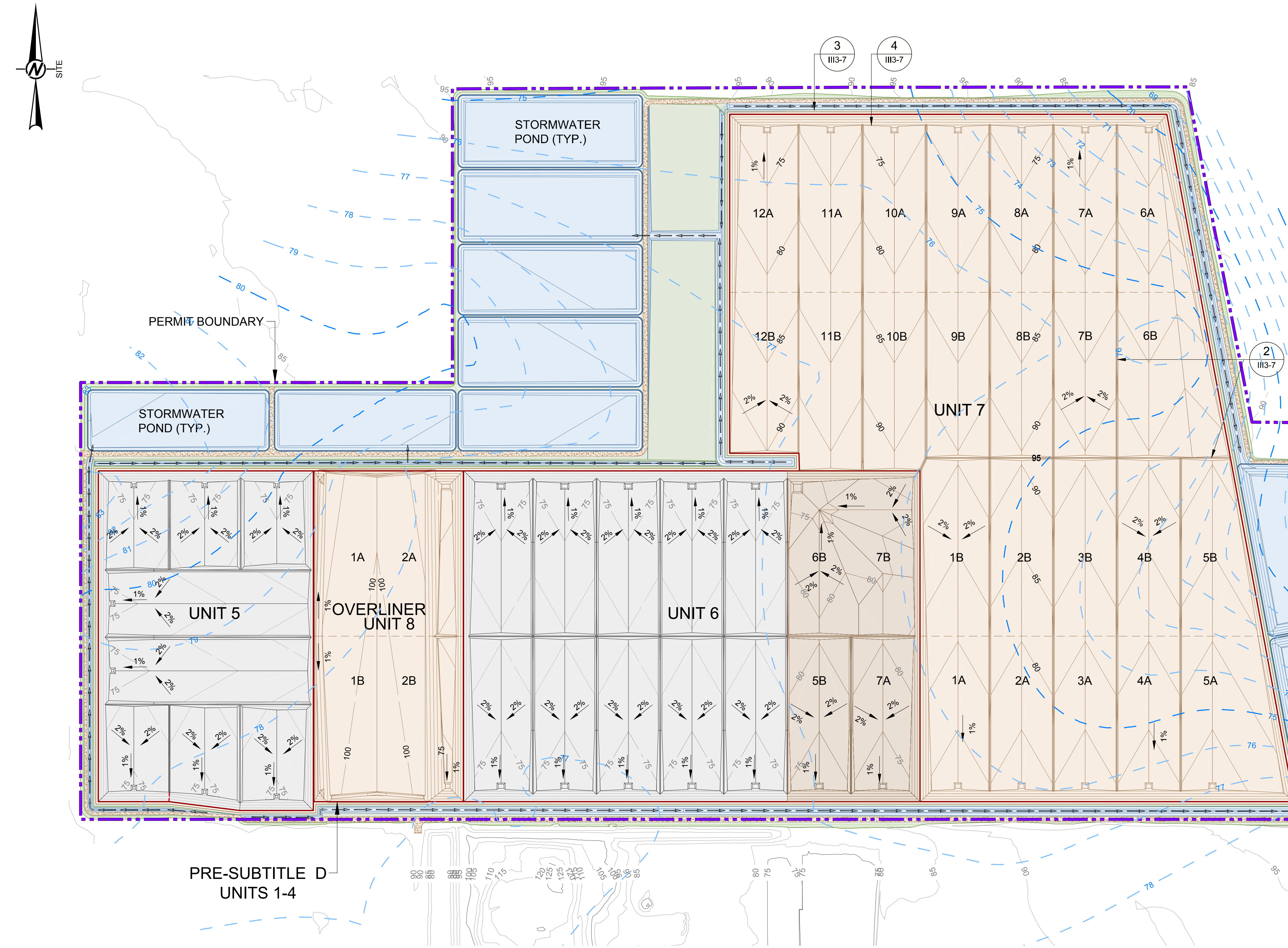
**UNDERDRAIN SEEPAGE**
**SUBGRADE LAYOUT AND SEASONAL HIGH GROUNDWATER MAP**

| PROJECT NO. | APPLICATION SECTION | REV. | FIGURE |
|---|---|---|---|
| 1401491 | III3E-2A | 2 | III3E-2A-1 |

1 of 1

# APPENDIX III-3F-3A

# UNDERDRAIN SEEPAGE CALCULATION




**LEGEND**

- PERIMETER BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- SEASONAL HIGH GROUNDWATER 5 ft CONTOUR
- SEASONAL HIGH GROUNDWATER 1 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. OVERLINER OPTION SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. SUBGRADE ELEVATIONS SHOWN.
3. TOP OF THE LINER ELEVATIONS IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS ARE 2 ft LOWER THAN ELEVATION OF THE LOW POINT ON THE LINER.
4. THE LOW POINT ON CELL LINER AT THE EDGE OF LEACHATE COLLECTION SUMP FOR UNITS 6 AND 7 IS 72 ft-MSL.
5. THE ELEVATION OF DEEPEST EXCAVATION (EDE) LOCATED IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS FOR UNITS 6 AND 7 IS 70 ft-MSL.
6. THE ELEVATION OF THE DEEPEST EXCAVATION (EDE) FOR THE FACILITY IS 70 ft-msl LOCATED AT THE BOTTOM OF THE LEACHATE COLLECTION SUMPS FOR EACH CELL WITHIN UNITS 6, 7, AND 8 AS DEPICTED ON FIGURES III3-2A AND III3-2B. IN ADDITION, THE NOTES ON THE AFOREMENTIONED FIGURES HAVE BEEN REVISED TO CLARIFY THE LOCATIONS OF THE EDE.
7. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/2014.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | JBF | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | TNB | JBF | CGD |

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PROJECT

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PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

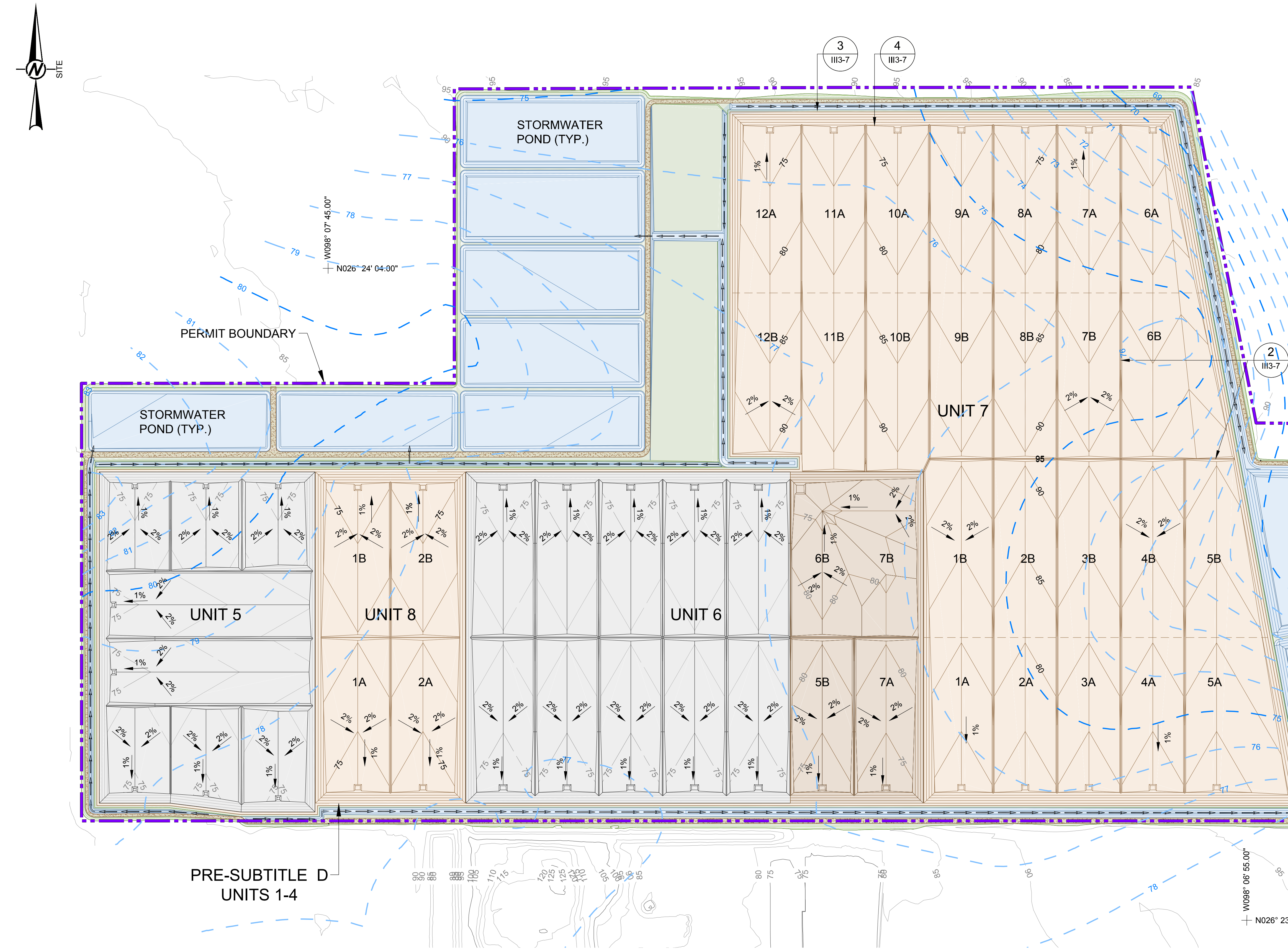
TITLE

**SUBGRADE LAYOUT PLAN OVERLINER OPTION WITH SEASONAL HIGH GROUNDWATER**

| PROJECT NO. | APPLICATION SECTION | REV. | 3 of 4 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3F | 2 | | III3F-3A |

**APPENDIX III-3F-3B**

**UNDERDRAIN PIPE SIZING CALCULATION**




**LEGEND**

- PERIMETER BOUNDARY
- EXISTING GROUND 25 ft CONTOUR
- EXISTING GROUND 5 ft CONTOUR
- SUBGRADE 25 ft CONTOUR
- SUBGRADE 5 ft CONTOUR
- SEASONAL HIGH GROUNDWATER 5 ft CONTOUR
- SEASONAL HIGH GROUNDWATER 1 ft CONTOUR
- ROADS
- 1A CELL DESIGNATION
- SURFACE WATER PERIMETER CHANNEL FLOW DIRECTION

**NOTE(S)**

1. UNIT 8 OPTION (WASTE EXCAVATION) SHOWN FOR PRE-SUBTITLE D UNITS 1-4.
2. SUBGRADE ELEVATIONS SHOWN.
3. THE LOW POINT ON CELL LINER AT THE EDGE OF LEACHATE COLLECTION SUMP FOR UNITS 6 AND 7 IS 72 ft-MSL.
4. THE ELEVATION OF DEEPEST EXCAVATION (EDE) LOCATED IN THE BOTTOM OF THE LEACHATE COLLECTION SUMPS FOR UNITS 6 AND 7 IS 70 ft-MSL.
5. THE ELEVATION OF THE DEEPEST EXCAVATION (EDE) FOR THE FACILITY IS 70 ft-msl LOCATED AT THE BOTTOM OF THE LEACHATE COLLECTION SUMPS FOR EACH CELL WITHIN UNITS 6, 7, AND 8 AS DEPICTED ON FIGURES III3-2A AND III3-2B. IN ADDITION, THE NOTES ON THE AFOREMENTIONED FIGURES HAVE BEEN REVISED TO CLARIFY THE LOCATIONS OF THE EDE.
6. EXISTING TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 07/24/2014.

| REV. | YYYY-MM-DD | DESCRIPTION | DESIGNED | PREPARED | REVIEWED | APPROVED |
|---|---|---|---|---|---|---|
| 2 | 2018-01-11 | RESPONSE TO TCEQ SECOND NOTICE OF DEFICIENCY | CEI | TNB | CEI | JBF |
| 1 | 2017-11-07 | RESPONSE TO TCEQ FIRST NOD | CEI | TNB | JBF | JBF |
| 0 | 2017-07-21 | PERMIT AMENDMENT APPLICATION SUBMITTAL | CEI | TNB | JBF | CGD |

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EDINBURG REGIONAL DISPOSAL FACILITY
PERMIT AMENDMENT APPLICATION TCEQ PERMIT MSW-956C
EDINBURG, HIDALGO COUNTY, TEXAS

TITLE
**SUBGRADE LAYOUT PLAN UNIT 8 OPTION WITH SEASONAL HIGH GROUNDWATER**

| PROJECT NO. | APPLICATION SECTION | REV. | 4 of 4 | FIGURE |
|---|---|---|---|---|
| 1401491 | III3F | 2 | | III3F-3B |