City of Laredo Landfill Permit Amendment 1693B
City of Laredo, Texas
Permit Amendment MSW Permit 1693B
Laredo, Texas
Webb County, Texas
August 2014

PART III
Site Development Plan

August 2014
Revised June 2015

STATE OF TEXAS
STEVEN B. HENIFORD
66257
LICENSED
PROFESSIONAL ENGINEER

TX F-10098

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6/18/15

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1.0 Introduction

The City of Laredo (City) owns and operates the City of Laredo Landfill ("Landfill"), a 200-acre Type I Municipal Solid Waste Facility in Webb County, Texas. The Landfill is located within the City limits approximately 2.0 miles east of the intersection of State Highway 359 and Loop 20. This permit amendment seeks to increase the size of the Landfill by 3.12 acres and to increase the height of the Landfill. In addition, the City will also seek to increase the capacity of the Landfill by utilizing area that was previously used for a pipeline that has since been abandoned. This Site Development Plan, along with corresponding attachments provides a description of the design of the Landfill and plans for the protection of water and air quality. Specific Attachments to the SDP include the following.

Table III.1

List of Attachments to the Site Development Plan

Permit Amendment Part III – 1	Site Layout Plan
Permit Amendment Part III – 2	Fill Cross Sections
Permit Amendment Part III – 3	Existing Contours
Permit Amendment Part III – 4	Geology Report
Permit Amendment Part III – 5	Groundwater Characterization
Permit Amendment Part III – 6	Surface Water Protection / Drainage
Permit Amendment Part III – 7	Final Contour Map
Permit Amendment Part III – 8	Cost Est. for Closure/Post Closure
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Permit Amendment Part III – 10	Soil Liner Quality Control Plan
Permit Amendment Part III – 11	Groundwater Sampling and Analysis Plan
Permit Amendment Part III – 12	Final Closure Plan
Permit Amendment Part III – 13	Post Closure Plan
Permit Amendment Part III – 14	Landfill Gas Management Plan
Permit Amendment Part III – 15	Leachate and Contaminated Water Control Plan

1.1 Permit History

The initial Landfill permit was approved by the Texas Natural Resource Conservation Commission (TNRCC) on March 10, 1986. The permit was subsequently amended as Permit No. MSW-1693A on September 15, 1999 which raised the maximum elevation from 548' mean sea level (msl) to 640.5' msl. The permit has subsequently been modified since the amendment was approved. Some of the key modifications include the following.

- Permit Modification was issued on November 13, 2000 for revisions to the Site Layout Plan to add a clean branches storage area, leachate storage tank, used tire storage area and white goods storage area.

- Permit Modification was issued on August 29, 2001 for revisions to the Site Layout Plan to add scales and a new scalehouse.

- Permit Modification was issued on September 3, 2003 for revisions to the Site Layout Plan to add a third scale.

- Permit Modification was issued in 2006 to update the groundwater sampling program to comply with Subchapter J of TCEQ Landfill Regulations.

- Permit Modifications were issued in 2006 to upgrade the Site Operating Plan (SOP) and to update the Surface Water Protection Plan.

- Multiple Permit Modifications were issued from 2001 to 2005 to upgrade the Gas Management Plan.

2.0 Waste Characteristics & Quantities 305.45(a)(B)(i) & 305.45 (a)(8)(B)(ii)

2.1 Waste Characteristics & Historic Quantities 305.45(a)(8)(B)(ii)

The Landfill is authorized to accept municipal solid waste ("MSW") resulting from or incidental to municipal, community, commercial, institutional and recreational activities; MSW resulting from Class 4 construction or demolition projects; Class 2 nonhazardous industrial solid waste; Class 3 nonhazardous industrial solid waste; and special waste that has been properly identified and approved by TCEQ. The acceptance of Class 2 industrial solid waste and/or special waste is contingent upon such waste being handled in accordance with the Landfill's Site Operating Plan (SOP).

The annual quantities of waste received and reported by the City to the Texas Commission on Environmental Quality (TCEQ) have ranged between approximately 315,000 tons and 377,000 tons for the period 2003 to 2012 (Table III.2). As is shown in Table III.2, the rate of disposal has remained relatively constant. Factors that may affect future disposal quantities include the success of the City's recycling program, the amount of housing development planned in the area, and economic development and population growth. In determining future landfill needs, a constant per capita waste generation rate has been assumed.

Table III.2
MSW Quantities Disposed 2003-2012

Year	Tons/Year Disposed	Estimated Remaining Cubic Yards (millions)	Estimated Remaining Tons (millions)
2003	316,554	11.2	6.41
2004	343,950	10.1	6.06
2005	345,303	9.5	5.72
2006	370,845	8.9	5.35
2007	363,916	8.3	4.98
2008	377,504	7.7	4.60
2009	346,504	6.6	4.26
2010	326,554	6.1	3.94
2011	335,024	6.0*	3.93
2012	334,502	5.6	3.6

Source: TCEQ. Municipal Solid Waste in Texas: A Year in Review. (2003-2012Reports)
**Recalculated to account for updated topographic information*

The City does accept certain non-hazardous industrial wastes in compliance with its approved Site Operating Plan. The City requires that generators of these wastes submit a written form prior to delivering the waste to the Landfill. The generator must identify the types of materials, chemical characteristics, and a description of the process by which they were generated. The City reserves the right to accept or reject the loads of special wastes. These special waste deliveries also undergo additional screening, as described in the SOP when they are delivered to the Landfill. The Landfill Manager will evaluate if any special handling at the working face is required for the special wastes which are described in the SOP.

Wastes that are ***prohibited*** at the site include Class 1 Industrial Solid Waste until it complies with the requirements of §30 TAC 330.171. Regulated hazardous waste, except for waste from conditionally exempt small quantity generators, will not be accepted at the facility. PCB wastes as defined in §30 TAC 330.2, Class 2 and Class 3 industrial solid waste that interferes with the site operations, radioactive wastes, lead-acid batteries, CFC-containing equipment, whole tires, and used oil and oil filters are not be accepted at the facility.

2.2 Waste Quantity Projections 305.45(a)(8)(B)(i)

For the purposes of determining waste generation quantities for the near-term, a waste generation rate of 6.6 pounds per capita per day is used and applied to population forecasts developed by the State of Texas Real Estate Center – Texas A&M University. Table III.3 presents the forecasted annual tons, average daily tons and peak daily tons for the period 2014 – 2036. The average tons per day (tpd) is derived by dividing annual tonnage by 312 days (52 weeks times 6 days per week operation). The Landfill is authorized to operate seven days per week; however, the City typically only operates on a six day per week schedule.

The City provides twice per week solid waste collection. Typically, a significantly larger quantity of waste is accepted at the Landfill on Monday and Tuesday. This is due to the fact that the City collects residential waste on Monday and Tuesday and collects recyclables on Thursday and Friday. No residential material or waste is typically collected on Wednesday. Also, there are seasonal variations in the amount of waste generated. A review of historic records of daily waste logs for the year 2011-12, shows that the daily peak was approximately 50% higher than the average accepted, excluding Saturday when there is minimal residential waste taken to the Landfill. To forecast daily peaks, the average daily waste acceptance rate is multiplied times 1.50. Table III.3 presents projected waste generation through the year 2036. Refer to Part II for a more detailed discussion of waste generation and projections.

Table III.3
Waste Quantity Projections

Year	Projected Tons/Year	Cumulative Tons	Average TPD	Peak TPD
2014	364,519	364,519	1,168	1,752
2015	364,519	729,038	1,168	1,752
2016	383,194	1,112,232	1,228	1,842
2017	402,826	1,515,059	1,291	1,937
2018	423,464	1,938,523	1,357	2,036
2019	445,160	2,383,683	1,427	2,140
2020	467,966	2,851,649	1,500	2,250
2021	479,458	3,331,107	1,537	2,305
2022	491,231	3,822,338	1,574	2,362
2023	503,294	4,325,633	1,613	2,420
2024	515,653	4,841,286	1,653	2,479
2025	528,316	5,369,602	1,693	2,540
2026	541,069	5,910,670	1,734	2,601
2027	554,130	6,464,800	1,776	2,664
2028	567,506	7,032,306	1,819	2,728
2029	581,205	7,613,510	1,863	2,794
2030	595,234	8,208,745	1,908	2,862
2030	595,234	8,208,745	1,908	2,862
2031	608,921	8,817,666	1,952	2,928
2032	622,922	9,440,588	1,997	2,995
2033	637,245	10,077,833	2,042	3,064
2034	651,898	10,729,731	2,089	3,134
2035	666,887	11,396,618	2,137	3,206
2036	682,221	12,078,839	2,187	3,280

3.0 Location Restrictions

3.1 Introduction

The following section addresses location restrictions related to easements 330.542(a), buffer zones 330.543(b)(2)(A), floodway 330.547, wetlands 330.553(a)&(b), fault zones 330.555(a), seismic impact zones 330.557 and unstable areas 330.559. A detailed discussion and demonstration that the Landfill meets the requirements of location restrictions is provided in Part II of the application.

3.1.1 Easements 305.543(a)

There is an electric easement that intersects the Landfill in a north south direction. The easement is owned by AEP Central Power & Light. The City maintains the proper 25-foot clearance per the easement agreement, and no waste is disposed within 25 feet of the easement's boundaries. Green markers are located on both sides of the easement to identify its limits. The natural gas pipeline that was previously running east-west has been officially abandoned. According to the property deed, should the owner of the easement not use the easement for transporting natural gas or petroleum products for a one year period, the easement is revoked. Portions of the pipeline have already been excavated and the pipeline material has been recycled.

3.1.2 Buffer Zones 330.543(b)(2) 330.543(b)(3)

The Landfill will be increasing capacity through both vertical expansions and by adding new acreage (3.12 acres). The permit amendment design will increase the height of both the East Phase and the West Phase. The amendment will also seek to line and fill areas that were previously used for the natural gas pipeline. The City has a buffer area around the entire Landfill that varies in width. The Buffer Zone is discussed in Part II Section 3.13.2 and is illustrated in Part II, Attachment 1, Figure II.1.4.

In addition to buffer zones, the City has constructed a 9' tall metal-panel fence that provides additional screening along the eastern boundary of the Landfill. This fence was constructed as a consideration for the City's drainage easement from the owner of the property to the east of the Landfill. Land uses around the site include light commercial/industrial to the east of the site, a rail yard to the north of the site, light commercial/industrial to the west of the site, and the City's owned facilities to the south of the permitted area. No residential areas are located adjacent to the Landfill. Refer to Part II for a detailed discussion of land use surrounding the Landfill.

The City maintains drainage easements located outside the permit boundary to the west, north and east side of the Landfill. These easements are owned by the City "in perpetuity." The City also owns the property between the Landfill permit boundary and SH 359, a distance of approximately 800'.

No “new” waste will be disposed on the northern portion of the Landfill in the future.

In addition to the buffer along the southern border of the site, the City owns the property where administrative and fleet maintenance vehicles are located and represents an additional 800’ of buffer between the Landfill permit boundary and SH 359. The City commits to maintaining ownership of this property throughout the life of the landfill, and through the post-closure care period.

Table III.4 presents a summary of buffer zone distances for the Landfill both with and without the additional easements. As mentioned, the official buffer boundary around the fill limits is shown in Part II, Attachment 1, Figure II.1.4 and on the Site Layout Plan, Part III, Attachment 1.

Table III.4 Buffer Zones

	Buffer from Toe of Fill	Buffer from New Waste
North	345’ – 365’	946- - 962’
East	230’ – 412’	238’ – 800’
West	206’ – 246’	227’ – 785’
South	819’ – 884’	970’ – 971’

The additional 3.12 acres that is proposed to be added to the Landfill boundary as part of this amendment are for the leachate storage tank, white good storage, tire storage and shredding and storage and other miscellaneous site operations allowable by this permit. No waste disposal will occur within the 3.12 acres.

The buffer zones are utilized for access for emergency vehicles. A roadway around the entire perimeter of the site is maintained by the City. The buffer zone also includes drainage structures to manage storm water, including the three on-site ponds for water detention. Groundwater monitoring wells and gas probes are also located in the buffer zones.

3.1.3 Floodway 330.547(a) 330.547(b) 330.547(c)

At the time the 1999 Landfill permit amendment was issued, FEMA’s floodplain map illustrated that the Landfill was not located within the 100 year floodplain or the floodway. A re-examination of the floodplain was conducted by FEMA in 2008. The revised map, showed a portion of the Landfill as having a floodplain located within the boundary. This floodplain was defined as Zone A. Zone A is defined as: “No Base Flood Elevations Determined.” The City prepared a Letter of Map Revision to be submitted to FEMA for the affected area. Based on an analysis of detailed topographic data, it was determined that the Landfill was not in the floodplain. Prior to submittal of the LOMR, a private developer submitted a LOMR (Hurd LOMR) to FEMA for a private development approximately 1.5 miles northwest of the Landfill. This LOMR re-defined the floodplain differently from the 2008 map. The City appealed this Hurd LOMR as it placed the floodplain in the Landfill boundary. FEMA reviewed the appeal, and consequently converted the City's appeal submittal into a new LOMR. This LOMR was approved by FEMA and the map has been officially revised as of July 2014.

3.1.4 Wetlands 330.553 (a)&(b)

A review of the site was performed for potential wetlands. No areas of the Landfill were determined to have wetlands. The additional 3.12 acres added to the Landfill boundary were evaluated for both wetlands and Waters of the US and no wetlands or Waters of the US were identified in this additional property. Part II, Attachment 16 contains demonstration that the site complies with this location restriction.

3.1.5 Faults, Seismic Impact Zones and Unstable Areas 330.555(a) 330.557 330.559

A review of geologic information demonstrates that the Landfill meets these location restrictions. These demonstrations are provided in Part II, Attachments 11, 12 and 13.

4.0 Geology & Groundwater Characterization [330.63(e)]

4.1 Site Geology

The general stratigraphy underlying the site is consistent with the regional geology. In 1999, the City commissioned an extensive geology and groundwater assessment for the Landfill by Huntington Engineering and Environmental (June 1994). Portions of this report are included in Part II, Attachment 10. A full version of the Geology Report completed by Huntington Engineering and Environmental is provided in Part III, Attachment 4.

The City submitted to TCEQ in 2013 a boring plan that indicated there was sufficient information from the 1999 analysis for this permit amendment. TCEQ approved this plan which is included in Part III, Attachment 4. The following provides a summary of the site geology and soils.

The facility is located on an outcrop of the Laredo Formation. The Laredo Formation is a geologic unit occurring in the Claiborne Group of the Eocene Series within the Tertiary System. The Geologic Atlas of Texas, Laredo Sheet, 1976, characterizes the Laredo Formation as sandstone and clay with thick sandstone members in the upper and lower part. The formation is described as very fine to fine-grained, in part glauconitic, micaceous, ferruginous, cross-bedded, dominantly red and brown with clay in the middle. It weathers to an orange-yellow color with dark gray limestone layers and concretions common, some which are fossiliferous with abundant marine megafossils. The average thickness beneath the facility is about 620 feet. The site geology has been previously described in various site investigation reports, Huntingdon, 1994, F.G. Bryant, 1983, and Rust E&I (REI), 1997. These reports are included in Appendices A, B, and C, Part III, Attachment 4, respectively.

4.2 Site Soil Conditions

According to the United States Department of Agriculture Soil Conservation Service Soil Survey of Webb County, a portion of which is included as Part II, Figure II.1.11, the most predominant soil classification located on the site is JQD (Jimenez-Quemado Complex). This soil type is located in the southeast quadrant, the southwest corner, and along the western boundary of the site.

The next most predominant soil classification is MCE (Maverick-Catarina Complex). This soil is intermingled with the JQD soil on the south and west. This soil type also stretches along the north central part of the site and approaches the northeast comer. Two additional soil classifications also exist on the site in small quantities; CaB and CfA, which are both classified as Catarina clay. The CaB soil is located in the northeast and southeast corners of the site. The CfA soil is located along the northern and eastern boundaries of the site.

The Jimenez soil generally occurs on the ridges and side slopes of hills while the Quemado soils occur on the ridges and summits of hills. Slopes generally range from 1 percent to 8 percent. These two soils are mapped together because they are intricately mixed. This soil complex (JQD) is 40 percent to 55 percent Jimenez soil and similar soils, 30 percent to 50 percent Quemado soil and similar soils, and 0 percent to 30 percent contrasting soils (Aguilares, Catarina, Copita, Maverick, Nido, and Palatox) and scattered areas of rock outcrop. The soil similar to the Jimenez is lighter colored in the surface layer. The soil similar to the Quemado has hard caliche at 20 inches to 30 inches.

The Jimenez surface layer is typically a very gravelly sandy clay loam approximately 13 inches thick, with the upper 9 inches being dark brown and the lower 4 inches being brown. The middle layer is a strongly cemented caliche extending to 25 inches in depth. The next layer is a very gravelly weakly cemented caliche and extends to a depth of approximately 60 inches. The soil is well drained and calcareous and moderately alkaline throughout. Surface runoff is medium, permeability is moderate, and the available water capacity is very low. The root zone is shallow to very shallow. The water erosion hazard is moderate, and the soil blowing hazard is slight (bare of vegetation).

The Quemado surface layer is a reddish brown very gravelly sandy loam about 6 inches thick. The next layer is a reddish brown very gravelly sandy clay loam extending to a depth of 12 inches. The next layer is a strongly cemented caliche extending to a depth of 14 inches. The next layer is a very gravelly weakly cemented caliche to a depth of 60 inches. The soil is well drained with medium surface runoff, moderate permeability, and a very low water capacity. The rooting zone is shallow.

The hazard of water erosion is moderate and the hazard of soil blowing is slight (bare of vegetation).

The JQD soils are used mostly as rangeland.

The Maverick soils generally occur on the summit and side slopes of hills while the Catarina soil occurs in narrow valleys and on foot slopes of hills. The slopes of Maverick soils range from 3 percent to 10 percent and the slopes of Catarina soils are less than 2 percent. These two soils are mapped together because they are intricately mixed. This soil complex (MCE) is 55 percent to 70 percent Maverick and similar soils, 20 percent to 40 percent Catarina and similar soils, and 0 percent to 25 percent contrasting soils.

The Maverick surface layer is a 6-inch thick grayish brown clay. The subsoil from 6 inches to 15 inches is light olive brown saline clay. From 15 inches to 25 inches, it is pale olive saline clay. To a depth of 60 inches, the clay is pale yellow, saline and fractured. The soil is calcareous, well drained, and moderately alkaline throughout. The surface runoff is rapid, the permeability is slow, the available water capacity is low, and the rooting zone is moderately deep. Water erosion is a severe hazard and soil blowing is a slight hazard (bare of vegetation).

The Catarina surface layer is a 10-inch thick grayish brown clay. The upper 10 inches to 25 inches of the subsoil is a light brownish gray saline clay. The middle, from 25 inches to 37 inches, is a yellowish brown saline clay. The lower part to 60 inches is a pale yellow saline clay. The soil is calcareous, moderately well drained, and moderately alkaline throughout. The surface runoff is medium, the permeability is very slow, and the available water capacity is low. The rooting zone is deep, water erosion is a moderate hazard and soil blowing is a slight hazard (bare of vegetation).

The MCE soils are used mostly for rangeland.

4.3 Geotechnical Analysis

Included in Attachment 4, are geotechnical analysis performed for the Laredo Landfill design. These analyses evaluate the following:

- Stability Analysis for the conditions on the existing Phase 4 area that will be lined prior to placement of Type 1 waste.
- Slope stability analysis at various locations of the landfill, including the slope stability of the piggy-back liner system to be placed on Phase 2 which is over the pre-Subtitle D waste.

4.5 Groundwater Characteristics

Attachment 5.0 of this Part III presents a summary of groundwater conditions at the Landfill. The Landfill continues to maintain a groundwater characterization analysis on a semi-annual basis in accordance with the approved Groundwater Sampling and Analysis Plan. The site is not located on the outcrop of or above any recognized major or minor aquifer of Texas (Attachment II.14). The uppermost water bearing unit at the facility is found in Layer II. Layer II is a greenish-gray sandstone. This sandstone is micaceous, glauconitic containing scattered fossils with occasional highly cemented calcareous layers. A water-bearing zone has been identified in this unit. Layer II thickness ranges from 40 feet near the northwestern portion of the facility to 63 feet thick near the southeastern portion of the facility with the thickest section near the center at 70 feet. Previous in-situ slug testing of the monitored groundwater interval produced hydraulic conductivities ranging up to 4 x $I0^{-4}$ cm/sec with a median value of 3.0 x 10^{-6} cm/sec. Groundwater flow velocity in Layer II is about 2 feet/year.

There are 17 groundwater monitoring wells located at the landfill. Groundwater elevations measured in the 17 monitoring wells ranged from a high of 483.05 feet above mean sea level (msl) in MW-4R1 (the background well) to a low of 429.14 feet msl in MW-11 during the November 2012 groundwater sampling event. The current groundwater monitoring program is approved at 12 monitoring wells. A series of groundwater flow maps prepared by SCS Engineers using groundwater data from October 2004, 2006, and 2007 indicate flow from the southwestern corner (MW-4R1) toward the north, northeast, and east (Attachment II.14). Groundwater elevations from more recent data (November 2011 and November 2012) substantiate the same directions. Attachment II.14, presents the groundwater elevations for the 2007, 2011, and 2012 dates.

No volatile organic compounds have been detected in the groundwater from any of the monitoring well samples. No metals have been detected in the groundwater from any of the monitoring well samples at concentrations exceeding federally-promulgated maximum concentration levels (MCLs). The Point of Compliance is presented in the Groundwater Sampling an Analysis Plan – Attachment III-11.

5.0 General Facility Design 330.63(b)

5.1 Current Facility Description

The Landfill currently includes the following key features.

Attachment III-1 of this permit amendment includes information related to the Site Layout Plan, including the location of the cells, and Phased Development figures for the Landfill.

Attachment III-2 includes cross-sections of the Landfill. These figures illustrate the bottom contours of the Landfill, permitted elevations, recent elevations for the Landfill and final elevations proposed for the permit amendment. Included in these figures are soil boring results at various locations along the cross-sections.

Attachment III-3 presents the existing contour maps for the Landfill, including the existing topographic map for the entire Landfill and the existing topographic information for East Phase and West Phase of the Landfill.

Attachment III-7 presents the final contours for the Landfill, including a figure illustrating final drainage patterns for the Landfill once it reaches capacity.

5.1.1 Access Road

The access road is located on the north side of SH 359 and accesses the Landfill's southern boundary near its midpoint. Access is controlled through a lockable gate and, during operations, a scale facility. The access road has two lanes for ingress and one for egress. There is an emergency exit from the Landfill that is located on the southwest corner of the Landfill.

5.1.2 Scale Facility

The Scale Facility is located within the permit boundary. The City currently maintains an in-coming scale and an outgoing scale and a third scale for trucks with tare weights (weight of an empty vehicle). The City is authorized to add an additional scale if it is appropriate or necessary. The Scale Facility is continuously staffed while the Landfill is accepting waste.

5.1.3 Landfill Phases

The Landfill is currently divided into four phases. These phases are separated by an electric utility easement which runs north and south and an abandoned natural gas pipeline which runs east and west. As of 2014, Phase I and Phase II have been utilized for waste disposal and both have remaining capacity. Phase III is planned to be constructed in 2014. One cell of Phase IV has been used for the disposal of construction and demolition waste. Under the current 1999 permit, the minimum permitted waste elevations (top of liner elevations) are 445' msl for Phase 1 (NW), 445' msl for Phase 2 (NE), 445' msl for Phase 3 (SE), and 490' msl for Phase 4 (SW). The current permit set the maximum final cover elevations as 640.5' msl for Phase 1 (NW), 637' msl for Phase 2 (NE), 546.5' msl for Phase 3 (SE) and 576.5' msl for Phase 4 (SW). Based on a two-foot thickness for the typical standard final cover, the maximum waste placement elevations would be 638.5' msl for Phase 1 (NW), 635' msl for Phase 2 (NE), 544.5' msl for Phase 3 (SE) and 574.5'. Table III.5 presents the permitted maximum depth and maximum height of the four Landfill phases.

Table III.5
Current Landfill Approximate Depth and Height
Elevation in Feet (MSL)

Phase / Type of Disposal Operation	Location on Site	Permitted Top of Liner	Permitted Final Maximum Elevation
1 (Type I)	North West	445.0’	640.0’
2 (Type I)	North East	445.0’	637.0’
3 (Type I)	South East	445.0’	546.5’
4 (Type IV)	South West	490.0’	576.5’
Source: 1999 Permit Amendment Cross Sections			

5.1.4 Liners

The Landfill was originally permitted in 1986, prior to the implementation of Subtitle D Regulations. Cells 1 through 16 of Phase I and Cell 1 of Phase II were constructed with in-situ compacted clay liners. Phase I Cells 17 and 18 and Phase II Cells 2-14 were designed with a Subtitle D composite liner, using either clay or a geosynthetic clay liner and geomembrane liner. The existing liner cross-sections for the currently constructed Pre-Subtitle D Type I and Subtitle D Type I cells, and the current Type IV liner alternatives are described in Table III.6 below.

Phase IV is currently permitted as a Type IV- Construction/Demolition Landfill. This area is approved with a 3’ clay or geocomposite liner. The existing cell liner configuration is shown on Figure III.15.1. Liner Details are presented in Attachment III.15 – Leachate and Contaminated Water Plan.

Table III.6 – Existing Liner Alternatives

Existing Subtitle D Type I Liner Components

Alternative 1 **Material**	**Thickness**
Protective Cover	12”
Drainage Layer	12”
Geotextile	Negligible
Geomembrane	60 mil HDPE
Geosynthetic Clay Liner	Negligible
Prepared Subgrade	24”

Alternate 2 **Material**	**Thickness**
Protective Cover	12”
Drainage Layer	12”
Geosynthetic Clay Liner	Negligable
Insitu and Compacted Clay Liner	24”

Existing Pre-Subtitle D Type I Liner Components

Material	Thickness
Protective Cover	12”
Drainage Layer	12”
Insitu and Compacted Clay Liner	36”

Existing Type IV Liner Components

Alternate 1 **Material**	**Thickness**
Protective Cover	12”
Drainage Layer	12”
Geosynthetic Clay Liner	Negligible
Prepared Subgrade	**24”**
Alternate 2 **Material**	Thickness
Protective Cover	12”
Drainage Layer	12”
Insitu and Compacted Clay Liner	36”

Alternate 3 **Material**	**Thickness**
Protective Cover	12”
Drainage Layer	12”
Geosynthetic Clay Liner	Negligible
Insitu and Compacted Clay Liner	6”

Table III.8B in Section 5.2.3 lists all existing and proposed waste cells with each cell’s construction and filling status, liner type, lowest permitted liner elevation, drainage media components, sump identification, slope of leachate collection piping and minimum floor slope. Liner Details are presented in Attachment III.15 – Leachate and Contaminated Water Plan as Figure III-15.5 through Figure III-15.7A.

5.1.5 Leachate Collection System

A leachate collection system is constructed in existing cells where Subtitle D liners were constructed. Leachate is collected by gravity through a series of pipes and pumped via a force-main that directs the leachate to a storage tank. During construction of Cell 1 of Phase III, the existing leachate storage tank will be demolished and leachate will be temporarily collected in tanker trucks located in a cleared area of Phase IV. This system was approved in a 2013 permit modification. The existing Leachate Management Collection System layout is shown on Figure III.15.2. The overall management of Leachate is presented in Attachment III.15

5.1.6 Landfill Gas Monitoring and Management

The Landfill has an active gas collection system. Gas is collected from a series of wells that are primarily located on the north side of the Landfill. Gas is piped to a flare facility and combusted. The City has 21 gas monitoring probes located around the perimeter of the site. These wells are monitored on a quarterly basis. The location of the monitoring probes are shown on Figure III.14.1. The Landfill Gas Management Plan is presented in Attachment III-14.

5.1.7 Groundwater Monitoring Wells

A total of 12 groundwater monitoring wells are located around the perimeter of the Landfill. The location of these wells was approved in a 2005 Permit Modification. Wells are monitored and sampled on a semi-annual basis. The location of these monitoring wells are shown on Figure III.11.1. The overall Groundwater Monitoring Plan is presented in Attachment III-11.

5.1.8 Drainage Facilities

The site is designed to manage the 25-year, 24-hour rainfall water through a series of channels, culverts, and detention ponds. A complete description of the drainage design is included in the Surface Protection Plan and Drainage Plan (Attachment III-6).

5.1.9 Final Closure & Post-Closure Care

No areas of the Landfill have been closed or received final cover. All of Phase I and a majority of Phase II have intermediate cover in place in accordance with the SOP. Cell 1 of Phase 4 that has been partially filled and has received intermediate cover. The intermediate cover is maintained to prevent storm water pollution and provide for erosion control. The Closure and Post-closure Care Cost Estimate, Closure Plan and Post-Closure Care Plan are presented in Attachments III-8, III-.12 and III-13 respectively.

5.2 Amended General Facility Design

5.2.1 Landfill Capacity

The design of the Landfill, as amended, will have an estimated total capacity of 25.25 million cubic yards. The West Phase will have a capacity of 12.5 million cubic yards and the East Phase will have a capacity of 12.75 million cubic yards. The height of the landfill is increased from 640.0’ to 664.5’ on the West Phase and from 637’ feet to 654.5’ on the East Phase. Phases 1 and 2 are constructed and their lowest elevations of liner will remain unchanged at 445.0 for Phase 1 and 445.0 for Phase 2.

The lowest permitted liner in Phase 3 will in its reconfigured footprint will remain at elevation 445.0. The lowest permitted liner elevation in Phase 4 will be lowered from 490.0 to 467.0. Attachment III-1 provides drawings depicting the Landfill boundary, phases, development plan, and design features. Attachment III-2 presents site cross-sections. Attachment III-3 provides the existing site topography and drainage. Attachment III-7 is the final contour map

The disposal area will be increased about 5 acres to +/- 155 acres. To attain the additional disposal area, the abandoned natural gas pipeline bisecting the Landfill will be excavated and removed. Portions of the pipeline have already been excavated and material recovered has been recycled. A liner and leachate collection system will be constructed over these areas. The area between phases 2 and 3 will be an extension of Phase 3 and the area between Phases 1 and 4 will be identified as Phase 5. The final landfill condition will be two larger hills instead of the currently permitted four hills. The western hill will include Phases 1, 4 and 5 and the eastern hill will include Phases 2 and 3. The two hills will be divided by the existing power line easement that runs north to south through the center of the permit boundary.

Phase IV will be changed from a Type IV operation to a Type I unit with a leachate collection system. The lowest excavation elevation will remain at the 445' (msl) as previously permitted in Permit No. MSW-1693A.

In 2013, the City had an estimated 4.8 million cubic yards of remaining capacity, assuming no amendment was granted – including the airspace in Phase 4, the construction/demolition waste fill area. Table III.7 provides a summary of waste volume capacity for the various Phases of the Landfill. The permit amendment design provides an additional 4.1 million cubic yards. Assuming waste quantities presented in Table III.7, the Landfill operational life is estimated to extend beyond 2030 through 2035. If recycling and source reduction programs are successfully implemented, or there are major shifts in the flow of waste to the Landfill, this time-frame could be different.

Table III.7
Laredo Landfill Volume Summary

Phase	Volume Remaining in Permitted Hills	Additional Volume Between Amended and Permitted Hills	Volume Remaining With Amendment
West Side			
Phase 1	1,050,000	950,000	2,000,000
Phase 4	850,000	500,000	1,350,000
Phase 5	0	380,000	380,000
West Total	1,900,000	1,830,000	3,730,000
East – Option 1			
Phase 2	1,950,000	1,000,000	2,950,000
Phase 3	1,450,000	450,000	1,900,000
Phase 3 (expanded)	0	900,000	900,000
East – Total	**3,400,000**	**2,350,000**	**5,750,000**
Totals – Option 1	**5,300,000**	**4,180,000**	**9,480,000**

5.2.2 Facility Access 330.63 (b)(1)

5.2.2.1 Landfill Entrance

The site currently has two lanes for ingress and one lane for egress. Access is controlled by a lockable gate. The Landfill entrance has a scale house facility which is manned during Landfill Operations. The scales have two lanes for incoming vehicles and one lane for exiting vehicles. There are two access lanes that allow equipment operators and other authorized vehicles to bypass the scales.

Currently, the entrance road from SH 359 is approximately 800’ in length. This provides queuing for approximately 30 solid waste collection vehicles, assuming an average vehicle length of 23 feet, and two feet clearance for each vehicle. Historically, waste flows to the Landfill have been dispersed widely throughout the time of operation and queuing has not been an issue. Figure III-1.11 shows the landfill entry facilities.

5.2.2.2 Onsite Access Roads

The main road into the Landfill from SH 359 is an asphalt roadway owned by the City. The City maintains this roadway through periodic grading and addition of asphalt. This is an all-weather road allowing access to the site in inclement weather.

The onsite access roads provide access to the entire perimeter of the Landfill and there is another access road that is located between the east and west phases. The access roads are constructed of compacted subgrade material and graded to allow drainage. These access roads are a minimum of 15 feet wide and provide access to all points around the landfill perimeter including stormwater retention/detention facilities, gas flare, leachate storage, tire chipping and other storage areas. Periodic maintenance and regrading of the access roads is required to minimize depressions, ruts and potholes and to keep them safely operable. During dry weather, the City will control dust by sprinkling the roads and ramps with water. The water used for dust control must be uncontaminated. Leachate may not be used. Acceptable water sources are the sedimentation ponds or any other source of uncontaminated water available at the site.

5.2.2.3 Site Access Control

Site access control will consist of at least a three-strand barbed wire fence around the entire perimeter of the site, with the exception of the east side where a 9' tall metal panel fence is constructed. Control features at the site entrance include a lockable gate and a scale house. Site personnel will inspect the fencing, report any failure and see that any damage is quickly repaired. All security features, including the metal entry gate, and the locks will be kept in proper working order, maintained, and quickly replaced if inoperable and/or irreparable. Maintenance will be performed to site security mechanisms, as necessary, to maintain access control.

Gatehouse personnel at the main entrance will control site access whenever the entry gate is open. When the site is closed, the entry gate will be locked to prevent unauthorized and uncontrolled waste disposal, and locked when no personnel are present on site. Vehicular access to the site at points other than the entry gate will be prevented by the perimeter fencing and a lockable gate.

The gate attendant will direct drivers to the active disposal area. There, the drivers will be directed by landfill personnel to a specific unloading area. The use of internal signs may also be used to direct drivers to the appropriate disposal locations.

5.2.3 Landfill Method, Waste Movement & Landfill Cells 330.63(B)(b)(2)

The current and proposed landfill method for this facility is the area fill method for both above and below grade fills. Waste will be covered daily, creating daily cells which are separated from each other by at least 6" of clean soil, or the approved alternative daily cover material.

The Landfill has been in operation since 1986. Prior to Subtitle D regulations becoming effective, the landfill was lined with re-compacted and density controlled in-situ material. Following the implementation of Subtitle D, landfill cells have been constructed with approved liners and leachate collection systems.

Installation of a piggy-back separation liner is planned over the existing Type IV waste in Phase 4 and the Pre-Subtitle D waste area in Phase 1 where vertical expansion is proposed. These liners will sloped to direct leachate flow towards Subtitle D lined areas that contain leachate collection systems. The piggy-back separation liner over the Pre-Subtitle D waste in Phase 1 will be installed with a 3% minimum slope that will cause leachate to flow from north to south and away from the side slopes. The liner will extend beyond the limits of the Pre-Subtitle D waste and into the area above the Subtitle D waste of Phase 1, Cells 17 and 18 where it will be anchored into compacted fill placed on the existing intermediate cover. It will be installed at a maximum elevation of 629 MSL which is lower than the currently permitted maximum waste elevations of the top dome and the sideslopes of Phase 1.

As stated, the proposed piggyback separation liner to be installed over existing Pre-Subtitle D Type 1 waste is to contain leachate and direct it toward Subtitle D lined areas without leachate ponding. To assure that the piggyback separation liner's performance is not compromised over time due to settlement, the expected maximum differential in future settlement of Phase 1 below the piggyback separation liner will be analyzed. To do this, the fill beneath the liner will be considered to be made up of four different components: 1) Pre 1999 waste, 2) 1999 to 2012 waste, 3) new waste, and 4) compacted earthen fill.

The anticipated settlement of a solid waste hill under normal operating procedures is generally accepted to be between 5% and 10% of the total depth of the fill. The base liner elevation for the cells within the Pre-Subtitle D area is approximately 458.11' msl. The topographic survey prepared for the 1999 permit amendment shows the average fill elevation to be at elevation 535' msl creating an approximate depth of 77 feet. Assuming that 90% of the anticipated settlement will have occurred by the time the piggyback separation liner is constructed, the future settlement in the pre 1999 waste is anticipated to be between 0.5% and 1% of the 77 feet, or 0.39 feet to 0.77 feet. This indicates that the maximum difference in settlement between two locations could be expected to be 0.39 feet for the pre-1999 waste.

The topographic survey prepared in 2012 shows the average fill elevation to be at elevation 606' msl creating an approximate depth of 71 feet down to the pre-1999 waste. Assuming that 75% of the anticipated settlement for this layer will have occurred by the time the piggyback separation liner is constructed, the future settlement in the 1999 to 2012 waste is anticipated to be between 1.25% and 2.5% of the 71 feet, or 0.89 feet to 1.78 feet. This indicates that the maximum difference in settlement between two locations could be expected to be 0.89 feet for the 1999 to 2012 waste.

The maximum depth of new waste below the liner will be approximately 12 feet and would be at or near the north end (upslope end) of the proposed liner. Assuming this waste will settle between 5% and 10% of its depth, the expected settlement will be between 0.6 feet and 1.2 feet, or a differential of 0.6 feet. The differential settlement of the 3-foot minimum thick compacted earth layer is considered to be negligible.

By this analysis, the maximum differential in settlement between two points on the proposed piggyback separation liner is 1.88 feet (0.39+0.89+0.6). Making the assumption that the expected settlement differential between two analysis points decreases as the distance between the points decreases, the minimum separation distance to be considered is 100 feet. Therefore, it can be expected that the maximum difference in settlement between two points separated by 100 feet is 1.88 feet. If the upslope point were to settle more than the downslope point, the slope on the liner would be reduced by 1.88% which is less than the 2% liner slope to be constructed. This means that there would still be positive grade provided on the liner and ponding should not occur. The liner is to be constructed to direct leachate away from the liner edges and southward in a sheet flow manner towards the Subtitle D cells. In addition to the 2% liner slope for the interior portion of the liner, the outer edges of the liner will be raised an additional foot to provide additional assurance that leachate will not collect along the edges or escape to the surface. Figure III-2.3 provides the cross section longitudinally through the center of the proposed piggyback separation liner. Figure III-2.5 provides the cross section laterally through the proposed liner. Figure III-2.8 shows the limits of the four layers used in this analysis. Details of the proposed piggyback separation liner are provided on Figures III-15.7 and III-15.7A.

The differential settlement previously described would be considered the worst case scenario since the piggyback separation liner's toe of the slope in question begins at an approximate elevation of 600' msl. The top of the slope is at an approximately 615' msl. Therefore, most of the differential settlement would be expected to occur in the 15 foot (615' msl – 600' msl) elevation difference below the low end of the slope to the high end of the slope. The rest of the waste thickness (~460' msl to ~600' msl) would be expected to settle relatively consistently over time since the waste is normally placed in lifts, leveled, and then compacted as the waste is accepted in the different landfill cells.

The cross section components of proposed liner system alternatives are presented in Table III.8A below.

Table III.8A – Proposed Liner Alternatives

Typical Proposed Type I Liner Components

Material	Thickness
Protective Cover	12"
Drainage Layer	12"
Geotextile	Negligible
Geomembrane	60 mil HDPE
Geosynthetic Clay Liner	Negligible
Prepared Subgrade	24"

Typical Proposed Piggyback Separation Liner Components

Material	Thickness
Protective Cover	12”
Drainage Layer	12”
Geotextile	Negligible
Geomembrane	60 mil HDPE
Geosynthetic Clay Liner	Negligible
Prepared Subgrade	36”

Table III.8B presents a summary of liner details throughout the site, including cells that will be constructed in the future. Liner details for existing and future cells are presented in Attachment III-15 - Leachate and Contaminated Water Plan as Figure III-15.5 through Figure III-15.7A. The liners are to be constructed in accordance with the Soil Liner Quality Control Plan – Attachment III-10. Liners may be constructed using 2 feet of clay, or an approved geosynthetic clay liner as defined in the SLQCP.

Table III.8B
Existing & Future Cell Configurations

CELL (STATUS)	LINER TYPE	APPROX. LOWEST TOP OF LINER ELEVTION (ft) MSL	DRAINAGE MEDIA COMPONENTS	LCS SUMP	SLOPE OF LCS PIPES	SLOPE OF FLOOR
Phase 1, Cells 1 through 16 (Constructed and partially filled)	In-situ and compacted clay	458.11	N/A	N/A	N/A	N/A
Phase 2, Cell 1 (Constructed and partially filled)	In-situ	470.00	N/A	N/A	N/A	N/A
Phase 2, Cell 2 (Constructed and partially filled)	GCL, 60-mil HDPE	452.46	Sidewalls: geonet w/geotextile both sides and 2 ft of protective cover floor: 1 ft of gravel, 1 ft of protective cover and chimney drains	No. 2-2	2%	2.83%

CELL (STATUS)	LINER TYPE	APPROX. LOWEST TOP OF LINER ELEVTION (ft) MSL	DRAINAGE MEDIA COMPONENTS	LCS SUMP	SLOPE OF LCS PIPES	SLOPE OF FLOOR
Phase 2, Cell 3 (Constructed and partially filled)	2 ft clay, 60-mil HDPE	453.00	Sidewalls: geonet w/geotextile both sides and 2 ft of protective cover floor: 1 ft of gravel, 1 ft of protective cover and chimney drains	No. 2-3	1%	1.41%
Phase 2, Cell 4 (Constructed and partially filled)	2 ft clay, GCL, 60-mil HDPE	453.57	Sidewalls: geonet w/geotextile both sides and 2 ft of protective cover floor: 1 ft of gravel, 1 ft of protective cover and chimney drains	No. 2-4	2%	2.83%
Phase 2, Cell 5/6 (Constructed and partially filled)	GCL, 60-mil HDPE	455.00	Geonet w/ geotextile one side, 2 ft of protective cover	No. 2-5/6	1%	2%
Phase 2, Cell 7/8 (Constructed and partially filled)	GCL, 60-mil HDPE	455.00	Geonet w/ geotextile one side, 2 ft of protective cover	No. 2-7/8	1%	2.5%
Phase 2, Cell 9/10 (Constructed and partially filled)	GCL, 60-mil HDPE	454.00	Geonet w/ geotextile one side, 2 ft of protective cover	No. 2-9/10	1%	2%
Phase 2, Cell 11/12 (Constructed and partially filled)	GCL, 60-mil HDPE	454.00	Geonet w/ geotextile one side, 2 ft of protective cover	No. 2-11/12	1%	2%
Phase 2, Cell 13/14 (Constructed, active cell)	GCL, 60-mil HDPE	449.50	Geonet w/ geotextile one side, 2 ft of protective cover	No. 2-13/14	1.6%	2.5%
Phase 3, Cell 1	GCL, 60-mil HDPE	443.00	Geonet w/ geotextile one side, 2 ft of protective cover	No. 3-1	1%	2%

CELL (STATUS)	LINER TYPE	APPROX. LOWEST TOP OF LINER ELEVTION (ft) MSL	DRAINAGE MEDIA COMPONENTS	LCS SUMP	SLOPE OF LCS PIPES	SLOPE OF FLOOR
Phase 3, Cell 2 (Future)	GCL, 60-mil HDPE	454.00	Geonet w/ geotextile one side, 2 ft of protective cover	No. 2-13/14	???	???
Phase 4, Cell IV-1 Type 4 Waste (Constructed and partially filled)	GCL	495.00	N/A	N/A	N/A	N/A
Phase 4, Cell IV-1 Type I Design (Future)	Engineered Fill and GCL, 60-mil HDPE	522.00	Geonet w/ geotextile one side, 2 ft of protective cover	N/A	1.5%	Varies, 2% min
Phase 4, Cell IV-2 (Future)	GCL, 60-mil HDPE	486.00	Geonet w/ geotextile one side, 2 ft of protective cover	No. 4-2	1%	2%
Phase 4, Cell IV-3 (Future)	GCL, 60-mil HDPE	465.50	Geonet w/ geotextile one side, 2 ft of protective cover	No. 4-3	1%	2%
Phase 5 (Future)	GCL, 60-mil HDPE	501.50	Geonet w/ geotextile one side, 2 ft of protective cover	No. 5-1 & No. 5-2	3%	3.2%

5.2.3.1 Waste Movement

Part II, Attachment II.6 presents the sequencing plan for the Landfill. This information is repeated in Part III, Attachment III.1.

Approximately 155 acres of the 203.1 acres will be used for disposal operations. This includes the previously permitted areas and the additional acreages where the abandoned pipe line was previously located. The site is currently divided into four phases, each separated by the north-to-south electrical easement and the west-to-east abandoned natural gas pipeline easement. The phases are designated 1, 2, 3, and 4 and represent separate waste units as shown on Part III, Attachment 1. Phase 3 of the current design will be expanded to include the area to be lined where the abandoned pipeline was located. A new Phase 5 will be constructed where the abandoned pipeline was located on the West Phase of the Landfill. The Type IV, Phase 4, will be converted to a Type I Area.

In 2014, waste filling operations are progressing in Cells 13 and 14 of Phase 2.

The Permit Amendment will make the following waste storage changes to the facility design:

- The area between Phases 2 and 3 will be lined and filled as part of Phase 3. The new area will include a leachate collection system.
- The eastern limit of Phase 3 will be moved westward to allow modification to the current detention pond facility.
- The height of the East Phase will be increased from an elevation of 637 msl to 654.5 msl. All new waste on the East Phase will be placed over areas that were lined in accordance with Subtitle D regulations.
- Phase 4 will be converted from a Type IV operation to a Type I operation. Engineered fill will be constructed on top of construction/demolition waste that has been put in place. A liner will be placed over the constructed fill and unused areas of Phase 4. A leachate collection system will be part of the amended Phase IV design.
- A new Phase 5 will be constructed in the area between Phase 1 and 4. This area will include a liner and leachate collection system.
- In Phase 1, a separation liner will be constructed over engineered fill on top of waste that was previously filled over Pre-Subtitle D cells. A liner will be constructed and designed so that leachate drains to the existing leachate collection system.
- The height of the West Phase will be increased from 640.0 msl to 664.5 msl.

Part IV - Site Operating Plan provides a generalized processing design and working plan for waste brought to the landfill. A process flow diagram for waste handling is provided as Figure III-1.13

5.2.3.2 Maximum Time 300.63(d)(1)(B)

Waste accepted at the site is directed to the working face and disposed. All waste must be covered with at least 6” of clean soil or approved alternative liner material by the end of the working day. The City will operate the facility in a manner that reduces the size of the working face of the Landfill to reduce potential nuisances.

5.2.4 Sanitation & Contaminated Water

All equipment cleaning is done offsite. White goods storage may take place on the additional 3.5 acre tract of land. No equipment cleaning will be conducted within the permitted area.. Berms will be constructed around the storage area to redirect storm water from the storage area. The storm water that comes in contact with white goods will be treated as uncontaminated water and be directed to the storm water system.

5.2.4.1 Control of Spills & Contaminated Water 330.63(d)(1)(B)

Landfill design and operations are designed to protect groundwater and surface water resources. The Site Operating Plan details means and methods to reduce the introduction of contaminated liquids into the site, unless they meet waste acceptance standards.

The design of the Landfill includes provisions for the protection of surface waters through the drainage plan, intermediate and final cover systems.

Intermediate and final cover systems are designed to keep water from infiltrating into the waste. The intermediate cover system includes a minimum of 2 feet of compacted soil and a protective vegetative layer. Due to the arid conditions in Laredo, it is difficult to establish vegetation on the side slopes of the Landfill. When vegetation has not become established, the City will periodically inspect the intermediate cover and add soil to provide sufficient depth and to re-grade to prevent infiltration of storm water through the cover and into the waste.

The final cover closure design and closure plan are presented in the Final Closure Plan (Part III, Attachment 12). Three options for final cover design will be available. They are (i) a standard Subtitle D final cover; (ii) an alternative final cover system which utilizes geosynthetic clay in place of 2 feet of compacted clay; and a "water balance" final cover system. The demonstration for these liner options is presented in the Final Closure Care Plan. For each of the three final cover options, the Final Cover Plan also addresses options for a final cover system that utilizes vegetation and a non-vegetative final cover system that relies on other means to reduce erosion, including long-term maintenance.

5.2.4.2 Contaminated Water Collection & Treatment

Part III, Attachment 15 is the Leachate and Contaminated Water Plan. Three components of the Contaminated Water Plan are: (i) reduce generation of contaminated water; (ii) collection; and (iii) treatment. The City reduces the amounts of contaminated water generated by reducing the working face of the Landfill, by inspecting loads of waste as they enter the Landfill, diversion berms, around the flare facility, and interim drainage controls.

Drainage features that direct uncontaminated water to the storm water system are to be constructed and maintained. These features are presented in Attachment III-6, Groundwater and Surface Water Protection and Drainage Plan.

The landfill currently processes white goods and used tires within the permit boundary near the western end of Phase 3. Diesel fuel for landfill use is also stored in this area. Brush mulching currently occurs outside of the permit boundary. With this permit, the used tire processing and white goods processing operations will be relocated to the area of the 3.12 acre horizontal permit boundary expansion near the southeast corner of the site. These areas will incorporate proper storm water protection design and operating procedures to reduce the generation of contaminated water. These measures will include concrete pads built above grade, double containment protection for the diesel fuel storage and operating procedures to limit the time that shredded tires are stored on-site.

5.2.4.3 Containment Berms

Storm water that may come into contact with solid waste or alternate daily cover will be retained as contaminated water in the vicinity of the active waste area so that it does not mix with uncontaminated water or flow off site. The containment berms at the working face will be capable of handling a 25-year, 24-hour storm event. Berm sizing calculations are contained in the Run-Off/Run-On Control Plan in Part III, Attachment 15 (Leachate and Contaminated Water Management Plan), Appendix A. A typical berm configuration at the working face is shown in Part III, Attachment 6. The berms will be maintained and relocated as necessary to assure that the containment berm is always ahead of disposal operations.

5.2.4.4 Effluent Processing

Due to the semi-arid climate of the region, only small amounts of leachate are produced by the landfill. Leachate will be removed from the collection sumps and pumped to a leachate storage tank located in a newly added area of the Landfill located south of Phase 3. The tank will be double contained and periodically pumped out into trucks and taken to the wastewater treatment plant operated by the City of Laredo for treatment. Leachate may also be stored in a tanker truck, recirculated over Subtitle D lined areas or piped to a wastewater pipeline and delivered to a public owned wastewater treatment facility.

Any stormwater that has become contaminated from contact with waste or spillages will be contained and kept separated from uncontaminated storm water sources. The contaminated storm water will be treated as leachate.

5.2.5 All-Weather Operations

The facility entrance road is an all-weather asphalt roadway. The site does not currently nor does it propose to have a separate wet weather area. Laredo is typically semi-arid. If rain slows operations, the landfill will close to the general public. This procedure has worked in the site's past history and has proven not to cause unreasonable down-times during the infrequent "wet weather conditions" which occur at the site.

To help minimize the tracking of mud from the facility onto public roads, the 800' site entrance road is constructed of all-weather asphalt surface from the entrance at State Highway 359 to 30' past the gate house. During periods of inclement weather, the Landfill Supervisor will inspect the main access road on a daily basis and, as needed, will clear mud tracked onto the pavement by washing, blading or sweeping.

As a routine procedure, a stockpile of cover material will be maintained near the working area. This will provide daily cover on a contingency basis for such conditions as inclement weather, unanticipated down-time of cover hauling equipment, and fire/hot load control at the working face. Any interruption in disposal operations, due to weather or equipment problems would be expected to be short since protracted rains in this semi-arid area are rare and the City has sufficient reserve equipment to reinitiate operations to protect public health within the community.

5.2.6 Leachate Collection & Storage

Leachate that is collected in the leachate collection system is pumped by force main that is located along the perimeter of the Landfill cells and parallel to the existing electric transmission easement. The force main is a four inch diameter pipe that transports the leachate from each of the sump locations to a storage tank that will be located on the additional 3.12 acre tract of land. The leachate storage tank will provide sufficient storage for leachate to be collected and stored. Figure III-1.12 shows the proposed horizontal expansion area of the landfill and the location of the proposed leachate storage tank.

Part III, Attachment 15 is the Leachate Collection and Contaminated Water Plan and provides greater detail on the design of the system and storage options available to the City.

Once collected, leachate may either be recirculated over areas where there is a standard Subtitle D liner system; transported to an approved wastewater treatment facility via truck; or transported via pipeline to an approved wastewater treatment facility.

5.2.7 Landfill Gas Management Infrastructure

Landfill gas is collected and piped to a flare facility. The flare facility is located on the northern area of the Landfill, adjacent to the road that is located along the central area of the Landfill. Landfill gas monitoring, collection and flare facility are discussed in greater detail in Part III, Attachment 14, the Landfill Gas Management Plan.

5.2.8 Groundwater Monitoring Wells

The Landfill has an approved groundwater monitoring program for the Landfill. A total of 12 wells are located around the perimeter of the Landfill. These wells are monitored in accordance with the Ground Water Sampling and Analysis Plan. The GWSAP is included in Attachment III-11.

5.3 Surface Water Drainage for Municipal Solid Waste Facilities TAC 330.303

Attachment III-6, Groundwater and Surface Water Protection Plan & Drainage Plan provides demonstration that the Landfill design meets the requirements of TAC § 330.303. Specifically, the Surface Water Drainage Report demonstrates the following.

- The Landfill is designed to maintain and manage run-on and runoff during the peak discharge of a 25-year, 24 hour rainfall event and is designed to prevent the off-site discharge of waste and feedstock material, including, but not limited to, in-process and/or processed materials.
- Drainage facilities in and around the Landfill will control and minimize surface water running onto, into, and off the Landfill using a system of berms, channels, culverts and sedimentation/detention ponds.

5.3.1 Existing Drainage Patterns

The Landfill is designed so that permitted drainage patterns will not be adversely altered. As described in Part III, Attachment 6, the Landfill is designed to achieve the following.

- The Landfill's run-on control systems are capable of preventing flow onto the active portion of the landfill during the peak discharge from at least a 25-year, 24 hour rainfall event.
- The City has maintained, and will continue to maintain, a runoff management system from the active portion of the landfill to collect and control at a minimum the water volume resulting from a 24-hour, 25-year storm.
- The landfill design is designed to provide effective erosional stability to top dome surfaces and external embankment side slopes during all phases of landfill operation, closure, and post-closure care
- Embankments, drainage structures and diversion channels are sized and graded to handle the design runoff must be provided. The slopes of the sides and toe will be graded in such a manner as to minimize the potential for erosion. The surface water protection and erosion control practices are designed to maintain low non-erodible velocities, minimize soil erosion losses below permissible levels, and provide long-term, low maintenance geotechnical stability to the final cover.
- The City will maintain the collection, drainage, and/or storage units as designed, and will restore and repair the drainage system in the event of washout or failure as quickly as practical; and
- The City will also control erosion and sedimentation, including having interim controls for phased development as shown in the Attachment III-6.

5.3.2 Flood Protection for Landfill

The fill area of the Landfill is not located in the100-year floodplain, as demonsatrated in Attachment II-.15. Therefore, flood protection structures are not required.

5.3.3 Stormwater Management

Stormwater run-on and run-off will be controlled with channels and berms to keep uncontaminated water from coming into contact with waste storage, processing and disposal activities. Refer to Attachment III-6 for the Landfill's Storm Water Pollution Prevention Plan.

In accordance with 30 TAC §330.15(h), the design and operation of the Laredo facility will provide for the following.

1. *No discharge of solid wastes or pollutants adjacent to or into the water in the state, including wetlands, that is in violation of the requirements of the Texas Water Code, §26.121.* During the active life of the disposal facility, all stormwater coming into contact with solid waste or alternate daily cover will be retained as contaminated water and treated or disposed of as outlined in Attachment III-15, the Leachate and Contaminated Water Plan.
2. *No discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements, pursuant to §402 as amended.* The operations related to the handling of contaminated water at the Landfill will prevent the discharge of pollutants associated with solid waste. Pollutant discharge associated with contaminated stormwater runoff from the active portion of the site will be prevented by incorporating best management practices (BMPs) to limit erosion and sediment discharge. Best management practices include the proper vegetation of the final cover, the use of drainage terraces and rundown channels to control and decrease the velocity of the final cover exposed to surface runoff, provisions for sedimentation basins to detain the surface water runoff and trap the sediment prior to discharging from the site, seeding and mulching of drainage channels and detention/sedimentation basins, and providing erosion protection at critical points in the drainage channels. The design of the surface water runoff system, which incorporates best management practices, is included in the Drainage Plan, Attachment III-6.

   The facility is currently covered by an EPA NPDES storm water multi-sector general permit # TXR05AZ35. A copy of the permit is included in the Part III, Attachment 6.

3. *No discharge of dredged or fill material to waters of the United States, including wetlands, that is in violation of the requirements under the Federal Clean Water Act, §404, as amended.* - A wetlands field investigation of the Laredo Sanitary Landfill site was conducted in 2013 for this application. No jurisdictional wetlands or waters of the US were identified within the permit boundary. Refer to Attachment II.16.

4. *No discharge of a nonpoint source pollution of waters of the United States, including wetlands, that violates any requirement of an area-wide or statewide water quality management plan that has been approved under the Federal Clean Water Act, §208*

or §319, as amended. The proposed Laredo facility will be in compliance with §208 of the Clean Water Act.

5.4 Odor Control Measures

Methods to control potential odors emanating from the site will vary depending on the odor source type and its location within the landfill. An Odor Control Plan is part of the Site Operating Plan (SOP). These methods include the following.

<u>Landfill and Working Face</u>

- Repair areas where soil cover has eroded.
- Minimize the size of the working face.
- Remove ponded water if creating objectionable odor.
- Identify potential odor sources at the gatehouse and alerting working face personnel about incoming material.
- Immediately cover the odorous material with other waste or soil material.
- Immediately clean up or covering odorous material spills.
- Properly dispose of dead animals received as outlined in the SOP.
- Periodically inspect and properly maintain the leachate collection and storage facilities.

<u>Other Areas</u>

- Prohibit the unloading of putrescible material in unauthorized areas.
- Non-paved storage areas will be maintained to prevent ponding that might produce objectionable odors.
- Paved storage areas will be periodically cleaned with street sweeping or similar equipment.

6.0 Endangered Species Protection

According to the criterion in 30 TAC §330.63(b)(5) the impact of a solid waste disposal facility upon endangered or threatened species shall be considered. The facility and the operation of the facility shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species, or cause or contribute to the taking of any endangered or threatened species. Refer to Attachment II.14.

7.0 Landfill Markers §330.55(b)(10)

7.1 Colors/Codes

The benchmark and all required site grid markers will be maintained so that they are visible during operating hours. Markers that are removed or destroyed will be replaced within 15 days of removal or destruction. In construction areas where markers have been destroyed, the marker will be replaced within 15 days upon completion of the construction activities. All markers will be repainted as necessary to retain visibility.

Landfill markers generally consist of durable posts (wooden or steel) extending at least 6 ft above ground level to clearly identify significant onsite features such as easements and liner limits. In the event a marker should be located in a roadway, waterway or other area incapable of sustaining an above-ground marker, an alternate marker may be placed with its offset from its true location noted on the marker. All markers are color coded as follows.

1. Easement and R.O.W. markers (Green) - Easement and right-of-way markers have been placed along either the centerline or the limits of an easement and along the boundary of a right-of-way at intervals of 300 ft and at each comer within the site and the intersection of the site boundary.
2. Site Grid System markers (White) - A site grid system has been established at the facility. The grid system encompasses at least the area expected to be filled within the next 3-yr period. Although grid markers will be maintained during the active life of the site, post-closure maintenance of the grid system is recommended but not required. The grid system, similar to a typical city map grid, consists of lettered markers along two opposite sides, and numbered markers along the other two sides. Markers are spaced no greater than 100 ft apart measured along perpendicular lines. Where markers cannot be seen from opposite boundaries, intermediate markers will be installed, where feasible.
3. SLER, FMLER, or GCLER Area markers (Red) - SLER, FMLER, or GCLER area markers will be placed so that all areas for which a SLER, FMLER, or GCLER has been submitted and approved by the department are readily determinable. Such markers are to provide site workers immediate knowledge of the extent of approved disposal areas. These markers will be located so that they are not destroyed during operations until operations extend into the next SLER, FMLER, or GCLER. The location of these markers will be tied into the site grid system and will be reported on each SLER, FMLER, or GCLER submitted. SLER, FMLER, or GCLER markers will not be placed inside the evaluated areas.
4. 100-year Flood Limit Protection markers (Blue) - Flood protection markers are required for all areas within the site which are within the 100-year floodplain. These markers will be installed once the ponds have been constructed.
5. Boundary Markers (Black) - Site boundary markers are placed at each comer of the site and along each boundary line at intervals no greater than 300 ft. Fencing may be placed within these markers as required.
6. Buffer Zone Markers (Yellow) - Markers identifying the buffer zone are placed along each buffer zone boundary at all corners and between corners at intervals of 300 ft. The buffer zone is shown in Attachment II.1.

7.2 Permanent Benchmark

One permanent benchmark has been established at the site at the northeast property comer. The benchmark is a bronze disk set in concrete with the survey date and elevation stamped on it. The location of the benchmark is shown on Figure III.1-1 in Attachment III.1.

City of Laredo Landfill Permit Amendment 1693B
City of Laredo, Texas
Permit Amendment MSW Permit 1693B
Laredo, Texas
Webb County, Texas
August 2014
Revised June 2015

PART III
Attachment 1
Site Layout Plan

STATE OF TEXAS
STEVEN B. HENIFORD
66257
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PROFESSIONAL ENGINEER

TX F-10098

Steven B. Heniford
6/18/15

LAREDO LANDFILL
PART III
Attachment 1
Site Layout Plan

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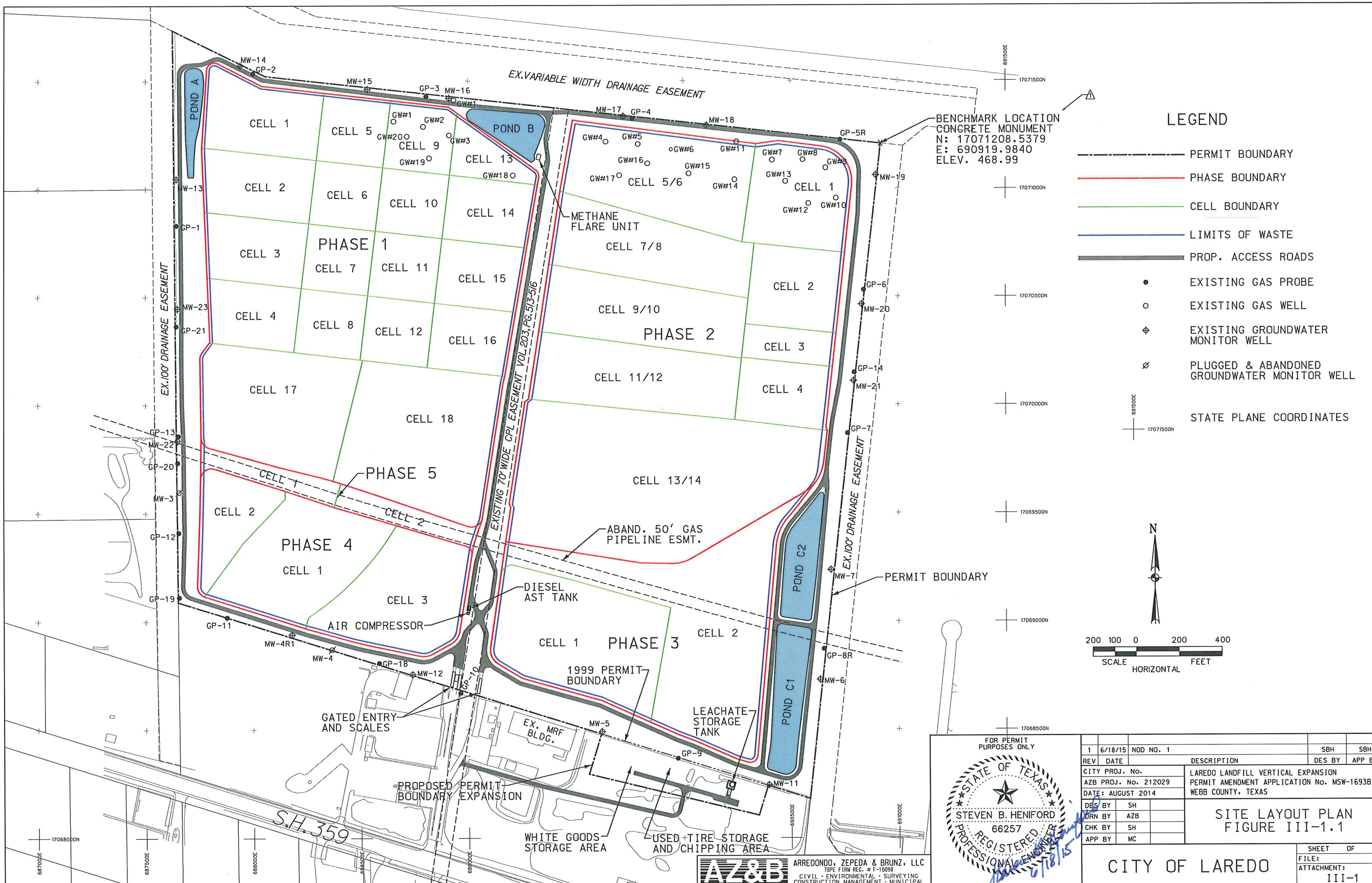
EX.VARIABLE WIDTH DRAINAGE EASEMENT
EX.100' DRAINAGE EASEMENT
EXISTING 70' WIDE CPL EASEMENT VOL.203,PG.513-516
POND A
POND B
POND C1
POND C2
PHASE 1
CELL 1
CELL 2
CELL 3
CELL 4
CELL 5
CELL 6
CELL 7
CELL 8
CELL 9
CELL 10
CELL 11
CELL 12
CELL 13
CELL 14
CELL 15
CELL 16
CELL 17
CELL 18
PHASE 2
CELL 1
CELL 2
CELL 3
CELL 4
CELL 5/6
CELL 7/8
CELL 9/10
CELL 11/12
CELL 13/14
PHASE 3
CELL 1
CELL 2
PHASE 4
CELL 1
CELL 2
CELL 3
PHASE 5
CELL 1
CELL 2
METHANE FLARE UNIT
ABAND. 50' GAS PIPELINE ESMT.
DIESEL AST TANK
AIR COMPRESSOR
1999 PERMIT BOUNDARY
PERMIT BOUNDARY
LEACHATE STORAGE TANK
GATED ENTRY AND SCALES
EX. MRF BLDG.
PROPOSED PERMIT BOUNDARY EXPANSION
WHITE GOODS STORAGE AREA
USED TIRE STORAGE AND CHIPPING AREA
S.H. 359
BENCHMARK LOCATION
CONCRETE MONUMENT
N: 17071208.5379
E: 690919.9840
ELEV. 468.99
MW-14
GP-2
MW-15
GP-3
MW-16
MW-17
GP-4
MW-18
GP-5R
MW-19
GP-6
MW-20
GP-14
MW-21
GP-7
MW-7
GP-8R
MW-6
MW-11
GP-9
MW-5
MW-12
GP-18
MW-4
MW-4R1
GP-11
GP-19
GP-12
MW-3
GP-20
MW-22
GP-13
GP-21
MW-23
GP-1
MW-13
GP-10
GW#1
GW#2
GW#3
GW#4
GW#5
GW#6
GW#7
GW#8
GW#9
GW#10
GW#11
GW#12
GW#13
GW#14
GW#15
GW#16
GW#17
GW#18
GW#19
GW#20
17071500N
17071000N
17070500N
17070000N
17069500N
17069000N
17068500N
17068000N
691500E
691000E
690500E
689000E
688500E
688000E
687500E
687000E
LEGEND
PERMIT BOUNDARY
PHASE BOUNDARY
CELL BOUNDARY
LIMITS OF WASTE
PROP. ACCESS ROADS
EXISTING GAS PROBE
EXISTING GAS WELL
EXISTING GROUNDWATER MONITOR WELL
PLUGGED & ABANDONED GROUNDWATER MONITOR WELL
STATE PLANE COORDINATES
N
200 100 0 200 400
SCALE
FEET
HORIZONTAL
FOR PERMIT PURPOSES ONLY
STATE OF TEXAS
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TBPE FIRM REG. # F-1009B
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1 6/18/15 NOD NO. 1 SBH SBH
REV DATE DESCRIPTION DES BY APP BY
CITY PROJ. No.
AZB PROJ. No. 212029
DATE: AUGUST 2014
LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS
DES BY SH
DRN BY AZB
CHK BY SH
APP BY MC
SITE LAYOUT PLAN
FIGURE III-1.1
SHEET OF
FILE:
ATTACHMENT:
III-1
CITY OF LAREDO

LEGEND

- PERMIT BOUNDARY
- PHASE BOUNDARY
- CELL BOUNDARY
- NEW LINER OVER PRESUBTITLE D AREA
- (X) SEQUENCE NUMBER AND DIRECTION OF CONSTRUCTION
- 17071500N 691500E STATE PLANE COORDINATES
- 540 PROPOSED FINAL ELEVATION CONTOURS

SEQUENCE OF DEVELOPMENT

1. CURRENT FILL OPERATIONS IN PERMITTED AREA PHASE 2
2. CONSTRUCT AND FILL CELL 1 OF PHASE 3
3. CONSTRUCT CELL 2 OF PHASE 3
4. FILL TO FINAL ELEVATION ON EAST PHASE AND BEGIN CLOSURE OF EAST PHASE
5. CONSTRUCT LINER & LEACHATE SYSTEM IN PHASE 4 AND PHASE 5 THEN PARTIALLY FILL
6. CONSTRUCT PIGGYBACK SEPARATION LINER OVER PHASE 1 PRE-SUBTITLE D AREAS THEN FILL
7. FILL TO FINAL ELEVATION ON WEST PHASE AND BEGIN CLOSURE OF WEST PHASE

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LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

OVERALL SITE DEVELOPMENT PLAN
FIGURE III-1.2

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CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-1

N

200 100 0 200 400

SCALE FEET
HORIZONTAL

LEGEND

PERMIT BOUNDARY

PHASE BOUNDARY

CELL BOUNDARY

600 PROPOSED 10' CONTOUR

580 EXISTING 10' CONTOUR

17071500N 691500E STATE PLANE COORDINATES

NOTES:

1. STAGE 2 TO CONSIST OF CONSTRUCTION AND FILL OF CELL 1 OF PHASE 3 PER 1999 PERMIT AND 2013 MODIFICATION.
2. DIESEL FUEL STORAGE TANK & AIR COMPRESSOR RELOCATED PER 2013 MODIFICATION.
3. LEACHATE STORAGE TANK MOVED AFTER AMENDMENT APPROVED.
4. CITY WILL MAINTAIN OPTION TO BUILD AND OPERATE TIRE SHREDDER.

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SITE DEVELOPMENT PLAN
STAGE 2
FIGURE III-1.4

CITY OF LAREDO

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III-1

LEGEND

- PERMIT BOUNDARY
- PHASE BOUNDARY
- CELL BOUNDARY
- PIGGYBACK LINER OVER C & D WASTE
- 600 PROPOSED 10' CONTOUR
- 580 EXISTING 10' CONTOUR
- 17071500N 691500E STATE PLANE COORDINATES

NOTES:

1. STAGE 5 TO CONSIST OF CONSTRUCTION OF LINERS AND LEACHATE SYSTEMS OF PHASE 4 AND PHASE 5 INCLUDING PIGGYBACK SEPARATION LINER OVER EXISTING TYPE 4 WASTE AREA IN CELL 1 OF PHASE 4, FOLLOWED BY PARTIAL FILLING OVER THESE AREAS.

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DES BY SH	SITE DEVELOPMENT PLAN
DRN BY AZB	STAGE 5
CHK BY SH	FIGURE III-1.7
APP BY MC	

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-1

N

200 100 0 200 400

SCALE FEET

HORIZONTAL

LEGEND

PERMIT BOUNDARY

PHASE BOUNDARY

CELL BOUNDARY

NEW LINER OVER PRESUBTITLE D

600 PROPOSED 10' CONTOUR

580 EXISTING 10' CONTOUR

17071500N 691500E STATE PLANE COORDINATES

NOTES:

1. STAGE 6 TO CONSIST OF CONSTRUCTION OF PIGGYBACK SEPARATION LINER OVER PRE-SUBTITLE D AREA OF PHASE 1.

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LAREDO LANDFILL VERTICAL EXPANSION
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WEBB COUNTY, TEXAS

SITE DEVELOPMENT PLAN
STAGE 6
FIGURE III-1.8

CITY OF LAREDO

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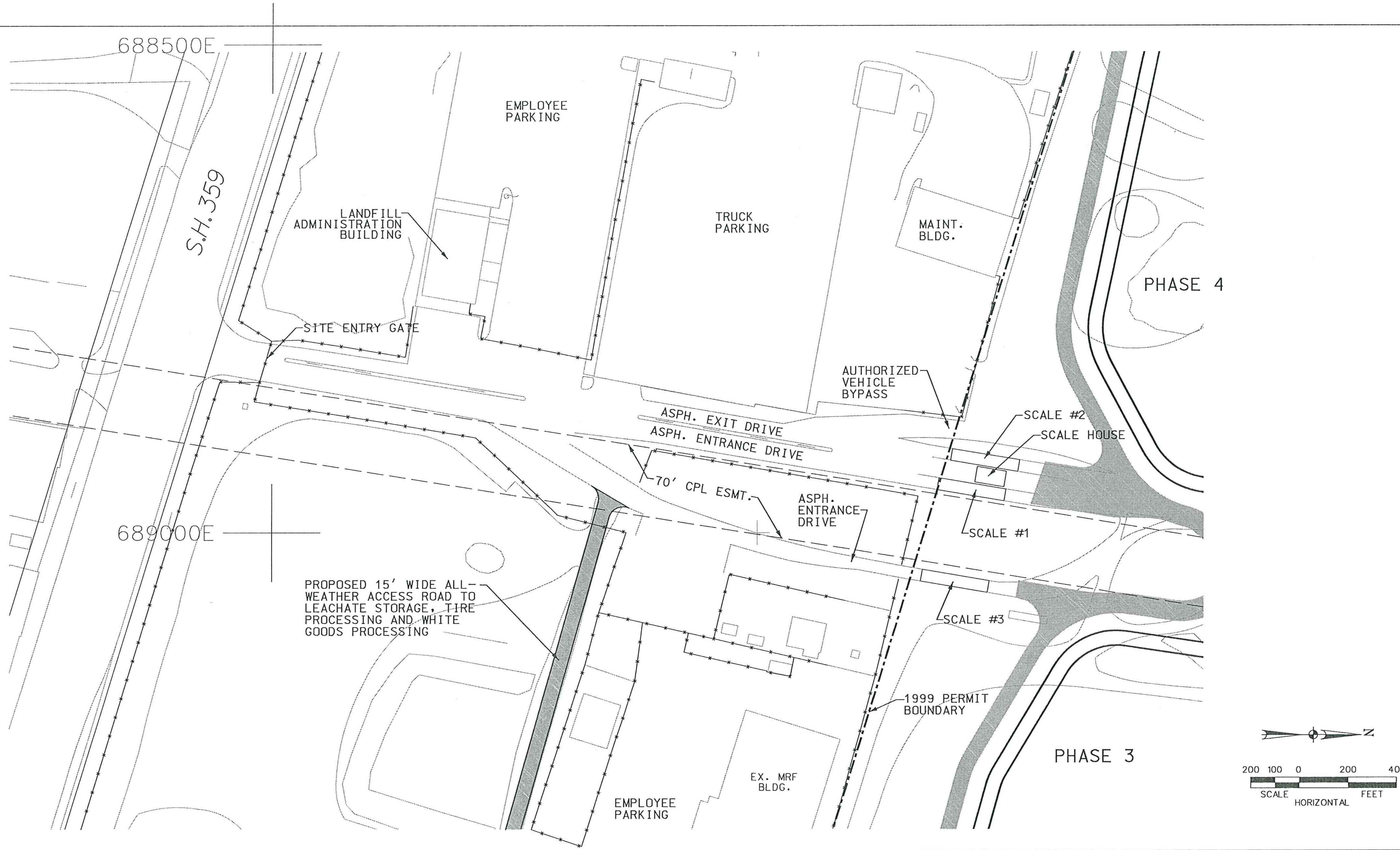
III-1



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LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

SITE ENTRANCE PLAN
FIGURE III-1.11 1

CITY OF LAREDO

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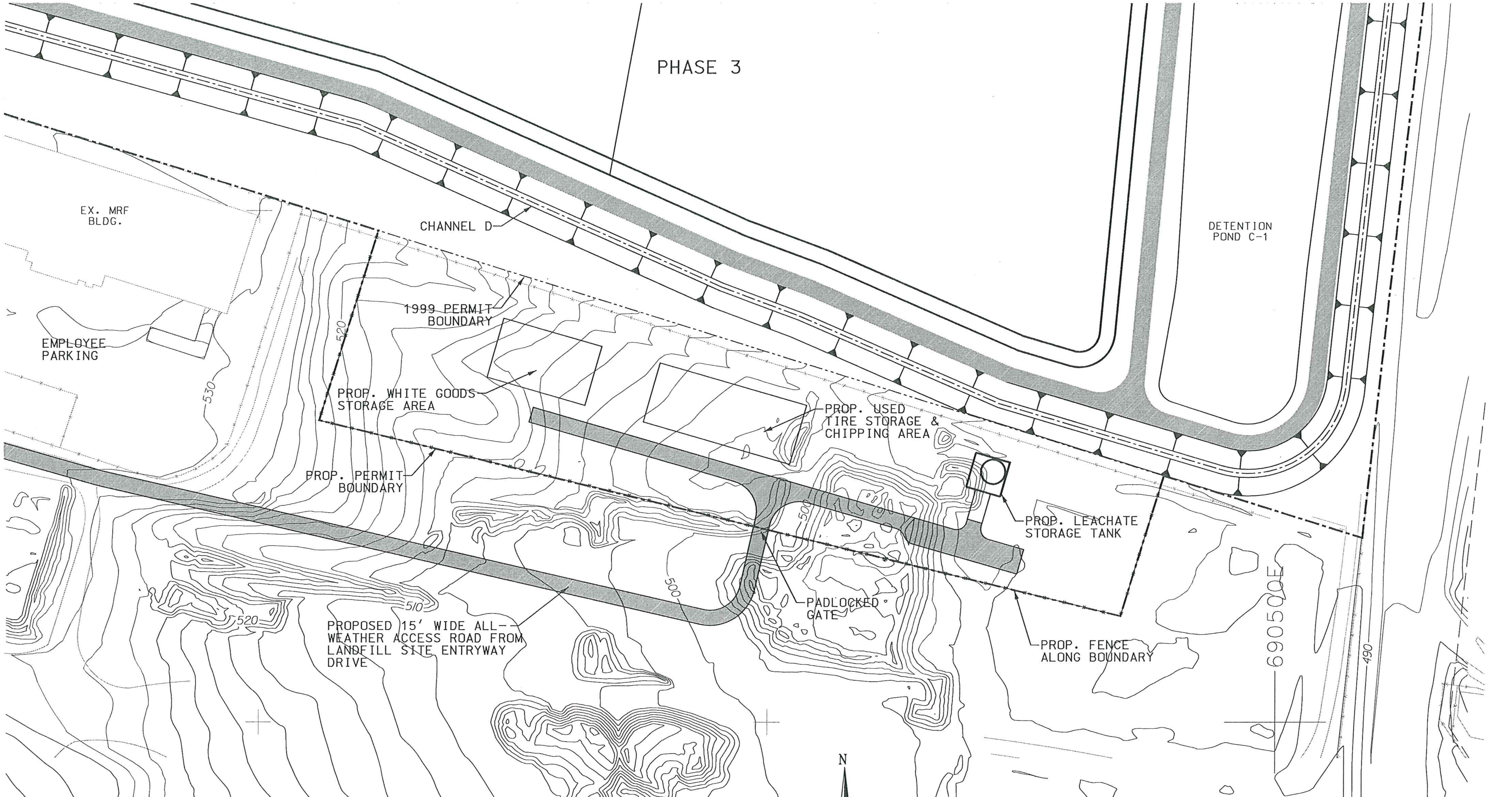

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DES BY	SH	PERMIT BOUNDARY EXPANSION PLAN FIGURE III-1.12		
DRN BY	AZB			
CHK BY	SH			
APP BY	MC			

CITY OF LAREDO

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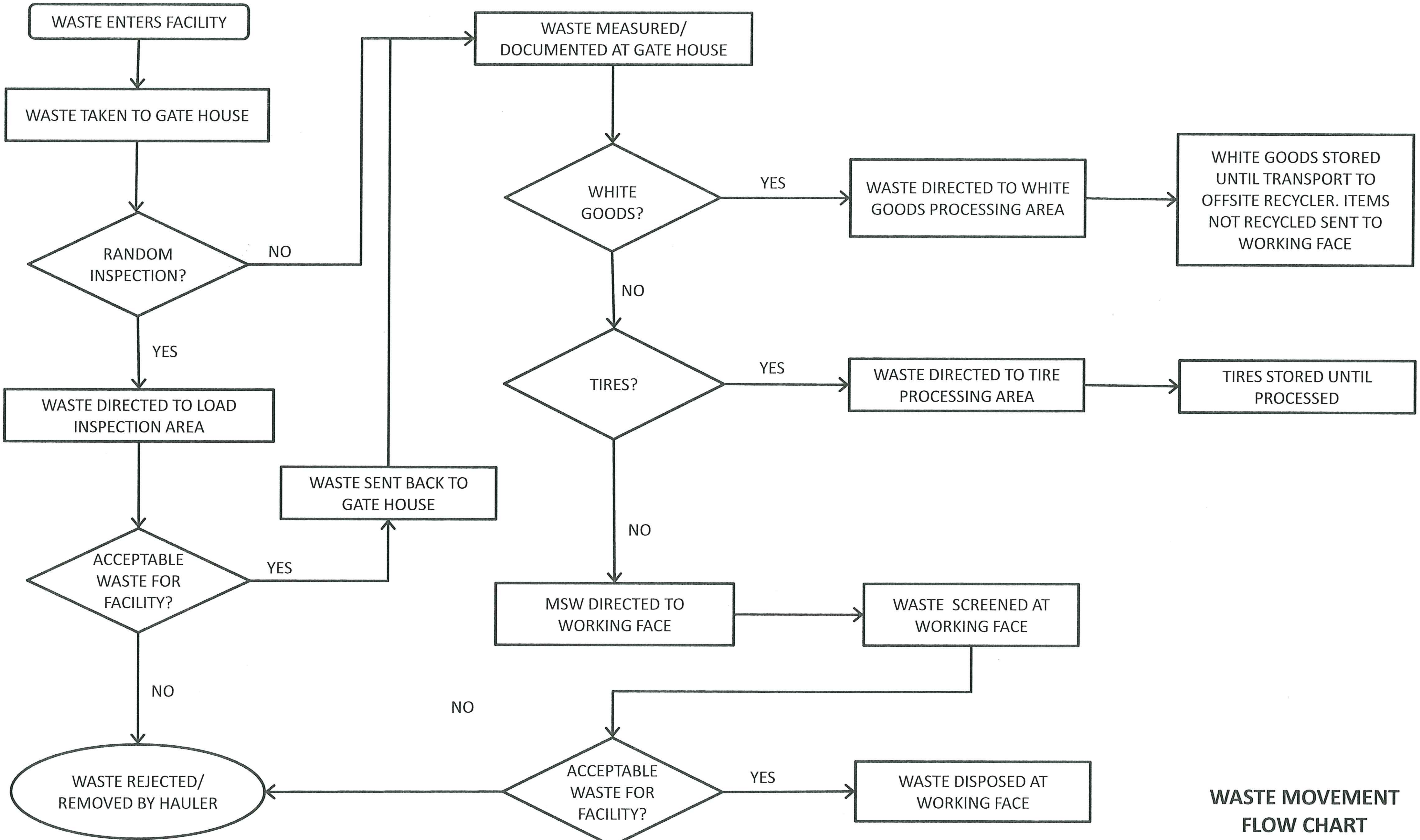

WASTE MOVEMENT FLOW CHART
FIGURE III-1.13

City of Laredo Landfill Permit Amendment 1693B
City of Laredo, Texas
Permit Amendment MSW Permit 1693B
Laredo, Texas
Webb County, Texas
August 2014
Revised June 2015

PART III
Attachment 2
Fill Cross Sections

STATE OF TEXAS
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TX F-10098

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LAREDO LANDFILL
PART III
Attachment 2
Fill Cross Sections

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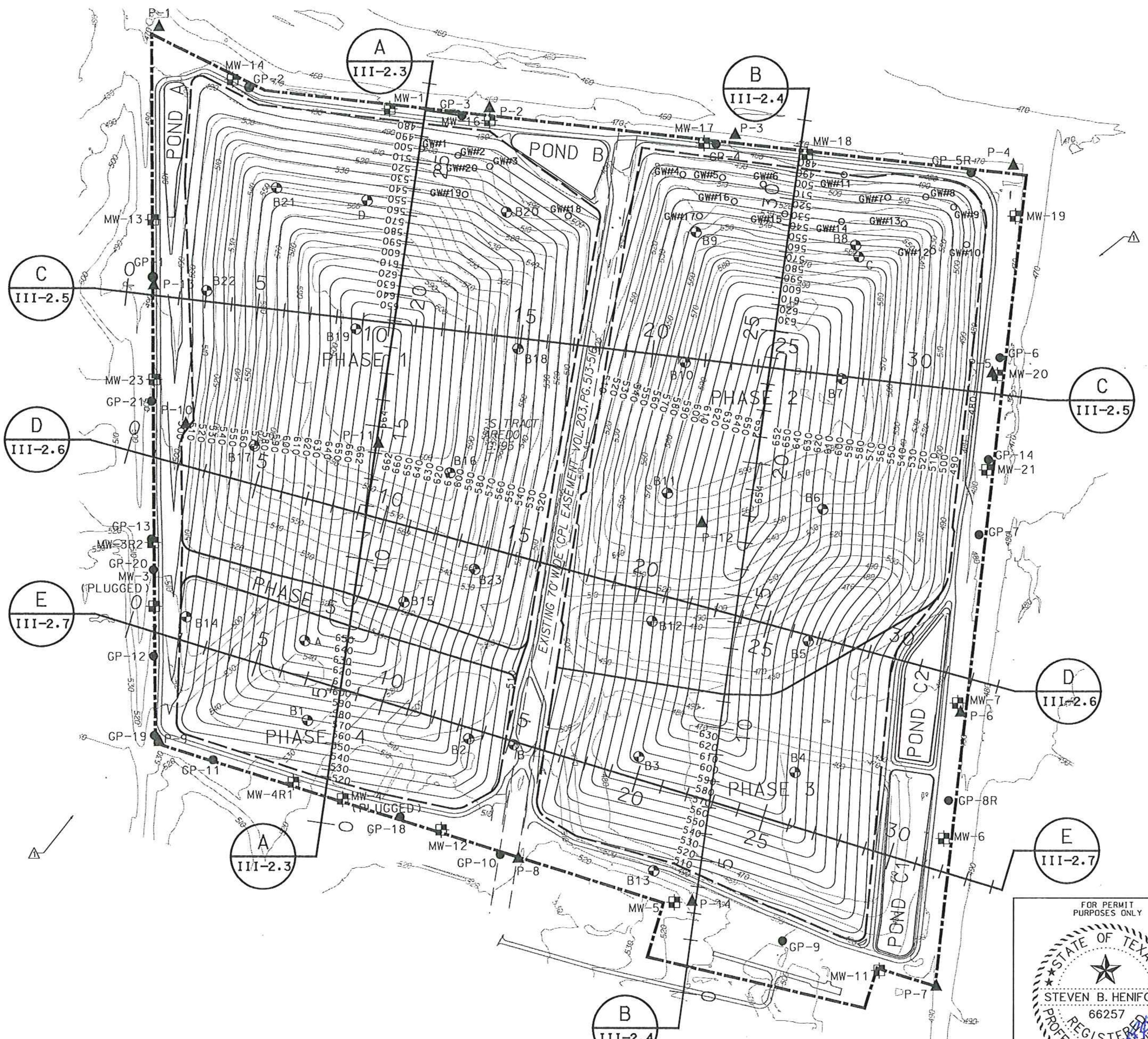

LEGEND

	PERMIT BOUNDARY
	PHASE BOUNDARY
	LIMITS OF HILL
500	PROPOSED 10-FT CONTOURS
500	EXISTING 10-FT CONTOURS
B11	SOIL BORING
P-6	PIEZOMETER
MW-19	GROUNDWATER MONITORING WELL
GP-9	GAS PROBE
GW#8	GAS COLLECTION WELL

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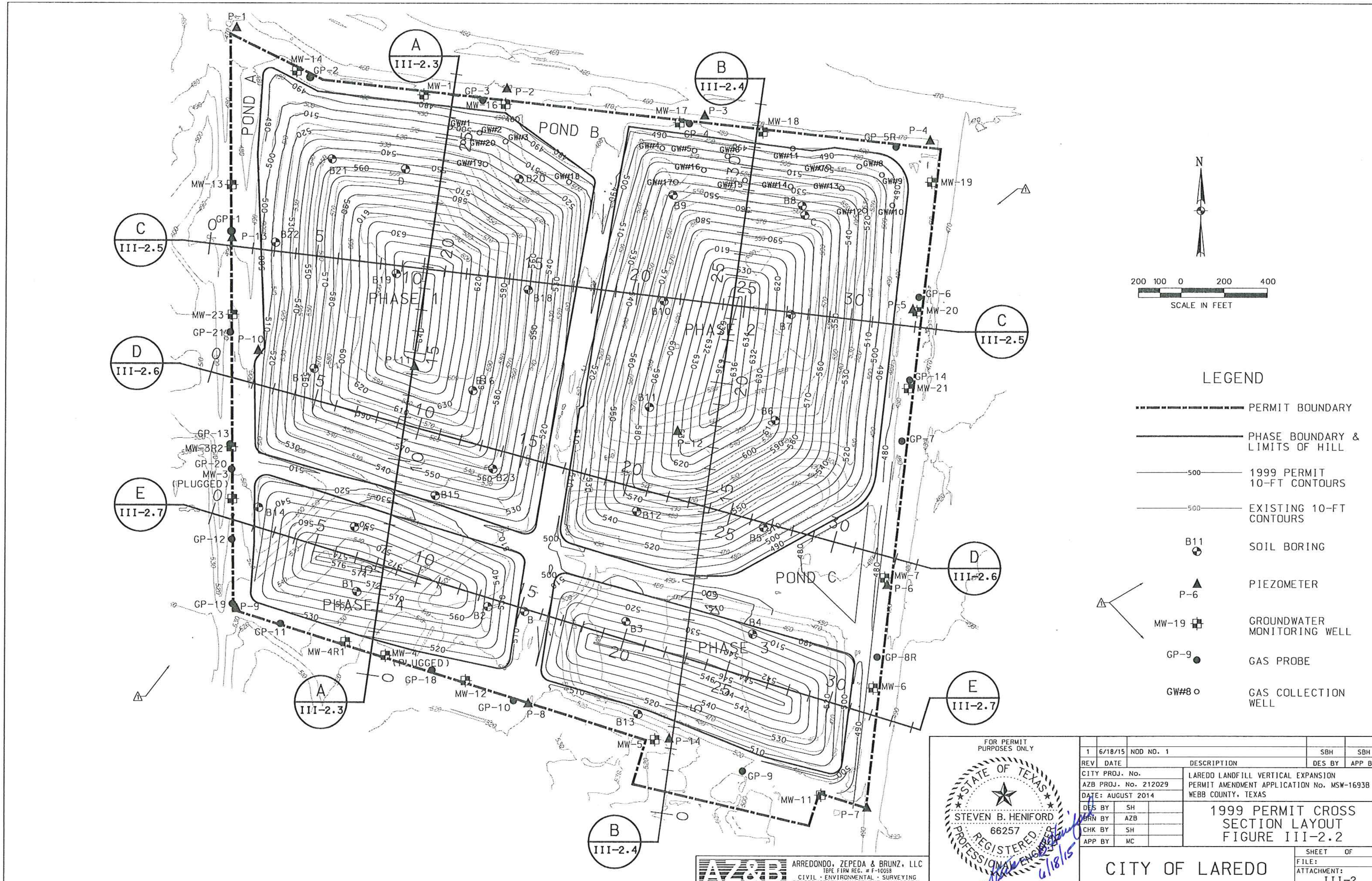
CITY PROJ. No.	LAREDO LANDFILL VERTICAL EXPANSION
AZB PROJ. No. 212029	PERMIT AMENDMENT APPLICATION No. MSW-1693B
DATE: AUGUST 2014	WEBB COUNTY, TEXAS
DES BY SH	PROPOSED FILL CROSS SECTION LAYOUT FIGURE III-2.1
DRN BY AZB	
CHK BY SH	
APP BY MC	

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-2



POND A
POND B
POND C
PHASE 1
PHASE 2
PHASE 3
PHASE 4
A III-2.3
B III-2.4
C III-2.5
D III-2.6
E III-2.7
N
200 100 0 200 400
SCALE IN FEET
LEGEND
PERMIT BOUNDARY
PHASE BOUNDARY & LIMITS OF HILL
1999 PERMIT 10-FT CONTOURS
EXISTING 10-FT CONTOURS
SOIL BORING
PIEZOMETER
GROUNDWATER MONITORING WELL
GAS PROBE
GAS COLLECTION WELL
FOR PERMIT PURPOSES ONLY
STATE OF TEXAS
STEVEN B. HENIFORD
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6/18/15
1 | 6/18/15 | NOD NO. 1 | SBH | SBH
REV | DATE | DESCRIPTION | DES BY | APP BY
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DATE: AUGUST 2014
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CHK BY SH
APP BY MC
LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS
1999 PERMIT CROSS SECTION LAYOUT
FIGURE III-2.2
CITY OF LAREDO
SHEET OF
FILE:
ATTACHMENT: III-2
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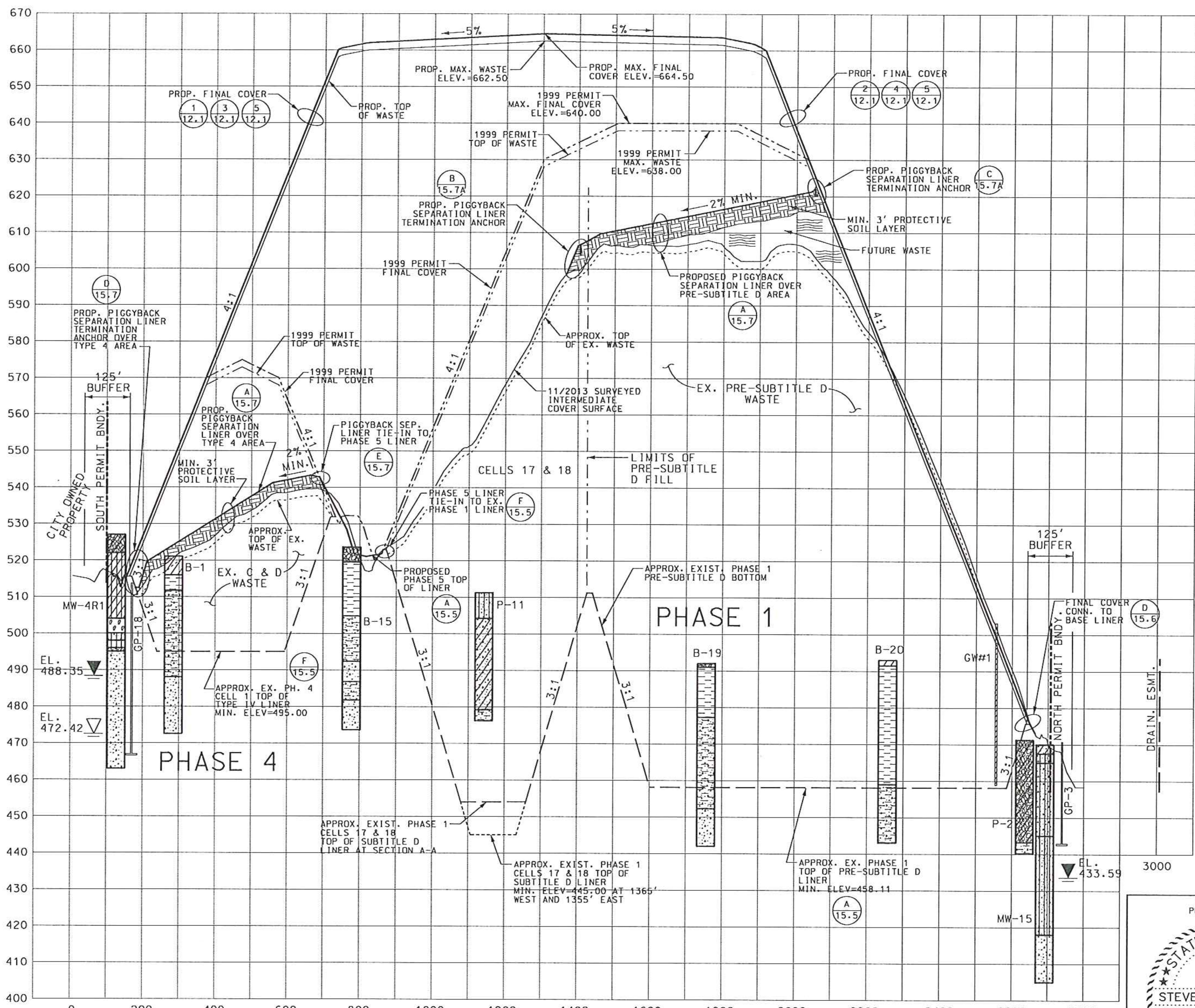
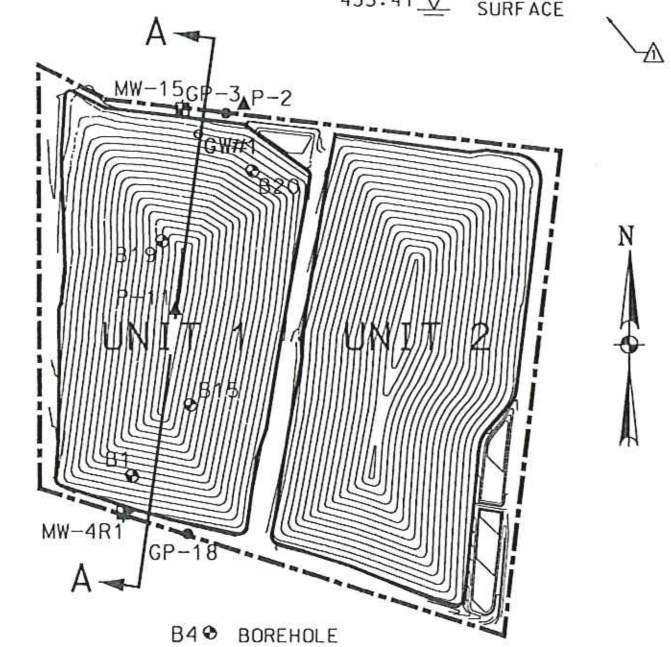


BORING LOG LEGEND

- CLAY
- SANDY CLAY
- CLAYEY SAND WITH GRAVEL
- SILT
- SANDY SILT
- SILTY CLAY
- SHALE
- SHALY SANDSTONE
- SANDSTONE
- SANDY GRAVEL
- OYSTER BED
- EL. 438.61 STABILIZED WATER SURFACE (5/6/14)
- EL. 435.41 INITIAL WATER SURFACE



- B4 BOREHOLE
- P-2 PIEZOMETER (PLUGGED)
- MW-6 GW MONITOR WELL
- GP-8R GAS PROBE
- GW#1 GAS COLLECTION WELL

30 15 0 30
SCALE FEET
VERTICAL

300 150 0 300
SCALE FEET
HORIZONTAL

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STATE OF TEXAS
STEVEN B. HENIFORD
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REGISTERED PROFESSIONAL ENGINEER
6/18/15

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AZB PROJ. No. 212029	
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CHK BY	SH
APP BY	MC

LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

FILL CROSS SECTION
SECTION A-A
FIGURE III-2.3

CITY OF LAREDO

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TBPE FIRM REG. # F-10058
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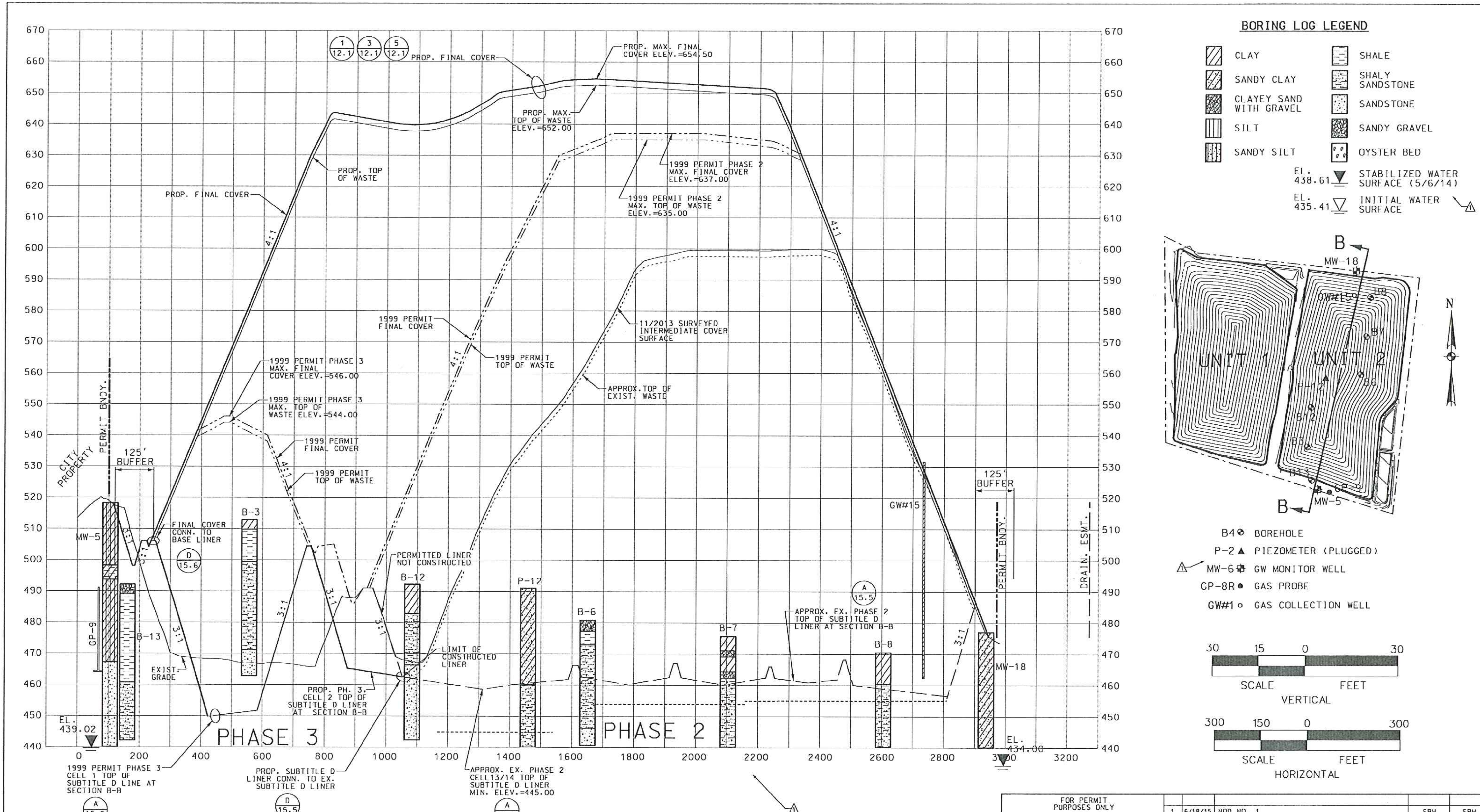

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STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
6/18/15

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
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REV	DATE	DESCRIPTION	DES BY	APP BY
1	6/18/15	NOD NO. 1	SBH	SBH

CITY PROJ. No.
AZB PROJ. No. 212029
DATE: AUGUST 2014
DES BY SH
DRN BY AZB
CHK BY SH
APP BY MC

LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

FILL CROSS SECTION
SECTION B-B
FIGURE III-2.4

CITY OF LAREDO

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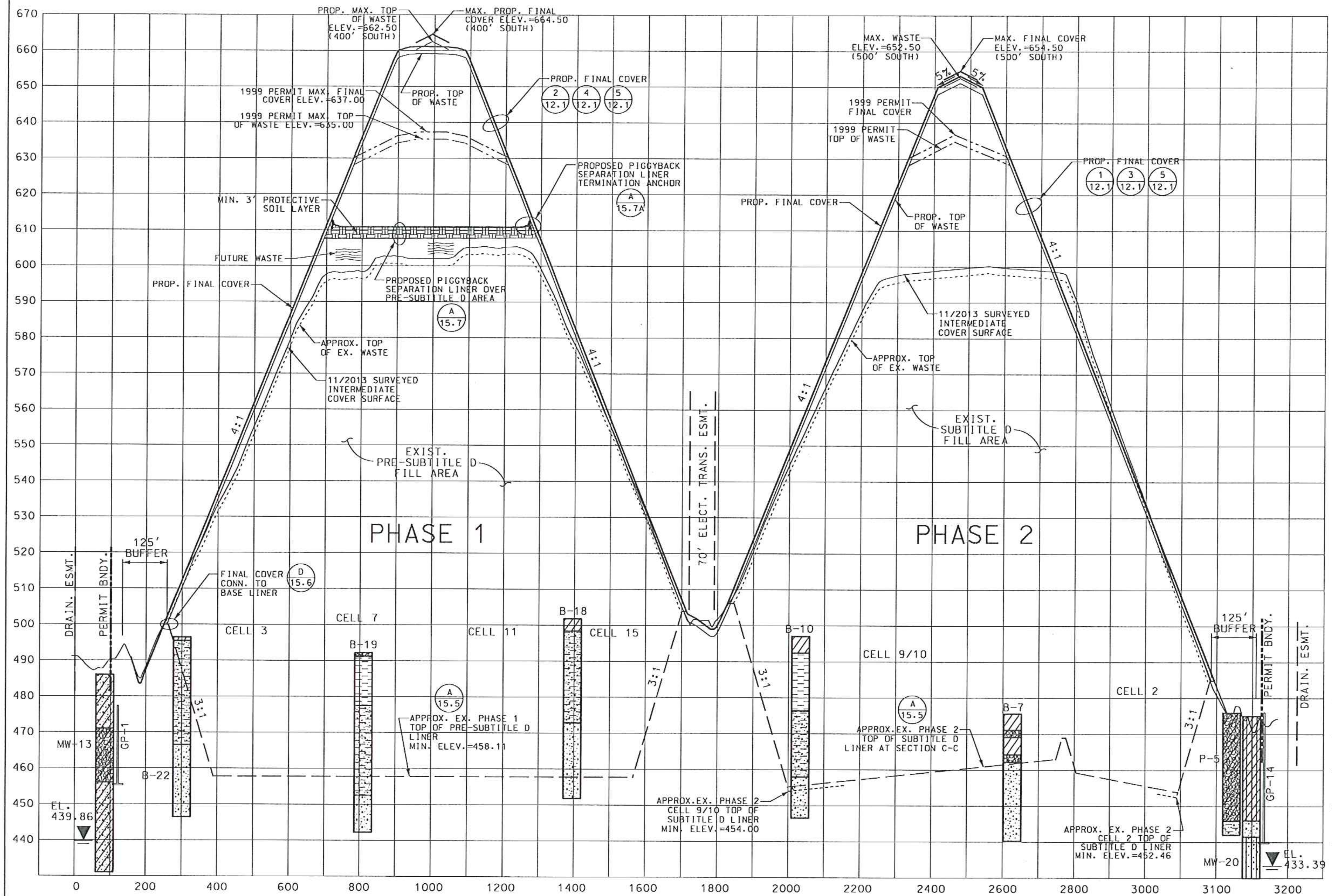
ATTACHMENT: III-2

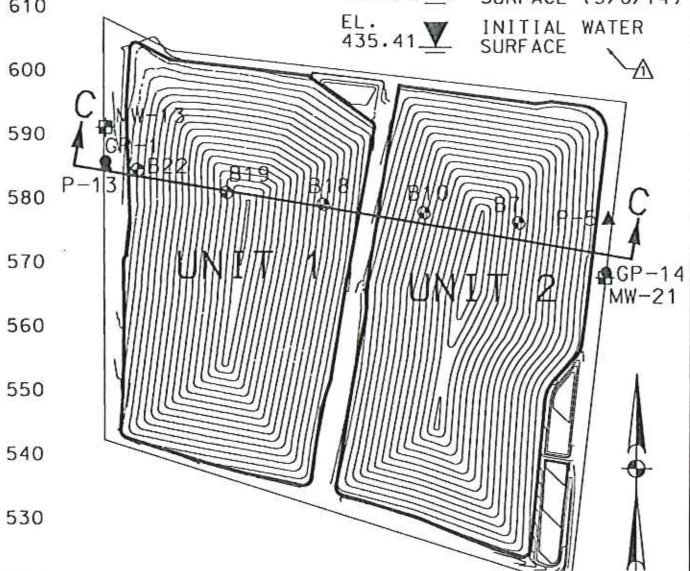


BORING LOG LEGEND

CLAY	SHALE
SANDY CLAY	SHALY SANDSTONE
CLAYEY SAND WITH GRAVEL	SANDSTONE
SILT	SANDY GRAVEL
SANDY SILT	OYSTER BED

EL. 438.61 STABILIZED WATER SURFACE (5/6/14)

EL. 435.41 INITIAL WATER SURFACE



B4 BOREHOLE
P-2 PIEZOMETER (PLUGGED)
MW-6 GW MONITOR WELL
GP-8R GAS PROBE
GW#1 GAS COLLECTION WELL

30 15 0 30
SCALE FEET
VERTICAL

300 150 0 300
SCALE FEET
HORIZONTAL

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WEBB COUNTY, TEXAS

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FILL CROSS SECTION
SECTION C - C
FIGURE III-2.5

CITY OF LAREDO

SHEET 1 OF 1
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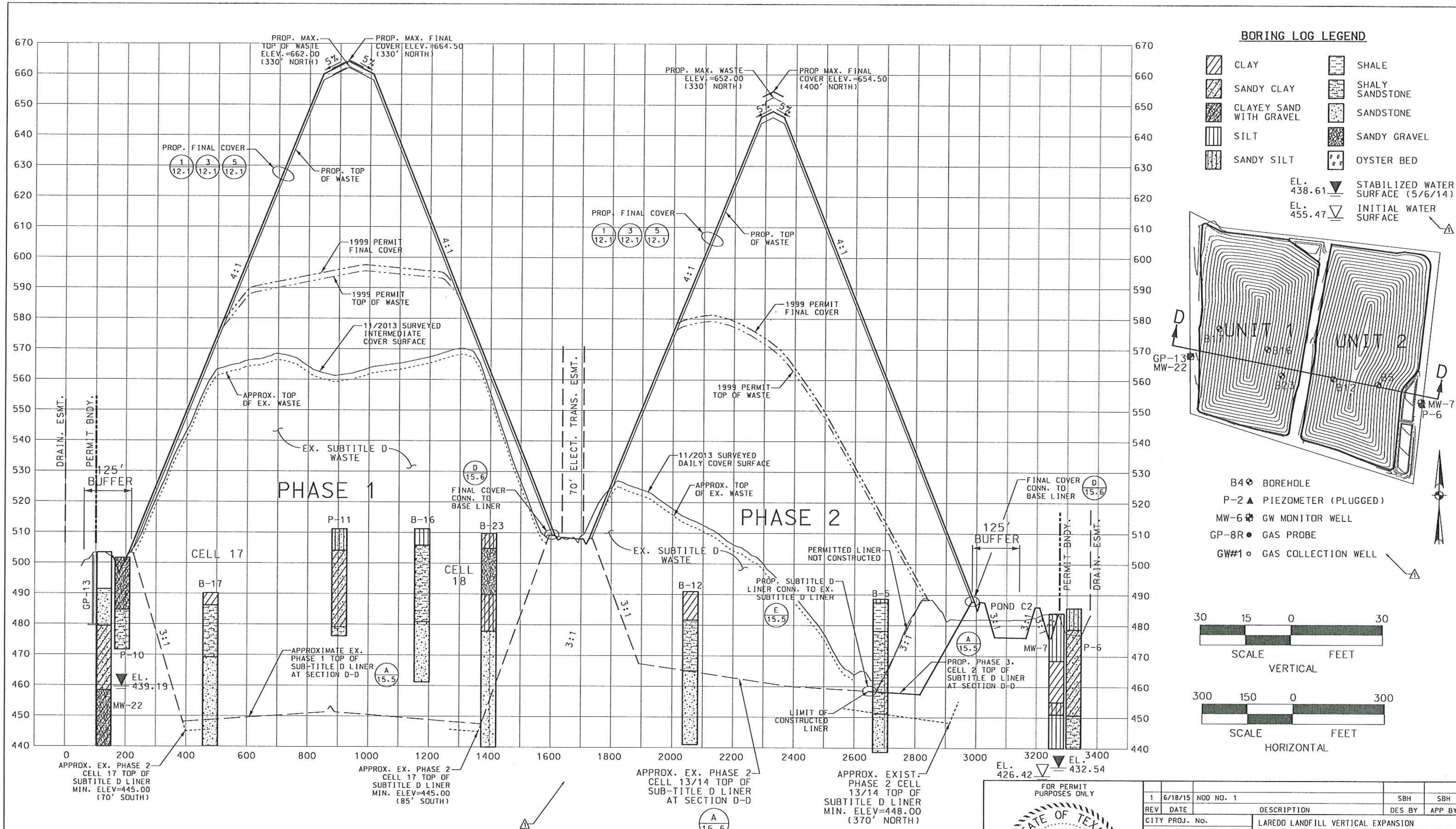
ATTACHMENT: III-2



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LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

FILL CROSS SECTION
SECTION D – D
FIGURE III-2.6

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CITY OF LAREDO

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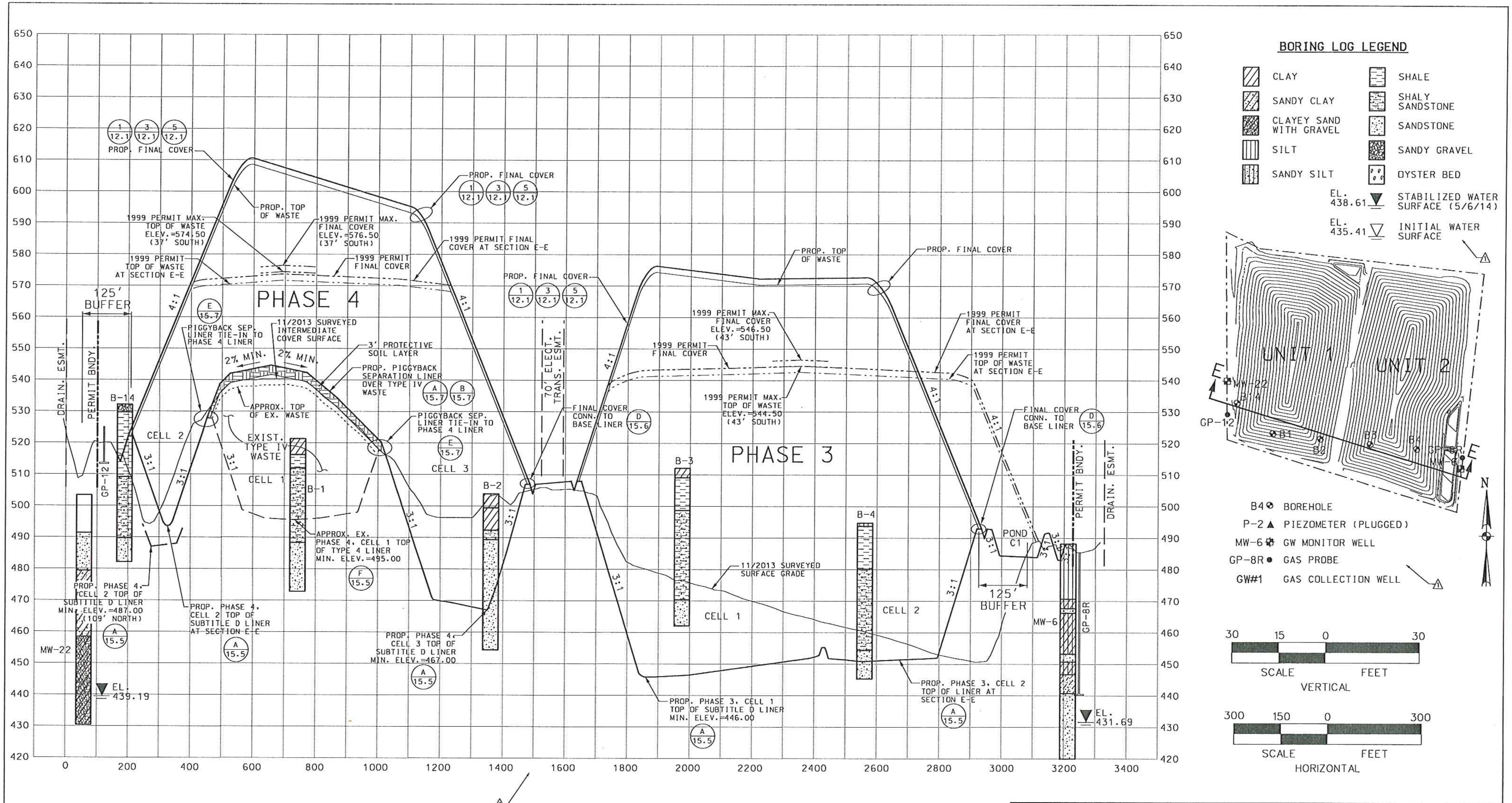

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LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

FILL CROSS SECTION
SECTION E-E
FIGURE III-2.7

CITY OF LAREDO

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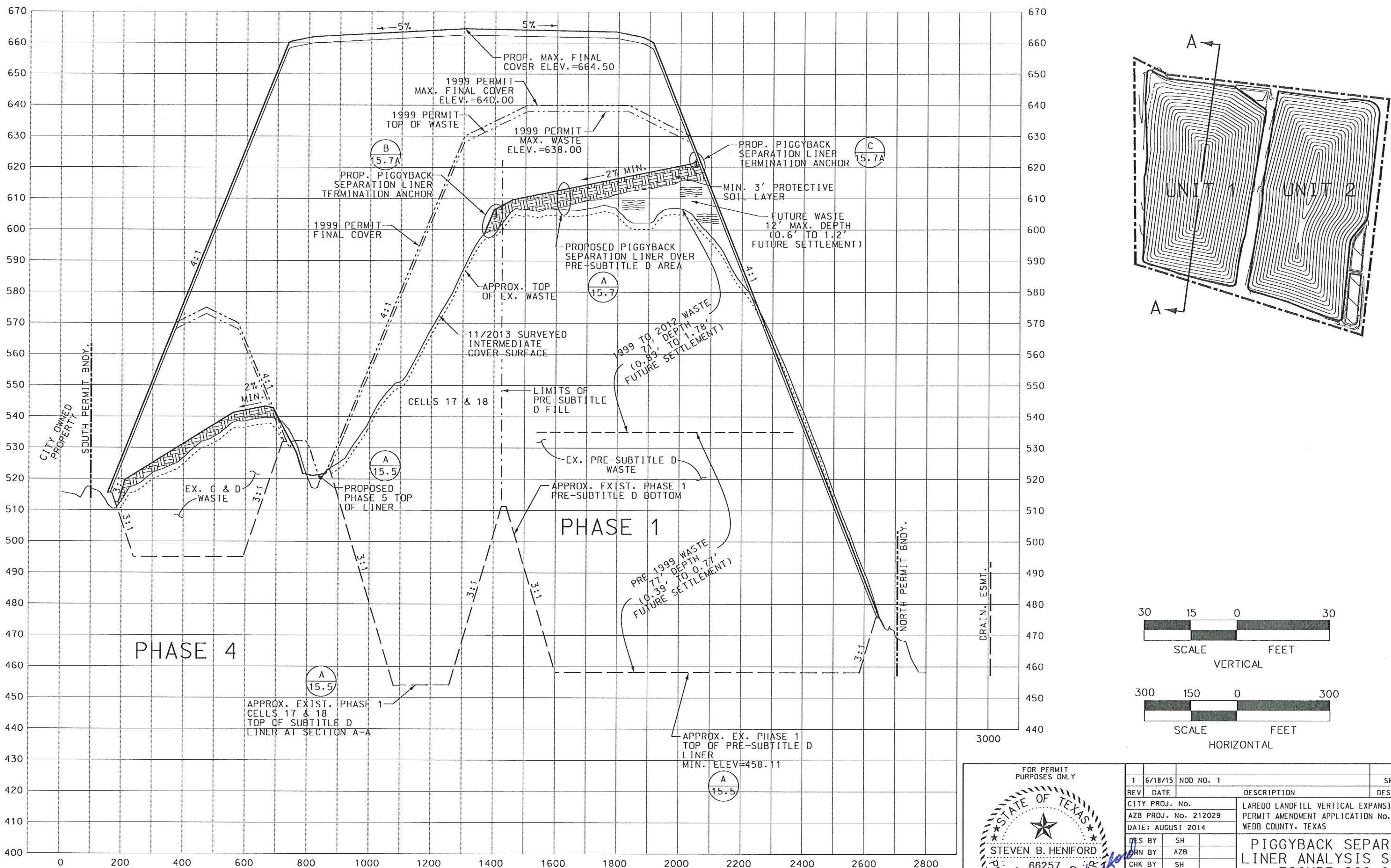

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DATE: AUGUST 2014

LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

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CHK BY	SH
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PIGGYBACK SEPARATION LINER ANALYSIS SECTION
FIGURE III-2.8

CITY OF LAREDO

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City of Laredo Landfill Permit Amendment 1693B
City of Laredo, Texas
Permit Amendment MSW Permit 1693B
Laredo, Texas
Webb County, Texas
August 2014
Revised June 2015

PART III
Attachment 6
Groundwater and Surface Water Protection
Plan and Drainage Plan

STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER

TX F-10098

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6/18/15

LAREDO LANDFILL
PART III
Attachment 6
Groundwater and Surface Water Protection Plan and Drainage Plan

STATE OF TEXAS
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Steven B. Heniford
6/18/15

1.0 FACILITY SURFACE WATER DRAINAGE REPORT [330.63(c)]

The Laredo Landfill design has been prepared in accordance with the requirements of 330.303 – Surface Water Drainage for Municipal Solid Waste Facilities. Attachment 6 includes existing and proposed drainage area maps, design calculations and drainage structure detail drawings including terrace channels, rundown channels, ditches, culverts, storm drains, and sedimentation/detention ponds. To minimize surface water from coming into contact with waste and leachate, a system of on-site ditches, retention/detention ponds, culverts and storm sewer pipes will be used to direct the 25-year, 24-hour storm run-on and runoff through and around the site.

Stormwater runoff discharged from the landfill must not adversely alter existing drainage patterns. To assure this, a hydrologic and hydraulic analysis will be made to compare the proposed post development conditions with the currently permitted conditions. This surface water drainage report has been prepared in accordance with 330.63 Subchapter G.

Surface water controls at the facility are designed to prevent solid wastes, pollutants, and dredged or fill materials from being discharged into waters of the U.S. or wetlands [§330.307], maintain natural drainage patterns [§330.305(a)], prevent rainfall run-off from coming in contact with leachate or refuse [§330.305(b)], control runoff from the active face [§330.305(c)], and control erosion of all surfaces during the life and post-closure of the facility [§330.305(d)].

1.1 Drainage Analyses

1.1.1 Existing Pre-Development Drainage Condition

The landfill site is bounded on the west, north and east sides by drainage easements of varying width that contain existing earthen drainage channels. These offsite channels were designed and constructed to convey stormwater originating from off-site areas around the landfill boundary. As represented on Figure III.6.1, Existing Drainage Area Map, a large watershed of approximately 983.5 acres (1.538 sq. mi.) generates surface water flow to the channel adjacent to the east boundary. A small watershed of approximately 43.1 acres (0.067 sq. mi.) to the west of the site flows in the existing channel adjacent to the west boundary, and a watershed of approximately 141.6 acres (0.221 sq. mi.) southeast of the site currently flows onto the site across the south facility boundary. The existing permit proposes to direct this run-on via ditches identified as Ditch S-1 to S-7 along the south and east boundary lines to a discharge point at the northeast corner of the landfill site. At this time, this channel has not been constructed and the discharge is conveyed through the site in ditches and culverts to existing sedimentation/detention Pond C before eventually leaving the site near its northeast corner. During past development of the landfill, a borrow pit has been excavated along the drainage path of this 141.6 acre offsite area outside of the permitted boundary. This borrow pit intercepts and retains runoff that would have flowed onto the landfill site, therefore reducing the run-on being experienced. When the borrow pit nears its holding capacity, flow begins to run on to the landfill at a reduced rate. Retained water in the pit is either pumped out after the storm event into the nearby channels or is used for landfill purposes. This excavation pit is to remain for the developed condition and is accounted for in the hydrologic and hydraulic calculations performed.

For the existing on-site flows, as shown on Figure III-6.2, – Existing Onsite Drainage Plan, the site can be divided into six major drainage areas that have six outfall locations. Area 1, containing 2.20 acres discharges directly into the existing channel along the landfill site's western boundary identified as Outfall 1. Area 2 containing 34.89 acres, passes through Sedimentation/Detention Pond A and discharges through an outlet pipe, leaving the site near the northwest corner of the landfill site at Outfall 2. Areas 3 and 5 combined contain 37.80 acres and discharges from the site generally as sheet flow along the northern boundary at Outfalls 3 and 5 respectively. Area 4 contains 17.48 acres, passes through Sedimentation/Detention Pond B and discharges through an outlet pipe to the existing drainage channel located off of the northern boundary near the center of the site identified as Outfall 4. Area 6A contains 87.25 acres, is passed through Sedimentation/Detention Pond C and is eventually discharged offsite at Outfall 6 at the site's northeast corner in an earthen channel. Areas 6B and 6C together contain 20.22 acres that includes the east side of Phase 1 that does not pass through any sedimentation/detention facility and the area of the existing channel along the landfill's eastern boundary. This channel conveys the onsite run-off of this 21.2 acre area as well the 87.25 acre discharged through Sedimentation/Detention Pond C and the run-on from the 141.6 acre offsite basin mentioned above.

Earthen ditches along the toes of slope of the landfill hills convey run-off from the hills to the sedimentation/detention ponds described. The landfill site has a low area located at the common corner of the four phases/hills near the center of the site. A major drainage feature in the currently permitted design is a lined ditch identified as Ditch 2S-2/3. This ditch flows west to east along the north side of the abandoned natural gas pipeline easement (between Phases 2 and 3) and conveys runoff from the 86.0 acre onsite basin and the offsite 141.6 acre basin to Pond C.

1.1.2 Proposed Post-Development Drainage Design

The surface water management system design for the developed condition is presented on Figures III.6.3 through Figure III.6.6. Figure III.6.3, Proposed Drainage Area Map shows the offsite and onsite drainage patterns for comparison with the existing condition. The proposed vertical expansion will result in two hills separated by the existing 70-foot electrical transmission easement. The vertical expansion will be accomplished by filling in the area along the abandoned gas line easement that separates Phase 1 from Phase 4 and Phase 2 from Phase 3. Proposed drainage areas were delineated based upon this final landfill configuration and are indicated on Figure III.6.4, Proposed Overall Drainage Plan. The proposed condition maintains the location of the six discharge points identified for the existing condition. Figure III.6.5, West Hill Drainage Plan shows the western hill in more detail and Figure III.6.6, East Hill Drainage Plan provides more detail regarding the eastern hill.

To analyze the proposed post-development condition with the current pre-development condition, the resulting discharge rates for the two conditions will be compared at the six outfall points identified for the existing condition and at the most downstream point in the adjacent drainage channel near the landfill's northwest corner. As required in the regulations, the analysis will include the 25-year, 24-hour storm event.

There is no change to the existing offsite drainage areas or patterns with the proposed drainage design. For the post-development on-site flows, as shown on Figure III.6.4, Proposed Overall Drainage Plan, the site is still divided into six separate major drainage areas related to the six outfall locations for comparison to the existing condition. The proposed major onsite drainage areas are broken down into multiple sub-areas for onsite drainage structure design purposes.

Area 1, containing 3.53 acres discharges directly into the existing channel along the landfill site's western boundary identified as Outfall 1. Area 2 containing 33.04 acres, passes through Sedimentation/Detention Pond A and discharges from the site near the northwest corner of the landfill site at Outfall 2. Areas 3 and 5 combined contain 11.95 acres and discharges from the site generally as sheet flow along the northern boundary at Outfalls 3 and 5 respectively. Area 4 contains 45.02 acres, passes through Sedimentation/Detention Pond B and discharges to the drainage channel located off of the northern boundary near the center of the site identified as Outfall 4. Area 6 contains 109.61 acres, is passed through Sedimentation/Detention Ponds C1 and C2 and is eventually discharged offsite at Outfall 6 at the site's northeast corner in an earthen channel.

To accommodate the joining together of Phases 1 and 4 and Phases 2 and 3 into two hills, the aforementioned ditch 2S-2/3 that runs between Phase 2 and Phase 3 will be eliminated. To accomplish the conveyance of drainage formerly handled by this ditch, an HDPE pipe storm drain will be constructed from a point near the eastern common corner of Phases 2 and 3 and around the south end of Phase 3. This storm drain will discharge into retention Pond C-1, the upstream pond of a two-stage retention facility designed to replace the existing stormwater storage capacity of the current Pond C. The second, downstream pond of the two-stage facility is identified as Pond C-2. Due to the topography's slope, Ponds C-1 and C-2 are separated to have differing water surface elevations, thus maximizing the available storage volume. Discharge from Pond C-1 directly drains into Pond C-2 through a free flowing pipe.

As was provided in the current permit, a channel will be used to convey run-on from the 141.6 acre offsite drainage basin to the southwest. As mentioned above, the flow in this channel is reduced due to the retention/detention effects of the borrow pit excavated near and outside of the southwest corner of the landfill. This channel will run along and within the permit boundary's south line to the southeast corner of the landfill where it will turn north and run northward just inside of the landfill's eastern boundary. This channel will circumvent Sedimentation/Detention Ponds C1 and C2 and outfall at the northeast corner identified as Outfall 6. Discharge from Sedimentation/Detention Pond C2 will be released into this channel.

Surface water run-off from the final cover of each phase will sheet flow across the top dome surface of the landfill and a short distance down the 4(H):1(V) landfill sideslope. Berms will be constructed at 40 vertical-foot intervals down the sideslope to form drainage terraces which intercept runoff and convey it laterally across the hillside to rundown channels. These rundowns are lined, flat-bottom channels which route runoff down the side slope to the landfill toe. Once the runoff is conveyed to the base of the hill, it is carried in surface ditches to sedimentation basins located west of Phase 1 (sedimentation Pond A), northeast of Phase 1 (sedimentation Pond B), and east of Phase 3 (sedimentation Ponds C1 and C2). Culverts will be used at locations where drainage ditches cross the access roads and easements as well as for the sedimentation basin outlet structures. All drainage structures for protecting the active face and waste storage units from run-off will be designed for the 24-hour, 25-year event.

1.2 Basis of Hydrologic Analysis

The regulations require that the Rational Method be used to calculate peak discharge rates for all drainage areas 200 acres or less. For drainage areas greater than 200 acres in size, discharges shall be calculated using unit hydrograph methods. All of the six major onsite drainage areas associated with the six discharge points identified above are less than 200 acres. The total drainage basin at the most downstream comparison point for this analysis is over 1000 acres. Therefore, flow rates used to analyze onsite drainage facilities conveying onsite generated run-off will be calculated using the Rational Method and a unit hydrograph method will be used to calculate flow rates for comparison of the pre-development and post development conditions at the most downstream point adjacent to the landfill.

1.2.1 Rational Method Calculations

The Rational Method estimates peak runoff for a drainage area based on three factors: the size of the drainage area; the rainfall intensity for the maximum time of concentration; and a runoff coefficient. The TxDOT Hydraulic Manual presents this formula as Equation 4-20 expressed as:

$$Q = C\ I\ A\ /\ Z$$

Where:
Q = Peak discharge in cubic feet per second (cfs)
C = Rational Method runoff coefficient (unitless)
I = Rainfall intensity in inches per hour (in./hr.)
A = Drainage area size in acres (ac.)
Z = Conversion factor (1 for English units)

The TxDOT Hydraulic Manual provides Equation 4-22 for calculating the runoff coefficient "C". This equation is presented as:

$$C = C_r + C_i + C_v + C_s$$

Where:
C = runoff coefficient for rural watershed
C_r = Component of coefficient for watershed relief
C_i = Component of coefficient for soil infiltration
C_v = Component of coefficient for vegetal cover
C_s = Component of coefficient for surface type

Table 4-11: Runoff Coefficients for Rural Watersheds presents value ranges for the runoff coefficient components. These values reflect the topography, soil type, vegetation and surface storage of the drainage area. According to TxDOT Manual Table 4.11, the C value components to be used for this design are as follows:

Condition	Description	Coeff. C
Relief, C_r	Hilly, 10%-30% avg. slopes	0.24
Soil Infiltration, C_i	Normal, well drained	0.06
Vegetal Cover, C_v	Fair to good, 50% grass cover	0.08
Surface Storage, C_s	Negligible surface storage	0.10
TOTAL, C		0.48

Rainfall intensity, I, for a given return interval is calculated per the TxDOT Manual by Equation 4-20 as:

$$I = P_d/t_c$$

Where:
I = design rainfall intensity (in./hr.)
Pd = Depth of rainfall in inches for AEP design storm of duration tc
tc = time of concentration in hours

The time of concentration (t_c) is the time required for the entire watershed to contribute to runoff at a given design point. This is calculated as the time for runoff from the most hydraulically remote point of the drainage area to the design point. The TxDOT Manual recommends using either the Kerby-Kirpich Method or the Natural Resource Conservation Service (NRCS) Method to calculate time of concentration. The Kirby-

Kirpich approach is recommended for drainage areas greater than 0.25 square miles and drainage lengths greater one mile, neither of which apply to the on-site analysis. Therefore, the NRCS Method will be used for on-site time of concentration calculations. The NRCS Method is presented in the TxDOT Manual with Equation 4-16 as:

$t_c = t_{sh} + t_{sc}\ \ t_{ch}$

Where:
tsh = sheet flow travel time in hours
tsc = shallow concentrated flow travel time in hours
tch = channel flow travel time in hours

The sheet flow travel time component t_{sh}, is computed according to TxDOT Manual Equation 4-17 as:

$t_{sh} = 0.007(n_{ol}L_{sh})^{0.8}/(P_2)^{0.5}S_{sh}^{0.4}$

Where:
tsh = sheet flow travel time (hours)
nol = overland flow roughness coefficient (unitless)
Lsh = sheet flow length (feet) (300 ft. maximum)
P2 = 2-year, 24-hr. rainfall depth (inches)
Ssh = sheet flow slope (ft./ft.)

Values for the overland flow roughness coefficient, n_{ol}, are provided in table 4-6 of the TxDOT Manual which indicates a value of 0.15 for short prairie grass and 0.011 for smooth surfaces such as asphalt and concrete. The TxDOT Manual provides a value of 1.7 in/hr. for the 25-year P_2 for the Laredo area and a value of 2.1 for the 100-year value.

The shallow concentrated flow travel time component is computed according to TxDOT Manual Equation 4-18 as:

$t_{sc} = L_{sc}/3600KS_{sc}^{0.5}$

Where:
tsc = shallow concentrated flow travel time (hours)
Lsc = shallow concentrated flow length (feet)
K = 16.13 for unpaved surface, 20.32 for paved surface
Ssc = shallow concentrated flow slope (ft./ft.)

The channel flow travel time component is computed by dividing channel distance by the flow velocity obtained from Manning's equation which according to TxDOT Manual Equation 4-19 is represented as:

$t_{ch} = L_{ch}/(3600(1.49/n)R^{2/3}S_{ch}^{0.5)}$

Where:
tch = channel flow travel time (hours)
Lch = channel flow length (feet)
Sch = channel flow slope (ft./ft.)
n = Manning's roughness coefficient
R = channel hydraulic radius (cross-sectional area divided by the wetted perimeter)
Ssc = shallow concentrated flow slope (ft./ft.)

The TxDOT Manual provides ranges of Manning's roughness coefficients (n) for channel characteristics in Table 4-7. For this analysis, an n value of 0.04 will be used for uniform, straight earthen channels with short grass which will be the principal condition on the landfill. For rip-rap lined channels, a n value of 0.025 will be used.

Where long flow length in pipe is to be experienced, the calculated pipe travel time based on Manning' equation will be added to the time of concentration calculation. The Manning's n value for corrugated HDPE pipe selected for use is 0.018 and is taken from Table 4-9 of the TxDOT Manual.

Flow paths for each drainage area consist of a mixture of overland sheet flow, channelized flow and pipe flow. This analysis individually considers differing flow conditions and slopes for several flow paths for each drainage area to determine the longest travel time for that area.

1.2.2 Unit Hydrograph Method

Since the existing condition versus proposed condition comparison point at the most downstream location contains a drainage basin that is greater than 200 acres, a unit hydrograph method will be used for this analysis. To accomplish this, the U.S. Army Corps of Engineers (USACE) HEC-HMS computer program was used to generate peak flow rates of the existing and the proposed landfill conditions. These programs model the rainfall, runoff generation, detention facilities and channel routing experienced within the drainage system for both conditions. A complete description of the analysis is provided in Section 1.5 Flood Control and Analysis.

1.3 Drainage Facility Design

1.3.1 Drainage Terrace and Rundown Channel Design

On the final cover, surface water run-off flows down the 4(H):1(V) sideslopes to the drainage terraces on the final cover where it is intercepted and routed to the landfill toe via the riprap-lined rundown channels. The drainage terraces are formed by soil berms added perpendicular to the landfill sideslopes. Drainage terrace channels will have a triangular cross-section, 4H: 1V and 2.5H: 1V sideslopes and a maximum depth of 2.5 feet. A typical section for drainage terraces is shown on Figure III.6.7. Drainage terraces will be provided at approximately 40 feet vertical intervals on the final cover of each phase to minimize erosion. The 40 feet vertical interval was established using soil loss calculations in accordance with 30 TAC §330.305(d); refer to the calculations presented in Appendix 6B of this Part III, Attachment 6.

The drainage terrace channels will be sloped at approximately three (3) percent toward the rundown channels. This slope was designed to prevent the flow in the drainage terraces from scouring the final cover soil due to high velocities. Shear stress analysis as described in the section below, 3.3.2 Drainage Ditch Design, was used for the most severe case (highest velocity) to assure soil stability of the drainage terraces.

Rundown channels link the drainage terraces, carry the surface water run-off down the final cover, and discharge into the perimeter ditches or sedimentation ponds. The rundown channels are trapezoidal in shape with 2H: 1V sideslopes, a bottom width of 9 feet and a surface comprised of rock riprap contained within wire mesh cages called reno mattresses to control erosion by the expected high velocities. The rundown channels will be sloped at 25 percent down the side of the hills. Energy dissipation in the form of rock/concrete riprap or concrete channel lining will be provided at the end of rundown channels to minimize erosion of the perimeter ditches. Channel flow design analysis for the terraces and rundowns will be accomplished using Manning's equation for open channel flow. This equation is identified as Equation 6-2 in TxDOT's Hydraulic Design Manual and is represented as:

$$V=1.486 / n \times R^{2/3} \times S^{1/2}$$

Where:
v = Velocity in fps
n = Manning's roughness coeeficient (unitless)
R = Hydraulic Radius in feet = A / WP
WP = Wetted perimeter (the length of the channel boundary in direct contact with the water)
S = Slope of the energy grade line in ft./ft.

Flow (discharge) capacity is then determined by combining Manning's Equation with the Continuity Equation,

$$Q = v \times A$$

Where:
Q = discharge in cfs
A = Cross-sectional area of flow in square feet.

Detailed design calculations of the drainage terraces and rundown channels are provided in Appendix 6A, Drainage Structures – Design Calculations.

1.3.2 Drainage Channel Design

Perimeter channels located at the base of the landfill disposal areas will collect surface water runoff from the 4(H):1(V) sideslopes and drainage terrace rundown channels, and convey it to on-site sedimentation basins. These perimeter channels are sized to convey the 25-year, 24-hour design storm with at least one foot of freeboard. The 100-year, 24-hour design storm in the perimeter channels was also analyzed to assure that no washout of waste would occur in accordance to 30 TAC §330.305. The channels will typically be grass lined and have a trapezoidal or triangular cross-section with 3(H): 1(V) sideslopes with varying bottom widths. Perimeter channel depths will vary according to the calculated flow rates and will have a maximum depth of 3 feet. The channel design was performed using Manning's Equation for the perimeter channels and used the U.S. Corps of Engineers surface water design program, HEC-RAS, for designing Channel D that routes flow from offsite around the south and east boundaries of the landfill. Detailed calculations for all perimeter channels are presented in Appendix 6A, Drainage Structures – Design Calculations.

In order to assure that flow in the onsite channels does not create an erosion issue, each channel was analyzed for shear stress exerted on the channels' surface lining per the TxDOT Hydraulic Manual. According to the manual, the shear stress, T_d, is calculated using Equation 7-3 and is presented as:

$$T_d = 62.4RS$$

Where:
T_d = Maximum shear stress at normal depth (lbs./ft^2)
R = Hydraulic radius (ft.)
S = Channel slope (ft./ft.)

The surface lining for the perimeter channels will be grass, either Bermuda or other native species. The TxDOT Manual identifies grass coverings by a Retardance Class rating based on the grass's variation and condition. Per the TxDOT Manual, mowed grass is a Retardance Class C Vegetation with an allowable shear stress of 1.00 lb./ft.^{2} and unmowed grass is a more durable Retardance Class B Vegetation with an allowable shear stress of 2.10 lbs./ft.^{2}. For this analysis, it was assumed that the grass channels will be mowed periodically since it has a lower rating than unmowed grass. When the shear stress experienced is greater than 1.00 lbs./sq.ft., the channel will be lined.

Calculations of shear stress generated in each section of channel and comparison to the allowable shear stress for Class C vegetation are provided in Appendix 6A.

1.3.3 Culverts and Storm Drain Design

Culverts and storm drains will be installed to provide channel crossings for roads, the electrical transmission easement, outlet structures from the sedimentation basins and where positive surface flow cannot be achieved due to grades. Calculations for culverts were performed using Manning's equation utilized by the Federal Highway Administration (FHWA) HY-8 culvert analysis program based upon a 25-year design in accordance with 30 TAC §330.63. Calculations for storm drains were performed using Manning's equation by a storm sewer hydraulic design spreadsheet. The sedimentation/detention pond outfall pipes are designed using the embedded outlet structure capabilities of USACE's HEC-HMS computer program or by spreadsheet calculations as described in the section below.

There is one culvert (Culvert 1) proposed for the site and six (6) storm drains (Storm Drains 1 through 6) that are not pond outfall structures. Culverts and storm drains will generally be corrugated metal pipe (CMP), smooth interior HDPE pipe, or reinforced concrete pipe (RCP) depending on estimated loading conditions. Riprap will be provided at the outlets of culverts and storm drains, and at the outfall locations in the sedimentation basins to prevent soil erosion. The locations and identifications of all site culverts and storm drains are shown in Figures III.6.4 through III.6.6. Detailed calculations are presented in Appendix 6A, Drainage Structures – Design Calculations.

1.3.4 Onsite Sedimentation/Detention Pond Design

Most uncontaminated surface water runoff from waste disposal areas will be routed into one of the three sedimentation/detention ponds which are proposed for the facility. Sedimentation/Detention Pond A will be located at the northwest corner of Phase 1, Sedimentation/Detention Pond B will be located at the northeast comer of Phase 1, and two-stage Sedimentation/Detention Pond C (Ponds C-1 and C-2) will be located at the east end of Phase 3. Sedimentation/detention pond locations are shown on Figures III.6.4, 5 and 6. The depths of the sedimentation/detention ponds range from 6 to 10 feet. The ponds are designed to detain surface water run-off, causing a decrease in peak flow rate and velocity to allow suspended sediment to be deposited in the pond, prior to discharge of the surface water off-site.

Each pond will have at least one principal discharge structure and one emergency spillway. The discharge structure will consist of a horizontal culvert (trickle tube) or a perforated vertical standpipe. The trickle tube will be a culvert which extends through the pond embankment. The standpipe will consist of a perforated vertical pipe connected to a horizontal discharge pipe which extends through the pond embankment. Riprap or an equivalent material will be placed at the discharge end of the pipe for erosion protection.

Each sedimentation/detention pond is analyzed using the routing, storage volume capacity and discharge calculation capabilities of the USACE HEC-HMS hydrology modeling computer program used to analyze the proposed condition in Section 1.5 Flood Control and Analysis. The model uses pond specific elevation-area tables to determine storage volumes for each pond. Depending on the type of outfall structure used, each pond either uses an elevation-discharge table to calculate discharge rates for each water surface elevation or uses the outfall and spillway routines within the program to do the calculations. Since HEC-HMS does not have the ability to efficiently model multiple orifice openings set at varying elevations as are proposed for the standpipe outlet structures, ponds with standpipes will use elevation-discharge tables using values externally generated. For these ponds, calculations for combined outlet and spillway discharges were performed to determine the tables' values. Orifice and weir flow equations are used for these calculations and are represented as:

Orifice Equation:
$Q = C_o A (2gh)^{1/2}$

Where:
Q = flow rate (cfs)
C_o = Orifice Coefficient (C_o = 0.6)
A = Area of orifice opening (sf)
g = gravitational acceleration (ft./s^2)
h = Height of water surface above orifice opening (ft.)

Weir Equation:
$Q = C_w L h^{3/2}$

Where:
C_w = Weir Coefficient (C_w = 3.0)
L = Length of weir (ft.)
h = Height of water surface above weir elevation (ft.)

Sedimentation/Detention Pond A will have two 36-inch diameter trickle tubes for the principal discharge structure. HEC-HMS's outlet and spillway routines were used to calculate discharge rates.

One 36-inch diameter perforated standpipe will serve as the principal discharge structure for Sedimentation/Detention Pond B. The elevation-discharge relationship for the standpipe and spillway was calculated externally for creation of the defined elevation-discharge table used by the program.

Sedimentation/Detention Pond C-1 has one 24-inch diameter trickle tube that discharges directly into Sedimentation/Detention Pond C-2 which has a 36-inch diameter perforated standpipe for the principal discharge structure. Pond C-1 uses the internal outlet and spillway routines of HEC-HMS and Pond C-2 uses externally calculated elevation-discharge values.

The emergency spillway for each pond will be a one (1) foot deep trapezoidal channel with 10(H):1(V) sideslopes and a bottom width of 20 feet. The emergency spillway will be lined with riprap or an equivalent material for erosion protection. The ponds are designed such that the surface water runoff from a 25-year, 24-hour storm event discharges only through the principal discharge structure (no discharge is expected to occur through the emergency spillway). Runoff from a 100-year, 24-hour storm event will discharge through both the principal and the emergency spillways.

As stated above, the hydraulic analysis of the sedimentation ponds is included in the HEC-HMS model for the proposed condition. Detailed model output relating to the sedimentation ponds and other supporting external calculations are provided in Appendix 6A, Drainage Structures – Design calculations.

1.3.5 Working Face Run-on/Run-off Prevention

The working face will be protected from the 24-hour, 25-year event stormwater run-on by the channel along the south and east boundaries described in Section 1.1.2. Protection from stormwater run-off will be achieved by the use of working face berms. These berms will be temporary in nature, moving in location and size as the working face moves through the disposal areas. As with other drainage control features, working face berms will be designed for the 25-year, 24-hour storm. They will be installed prior to commencing disposal activities or removing existing berms currently protecting waste disposal areas. Working face berms will direct run-off towards other drainage features designed to handle the expected flow rate. Run-off and run-on flow rates for these working face berms will be calculated using the Rational Method previously described since the drainage areas will be less than 200 acres. A typical working face berm cross section is provided on Figure III.6.8.

If any stormwater comes into contact with the working face, other waste or leachate, it will be considered as contaminated water/leachate and will be handled in accordance with TAC 330.207. The design and construction of each cell will be done in a manner where stormwater that becomes contaminated will flow under gravity to a separated collection sump for pumping into the leachate collection system or will flow directly into the leachate collection system. The size of the receiving sump or leachate facility shall be designed with the capacity to hold the expected runoff volume generated by the 24-hour, 25-year rainfall event for the contributing area.

1.3.6 Erosion Stability

Temporary and permanent erosion control measures during fill operations and post-closure are provided to prevent and reduce erosion and sediment transfer from the site. The final cover of the top domes will have a maximum slope of 5.0% and sideslopes will have a maximum slope of 25% (4H:1V). Overland flow velocities created by the proposed landfill design should be below the non-erosive velocity for similar soil and vegetative cover conditions. A typically used maximum non-erosive flow velocity for a similar sparsely vegetated intermediate cover condition is 4 feet per second (fps). For the final cover, the maximum non-erosive velocity is 3 fps based on a surface partially vegetated with short grass.

Overland sheet flow velocities were calculated for the worst case situation for the top domes and sideslopes. The methodology used to calculate the sheet flow velocities was as follows:

1. Determine 25-year, 24-hour peak flow rate for a standard unit width of one foot (1-ft.) using the Rational Method as specified in TxDOT's Hydraulic Design manual and described in Section 1.2.1 Rational Method Calculations.
2. Determine depth of flow using Manning's Equation presented in Section 1.3.1 Drainage Terrace and Rundown Channel Design and rearranging to solve for the flow depth, y

3. Calculate the peak flow velocity using the Continuity Equation identified as V=q/A, where:
    a. V = Peak Velocty (fps)
    b. q = Peak Flow for 1-ft. unit width.
    c. A = Cross sectional area of a 1-ft. unit width, or the flow depth, y in this case.

The calculated velocities will then be compared to the maximum non-erosive velocities to check that erosive conditions are not being created.

The worst case situation is where the longest overland flow length is experienced. For both the top dome and sideslopes in both the intermediate and final cover conditions, this occurs on the north face of the western finished hill. There, the maximum top dome flow length is 95 feet for each cover condition and the maximum sideslope flow length is 790 feet for the intermediate cover condition and 165 feet for the final cover. Using the methodology described above for the intermediate cover condition, the 5% top dome slope creates a maximum flow velocity of 0.82 fps and 3.08 fps for the 25% sideslope. Both of these calculated values are less than the 4 fps maximum non-erosive velocity for intermediate cover and are therefore acceptable. For the final cover condition, the 5% top dome slope creates a maximum flow velocity of 0.71 fps and 1.44 fps for the 25% sideslope. Both of these calculated values are less than the 3 fps maximum non-erosive velocity for the final cover and are therefore acceptable. Sideslopes have been designed to minimize soil loss from erosion by placing permanent berms on the final cover slopes at 165-foot spacing (40-foot vertical and 160- ft horizontal) to create terraces that intercept the run-off. The calculations for overland sheet flow velocities are provided in Appendix 6A – Drainage Structures – Design Calculations.

The terraces will be designed with slopes that limit flow velocities to non-erosion causing values and will direct the runoff to lined rundown channels. The rundown channels will convey the run-off down into the perimeter ditch and sedimentation/retention pond systems. Locations of the terraces are shown on Figures III.6.5 and III.6.6. The perimeter ditches are also designed to control erosion by using slopes that convey the flow at lower velocities. Where ditch velocity generates a shear stress that exceeds 1.0 psf, the ditch will be concrete or rock rip-rap lined. At ditch flow line drops and pipe outfalls in un-lined ditches, rip-rap will be placed to minimize erosion. Sedimentation/detention ponds are strategically located on the site to detain flow from onsite areas and allow the capture of suspended sediments. A complete description of permanent erosion and sedimentation measures to be employed along with supporting calculations are presented in Appendix 6B of this attachment. Interim erosion control measures for phased development are discussed in Appendix 6B, Section 1.3 – Interim Conditions.

1.4 Onsite Drainage Analysis Results

The surface water management plan for the proposed horizontal and vertical expansion provides control of the run-off for the 25-year, 24-hour storm event in accordance with the surface water drainage for municipal solid waste facilities requirements set forth in 30 TAC §330.63(c). The surface water management plan provides the required conveyance for the 25-year storm with 1 foot of freeboard. The design directs surface water flow from offsite sources away from the disposal areas and around the site. The onsite flows from the disposal areas will be directed to one of three sedimentation/detention pond facilities before being discharged into the surrounding drainage features.

1.4.1 Offsite Discharge

As described above, there are three locations where concentrated discharges leave the landfill site for both the existing and proposed conditions, all of them being on the north side of the site. In addition to these concentrated discharges, there are three areas with shallow sheet flow off of the north and east sides of the landfill. The volume of this sheet flow is minimized by the use of interceptor swales placed along the northern face of Phases 1 and 3. These discharge locations are illustrated on Figure III.6.3.

The existing pre-development and the proposed post-development 25-year peak flows at these locations are presented in Tables III.6.1 and III.6.2, Existing Discharge Summary (25-Year Storm) and Proposed Discharge Summary (25-Year Storm, respectively.

TABLE III.6.1

EXISTING DISCHARGE SUMMARY (25-YEAR STORM)			
Point of Discharge	**Type of Fow**	**Watershed Area (ac)**	**Peak Discharge (cfs)**
Outfall 1	Sheet	1.28	4.6
Outfall 2	Channel	35.89	94.4[3]
Outfall 3	Sheet	11.49	31.0
Outfall 4	Channel	17.33	4.6[3]
Outfall 5	Sheet	26.38	59.6
Outfall 6	Channel	107.63[1]	389.0[2,3]
Totals		200.00	583.2

1- Includes area of offsite basin flowing through site
2- Includes discharge from contributing offsite area flowing through site as calculated using HEC-HMS as presented in Appendix 6D
3- From HEC-HMS Model Pond Discharge output data

TABLE III.6.2

PROPOSED DISCHARGE SUMMARY (25-YEAR STORM)				
Point of Discharge	**Type of Fow**	**Watershed Area (ac)**	**Peak Discharge (cfs)**	**Peak Increase/ Decrease (cfs)**
Outfall 1	Sheet	1.76	6.5	+1.9
Outfall 2	Channel	34.86	122.3[3]	+27.9
Outfall 3	Sheet	5.61	20.3	-10.7
Outfall 4	Channel	44.98	79.0[3]	+74.4
Outfall 5	Sheet	6.33	26.4	-33.2
Outfall 6	Channel	106.46[1]	162.8[2,3]	-226.2
Totals		200.00	417.3	-165.9

1- Includes area of offsite basin flowing through site
2- Includes discharge from contributing offsite area flowing through site as calculated using HEC-HMS as presented in Appendix 6D
3- From HEC-HMS Model Pond Discharge output data

As can be seen in these tables, the change in peak discharge at each of the discharge locations is either negative or is an increase of an amount that will have no negative impact to the receiving drainage feature.

Development of the site, as intended and shown in this permit application, will not significantly impact the natural drainage patterns or characteristics, and all proposed and existing areas of waste disposal will be adequately protected from both the 25-year and 100-year, 24-hour storm events.

All drainage calculations are provided in Appendix 6B and are presented in the following order:

Existing Conditions
- Existing Time of Concentration Calculations for Major Onsite Drainage Areas
- Existing Runoff Calculations for Major Onsite Drainage Areas

Proposed Drainage Areas
- Proposed Time of Concentration Calculations
- Proposed Runoff Calculations

Proposed Berms
- Proposed Interceptor Berm Hydraulic Calculations

Proposed Rundown Channels
- Proposed Rundown Channel Time of Concentration Calculations
- Proposed Rundown Channel Runoff Calculations
- Proposed Rundown Channel Hydraulic Calculations

Proposed Channels
Proposed Channel Time of Concentration Calculations
Proposed Channel Runoff Calculations
Proposed Channel Hydraulic Calculations
Permissible Shear Stress Calculations for Proposed Channels

Proposed Storm Drains
Proposed Storm Drain Time of Concentration and Runoff Calculations
Proposed Storm Drain Hydraulic Calculations

Proposed Culvert 1 HY-8 Analysis

HEC-HMS Detention Pond Analyses Input & Output

Top Dome and Sideslope Velocity Calculations

1.5 Sequencing of Drainage Improvements

The landfill site has been in operation since 1986 and at this time has some of its drainage structures already constructed and in operation per the current permit. Some of these structures are identical or very similar to the proposed structures shown in this amendment. These identical or very similar existing features include Ponds A and B, and drainage channels A1, B1, B2, C1, and C3.

As indicated on the Site Development Plan, Stage 1 drawing, ongoing fill operations in Phase 2 will continue until filled approximately to the current permit's allowable height. No new drainage structures need to be constructed to accomplish this.

As shown on the Stage 2 drawing, Cell 1 of Phase 3 will be constructed. With this stage, the culvert across the entrance road, Culvert 1 and Channel D along the south and east boundaries will be constructed. Channel C4 and portions of Channel C5 will be constructed around the Cell 1 perimeter. Storm Drain 1 will be constructed in this stage even though it will not be utilized until later stages. The existing channel between Phases 2 and 3 will be maintained as well as existing Pond C.

Stage 3 includes fill operations in Cell 1 of Phase 3 while Phase 3, Cell 2 is constructed. With this stage, the remainder of Channel C5 along with Channels C6, C7 and C8 will be constructed. Pond C and the existing channel between Phases 2 and 3 will be removed and the two new ponds, Pond C1 and Pond C2, will be constructed including the pond outfall structures. Storm Drain 1 will be put into operation and includes constructing its outfall into Pond C1 and construction of Storm Drain 2 and the inlet where Channels C3 and C4 come together. Storm Drain 4 (connecting Channel C5 to Pond C1), Storm Drain 5 (connecting Channels C7, C8 and Rundown Channel C2 to Pond C2), and Storm Drain 6 (connecting Channel B2 to Pond B) will be constructed.

Stage 4 includes fill operations to bring the east hill (Phases 2 and 3) to the amended permit height and does not include construction of new cells. No drainage structures need to be constructed in this stage.

Stage 5 includes construction of Cells IV-2 and IV-3 of Phase 4 as well as construction of a separation liner over the existing C&D waste previously placed in Cell IV-1. During Stage 5, Channel C2 and Storm Drain 3 will be constructed.

Stage 6 includes construction of the two cells of Phase 5 located between Phase1 and Phase 4. The existing channels between Phases 1 and 4 will be removed and no new drainage structures need to be constructed in this stage.

Stage 7 includes fill operations to bring the west hill (Phases 1, 4 and 5) to the amended permit height and does not include construction of new cells. No drainage structures need to be constructed in this stage. This will complete the proposed fill operations according to the proposed permit amendment.

During final closure, the proposed interceptor berms and rundown channels will be constructed on the sideslopes of the hills. Vegetative cover or rock armoring will be completed. The City may close the east hill upon completion of Stage 4 or it may wait until completion of the west hill and close both hills at the same time.

1.6 Flood Control and Analysis

The Laredo facility is adjacent to the 100-yr floodplain of an unnamed tributary of the Tex-Mex Tributary of Chacon Creek as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community Panels 48479C1220C and 48479C1385C, dated April 2, 2008. These effective maps indicate that 100-year floodplain encroaches on the landfill site on the north and east boundaries. The effective hydrologic and hydraulic analyses do not take into account current topography that shows improved channels around the landfill site and use overly conservative parameters regarding the generation of runoff volumes.

The existing topographic conditions and more detailed and applicable hydrologic and hydraulic parameters were employed to re-analyze the 10-year, 50-year, 100-year and 500-year storms for FEMA processing and the 25-year and 100-year storms for analysis of the landfill development. The results of these analyses indicate that the 100-year floodplain does not encroach on the landfill site due to a reduced peak flow and the improved channels constructed around the landfill. Appendix 6D includes a description of the methodology used, the parameters used and the results of the 25-year and 100-year analyses of the existing and proposed conditions.

Appendix 6A: Drainage Structures – Design Calculations

Revised June 2015

STATE OF TEXAS
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PROFESSIONAL ENGINEER

TX F-10098

Steven B. Heniford
6/18/15

Pond A Input Data

Outlet Pipe

Type:	3 - 36" Diameter Corrugated Metal Pipes
Length:	50 Feet
Inlet Elev.:	475.00
Entrance Coeff.:	0.5
Outlet Elev.:	474.50
Exit Coeff.:	1.0
Mannings n:	0.024

Spillway

Elev:	479.00
Length:	20
Weir Coeff.:	3.0

Dam

Elev.:	480.00
Length:	50
Coeff.:	3.0

Area-Elev. Table	
Elev. (Feet)	Area (Acres)
475.0	0.0000
476.0	0.4007
477.0	0.5166
478.0	0.6779
479.0	0.7664
480.0	0.8844
481.0	0.9650

Project: Laredo Proposed
Simulation Run: 25 year Reservoir: Pond A

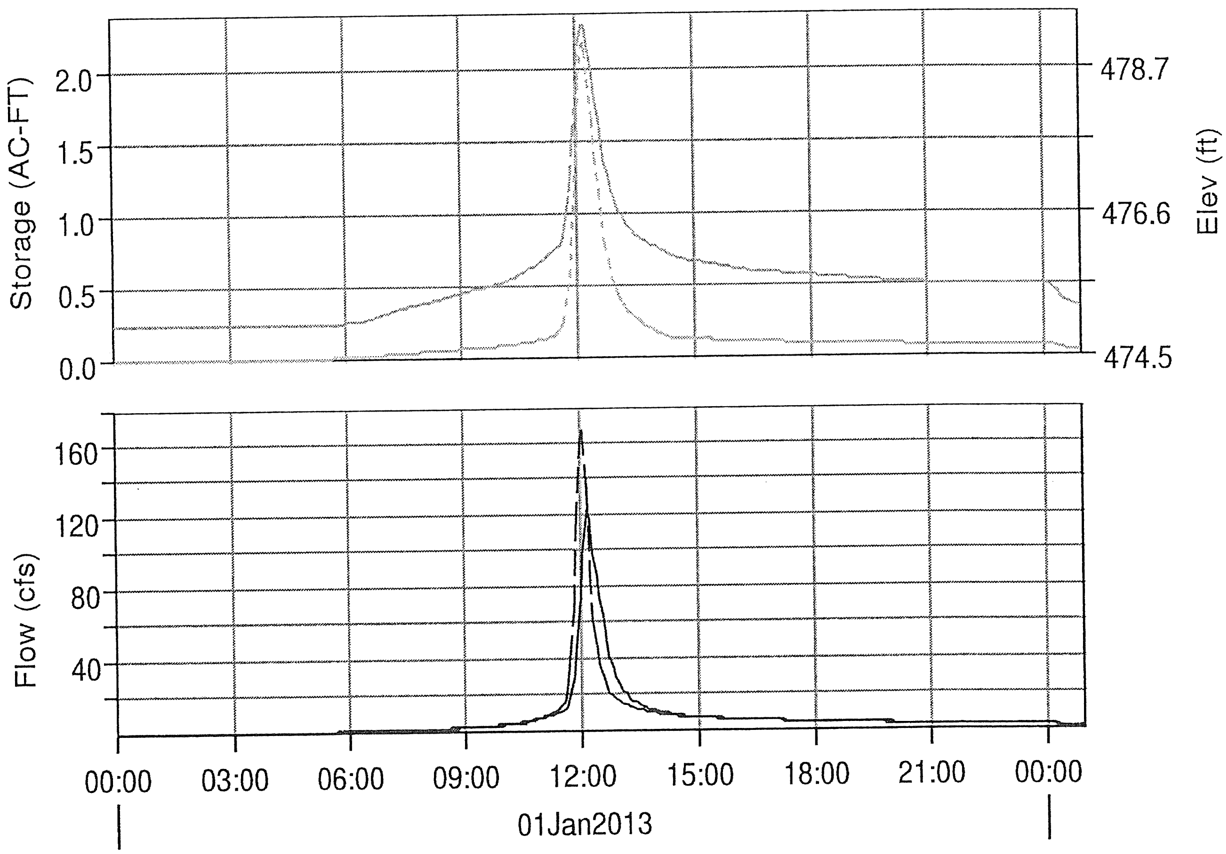
Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	25 year 24 hr
Compute Time:	17Sep2014, 11:13:14	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	167.7 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:05
Peak Outflow :	122.3 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:10
Total Inflow :	4.42 (IN)	Peak Storage :	2.2 (AC-FT)
Total Outflow :	4.41 (IN)	Peak Elevation :	479.3 (FT)

Reservoir "Pond A" Results for Run "25 year"



Run:25 YEAR Element:POND A Result:Storage

Run:25 YEAR Element:POND A Result:Pool Elevation

Run:25 year Element:POND A Result:Outflow

Run:25 YEAR Element:POND A Result:Combined Flow

Project: Laredo Proposed
Simulation Run: 25 year Reservoir: Pond A

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 25 year 24
Compute Time: 17Sep2014, 11:13:14 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.0	475.0	0.0
01Jan2013	00:05	0.0	0.0	475.0	0.0
01Jan2013	00:10	0.0	0.0	475.0	0.0
01Jan2013	00:15	0.0	0.0	475.0	0.0
01Jan2013	00:20	0.0	0.0	475.0	0.0
01Jan2013	00:25	0.0	0.0	475.0	0.0
01Jan2013	00:30	0.0	0.0	475.0	0.0
01Jan2013	00:35	0.0	0.0	475.0	0.0
01Jan2013	00:40	0.0	0.0	475.0	0.0
01Jan2013	00:45	0.0	0.0	475.0	0.0
01Jan2013	00:50	0.0	0.0	475.0	0.0
01Jan2013	00:55	0.0	0.0	475.0	0.0
01Jan2013	01:00	0.0	0.0	475.0	0.0
01Jan2013	01:05	0.0	0.0	475.0	0.0
01Jan2013	01:10	0.0	0.0	475.0	0.0
01Jan2013	01:15	0.0	0.0	475.0	0.0
01Jan2013	01:20	0.0	0.0	475.0	0.0
01Jan2013	01:25	0.0	0.0	475.0	0.0
01Jan2013	01:30	0.0	0.0	475.0	0.0
01Jan2013	01:35	0.0	0.0	475.0	0.0
01Jan2013	01:40	0.0	0.0	475.0	0.0
01Jan2013	01:45	0.0	0.0	475.0	0.0
01Jan2013	01:50	0.0	0.0	475.0	0.0
01Jan2013	01:55	0.0	0.0	475.0	0.0
01Jan2013	02:00	0.0	0.0	475.0	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	475.0	0.0
01Jan2013	02:10	0.0	0.0	475.0	0.0
01Jan2013	02:15	0.0	0.0	475.0	0.0
01Jan2013	02:20	0.0	0.0	475.0	0.0
01Jan2013	02:25	0.0	0.0	475.0	0.0
01Jan2013	02:30	0.0	0.0	475.0	0.0
01Jan2013	02:35	0.0	0.0	475.0	0.0
01Jan2013	02:40	0.0	0.0	475.0	0.0
01Jan2013	02:45	0.0	0.0	475.0	0.0
01Jan2013	02:50	0.0	0.0	475.0	0.0
01Jan2013	02:55	0.0	0.0	475.0	0.0
01Jan2013	03:00	0.0	0.0	475.0	0.0
01Jan2013	03:05	0.0	0.0	475.0	0.0
01Jan2013	03:10	0.0	0.0	475.0	0.0
01Jan2013	03:15	0.0	0.0	475.0	0.0
01Jan2013	03:20	0.0	0.0	475.0	0.0
01Jan2013	03:25	0.0	0.0	475.0	0.0
01Jan2013	03:30	0.0	0.0	475.0	0.0
01Jan2013	03:35	0.0	0.0	475.0	0.0
01Jan2013	03:40	0.0	0.0	475.0	0.0
01Jan2013	03:45	0.0	0.0	475.0	0.0
01Jan2013	03:50	0.0	0.0	475.0	0.0
01Jan2013	03:55	0.0	0.0	475.0	0.0
01Jan2013	04:00	0.0	0.0	475.0	0.0
01Jan2013	04:05	0.0	0.0	475.0	0.0
01Jan2013	04:10	0.0	0.0	475.0	0.0
01Jan2013	04:15	0.0	0.0	475.0	0.0
01Jan2013	04:20	0.0	0.0	475.0	0.0
01Jan2013	04:25	0.0	0.0	475.0	0.0
01Jan2013	04:30	0.0	0.0	475.0	0.0
01Jan2013	04:35	0.0	0.0	475.0	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	04:40	0.0	0.0	475.0	0.0
01Jan2013	04:45	0.0	0.0	475.0	0.0
01Jan2013	04:50	0.0	0.0	475.0	0.0
01Jan2013	04:55	0.0	0.0	475.0	0.0
01Jan2013	05:00	0.0	0.0	475.0	0.0
01Jan2013	05:05	0.0	0.0	475.0	0.0
01Jan2013	05:10	0.0	0.0	475.0	0.0
01Jan2013	05:15	0.0	0.0	475.0	0.0
01Jan2013	05:20	0.0	0.0	475.0	0.0
01Jan2013	05:25	0.0	0.0	475.0	0.0
01Jan2013	05:30	0.0	0.0	475.0	0.0
01Jan2013	05:35	0.0	0.0	475.0	0.0
01Jan2013	05:40	0.0	0.0	475.0	0.0
01Jan2013	05:45	0.0	0.0	475.0	0.0
01Jan2013	05:50	0.0	0.0	475.0	0.0
01Jan2013	05:55	0.0	0.0	475.0	0.0
01Jan2013	06:00	0.0	0.0	475.0	0.0
01Jan2013	06:05	0.1	0.0	475.0	0.0
01Jan2013	06:10	0.1	0.0	475.0	0.0
01Jan2013	06:15	0.1	0.0	475.0	0.0
01Jan2013	06:20	0.2	0.0	475.0	0.0
01Jan2013	06:25	0.2	0.0	475.0	0.0
01Jan2013	06:30	0.2	0.0	475.0	0.0
01Jan2013	06:35	0.3	0.0	475.1	0.0
01Jan2013	06:40	0.3	0.0	475.1	0.0
01Jan2013	06:45	0.3	0.0	475.1	0.1
01Jan2013	06:50	0.4	0.0	475.1	0.1
01Jan2013	06:55	0.4	0.0	475.1	0.1
01Jan2013	07:00	0.4	0.0	475.1	0.1
01Jan2013	07:05	0.5	0.0	475.1	0.2
01Jan2013	07:10	0.5	0.0	475.2	0.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	0.6	0.0	475.2	0.3
01Jan2013	07:20	0.6	0.0	475.2	0.3
01Jan2013	07:25	0.6	0.0	475.2	0.4
01Jan2013	07:30	0.7	0.0	475.2	0.4
01Jan2013	07:35	0.7	0.0	475.2	0.5
01Jan2013	07:40	0.8	0.0	475.2	0.5
01Jan2013	07:45	0.8	0.0	475.3	0.6
01Jan2013	07:50	0.8	0.0	475.3	0.6
01Jan2013	07:55	0.9	0.0	475.3	0.7
01Jan2013	08:00	0.9	0.0	475.3	0.7
01Jan2013	08:05	1.0	0.0	475.3	0.8
01Jan2013	08:10	1.0	0.0	475.3	0.8
01Jan2013	08:15	1.1	0.0	475.3	0.9
01Jan2013	08:20	1.2	0.0	475.3	1.0
01Jan2013	08:25	1.2	0.0	475.3	1.0
01Jan2013	08:30	1.3	0.0	475.3	1.1
01Jan2013	08:35	1.4	0.0	475.4	1.2
01Jan2013	08:40	1.5	0.0	475.4	1.3
01Jan2013	08:45	1.6	0.1	475.4	1.3
01Jan2013	08:50	1.7	0.1	475.4	1.4
01Jan2013	08:55	1.8	0.1	475.4	1.5
01Jan2013	09:00	1.9	0.1	475.4	1.6
01Jan2013	09:05	2.0	0.1	475.4	1.8
01Jan2013	09:10	2.1	0.1	475.5	1.9
01Jan2013	09:15	2.2	0.1	475.5	2.0
01Jan2013	09:20	2.3	0.1	475.5	2.1
01Jan2013	09:25	2.4	0.1	475.5	2.2
01Jan2013	09:30	2.4	0.1	475.5	2.3
01Jan2013	09:35	2.5	0.1	475.5	2.3
01Jan2013	09:40	2.6	0.1	475.5	2.4
01Jan2013	09:45	2.7	0.1	475.5	2.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	2.9	0.1	475.5	2.6
01Jan2013	09:55	3.0	0.1	475.5	2.7
01Jan2013	10:00	3.2	0.1	475.6	2.9
01Jan2013	10:05	3.4	0.1	475.6	3.0
01Jan2013	10:10	3.6	0.1	475.6	3.2
01Jan2013	10:15	3.8	0.1	475.6	3.4
01Jan2013	10:20	4.1	0.1	475.6	3.7
01Jan2013	10:25	4.3	0.1	475.7	3.9
01Jan2013	10:30	4.6	0.1	475.7	4.2
01Jan2013	10:35	4.9	0.1	475.7	4.4
01Jan2013	10:40	5.3	0.1	475.7	4.8
01Jan2013	10:45	5.7	0.1	475.8	5.1
01Jan2013	10:50	6.1	0.1	475.8	5.5
01Jan2013	10:55	6.6	0.1	475.8	6.0
01Jan2013	11:00	7.1	0.1	475.8	6.4
01Jan2013	11:05	7.7	0.1	475.9	7.0
01Jan2013	11:10	8.4	0.1	475.9	7.5
01Jan2013	11:15	9.2	0.1	476.0	8.3
01Jan2013	11:20	10.2	0.1	476.0	8.9
01Jan2013	11:25	11.4	0.1	476.0	9.3
01Jan2013	11:30	12.7	0.2	476.1	10.0
01Jan2013	11:35	15.2	0.2	476.1	10.9
01Jan2013	11:40	22.8	0.2	476.2	13.0
01Jan2013	11:45	38.7	0.3	476.5	17.9
01Jan2013	11:50	66.3	0.5	476.9	28.9
01Jan2013	11:55	112.2	0.9	477.5	47.4
01Jan2013	12:00	159.2	1.4	478.3	74.4
01Jan2013	12:05	167.7	1.9	479.0	99.8
01Jan2013	12:10	132.5	2.2	479.3	122.3
01Jan2013	12:15	90.0	2.1	479.3	116.8
01Jan2013	12:20	62.2	1.9	479.0	99.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	46.4	1.7	478.6	86.7
01Jan2013	12:30	36.2	1.4	478.3	73.7
01Jan2013	12:35	29.0	1.1	477.9	61.6
01Jan2013	12:40	24.0	0.9	477.6	50.3
01Jan2013	12:45	20.6	0.8	477.3	41.6
01Jan2013	12:50	18.3	0.7	477.1	35.0
01Jan2013	12:55	16.6	0.6	476.9	29.5
01Jan2013	13:00	15.3	0.5	476.7	25.0
01Jan2013	13:05	14.4	0.4	476.6	21.8
01Jan2013	13:10	13.5	0.4	476.5	19.4
01Jan2013	13:15	12.8	0.3	476.4	17.5
01Jan2013	13:20	12.2	0.3	476.4	16.1
01Jan2013	13:25	11.7	0.3	476.3	15.0
01Jan2013	13:30	11.2	0.3	476.3	14.0
01Jan2013	13:35	10.7	0.2	476.2	13.2
01Jan2013	13:40	10.2	0.2	476.2	12.5
01Jan2013	13:45	9.8	0.2	476.2	11.9
01Jan2013	13:50	9.5	0.2	476.1	11.3
01Jan2013	13:55	9.1	0.2	476.1	10.8
01Jan2013	14:00	8.7	0.2	476.1	10.4
01Jan2013	14:05	8.4	0.2	476.1	9.9
01Jan2013	14:10	8.1	0.2	476.0	9.5
01Jan2013	14:15	7.9	0.1	476.0	9.2
01Jan2013	14:20	7.7	0.1	476.0	8.9
01Jan2013	14:25	7.5	0.1	476.0	8.3
01Jan2013	14:30	7.4	0.1	475.9	7.8
01Jan2013	14:35	7.3	0.1	475.9	7.5
01Jan2013	14:40	7.1	0.1	475.9	7.3
01Jan2013	14:45	7.0	0.1	475.9	7.2
01Jan2013	14:50	6.9	0.1	475.9	7.1
01Jan2013	14:55	6.8	0.1	475.9	6.9

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	6.7	0.1	475.9	6.8
01Jan2013	15:05	6.6	0.1	475.9	6.7
01Jan2013	15:10	6.4	0.1	475.9	6.6
01Jan2013	15:15	6.3	0.1	475.9	6.5
01Jan2013	15:20	6.2	0.1	475.8	6.3
01Jan2013	15:25	6.1	0.1	475.8	6.2
01Jan2013	15:30	5.9	0.1	475.8	6.1
01Jan2013	15:35	5.8	0.1	475.8	6.0
01Jan2013	15:40	5.7	0.1	475.8	5.9
01Jan2013	15:45	5.6	0.1	475.8	5.7
01Jan2013	15:50	5.5	0.1	475.8	5.6
01Jan2013	15:55	5.4	0.1	475.8	5.5
01Jan2013	16:00	5.2	0.1	475.8	5.4
01Jan2013	16:05	5.1	0.1	475.8	5.3
01Jan2013	16:10	5.0	0.1	475.8	5.2
01Jan2013	16:15	4.9	0.1	475.7	5.0
01Jan2013	16:20	4.8	0.1	475.7	4.9
01Jan2013	16:25	4.8	0.1	475.7	4.9
01Jan2013	16:30	4.8	0.1	475.7	4.8
01Jan2013	16:35	4.7	0.1	475.7	4.8
01Jan2013	16:40	4.7	0.1	475.7	4.7
01Jan2013	16:45	4.6	0.1	475.7	4.7
01Jan2013	16:50	4.5	0.1	475.7	4.6
01Jan2013	16:55	4.5	0.1	475.7	4.6
01Jan2013	17:00	4.5	0.1	475.7	4.6
01Jan2013	17:05	4.5	0.1	475.7	4.5
01Jan2013	17:10	4.4	0.1	475.7	4.5
01Jan2013	17:15	4.3	0.1	475.7	4.4
01Jan2013	17:20	4.3	0.1	475.7	4.4
01Jan2013	17:25	4.2	0.1	475.7	4.3
01Jan2013	17:30	4.2	0.1	475.7	4.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	4.2	0.1	475.7	4.2
01Jan2013	17:40	4.2	0.1	475.7	4.2
01Jan2013	17:45	4.1	0.1	475.7	4.2
01Jan2013	17:50	4.0	0.1	475.7	4.1
01Jan2013	17:55	4.0	0.1	475.7	4.1
01Jan2013	18:00	4.0	0.1	475.7	4.0
01Jan2013	18:05	3.9	0.1	475.7	4.0
01Jan2013	18:10	3.9	0.1	475.7	4.0
01Jan2013	18:15	3.8	0.1	475.7	3.9
01Jan2013	18:20	3.8	0.1	475.7	3.9
01Jan2013	18:25	3.8	0.1	475.7	3.8
01Jan2013	18:30	3.7	0.1	475.6	3.8
01Jan2013	18:35	3.7	0.1	475.6	3.8
01Jan2013	18:40	3.6	0.1	475.6	3.7
01Jan2013	18:45	3.5	0.1	475.6	3.6
01Jan2013	18:50	3.5	0.1	475.6	3.6
01Jan2013	18:55	3.5	0.1	475.6	3.6
01Jan2013	19:00	3.5	0.1	475.6	3.5
01Jan2013	19:05	3.4	0.1	475.6	3.5
01Jan2013	19:10	3.3	0.1	475.6	3.4
01Jan2013	19:15	3.3	0.1	475.6	3.4
01Jan2013	19:20	3.3	0.1	475.6	3.3
01Jan2013	19:25	3.2	0.1	475.6	3.3
01Jan2013	19:30	3.2	0.1	475.6	3.3
01Jan2013	19:35	3.2	0.1	475.6	3.2
01Jan2013	19:40	3.1	0.1	475.6	3.2
01Jan2013	19:45	3.0	0.1	475.6	3.1
01Jan2013	19:50	3.0	0.1	475.6	3.1
01Jan2013	19:55	3.0	0.1	475.6	3.0
01Jan2013	20:00	2.9	0.1	475.6	3.0
01Jan2013	20:05	2.9	0.1	475.6	3.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	2.9	0.1	475.6	2.9
01Jan2013	20:15	2.8	0.1	475.6	2.9
01Jan2013	20:20	2.8	0.1	475.6	2.9
01Jan2013	20:25	2.8	0.1	475.6	2.8
01Jan2013	20:30	2.8	0.1	475.6	2.8
01Jan2013	20:35	2.7	0.1	475.6	2.8
01Jan2013	20:40	2.8	0.1	475.6	2.8
01Jan2013	20:45	2.8	0.1	475.6	2.8
01Jan2013	20:50	2.7	0.1	475.5	2.8
01Jan2013	20:55	2.7	0.1	475.5	2.7
01Jan2013	21:00	2.7	0.1	475.5	2.7
01Jan2013	21:05	2.7	0.1	475.5	2.7
01Jan2013	21:10	2.7	0.1	475.5	2.7
01Jan2013	21:15	2.7	0.1	475.5	2.7
01Jan2013	21:20	2.7	0.1	475.5	2.7
01Jan2013	21:25	2.7	0.1	475.5	2.7
01Jan2013	21:30	2.7	0.1	475.5	2.7
01Jan2013	21:35	2.7	0.1	475.5	2.7
01Jan2013	21:40	2.7	0.1	475.5	2.7
01Jan2013	21:45	2.7	0.1	475.5	2.7
01Jan2013	21:50	2.6	0.1	475.5	2.7
01Jan2013	21:55	2.6	0.1	475.5	2.6
01Jan2013	22:00	2.6	0.1	475.5	2.6
01Jan2013	22:05	2.6	0.1	475.5	2.6
01Jan2013	22:10	2.6	0.1	475.5	2.6
01Jan2013	22:15	2.6	0.1	475.5	2.6
01Jan2013	22:20	2.6	0.1	475.5	2.6
01Jan2013	22:25	2.6	0.1	475.5	2.6
01Jan2013	22:30	2.6	0.1	475.5	2.6
01Jan2013	22:35	2.5	0.1	475.5	2.6
01Jan2013	22:40	2.5	0.1	475.5	2.6

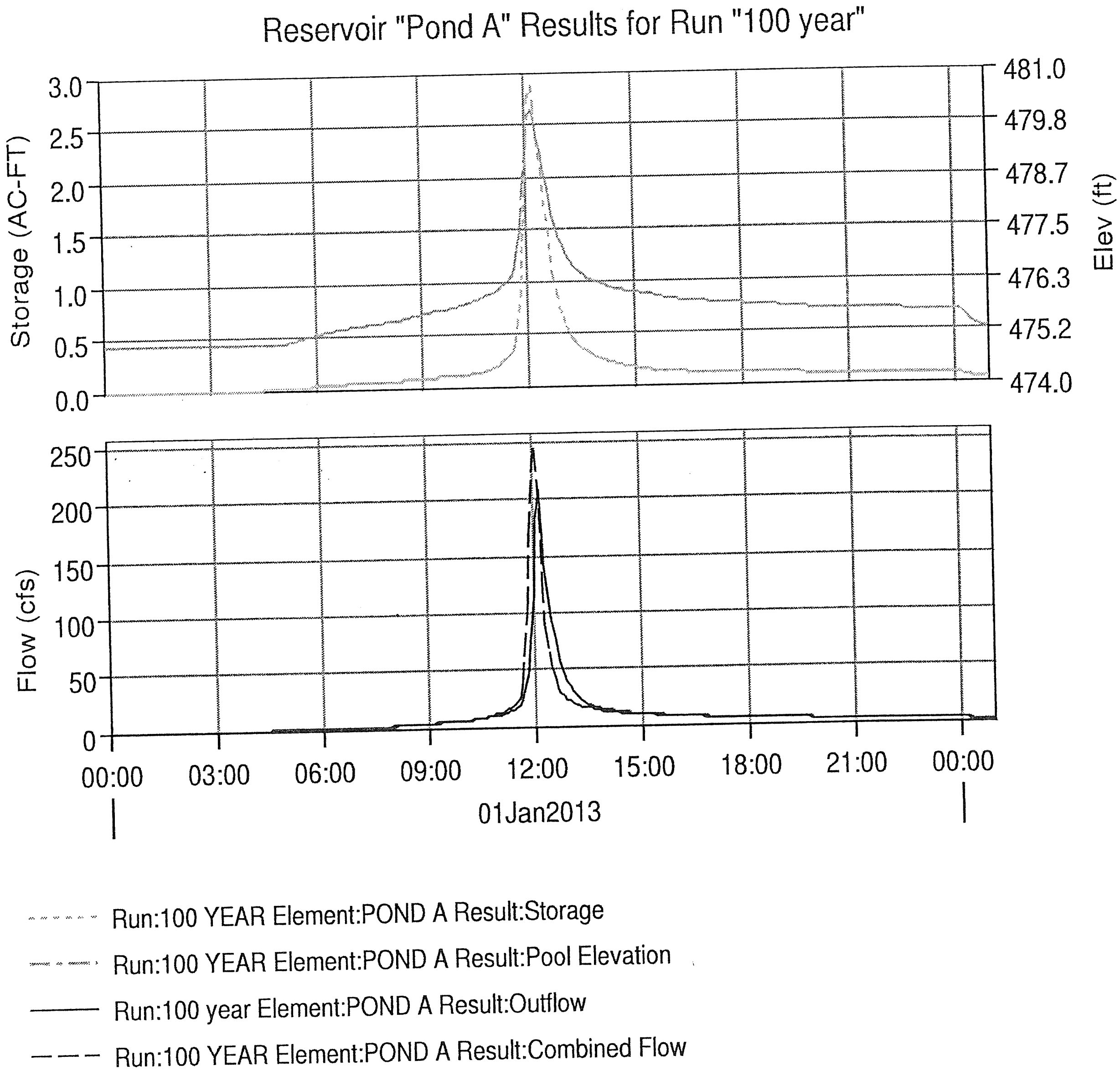
Project: Laredo Proposed
Simulation Run: 100 year Reservoir: Pond A

Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	100 year 24 hr
Compute Time:	17Sep2014, 11:11:16	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	245.2 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:05
Peak Outflow :	209.7 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:10
Total Inflow :	6.57 (IN)	Peak Storage :	2.9 (AC-FT)
Total Outflow :	6.57 (IN)	Peak Elevation :	480.1 (FT)



Reservoir "Pond A" Results for Run "100 year"
Storage (AC-FT)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Elev (ft)
481.0
479.8
478.7
477.5
476.3
475.2
474.0
Flow (cfs)
250
200
150
100
50
0
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2013
Run:100 YEAR Element:POND A Result:Storage
Run:100 YEAR Element:POND A Result:Pool Elevation
Run:100 year Element:POND A Result:Outflow
Run:100 YEAR Element:POND A Result:Combined Flow

Project: Laredo Proposed
Simulation Run: 100 year Reservoir: Pond A

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 100 year 2
Compute Time: 17Sep2014, 11:11:16 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.0	475.0	0.0
01Jan2013	00:05	0.0	0.0	475.0	0.0
01Jan2013	00:10	0.0	0.0	475.0	0.0
01Jan2013	00:15	0.0	0.0	475.0	0.0
01Jan2013	00:20	0.0	0.0	475.0	0.0
01Jan2013	00:25	0.0	0.0	475.0	0.0
01Jan2013	00:30	0.0	0.0	475.0	0.0
01Jan2013	00:35	0.0	0.0	475.0	0.0
01Jan2013	00:40	0.0	0.0	475.0	0.0
01Jan2013	00:45	0.0	0.0	475.0	0.0
01Jan2013	00:50	0.0	0.0	475.0	0.0
01Jan2013	00:55	0.0	0.0	475.0	0.0
01Jan2013	01:00	0.0	0.0	475.0	0.0
01Jan2013	01:05	0.0	0.0	475.0	0.0
01Jan2013	01:10	0.0	0.0	475.0	0.0
01Jan2013	01:15	0.0	0.0	475.0	0.0
01Jan2013	01:20	0.0	0.0	475.0	0.0
01Jan2013	01:25	0.0	0.0	475.0	0.0
01Jan2013	01:30	0.0	0.0	475.0	0.0
01Jan2013	01:35	0.0	0.0	475.0	0.0
01Jan2013	01:40	0.0	0.0	475.0	0.0
01Jan2013	01:45	0.0	0.0	475.0	0.0
01Jan2013	01:50	0.0	0.0	475.0	0.0
01Jan2013	01:55	0.0	0.0	475.0	0.0
01Jan2013	02:00	0.0	0.0	475.0	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	475.0	0.0
01Jan2013	02:10	0.0	0.0	475.0	0.0
01Jan2013	02:15	0.0	0.0	475.0	0.0
01Jan2013	02:20	0.0	0.0	475.0	0.0
01Jan2013	02:25	0.0	0.0	475.0	0.0
01Jan2013	02:30	0.0	0.0	475.0	0.0
01Jan2013	02:35	0.0	0.0	475.0	0.0
01Jan2013	02:40	0.0	0.0	475.0	0.0
01Jan2013	02:45	0.0	0.0	475.0	0.0
01Jan2013	02:50	0.0	0.0	475.0	0.0
01Jan2013	02:55	0.0	0.0	475.0	0.0
01Jan2013	03:00	0.0	0.0	475.0	0.0
01Jan2013	03:05	0.0	0.0	475.0	0.0
01Jan2013	03:10	0.0	0.0	475.0	0.0
01Jan2013	03:15	0.0	0.0	475.0	0.0
01Jan2013	03:20	0.0	0.0	475.0	0.0
01Jan2013	03:25	0.0	0.0	475.0	0.0
01Jan2013	03:30	0.0	0.0	475.0	0.0
01Jan2013	03:35	0.0	0.0	475.0	0.0
01Jan2013	03:40	0.0	0.0	475.0	0.0
01Jan2013	03:45	0.0	0.0	475.0	0.0
01Jan2013	03:50	0.0	0.0	475.0	0.0
01Jan2013	03:55	0.0	0.0	475.0	0.0
01Jan2013	04:00	0.0	0.0	475.0	0.0
01Jan2013	04:05	0.0	0.0	475.0	0.0
01Jan2013	04:10	0.0	0.0	475.0	0.0
01Jan2013	04:15	0.0	0.0	475.0	0.0
01Jan2013	04:20	0.0	0.0	475.0	0.0
01Jan2013	04:25	0.0	0.0	475.0	0.0
01Jan2013	04:30	0.0	0.0	475.0	0.0
01Jan2013	04:35	0.0	0.0	475.0	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	1.6	0.1	475.4	1.4
01Jan2013	07:20	1.7	0.1	475.4	1.5
01Jan2013	07:25	1.7	0.1	475.4	1.6
01Jan2013	07:30	1.8	0.1	475.4	1.6
01Jan2013	07:35	1.9	0.1	475.4	1.7
01Jan2013	07:40	1.9	0.1	475.4	1.8
01Jan2013	07:45	2.0	0.1	475.4	1.8
01Jan2013	07:50	2.0	0.1	475.5	1.9
01Jan2013	07:55	2.1	0.1	475.5	2.0
01Jan2013	08:00	2.2	0.1	475.5	2.0
01Jan2013	08:05	2.3	0.1	475.5	2.1
01Jan2013	08:10	2.3	0.1	475.5	2.2
01Jan2013	08:15	2.4	0.1	475.5	2.2
01Jan2013	08:20	2.6	0.1	475.5	2.3
01Jan2013	08:25	2.7	0.1	475.5	2.5
01Jan2013	08:30	2.8	0.1	475.5	2.6
01Jan2013	08:35	3.0	0.1	475.5	2.7
01Jan2013	08:40	3.2	0.1	475.6	2.9
01Jan2013	08:45	3.3	0.1	475.6	3.0
01Jan2013	08:50	3.5	0.1	475.6	3.2
01Jan2013	08:55	3.7	0.1	475.6	3.4
01Jan2013	09:00	3.8	0.1	475.6	3.5
01Jan2013	09:05	4.0	0.1	475.6	3.7
01Jan2013	09:10	4.2	0.1	475.7	3.9
01Jan2013	09:15	4.3	0.1	475.7	4.1
01Jan2013	09:20	4.5	0.1	475.7	4.2
01Jan2013	09:25	4.6	0.1	475.7	4.4
01Jan2013	09:30	4.6	0.1	475.7	4.5
01Jan2013	09:35	4.7	0.1	475.7	4.6
01Jan2013	09:40	4.8	0.1	475.7	4.7
01Jan2013	09:45	5.0	0.1	475.7	4.8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	5.3	0.1	475.7	5.0
01Jan2013	09:55	5.5	0.1	475.8	5.2
01Jan2013	10:00	5.8	0.1	475.8	5.4
01Jan2013	10:05	6.1	0.1	475.8	5.7
01Jan2013	10:10	6.4	0.1	475.8	6.0
01Jan2013	10:15	6.8	0.1	475.8	6.3
01Jan2013	10:20	7.2	0.1	475.9	6.7
01Jan2013	10:25	7.7	0.1	475.9	7.1
01Jan2013	10:30	8.1	0.1	475.9	7.5
01Jan2013	10:35	8.6	0.1	476.0	8.0
01Jan2013	10:40	9.1	0.1	476.0	8.5
01Jan2013	10:45	9.7	0.1	476.0	8.9
01Jan2013	10:50	10.4	0.1	476.0	9.1
01Jan2013	10:55	11.2	0.2	476.0	9.5
01Jan2013	11:00	12.0	0.2	476.1	10.0
01Jan2013	11:05	12.9	0.2	476.1	10.6
01Jan2013	11:10	13.9	0.2	476.1	11.3
01Jan2013	11:15	15.2	0.2	476.2	12.1
01Jan2013	11:20	16.8	0.2	476.2	13.1
01Jan2013	11:25	18.7	0.3	476.3	14.4
01Jan2013	11:30	20.6	0.3	476.4	15.8
01Jan2013	11:35	24.5	0.3	476.4	17.7
01Jan2013	11:40	36.3	0.4	476.6	21.5
01Jan2013	11:45	60.5	0.6	476.9	30.4
01Jan2013	11:50	101.8	0.9	477.5	45.7
01Jan2013	11:55	168.7	1.4	478.3	73.2
01Jan2013	12:00	235.4	2.1	479.3	116.0
01Jan2013	12:05	245.2	2.7	480.0	184.4
01Jan2013	12:10	192.5	2.9	480.1	209.7
01Jan2013	12:15	130.1	2.7	479.9	177.0
01Jan2013	12:20	89.5	2.4	479.5	139.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	66.6	2.0	479.2	109.3
01Jan2013	12:30	51.7	1.8	478.8	92.5
01Jan2013	12:35	41.3	1.5	478.4	79.3
01Jan2013	12:40	34.0	1.3	478.1	67.4
01Jan2013	12:45	29.2	1.0	477.8	56.2
01Jan2013	12:50	25.9	0.9	477.5	47.1
01Jan2013	12:55	23.4	0.8	477.3	40.2
01Jan2013	13:00	21.6	0.7	477.1	35.0
01Jan2013	13:05	20.3	0.6	477.0	30.7
01Jan2013	13:10	19.1	0.5	476.8	27.0
01Jan2013	13:15	18.1	0.5	476.7	24.2
01Jan2013	13:20	17.2	0.4	476.6	22.1
01Jan2013	13:25	16.5	0.4	476.6	20.5
01Jan2013	13:30	15.8	0.4	476.5	19.2
01Jan2013	13:35	15.1	0.3	476.5	18.1
01Jan2013	13:40	14.4	0.3	476.4	17.1
01Jan2013	13:45	13.8	0.3	476.4	16.2
01Jan2013	13:50	13.3	0.3	476.3	15.5
01Jan2013	13:55	12.8	0.3	476.3	14.8
01Jan2013	14:00	12.2	0.3	476.3	14.2
01Jan2013	14:05	11.8	0.3	476.3	13.6
01Jan2013	14:10	11.4	0.2	476.2	13.1
01Jan2013	14:15	11.1	0.2	476.2	12.6
01Jan2013	14:20	10.8	0.2	476.2	12.2
01Jan2013	14:25	10.5	0.2	476.2	11.8
01Jan2013	14:30	10.3	0.2	476.2	11.5
01Jan2013	14:35	10.2	0.2	476.1	11.2
01Jan2013	14:40	10.0	0.2	476.1	10.9
01Jan2013	14:45	9.9	0.2	476.1	10.7
01Jan2013	14:50	9.7	0.2	476.1	10.5
01Jan2013	14:55	9.5	0.2	476.1	10.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	9.4	0.2	476.1	10.1
01Jan2013	15:05	9.2	0.2	476.1	9.9
01Jan2013	15:10	9.0	0.2	476.1	9.7
01Jan2013	15:15	8.8	0.2	476.0	9.5
01Jan2013	15:20	8.7	0.1	476.0	9.3
01Jan2013	15:25	8.5	0.1	476.0	9.2
01Jan2013	15:30	8.3	0.1	476.0	9.0
01Jan2013	15:35	8.1	0.1	476.0	8.8
01Jan2013	15:40	8.0	0.1	476.0	8.4
01Jan2013	15:45	7.8	0.1	476.0	8.1
01Jan2013	15:50	7.7	0.1	475.9	7.9
01Jan2013	15:55	7.5	0.1	475.9	7.7
01Jan2013	16:00	7.3	0.1	475.9	7.6
01Jan2013	16:05	7.1	0.1	475.9	7.4
01Jan2013	16:10	7.0	0.1	475.9	7.2
01Jan2013	16:15	6.8	0.1	475.9	7.0
01Jan2013	16:20	6.7	0.1	475.9	6.9
01Jan2013	16:25	6.7	0.1	475.9	6.8
01Jan2013	16:30	6.7	0.1	475.9	6.7
01Jan2013	16:35	6.6	0.1	475.9	6.7
01Jan2013	16:40	6.5	0.1	475.9	6.6
01Jan2013	16:45	6.4	0.1	475.9	6.5
01Jan2013	16:50	6.4	0.1	475.9	6.5
01Jan2013	16:55	6.3	0.1	475.8	6.4
01Jan2013	17:00	6.3	0.1	475.8	6.4
01Jan2013	17:05	6.3	0.1	475.8	6.3
01Jan2013	17:10	6.1	0.1	475.8	6.3
01Jan2013	17:15	6.0	0.1	475.8	6.2
01Jan2013	17:20	6.0	0.1	475.8	6.1
01Jan2013	17:25	5.9	0.1	475.8	6.0
01Jan2013	17:30	5.9	0.1	475.8	5.9

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	5.9	0.1	475.8	5.9
01Jan2013	17:40	5.8	0.1	475.8	5.9
01Jan2013	17:45	5.8	0.1	475.8	5.8
01Jan2013	17:50	5.6	0.1	475.8	5.8
01Jan2013	17:55	5.5	0.1	475.8	5.7
01Jan2013	18:00	5.5	0.1	475.8	5.6
01Jan2013	18:05	5.5	0.1	475.8	5.6
01Jan2013	18:10	5.4	0.1	475.8	5.5
01Jan2013	18:15	5.3	0.1	475.8	5.4
01Jan2013	18:20	5.3	0.1	475.8	5.4
01Jan2013	18:25	5.3	0.1	475.8	5.3
01Jan2013	18:30	5.2	0.1	475.8	5.3
01Jan2013	18:35	5.1	0.1	475.8	5.2
01Jan2013	18:40	5.0	0.1	475.8	5.1
01Jan2013	18:45	4.9	0.1	475.7	5.0
01Jan2013	18:50	4.9	0.1	475.7	5.0
01Jan2013	18:55	4.9	0.1	475.7	5.0
01Jan2013	19:00	4.8	0.1	475.7	4.9
01Jan2013	19:05	4.7	0.1	475.7	4.8
01Jan2013	19:10	4.7	0.1	475.7	4.8
01Jan2013	19:15	4.6	0.1	475.7	4.7
01Jan2013	19:20	4.6	0.1	475.7	4.6
01Jan2013	19:25	4.5	0.1	475.7	4.6
01Jan2013	19:30	4.5	0.1	475.7	4.5
01Jan2013	19:35	4.4	0.1	475.7	4.5
01Jan2013	19:40	4.3	0.1	475.7	4.4
01Jan2013	19:45	4.2	0.1	475.7	4.3
01Jan2013	19:50	4.1	0.1	475.7	4.3
01Jan2013	19:55	4.1	0.1	475.7	4.2
01Jan2013	20:00	4.1	0.1	475.7	4.1
01Jan2013	20:05	4.0	0.1	475.7	4.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	4.0	0.1	475.7	4.1
01Jan2013	20:15	3.9	0.1	475.7	4.0
01Jan2013	20:20	3.9	0.1	475.7	4.0
01Jan2013	20:25	3.9	0.1	475.7	3.9
01Jan2013	20:30	3.9	0.1	475.7	3.9
01Jan2013	20:35	3.8	0.1	475.7	3.9
01Jan2013	20:40	3.8	0.1	475.7	3.8
01Jan2013	20:45	3.8	0.1	475.7	3.8
01Jan2013	20:50	3.8	0.1	475.7	3.8
01Jan2013	20:55	3.7	0.1	475.6	3.8
01Jan2013	21:00	3.7	0.1	475.6	3.8
01Jan2013	21:05	3.8	0.1	475.6	3.8
01Jan2013	21:10	3.8	0.1	475.6	3.8
01Jan2013	21:15	3.7	0.1	475.6	3.8
01Jan2013	21:20	3.7	0.1	475.6	3.7
01Jan2013	21:25	3.7	0.1	475.6	3.7
01Jan2013	21:30	3.7	0.1	475.6	3.7
01Jan2013	21:35	3.7	0.1	475.6	3.7
01Jan2013	21:40	3.7	0.1	475.6	3.7
01Jan2013	21:45	3.7	0.1	475.6	3.7
01Jan2013	21:50	3.7	0.1	475.6	3.7
01Jan2013	21:55	3.6	0.1	475.6	3.7
01Jan2013	22:00	3.6	0.1	475.6	3.7
01Jan2013	22:05	3.6	0.1	475.6	3.6
01Jan2013	22:10	3.6	0.1	475.6	3.6
01Jan2013	22:15	3.6	0.1	475.6	3.6
01Jan2013	22:20	3.6	0.1	475.6	3.6
01Jan2013	22:25	3.6	0.1	475.6	3.6
01Jan2013	22:30	3.6	0.1	475.6	3.6
01Jan2013	22:35	3.5	0.1	475.6	3.6
01Jan2013	22:40	3.5	0.1	475.6	3.5

Pond B Input Data

<u>Outlet Pipe</u>

Type:	1 - 36" Diameter Corrugated Metal StandPipe (See Pond B Elevation-Discharge Calculations for Standpipe Orifice Information)
Length:	109 Feet
Top Inlet Elev.:	477.00
Outlet Elev.:	469.00
Exit Coeff.:	1.0
Mannings n:	0.024

<u>Spillway</u>

Elev:	479.00
Length:	20
Weir Coeff.:	3.0

<u>Dam</u>

Elev.:	480.00
Length:	50
Coeff.:	3.0

Area-Elev. Table	
Elev. (Feet)	Area (Acres)
470.0	0.0000
471.0	0.6571
472.0	0.7371
473.0	0.7943
474.0	0.8620
475.0	0.9300
476.0	0.9959
478.0	1.1411
479.0	1.2321
480.0	1.3218
481.0	1.5000

Elev. - Discharge Table	
Elev. (Feet)	Discharge (cfs)
470.0	0.0
470.5	0.0
471.0	0.7
471.5	0.9
472.0	1.2
472.5	1.3
473.0	2.2
473.5	2.6
474.0	2.9
474.5	3.2
475.0	4.2
475.5	4.7
476.0	5.1
476.5	5.5
477.0	5.9
477.5	16.2
478.0	34.8
478.5	58.8
479.0	87.1
479.5	151.0
480.0	274.6
480.5	468.7

POND B ELEVATION-DISCHARGE CALCULATIONS

Pond Flowline=	470.00		Orifice Flow Equation	Wier L=	20 ft.
Orifice Coeff. C=	0.60		$q_X = C \times A \times (2\ g\ h)$^.5	Wier El.=	479 msl
Orifice Size (in.)=	3.00			Wier SS=	10 :1
		# orifices			
Orifice Elev. 1=	470.50	4			
Orifice Elev. 2=	472.50	4		Stack Pipe Top Elev =	477.00 msl
Orifice Elev. 3=	474.50	4		Stack Pipe Diam.=	3.00 ft.

Wier Flow Equation
Q = 3 x L x h^1.5

	ORIFICE CALCULATIONS							PIPE STACK CALCULATIONS		WIER CALCULATIONS		
WS Elevation	h1	h2	h3	q1	q2	q3	Orifice Flow q_o	Pipe Stack Head, h_p	Pipe Stack Flow, Q_p	Wier Head h_W	Wier Flow Q_W	Total Q for Elev.
	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(cfs)
470.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
470.5	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
471.0	0.50	0.00	0.00	0.7	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7
471.5	1.00	0.00	0.00	0.9	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.9
472.0	1.50	0.00	0.00	1.2	0.0	0.0	1.2	0.0	0.0	0.0	0.0	1.2
472.5	2.00	0.00	0.00	1.3	0.0	0.0	1.3	0.0	0.0	0.0	0.0	1.3
473.0	2.50	0.50	0.00	1.5	0.7	0.0	2.2	0.0	0.0	0.0	0.0	2.2
473.5	3.00	1.00	0.00	1.6	0.9	0.0	2.6	0.0	0.0	0.0	0.0	2.6
474.0	3.50	1.50	0.00	1.8	1.2	0.0	2.9	0.0	0.0	0.0	0.0	2.9
474.5	4.00	2.00	0.00	1.9	1.3	0.0	3.2	0.0	0.0	0.0	0.0	3.2
475.0	4.50	2.50	0.50	2.0	1.5	0.7	4.2	0.0	0.0	0.0	0.0	4.2
475.5	5.00	3.00	1.00	2.1	1.6	0.9	4.7	0.0	0.0	0.0	0.0	4.7
476.0	5.50	3.50	1.50	2.2	1.8	1.2	5.1	0.0	0.0	0.0	0.0	5.1
476.5	6.00	4.00	2.00	2.3	1.9	1.3	5.5	0.0	0.0	0.0	0.0	5.5
477.0	6.50	4.50	2.50	2.4	2.0	1.5	5.9	0.0	0.0	0.0	0.0	5.9
477.5	7.00	5.00	3.00	2.5	2.1	1.6	6.3	0.5	10.0	0.0	0.0	16.2
478.0	7.50	5.50	3.50	2.6	2.2	1.8	6.6	1.0	28.3	0.0	0.0	34.8
478.5	8.00	6.00	4.00	2.7	2.3	1.9	6.9	1.5	51.9	0.0	0.0	58.8
479.0	8.50	6.50	4.50	2.8	2.4	2.0	7.2	2.0	80.0	0.0	0.0	87.1
479.5	9.00	7.00	5.00	2.8	2.5	2.1	7.5	2.5	111.8	0.5	31.8	151.0
480.0	9.50	7.50	5.50	2.9	2.6	2.2	7.7	3.0	146.9	1.0	120.0	274.6
480.5	10.00	8.00	6.00	3.0	2.7	2.3	8.0	3.5	185.1	1.5	275.6	468.7

Orifice Calculations

h1 = height above orifices at Elev. 1

h2 = height above orifices at Elev. 2

h3 = height above orifices at Elev. 3

q1 = flow into orifices at Elev. 1, $q_X = C \times A \times (2\ g\ h1)$^.5

q2 = flow into orifices at Elev. 2, $q_X = C \times A \times (2\ g\ h2)$^.5

q3 = flow into orifices at Elev. 3, $q_X = C \times A \times (2\ g\ h3)$^.5

$q_{o=}$ total orifice flow for that water surface elevation

Pipe Stack Calculations

h_P = surface water height above top of stack pipe

Q_P = flow into top of stack pipe using weir equation

Weir Calculations

h_W = surface water height above weir flowline elev.

Q_W = flow weir using weir equation

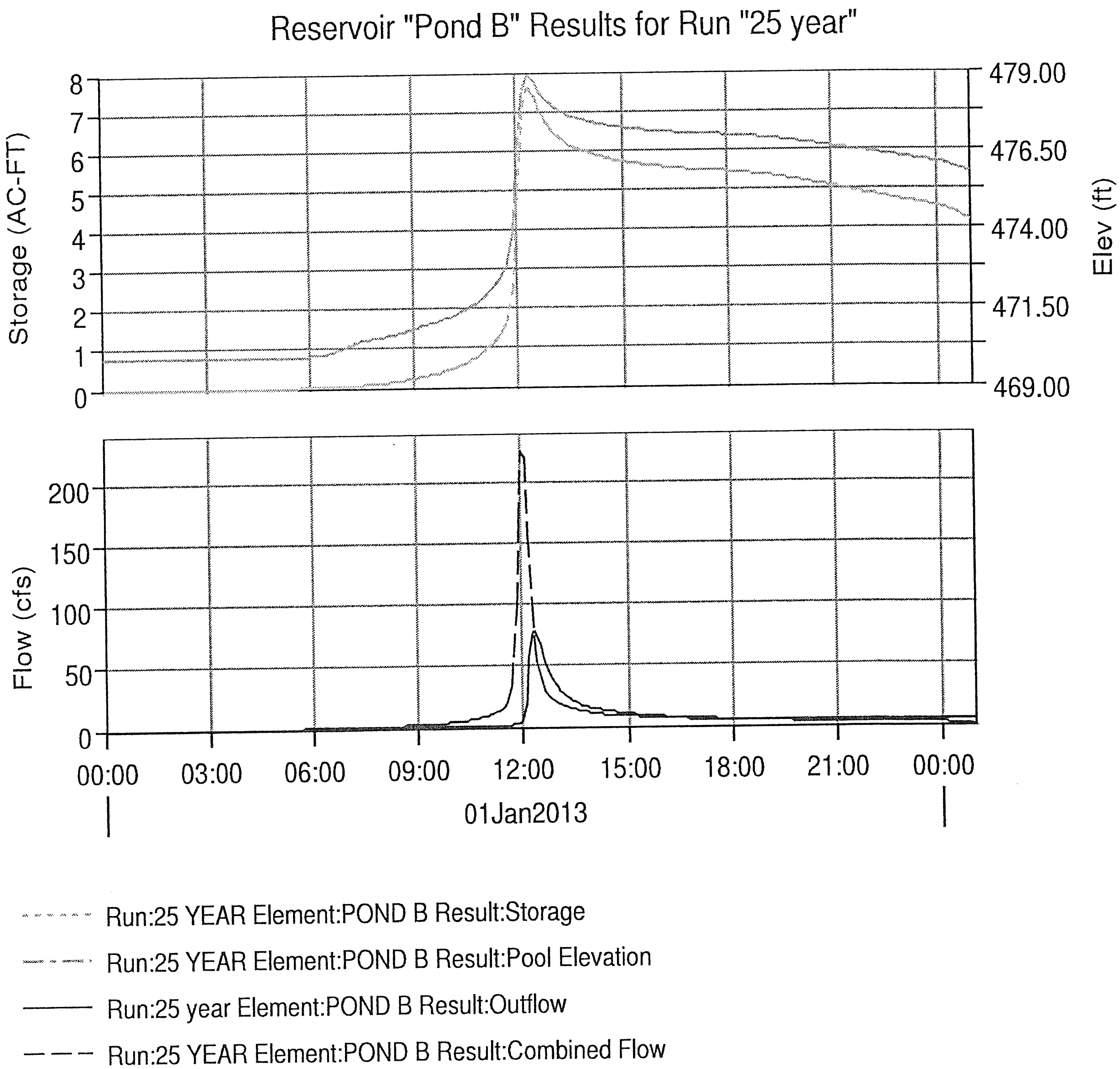
Toatal Q = Total flow through orifices, stack pipe and weir

	Project:	Laredo Proposed	
	Simulation Run:	25 year	Reservoir: Pond B
Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	25 year 24 hr
Compute Time:	17Sep2014, 11:13:14	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	224.4 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:00
Peak Outflow :	79.0 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:20
Total Inflow :	4.42 (IN)	Peak Storage :	7.6 (AC-FT)
Total Outflow :	3.30 (IN)	Peak Elevation :	478.9 (FT)


Reservoir "Pond B" Results for Run "25 year"
Storage (AC-FT)
Elev (ft)
479.00
476.50
474.00
471.50
469.00
Flow (cfs)
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2013
Run:25 YEAR Element:POND B Result:Storage
Run:25 YEAR Element:POND B Result:Pool Elevation
Run:25 year Element:POND B Result:Outflow
Run:25 YEAR Element:POND B Result:Combined Flow

Project: Laredo Proposed
Simulation Run: 25 year Reservoir: Pond B

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 25 year 24
Compute Time: 17Sep2014, 11:13:14 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.0	470.0	0.0
01Jan2013	00:05	0.0	0.0	470.0	0.0
01Jan2013	00:10	0.0	0.0	470.0	0.0
01Jan2013	00:15	0.0	0.0	470.0	0.0
01Jan2013	00:20	0.0	0.0	470.0	0.0
01Jan2013	00:25	0.0	0.0	470.0	0.0
01Jan2013	00:30	0.0	0.0	470.0	0.0
01Jan2013	00:35	0.0	0.0	470.0	0.0
01Jan2013	00:40	0.0	0.0	470.0	0.0
01Jan2013	00:45	0.0	0.0	470.0	0.0
01Jan2013	00:50	0.0	0.0	470.0	0.0
01Jan2013	00:55	0.0	0.0	470.0	0.0
01Jan2013	01:00	0.0	0.0	470.0	0.0
01Jan2013	01:05	0.0	0.0	470.0	0.0
01Jan2013	01:10	0.0	0.0	470.0	0.0
01Jan2013	01:15	0.0	0.0	470.0	0.0
01Jan2013	01:20	0.0	0.0	470.0	0.0
01Jan2013	01:25	0.0	0.0	470.0	0.0
01Jan2013	01:30	0.0	0.0	470.0	0.0
01Jan2013	01:35	0.0	0.0	470.0	0.0
01Jan2013	01:40	0.0	0.0	470.0	0.0
01Jan2013	01:45	0.0	0.0	470.0	0.0
01Jan2013	01:50	0.0	0.0	470.0	0.0
01Jan2013	01:55	0.0	0.0	470.0	0.0
01Jan2013	02:00	0.0	0.0	470.0	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	470.0	0.0
01Jan2013	02:10	0.0	0.0	470.0	0.0
01Jan2013	02:15	0.0	0.0	470.0	0.0
01Jan2013	02:20	0.0	0.0	470.0	0.0
01Jan2013	02:25	0.0	0.0	470.0	0.0
01Jan2013	02:30	0.0	0.0	470.0	0.0
01Jan2013	02:35	0.0	0.0	470.0	0.0
01Jan2013	02:40	0.0	0.0	470.0	0.0
01Jan2013	02:45	0.0	0.0	470.0	0.0
01Jan2013	02:50	0.0	0.0	470.0	0.0
01Jan2013	02:55	0.0	0.0	470.0	0.0
01Jan2013	03:00	0.0	0.0	470.0	0.0
01Jan2013	03:05	0.0	0.0	470.0	0.0
01Jan2013	03:10	0.0	0.0	470.0	0.0
01Jan2013	03:15	0.0	0.0	470.0	0.0
01Jan2013	03:20	0.0	0.0	470.0	0.0
01Jan2013	03:25	0.0	0.0	470.0	0.0
01Jan2013	03:30	0.0	0.0	470.0	0.0
01Jan2013	03:35	0.0	0.0	470.0	0.0
01Jan2013	03:40	0.0	0.0	470.0	0.0
01Jan2013	03:45	0.0	0.0	470.0	0.0
01Jan2013	03:50	0.0	0.0	470.0	0.0
01Jan2013	03:55	0.0	0.0	470.0	0.0
01Jan2013	04:00	0.0	0.0	470.0	0.0
01Jan2013	04:05	0.0	0.0	470.0	0.0
01Jan2013	04:10	0.0	0.0	470.0	0.0
01Jan2013	04:15	0.0	0.0	470.0	0.0
01Jan2013	04:20	0.0	0.0	470.0	0.0
01Jan2013	04:25	0.0	0.0	470.0	0.0
01Jan2013	04:30	0.0	0.0	470.0	0.0
01Jan2013	04:35	0.0	0.0	470.0	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	04:40	0.0	0.0	470.0	0.0
01Jan2013	04:45	0.0	0.0	470.0	0.0
01Jan2013	04:50	0.0	0.0	470.0	0.0
01Jan2013	04:55	0.0	0.0	470.0	0.0
01Jan2013	05:00	0.0	0.0	470.0	0.0
01Jan2013	05:05	0.0	0.0	470.0	0.0
01Jan2013	05:10	0.0	0.0	470.0	0.0
01Jan2013	05:15	0.0	0.0	470.0	0.0
01Jan2013	05:20	0.0	0.0	470.0	0.0
01Jan2013	05:25	0.0	0.0	470.0	0.0
01Jan2013	05:30	0.0	0.0	470.0	0.0
01Jan2013	05:35	0.0	0.0	470.0	0.0
01Jan2013	05:40	0.0	0.0	470.0	0.0
01Jan2013	05:45	0.0	0.0	470.0	0.0
01Jan2013	05:50	0.0	0.0	470.0	0.0
01Jan2013	05:55	0.0	0.0	470.0	0.0
01Jan2013	06:00	0.1	0.0	470.0	0.0
01Jan2013	06:05	0.1	0.0	470.0	0.0
01Jan2013	06:10	0.1	0.0	470.0	0.0
01Jan2013	06:15	0.2	0.0	470.0	0.0
01Jan2013	06:20	0.2	0.0	470.0	0.0
01Jan2013	06:25	0.3	0.0	470.1	0.0
01Jan2013	06:30	0.3	0.0	470.1	0.0
01Jan2013	06:35	0.4	0.0	470.1	0.0
01Jan2013	06:40	0.4	0.0	470.1	0.0
01Jan2013	06:45	0.5	0.0	470.1	0.0
01Jan2013	06:50	0.5	0.0	470.2	0.0
01Jan2013	06:55	0.5	0.0	470.2	0.0
01Jan2013	07:00	0.6	0.0	470.2	0.0
01Jan2013	07:05	0.7	0.0	470.3	0.0
01Jan2013	07:10	0.7	0.0	470.3	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	0.7	0.0	470.4	0.0
01Jan2013	07:20	0.8	0.0	470.4	0.0
01Jan2013	07:25	0.9	0.1	470.5	0.0
01Jan2013	07:30	0.9	0.1	470.5	0.0
01Jan2013	07:35	1.0	0.1	470.5	0.0
01Jan2013	07:40	1.0	0.1	470.5	0.0
01Jan2013	07:45	1.1	0.1	470.5	0.1
01Jan2013	07:50	1.1	0.1	470.6	0.1
01Jan2013	07:55	1.2	0.1	470.6	0.1
01Jan2013	08:00	1.2	0.1	470.6	0.1
01Jan2013	08:05	1.3	0.1	470.6	0.1
01Jan2013	08:10	1.3	0.1	470.6	0.2
01Jan2013	08:15	1.4	0.1	470.6	0.2
01Jan2013	08:20	1.5	0.1	470.7	0.2
01Jan2013	08:25	1.6	0.1	470.7	0.2
01Jan2013	08:30	1.7	0.2	470.7	0.3
01Jan2013	08:35	1.9	0.2	470.7	0.3
01Jan2013	08:40	2.0	0.2	470.7	0.3
01Jan2013	08:45	2.1	0.2	470.8	0.4
01Jan2013	08:50	2.3	0.2	470.8	0.4
01Jan2013	08:55	2.4	0.2	470.8	0.4
01Jan2013	09:00	2.5	0.2	470.8	0.5
01Jan2013	09:05	2.7	0.2	470.9	0.5
01Jan2013	09:10	2.8	0.3	470.9	0.6
01Jan2013	09:15	2.9	0.3	470.9	0.6
01Jan2013	09:20	3.0	0.3	471.0	0.7
01Jan2013	09:25	3.1	0.3	471.0	0.7
01Jan2013	09:30	3.2	0.3	471.0	0.7
01Jan2013	09:35	3.3	0.3	471.1	0.7
01Jan2013	09:40	3.4	0.4	471.1	0.7
01Jan2013	09:45	3.5	0.4	471.1	0.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	3.7	0.4	471.1	0.8
01Jan2013	09:55	4.0	0.4	471.2	0.8
01Jan2013	10:00	4.2	0.4	471.2	0.8
01Jan2013	10:05	4.4	0.5	471.2	0.8
01Jan2013	10:10	4.7	0.5	471.3	0.8
01Jan2013	10:15	5.0	0.5	471.3	0.8
01Jan2013	10:20	5.4	0.5	471.4	0.8
01Jan2013	10:25	5.7	0.6	471.4	0.9
01Jan2013	10:30	6.1	0.6	471.5	0.9
01Jan2013	10:35	6.5	0.6	471.5	0.9
01Jan2013	10:40	7.0	0.7	471.6	0.9
01Jan2013	10:45	7.5	0.7	471.6	1.0
01Jan2013	10:50	8.1	0.8	471.7	1.0
01Jan2013	10:55	8.7	0.8	471.8	1.1
01Jan2013	11:00	9.4	0.9	471.8	1.1
01Jan2013	11:05	10.2	0.9	471.9	1.2
01Jan2013	11:10	11.1	1.0	472.0	1.2
01Jan2013	11:15	12.2	1.1	472.1	1.2
01Jan2013	11:20	13.7	1.2	472.2	1.2
01Jan2013	11:25	15.3	1.3	472.3	1.3
01Jan2013	11:30	16.9	1.4	472.5	1.3
01Jan2013	11:35	20.8	1.5	472.6	1.5
01Jan2013	11:40	32.8	1.6	472.9	1.9
01Jan2013	11:45	56.5	1.9	473.2	2.4
01Jan2013	11:50	97.3	2.4	473.8	2.8
01Jan2013	11:55	163.8	3.3	474.8	3.9
01Jan2013	12:00	224.4	4.6	476.2	5.2
01Jan2013	12:05	219.0	6.1	477.5	18.0
01Jan2013	12:10	157.0	7.1	478.5	56.7
01Jan2013	12:15	100.7	7.5	478.8	76.5
01Jan2013	12:20	70.2	7.6	478.9	79.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	52.8	7.5	478.8	74.1
01Jan2013	12:30	41.6	7.3	478.6	66.6
01Jan2013	12:35	33.8	7.2	478.5	58.6
01Jan2013	12:40	28.3	7.0	478.4	51.8
01Jan2013	12:45	24.7	6.8	478.2	45.5
01Jan2013	12:50	22.3	6.7	478.1	40.0
01Jan2013	12:55	20.6	6.6	478.0	35.4
01Jan2013	13:00	19.2	6.5	477.9	32.1
01Jan2013	13:05	18.1	6.4	477.9	29.4
01Jan2013	13:10	17.1	6.3	477.8	27.0
01Jan2013	13:15	16.2	6.3	477.7	24.8
01Jan2013	13:20	15.5	6.2	477.7	23.0
01Jan2013	13:25	14.8	6.2	477.6	21.4
01Jan2013	13:30	14.2	6.1	477.6	20.0
01Jan2013	13:35	13.6	6.1	477.6	18.7
01Jan2013	13:40	13.0	6.1	477.5	17.6
01Jan2013	13:45	12.5	6.0	477.5	16.6
01Jan2013	13:50	12.0	6.0	477.5	15.9
01Jan2013	13:55	11.6	6.0	477.5	15.4
01Jan2013	14:00	11.1	6.0	477.4	14.9
01Jan2013	14:05	10.7	5.9	477.4	14.4
01Jan2013	14:10	10.4	5.9	477.4	13.9
01Jan2013	14:15	10.1	5.9	477.4	13.5
01Jan2013	14:20	9.8	5.9	477.3	13.1
01Jan2013	14:25	9.6	5.8	477.3	12.6
01Jan2013	14:30	9.4	5.8	477.3	12.3
01Jan2013	14:35	9.3	5.8	477.3	11.9
01Jan2013	14:40	9.2	5.8	477.3	11.6
01Jan2013	14:45	9.0	5.8	477.3	11.3
01Jan2013	14:50	8.9	5.7	477.2	11.0
01Jan2013	14:55	8.7	5.7	477.2	10.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	8.6	5.7	477.2	10.5
01Jan2013	15:05	8.4	5.7	477.2	10.2
01Jan2013	15:10	8.2	5.7	477.2	10.0
01Jan2013	15:15	8.1	5.7	477.2	9.8
01Jan2013	15:20	7.9	5.7	477.2	9.5
01Jan2013	15:25	7.8	5.7	477.2	9.3
01Jan2013	15:30	7.6	5.6	477.2	9.1
01Jan2013	15:35	7.4	5.6	477.1	8.9
01Jan2013	15:40	7.3	5.6	477.1	8.7
01Jan2013	15:45	7.2	5.6	477.1	8.6
01Jan2013	15:50	7.1	5.6	477.1	8.4
01Jan2013	15:55	6.9	5.6	477.1	8.2
01Jan2013	16:00	6.7	5.6	477.1	8.0
01Jan2013	16:05	6.5	5.6	477.1	7.9
01Jan2013	16:10	6.4	5.6	477.1	7.7
01Jan2013	16:15	6.3	5.6	477.1	7.5
01Jan2013	16:20	6.2	5.6	477.1	7.4
01Jan2013	16:25	6.2	5.5	477.1	7.2
01Jan2013	16:30	6.2	5.5	477.1	7.1
01Jan2013	16:35	6.1	5.5	477.1	7.0
01Jan2013	16:40	6.0	5.5	477.0	6.9
01Jan2013	16:45	5.9	5.5	477.0	6.7
01Jan2013	16:50	5.8	5.5	477.0	6.6
01Jan2013	16:55	5.8	5.5	477.0	6.5
01Jan2013	17:00	5.8	5.5	477.0	6.5
01Jan2013	17:05	5.8	5.5	477.0	6.4
01Jan2013	17:10	5.6	5.5	477.0	6.3
01Jan2013	17:15	5.5	5.5	477.0	6.2
01Jan2013	17:20	5.5	5.5	477.0	6.1
01Jan2013	17:25	5.4	5.5	477.0	6.0
01Jan2013	17:30	5.4	5.5	477.0	6.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	5.4	5.5	477.0	5.9
01Jan2013	17:40	5.4	5.5	477.0	5.9
01Jan2013	17:45	5.3	5.5	477.0	5.9
01Jan2013	17:50	5.2	5.5	477.0	5.9
01Jan2013	17:55	5.1	5.5	477.0	5.9
01Jan2013	18:00	5.1	5.5	477.0	5.9
01Jan2013	18:05	5.1	5.5	477.0	5.9
01Jan2013	18:10	5.0	5.4	477.0	5.9
01Jan2013	18:15	4.9	5.4	477.0	5.9
01Jan2013	18:20	4.9	5.4	477.0	5.9
01Jan2013	18:25	4.9	5.4	476.9	5.9
01Jan2013	18:30	4.8	5.4	476.9	5.9
01Jan2013	18:35	4.7	5.4	476.9	5.8
01Jan2013	18:40	4.6	5.4	476.9	5.8
01Jan2013	18:45	4.6	5.4	476.9	5.8
01Jan2013	18:50	4.6	5.4	476.9	5.8
01Jan2013	18:55	4.5	5.4	476.9	5.8
01Jan2013	19:00	4.5	5.4	476.9	5.8
01Jan2013	19:05	4.3	5.4	476.9	5.8
01Jan2013	19:10	4.3	5.3	476.9	5.8
01Jan2013	19:15	4.3	5.3	476.9	5.8
01Jan2013	19:20	4.2	5.3	476.9	5.8
01Jan2013	19:25	4.2	5.3	476.8	5.8
01Jan2013	19:30	4.1	5.3	476.8	5.8
01Jan2013	19:35	4.1	5.3	476.8	5.8
01Jan2013	19:40	4.0	5.3	476.8	5.7
01Jan2013	19:45	3.9	5.3	476.8	5.7
01Jan2013	19:50	3.8	5.3	476.8	5.7
01Jan2013	19:55	3.8	5.2	476.8	5.7
01Jan2013	20:00	3.8	5.2	476.8	5.7
01Jan2013	20:05	3.7	5.2	476.7	5.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	3.7	5.2	476.7	5.7
01Jan2013	20:15	3.6	5.2	476.7	5.7
01Jan2013	20:20	3.6	5.2	476.7	5.7
01Jan2013	20:25	3.6	5.2	476.7	5.7
01Jan2013	20:30	3.6	5.1	476.7	5.6
01Jan2013	20:35	3.5	5.1	476.7	5.6
01Jan2013	20:40	3.6	5.1	476.7	5.6
01Jan2013	20:45	3.6	5.1	476.6	5.6
01Jan2013	20:50	3.5	5.1	476.6	5.6
01Jan2013	20:55	3.4	5.1	476.6	5.6
01Jan2013	21:00	3.5	5.1	476.6	5.6
01Jan2013	21:05	3.5	5.0	476.6	5.6
01Jan2013	21:10	3.5	5.0	476.6	5.6
01Jan2013	21:15	3.5	5.0	476.6	5.5
01Jan2013	21:20	3.4	5.0	476.5	5.5
01Jan2013	21:25	3.5	5.0	476.5	5.5
01Jan2013	21:30	3.4	5.0	476.5	5.5
01Jan2013	21:35	3.4	5.0	476.5	5.5
01Jan2013	21:40	3.5	4.9	476.5	5.5
01Jan2013	21:45	3.4	4.9	476.5	5.5
01Jan2013	21:50	3.4	4.9	476.5	5.5
01Jan2013	21:55	3.4	4.9	476.4	5.5
01Jan2013	22:00	3.3	4.9	476.4	5.4
01Jan2013	22:05	3.3	4.9	476.4	5.4
01Jan2013	22:10	3.3	4.9	476.4	5.4
01Jan2013	22:15	3.3	4.8	476.4	5.4
01Jan2013	22:20	3.3	4.8	476.4	5.4
01Jan2013	22:25	3.3	4.8	476.4	5.4
01Jan2013	22:30	3.3	4.8	476.3	5.4
01Jan2013	22:35	3.2	4.8	476.3	5.4
01Jan2013	22:40	3.2	4.8	476.3	5.4

Project: Laredo Proposed
Simulation Run: 100 year Reservoir: Pond B

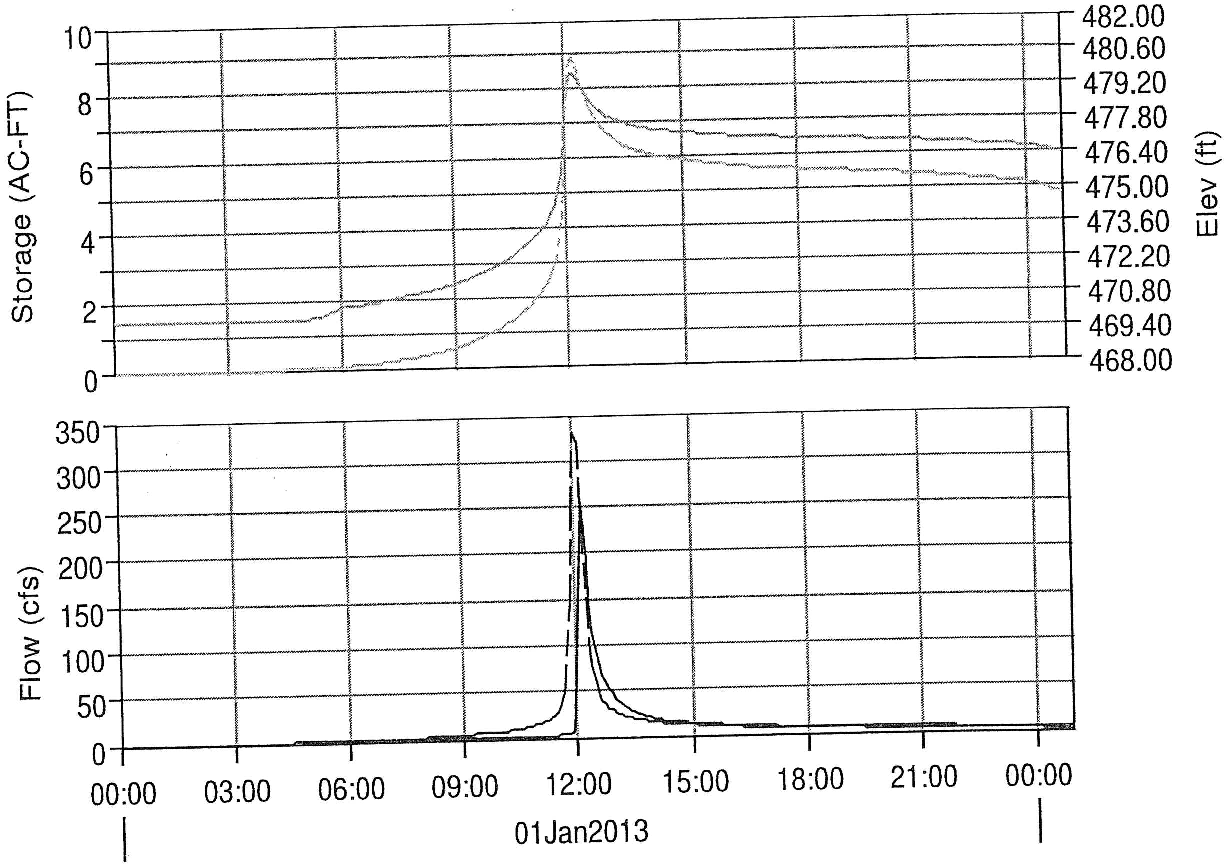
Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	100 year 24 hr
Compute Time:	17Sep2014, 11:11:16	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	330.5 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:00
Peak Outflow :	257.0 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:10
Total Inflow :	6.57 (IN)	Peak Storage :	9.0 (AC-FT)
Total Outflow :	5.30 (IN)	Peak Elevation :	479.9 (FT)

Reservoir "Pond B" Results for Run "100 year"



Run:100 YEAR Element:POND B Result:Storage

Run:100 YEAR Element:POND B Result:Pool Elevation

Run:100 year Element:POND B Result:Outflow

Run:100 YEAR Element:POND B Result:Combined Flow

Project: Laredo Proposed
Simulation Run: 100 year Reservoir: Pond B

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 100 year 2
Compute Time: 17Sep2014, 11:11:16 Control Specifications: Contro

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.0	470.0	0.0
01Jan2013	00:05	0.0	0.0	470.0	0.0
01Jan2013	00:10	0.0	0.0	470.0	0.0
01Jan2013	00:15	0.0	0.0	470.0	0.0
01Jan2013	00:20	0.0	0.0	470.0	0.0
01Jan2013	00:25	0.0	0.0	470.0	0.0
01Jan2013	00:30	0.0	0.0	470.0	0.0
01Jan2013	00:35	0.0	0.0	470.0	0.0
01Jan2013	00:40	0.0	0.0	470.0	0.0
01Jan2013	00:45	0.0	0.0	470.0	0.0
01Jan2013	00:50	0.0	0.0	470.0	0.0
01Jan2013	00:55	0.0	0.0	470.0	0.0
01Jan2013	01:00	0.0	0.0	470.0	0.0
01Jan2013	01:05	0.0	0.0	470.0	0.0
01Jan2013	01:10	0.0	0.0	470.0	0.0
01Jan2013	01:15	0.0	0.0	470.0	0.0
01Jan2013	01:20	0.0	0.0	470.0	0.0
01Jan2013	01:25	0.0	0.0	470.0	0.0
01Jan2013	01:30	0.0	0.0	470.0	0.0
01Jan2013	01:35	0.0	0.0	470.0	0.0
01Jan2013	01:40	0.0	0.0	470.0	0.0
01Jan2013	01:45	0.0	0.0	470.0	0.0
01Jan2013	01:50	0.0	0.0	470.0	0.0
01Jan2013	01:55	0.0	0.0	470.0	0.0
01Jan2013	02:00	0.0	0.0	470.0	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	470.0	0.0
01Jan2013	02:10	0.0	0.0	470.0	0.0
01Jan2013	02:15	0.0	0.0	470.0	0.0
01Jan2013	02:20	0.0	0.0	470.0	0.0
01Jan2013	02:25	0.0	0.0	470.0	0.0
01Jan2013	02:30	0.0	0.0	470.0	0.0
01Jan2013	02:35	0.0	0.0	470.0	0.0
01Jan2013	02:40	0.0	0.0	470.0	0.0
01Jan2013	02:45	0.0	0.0	470.0	0.0
01Jan2013	02:50	0.0	0.0	470.0	0.0
01Jan2013	02:55	0.0	0.0	470.0	0.0
01Jan2013	03:00	0.0	0.0	470.0	0.0
01Jan2013	03:05	0.0	0.0	470.0	0.0
01Jan2013	03:10	0.0	0.0	470.0	0.0
01Jan2013	03:15	0.0	0.0	470.0	0.0
01Jan2013	03:20	0.0	0.0	470.0	0.0
01Jan2013	03:25	0.0	0.0	470.0	0.0
01Jan2013	03:30	0.0	0.0	470.0	0.0
01Jan2013	03:35	0.0	0.0	470.0	0.0
01Jan2013	03:40	0.0	0.0	470.0	0.0
01Jan2013	03:45	0.0	0.0	470.0	0.0
01Jan2013	03:50	0.0	0.0	470.0	0.0
01Jan2013	03:55	0.0	0.0	470.0	0.0
01Jan2013	04:00	0.0	0.0	470.0	0.0
01Jan2013	04:05	0.0	0.0	470.0	0.0
01Jan2013	04:10	0.0	0.0	470.0	0.0
01Jan2013	04:15	0.0	0.0	470.0	0.0
01Jan2013	04:20	0.0	0.0	470.0	0.0
01Jan2013	04:25	0.0	0.0	470.0	0.0
01Jan2013	04:30	0.0	0.0	470.0	0.0
01Jan2013	04:35	0.0	0.0	470.0	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	04:40	0.0	0.0	470.0	0.0
01Jan2013	04:45	0.0	0.0	470.0	0.0
01Jan2013	04:50	0.1	0.0	470.0	0.0
01Jan2013	04:55	0.1	0.0	470.0	0.0
01Jan2013	05:00	0.2	0.0	470.0	0.0
01Jan2013	05:05	0.2	0.0	470.0	0.0
01Jan2013	05:10	0.3	0.0	470.1	0.0
01Jan2013	05:15	0.4	0.0	470.1	0.0
01Jan2013	05:20	0.4	0.0	470.1	0.0
01Jan2013	05:25	0.5	0.0	470.1	0.0
01Jan2013	05:30	0.6	0.0	470.2	0.0
01Jan2013	05:35	0.6	0.0	470.2	0.0
01Jan2013	05:40	0.7	0.0	470.2	0.0
01Jan2013	05:45	0.8	0.0	470.3	0.0
01Jan2013	05:50	0.8	0.0	470.3	0.0
01Jan2013	05:55	0.9	0.0	470.4	0.0
01Jan2013	06:00	1.0	0.0	470.4	0.0
01Jan2013	06:05	1.0	0.1	470.5	0.0
01Jan2013	06:10	1.1	0.1	470.5	0.0
01Jan2013	06:15	1.2	0.1	470.5	0.0
01Jan2013	06:20	1.3	0.1	470.5	0.1
01Jan2013	06:25	1.3	0.1	470.6	0.1
01Jan2013	06:30	1.4	0.1	470.6	0.1
01Jan2013	06:35	1.5	0.1	470.6	0.1
01Jan2013	06:40	1.6	0.1	470.6	0.2
01Jan2013	06:45	1.6	0.1	470.6	0.2
01Jan2013	06:50	1.7	0.1	470.7	0.2
01Jan2013	06:55	1.8	0.1	470.7	0.3
01Jan2013	07:00	1.9	0.2	470.7	0.3
01Jan2013	07:05	1.9	0.2	470.7	0.3
01Jan2013	07:10	2.0	0.2	470.8	0.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	2.1	0.2	470.8	0.4
01Jan2013	07:20	2.2	0.2	470.8	0.4
01Jan2013	07:25	2.3	0.2	470.8	0.5
01Jan2013	07:30	2.4	0.2	470.9	0.5
01Jan2013	07:35	2.4	0.2	470.9	0.5
01Jan2013	07:40	2.5	0.3	470.9	0.6
01Jan2013	07:45	2.6	0.3	470.9	0.6
01Jan2013	07:50	2.6	0.3	471.0	0.6
01Jan2013	07:55	2.7	0.3	471.0	0.7
01Jan2013	08:00	2.9	0.3	471.0	0.7
01Jan2013	08:05	2.9	0.3	471.0	0.7
01Jan2013	08:10	3.0	0.3	471.1	0.7
01Jan2013	08:15	3.2	0.4	471.1	0.7
01Jan2013	08:20	3.4	0.4	471.1	0.7
01Jan2013	08:25	3.6	0.4	471.1	0.8
01Jan2013	08:30	3.7	0.4	471.2	0.8
01Jan2013	08:35	3.9	0.4	471.2	0.8
01Jan2013	08:40	4.2	0.5	471.2	0.8
01Jan2013	08:45	4.4	0.5	471.3	0.8
01Jan2013	08:50	4.6	0.5	471.3	0.8
01Jan2013	08:55	4.8	0.5	471.3	0.8
01Jan2013	09:00	5.0	0.6	471.4	0.9
01Jan2013	09:05	5.3	0.6	471.4	0.9
01Jan2013	09:10	5.5	0.6	471.5	0.9
01Jan2013	09:15	5.7	0.7	471.5	0.9
01Jan2013	09:20	5.8	0.7	471.6	0.9
01Jan2013	09:25	5.9	0.7	471.6	1.0
01Jan2013	09:30	6.0	0.8	471.7	1.0
01Jan2013	09:35	6.1	0.8	471.7	1.0
01Jan2013	09:40	6.3	0.8	471.8	1.1
01Jan2013	09:45	6.5	0.9	471.8	1.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	6.9	0.9	471.9	1.1
01Jan2013	09:55	7.3	0.9	471.9	1.2
01Jan2013	10:00	7.6	1.0	472.0	1.2
01Jan2013	10:05	8.0	1.0	472.0	1.2
01Jan2013	10:10	8.4	1.1	472.1	1.2
01Jan2013	10:15	9.0	1.1	472.2	1.2
01Jan2013	10:20	9.5	1.2	472.3	1.3
01Jan2013	10:25	10.1	1.2	472.3	1.3
01Jan2013	10:30	10.6	1.3	472.4	1.3
01Jan2013	10:35	11.3	1.4	472.5	1.3
01Jan2013	10:40	12.0	1.4	472.6	1.5
01Jan2013	10:45	12.8	1.5	472.7	1.6
01Jan2013	10:50	13.8	1.6	472.8	1.8
01Jan2013	10:55	14.8	1.7	472.9	2.0
01Jan2013	11:00	15.8	1.8	473.0	2.2
01Jan2013	11:05	17.0	1.9	473.1	2.3
01Jan2013	11:10	18.5	2.0	473.3	2.4
01Jan2013	11:15	20.2	2.1	473.4	2.5
01Jan2013	11:20	22.4	2.2	473.6	2.6
01Jan2013	11:25	24.9	2.4	473.7	2.7
01Jan2013	11:30	27.4	2.5	473.9	2.9
01Jan2013	11:35	33.3	2.7	474.1	3.0
01Jan2013	11:40	51.9	3.0	474.5	3.2
01Jan2013	11:45	88.2	3.4	475.0	4.1
01Jan2013	11:50	148.8	4.2	475.8	4.9
01Jan2013	11:55	245.4	5.5	477.1	7.1
01Jan2013	12:00	330.5	7.3	478.6	64.2
01Jan2013	12:05	319.2	8.6	479.7	194.7
01Jan2013	12:10	227.5	9.0	479.9	257.0
01Jan2013	12:15	145.3	8.7	479.7	201.1
01Jan2013	12:20	100.8	8.3	479.4	143.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	75.5	8.0	479.2	114.6
01Jan2013	12:30	59.2	7.8	479.0	90.1
01Jan2013	12:35	48.0	7.6	478.8	78.6
01Jan2013	12:40	40.1	7.4	478.7	69.0
01Jan2013	12:45	35.0	7.2	478.5	60.3
01Jan2013	12:50	31.6	7.0	478.4	53.4
01Jan2013	12:55	29.1	6.9	478.3	47.7
01Jan2013	13:00	27.2	6.8	478.2	42.8
01Jan2013	13:05	25.5	6.7	478.1	38.7
01Jan2013	13:10	24.1	6.6	478.0	35.3
01Jan2013	13:15	22.9	6.5	477.9	32.8
01Jan2013	13:20	21.8	6.5	477.9	30.6
01Jan2013	13:25	20.9	6.4	477.8	28.7
01Jan2013	13:30	20.0	6.3	477.8	27.0
01Jan2013	13:35	19.1	6.3	477.8	25.5
01Jan2013	13:40	18.3	6.3	477.7	24.1
01Jan2013	13:45	17.6	6.2	477.7	22.8
01Jan2013	13:50	16.9	6.2	477.6	21.7
01Jan2013	13:55	16.3	6.2	477.6	20.7
01Jan2013	14:00	15.6	6.1	477.6	19.7
01Jan2013	14:05	15.0	6.1	477.6	18.8
01Jan2013	14:10	14.6	6.1	477.5	18.0
01Jan2013	14:15	14.2	6.1	477.5	17.2
01Jan2013	14:20	13.8	6.0	477.5	16.6
01Jan2013	14:25	13.5	6.0	477.5	16.1
01Jan2013	14:30	13.2	6.0	477.5	15.7
01Jan2013	14:35	13.1	6.0	477.5	15.4
01Jan2013	14:40	12.9	6.0	477.4	15.1
01Jan2013	14:45	12.7	5.9	477.4	14.8
01Jan2013	14:50	12.4	5.9	477.4	14.5
01Jan2013	14:55	12.2	5.9	477.4	14.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	12.0	5.9	477.4	14.0
01Jan2013	15:05	11.8	5.9	477.4	13.7
01Jan2013	15:10	11.5	5.9	477.4	13.5
01Jan2013	15:15	11.3	5.9	477.4	13.2
01Jan2013	15:20	11.1	5.9	477.3	13.0
01Jan2013	15:25	10.9	5.8	477.3	12.7
01Jan2013	15:30	10.6	5.8	477.3	12.5
01Jan2013	15:35	10.4	5.8	477.3	12.3
01Jan2013	15:40	10.2	5.8	477.3	12.0
01Jan2013	15:45	10.0	5.8	477.3	11.8
01Jan2013	15:50	9.9	5.8	477.3	11.6
01Jan2013	15:55	9.6	5.8	477.3	11.3
01Jan2013	16:00	9.4	5.8	477.3	11.1
01Jan2013	16:05	9.1	5.7	477.2	10.9
01Jan2013	16:10	8.9	5.7	477.2	10.7
01Jan2013	16:15	8.8	5.7	477.2	10.4
01Jan2013	16:20	8.6	5.7	477.2	10.2
01Jan2013	16:25	8.6	5.7	477.2	10.0
01Jan2013	16:30	8.6	5.7	477.2	9.8
01Jan2013	16:35	8.5	5.7	477.2	9.7
01Jan2013	16:40	8.4	5.7	477.2	9.5
01Jan2013	16:45	8.3	5.7	477.2	9.4
01Jan2013	16:50	8.2	5.7	477.2	9.2
01Jan2013	16:55	8.2	5.6	477.2	9.1
01Jan2013	17:00	8.2	5.6	477.2	9.0
01Jan2013	17:05	8.0	5.6	477.1	8.9
01Jan2013	17:10	7.9	5.6	477.1	8.8
01Jan2013	17:15	7.7	5.6	477.1	8.7
01Jan2013	17:20	7.7	5.6	477.1	8.5
01Jan2013	17:25	7.6	5.6	477.1	8.4
01Jan2013	17:30	7.5	5.6	477.1	8.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	7.6	5.6	477.1	8.2
01Jan2013	17:40	7.5	5.6	477.1	8.1
01Jan2013	17:45	7.4	5.6	477.1	8.1
01Jan2013	17:50	7.2	5.6	477.1	8.0
01Jan2013	17:55	7.1	5.6	477.1	7.9
01Jan2013	18:00	7.1	5.6	477.1	7.8
01Jan2013	18:05	7.1	5.6	477.1	7.7
01Jan2013	18:10	6.9	5.6	477.1	7.6
01Jan2013	18:15	6.8	5.6	477.1	7.5
01Jan2013	18:20	6.8	5.6	477.1	7.4
01Jan2013	18:25	6.8	5.6	477.1	7.4
01Jan2013	18:30	6.7	5.6	477.1	7.3
01Jan2013	18:35	6.5	5.5	477.1	7.2
01Jan2013	18:40	6.4	5.5	477.1	7.1
01Jan2013	18:45	6.4	5.5	477.1	7.0
01Jan2013	18:50	6.4	5.5	477.1	6.9
01Jan2013	18:55	6.3	5.5	477.0	6.9
01Jan2013	19:00	6.2	5.5	477.0	6.8
01Jan2013	19:05	6.0	5.5	477.0	6.7
01Jan2013	19:10	6.0	5.5	477.0	6.6
01Jan2013	19:15	5.9	5.5	477.0	6.5
01Jan2013	19:20	5.8	5.5	477.0	6.5
01Jan2013	19:25	5.8	5.5	477.0	6.4
01Jan2013	19:30	5.7	5.5	477.0	6.3
01Jan2013	19:35	5.6	5.5	477.0	6.2
01Jan2013	19:40	5.5	5.5	477.0	6.2
01Jan2013	19:45	5.4	5.5	477.0	6.1
01Jan2013	19:50	5.3	5.5	477.0	6.0
01Jan2013	19:55	5.3	5.5	477.0	5.9
01Jan2013	20:00	5.3	5.5	477.0	5.9
01Jan2013	20:05	5.2	5.5	477.0	5.9

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	5.1	5.5	477.0	5.9
01Jan2013	20:15	5.1	5.5	477.0	5.9
01Jan2013	20:20	5.0	5.5	477.0	5.9
01Jan2013	20:25	5.0	5.4	477.0	5.9
01Jan2013	20:30	5.0	5.4	477.0	5.9
01Jan2013	20:35	4.9	5.4	477.0	5.9
01Jan2013	20:40	4.9	5.4	477.0	5.9
01Jan2013	20:45	5.0	5.4	476.9	5.9
01Jan2013	20:50	4.9	5.4	476.9	5.9
01Jan2013	20:55	4.8	5.4	476.9	5.8
01Jan2013	21:00	4.8	5.4	476.9	5.8
01Jan2013	21:05	4.8	5.4	476.9	5.8
01Jan2013	21:10	4.9	5.4	476.9	5.8
01Jan2013	21:15	4.8	5.4	476.9	5.8
01Jan2013	21:20	4.8	5.4	476.9	5.8
01Jan2013	21:25	4.8	5.4	476.9	5.8
01Jan2013	21:30	4.8	5.4	476.9	5.8
01Jan2013	21:35	4.8	5.4	476.9	5.8
01Jan2013	21:40	4.8	5.3	476.9	5.8
01Jan2013	21:45	4.8	5.3	476.9	5.8
01Jan2013	21:50	4.7	5.3	476.9	5.8
01Jan2013	21:55	4.7	5.3	476.9	5.8
01Jan2013	22:00	4.7	5.3	476.8	5.8
01Jan2013	22:05	4.6	5.3	476.8	5.8
01Jan2013	22:10	4.6	5.3	476.8	5.8
01Jan2013	22:15	4.6	5.3	476.8	5.8
01Jan2013	22:20	4.6	5.3	476.8	5.8
01Jan2013	22:25	4.6	5.3	476.8	5.7
01Jan2013	22:30	4.6	5.3	476.8	5.7
01Jan2013	22:35	4.5	5.3	476.8	5.7
01Jan2013	22:40	4.5	5.3	476.8	5.7

Pond C1 Input Data

Outlet Pipe	
Type:	1 - 36" Diameter Corrugated Metal Pipe
Length:	70 Feet
Inlet Elev.:	480.50
Entrance Coeff.:	0.5
Outlet Elev.:	480.00
Exit Coeff.:	0.5
Mannings n:	0.024
Spillway	
Elev:	487.50
Length:	30
Weir Coeff.:	3.0
Dam	
Elev.:	489.00
Length:	100
Coeff.:	3.0

Area-Elev. Table	
Elev. (Feet)	Area (Acres)
480.5	0.0000
481.0	0.2891
482.0	0.6820
483.0	1.0831
484.0	1.4924
485.0	1.8692
486.0	1.9983
487.0	2.1103
488.0	2.2190
489.0	2.4300
490.0	2.6500
491.0	2.7500

Project: Laredo Proposed

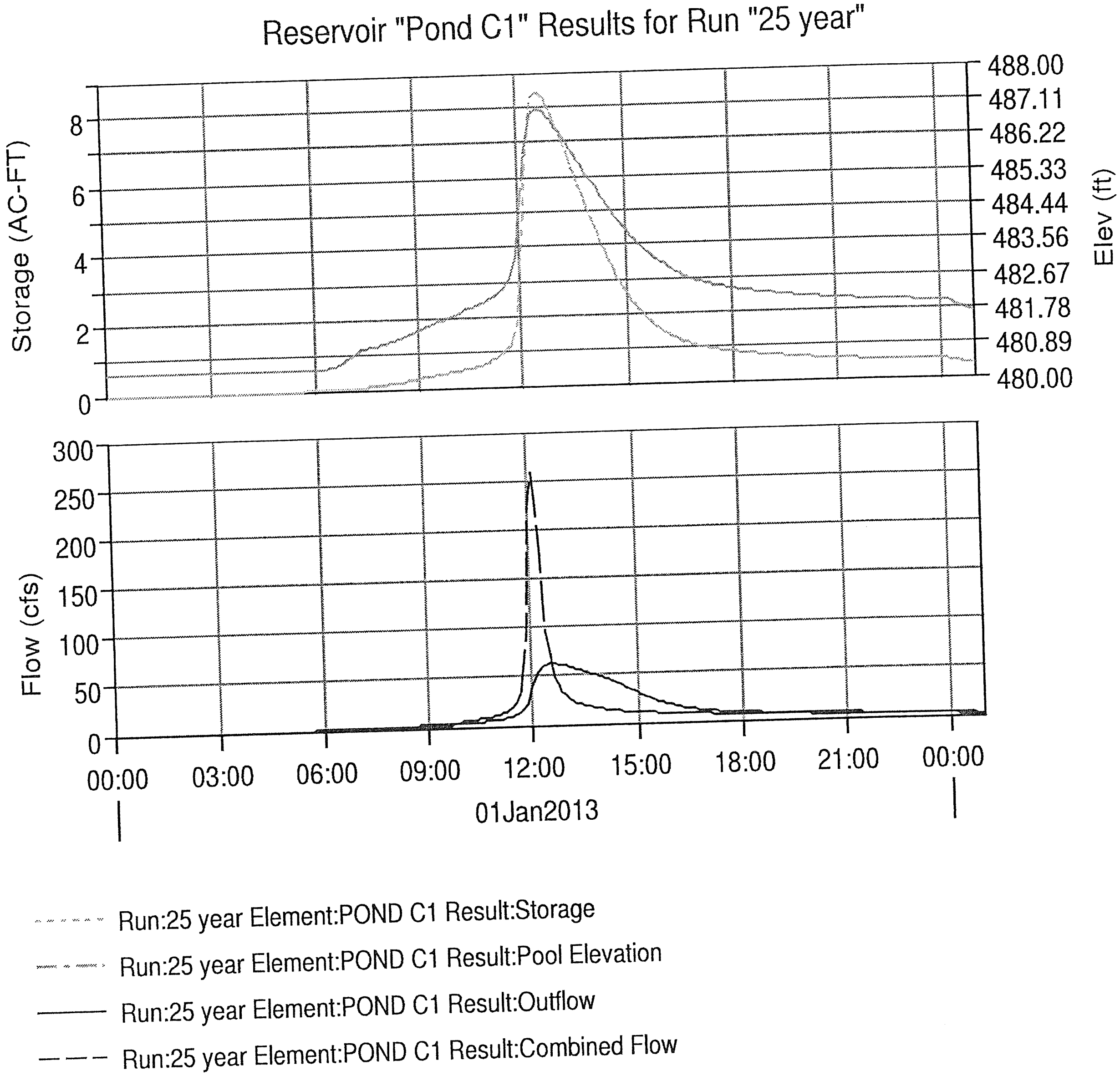
Simulation Run: 25 year   Reservoir: Pond C1

Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	25 year 24 hr
Compute Time:	17Sep2014, 11:13:14	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	260.0 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:05
Peak Outflow :	62.3 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:35
Total Inflow :	4.42 (IN)	Peak Storage :	8.4 (AC-FT)
Total Outflow :	4.34 (IN)	Peak Elevation :	487.0 (FT)



Reservoir "Pond C1" Results for Run "25 year"
Storage (AC-FT)
Elev (ft)
488.00
487.11
486.22
485.33
484.44
483.56
482.67
481.78
480.89
480.00
8
6
4
2
0
Flow (cfs)
300
250
200
150
100
50
0
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2013
Run:25 year Element:POND C1 Result:Storage
Run:25 year Element:POND C1 Result:Pool Elevation
Run:25 year Element:POND C1 Result:Outflow
Run:25 year Element:POND C1 Result:Combined Flow

Project: Laredo Proposed
Simulation Run: 25 year Reservoir: Pond C1

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 25 year 24
Compute Time: 17Sep2014, 11:13:14 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.0	480.5	0.0
01Jan2013	00:05	0.0	0.0	480.5	0.0
01Jan2013	00:10	0.0	0.0	480.5	0.0
01Jan2013	00:15	0.0	0.0	480.5	0.0
01Jan2013	00:20	0.0	0.0	480.5	0.0
01Jan2013	00:25	0.0	0.0	480.5	0.0
01Jan2013	00:30	0.0	0.0	480.5	0.0
01Jan2013	00:35	0.0	0.0	480.5	0.0
01Jan2013	00:40	0.0	0.0	480.5	0.0
01Jan2013	00:45	0.0	0.0	480.5	0.0
01Jan2013	00:50	0.0	0.0	480.5	0.0
01Jan2013	00:55	0.0	0.0	480.5	0.0
01Jan2013	01:00	0.0	0.0	480.5	0.0
01Jan2013	01:05	0.0	0.0	480.5	0.0
01Jan2013	01:10	0.0	0.0	480.5	0.0
01Jan2013	01:15	0.0	0.0	480.5	0.0
01Jan2013	01:20	0.0	0.0	480.5	0.0
01Jan2013	01:25	0.0	0.0	480.5	0.0
01Jan2013	01:30	0.0	0.0	480.5	0.0
01Jan2013	01:35	0.0	0.0	480.5	0.0
01Jan2013	01:40	0.0	0.0	480.5	0.0
01Jan2013	01:45	0.0	0.0	480.5	0.0
01Jan2013	01:50	0.0	0.0	480.5	0.0
01Jan2013	01:55	0.0	0.0	480.5	0.0
01Jan2013	02:00	0.0	0.0	480.5	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	480.5	0.0
01Jan2013	02:10	0.0	0.0	480.5	0.0
01Jan2013	02:15	0.0	0.0	480.5	0.0
01Jan2013	02:20	0.0	0.0	480.5	0.0
01Jan2013	02:25	0.0	0.0	480.5	0.0
01Jan2013	02:30	0.0	0.0	480.5	0.0
01Jan2013	02:35	0.0	0.0	480.5	0.0
01Jan2013	02:40	0.0	0.0	480.5	0.0
01Jan2013	02:45	0.0	0.0	480.5	0.0
01Jan2013	02:50	0.0	0.0	480.5	0.0
01Jan2013	02:55	0.0	0.0	480.5	0.0
01Jan2013	03:00	0.0	0.0	480.5	0.0
01Jan2013	03:05	0.0	0.0	480.5	0.0
01Jan2013	03:10	0.0	0.0	480.5	0.0
01Jan2013	03:15	0.0	0.0	480.5	0.0
01Jan2013	03:20	0.0	0.0	480.5	0.0
01Jan2013	03:25	0.0	0.0	480.5	0.0
01Jan2013	03:30	0.0	0.0	480.5	0.0
01Jan2013	03:35	0.0	0.0	480.5	0.0
01Jan2013	03:40	0.0	0.0	480.5	0.0
01Jan2013	03:45	0.0	0.0	480.5	0.0
01Jan2013	03:50	0.0	0.0	480.5	0.0
01Jan2013	03:55	0.0	0.0	480.5	0.0
01Jan2013	04:00	0.0	0.0	480.5	0.0
01Jan2013	04:05	0.0	0.0	480.5	0.0
01Jan2013	04:10	0.0	0.0	480.5	0.0
01Jan2013	04:15	0.0	0.0	480.5	0.0
01Jan2013	04:20	0.0	0.0	480.5	0.0
01Jan2013	04:25	0.0	0.0	480.5	0.0
01Jan2013	04:30	0.0	0.0	480.5	0.0
01Jan2013	04:35	0.0	0.0	480.5	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	4.6	0.4	481.8	2.7
01Jan2013	09:55	4.9	0.4	481.8	2.9
01Jan2013	10:00	5.2	0.4	481.8	3.1
01Jan2013	10:05	5.5	0.5	481.9	3.3
01Jan2013	10:10	5.8	0.5	481.9	3.6
01Jan2013	10:15	6.2	0.5	481.9	3.8
01Jan2013	10:20	6.6	0.5	482.0	4.1
01Jan2013	10:25	7.0	0.5	482.0	4.4
01Jan2013	10:30	7.4	0.5	482.0	4.6
01Jan2013	10:35	7.9	0.6	482.0	4.8
01Jan2013	10:40	8.5	0.6	482.1	5.1
01Jan2013	10:45	9.1	0.6	482.1	5.3
01Jan2013	10:50	9.8	0.6	482.1	5.6
01Jan2013	10:55	10.6	0.7	482.2	6.0
01Jan2013	11:00	11.4	0.7	482.2	6.3
01Jan2013	11:05	12.3	0.7	482.2	6.8
01Jan2013	11:10	13.4	0.8	482.3	7.2
01Jan2013	11:15	14.6	0.8	482.3	7.8
01Jan2013	11:20	16.2	0.9	482.4	8.4
01Jan2013	11:25	18.0	0.9	482.5	9.2
01Jan2013	11:30	20.0	1.0	482.5	10.1
01Jan2013	11:35	23.4	1.1	482.6	11.1
01Jan2013	11:40	32.7	1.2	482.7	12.8
01Jan2013	11:45	52.7	1.4	483.0	15.8
01Jan2013	11:50	89.4	1.7	483.3	20.2
01Jan2013	11:55	151.3	2.4	483.8	28.3
01Jan2013	12:00	223.5	3.4	484.5	38.9
01Jan2013	12:05	260.0	4.8	485.2	47.4
01Jan2013	12:10	236.4	6.2	485.9	53.6
01Jan2013	12:15	180.2	7.2	486.5	57.7
01Jan2013	12:20	129.1	7.9	486.8	60.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	95.8	8.2	486.9	61.7
01Jan2013	12:30	74.2	8.4	487.0	62.2
01Jan2013	12:35	58.7	8.4	487.0	62.3
01Jan2013	12:40	47.7	8.4	487.0	62.2
01Jan2013	12:45	40.0	8.2	487.0	61.7
01Jan2013	12:50	34.7	8.1	486.9	61.1
01Jan2013	12:55	30.9	7.9	486.8	60.3
01Jan2013	13:00	27.9	7.7	486.7	59.5
01Jan2013	13:05	25.5	7.4	486.6	58.7
01Jan2013	13:10	23.7	7.2	486.5	57.7
01Jan2013	13:15	22.3	7.0	486.3	56.8
01Jan2013	13:20	21.1	6.7	486.2	55.8
01Jan2013	13:25	20.2	6.5	486.1	54.9
01Jan2013	13:30	19.3	6.3	486.0	53.9
01Jan2013	13:35	18.4	6.0	485.9	52.8
01Jan2013	13:40	17.6	5.8	485.7	51.8
01Jan2013	13:45	16.9	5.6	485.6	50.9
01Jan2013	13:50	16.2	5.3	485.5	49.8
01Jan2013	13:55	15.6	5.1	485.4	48.7
01Jan2013	14:00	15.0	4.9	485.3	47.7
01Jan2013	14:05	14.4	4.6	485.1	46.6
01Jan2013	14:10	13.9	4.4	485.0	45.6
01Jan2013	14:15	13.5	4.2	484.9	44.6
01Jan2013	14:20	13.1	4.0	484.8	43.2
01Jan2013	14:25	12.8	3.8	484.7	41.7
01Jan2013	14:30	12.5	3.6	484.5	40.1
01Jan2013	14:35	12.3	3.4	484.4	38.5
01Jan2013	14:40	12.1	3.2	484.3	37.0
01Jan2013	14:45	11.9	3.1	484.2	35.5
01Jan2013	14:50	11.7	2.9	484.1	34.1
01Jan2013	14:55	11.5	2.8	484.0	32.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	11.3	2.6	484.0	31.1
01Jan2013	15:05	11.1	2.5	483.9	29.5
01Jan2013	15:10	10.9	2.4	483.8	28.0
01Jan2013	15:15	10.7	2.3	483.7	26.6
01Jan2013	15:20	10.5	2.1	483.6	25.3
01Jan2013	15:25	10.3	2.0	483.5	24.1
01Jan2013	15:30	10.1	2.0	483.4	22.9
01Jan2013	15:35	9.8	1.9	483.4	21.9
01Jan2013	15:40	9.6	1.8	483.3	20.9
01Jan2013	15:45	9.5	1.7	483.2	20.0
01Jan2013	15:50	9.3	1.6	483.2	19.2
01Jan2013	15:55	9.1	1.6	483.1	18.4
01Jan2013	16:00	8.9	1.5	483.1	17.7
01Jan2013	16:05	8.6	1.5	483.0	17.0
01Jan2013	16:10	8.4	1.4	483.0	16.4
01Jan2013	16:15	8.3	1.3	482.9	15.5
01Jan2013	16:20	8.1	1.3	482.9	14.8
01Jan2013	16:25	8.1	1.3	482.8	14.1
01Jan2013	16:30	8.0	1.2	482.8	13.5
01Jan2013	16:35	8.0	1.2	482.8	12.9
01Jan2013	16:40	7.9	1.1	482.7	12.4
01Jan2013	16:45	7.8	1.1	482.7	12.0
01Jan2013	16:50	7.7	1.1	482.7	11.6
01Jan2013	16:55	7.6	1.1	482.6	11.2
01Jan2013	17:00	7.6	1.0	482.6	10.9
01Jan2013	17:05	7.5	1.0	482.6	10.6
01Jan2013	17:10	7.4	1.0	482.5	10.3
01Jan2013	17:15	7.3	1.0	482.5	10.0
01Jan2013	17:20	7.2	1.0	482.5	9.8
01Jan2013	17:25	7.1	0.9	482.5	9.5
01Jan2013	17:30	7.0	0.9	482.5	9.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	7.0	0.9	482.4	9.1
01Jan2013	17:40	7.0	0.9	482.4	8.9
01Jan2013	17:45	6.9	0.9	482.4	8.8
01Jan2013	17:50	6.8	0.9	482.4	8.6
01Jan2013	17:55	6.7	0.9	482.4	8.4
01Jan2013	18:00	6.7	0.9	482.4	8.3
01Jan2013	18:05	6.6	0.8	482.4	8.1
01Jan2013	18:10	6.5	0.8	482.4	8.0
01Jan2013	18:15	6.4	0.8	482.3	7.9
01Jan2013	18:20	6.4	0.8	482.3	7.8
01Jan2013	18:25	6.3	0.8	482.3	7.6
01Jan2013	18:30	6.3	0.8	482.3	7.5
01Jan2013	18:35	6.2	0.8	482.3	7.4
01Jan2013	18:40	6.0	0.8	482.3	7.3
01Jan2013	18:45	6.0	0.8	482.3	7.2
01Jan2013	18:50	5.9	0.8	482.3	7.1
01Jan2013	18:55	5.9	0.7	482.3	7.0
01Jan2013	19:00	5.8	0.7	482.3	6.9
01Jan2013	19:05	5.7	0.7	482.2	6.8
01Jan2013	19:10	5.6	0.7	482.2	6.8
01Jan2013	19:15	5.6	0.7	482.2	6.7
01Jan2013	19:20	5.5	0.7	482.2	6.6
01Jan2013	19:25	5.5	0.7	482.2	6.5
01Jan2013	19:30	5.4	0.7	482.2	6.4
01Jan2013	19:35	5.3	0.7	482.2	6.3
01Jan2013	19:40	5.2	0.7	482.2	6.3
01Jan2013	19:45	5.1	0.7	482.2	6.2
01Jan2013	19:50	5.0	0.7	482.2	6.1
01Jan2013	19:55	5.0	0.7	482.2	6.0
01Jan2013	20:00	4.9	0.7	482.2	5.9
01Jan2013	20:05	4.9	0.6	482.1	5.9

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	4.8	0.6	482.1	5.8
01Jan2013	20:15	4.8	0.6	482.1	5.7
01Jan2013	20:20	4.7	0.6	482.1	5.6
01Jan2013	20:25	4.6	0.6	482.1	5.6
01Jan2013	20:30	4.6	0.6	482.1	5.5
01Jan2013	20:35	4.6	0.6	482.1	5.4
01Jan2013	20:40	4.6	0.6	482.1	5.4
01Jan2013	20:45	4.6	0.6	482.1	5.3
01Jan2013	20:50	4.6	0.6	482.1	5.3
01Jan2013	20:55	4.5	0.6	482.1	5.2
01Jan2013	21:00	4.5	0.6	482.1	5.2
01Jan2013	21:05	4.5	0.6	482.1	5.1
01Jan2013	21:10	4.5	0.6	482.1	5.1
01Jan2013	21:15	4.5	0.6	482.1	5.0
01Jan2013	21:20	4.5	0.6	482.1	5.0
01Jan2013	21:25	4.5	0.6	482.1	5.0
01Jan2013	21:30	4.5	0.6	482.0	4.9
01Jan2013	21:35	4.5	0.6	482.0	4.9
01Jan2013	21:40	4.5	0.6	482.0	4.9
01Jan2013	21:45	4.5	0.6	482.0	4.8
01Jan2013	21:50	4.4	0.6	482.0	4.8
01Jan2013	21:55	4.4	0.5	482.0	4.8
01Jan2013	22:00	4.4	0.5	482.0	4.8
01Jan2013	22:05	4.3	0.5	482.0	4.7
01Jan2013	22:10	4.3	0.5	482.0	4.7
01Jan2013	22:15	4.3	0.5	482.0	4.7
01Jan2013	22:20	4.3	0.5	482.0	4.7
01Jan2013	22:25	4.3	0.5	482.0	4.6
01Jan2013	22:30	4.3	0.5	482.0	4.6
01Jan2013	22:35	4.2	0.5	482.0	4.6
01Jan2013	22:40	4.2	0.5	482.0	4.6

Project: Laredo Proposed
Simulation Run: 100 year Reservoir: Pond C1

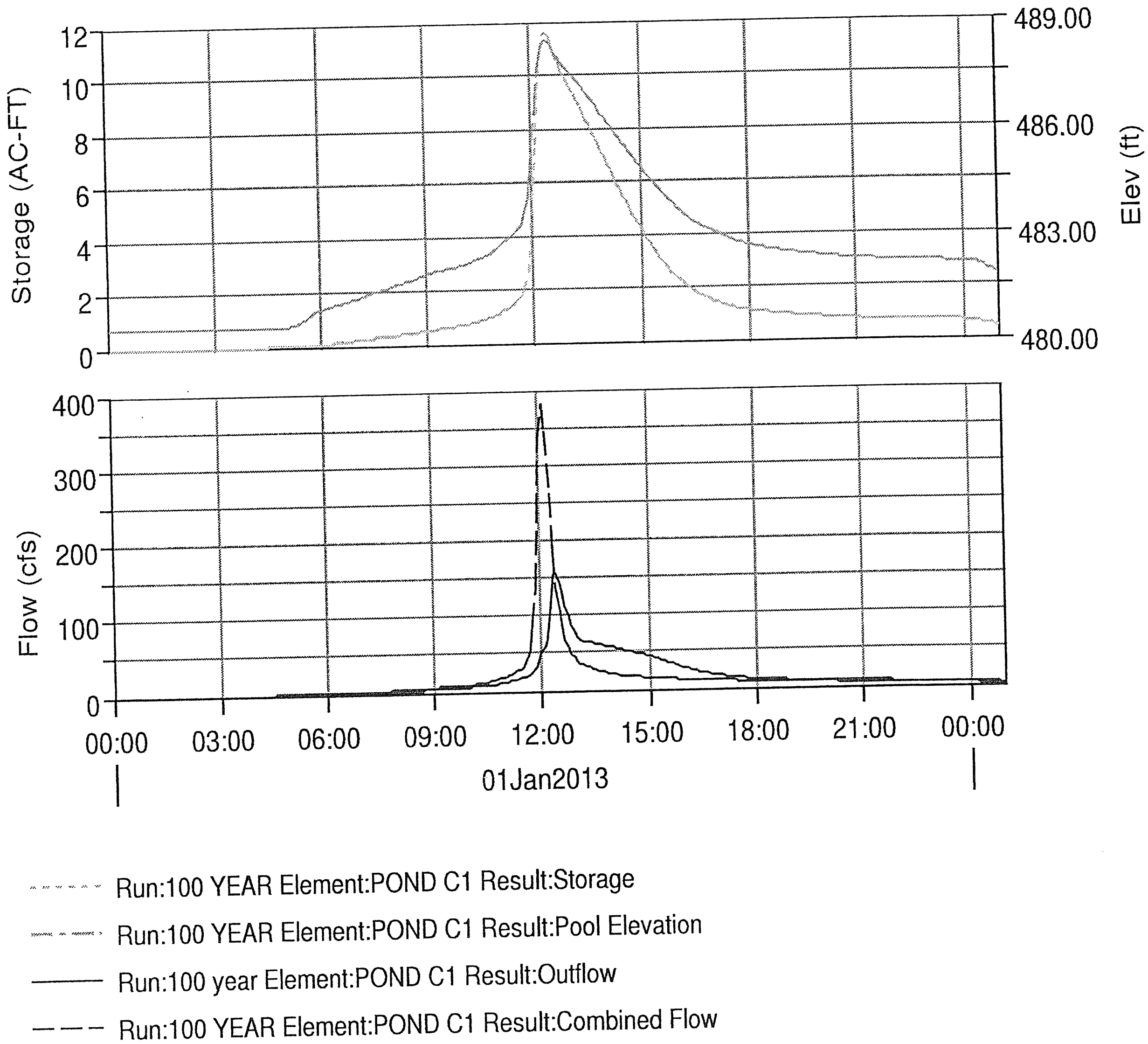
Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	100 year 24 hr
Compute Time:	17Sep2014, 11:11:16	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	382.2 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:05
Peak Outflow :	156.9 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:25
Total Inflow :	6.57 (IN)	Peak Storage :	11.6 (AC-FT)
Total Outflow :	6.49 (IN)	Peak Elevation :	488.5 (FT)

Reservoir "Pond C1" Results for Run "100 year"



Project: Laredo Proposed
Simulation Run: 100 year Reservoir: Pond C1

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 100 year 2
Compute Time: 17Sep2014, 11:11:16 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.0	480.5	0.0
01Jan2013	00:05	0.0	0.0	480.5	0.0
01Jan2013	00:10	0.0	0.0	480.5	0.0
01Jan2013	00:15	0.0	0.0	480.5	0.0
01Jan2013	00:20	0.0	0.0	480.5	0.0
01Jan2013	00:25	0.0	0.0	480.5	0.0
01Jan2013	00:30	0.0	0.0	480.5	0.0
01Jan2013	00:35	0.0	0.0	480.5	0.0
01Jan2013	00:40	0.0	0.0	480.5	0.0
01Jan2013	00:45	0.0	0.0	480.5	0.0
01Jan2013	00:50	0.0	0.0	480.5	0.0
01Jan2013	00:55	0.0	0.0	480.5	0.0
01Jan2013	01:00	0.0	0.0	480.5	0.0
01Jan2013	01:05	0.0	0.0	480.5	0.0
01Jan2013	01:10	0.0	0.0	480.5	0.0
01Jan2013	01:15	0.0	0.0	480.5	0.0
01Jan2013	01:20	0.0	0.0	480.5	0.0
01Jan2013	01:25	0.0	0.0	480.5	0.0
01Jan2013	01:30	0.0	0.0	480.5	0.0
01Jan2013	01:35	0.0	0.0	480.5	0.0
01Jan2013	01:40	0.0	0.0	480.5	0.0
01Jan2013	01:45	0.0	0.0	480.5	0.0
01Jan2013	01:50	0.0	0.0	480.5	0.0
01Jan2013	01:55	0.0	0.0	480.5	0.0
01Jan2013	02:00	0.0	0.0	480.5	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	480.5	0.0
01Jan2013	02:10	0.0	0.0	480.5	0.0
01Jan2013	02:15	0.0	0.0	480.5	0.0
01Jan2013	02:20	0.0	0.0	480.5	0.0
01Jan2013	02:25	0.0	0.0	480.5	0.0
01Jan2013	02:30	0.0	0.0	480.5	0.0
01Jan2013	02:35	0.0	0.0	480.5	0.0
01Jan2013	02:40	0.0	0.0	480.5	0.0
01Jan2013	02:45	0.0	0.0	480.5	0.0
01Jan2013	02:50	0.0	0.0	480.5	0.0
01Jan2013	02:55	0.0	0.0	480.5	0.0
01Jan2013	03:00	0.0	0.0	480.5	0.0
01Jan2013	03:05	0.0	0.0	480.5	0.0
01Jan2013	03:10	0.0	0.0	480.5	0.0
01Jan2013	03:15	0.0	0.0	480.5	0.0
01Jan2013	03:20	0.0	0.0	480.5	0.0
01Jan2013	03:25	0.0	0.0	480.5	0.0
01Jan2013	03:30	0.0	0.0	480.5	0.0
01Jan2013	03:35	0.0	0.0	480.5	0.0
01Jan2013	03:40	0.0	0.0	480.5	0.0
01Jan2013	03:45	0.0	0.0	480.5	0.0
01Jan2013	03:50	0.0	0.0	480.5	0.0
01Jan2013	03:55	0.0	0.0	480.5	0.0
01Jan2013	04:00	0.0	0.0	480.5	0.0
01Jan2013	04:05	0.0	0.0	480.5	0.0
01Jan2013	04:10	0.0	0.0	480.5	0.0
01Jan2013	04:15	0.0	0.0	480.5	0.0
01Jan2013	04:20	0.0	0.0	480.5	0.0
01Jan2013	04:25	0.0	0.0	480.5	0.0
01Jan2013	04:30	0.0	0.0	480.5	0.0
01Jan2013	04:35	0.0	0.0	480.5	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	04:40	0.0	0.0	480.5	0.0
01Jan2013	04:45	0.0	0.0	480.5	0.0
01Jan2013	04:50	0.1	0.0	480.5	0.0
01Jan2013	04:55	0.1	0.0	480.5	0.0
01Jan2013	05:00	0.2	0.0	480.5	0.0
01Jan2013	05:05	0.3	0.0	480.5	0.0
01Jan2013	05:10	0.3	0.0	480.6	0.0
01Jan2013	05:15	0.4	0.0	480.6	0.0
01Jan2013	05:20	0.5	0.0	480.6	0.0
01Jan2013	05:25	0.6	0.0	480.7	0.0
01Jan2013	05:30	0.6	0.0	480.7	0.0
01Jan2013	05:35	0.7	0.0	480.7	0.0
01Jan2013	05:40	0.8	0.0	480.8	0.0
01Jan2013	05:45	0.9	0.0	480.9	0.0
01Jan2013	05:50	1.0	0.0	480.9	0.0
01Jan2013	05:55	1.1	0.0	481.0	0.0
01Jan2013	06:00	1.2	0.1	481.0	0.0
01Jan2013	06:05	1.3	0.1	481.0	0.0
01Jan2013	06:10	1.3	0.1	481.1	0.0
01Jan2013	06:15	1.4	0.1	481.1	0.0
01Jan2013	06:20	1.5	0.1	481.1	0.0
01Jan2013	06:25	1.6	0.1	481.1	0.1
01Jan2013	06:30	1.7	0.1	481.1	0.1
01Jan2013	06:35	1.8	0.1	481.2	0.1
01Jan2013	06:40	1.9	0.1	481.2	0.2
01Jan2013	06:45	2.0	0.2	481.2	0.2
01Jan2013	06:50	2.1	0.2	481.2	0.3
01Jan2013	06:55	2.2	0.2	481.3	0.3
01Jan2013	07:00	2.3	0.2	481.3	0.4
01Jan2013	07:05	2.4	0.2	481.3	0.5
01Jan2013	07:10	2.5	0.2	481.4	0.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	2.6	0.2	481.4	0.7
01Jan2013	07:20	2.7	0.2	481.4	0.8
01Jan2013	07:25	2.8	0.3	481.4	0.9
01Jan2013	07:30	3.0	0.3	481.5	1.0
01Jan2013	07:35	3.1	0.3	481.5	1.1
01Jan2013	07:40	3.2	0.3	481.5	1.3
01Jan2013	07:45	3.3	0.3	481.5	1.4
01Jan2013	07:50	3.3	0.3	481.6	1.5
01Jan2013	07:55	3.5	0.3	481.6	1.7
01Jan2013	08:00	3.6	0.3	481.6	1.8
01Jan2013	08:05	3.7	0.4	481.7	2.0
01Jan2013	08:10	3.8	0.4	481.7	2.1
01Jan2013	08:15	4.0	0.4	481.7	2.3
01Jan2013	08:20	4.2	0.4	481.7	2.4
01Jan2013	08:25	4.4	0.4	481.8	2.6
01Jan2013	08:30	4.6	0.4	481.8	2.8
01Jan2013	08:35	4.9	0.4	481.8	3.0
01Jan2013	08:40	5.1	0.4	481.8	3.2
01Jan2013	08:45	5.4	0.5	481.9	3.4
01Jan2013	08:50	5.7	0.5	481.9	3.6
01Jan2013	08:55	6.0	0.5	481.9	3.9
01Jan2013	09:00	6.3	0.5	482.0	4.1
01Jan2013	09:05	6.6	0.5	482.0	4.4
01Jan2013	09:10	6.9	0.5	482.0	4.6
01Jan2013	09:15	7.1	0.5	482.0	4.8
01Jan2013	09:20	7.3	0.6	482.0	4.9
01Jan2013	09:25	7.5	0.6	482.1	5.1
01Jan2013	09:30	7.7	0.6	482.1	5.3
01Jan2013	09:35	7.8	0.6	482.1	5.4
01Jan2013	09:40	8.0	0.6	482.1	5.6
01Jan2013	09:45	8.2	0.6	482.1	5.8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	8.6	0.7	482.2	6.0
01Jan2013	09:55	9.0	0.7	482.2	6.2
01Jan2013	10:00	9.4	0.7	482.2	6.4
01Jan2013	10:05	9.9	0.7	482.2	6.7
01Jan2013	10:10	10.4	0.7	482.3	7.0
01Jan2013	10:15	11.0	0.8	482.3	7.3
01Jan2013	10:20	11.7	0.8	482.3	7.6
01Jan2013	10:25	12.4	0.8	482.3	8.0
01Jan2013	10:30	13.1	0.9	482.4	8.4
01Jan2013	10:35	13.9	0.9	482.4	8.8
01Jan2013	10:40	14.7	0.9	482.5	9.3
01Jan2013	10:45	15.7	1.0	482.5	9.8
01Jan2013	10:50	16.8	1.0	482.6	10.4
01Jan2013	10:55	18.0	1.1	482.6	11.0
01Jan2013	11:00	19.3	1.1	482.7	11.8
01Jan2013	11:05	20.7	1.2	482.7	12.6
01Jan2013	11:10	22.3	1.2	482.8	13.5
01Jan2013	11:15	24.3	1.3	482.9	14.5
01Jan2013	11:20	26.7	1.4	483.0	15.6
01Jan2013	11:25	29.5	1.4	483.0	16.8
01Jan2013	11:30	32.6	1.5	483.1	17.9
01Jan2013	11:35	37.8	1.6	483.2	19.2
01Jan2013	11:40	52.1	1.8	483.3	21.2
01Jan2013	11:45	82.8	2.1	483.6	24.9
01Jan2013	11:50	138.0	2.7	484.0	31.9
01Jan2013	11:55	228.7	3.7	484.6	40.9
01Jan2013	12:00	332.3	5.3	485.5	49.8
01Jan2013	12:05	382.2	7.4	486.5	58.5
01Jan2013	12:10	345.0	9.5	487.5	66.3
01Jan2013	12:15	261.6	10.9	488.2	121.4
01Jan2013	12:20	186.7	11.5	488.4	154.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	138.0	11.6	488.5	156.9
01Jan2013	12:30	106.5	11.4	488.4	145.3
01Jan2013	12:35	84.0	11.1	488.2	129.5
01Jan2013	12:40	68.0	10.8	488.1	113.6
01Jan2013	12:45	56.9	10.5	488.0	99.6
01Jan2013	12:50	49.2	10.2	487.9	87.6
01Jan2013	12:55	43.8	9.9	487.7	78.2
01Jan2013	13:00	39.5	9.7	487.6	71.3
01Jan2013	13:05	36.1	9.5	487.5	66.6
01Jan2013	13:10	33.5	9.3	487.4	65.3
01Jan2013	13:15	31.5	9.1	487.3	64.6
01Jan2013	13:20	29.8	8.8	487.2	63.7
01Jan2013	13:25	28.4	8.6	487.1	63.0
01Jan2013	13:30	27.1	8.4	487.0	62.2
01Jan2013	13:35	25.9	8.1	486.9	61.1
01Jan2013	13:40	24.8	7.9	486.8	60.2
01Jan2013	13:45	23.8	7.6	486.7	59.3
01Jan2013	13:50	22.8	7.4	486.5	58.4
01Jan2013	13:55	21.9	7.1	486.4	57.5
01Jan2013	14:00	21.0	6.9	486.3	56.5
01Jan2013	14:05	20.2	6.6	486.2	55.6
01Jan2013	14:10	19.5	6.4	486.1	54.6
01Jan2013	14:15	18.9	6.2	485.9	53.6
01Jan2013	14:20	18.4	5.9	485.8	52.5
01Jan2013	14:25	17.9	5.7	485.7	51.5
01Jan2013	14:30	17.5	5.5	485.6	50.4
01Jan2013	14:35	17.2	5.2	485.5	49.4
01Jan2013	14:40	16.9	5.0	485.3	48.4
01Jan2013	14:45	16.7	4.8	485.2	47.3
01Jan2013	14:50	16.4	4.6	485.1	46.5
01Jan2013	14:55	16.1	4.4	485.0	45.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	15.8	4.2	484.9	44.5
01Jan2013	15:05	15.5	4.0	484.8	43.2
01Jan2013	15:10	15.2	3.8	484.7	41.8
01Jan2013	15:15	14.9	3.6	484.6	40.4
01Jan2013	15:20	14.7	3.5	484.5	39.0
01Jan2013	15:25	14.4	3.3	484.4	37.6
01Jan2013	15:30	14.1	3.1	484.3	36.2
01Jan2013	15:35	13.8	3.0	484.2	34.8
01Jan2013	15:40	13.5	2.9	484.1	33.5
01Jan2013	15:45	13.2	2.7	484.0	32.3
01Jan2013	15:50	13.0	2.6	483.9	30.8
01Jan2013	15:55	12.8	2.5	483.8	29.4
01Jan2013	16:00	12.4	2.4	483.8	28.0
01Jan2013	16:05	12.1	2.3	483.7	26.7
01Jan2013	16:10	11.8	2.2	483.6	25.5
01Jan2013	16:15	11.6	2.1	483.5	24.4
01Jan2013	16:20	11.4	2.0	483.5	23.3
01Jan2013	16:25	11.3	1.9	483.4	22.4
01Jan2013	16:30	11.2	1.8	483.3	21.5
01Jan2013	16:35	11.1	1.8	483.3	20.6
01Jan2013	16:40	11.0	1.7	483.2	19.9
01Jan2013	16:45	10.9	1.6	483.2	19.2
01Jan2013	16:50	10.7	1.6	483.2	18.5
01Jan2013	16:55	10.6	1.5	483.1	17.9
01Jan2013	17:00	10.6	1.5	483.1	17.3
01Jan2013	17:05	10.5	1.4	483.0	16.9
01Jan2013	17:10	10.4	1.4	483.0	16.4
01Jan2013	17:15	10.2	1.4	483.0	15.7
01Jan2013	17:20	10.1	1.3	482.9	15.2
01Jan2013	17:25	9.9	1.3	482.9	14.6
01Jan2013	17:30	9.8	1.3	482.8	14.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	9.8	1.2	482.8	13.7
01Jan2013	17:40	9.8	1.2	482.8	13.3
01Jan2013	17:45	9.7	1.2	482.8	12.9
01Jan2013	17:50	9.5	1.2	482.7	12.6
01Jan2013	17:55	9.4	1.1	482.7	12.3
01Jan2013	18:00	9.3	1.1	482.7	12.0
01Jan2013	18:05	9.2	1.1	482.7	11.7
01Jan2013	18:10	9.1	1.1	482.6	11.5
01Jan2013	18:15	9.0	1.1	482.6	11.3
01Jan2013	18:20	8.9	1.1	482.6	11.0
01Jan2013	18:25	8.8	1.0	482.6	10.8
01Jan2013	18:30	8.8	1.0	482.6	10.6
01Jan2013	18:35	8.6	1.0	482.6	10.5
01Jan2013	18:40	8.4	1.0	482.5	10.3
01Jan2013	18:45	8.3	1.0	482.5	10.1
01Jan2013	18:50	8.3	1.0	482.5	10.0
01Jan2013	18:55	8.2	1.0	482.5	9.8
01Jan2013	19:00	8.1	1.0	482.5	9.6
01Jan2013	19:05	8.0	0.9	482.5	9.5
01Jan2013	19:10	7.9	0.9	482.5	9.4
01Jan2013	19:15	7.8	0.9	482.5	9.2
01Jan2013	19:20	7.7	0.9	482.4	9.1
01Jan2013	19:25	7.6	0.9	482.4	9.0
01Jan2013	19:30	7.5	0.9	482.4	8.8
01Jan2013	19:35	7.4	0.9	482.4	8.7
01Jan2013	19:40	7.3	0.9	482.4	8.6
01Jan2013	19:45	7.1	0.9	482.4	8.5
01Jan2013	19:50	7.0	0.9	482.4	8.4
01Jan2013	19:55	6.9	0.8	482.4	8.2
01Jan2013	20:00	6.9	0.8	482.4	8.1
01Jan2013	20:05	6.8	0.8	482.4	8.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	6.7	0.8	482.3	7.9
01Jan2013	20:15	6.6	0.8	482.3	7.8
01Jan2013	20:20	6.5	0.8	482.3	7.7
01Jan2013	20:25	6.5	0.8	482.3	7.6
01Jan2013	20:30	6.4	0.8	482.3	7.5
01Jan2013	20:35	6.4	0.8	482.3	7.4
01Jan2013	20:40	6.4	0.8	482.3	7.3
01Jan2013	20:45	6.4	0.8	482.3	7.3
01Jan2013	20:50	6.4	0.8	482.3	7.2
01Jan2013	20:55	6.3	0.8	482.3	7.1
01Jan2013	21:00	6.3	0.8	482.3	7.1
01Jan2013	21:05	6.3	0.7	482.3	7.0
01Jan2013	21:10	6.3	0.7	482.3	6.9
01Jan2013	21:15	6.3	0.7	482.2	6.9
01Jan2013	21:20	6.2	0.7	482.2	6.8
01Jan2013	21:25	6.2	0.7	482.2	6.8
01Jan2013	21:30	6.2	0.7	482.2	6.7
01Jan2013	21:35	6.2	0.7	482.2	6.7
01Jan2013	21:40	6.2	0.7	482.2	6.7
01Jan2013	21:45	6.2	0.7	482.2	6.6
01Jan2013	21:50	6.2	0.7	482.2	6.6
01Jan2013	21:55	6.1	0.7	482.2	6.6
01Jan2013	22:00	6.1	0.7	482.2	6.5
01Jan2013	22:05	6.0	0.7	482.2	6.5
01Jan2013	22:10	6.0	0.7	482.2	6.5
01Jan2013	22:15	6.0	0.7	482.2	6.4
01Jan2013	22:20	6.0	0.7	482.2	6.4
01Jan2013	22:25	6.0	0.7	482.2	6.4
01Jan2013	22:30	6.0	0.7	482.2	6.3
01Jan2013	22:35	5.9	0.7	482.2	6.3
01Jan2013	22:40	5.9	0.7	482.2	6.3

Pond C2 Input Data

<u>Outlet Pipe</u>

Type:	1 - 36" Diameter Corrugated Metal StandPipe (See Pond C2 Elevation-Discharge Calculations for Standpipe Orifice Information)
Length:	86 Feet
Top Inlet Elev.:	483.00
Outlet Elev.:	475.5
Exit Coeff.:	1.0
Mannings n:	0.024

<u>Spillway</u>

Elev:	485.00
Length:	20
Weir Coeff.:	3.0

<u>Dam</u>

Elev.:	486.00
Length:	50
Coeff.:	3.0

Area-Elev. Table	
Elev. (Feet)	Area (Acres)
476.0	0.0000
477.0	0.2395
478.0	0.6927
479.0	1.1054
480.0	1.3791
481.0	1.4760
482.0	1.5596
483.0	1.6559
484.0	1.7466
485.0	1.8405
486.0	1.9367
487.0	2.1000
487.5	2.2000

Elev. - Discharge Table	
Elev. (Feet)	Discharge (cfs)
476.0	0.0
476.5	0.0
477.0	0.0
477.5	0.7
478.0	0.9
478.5	1.6
479.0	2.2
479.5	2.6
480.0	3.6
480.5	4.1
481.0	4.6
481.5	5.0
482.0	5.4
482.5	5.8
483.0	6.1
483.5	16.5
484.0	35.0
484.5	59.0
485.0	87.3
485.5	151.2
486.0	274.8
486.5	468.8

POND C2 ELEVATION-DISCHARGE CALCULATIONS

Pond Flowline=	476.00		
Orifice Coeff. C=	0.60		
Orifice Size (in.)=	3.00		
		# orifices	
Orifice Elev. 1=	477.00	3	
Orifice Elev. 2=	478.50	3	
Orifice Elev. 3=	480.00	3	

Orifice Flow Equation
q_x = C x A x (2 g h)^.5

Wier L=	20	ft.
Wier El.=	487	msl
Wier SS=	10	:1
Stack Pipe Top Elev =	484.50	msl
Stack Pipe Diam.=	1.50	ft.

Wier Flow Equation
Q = 3 x L x h^1.5

	ORIFICE CALCULATIONS							PIPE STACK CALCULATIONS		WIER CALCULATIONS		
WS Elevation	h1	h2	h3	q1	q2	q3	Orifice Flow q_o	Pipe Stack Head, h_p	Pipe Stack Flow, Q_p	Wier Head h_W	Wier Flow Q_W	Total Q for Elev.
	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(cfs)
476.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
476.5	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
477.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
477.5	0.50	0.00	0.00	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.5
478.0	1.00	0.00	0.00	0.7	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7
478.5	1.50	0.00	0.00	0.9	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.9
479.0	2.00	0.50	0.00	1.0	0.5	0.0	1.5	0.0	0.0	0.0	0.0	1.5
479.5	2.50	1.00	0.00	1.1	0.7	0.0	1.8	0.0	0.0	0.0	0.0	1.8
480.0	3.00	1.50	0.00	1.2	0.9	0.0	2.1	0.0	0.0	0.0	0.0	2.1
480.5	3.50	2.00	0.50	1.3	1.0	0.5	2.8	0.0	0.0	0.0	0.0	2.8
481.0	4.00	2.50	1.00	1.4	1.1	0.7	3.2	0.0	0.0	0.0	0.0	3.2
481.5	4.50	3.00	1.50	1.5	1.2	0.9	3.6	0.0	0.0	0.0	0.0	3.6
482.0	5.00	3.50	2.00	1.6	1.3	1.0	3.9	0.0	0.0	0.0	0.0	3.9
482.5	5.50	4.00	2.50	1.7	1.4	1.1	4.2	0.0	0.0	0.0	0.0	4.2
483.0	6.00	4.50	3.00	1.7	1.5	1.2	4.5	0.0	0.0	0.0	0.0	4.5
483.5	6.50	5.00	3.50	1.8	1.6	1.3	4.7	0.0	0.0	0.0	0.0	4.7
484.0	7.00	5.50	4.00	1.9	1.7	1.4	5.0	0.0	0.0	0.0	0.0	5.0
484.5	7.50	6.00	4.50	1.9	1.7	1.5	5.2	0.0	0.0	0.0	0.0	5.2
485.0	8.00	6.50	5.00	2.0	1.8	1.6	5.4	0.5	5.0	0.0	0.0	10.4
485.5	8.50	7.00	5.50	2.1	1.9	1.7	5.6	1.0	14.1	0.0	0.0	19.7
486.0	9.00	7.50	6.00	2.1	1.9	1.7	5.8	1.5	26.0	0.0	0.0	31.8
486.5	9.50	8.00	6.50	2.2	2.0	1.8	6.0	2.0	40.0	0.0	0.0	46.0
487.0	10.00	8.50	7.00	2.2	2.1	1.9	6.2	2.5	55.9	0.0	0.0	62.1
487.5	10.50	9.00	7.50	2.3	2.1	1.9	6.4	3.0	73.5	0.5	31.8	111.6
488.0	11.00	9.50	8.00	2.4	2.2	2.0	6.5	3.5	92.6	1.0	120.0	219.1
488.5	11.50	10.00	8.50	2.4	2.2	2.1	6.7	4.0	113.1	1.5	275.6	395.4
489.0	12.00	10.50	9.00	2.5	2.3	2.1	6.9	4.5	135.0	2.0	509.1	651.0

Orifice Calculations
h1 = height above orifices at Elev. 1
h2 = height above orifices at Elev. 2
h3 = height above orifices at Elev. 3
q1 = flow into orifices at Elev. 1, q_x = C x A x (2 g h1)^.5
q2 = flow into orifices at Elev. 2, q_x = C x A x (2 g h2)^.5
q3 = flow into orifices at Elev. 3, q_x = C x A x (2 g h3)^.5
$q_{o=}$ total orifice flow for that water surface elevation

Pipe Stack Calculations
h_p = surface water height above top of stack pipe
Q_p = flow into top of stack pipe using weir equation

Weir Calculations
h_W = surface water height above weir flowline elev.
Q_W = flow weir using weir equation

Toatal Q = Total flow through orifices, stack pipe and weir

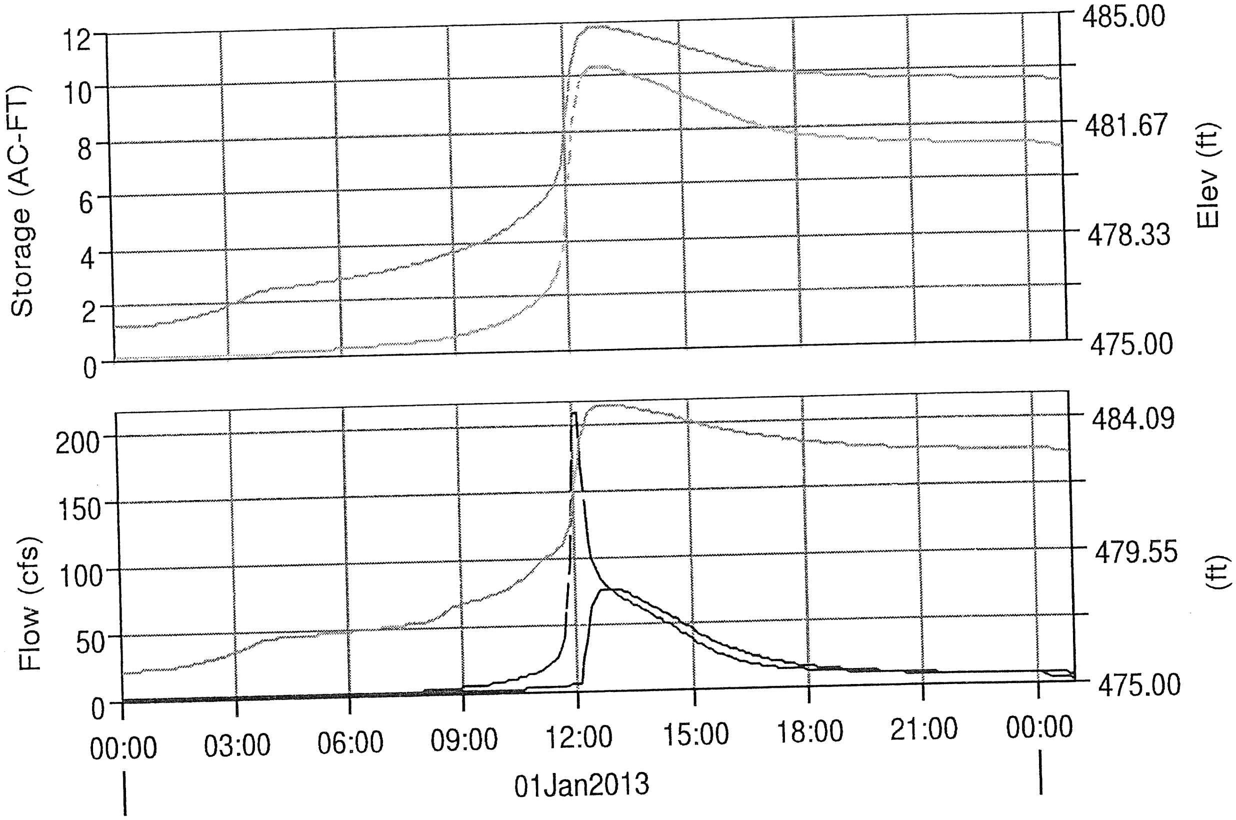
	Project:	Laredo Proposed	
	Simulation Run:	25 year	Reservoir: Pond C2
Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	25 year 24 hr
Compute Time:	17Sep2014, 11:13:14	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	211.1 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:05
Peak Outflow :	76.6 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:50
Total Inflow :	4.53 (IN)	Peak Storage :	10.3 (AC-FT)
Total Outflow :	3.60 (IN)	Peak Elevation :	484.8 (FT)

Reservoir "Pond C2" Results for Run "25 year"



Run:25 YEAR Element:POND C2 Result:Storage

Run:25 YEAR Element:POND C2 Result:Pool Elevation

Run:25 year Element:POND C2 Result:Outflow

Run:25 YEAR Element:POND C2 Result:Combined Flow

Run:25 year Element:POND C2 Result:Stage

Project: Laredo Proposed
Simulation Run: 25 year Reservoir: Pond C2

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 25 year 24
Compute Time: 17Sep2014, 11:13:14 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	00:00	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:05	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:10	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:15	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:20	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:25	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:30	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:35	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:40	0.1	0.0	476.0	0.0	476.0
01Jan2013	00:45	0.1	0.0	476.0	0.0	476.0
01Jan2013	00:50	0.1	0.0	476.0	0.0	476.0
01Jan2013	00:55	0.1	0.0	476.0	0.0	476.0
01Jan2013	01:00	0.1	0.0	476.0	0.0	476.0
01Jan2013	01:05	0.1	0.0	476.1	0.0	476.1
01Jan2013	01:10	0.1	0.0	476.1	0.0	476.1
01Jan2013	01:15	0.1	0.0	476.1	0.0	476.1
01Jan2013	01:20	0.1	0.0	476.1	0.0	476.1
01Jan2013	01:25	0.2	0.0	476.1	0.0	476.1
01Jan2013	01:30	0.2	0.0	476.1	0.0	476.1
01Jan2013	01:35	0.2	0.0	476.1	0.0	476.1
01Jan2013	01:40	0.2	0.0	476.1	0.0	476.1
01Jan2013	01:45	0.2	0.0	476.2	0.0	476.2
01Jan2013	01:50	0.2	0.0	476.2	0.0	476.2
01Jan2013	01:55	0.2	0.0	476.2	0.0	476.2
01Jan2013	02:00	0.3	0.0	476.2	0.0	476.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	02:05	0.3	0.0	476.2	0.0	476.2
01Jan2013	02:10	0.3	0.0	476.3	0.0	476.3
01Jan2013	02:15	0.3	0.0	476.3	0.0	476.3
01Jan2013	02:20	0.3	0.0	476.3	0.0	476.3
01Jan2013	02:25	0.3	0.0	476.3	0.0	476.3
01Jan2013	02:30	0.3	0.0	476.4	0.0	476.4
01Jan2013	02:35	0.3	0.0	476.4	0.0	476.4
01Jan2013	02:40	0.4	0.0	476.4	0.0	476.4
01Jan2013	02:45	0.4	0.0	476.5	0.0	476.5
01Jan2013	02:50	0.4	0.0	476.5	0.0	476.5
01Jan2013	02:55	0.4	0.0	476.5	0.0	476.5
01Jan2013	03:00	0.4	0.0	476.6	0.0	476.6
01Jan2013	03:05	0.4	0.0	476.6	0.0	476.6
01Jan2013	03:10	0.5	0.1	476.6	0.0	476.6
01Jan2013	03:15	0.5	0.1	476.7	0.0	476.7
01Jan2013	03:20	0.5	0.1	476.7	0.0	476.7
01Jan2013	03:25	0.5	0.1	476.8	0.0	476.8
01Jan2013	03:30	0.5	0.1	476.8	0.0	476.8
01Jan2013	03:35	0.5	0.1	476.9	0.0	476.9
01Jan2013	03:40	0.6	0.1	476.9	0.0	476.9
01Jan2013	03:45	0.6	0.1	476.9	0.0	476.9
01Jan2013	03:50	0.6	0.1	477.0	0.0	477.0
01Jan2013	03:55	0.6	0.1	477.0	0.0	477.0
01Jan2013	04:00	0.6	0.1	477.0	0.0	477.0
01Jan2013	04:05	0.6	0.1	477.0	0.0	477.0
01Jan2013	04:10	0.6	0.1	477.0	0.0	477.0
01Jan2013	04:15	0.7	0.1	477.0	0.0	477.0
01Jan2013	04:20	0.7	0.1	477.1	0.1	477.0
01Jan2013	04:25	0.7	0.1	477.1	0.1	477.0
01Jan2013	04:30	0.7	0.1	477.1	0.1	477.0
01Jan2013	04:35	0.8	0.1	477.1	0.1	477.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	04:40	0.8	0.1	477.1	0.1	477.1
01Jan2013	04:45	0.8	0.1	477.1	0.1	477.1
01Jan2013	04:50	0.8	0.1	477.1	0.1	477.1
01Jan2013	04:55	0.8	0.1	477.1	0.1	477.1
01Jan2013	05:00	0.9	0.1	477.1	0.1	477.1
01Jan2013	05:05	0.9	0.1	477.2	0.1	477.1
01Jan2013	05:10	0.9	0.2	477.2	0.1	477.1
01Jan2013	05:15	0.9	0.2	477.2	0.2	477.1
01Jan2013	05:20	1.0	0.2	477.2	0.2	477.1
01Jan2013	05:25	1.0	0.2	477.2	0.2	477.1
01Jan2013	05:30	1.0	0.2	477.2	0.2	477.1
01Jan2013	05:35	1.0	0.2	477.2	0.2	477.1
01Jan2013	05:40	1.1	0.2	477.2	0.2	477.2
01Jan2013	05:45	1.1	0.2	477.3	0.2	477.2
01Jan2013	05:50	1.1	0.2	477.3	0.2	477.2
01Jan2013	05:55	1.2	0.2	477.3	0.3	477.2
01Jan2013	06:00	1.2	0.2	477.3	0.3	477.2
01Jan2013	06:05	1.2	0.2	477.3	0.3	477.2
01Jan2013	06:10	1.2	0.2	477.3	0.3	477.2
01Jan2013	06:15	1.3	0.2	477.3	0.3	477.2
01Jan2013	06:20	1.3	0.2	477.4	0.3	477.2
01Jan2013	06:25	1.4	0.2	477.4	0.3	477.2
01Jan2013	06:30	1.4	0.3	477.4	0.3	477.2
01Jan2013	06:35	1.4	0.3	477.4	0.4	477.3
01Jan2013	06:40	1.4	0.3	477.4	0.4	477.3
01Jan2013	06:45	1.5	0.3	477.4	0.4	477.3
01Jan2013	06:50	1.5	0.3	477.5	0.4	477.3
01Jan2013	06:55	1.5	0.3	477.5	0.4	477.3
01Jan2013	07:00	1.6	0.3	477.5	0.4	477.3
01Jan2013	07:05	1.6	0.3	477.5	0.5	477.3
01Jan2013	07:10	1.6	0.3	477.5	0.5	477.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	07:15	1.6	0.3	477.5	0.5	477.3
01Jan2013	07:20	1.7	0.3	477.6	0.5	477.4
01Jan2013	07:25	1.7	0.3	477.6	0.5	477.4
01Jan2013	07:30	1.8	0.3	477.6	0.5	477.4
01Jan2013	07:35	1.8	0.4	477.6	0.6	477.4
01Jan2013	07:40	1.8	0.4	477.6	0.6	477.4
01Jan2013	07:45	1.9	0.4	477.7	0.6	477.4
01Jan2013	07:50	1.9	0.4	477.7	0.6	477.4
01Jan2013	07:55	2.0	0.4	477.7	0.6	477.4
01Jan2013	08:00	2.1	0.4	477.7	0.6	477.5
01Jan2013	08:05	2.1	0.4	477.7	0.7	477.5
01Jan2013	08:10	2.2	0.4	477.8	0.7	477.5
01Jan2013	08:15	2.3	0.4	477.8	0.7	477.5
01Jan2013	08:20	2.5	0.4	477.8	0.7	477.6
01Jan2013	08:25	2.6	0.5	477.8	0.8	477.6
01Jan2013	08:30	2.8	0.5	477.9	0.8	477.7
01Jan2013	08:35	3.0	0.5	477.9	0.8	477.8
01Jan2013	08:40	3.2	0.5	477.9	0.8	477.9
01Jan2013	08:45	3.4	0.5	478.0	0.9	477.9
01Jan2013	08:50	3.6	0.5	478.0	0.9	478.0
01Jan2013	08:55	3.8	0.6	478.0	0.9	478.0
01Jan2013	09:00	4.1	0.6	478.1	1.0	478.0
01Jan2013	09:05	4.3	0.6	478.1	1.0	478.1
01Jan2013	09:10	4.6	0.6	478.1	1.0	478.1
01Jan2013	09:15	4.8	0.6	478.1	1.1	478.1
01Jan2013	09:20	5.0	0.7	478.2	1.1	478.1
01Jan2013	09:25	5.2	0.7	478.2	1.1	478.2
01Jan2013	09:30	5.4	0.7	478.2	1.2	478.2
01Jan2013	09:35	5.7	0.8	478.3	1.2	478.2
01Jan2013	09:40	5.9	0.8	478.3	1.3	478.3
01Jan2013	09:45	6.2	0.8	478.3	1.3	478.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	09:50	6.6	0.9	478.4	1.4	478.3
01Jan2013	09:55	7.0	0.9	478.4	1.4	478.4
01Jan2013	10:00	7.4	0.9	478.5	1.5	478.4
01Jan2013	10:05	7.8	1.0	478.5	1.6	478.5
01Jan2013	10:10	8.3	1.0	478.6	1.6	478.5
01Jan2013	10:15	8.8	1.1	478.6	1.7	478.6
01Jan2013	10:20	9.4	1.1	478.7	1.8	478.6
01Jan2013	10:25	9.9	1.2	478.7	1.8	478.7
01Jan2013	10:30	10.4	1.2	478.8	1.9	478.8
01Jan2013	10:35	11.0	1.3	478.9	2.0	478.8
01Jan2013	10:40	11.6	1.4	478.9	2.1	478.9
01Jan2013	10:45	12.3	1.4	479.0	2.2	479.0
01Jan2013	10:50	13.0	1.5	479.1	2.3	479.1
01Jan2013	10:55	13.9	1.6	479.1	2.4	479.2
01Jan2013	11:00	14.8	1.6	479.2	2.5	479.3
01Jan2013	11:05	15.8	1.7	479.3	2.6	479.4
01Jan2013	11:10	17.0	1.8	479.3	2.7	479.5
01Jan2013	11:15	18.5	1.9	479.4	2.8	479.6
01Jan2013	11:20	20.2	2.0	479.5	2.9	479.7
01Jan2013	11:25	22.2	2.2	479.6	3.1	479.7
01Jan2013	11:30	24.4	2.3	479.7	3.2	479.8
01Jan2013	11:35	28.5	2.5	479.9	3.4	479.9
01Jan2013	11:40	39.8	2.7	480.0	3.6	480.0
01Jan2013	11:45	61.7	3.0	480.2	3.8	480.2
01Jan2013	11:50	97.3	3.5	480.6	4.2	480.6
01Jan2013	11:55	155.2	4.4	481.2	4.7	481.2
01Jan2013	12:00	209.2	5.6	482.0	5.4	482.0
01Jan2013	12:05	211.1	7.0	482.9	6.0	482.8
01Jan2013	12:10	169.6	8.2	483.6	23.0	483.7
01Jan2013	12:15	131.5	9.0	484.1	38.4	484.1
01Jan2013	12:20	111.6	9.5	484.4	53.6	484.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	12:25	100.2	9.9	484.5	63.2	484.6
01Jan2013	12:30	92.5	10.1	484.7	69.2	484.7
01Jan2013	12:35	86.9	10.2	484.7	72.9	484.7
01Jan2013	12:40	82.8	10.3	484.8	75.1	484.8
01Jan2013	12:45	79.7	10.3	484.8	76.2	484.8
01Jan2013	12:50	77.3	10.3	484.8	76.6	484.8
01Jan2013	12:55	75.3	10.3	484.8	76.6	484.8
01Jan2013	13:00	73.5	10.3	484.8	76.2	484.8
01Jan2013	13:05	71.9	10.3	484.8	75.6	484.8
01Jan2013	13:10	70.2	10.3	484.8	74.7	484.8
01Jan2013	13:15	68.6	10.2	484.7	73.8	484.8
01Jan2013	13:20	67.1	10.2	484.7	72.7	484.7
01Jan2013	13:25	65.7	10.2	484.7	71.5	484.7
01Jan2013	13:30	64.3	10.1	484.7	70.3	484.7
01Jan2013	13:35	62.7	10.1	484.7	69.1	484.7
01Jan2013	13:40	61.2	10.0	484.6	67.8	484.7
01Jan2013	13:45	60.0	10.0	484.6	66.5	484.6
01Jan2013	13:50	58.6	9.9	484.6	65.2	484.6
01Jan2013	13:55	57.1	9.9	484.6	63.8	484.6
01Jan2013	14:00	55.7	9.9	484.5	62.5	484.6
01Jan2013	14:05	54.3	9.8	484.5	61.1	484.5
01Jan2013	14:10	53.2	9.8	484.5	59.8	484.5
01Jan2013	14:15	51.9	9.7	484.4	58.5	484.5
01Jan2013	14:20	50.3	9.7	484.4	57.1	484.5
01Jan2013	14:25	48.6	9.6	484.4	55.7	484.4
01Jan2013	14:30	47.0	9.6	484.4	54.3	484.4
01Jan2013	14:35	45.3	9.5	484.3	52.8	484.4
01Jan2013	14:40	43.7	9.5	484.3	51.3	484.3
01Jan2013	14:45	42.1	9.4	484.3	49.7	484.3
01Jan2013	14:50	40.5	9.4	484.3	48.2	484.3
01Jan2013	14:55	39.0	9.3	484.2	46.6	484.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	15:00	37.4	9.3	484.2	45.1	484.2
01Jan2013	15:05	35.6	9.2	484.2	43.5	484.2
01Jan2013	15:10	34.0	9.1	484.1	41.9	484.1
01Jan2013	15:15	32.5	9.1	484.1	40.3	484.1
01Jan2013	15:20	31.0	9.0	484.1	38.8	484.1
01Jan2013	15:25	29.7	9.0	484.0	37.2	484.0
01Jan2013	15:30	28.5	8.9	484.0	35.8	484.0
01Jan2013	15:35	27.3	8.9	484.0	34.6	484.0
01Jan2013	15:40	26.2	8.8	484.0	33.7	484.0
01Jan2013	15:45	25.2	8.8	483.9	32.8	483.9
01Jan2013	15:50	24.3	8.7	483.9	31.9	483.9
01Jan2013	15:55	23.4	8.7	483.9	31.0	483.9
01Jan2013	16:00	22.5	8.6	483.8	30.2	483.9
01Jan2013	16:05	21.7	8.6	483.8	29.3	483.8
01Jan2013	16:10	21.0	8.5	483.8	28.4	483.8
01Jan2013	16:15	20.1	8.5	483.7	27.5	483.8
01Jan2013	16:20	19.2	8.4	483.7	26.7	483.8
01Jan2013	16:25	18.6	8.4	483.7	25.8	483.8
01Jan2013	16:30	18.0	8.3	483.7	25.0	483.7
01Jan2013	16:35	17.3	8.3	483.6	24.2	483.7
01Jan2013	16:40	16.8	8.2	483.6	23.4	483.7
01Jan2013	16:45	16.3	8.2	483.6	22.6	483.7
01Jan2013	16:50	15.8	8.1	483.5	21.9	483.6
01Jan2013	16:55	15.4	8.1	483.5	21.2	483.6
01Jan2013	17:00	15.1	8.1	483.5	20.5	483.6
01Jan2013	17:05	14.7	8.0	483.5	19.9	483.6
01Jan2013	17:10	14.4	8.0	483.5	19.3	483.6
01Jan2013	17:15	14.0	8.0	483.4	18.8	483.6
01Jan2013	17:20	13.7	7.9	483.4	18.2	483.5
01Jan2013	17:25	13.5	7.9	483.4	17.7	483.5
01Jan2013	17:30	13.2	7.9	483.4	17.2	483.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	17:35	13.0	7.8	483.4	16.8	483.5
01Jan2013	17:40	12.8	7.8	483.4	16.3	483.5
01Jan2013	17:45	12.6	7.8	483.3	15.9	483.5
01Jan2013	17:50	12.3	7.8	483.3	15.6	483.5
01Jan2013	17:55	12.1	7.7	483.3	15.2	483.4
01Jan2013	18:00	12.0	7.7	483.3	14.8	483.4
01Jan2013	18:05	11.8	7.7	483.3	14.5	483.4
01Jan2013	18:10	11.6	7.7	483.3	14.2	483.4
01Jan2013	18:15	11.4	7.7	483.3	13.9	483.4
01Jan2013	18:20	11.3	7.7	483.3	13.6	483.4
01Jan2013	18:25	11.2	7.6	483.3	13.4	483.3
01Jan2013	18:30	11.0	7.6	483.2	13.1	483.3
01Jan2013	18:35	10.8	7.6	483.2	12.9	483.3
01Jan2013	18:40	10.6	7.6	483.2	12.6	483.3
01Jan2013	18:45	10.5	7.6	483.2	12.4	483.3
01Jan2013	18:50	10.4	7.6	483.2	12.2	483.3
01Jan2013	18:55	10.3	7.6	483.2	12.0	483.3
01Jan2013	19:00	10.2	7.5	483.2	11.8	483.3
01Jan2013	19:05	10.0	7.5	483.2	11.6	483.3
01Jan2013	19:10	9.9	7.5	483.2	11.4	483.3
01Jan2013	19:15	9.7	7.5	483.2	11.2	483.2
01Jan2013	19:20	9.6	7.5	483.2	11.1	483.2
01Jan2013	19:25	9.5	7.5	483.2	10.9	483.2
01Jan2013	19:30	9.4	7.5	483.2	10.7	483.2
01Jan2013	19:35	9.3	7.5	483.2	10.6	483.2
01Jan2013	19:40	9.1	7.5	483.2	10.4	483.2
01Jan2013	19:45	9.0	7.5	483.1	10.3	483.2
01Jan2013	19:50	8.8	7.4	483.1	10.1	483.2
01Jan2013	19:55	8.8	7.4	483.1	10.0	483.2
01Jan2013	20:00	8.7	7.4	483.1	9.8	483.2
01Jan2013	20:05	8.5	7.4	483.1	9.7	483.2

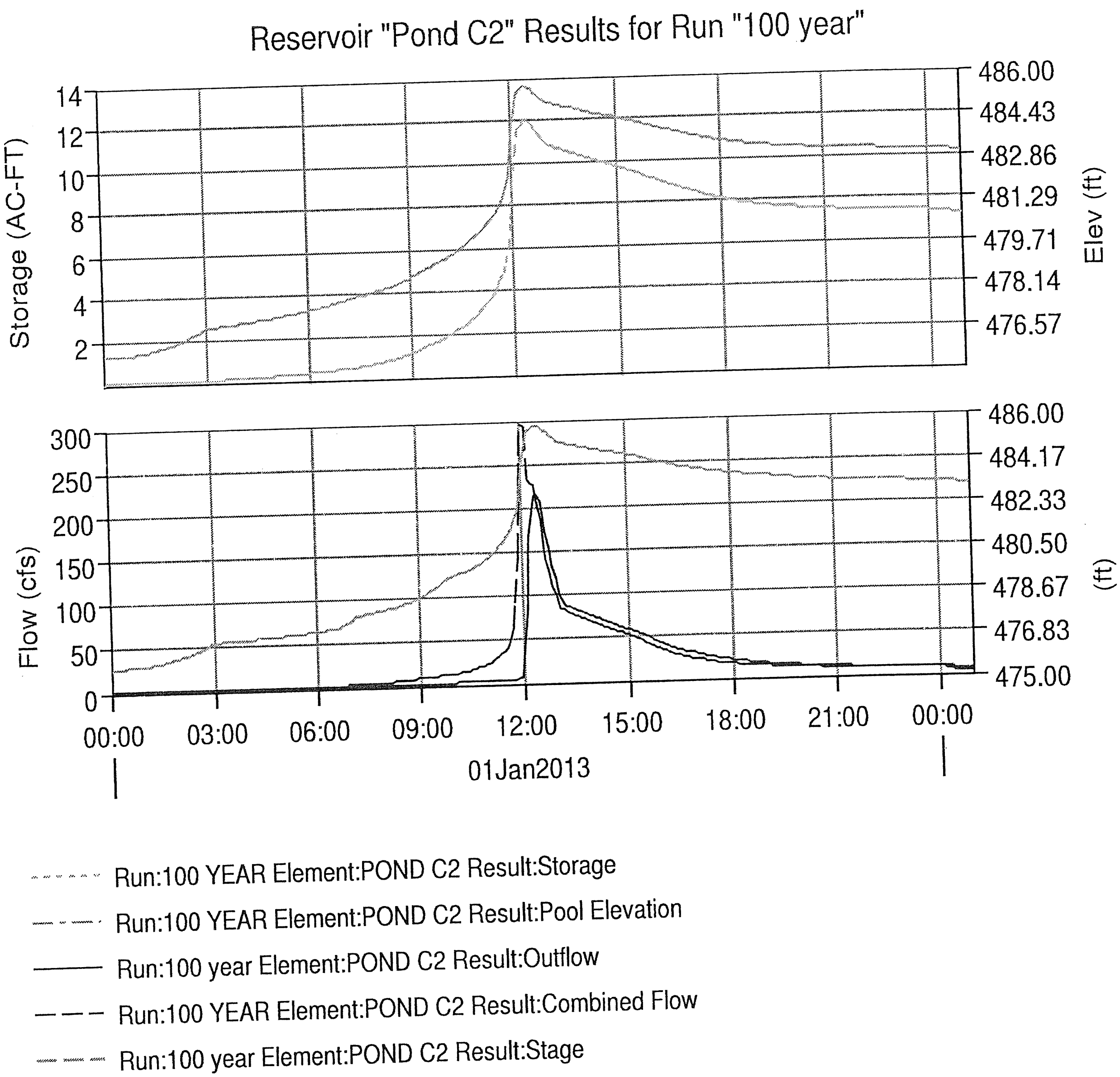
Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	20:10	8.4	7.4	483.1	9.6	483.2
01Jan2013	20:15	8.3	7.4	483.1	9.4	483.2
01Jan2013	20:20	8.2	7.4	483.1	9.3	483.2
01Jan2013	20:25	8.1	7.4	483.1	9.2	483.1
01Jan2013	20:30	8.1	7.4	483.1	9.1	483.1
01Jan2013	20:35	8.0	7.4	483.1	9.0	483.1
01Jan2013	20:40	8.0	7.4	483.1	8.8	483.1
01Jan2013	20:45	7.9	7.4	483.1	8.7	483.1
01Jan2013	20:50	7.8	7.4	483.1	8.6	483.1
01Jan2013	20:55	7.7	7.4	483.1	8.5	483.1
01Jan2013	21:00	7.7	7.3	483.1	8.5	483.1
01Jan2013	21:05	7.6	7.3	483.1	8.4	483.1
01Jan2013	21:10	7.6	7.3	483.1	8.3	483.1
01Jan2013	21:15	7.5	7.3	483.1	8.2	483.1
01Jan2013	21:20	7.5	7.3	483.1	8.1	483.1
01Jan2013	21:25	7.5	7.3	483.1	8.1	483.1
01Jan2013	21:30	7.4	7.3	483.1	8.0	483.1
01Jan2013	21:35	7.4	7.3	483.1	7.9	483.1
01Jan2013	21:40	7.4	7.3	483.1	7.9	483.1
01Jan2013	21:45	7.3	7.3	483.1	7.8	483.1
01Jan2013	21:50	7.3	7.3	483.1	7.8	483.1
01Jan2013	21:55	7.2	7.3	483.1	7.7	483.1
01Jan2013	22:00	7.2	7.3	483.1	7.6	483.1
01Jan2013	22:05	7.2	7.3	483.1	7.6	483.1
01Jan2013	22:10	7.1	7.3	483.0	7.5	483.1
01Jan2013	22:15	7.1	7.3	483.0	7.5	483.1
01Jan2013	22:20	7.1	7.3	483.0	7.4	483.1
01Jan2013	22:25	7.1	7.3	483.0	7.4	483.1
01Jan2013	22:30	7.0	7.3	483.0	7.4	483.1
01Jan2013	22:35	6.9	7.3	483.0	7.3	483.1
01Jan2013	22:40	6.9	7.3	483.0	7.3	483.1

Project:	Laredo Proposed		
Simulation Run:	100 year	Reservoir:	Pond C2
Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	100 year 24 hr
Compute Time:	17Sep2014, 11:11:16	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	294.8 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:00
Peak Outflow :	215.8 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:25
Total Inflow :	6.68 (IN)	Peak Storage :	12.0 (AC-FT)
Total Outflow :	5.73 (IN)	Peak Elevation :	485.7 (FT)



Reservoir "Pond C2" Results for Run "100 year"
Storage (AC-FT)
14
12
10
8
6
4
2
486.00
484.43
482.86
481.29
479.71
478.14
476.57
Elev (ft)
Flow (cfs)
300
250
200
150
100
50
0
486.00
484.17
482.33
480.50
478.67
476.83
475.00
(ft)
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2013
Run:100 YEAR Element:POND C2 Result:Storage
Run:100 YEAR Element:POND C2 Result:Pool Elevation
Run:100 year Element:POND C2 Result:Outflow
Run:100 YEAR Element:POND C2 Result:Combined Flow
Run:100 year Element:POND C2 Result:Stage

Project: Laredo Proposed
Simulation Run: 100 year Reservoir: Pond C2

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 100 year 2
Compute Time: 17Sep2014, 11:11:16 Control Specifications: Contro

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	00:00	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:05	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:10	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:15	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:20	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:25	0.0	0.0	476.0	0.0	476.0
01Jan2013	00:30	0.1	0.0	476.0	0.0	476.0
01Jan2013	00:35	0.1	0.0	476.0	0.0	476.0
01Jan2013	00:40	0.1	0.0	476.0	0.0	476.0
01Jan2013	00:45	0.1	0.0	476.0	0.0	476.0
01Jan2013	00:50	0.1	0.0	476.0	0.0	476.0
01Jan2013	00:55	0.2	0.0	476.1	0.0	476.1
01Jan2013	01:00	0.2	0.0	476.1	0.0	476.1
01Jan2013	01:05	0.2	0.0	476.1	0.0	476.1
01Jan2013	01:10	0.2	0.0	476.1	0.0	476.1
01Jan2013	01:15	0.2	0.0	476.1	0.0	476.1
01Jan2013	01:20	0.3	0.0	476.1	0.0	476.1
01Jan2013	01:25	0.3	0.0	476.2	0.0	476.2
01Jan2013	01:30	0.3	0.0	476.2	0.0	476.2
01Jan2013	01:35	0.3	0.0	476.2	0.0	476.2
01Jan2013	01:40	0.3	0.0	476.3	0.0	476.3
01Jan2013	01:45	0.4	0.0	476.3	0.0	476.3
01Jan2013	01:50	0.4	0.0	476.3	0.0	476.3
01Jan2013	01:55	0.4	0.0	476.4	0.0	476.4
01Jan2013	02:00	0.4	0.0	476.4	0.0	476.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	02:05	0.5	0.0	476.4	0.0	476.4
01Jan2013	02:10	0.5	0.0	476.5	0.0	476.5
01Jan2013	02:15	0.5	0.0	476.5	0.0	476.5
01Jan2013	02:20	0.5	0.0	476.6	0.0	476.6
01Jan2013	02:25	0.6	0.0	476.6	0.0	476.6
01Jan2013	02:30	0.6	0.1	476.7	0.0	476.7
01Jan2013	02:35	0.6	0.1	476.7	0.0	476.7
01Jan2013	02:40	0.6	0.1	476.8	0.0	476.8
01Jan2013	02:45	0.6	0.1	476.8	0.0	476.8
01Jan2013	02:50	0.7	0.1	476.9	0.0	476.9
01Jan2013	02:55	0.7	0.1	476.9	0.0	476.9
01Jan2013	03:00	0.7	0.1	477.0	0.0	477.0
01Jan2013	03:05	0.8	0.1	477.0	0.0	477.0
01Jan2013	03:10	0.8	0.1	477.0	0.0	477.0
01Jan2013	03:15	0.8	0.1	477.0	0.0	477.0
01Jan2013	03:20	0.8	0.1	477.0	0.0	477.0
01Jan2013	03:25	0.9	0.1	477.1	0.1	477.0
01Jan2013	03:30	0.9	0.1	477.1	0.1	477.0
01Jan2013	03:35	0.9	0.1	477.1	0.1	477.1
01Jan2013	03:40	0.9	0.1	477.1	0.1	477.1
01Jan2013	03:45	1.0	0.1	477.1	0.1	477.1
01Jan2013	03:50	1.0	0.1	477.1	0.1	477.1
01Jan2013	03:55	1.0	0.1	477.1	0.1	477.1
01Jan2013	04:00	1.0	0.1	477.2	0.1	477.1
01Jan2013	04:05	1.1	0.2	477.2	0.1	477.1
01Jan2013	04:10	1.1	0.2	477.2	0.2	477.1
01Jan2013	04:15	1.1	0.2	477.2	0.2	477.1
01Jan2013	04:20	1.2	0.2	477.2	0.2	477.1
01Jan2013	04:25	1.2	0.2	477.2	0.2	477.1
01Jan2013	04:30	1.3	0.2	477.2	0.2	477.2
01Jan2013	04:35	1.3	0.2	477.3	0.2	477.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	04:40	1.3	0.2	477.3	0.2	477.2
01Jan2013	04:45	1.3	0.2	477.3	0.3	477.2
01Jan2013	04:50	1.4	0.2	477.3	0.3	477.2
01Jan2013	04:55	1.4	0.2	477.3	0.3	477.2
01Jan2013	05:00	1.5	0.2	477.3	0.3	477.2
01Jan2013	05:05	1.5	0.2	477.4	0.3	477.2
01Jan2013	05:10	1.5	0.2	477.4	0.3	477.2
01Jan2013	05:15	1.6	0.3	477.4	0.4	477.3
01Jan2013	05:20	1.6	0.3	477.4	0.4	477.3
01Jan2013	05:25	1.7	0.3	477.4	0.4	477.3
01Jan2013	05:30	1.7	0.3	477.5	0.4	477.3
01Jan2013	05:35	1.7	0.3	477.5	0.4	477.3
01Jan2013	05:40	1.8	0.3	477.5	0.4	477.3
01Jan2013	05:45	1.9	0.3	477.5	0.5	477.3
01Jan2013	05:50	1.9	0.3	477.5	0.5	477.3
01Jan2013	05:55	1.9	0.3	477.6	0.5	477.4
01Jan2013	06:00	2.0	0.3	477.6	0.5	477.4
01Jan2013	06:05	2.0	0.4	477.6	0.5	477.4
01Jan2013	06:10	2.1	0.4	477.6	0.6	477.4
01Jan2013	06:15	2.1	0.4	477.7	0.6	477.4
01Jan2013	06:20	2.2	0.4	477.7	0.6	477.4
01Jan2013	06:25	2.3	0.4	477.7	0.6	477.5
01Jan2013	06:30	2.4	0.4	477.7	0.7	477.5
01Jan2013	06:35	2.4	0.4	477.8	0.7	477.5
01Jan2013	06:40	2.5	0.4	477.8	0.7	477.5
01Jan2013	06:45	2.6	0.4	477.8	0.7	477.6
01Jan2013	06:50	2.7	0.5	477.8	0.8	477.6
01Jan2013	06:55	2.8	0.5	477.9	0.8	477.7
01Jan2013	07:00	3.0	0.5	477.9	0.8	477.8
01Jan2013	07:05	3.1	0.5	477.9	0.8	477.9
01Jan2013	07:10	3.2	0.5	478.0	0.9	477.9

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	07:15	3.4	0.5	478.0	0.9	478.0
01Jan2013	07:20	3.5	0.5	478.0	0.9	478.0
01Jan2013	07:25	3.7	0.6	478.0	1.0	478.0
01Jan2013	07:30	3.9	0.6	478.1	1.0	478.1
01Jan2013	07:35	4.1	0.6	478.1	1.0	478.1
01Jan2013	07:40	4.2	0.6	478.1	1.0	478.1
01Jan2013	07:45	4.4	0.7	478.1	1.1	478.1
01Jan2013	07:50	4.6	0.7	478.2	1.1	478.2
01Jan2013	07:55	4.8	0.7	478.2	1.2	478.2
01Jan2013	08:00	5.0	0.7	478.2	1.2	478.2
01Jan2013	08:05	5.2	0.8	478.3	1.2	478.2
01Jan2013	08:10	5.4	0.8	478.3	1.3	478.3
01Jan2013	08:15	5.7	0.8	478.3	1.3	478.3
01Jan2013	08:20	6.0	0.8	478.4	1.4	478.3
01Jan2013	08:25	6.3	0.9	478.4	1.4	478.4
01Jan2013	08:30	6.6	0.9	478.4	1.5	478.4
01Jan2013	08:35	7.0	0.9	478.5	1.5	478.4
01Jan2013	08:40	7.4	1.0	478.5	1.6	478.5
01Jan2013	08:45	7.8	1.0	478.6	1.6	478.5
01Jan2013	08:50	8.2	1.1	478.6	1.7	478.6
01Jan2013	08:55	8.6	1.1	478.7	1.8	478.6
01Jan2013	09:00	9.0	1.2	478.7	1.8	478.7
01Jan2013	09:05	9.5	1.2	478.8	1.9	478.8
01Jan2013	09:10	9.9	1.3	478.8	2.0	478.8
01Jan2013	09:15	10.1	1.3	478.9	2.1	478.9
01Jan2013	09:20	10.3	1.4	479.0	2.1	479.0
01Jan2013	09:25	10.6	1.4	479.0	2.2	479.0
01Jan2013	09:30	10.8	1.5	479.1	2.3	479.1
01Jan2013	09:35	11.0	1.6	479.1	2.4	479.2
01Jan2013	09:40	11.3	1.6	479.2	2.4	479.3
01Jan2013	09:45	11.7	1.7	479.2	2.5	479.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	09:50	12.1	1.7	479.3	2.6	479.5
01Jan2013	09:55	12.6	1.8	479.3	2.6	479.5
01Jan2013	10:00	13.1	1.9	479.4	2.7	479.6
01Jan2013	10:05	13.6	1.9	479.4	2.8	479.6
01Jan2013	10:10	14.3	2.0	479.5	2.9	479.6
01Jan2013	10:15	15.0	2.1	479.6	3.0	479.7
01Jan2013	10:20	15.7	2.2	479.6	3.1	479.7
01Jan2013	10:25	16.5	2.3	479.7	3.2	479.8
01Jan2013	10:30	17.3	2.4	479.8	3.3	479.8
01Jan2013	10:35	18.3	2.5	479.9	3.4	479.9
01Jan2013	10:40	19.3	2.6	479.9	3.5	480.0
01Jan2013	10:45	20.4	2.7	480.0	3.6	480.0
01Jan2013	10:50	21.8	2.8	480.1	3.7	480.1
01Jan2013	10:55	23.2	2.9	480.2	3.8	480.2
01Jan2013	11:00	24.7	3.1	480.3	3.9	480.3
01Jan2013	11:05	26.3	3.2	480.4	4.0	480.4
01Jan2013	11:10	28.3	3.4	480.5	4.1	480.5
01Jan2013	11:15	30.7	3.6	480.6	4.2	480.6
01Jan2013	11:20	33.5	3.8	480.8	4.4	480.8
01Jan2013	11:25	36.5	4.0	480.9	4.5	480.9
01Jan2013	11:30	39.4	4.2	481.1	4.7	481.1
01Jan2013	11:35	45.3	4.5	481.2	4.8	481.2
01Jan2013	11:40	61.6	4.8	481.5	5.0	481.5
01Jan2013	11:45	92.9	5.3	481.8	5.2	481.8
01Jan2013	11:50	145.1	6.1	482.3	5.6	482.3
01Jan2013	11:55	225.1	7.3	483.1	7.6	483.1
01Jan2013	12:00	294.8	8.9	484.0	35.8	484.0
01Jan2013	12:05	292.5	10.6	484.9	82.8	484.9
01Jan2013	12:10	231.4	11.5	485.4	166.1	485.6
01Jan2013	12:15	226.2	11.8	485.6	198.0	485.7
01Jan2013	12:20	226.7	12.0	485.7	212.5	485.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	12:25	211.3	12.0	485.7	215.8	485.8
01Jan2013	12:30	187.9	11.9	485.6	207.6	485.7
01Jan2013	12:35	164.0	11.8	485.6	191.5	485.7
01Jan2013	12:40	142.5	11.6	485.5	172.0	485.6
01Jan2013	12:45	124.8	11.4	485.3	152.4	485.5
01Jan2013	12:50	110.3	11.2	485.3	134.7	485.4
01Jan2013	12:55	99.2	11.0	485.2	119.4	485.3
01Jan2013	13:00	90.9	10.9	485.1	107.0	485.2
01Jan2013	13:05	85.1	10.8	485.1	97.3	485.1
01Jan2013	13:10	82.8	10.7	485.0	90.5	485.0
01Jan2013	13:15	81.1	10.7	485.0	86.9	485.0
01Jan2013	13:20	79.5	10.6	485.0	85.7	485.0
01Jan2013	13:25	78.1	10.6	484.9	84.4	484.9
01Jan2013	13:30	76.6	10.6	484.9	83.1	484.9
01Jan2013	13:35	74.9	10.5	484.9	81.8	484.9
01Jan2013	13:40	73.4	10.5	484.9	80.4	484.9
01Jan2013	13:45	72.0	10.4	484.8	79.0	484.9
01Jan2013	13:50	70.6	10.4	484.8	77.6	484.8
01Jan2013	13:55	69.2	10.3	484.8	76.2	484.8
01Jan2013	14:00	67.8	10.3	484.8	74.8	484.8
01Jan2013	14:05	66.4	10.2	484.7	73.4	484.8
01Jan2013	14:10	65.1	10.2	484.7	72.0	484.7
01Jan2013	14:15	63.8	10.1	484.7	70.6	484.7
01Jan2013	14:20	62.5	10.1	484.7	69.2	484.7
01Jan2013	14:25	61.2	10.0	484.6	67.9	484.7
01Jan2013	14:30	60.0	10.0	484.6	66.6	484.6
01Jan2013	14:35	58.8	9.9	484.6	65.3	484.6
01Jan2013	14:40	57.6	9.9	484.6	64.0	484.6
01Jan2013	14:45	56.5	9.9	484.5	62.7	484.6
01Jan2013	14:50	55.4	9.8	484.5	61.5	484.5
01Jan2013	14:55	54.4	9.8	484.5	60.3	484.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	15:00	53.2	9.7	484.5	59.1	484.5
01Jan2013	15:05	51.7	9.7	484.4	57.9	484.5
01Jan2013	15:10	50.2	9.7	484.4	56.6	484.5
01Jan2013	15:15	48.6	9.6	484.4	55.3	484.4
01Jan2013	15:20	47.0	9.6	484.4	53.9	484.4
01Jan2013	15:25	45.4	9.5	484.3	52.5	484.4
01Jan2013	15:30	43.9	9.5	484.3	51.1	484.3
01Jan2013	15:35	42.4	9.4	484.3	49.6	484.3
01Jan2013	15:40	40.9	9.4	484.3	48.2	484.3
01Jan2013	15:45	39.5	9.3	484.2	46.7	484.2
01Jan2013	15:50	38.0	9.3	484.2	45.3	484.2
01Jan2013	15:55	36.3	9.2	484.2	43.8	484.2
01Jan2013	16:00	34.7	9.2	484.1	42.3	484.2
01Jan2013	16:05	33.3	9.1	484.1	40.8	484.1
01Jan2013	16:10	31.9	9.1	484.1	39.3	484.1
01Jan2013	16:15	30.7	9.0	484.1	37.8	484.1
01Jan2013	16:20	29.5	9.0	484.0	36.4	484.0
01Jan2013	16:25	28.6	8.9	484.0	35.1	484.0
01Jan2013	16:30	27.7	8.9	484.0	34.3	484.0
01Jan2013	16:35	26.8	8.8	483.9	33.5	484.0
01Jan2013	16:40	25.9	8.8	483.9	32.7	483.9
01Jan2013	16:45	25.2	8.7	483.9	31.9	483.9
01Jan2013	16:50	24.4	8.7	483.9	31.1	483.9
01Jan2013	16:55	23.8	8.6	483.8	30.3	483.9
01Jan2013	17:00	23.2	8.6	483.8	29.6	483.9
01Jan2013	17:05	22.7	8.5	483.8	28.9	483.8
01Jan2013	17:10	22.0	8.5	483.8	28.1	483.8
01Jan2013	17:15	21.3	8.5	483.7	27.4	483.8
01Jan2013	17:20	20.7	8.4	483.7	26.7	483.8
01Jan2013	17:25	20.1	8.4	483.7	26.0	483.8
01Jan2013	17:30	19.6	8.3	483.7	25.3	483.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	17:35	19.1	8.3	483.6	24.7	483.7
01Jan2013	17:40	18.7	8.3	483.6	24.0	483.7
01Jan2013	17:45	18.3	8.2	483.6	23.4	483.7
01Jan2013	17:50	17.8	8.2	483.6	22.8	483.7
01Jan2013	17:55	17.4	8.2	483.6	22.3	483.7
01Jan2013	18:00	17.1	8.1	483.5	21.7	483.6
01Jan2013	18:05	16.8	8.1	483.5	21.2	483.6
01Jan2013	18:10	16.5	8.1	483.5	20.7	483.6
01Jan2013	18:15	16.2	8.0	483.5	20.2	483.6
01Jan2013	18:20	16.0	8.0	483.5	19.7	483.6
01Jan2013	18:25	15.7	8.0	483.5	19.3	483.6
01Jan2013	18:30	15.5	8.0	483.4	18.9	483.6
01Jan2013	18:35	15.2	7.9	483.4	18.5	483.6
01Jan2013	18:40	14.9	7.9	483.4	18.1	483.5
01Jan2013	18:45	14.7	7.9	483.4	17.8	483.5
01Jan2013	18:50	14.5	7.9	483.4	17.4	483.5
01Jan2013	18:55	14.3	7.9	483.4	17.1	483.5
01Jan2013	19:00	14.1	7.8	483.4	16.8	483.5
01Jan2013	19:05	13.9	7.8	483.4	16.5	483.5
01Jan2013	19:10	13.7	7.8	483.3	16.2	483.5
01Jan2013	19:15	13.5	7.8	483.3	15.9	483.5
01Jan2013	19:20	13.3	7.8	483.3	15.6	483.5
01Jan2013	19:25	13.2	7.8	483.3	15.3	483.4
01Jan2013	19:30	13.0	7.7	483.3	15.1	483.4
01Jan2013	19:35	12.8	7.7	483.3	14.8	483.4
01Jan2013	19:40	12.6	7.7	483.3	14.6	483.4
01Jan2013	19:45	12.4	7.7	483.3	14.4	483.4
01Jan2013	19:50	12.2	7.7	483.3	14.1	483.4
01Jan2013	19:55	12.1	7.7	483.3	13.9	483.4
01Jan2013	20:00	11.9	7.7	483.3	13.7	483.4
01Jan2013	20:05	11.7	7.6	483.3	13.5	483.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)	Stage (FT)
01Jan2013	20:10	11.6	7.6	483.2	13.3	483.3
01Jan2013	20:15	11.5	7.6	483.2	13.1	483.3
01Jan2013	20:20	11.3	7.6	483.2	12.9	483.3
01Jan2013	20:25	11.2	7.6	483.2	12.7	483.3
01Jan2013	20:30	11.1	7.6	483.2	12.5	483.3
01Jan2013	20:35	11.0	7.6	483.2	12.4	483.3
01Jan2013	20:40	10.9	7.6	483.2	12.2	483.3
01Jan2013	20:45	10.8	7.6	483.2	12.1	483.3
01Jan2013	20:50	10.7	7.6	483.2	11.9	483.3
01Jan2013	20:55	10.6	7.5	483.2	11.8	483.3
01Jan2013	21:00	10.5	7.5	483.2	11.7	483.3
01Jan2013	21:05	10.5	7.5	483.2	11.5	483.3
01Jan2013	21:10	10.4	7.5	483.2	11.4	483.3
01Jan2013	21:15	10.3	7.5	483.2	11.3	483.2
01Jan2013	21:20	10.3	7.5	483.2	11.2	483.2
01Jan2013	21:25	10.3	7.5	483.2	11.1	483.2
01Jan2013	21:30	10.2	7.5	483.2	11.0	483.2
01Jan2013	21:35	10.1	7.5	483.2	10.9	483.2
01Jan2013	21:40	10.1	7.5	483.2	10.8	483.2
01Jan2013	21:45	10.1	7.5	483.2	10.7	483.2
01Jan2013	21:50	10.0	7.5	483.2	10.7	483.2
01Jan2013	21:55	9.9	7.5	483.2	10.6	483.2
01Jan2013	22:00	9.9	7.5	483.2	10.5	483.2
01Jan2013	22:05	9.8	7.5	483.2	10.4	483.2
01Jan2013	22:10	9.8	7.5	483.1	10.4	483.2
01Jan2013	22:15	9.8	7.5	483.1	10.3	483.2
01Jan2013	22:20	9.7	7.5	483.1	10.2	483.2
01Jan2013	22:25	9.7	7.4	483.1	10.2	483.2
01Jan2013	22:30	9.6	7.4	483.1	10.1	483.2
01Jan2013	22:35	9.5	7.4	483.1	10.1	483.2
01Jan2013	22:40	9.5	7.4	483.1	10.0	483.2

Appendix 6B: Erosion and Sedimentation Control Plan

Revised June 2015

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APPENDIX 6B - EROSION AND SEDIMENTATION CONTROL PLAN

The Erosion and Sedimentation Control Plan has been developed for the purpose of identifying structural and non-structural erosion and sediment control measures that will be employed to handle non-contaminated run-off for intermediate and final developed conditions.

1. DRAINAGE CONDITIONS

1.1 Existing Conditions

The existing permitted site is located approximately 800 feet north of SH 359, approximately 2.5 miles east of downtown Laredo, and is located within the City Limits. The original landfill permit for the 200 acre site was obtained in 1986 (MSW Permit 1693), and was subsequently amended in 1999(MSW Permit 1693A). The area utilized for fill is approximately 150 acres. The highest current elevation is approximately 540 feet above mean sea level ("MSL") in the southwest corner, and the lowest elevation located near the northeast corner is approximately 470 MSL. The facility is located on an outcrop of the Laredo Formation, which is a geologic unit occurring in the Claiborne Group of the Eocene Series within the Tertiary System. The Laredo Formation consists of sandstone and clay with thick sandstone members in the upper and lower part, and is further described as very fine to fine-grained, in part glauconitic, micaceous, ferruginous, cross-bedded, dominantly red and brown with clay in the middle. The site lies within the Rio Grande embayment of the Gulf Coastal Plain, which is characterized by a relatively flat, low-lying surface which slopes gradually to the Gulf of Mexico.

Since no portion of the landfill has been closed to date, all runoff flows across the hills' tops and down the sideslopes to the hills' toes of slope before encountering any drainage structure to alter its flow path. Currently, runoff from the northern areas of Phase 1 and 2 is allowed to run off the site across the northern boundary into an existing drainage feature as sheet flow or is captured by a system of channels and directed to two sedimentation/detention ponds identified as Pond A and Pond B. Flow released from Ponds A and B leaves the site across the northern boundary as channelized flow. Run-off in the southern area runs to either an existing system of channels to a sedimentation/detention pond identified as Pond C, is captured in one of several onsite excavated pits where it collects until pumped out, or is allowed to sheet flow off the site in small amounts. Run-off released from Pond C flows into a channel along the sites eastern boundary to discharge off the site near its northeast corner into the existing drainage feature previously mentioned. See Figure III.6.2 for existing onsite drainage patterns and structures.

1.2 Developed Conditions

The landfill's Proposed Drainage Plan is shown on Figure III-6.3. The final developed condition will include perimeter channels, sedimentation/detention ponds, vegetation, and paved or rock armored surfaces to control all site stormwater runoff. The existing drainage patterns on the northern portions of the site will remain for the proposed condition. Due to the combining of the Phase 1 hill with Phase 4 and the Phase 2 hill with Phase 3, the drainage patterns in the southern portions will be changed to redirect flow around the southern footprint of Phases 3 and 4 and to reconfigure Pond C (into Ponds C1 and C2). As with the current condition, small amounts of run-off are allowed to sheet flow off the site along the west boundary and the rest is directed to Pond C1 and C2. Flow released from these ponds is discharged off the site at the northeast corner via a channel into the existing drainage feature. The majority of surface water run-off from the landfill facility passes through the sedimentation ponds.

1.3 Interim Conditions

During development of the landfill, temporary diversion berms, rock filter dams, silt fencing and hay bales will be utilized where permanent measures have not been installed to prevent discharge of sediment-carrying surface water from the site. Details for these erosion control structures are shown on Figures III-6B.1 and III-6B.2. These temporary measures may be installed for intermediate covers, sheet flow areas, around the active face, and at newly graded areas around the base of the hills. These temporary structures will be placed, relocated and removed as necessary to accommodate the progressing development of the landfill. The proposed development plan is shown on Figures III-1.2 through III-1.9.

2. EROSION AND SEDIMENTATION CONTROLS

Preventing erosion is the most effective way to minimize soil loss during construction of a landfill. Erosion control best management practices (BMPs) will be implemented to minimize the amount of erosion from the landfill's surface areas. Also, run-off that does cause erosion will be directed to structures that allow sediment to be captured before leaving the site. The following summarizes the structural and non-structural BMP's which will be utilized at this facility.

1.1 Best Management Practices (BMPs)

During construction phases, temporary controls will be implemented for erosion and sedimentation management. Throughout the entire phasing of construction intermediate controls will be implemented and upon final closure permanent erosion control practices will be implemented.

2.1.1 Structural Controls – Structural controls are engineered devices that must be constructed or installed to limit erosion, and will be employed as required during all phases of the landfill life cycle. Examples of structural controls are silt fences, straw bales, rock filter berms, earth diversion berms, drainage channels, sedimentation ponds, and vegetation. Permanent and non-permanent structural controls will be constructed to accommodate the development condition at the time of construction. The following types of structural controls will be used at the facility.

- **Drainage Channels, Interceptor Berms and Check Dams** – Drainage channels and interceptor berms will be used to direct stormwater run-off away from working areas and into sedimentation ponds. Channels and berms will be designed to convey the design run-off at non-erosive velocities. Where velocities cannot be kept below the non-erosive level, the channel will be armored with rock riprap. At specified locations, rock check dams will be placed in channels to reduce discharge velocities and capture suspended sediment prior to leaving the site. Interceptor berms shall be constructed on the final cover at a maximum of 40 vertical-feet intervals to keep soil loss below the 3 ton/year allowable threshold as is demonstrated in the soil loss calculations provided in Attachment 12, Appendix B. Perimeter and rundown channels will be installed as shown on the drainage plans in Attachment 6.

- **Sedimentation Ponds** – Onsite channels will direct run-off to sedimentation ponds designed to hold water long enough for sediment to settle, allowing less sediment from leaving the site. Sediment captured during rainfall events will collect in these ponds and will have to be periodically removed to maintain the pond's design capacity. The design operation characteristics of each pond are described in Part III, Attachment 6.

- **Vegetation** – Due to the dry climate conditions of Webb County, the advantages of temporarily vegetating areas will be limited. Perimeter areas of the landfill that are not impacted by ongoing site operations or construction will be vegetated and allowed to grow undisturbed. Landfill areas that reach final permitted elevations may be vegetated or have an alternative cover placed in accordance with the Final Cover Plan presented in Part III, Attachment 12.

- **Silt Fences and Hay Bales** – Silt fences and hay bales will be installed where sheet flow occurs such as around the base of soil stockpile areas, active excavation and construction areas, along/around drainage features, and other areas as necessary to minimize transport of sediment in stormwater runoff. Silt fences will be placed so that the intercepted drainage area does not exceed the manufacturor's specification and in no case greater than 0.5 acre per 100 feet of silt fence.

- Compost Filter Berms – Compost filter berms or mesh socks filled with compost, mulch, straw, or similar materials may be installed at the bottom or on sides of slopes, and at locations along the perimeter drainage system to intercept runoff, capture sediments from the runoff , reduce flow velocity, and release the runoff as sheet flow. Filter berms should be at least 1-foot high by 2-feet wide and not allow stormwater to to pool on the landfill cover system.

- **Rock Armoring** – The top of dome and 4:1 sideslopes may be protected from erosion by the placement of rock armoring on the surface of the hills. This option may be used if vegetative cover cannot be successfully established due to climatic conditions. The rock armor cover alternative is presented in the Final Cover Plan presented in Part III, Attachment 12, which includes soil loss calculations.

As permanent drainage and erosion control measures are constructed and become affective during the operating phase of the landfill, the temporary erosion control measures may be removed.

2.1.2 **Non-Structural Controls** are BMPs that do not involve a structured or engineered solution. They include such measures as site inspection, site maintenance, phased development planning, education, and following stormwater management regulations. The Final Cover Plan identifies the non-structural erosion prevention/control measures to be taken during the closure process for areas of the landfill.

During the development process, non-structural erosion prevention and control measures will need to be employed prior to final cover being installed. Since vegetation will be difficult and/or slow to become established to an affective level, post-rainfall and periodic inspection and maintenance of the hill tops, sloped surfaces and drainage features will be necessary. Landfill personnel will make an inspection of all erosion prevention and drainage facilities at least once per month. On the next working day after a significant rainfall event that historically generates erosive conditions at the landfill, the erosion control devices and drainage structures will be inspected by site personnel for integrity and performance. Any failures or inoperable structures will be repaired as soon as feasible. Each inspection, maintenance operation or repair performed will be documented by the landfill operator in the Site Operating Record. The landfill operator is required to maintain the drainage facilities at all times so that run-off will not flow into the active portion of the landfill and solid waste or leachate will not be discharged from the site. The dry climate does reduce the number of rain events that will require post-event surface maintenance. Inspection, maintenance and repair operations will be performed by qualified personnel and these erosion control plans will be part of the training curricula.

Continual inspection of the site's temporary and permanent erosion control devices will be necessary to identify failures prior to expected rainfall events. Drainage structures will need to be inspected to determine operational capability and to determine remaining holding capacities of sedimentation ponds. All sediment removed from the ponds, channels and other structures and devices will be utilized in waste operations or site maintenance. Sediment removal will be accomplished using typical excavation equipment and trucks.

3. Soil Loss Calculation

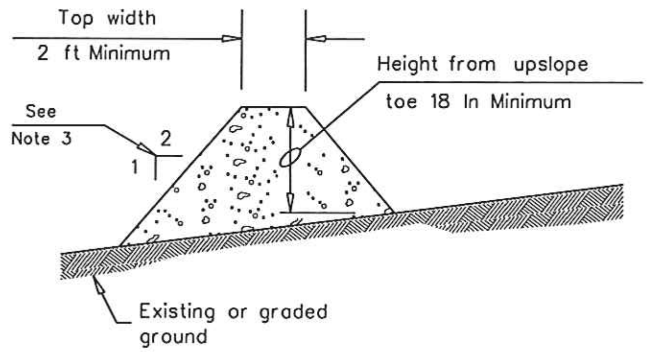
Soil loss calculations were completed using the Revised Soil Loss Equation (RUSLE) as provided by the National Resource Conservation Service (NRCS). These calculations are presented in Attachment 12, AppendixB.

4. Permissable Non-erodible Velocity Calculation

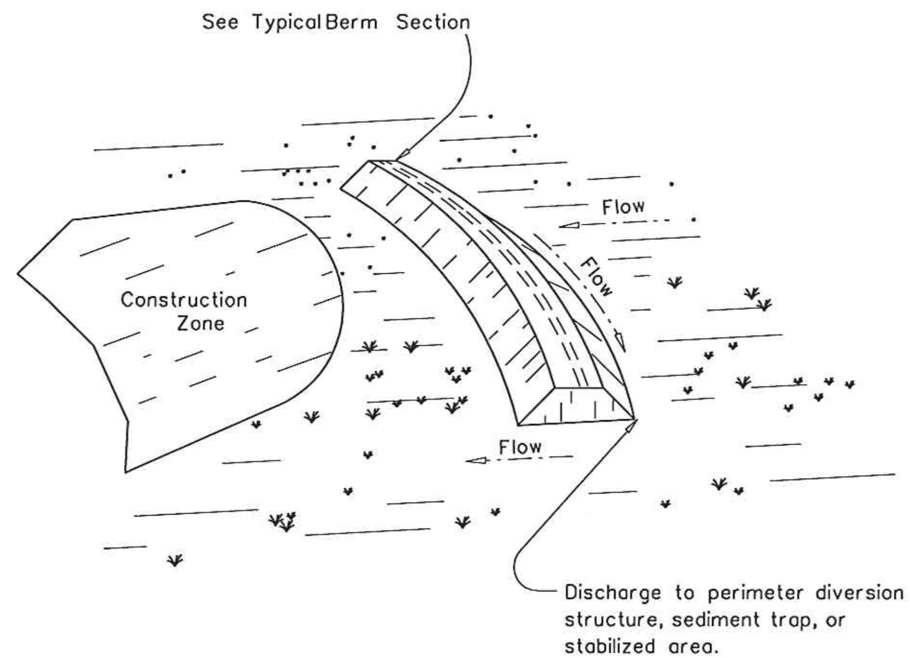
Temporary and permanent erosion control measures during fill operations and post-closure are provided to prevent and reduce erosion and sediment transfer from the site. The final cover of the top domes will have a maximum slope of 5.0% and sideslopes will have a maximum slope of 25% (4H:1V). Overland flow velocities created by the proposed landfill design should be below the non-erosive velocity for similar soil and vegetative cover conditions. A typically used maximum non-erosive flow velocity for a similar sparsely vegetated intermediate cover condition is 4 feet per second (fps). For the final cover, the maximum non-erosive velocity is 3 fps based on a surface partially vegetated with short grass.

Overland sheet flow velocities were calculated for the worst case situation for the top domes and sideslopes. The methodology used to calculate the sheet flow velocities is provided in Attachment 6, Section 1.3.6 – Erosion Stability. The calculated velocities will then be compared to the maximum non-erosive velocities to check that erosive conditions are not being created.

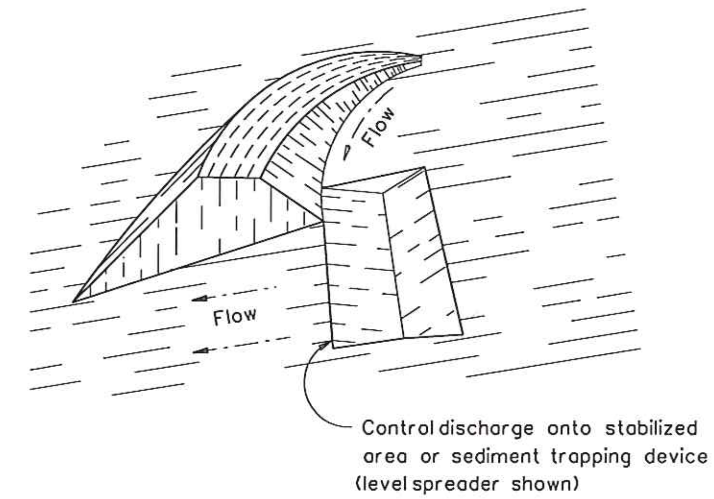
The worst case situation is where the longest overland flow length is experienced. For both the top dome and sideslopes in both the intermediate and final cover conditions, this occurs on the north face of the western finished hill. There, the maximum top dome flow length is 95 feet for each cover condition and the maximum sideslope flow length is 790 feet for the intermediate cover condition and 165 feet for the final cover. Using the methodology described above for the intermediate cover condition, the 5% top dome slope creates a maximum flow velocity of 0.82 fps and 3.08 fps for the 25% sideslope. Both of these calculated values are less than the 4 fps maximum non-erosive velocity for intermediate cover and are therefore acceptable. For the final cover condition, the 5% top dome slope creates a maximum flow velocity of 0.71 fps and 1.44 fps for the 25% sideslope. Both of these calculated values are less than the 3 fps maximum non-erosive velocity for the final cover and are therefore acceptable. The calculations for overland sheet flow velocities are provided in Appendix 6A – Drainage Structures – Design Calculations.



TYPICAL BERM SECTION (1 / 6B.2)
NTS



INTERCEPTOR BERM (2 / 6B.2)
NTS



PERIMETER BERM (3 / 6B.2)
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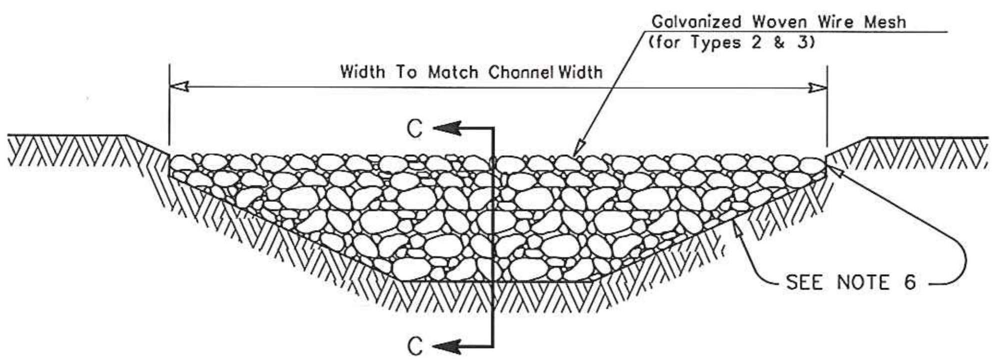
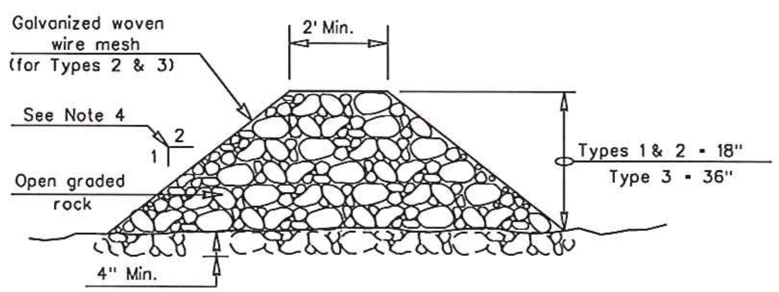


FILTER DAM AT CHANNEL SECTIONS (4 / 6B.2)
NTS



SECTION C-C (5 / 6B.2)
NTS

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approx. 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

BERM USAGE GUIDELINES

A berm may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).

The drainage area contributing runoff to a berm should not exceed 5 acres. The spacing of berms should be as follows:

Slope of disturbed areas above berm	greater than 10%	5 - 10%	less than 5%
Maximum distance between berms	100'	200'	300'

Intercepted runoff flowing along a berm should outlet to a stabilized area (vegetation, rock, etc.).

GENERAL NOTES:

1. Soil used in dike construction shall be machine compacted.
2. Top width and height of dike may be modified with prior approval of the Engineer.
3. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
4. Grading shall be shown elsewhere in the plans or as directed by the Engineer.
5. The Engineer reserves the right to modify the dimensions shown for the dike dependent on runoff volume characteristics.
6. Dikes that are in place for more than 14 calendar days should be stabilized to prevent sediment runoff.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
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FOR PERMIT PURPOSES ONLY

STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER

Steven B. Heniford 6/18/15

REV	DATE	DESCRIPTION	DES BY	APP BY
1	6/18/15	NOD NO. 1	SBH	SBH

CITY PROJ. No.	LAREDO LANDFILL VERTICAL EXPANSION
AZB PROJ. No. 212029	PERMIT AMENDMENT APPLICATION No. MSW-1693B
DATE: AUGUST 2014	WEBB COUNTY, TEXAS
DES BY SH	EROSION CONTROL DETAILS
DRN BY AZB	BERM & CHECK DAMS
CHK BY SH	FIGURE III-6B.2
APP BY MC	

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6B