Permit Amendment TCEQ Permit No. MSW- 1693B
City of Laredo Landfill

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Permit Amendment

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TBPE FIRM № F10098

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

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LAREDO LANDFILL
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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
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Permit Amendment Part III – 10	Soil Liner Quality Control Plan
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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	########	2,042	3,064
2034	651,898	########	2,089	3,134
2035	666,887	########	2,137	3,206
2036	682,221	########	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

Landfill Boundary	Existing Buffer To Permit Boundary	Drainage Easement & City Owned Property Buffer Zone
Northern Boundary (no new waste located along Northern boundary)	53’ to 64’	352’ to 430’
East Boundary	126’ to 316’	231’ to 421’
Southern Boundary (no new waste within 125’ of the current limit of fill along Southern Boundary)	77’ to 269	777’ to 969’
Western Boundary	105’ to 146’	205’ to 207’

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. Table III.5 presents the permitted maximum depth and maximum height of the four Landfill phases. 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.

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	452.0'	640.5'
2 (Type I)	North East	430.0'	637.0'
3 (Type I)	South East	490.0'	547,0'
4 (Type IV)	South West	498.0'	575,0'
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 liner cross-section for the most recently constructed cell, Phase II-Cells 13/14, is described in Table III.6 below. This is a typical design configuration for future cells.

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

Phase II - Cell 13/14 Liner Components

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

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. All of Phase I and a majority of Phase II have intermediate cover in place in accordance with the SOP. 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 640.5' to 664' on the West Phase and from 637' feet to 652' on the East Phase. 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**
[illegible]	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.

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. Table III.8 presents a summary of liner details throughout the site, including cells that will be constructed in the future. Liner details for future cells are presented in Attachment III-15. 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.8
Existing & Future Cell Configurations

CELL	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	In-situ and compacted clay	458.11	N/A	N/A	N/A	N/A
Phase 2, Cell 1	In-situ	470.00	N/A	N/A	N/A	N/A

CELL	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 2	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%
Phase 2, Cell 3	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	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	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	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	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	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	GCL, 60-mil HDPE	449.50	Geonet w/ geotextile one side, 2 ft of protective cover	No. 2-13/14	1.6%	2.5%

CELL	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 1	GCL, 60-mil HDPE	443.00	Geonet w/ geotextile one side, 2 ft of protective cover	No. 3-1	1%	2%
Phase 3, Cell 2	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	GCL	495.00	N/A	N/A	N/A	N/A
Phase 4, Cell IV-1 Type I Design	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	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	GCL, 60-mil HDPE	465.50	Geonet w/ geotextile one side, 2 ft of protective cover	No. 4-3	1%	2%
Phase 5	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

Attachment II.6 presents the sequencing plan for the Landfill.

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 654.7 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 640.5 msl to 664.8 msl.

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.

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 demoansatrated 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 # TXR05A235. 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.

Landfill and Working Face

- 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.

Other Areas

- 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 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

PART III
Attachment 1
Site Layout Plan

STATE OF TEXAS
STEVEN B. HENIFORD
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LICENSED
PROFESSIONAL ENGINEER

TX F-10098
9/17/14

LAREDO LANDFILL
PART III
Attachment 1
Site Layout Plan

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STATE OF TEXAS
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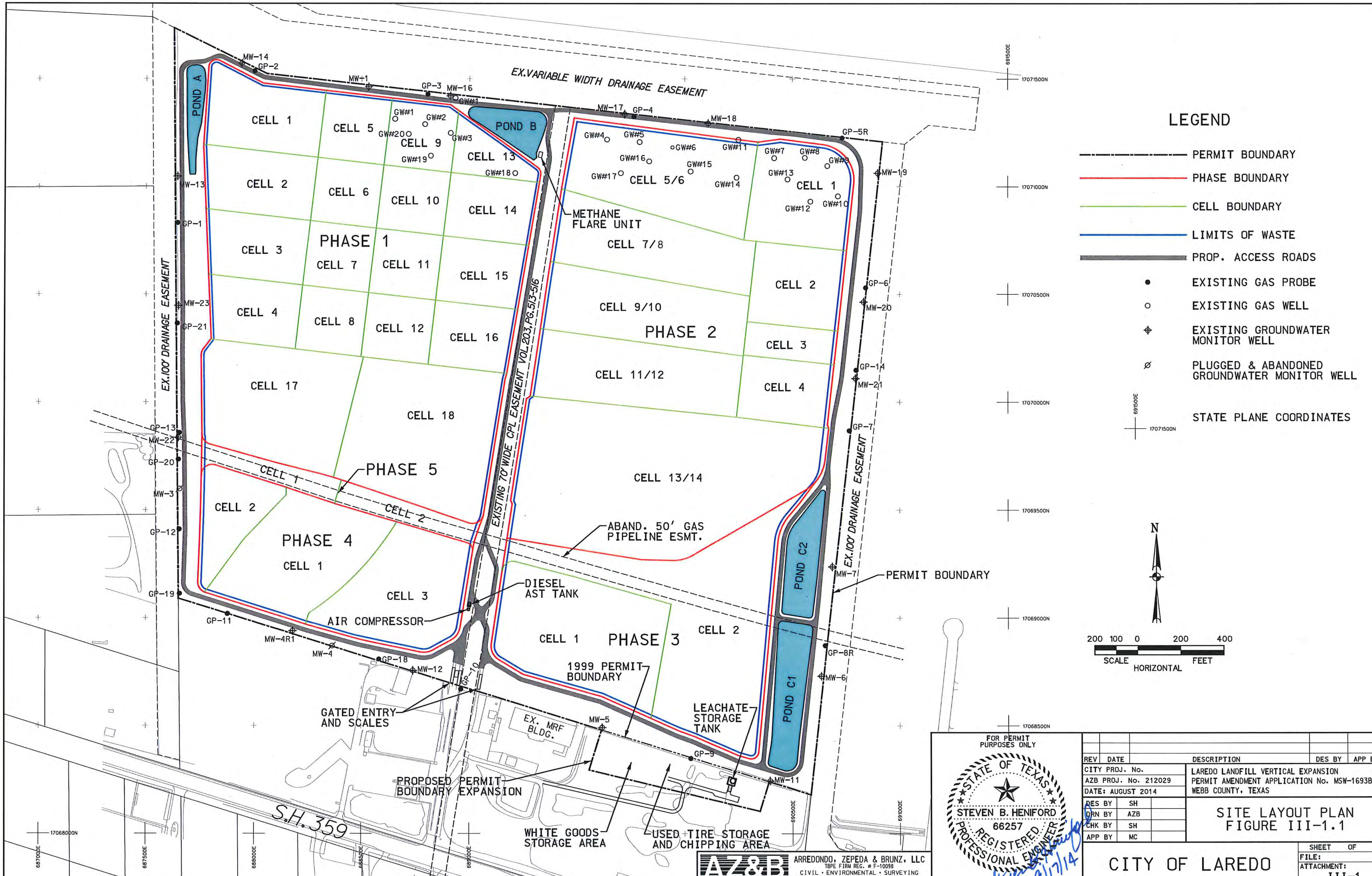
TX F-10098
9/17/14



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
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EX.100' DRAINAGE EASEMENT
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PHASE 5
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CELL 18
CELL 5/6
CELL 7/8
CELL 9/10
CELL 11/12
CELL 13/14
METHANE FLARE UNIT
ABAND. 50' GAS PIPELINE ESMT.
DIESEL AST TANK
AIR COMPRESSOR
GATED ENTRY AND SCALES
EX. MRF BLDG.
1999 PERMIT BOUNDARY
PROPOSED PERMIT BOUNDARY EXPANSION
WHITE GOODS STORAGE AREA
USED TIRE STORAGE AND CHIPPING AREA
LEACHATE STORAGE TANK
PERMIT BOUNDARY
S.H. 359
N
200 100 0 200 400
SCALE HORIZONTAL FEET
FOR PERMIT PURPOSES ONLY
STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14
AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
CIVIL · ENVIRONMENTAL · SURVEYING
CONSTRUCTION MANAGEMENT · MUNICIPAL
REV DATE DESCRIPTION DES BY APP BY
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
SITE LAYOUT PLAN
FIGURE III-1.1
CITY OF LAREDO
SHEET OF
FILE:
ATTACHMENT:
III-1

N

200 100 0 200 400
SCALE HORIZONTAL FEET

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
5. CONSTRUCT LINER & LEACHATE SYSTEM IN PHASE 4 THEN FILL
6. CONSTRUCT LINER & LEACHATE SYSTEM IN PHASE 5 THEN FILL
7. FILL TO FINAL ELEVATION ON WEST PHASE, INCLUDING CONSTRUCTION OF LINER & LEACHATE SYSTEM OVER AREAS OF PRE-SUBTITLE D WASTE ON PHASE2

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APP BY MC

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

OVERALL SITE DEVELOPMENT PLAN
FIGURE III-1.2

SHEET OF
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CITY OF LAREDO

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LEGEND

- PERMIT BOUNDARY
- PHASE BOUNDARY
- CELL BOUNDARY
- 600 — PROPOSED 10' CONTOUR
- 580 — EXISTING 10' CONTOUR
- 17071500N 691500E — STATE PLANE COORDINATES

NOTES:

1. STAGE 1 TO CONSIST OF FILL TO 1999 PERMITTED FINAL GRADE IN PHASE 2.
2. LEACHATE STORAGE, DIESEL AST AND AIR COMPRESSOR RELOCATED PER 2013 PERMIT MODIFICATION.

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REV	DATE	DESCRIPTION	DES BY	APP BY

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DES BY SH	SITE DEVELOPMENT PLAN
DRN BY AZB	STAGE 1
CHK BY SH	FIGURE III-1.3
APP BY MC	

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CITY OF LAREDO

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LEGEND

- PERMIT BOUNDARY
- PHASE BOUNDARY
- CELL BOUNDARY
- NEW LINER OVER PRESUBTITLE D
- PROPOSED 10' CONTOUR
- EXISTING 10' CONTOUR
- 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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AZB PROJ. No. 212029	PERMIT AMENDMENT APPLICATION No. MSW-1693B
DATE: AUGUST 2014	WEBB COUNTY, TEXAS
DES BY SH	SITE DEVELOPMENT PLAN
DRN BY AZB	STAGE 2
CHK BY SH	FIGURE III-1.4
APP BY MC	

CITY OF LAREDO

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N

200 100 0 200 400

SCALE HORIZONTAL FEET

LEGEND

- PERMIT BOUNDARY
- PHASE BOUNDARY
- CELL BOUNDARY
- 600 PROPOSED 10' CONTOUR
- 580 EXISTING 10' CONTOUR
- 17071500N 691500E STATE PLANE COORDINATES

NOTES:

1. STAGE 3 TO OCCUR AFTER APPROVAL OF PERMIT AMENDMENT.
2. STAGE 3 TO CONSIST OF CONSTRUCTION AND FILL OF PHASE 3 CELL 2 PER AMENDED PERMIT.
3. PONDS C1 AND C2 TO BE CONSTRUCTED WITH PHASE 3, CELL 2 CONSTRUCTION.

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APP BY MC

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

SITE DEVELOPMENT PLAN
STAGE 3
FIGURE III-1.5

CITY OF LAREDO

SHEET OF
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ATTACHMENT: III-1

NOTES:

1. STAGE 4 TO CONSIST OF FILL TO AMENDED PERMIT FINAL GRADE IN PHASES 2 AND 3.
2. BEGIN CLOSURE OF EAST PHASE.

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DATE: AUGUST 2014
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LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

SITE DEVELOPMENT PLAN
STAGE 4
FIGURE III-1.6

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CITY OF LAREDO

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N

200 100 0 200 400
SCALE HORIZONTAL FEET

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 PHASE 4 LINER AND LEACHATE SYSTEM INCLUDING PIGGYBACK LINER OVER EXISTING TYPE 4 WASTE AREA (CELL 1) FOLLOWED BY FILL OVER THESE ARAES.

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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:
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N

200 100 0 200 400

SCALE HORIZONTAL FEET

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 LINER AND LEACHATE SYSTEM OF PHASE 5, FILL TO PREVIOUSLY PERMITTED FINAL GRADE IN PHASE 1, INCLUDING CONSTRUCTION OF LINER OVER PRE-SUBTITLE D AREA OF PHASE 1.

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DES BY	SH	SITE DEVELOPMENT PLAN STAGE 6 FIGURE III-1.8
DRN BY	AZB	
CHK BY	SH	
APP BY	MC	

CITY OF LAREDO

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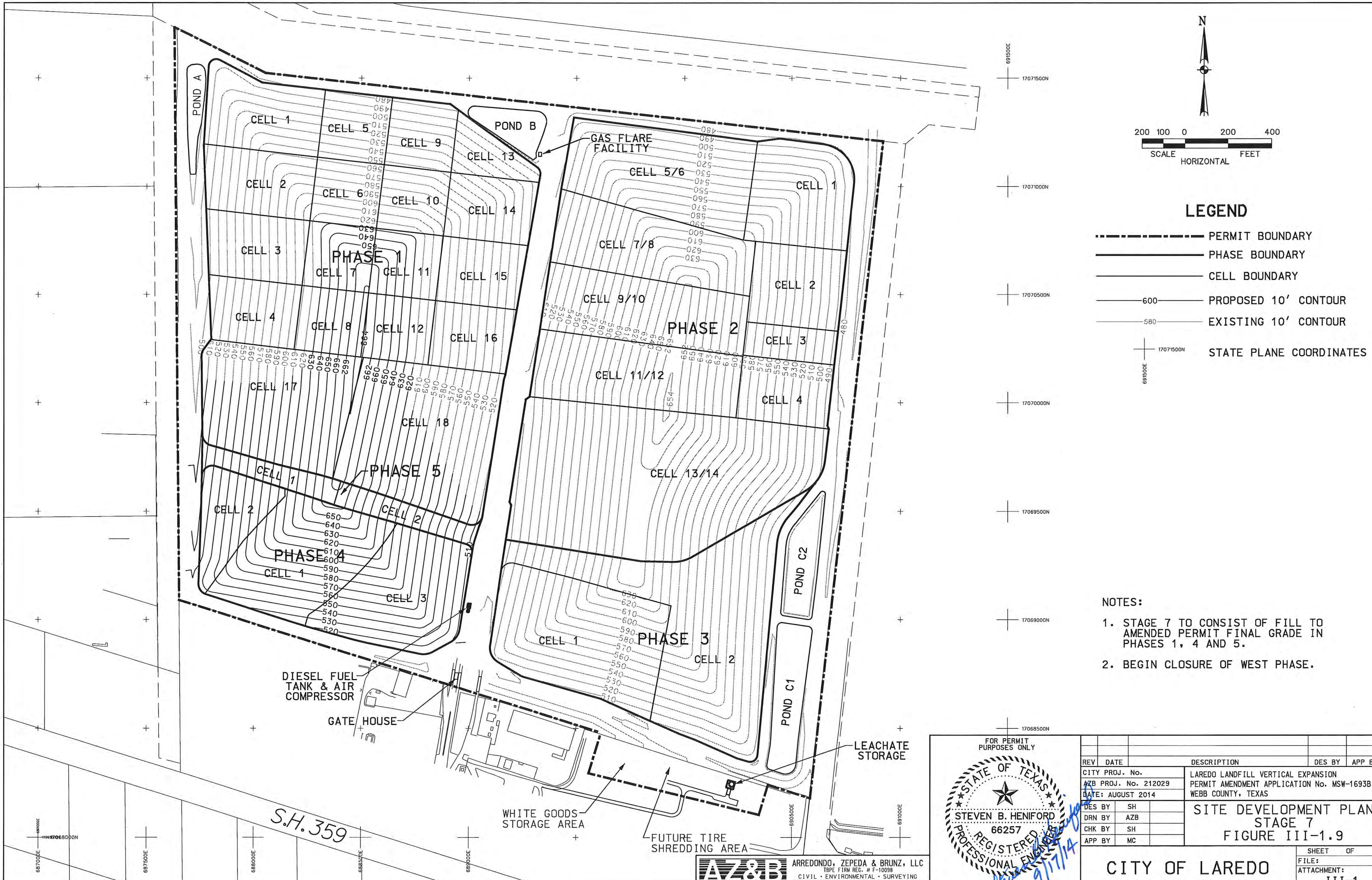
POND A
POND B
GAS FLARE FACILITY
CELL 1
CELL 5
CELL 9
CELL 13
CELL 2
CELL 6
CELL 10
CELL 14
CELL 3
PHASE 1
CELL 7
CELL 11
CELL 15
CELL 4
CELL 8
CELL 12
CELL 16
CELL 17
CELL 18
PHASE 5
CELL 1
CELL 2
PHASE 4
CELL 1
CELL 3
CELL 5/6
CELL 1
CELL 7/8
CELL 2
CELL 9/10
PHASE 2
CELL 3
CELL 11/12
CELL 4
CELL 13/14
POND C2
POND C1
CELL 1
PHASE 3
CELL 2
DIESEL FUEL TANK & AIR COMPRESSOR
GATE HOUSE
WHITE GOODS STORAGE AREA
FUTURE TIRE SHREDDING AREA
LEACHATE STORAGE
S.H. 359
N
200 100 0 200 400
SCALE FEET
HORIZONTAL
LEGEND
PERMIT BOUNDARY
PHASE BOUNDARY
CELL BOUNDARY
600 PROPOSED 10' CONTOUR
580 EXISTING 10' CONTOUR
STATE PLANE COORDINATES
NOTES:
1. STAGE 7 TO CONSIST OF FILL TO AMENDED PERMIT FINAL GRADE IN PHASES 1, 4 AND 5.
2. BEGIN CLOSURE OF WEST PHASE.
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9/17/14
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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
SITE DEVELOPMENT PLAN
STAGE 7
FIGURE III-1.9
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CITY OF LAREDO
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ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
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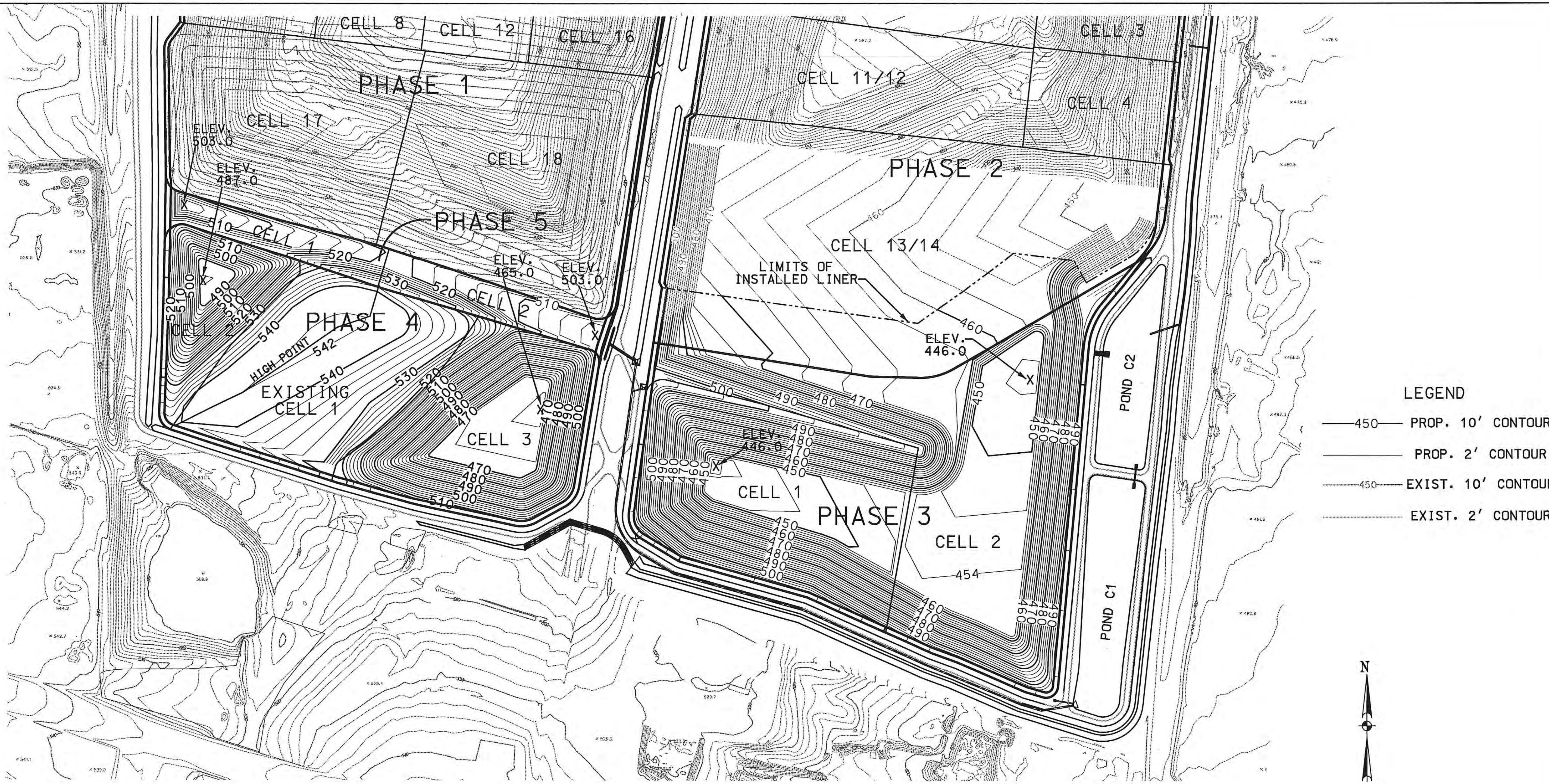
CONSTRUCTION MANAGEMENT · MUNICIPAL



200 100 0 200 400

SCALE FEET

HORIZONTAL

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9/17/14

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AZB PROJ. No. 212029	
DATE: AUGUST 2014	
DES BY SH	BASE GRADES PHASES 3, 4, & 5 FIGURE III-1.10
DRN BY AZB	
CHK BY SH	
APP BY MC	

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CITY OF LAREDO

SHEET OF
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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

PART III
Attachment 2
Fill Cross Sections

STATE OF TEXAS
STEVEN B. HENIFORD
66257
LICENSED
PROFESSIONAL ENGINEER

TX F-10098
Steven B. Heniford
9/17/14

LAREDO LANDFILL
PART III
Attachment 2
Fill Cross Sections

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STATE OF TEXAS
STEVEN B. HENIFORD
66257
LICENSED
PROFESSIONAL ENGINEER

TX F-10098
9/17/14

LEGEND

—·—·—	PERMIT BOUNDARY
———	PHASE BOUNDARY
— — —	LIMITS OF HILL
——500——	PROPOSED 10-FT CONTOURS
——500——	EXISTING 10-FT CONTOURS
B11	SOIL BORING
P-6	PIEZOMETER

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DATE: AUGUST 2014

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

DES BY	SH
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CHK BY	SH
APP BY	MC

PROPOSED FILL CROSS SECTION LAYOUT
FIGURE III-2.1

CITY OF LAREDO

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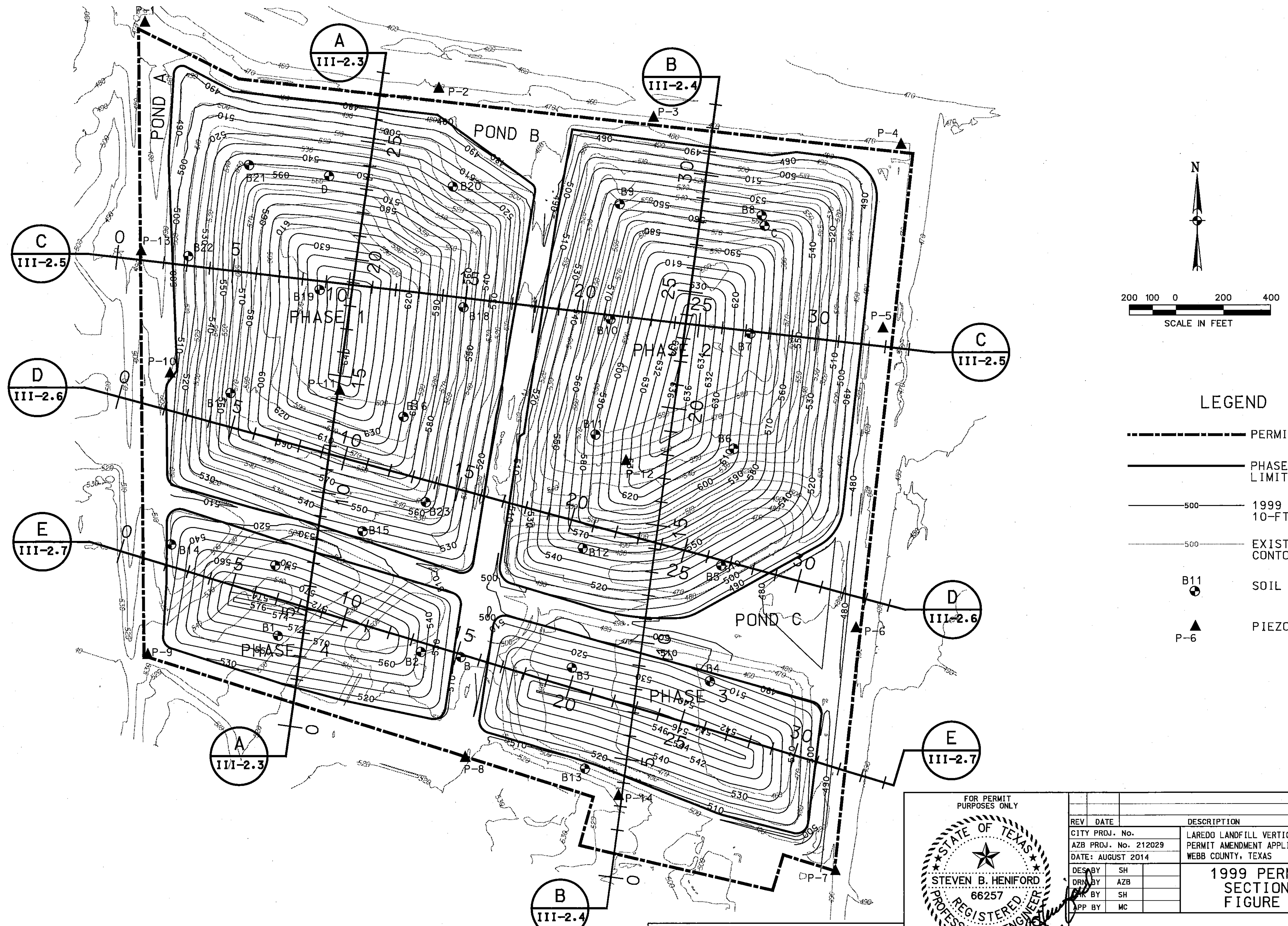

LEGEND

- PERMIT BOUNDARY
- PHASE BOUNDARY & LIMITS OF HILL
- 500 — 1999 PERMIT 10-FT CONTOURS
- 500 — EXISTING 10-FT CONTOURS
- B11 — SOIL BORING
- P-6 — PIEZOMETER

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DATE: AUGUST 2014	
DES BY SH	1999 PERMIT CROSS SECTION LAYOUT FIGURE III-2.2
DRN BY AZB	
CHK BY SH	
APP BY MC	

CITY OF LAREDO

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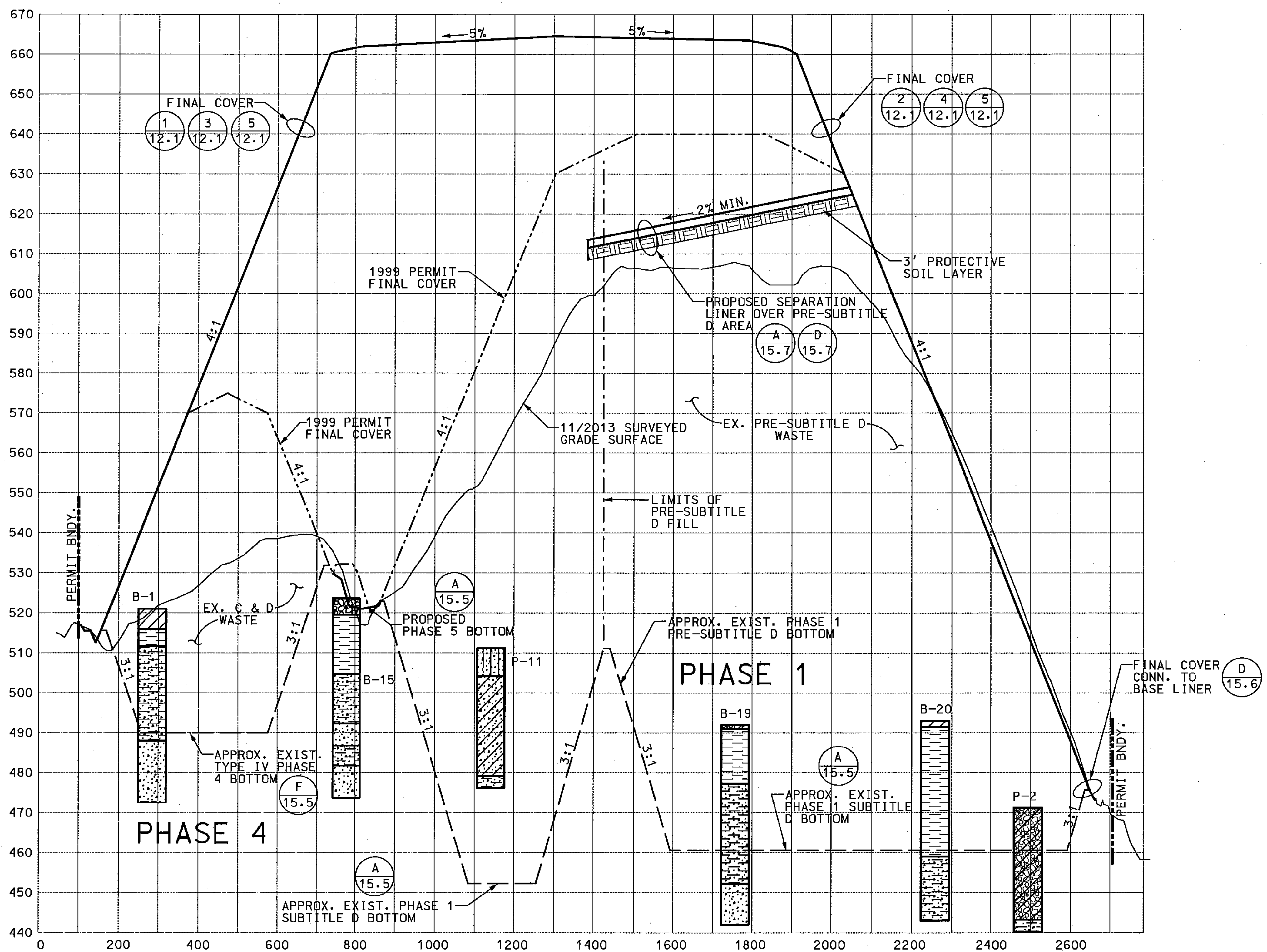
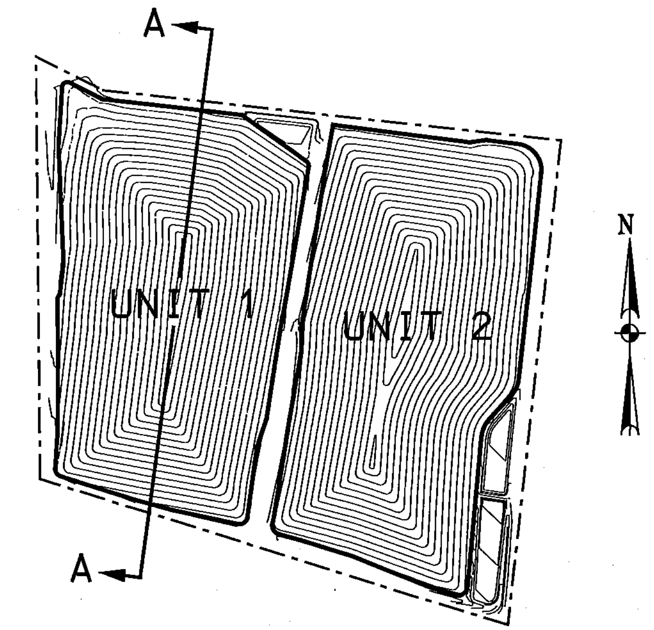
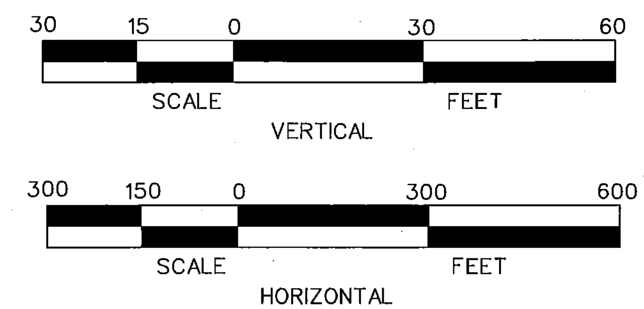


BORING LOG LEGEND

- CLAY
- SANDY CLAY
- CLAYEY SAND WITH GRAVEL
- SILT
- SANDY SILT
- SHALE
- SHALY SANDSTONE
- SANDSTONE
- SANDY GRAVEL





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9/17/14

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FILL CROSS SECTION
SECTION A-A
FIGURE III-2.3

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CITY OF LAREDO

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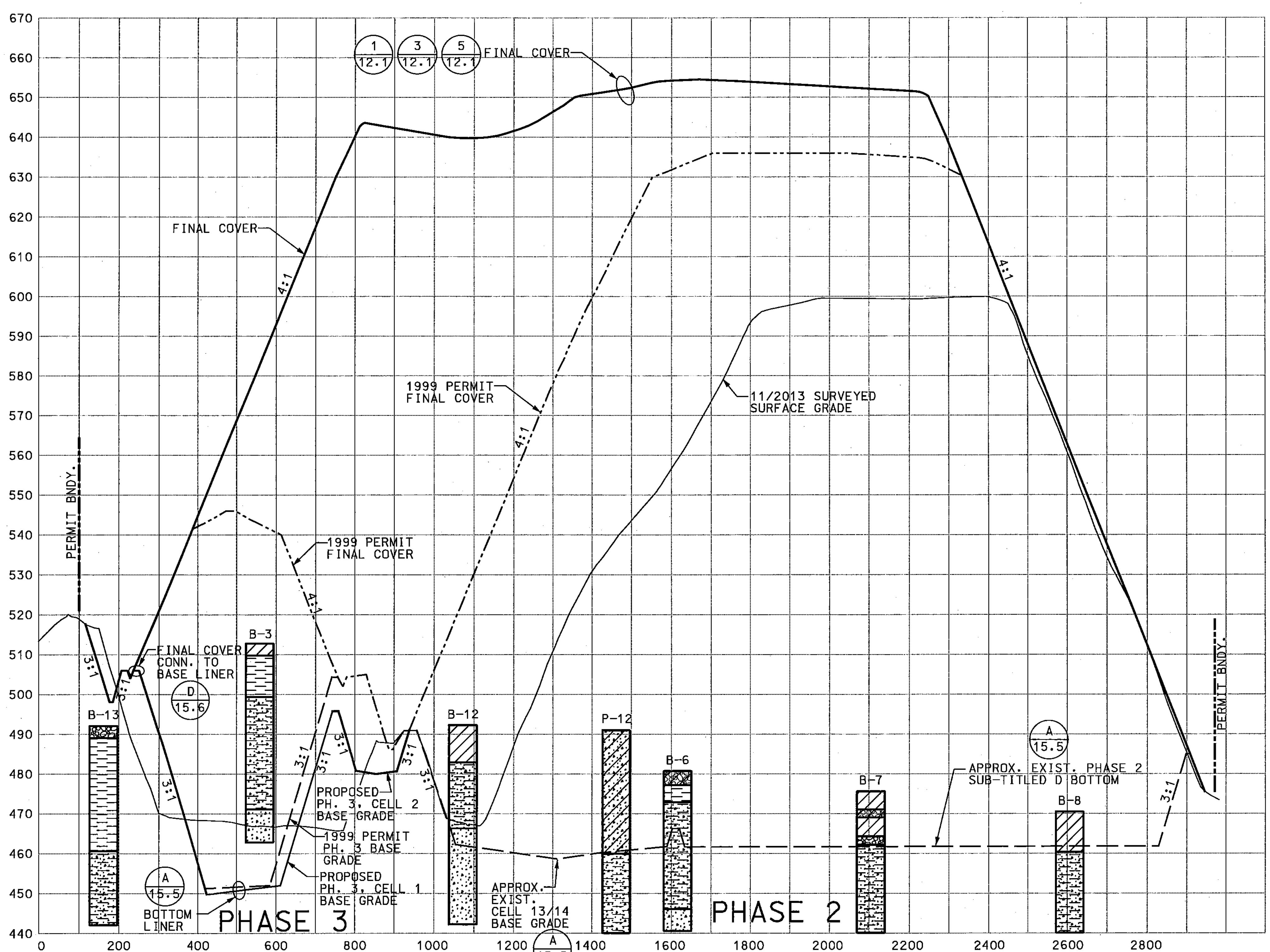
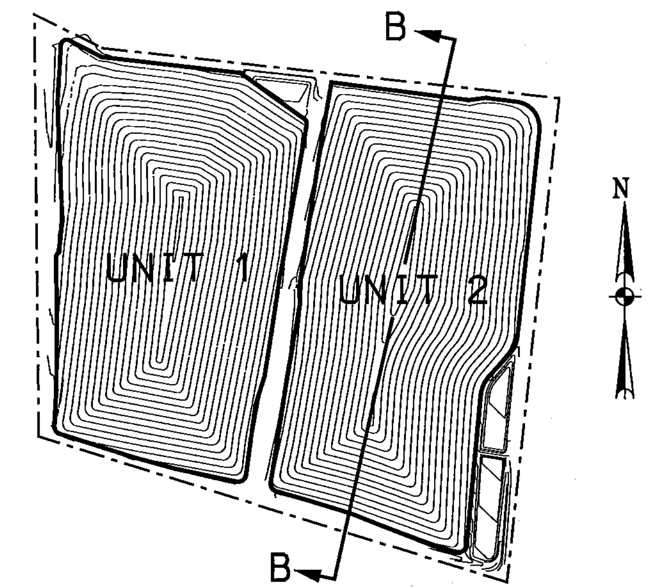


BORING LOG LEGEND

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



SCALE VERTICAL FEET (30 15 0 30 60)

SCALE HORIZONTAL FEET (300 150 0 300 600)

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LAREDO LANDFILL VERTICAL EXPANSION
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WEBB COUNTY, TEXAS

FILL CROSS SECTION
SECTION B-B
FIGURE III-2.4

CITY OF LAREDO

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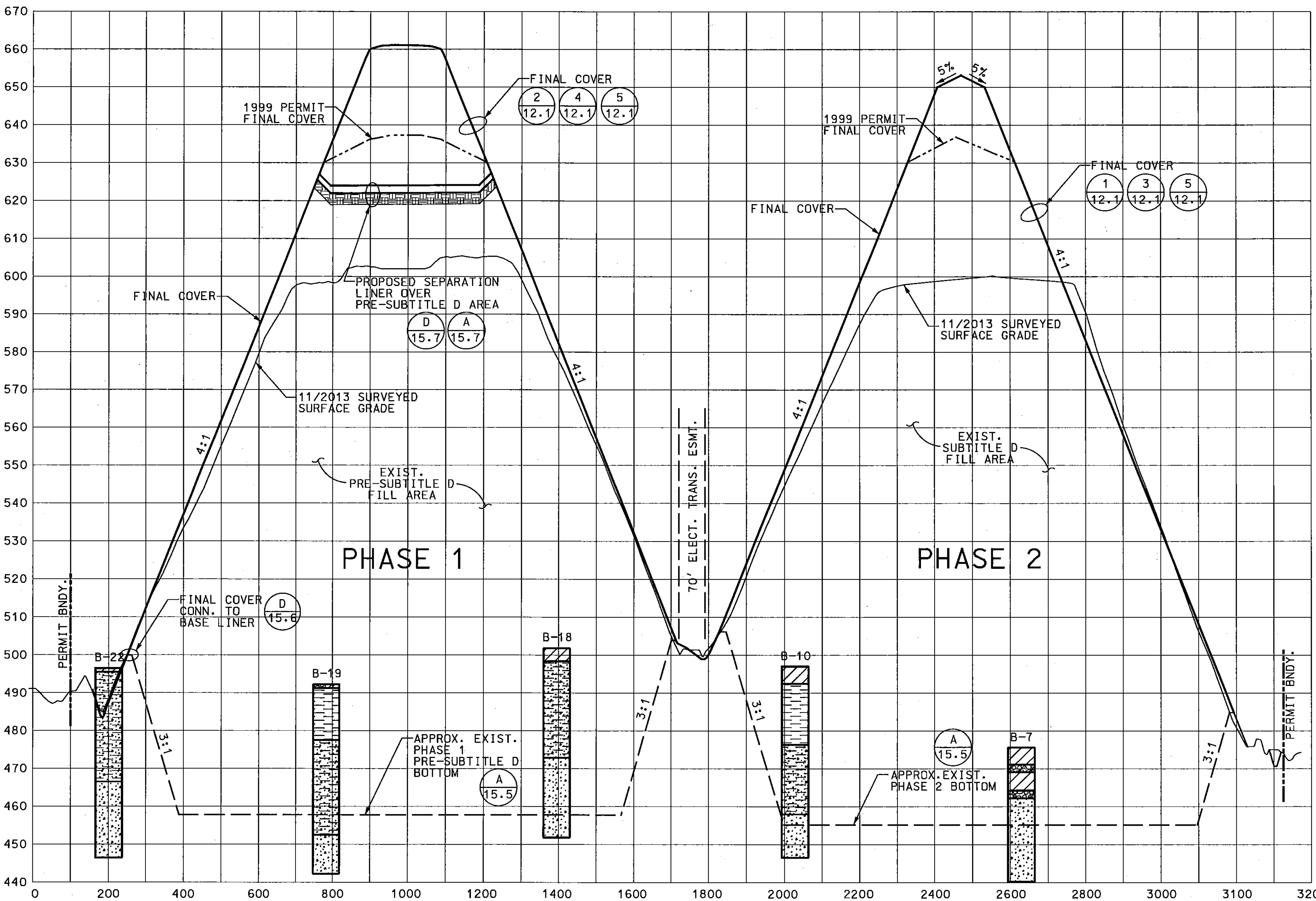
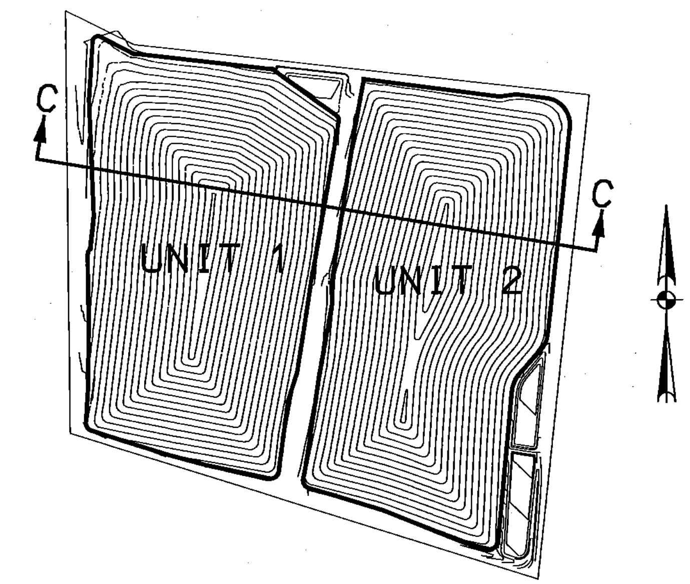
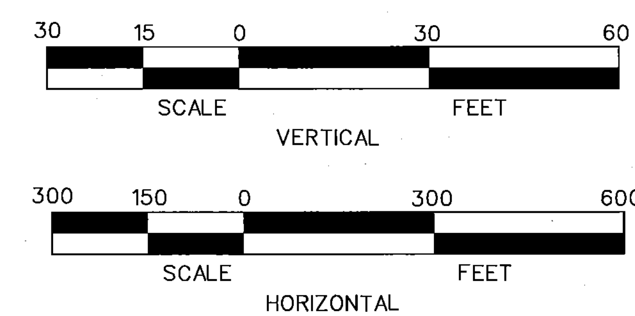


BORING LOG LEGEND

- CLAY
- SANDY CLAY
- CLAYEY SAND WITH GRAVEL
- SILT
- SANDY SILT
- SHALE
- SHALY SANDSTONE
- SANDSTONE
- SANDY GRAVEL





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DRN BY AZB	SECTION C – C
CHK BY SH	FIGURE III-2.5
APP BY MC	

CITY OF LAREDO

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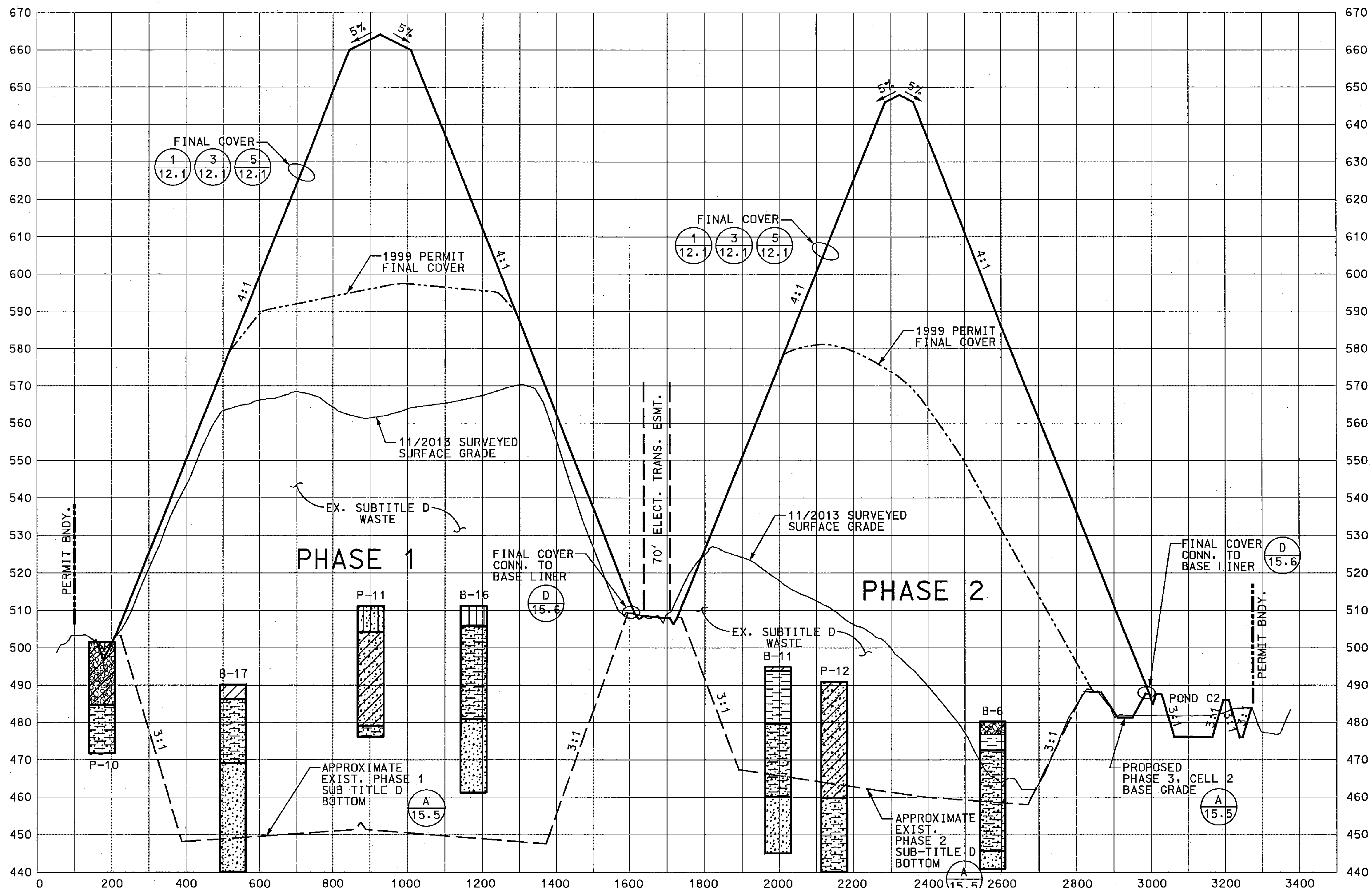
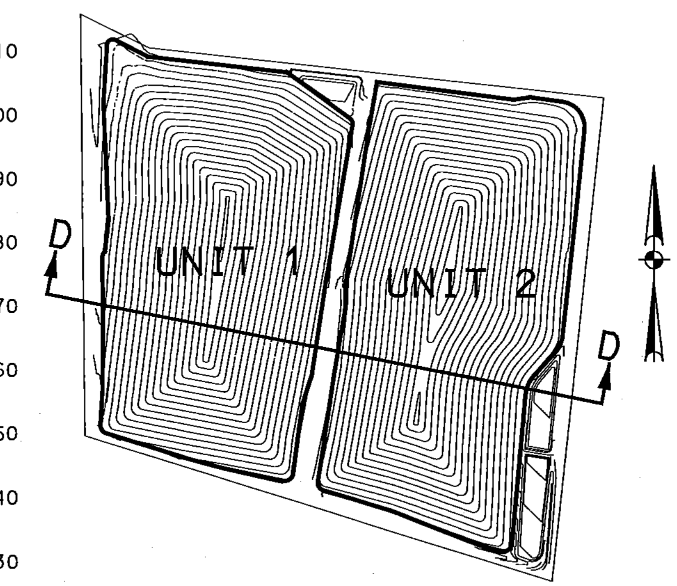
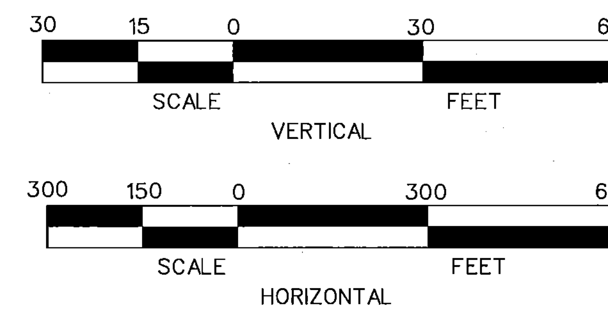


BORING LOG LEGEND

- CLAY
- SANDY CLAY
- CLAYEY SAND WITH GRAVEL
- SILT
- SANDY SILT
- SHALE
- SHALY SANDSTONE
- SANDSTONE
- SANDY GRAVEL





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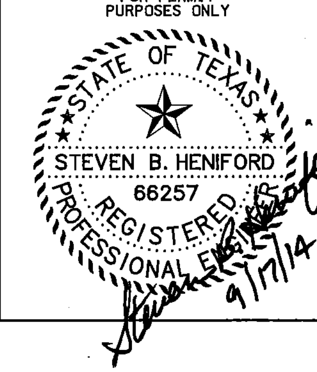

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CITY PROJ. No.
AZB PROJ. No. 212029
DATE: AUGUST 2014

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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 D - D
FIGURE III-2.6

CITY OF LAREDO

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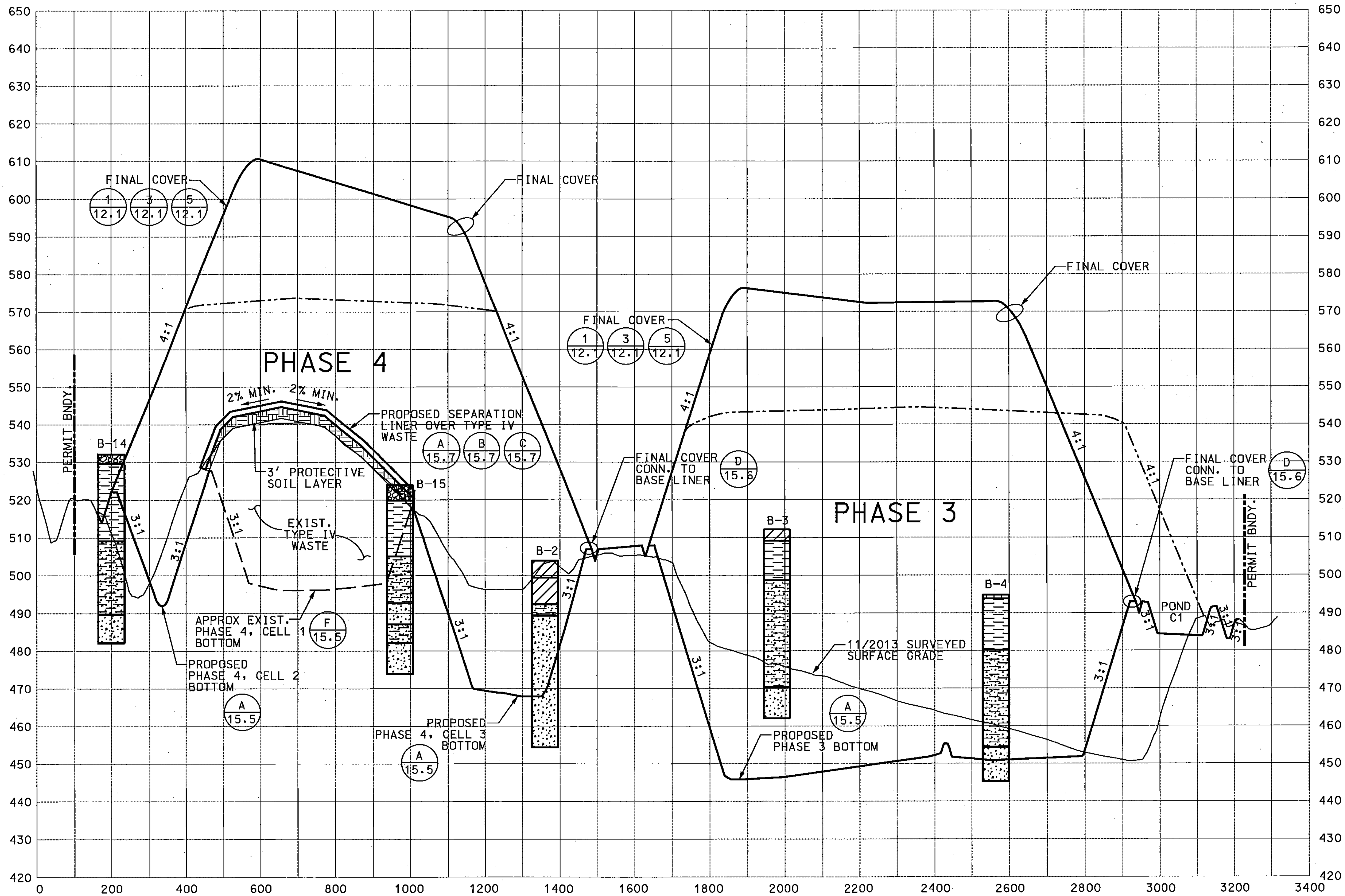
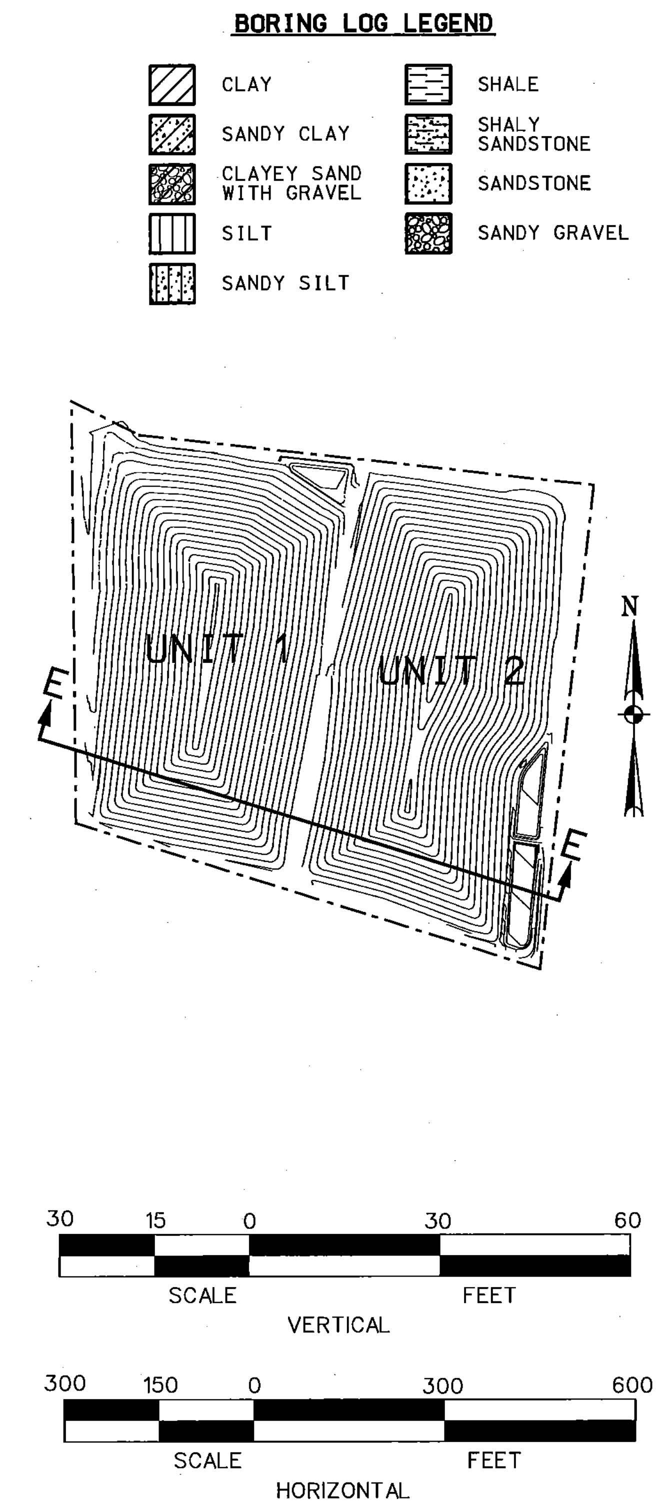
III-2





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LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
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FILL CROSS SECTION
SECTION E-E
FIGURE III-2.7

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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

PART III
Attachment 3
Existing Contour Map

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9/17/14

LAREDO LANDFILL
PART III
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Existing Contour Map

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LEGEND

- PERMIT BOUNDARY
- 560 — 10' CONTOUR
- 2' CONTOUR

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AZB PROJ. No. 212029	PERMIT AMENDMENT APPLICATION No. MSW-1693B
DATE: AUGUST 2014	WEBB COUNTY, TEXAS
DES BY: SH	NOVEMBER 2013
DRN BY: AZB	EXISTING CONTOUR MAP
CHK BY: SH	FIGURE III-3.1
APP BY: MC	

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CITY OF LAREDO

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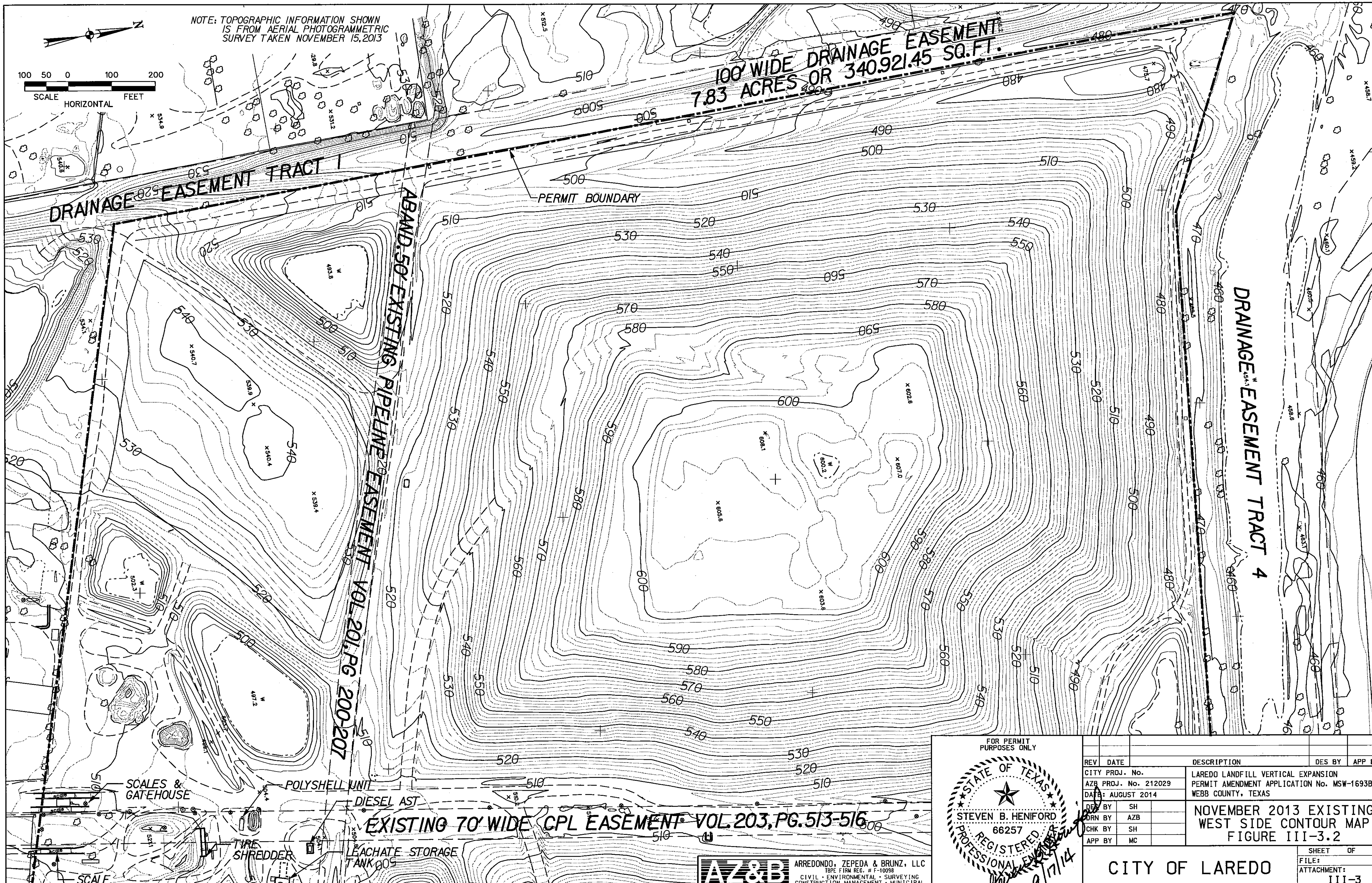

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N
100 50 0 100 200
SCALE FEET
HORIZONTAL
100' WIDE DRAINAGE EASEMENT
7.83 ACRES OR 340,921.45 SQ.FT.
DRAINAGE EASEMENT TRACT 1
PERMIT BOUNDARY
ABAND. 50' EXISTING PIPELINE EASEMENT VOL.201, PG. 200-207
DRAINAGE EASEMENT TRACT 4
SCALES & GATEHOUSE
POLYSHELL UNIT
DIESEL AST
EXISTING 70' WIDE CPL EASEMENT VOL.203, PG.513-516
TIRE SHREDDER
LEACHATE STORAGE TANK
SCALE
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LAREDO LANDFILL VERTICAL EXPANSION
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WEBB COUNTY, TEXAS
NOVEMBER 2013 EXISTING WEST SIDE CONTOUR MAP
FIGURE III-3.2
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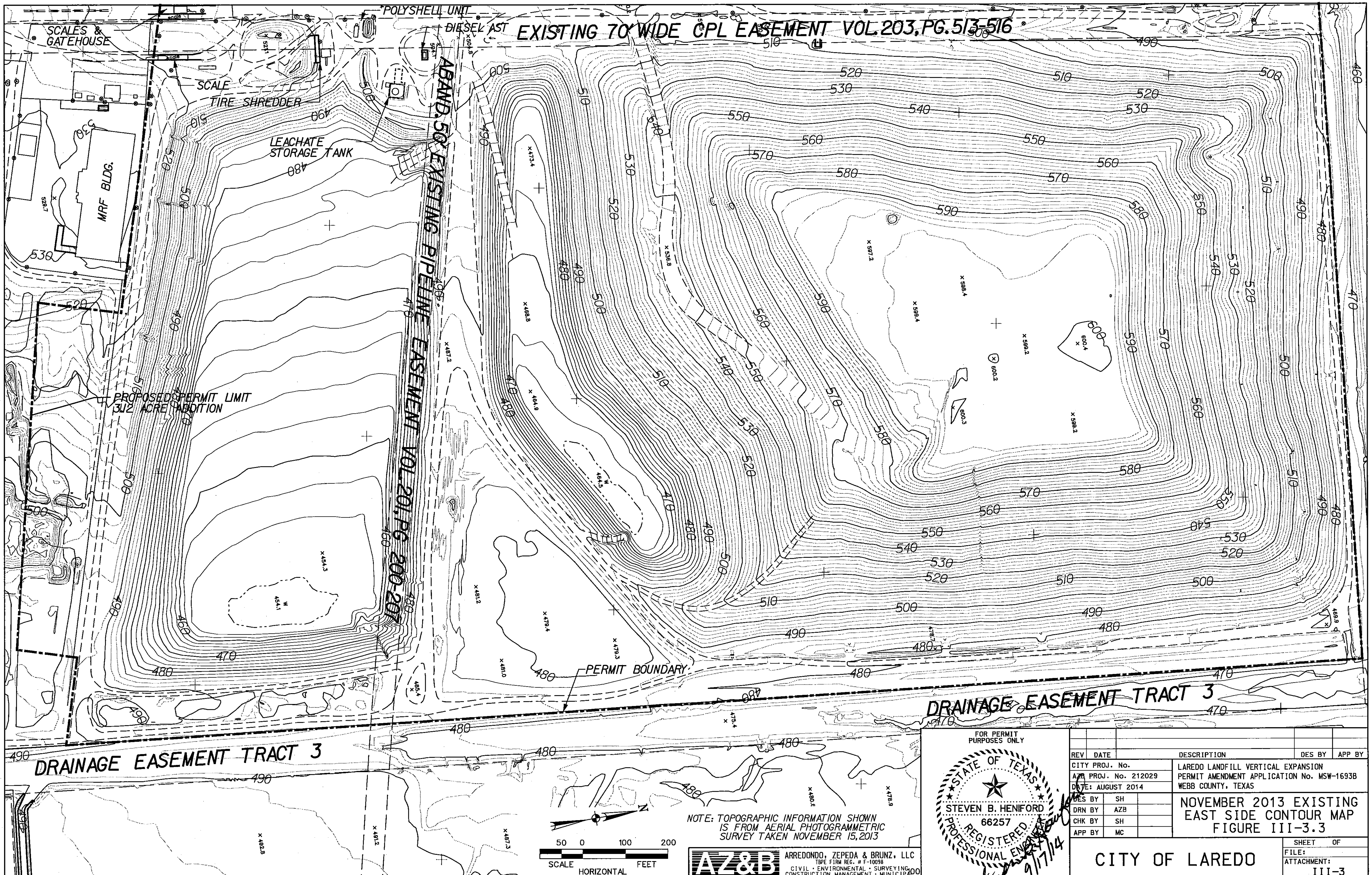

EXISTING 70' WIDE CPL EASEMENT VOL.203,PG.513-516
POLYSHELL UNIT
DIESEL AST
SCALES & GATEHOUSE
SCALE
TIRE SHREDDER
LEACHATE STORAGE TANK
MRF BLDG.
ABAND.50' EXISTING PIPELINE EASEMENT VOL.201,PG 200-207
PROPOSED PERMIT LIMIT 3.12 ACRE ADDITION
PERMIT BOUNDARY
DRAINAGE EASEMENT TRACT 3
DRAINAGE EASEMENT TRACT 3
NOTE: TOPOGRAPHIC INFORMATION SHOWN IS FROM AERIAL PHOTOGRAMMETRIC SURVEY TAKEN NOVEMBER 15, 2013
50 0 100 200
SCALE FEET
HORIZONTAL
AZ&B
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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
NOVEMBER 2013 EXISTING
EAST SIDE CONTOUR MAP
FIGURE III-3.3
SHEET OF
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ATTACHMENT:
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CITY OF LAREDO

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
Attachment 6
Groundwater and Surface Water Protection
Plan and Drainage Plan

STATE OF TEXAS
STEVEN B. HENIFORD
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LICENSED
PROFESSIONAL ENGINEER

TX F-10098
Steven B. Heniford
9/17/14

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

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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. 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 hill tops will have a maximum slope of 5.0% to keep flow velocities to a minimum and sideslopes have been designed to minimize soil loss from erosion by placing permanent berms on the final cover slopes to create terraces that intercept the run-off. These 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 erosion and sedimentation measures to be employed along with supporting calculations are presented in Appendix 6B of this attachment.

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

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.

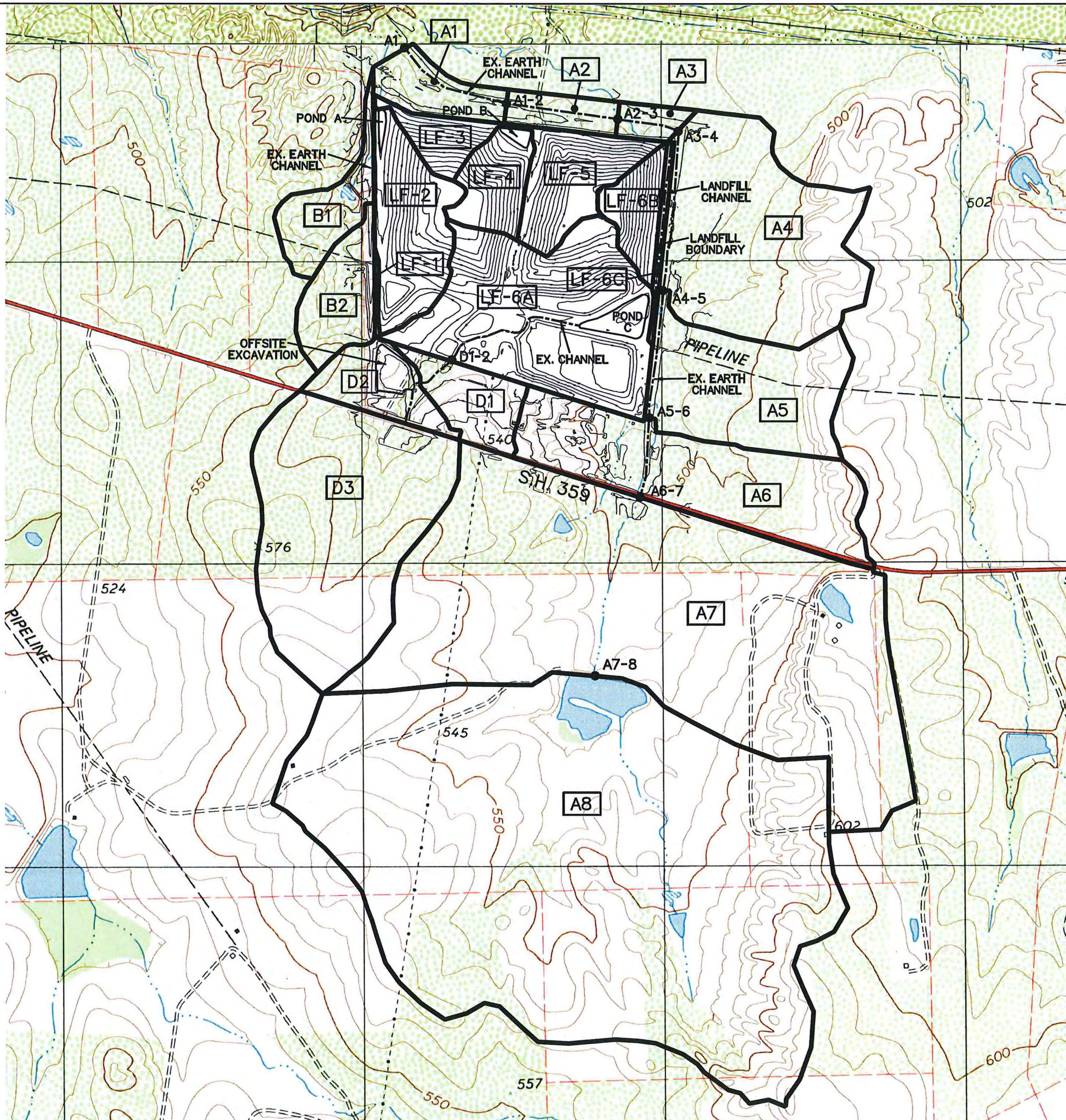
Stage 7 includes fill operations to bring the west hill (Phases 1, 4 and 5) to the amended permit height and does not include construction of new cells. No drainage structures need to be constructed in this stage. This will complete the proposed fill operations according to the proposed permit amendment.

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.



DRAINAGE AREA SUMMARY

AREA I.D.	AREA (Sq. Mi.)	AREA (ACRES)
A1	0.0260	16.64
A2	0.0260	16.69
A3	0.0100	6.40
A4	0.1580	101.12
A5	0.0980	62.72
A6	0.1240	79.36
A7	0.4580	293.12
A8	0.7000	448.00
B1	0.0310	19.84
B2	0.0360	23.04
LF-1	0.0020	1.28
LF-2	0.0561	35.89
LF-3	0.0180	11.49
LF-4	0.0271	17.33
LF-5	0.0412	26.38
LF-6A	0.1411	90.28
LF-6B	0.0221	14.13
LF-6C	0.0050	3.22
D1	0.0300	19.20
D2	0.0312	19.97
D3	0.1750	112.00

LEGEND

A3 — AREA I.D.

● A1-2 — HEC-HMS JUNCTION POINT

—·—·—· — CHANNEL

▬▬▬ — DRAINAGE AREA BOUNDARY

N

NOTE:
TOPOGRAPHIC INFORMATION TAKEN FROM USGS LAREDO EAST AND LAREDO SOUTH 7.5 MINUTE QUADRANGLE MAPS.

600 300 0 600 1200
SCALE FEET

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
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STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14

REV	DATE	DESCRIPTION	DES BY	APP BY

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

EXISTING DRAINAGE AREA MAP
FIGURE III-6.1

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6

LEGEND

EXISTING DRAINAGE DITCH

DRAINAGE DIVIDE

SEDIMENTATION/DETENTION POND

FLOW DIRECTION

DRAINAGE AREA I.D. (2)

AREA (AC.) (32.7)

OUTFALL POINT

EFFECTIVE 100-YR. FLOODPLAIN

NOTE:
TOPOGRAPHIC INFORMATION TAKEN FROM AERIAL PHOTO-GRAMMETIC SURVEY PERFORMED BY AEROMETRIC, INC. ON NOVEMBER 15, 2013.

N

200 100 0 200 400
SCALE HORIZONTAL FEET

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AZB PROJ. No. 212029	PERMIT AMENDMENT APPLICATION No. MSW-1693B
DATE: AUGUST 2014	WEBB COUNTY, TEXAS
DES BY SH	EXISTING ONSITE DRAINAGE PLAN FIGURE III-6.2
DRN BY AZB	
CHK BY SH	
APP BY MC	

CITY OF LAREDO

SHEET OF
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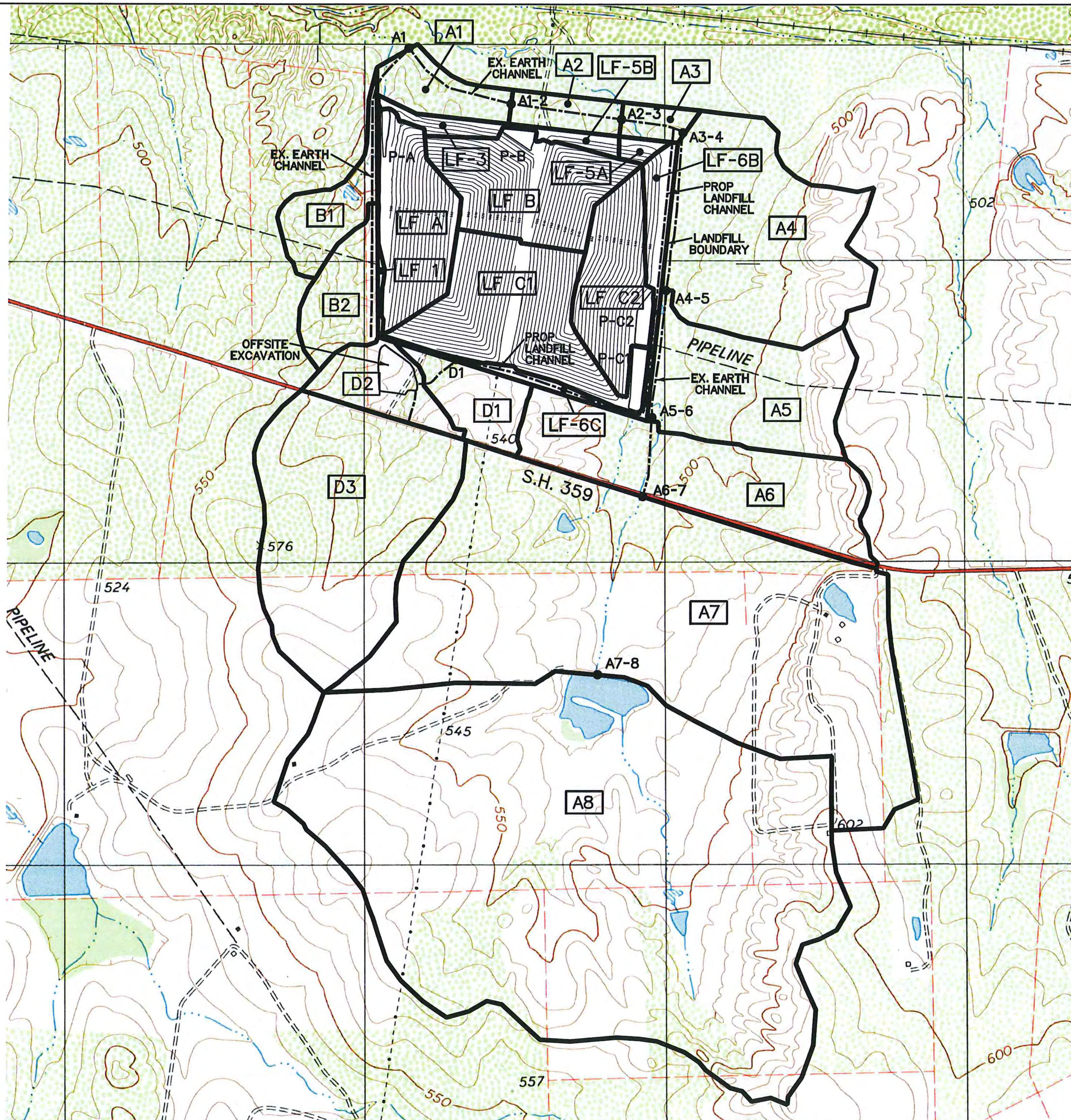
ATTACHMENT: III-6



DRAINAGE AREA SUMMARY

AREA I.D.	AREA (Sq. Mi.)	AREA (ACRES)
A1	0.0260	16.64
A2	0.0260	16.67
A3	0.0100	6.40
A4	0.1580	101.12
A5	0.0980	62.72
A6	0.1240	79.36
A7	0.4580	293.12
A8	0.7000	448.00
B1	0.0310	19.84
B2	0.0360	23.04
LF-1	0.0028	1.76
LF-A	0.0545	34.86
LF-3	0.0087	5.61
LF-B	0.0703	44.98
LF-5A	0.0050	3.21
LF-5B	0.0049	3.12
LF-C1	0.0911	58.28
LF-C2	0.0504	32.27
LF-6B	0.0153	9.77
LF-6C	0.0096	6.14
D1	0.0300	19.20
D2	0.0312	19.97
D3	0.1750	112.00

LEGEND

A3	AREA I.D.
● A1-2	HEC-HMS JUNCTION POINT
—·—·—	CHANNEL
▬▬▬	DRAINAGE AREA BOUNDARY

NOTE:
TOPOGRAPHIC INFORMATION TAKEN FROM USGS LAREDO EAST AND LAREDO SOUTH 7.5 MINUTE QUADRANGLE MAPS.

N

600 300 0 600 1200
SCALE FEET

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Steven B. Heniford 9/17/14

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PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

PROPOSED
DRAINAGE AREA MAP
FIGURE III-6.3

CITY OF LAREDO

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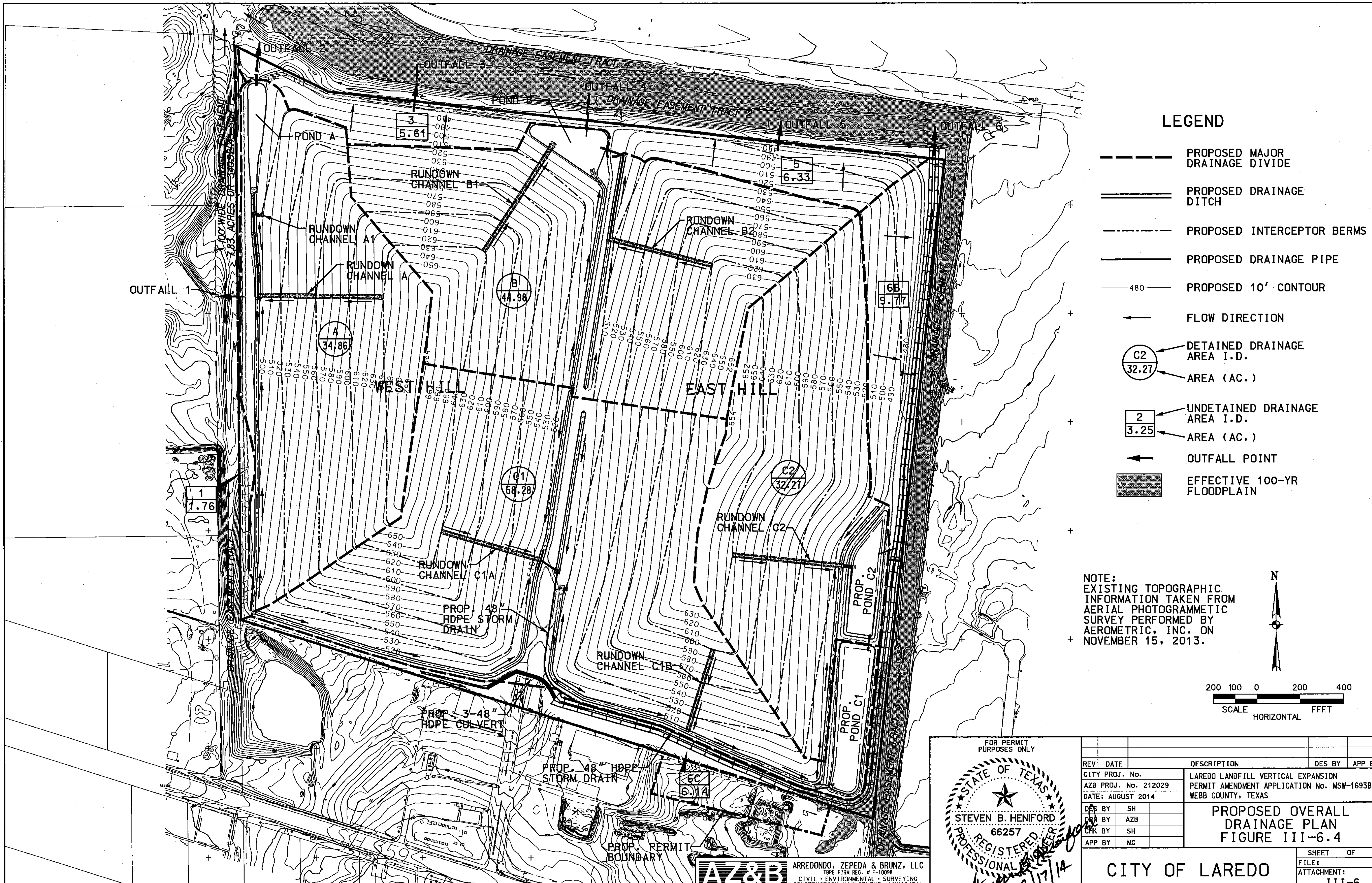

LEGEND
PROPOSED MAJOR DRAINAGE DIVIDE
PROPOSED DRAINAGE DITCH
PROPOSED INTERCEPTOR BERMS
PROPOSED DRAINAGE PIPE
PROPOSED 10' CONTOUR
FLOW DIRECTION
DETAINED DRAINAGE AREA I.D.
AREA (AC.)
UNDETAINED DRAINAGE AREA I.D.
AREA (AC.)
OUTFALL POINT
EFFECTIVE 100-YR FLOODPLAIN
NOTE: EXISTING TOPOGRAPHIC INFORMATION TAKEN FROM AERIAL PHOTOGRAMMETIC SURVEY PERFORMED BY AEROMETRIC, INC. ON NOVEMBER 15, 2013.
OUTFALL 1
OUTFALL 2
OUTFALL 3
OUTFALL 4
OUTFALL 5
OUTFALL 6
POND A
POND B
PROP. POND C1
PROP. POND C2
WEST HILL
EAST HILL
RUNDOWN CHANNEL A
RUNDOWN CHANNEL A1
RUNDOWN CHANNEL B1
RUNDOWN CHANNEL B2
RUNDOWN CHANNEL C1A
RUNDOWN CHANNEL C1B
RUNDOWN CHANNEL C2
PROP. 48" HDPE STORM DRAIN
PROP. 3-48" HDPE CULVERT
PROP. PERMIT BOUNDARY
DRAINAGE EASEMENT TRACT 4
DRAINAGE EASEMENT TRACT 2
DRAINAGE EASEMENT TRACT 3
100' WIDE DRAINAGE EASEMENT 1.83 ACRES OR 34,024 SQ. FT.
SCALE HORIZONTAL FEET
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LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS
PROPOSED OVERALL DRAINAGE PLAN
FIGURE III-6.4
CITY OF LAREDO
SHEET OF
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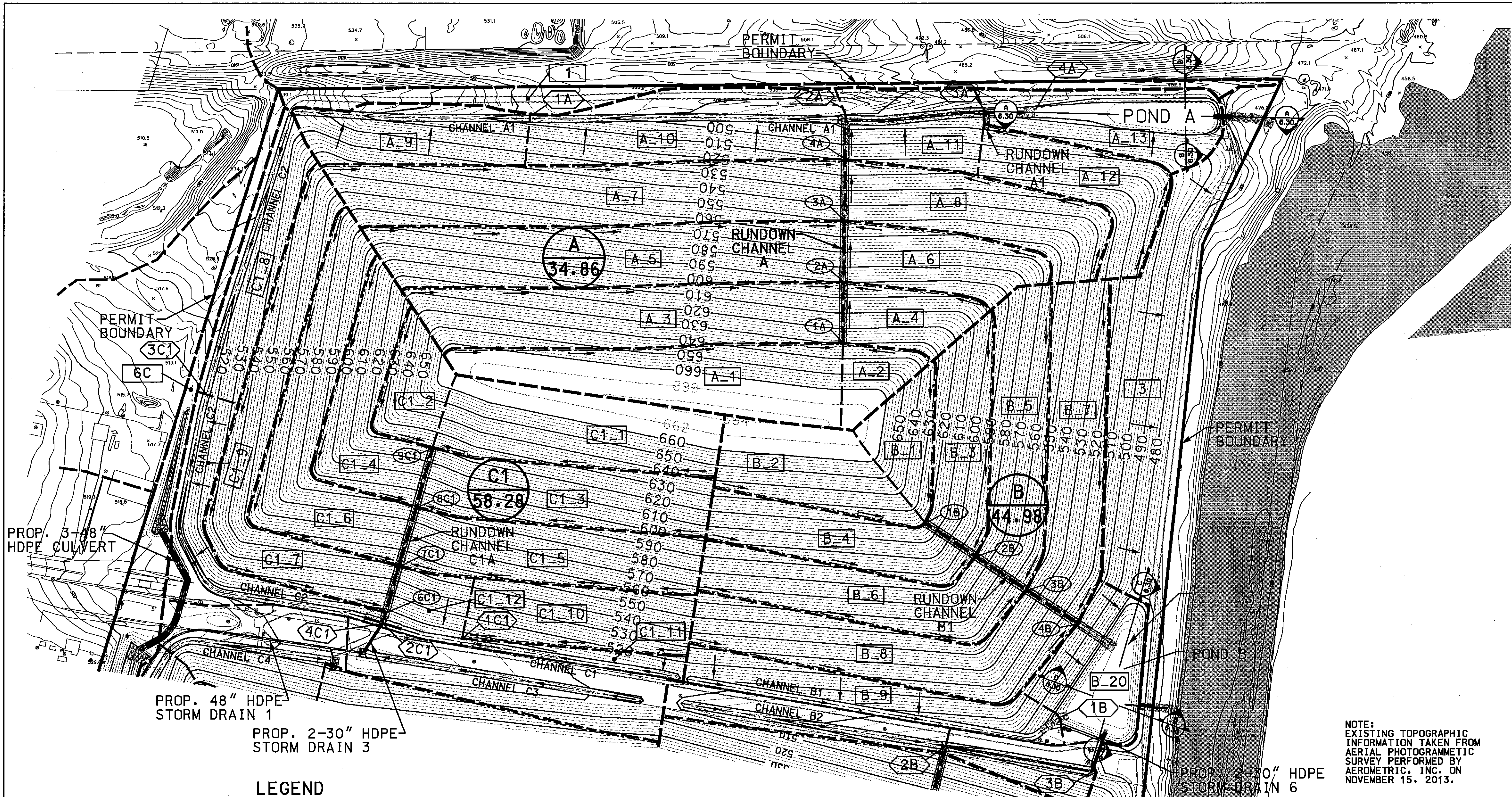

LEGEND

—·—·—	PROPOSED DRAINAGE DITCH
———	PROPOSED DRAINAGE PIPE
-·-·-	PROPOSED TERRACE BERM
— — —	MAJOR DRAINAGE DIVIDE
— — —	MINOR DRAINAGE DIVIDE
——530——	PROP. 10' CONTOUR
········	PROP. 2' CONTOUR
C2_8	MINOR DRAINAGE AREA I.D.
4C2	RUNDOWN CHANNEL DESIGN POINT
→	FLOW DIRECTION
1A	CHANNEL DESIGN POINT
(shaded)	100-YR. FLOODPLAIN
C2 / 30.1	MAJOR DRAINAGE I.D. / MAJOR DRAINAGE ACREAGE

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

WEST HILL DRAINAGE PLAN FIGURE III-6.5

CITY OF LAREDO

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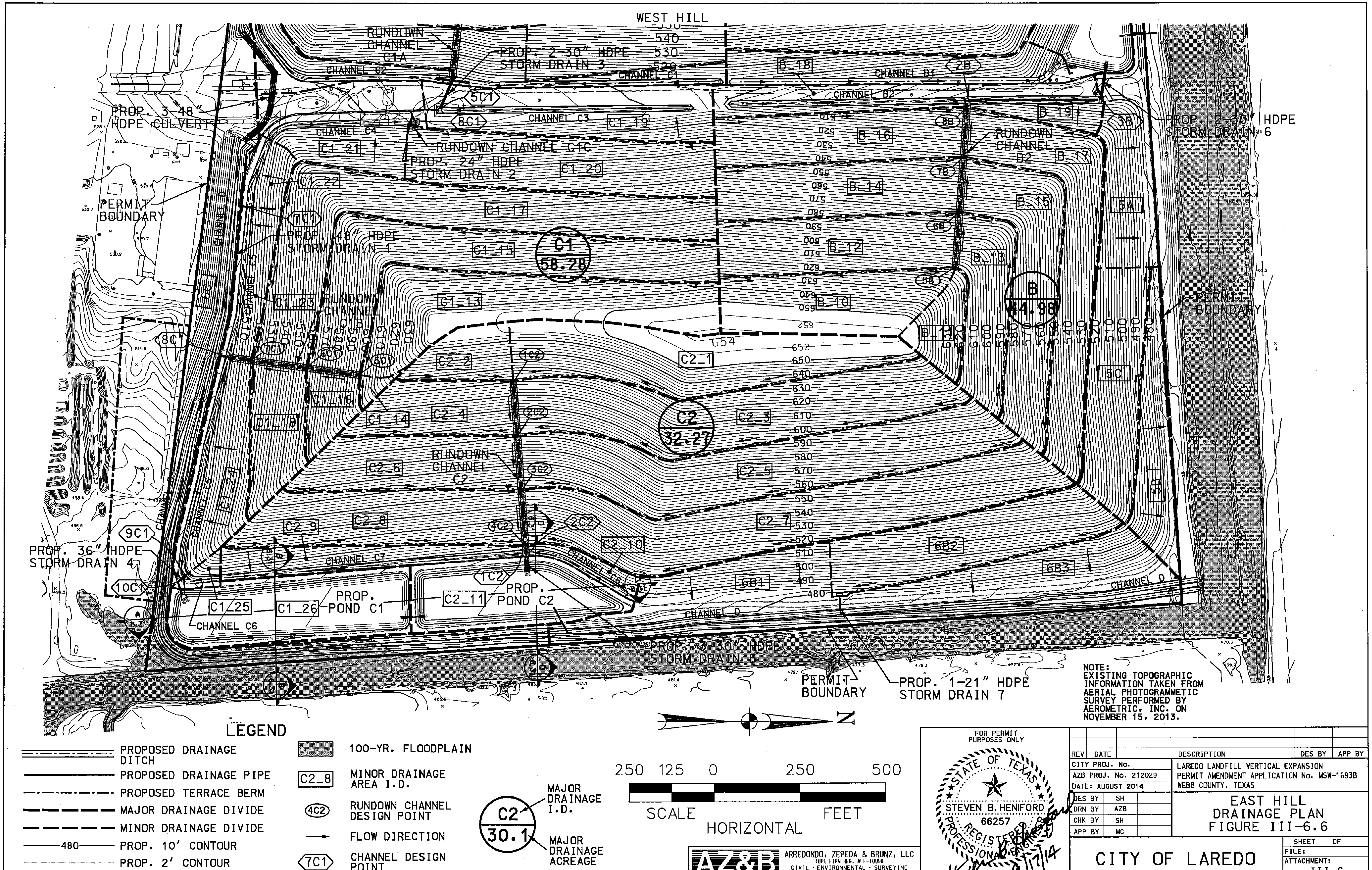
ATTACHMENT: III-6



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AZB PROJ. No. 212029		PERMIT AMENDMENT APPLICATION No. MSW-1693B		
DATE: AUGUST 2014		WEBB COUNTY, TEXAS		
DES BY	SH	EAST HILL DRAINAGE PLAN FIGURE III-6.6		
DRN BY	AZB			
CHK BY	SH			
APP BY	MC			

CITY OF LAREDO

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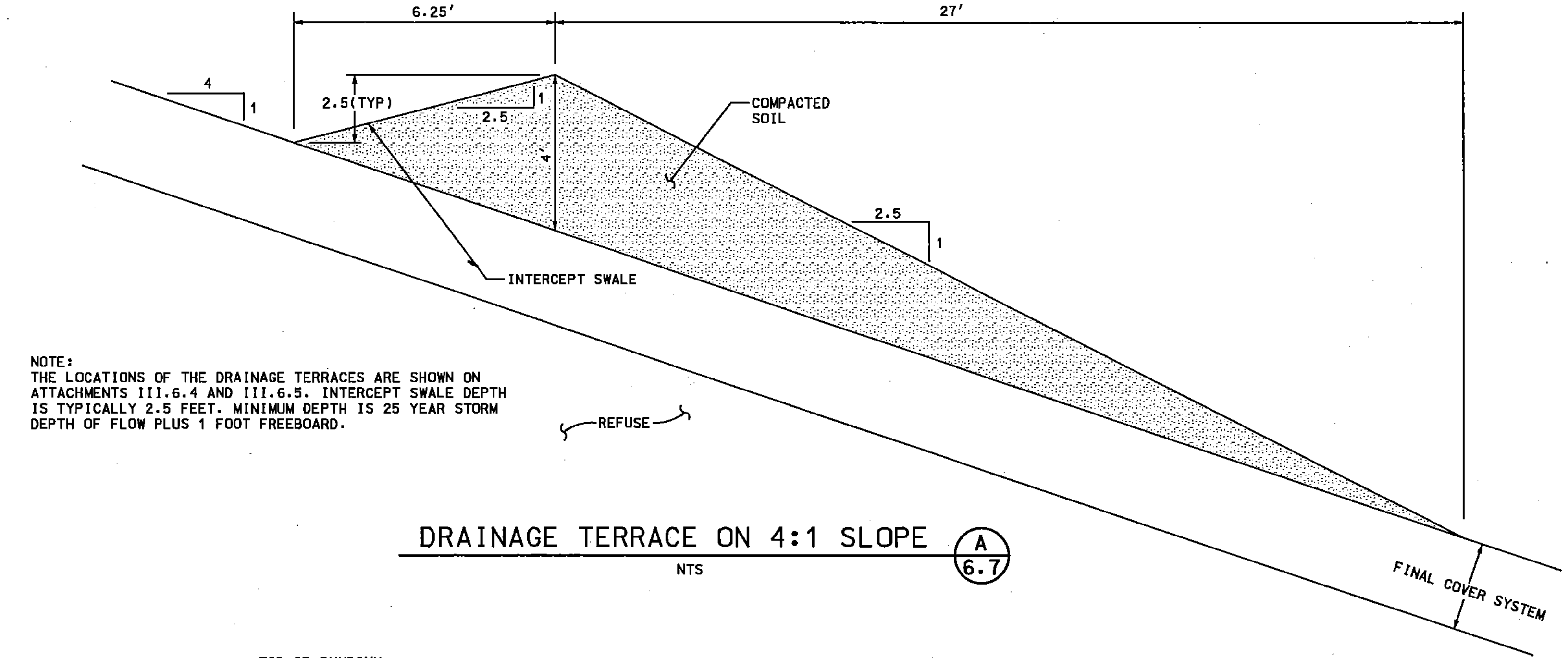
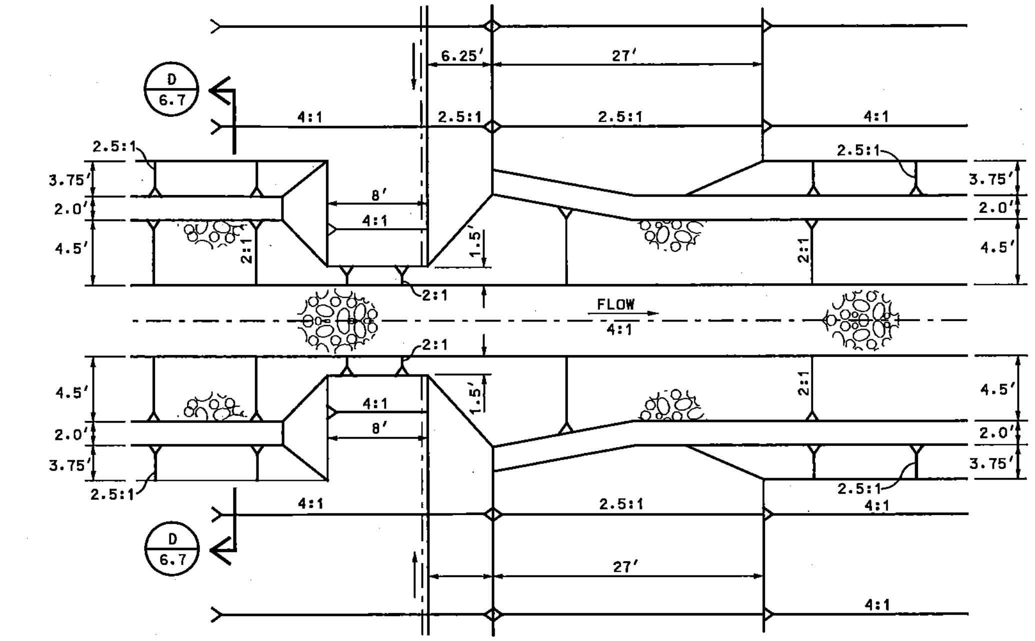
FILE:
ATTACHMENT: III-6



NOTE:
THE LOCATIONS OF THE DRAINAGE TERRACES ARE SHOWN ON ATTACHMENTS III.6.4 AND III.6.5. INTERCEPT SWALE DEPTH IS TYPICALLY 2.5 FEET. MINIMUM DEPTH IS 25 YEAR STORM DEPTH OF FLOW PLUS 1 FOOT FREEBOARD.

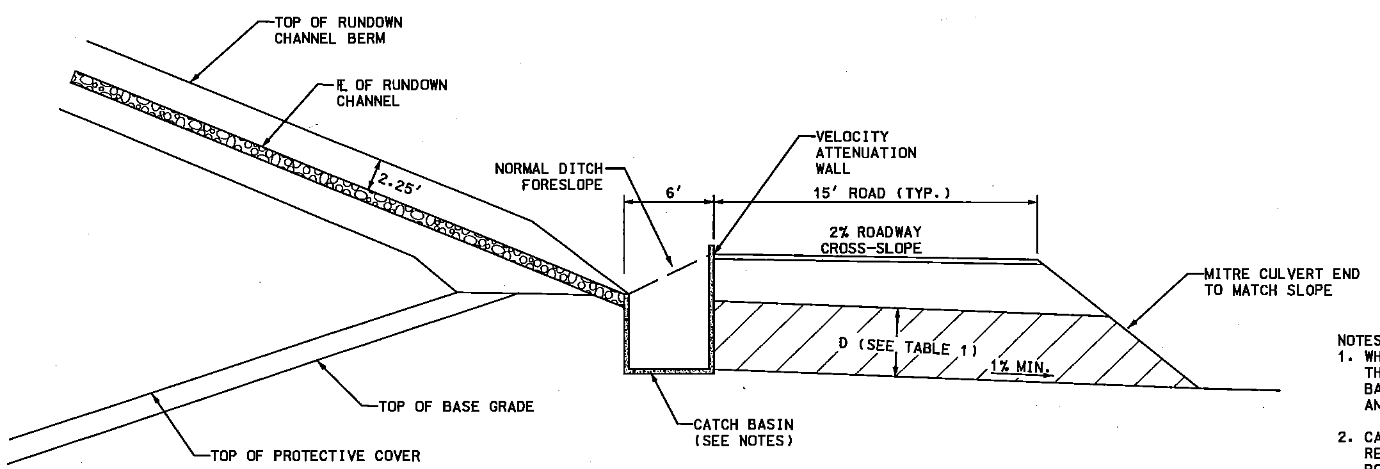
DRAINAGE TERRACE ON 4:1 SLOPE (A / 6.7)

NTS



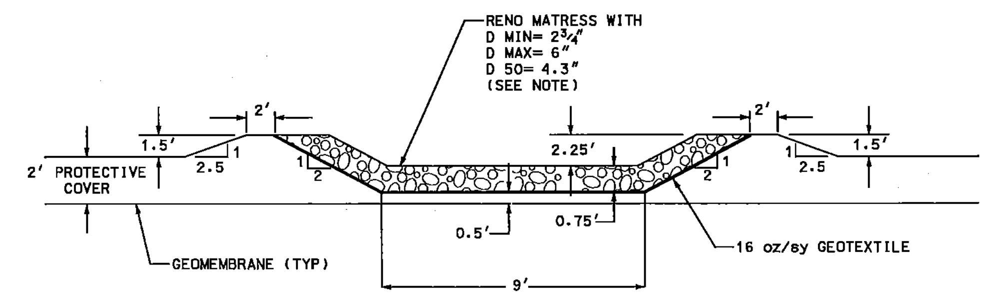
DRAINAGE TERRACE & RUNDOWN CHANNEL INTERSECTION (B / 6.7)

NTS



PROFILE

NOTES:
1. WHERE RUNDOWN CHANNEL DISCHARGES ONLY TO THE PERIMETER DITCH INSIDE OF ROAD, OMIT CATCH BASIN AND LINE DITCH WO 30 LF OF RENO MATTRESS AND PROVIDE VELOCITY ATTENUATION WALL.
2. CATCH BASIN MAY BE CONSTRUCTED OF CAST REINFORCED CONCRETE, CONCRETE RIPRAP, OR ROCK RIPRAP IN A RENO MATTRESS OR GABION.



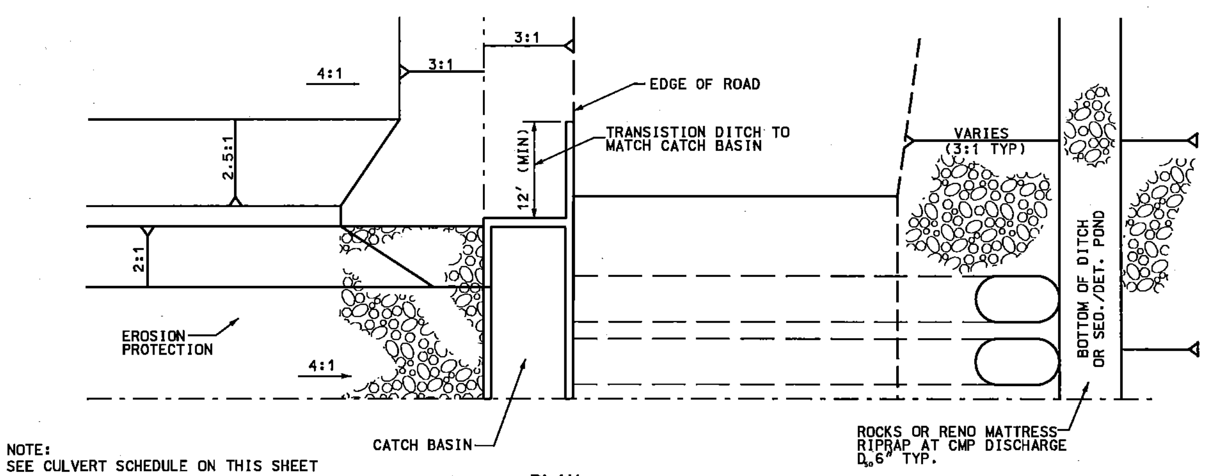
DRAINAGE RUNDOWN CHANNEL ON 4:1 SLOPE (D / 6.7)

NTS

NOTE:
CHANNEL LINING MAY BE RENO MATRESS GROUT INJECTED CONCRETE RIPRAP OR MINIMUM 60 ML GEOMEMBRANE AS APPROVED BY ENGINEER.

TABLE 1

STORM DRAIN NO.	NO. OF PIPES	DIAM. (in.)
5	3	30
7	1	21



PLAN

NOTE:
SEE CULVERT SCHEDULE ON THIS SHEET FOR CULVERT REQUIREMENTS

DRAINAGE RUNDOWN CHANNEL LAYOUT AT LANDFILL PERIMETER (C / 6.7)

NTS

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9/17/14

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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
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TERRACE & RUNDOWN CHANNEL DETAILS
FIGURE III-6.7

CITY OF LAREDO

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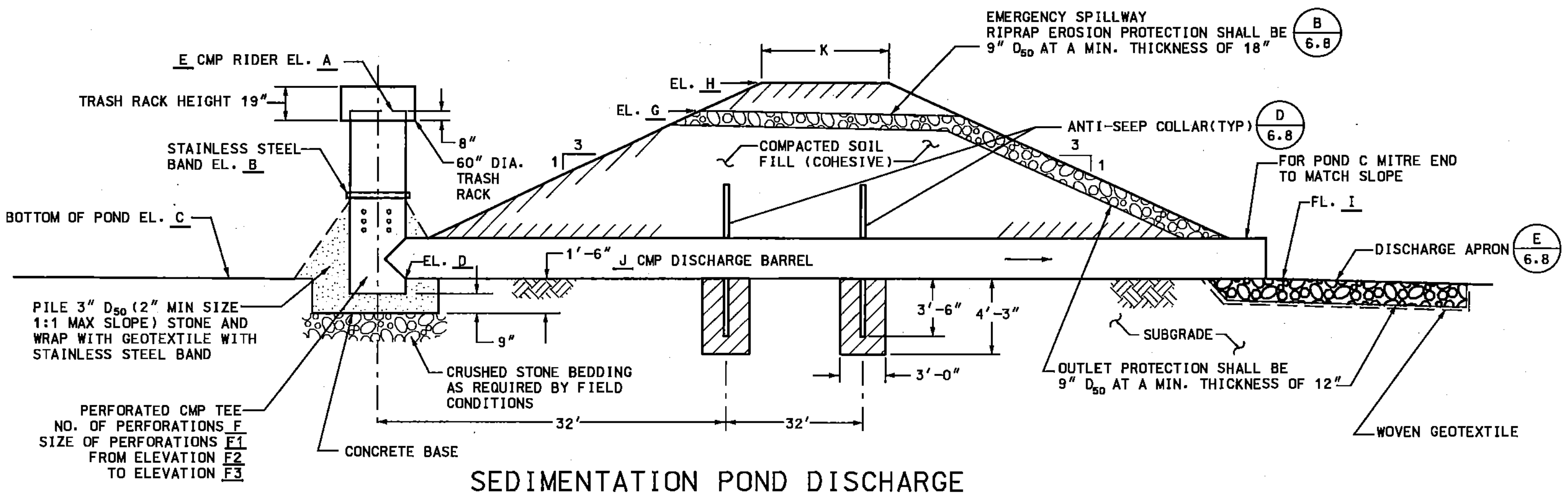


SEDIMENTATION POND DISCHARGE STRUCTURE FOR PONDS A,B,C1 AND C2

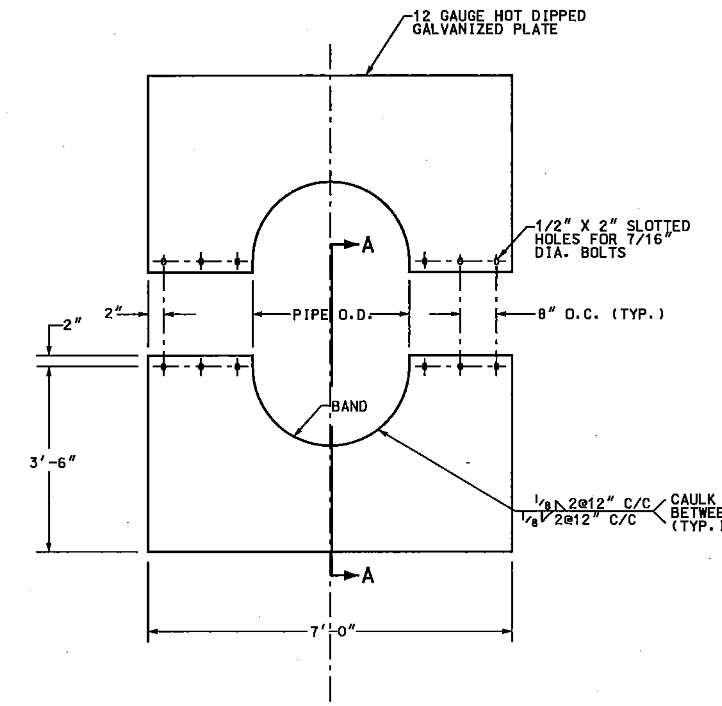
(A 6.8)

NTS

NOTE: EMERGENCY SPILLWAY IS PROTECTED OVER DISCHARGE PIPE

SEDMENTATION/DETENTION POND DISCHARGE STRUCTURES
TABLE III.6.8

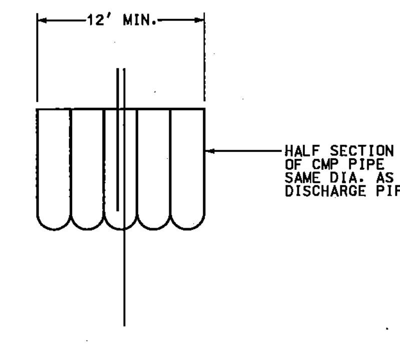
VARIABLE	POND A	POND B	POND C1	POND C2
A	N/A	477.00	N/A	483.00
B	N/A	N/A	N/A	N/A
C	474.00	470.00	481.00	476.00
D	474.00	470.00	481.00	476.00
E	N/A	1-36"	1-36"	1-36"
F	N/A	12	N/A	12
F1	N/A	3"	N/A	3"
F2	N/A	470.50	N/A	477.00
F3	N/A	474.50	N/A	479.50
G	479.00	479.00	487.50	485.00
H	480.00	480.00	489.00	486.00
I	473.50	469.00	480.50	475.50
J	2-36"	1-36"	1-36"	1-36"
K	15'	15'	25'	15'



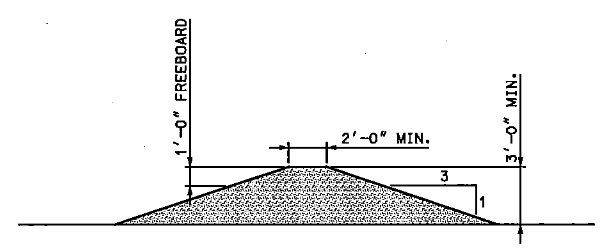
ANTI-SEEP COLLAR

(D 6.8)

NTS



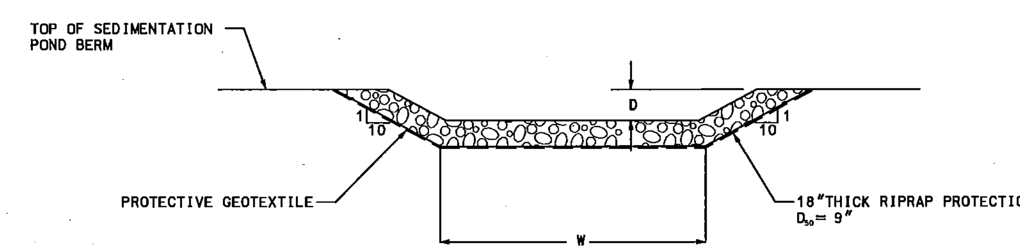
SECTION A-A



WORKING FACE BERM

(E 6.8)

NTS



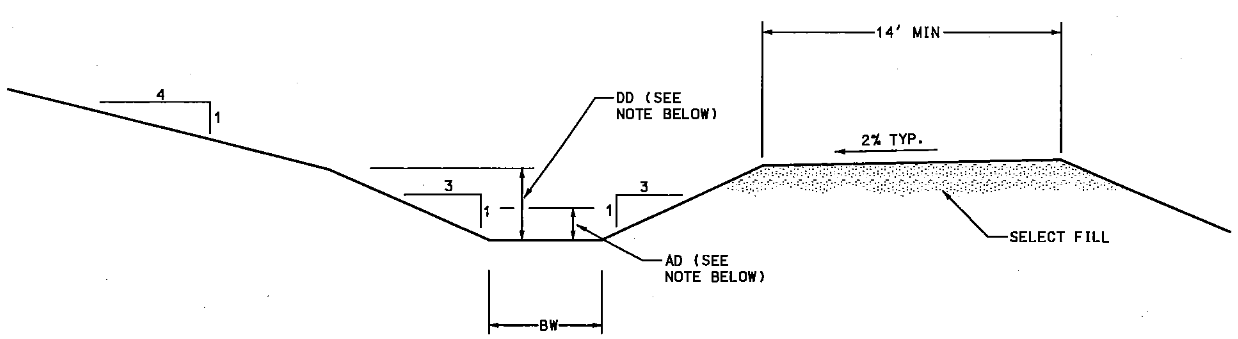
EMERGENCY SPILLWAY FOR PONDS A,B AND C

(B 6.8)

NTS

	POND A	POND B	POND C1	POND C2
DEPTH, D (FT)	1.0	1.0	1.5	1.0
WIDTH, W (FT)	20	15	30	20

NOTE:
RIPRAP PROTECTION TO EXTEND DOWN EMBANKMENT TO TOE OF SLOPE AND TIE INTO DISCHARGE PIPE OUTFALL.



PERIMETER DRAINAGE DITCH AND ACCESS ROAD

(C 6.8)

NTS

NOTE:
AD - ACTUAL DEPTH - CALCULATED DEPTH OF FLOW FOR 25 YR STORM
DD - DESIGN DEPTH - ACTUAL DEPTH (AD) + 1FT MINIMUM

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9/17/14

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APP BY	MC

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SEDIMENTATION/DETENTION POND DRAINAGE DETAILS
FIGURE III-6.8

CITY OF LAREDO

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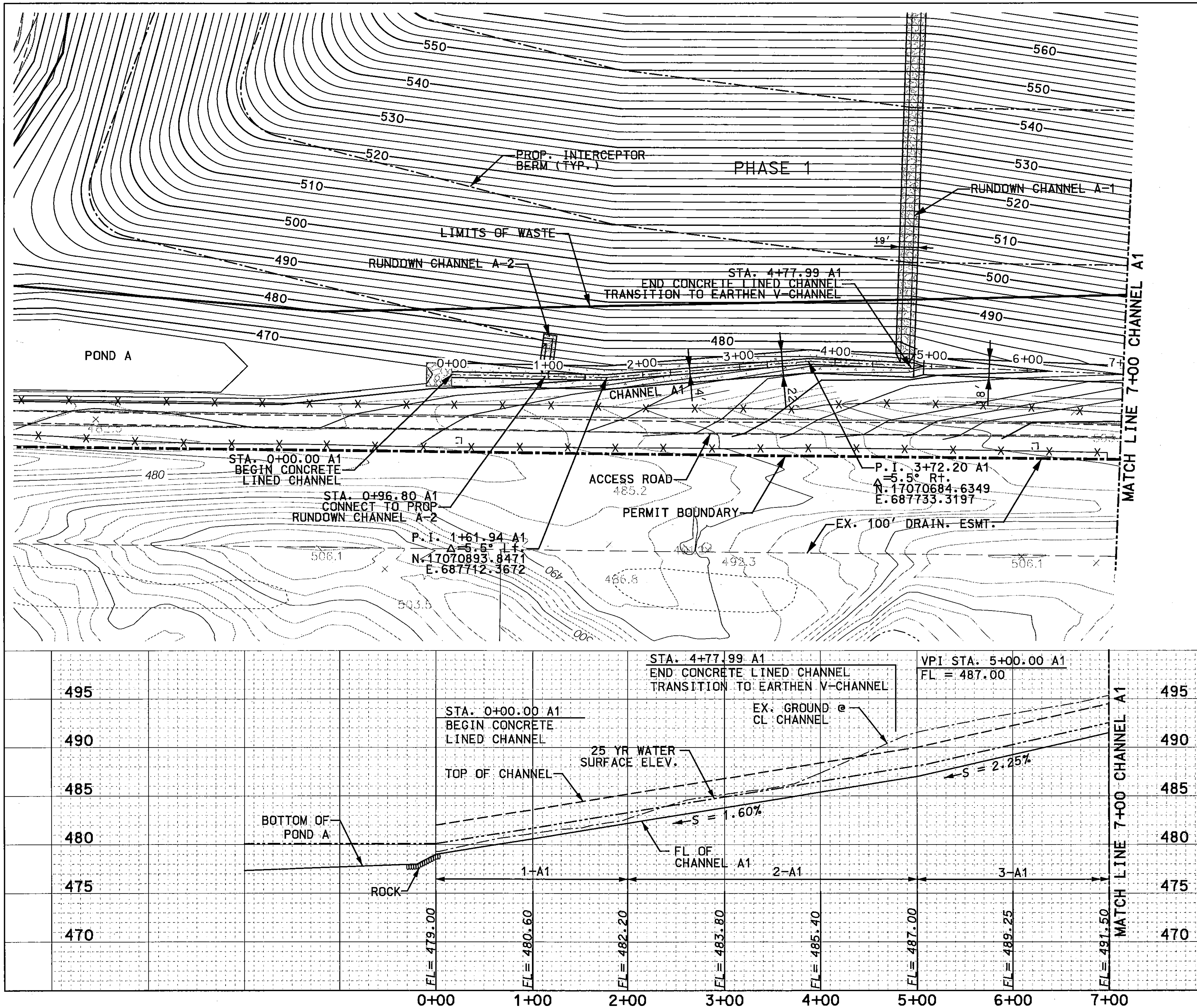
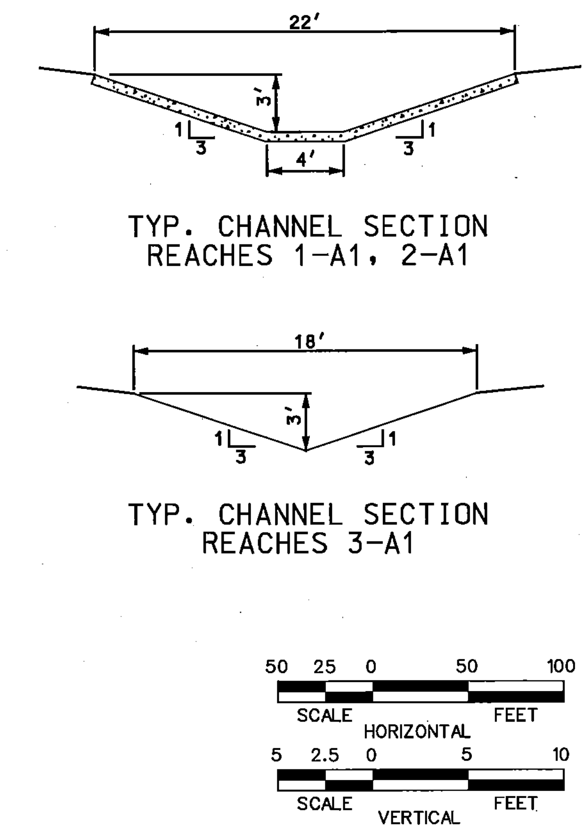
FILE:
ATTACHMENT: III-6





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CHAN. A1 PLAN & PROFILE
STA. 0+00 TO STA. 7+00
FIGURE III-6.9

CITY OF LAREDO

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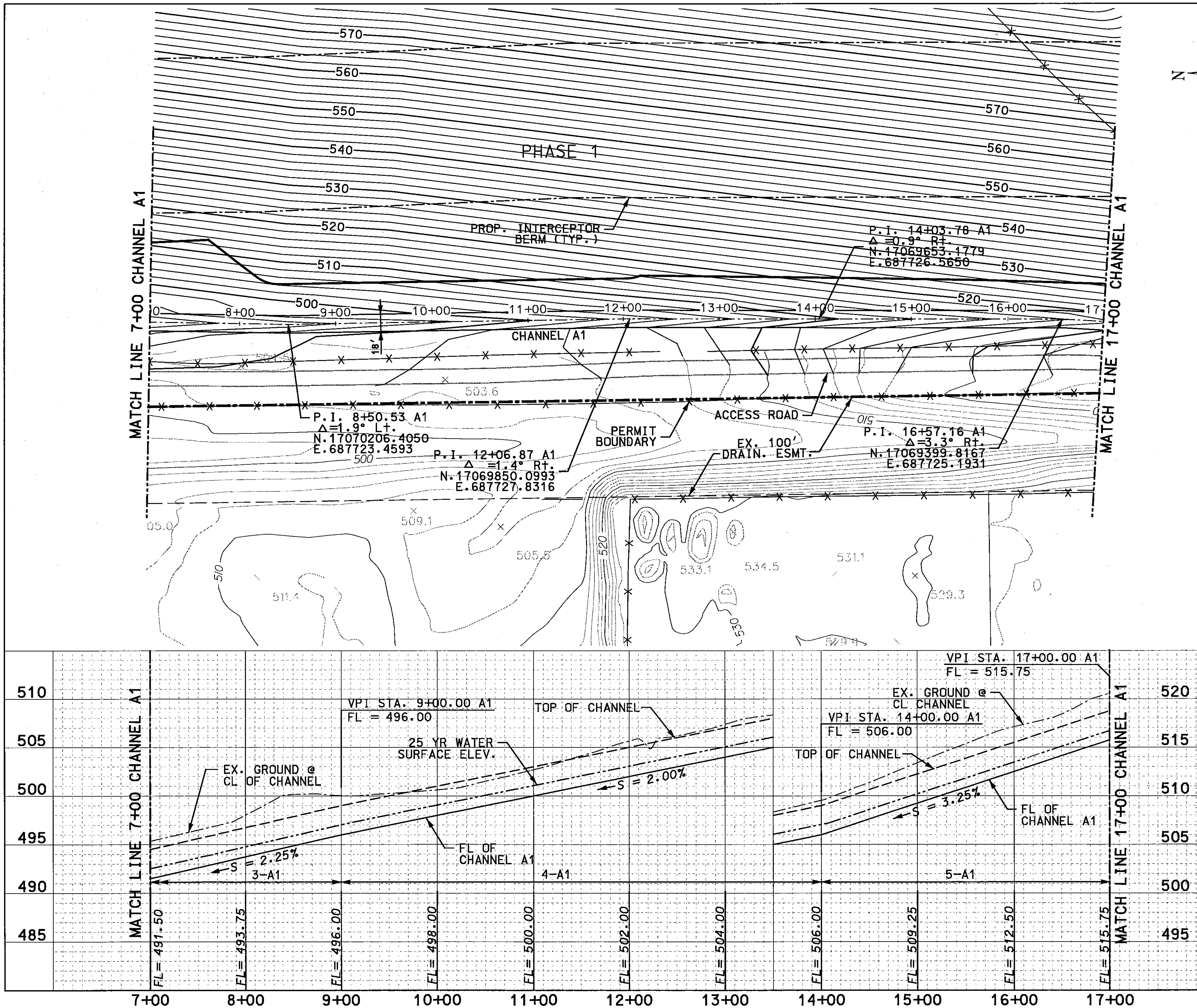
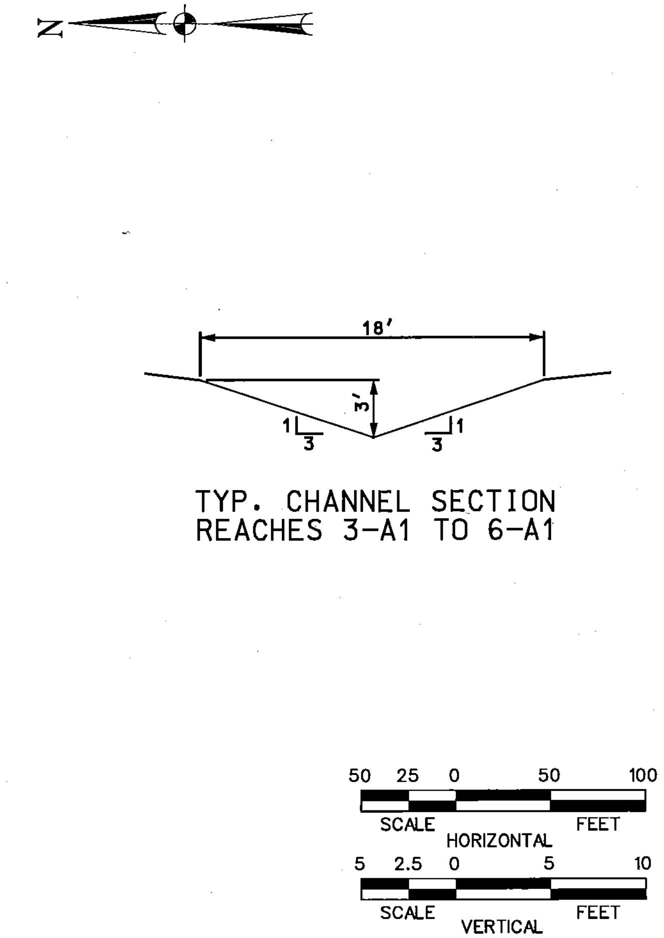
ATTACHMENT: III-6





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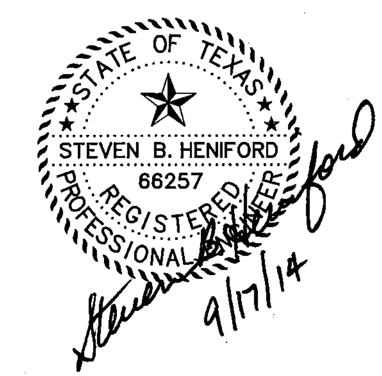

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CHAN. A1 PLAN & PROFILE
STA. 7+00 TO STA. 17+00
FIGURE III-6.10

CITY OF LAREDO

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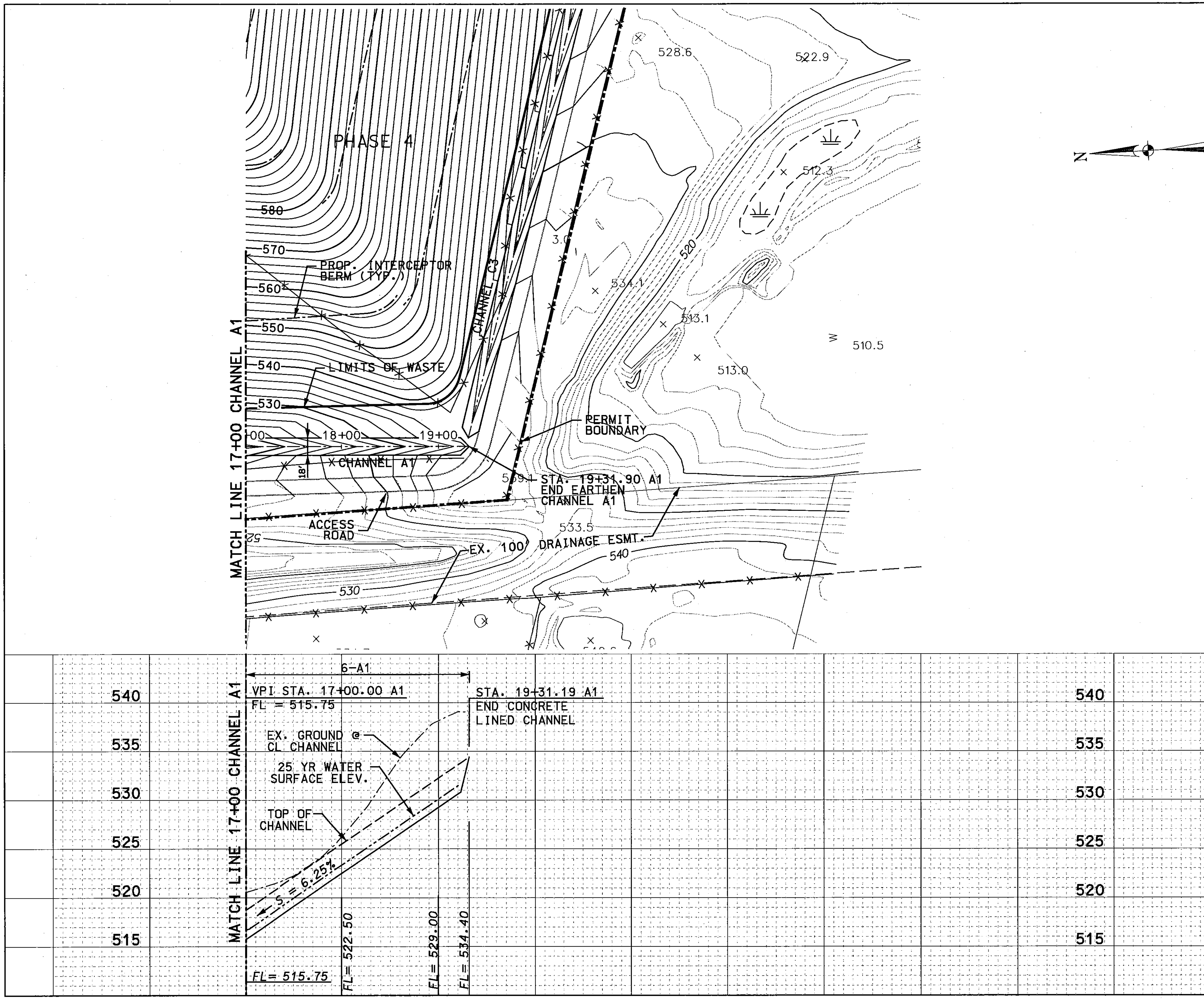
FILE:
ATTACHMENT: III-6



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CHAN. A1 PLAN & PROFILE
STA. 17+00 TO STA. 19+31
FIGURE III-6.11

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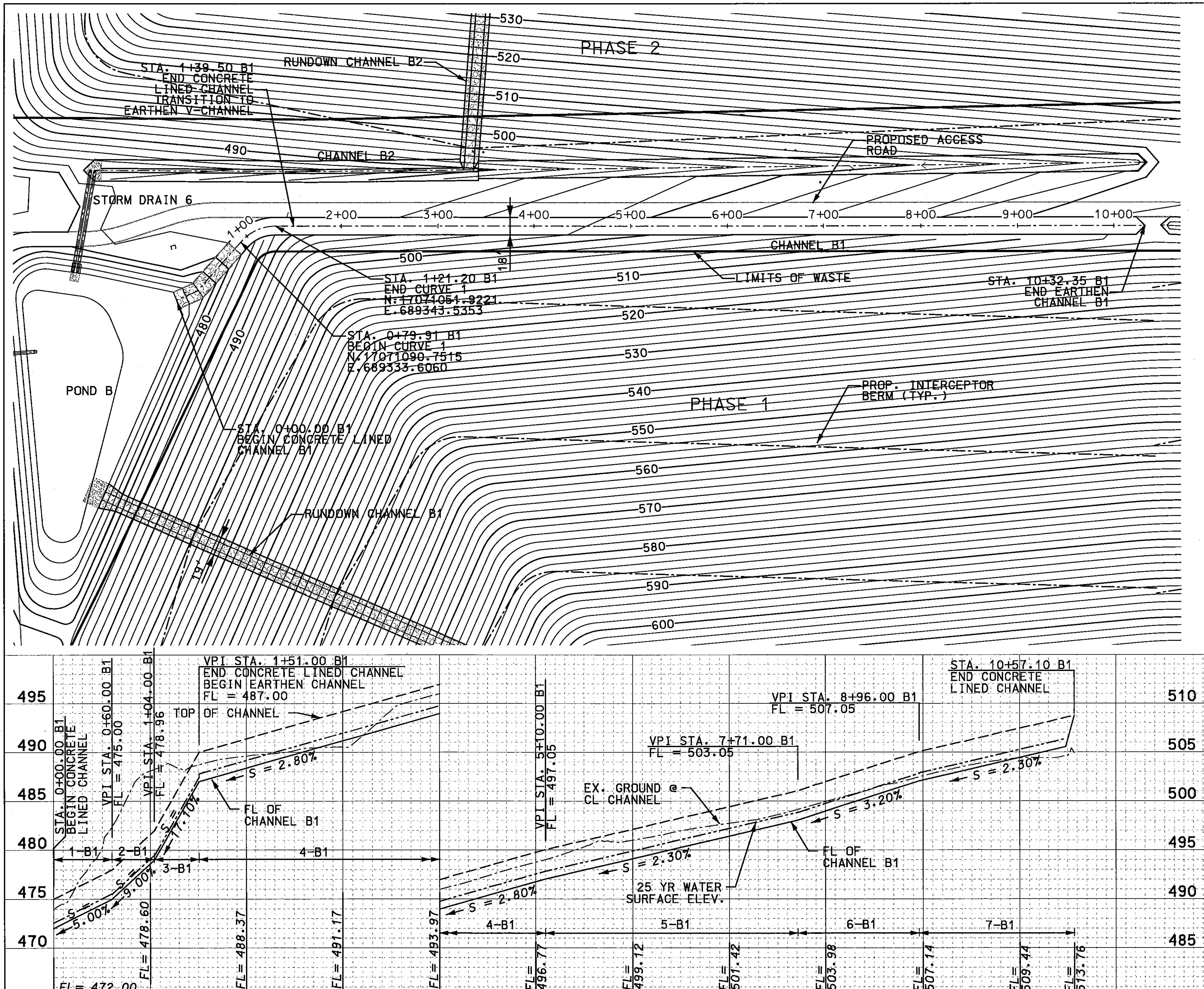

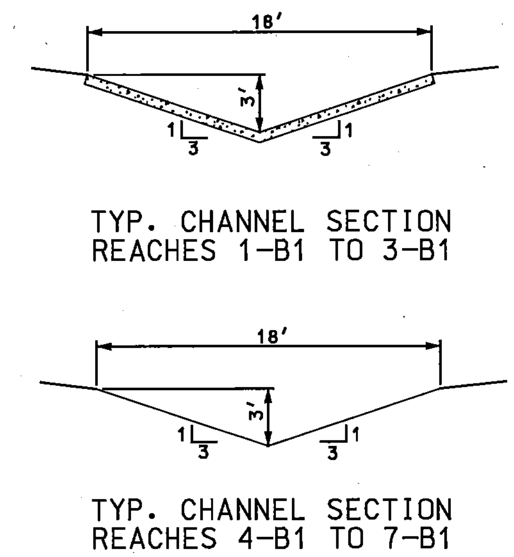

HORIZONTAL SCALE: 50 25 0 50 100 FEET
VERTICAL SCALE: 5 2.5 0 5 10 FEET

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CHANNEL B1 PLAN AND PROFILE FIGURE III-6.12

CITY OF LAREDO

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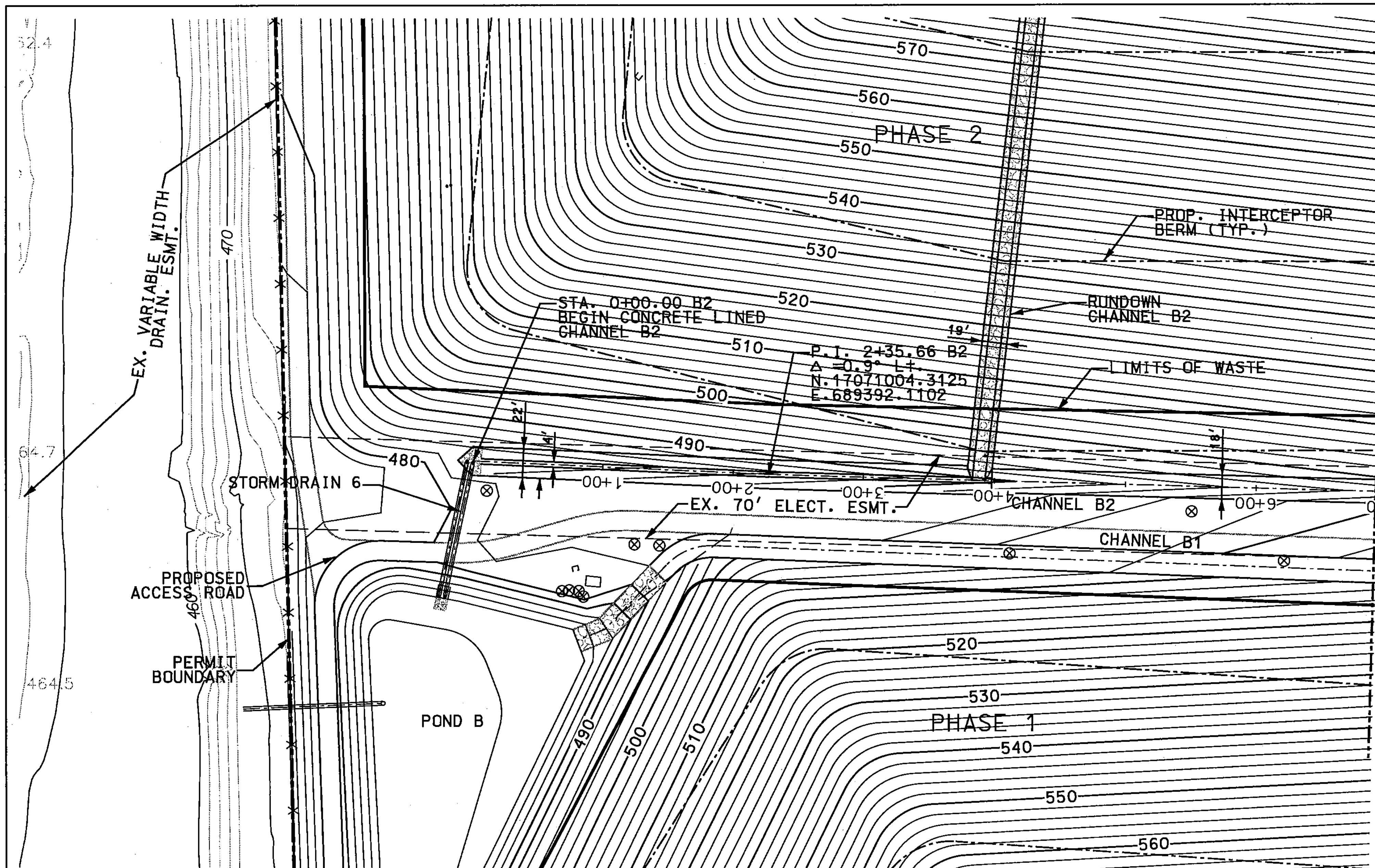
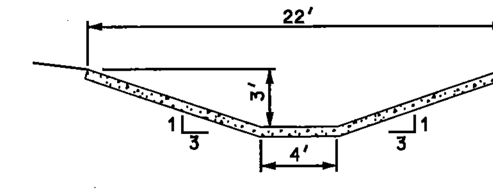
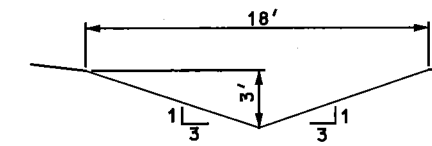
FILE:
ATTACHMENT: III-6





TYP. CHANNEL SECTION 1-B2



TYP. CHANNEL SECTION 2-B2

SCALE HORIZONTAL 50 25 0 50 100 FEET

SCALE VERTICAL 5 2.5 0 5 10 FEET

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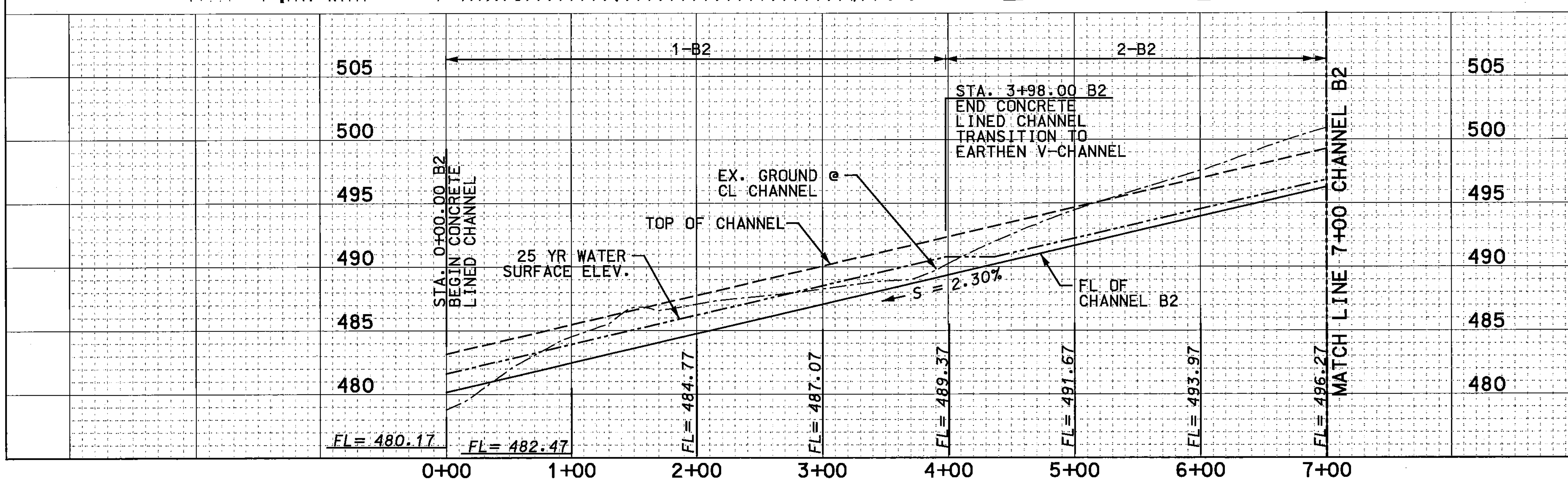

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CHAN. B2 PLAN & PROFILE
STA. 0+00 TO STA. 7+00
FIGURE III-6.13

CITY OF LAREDO

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FILE:
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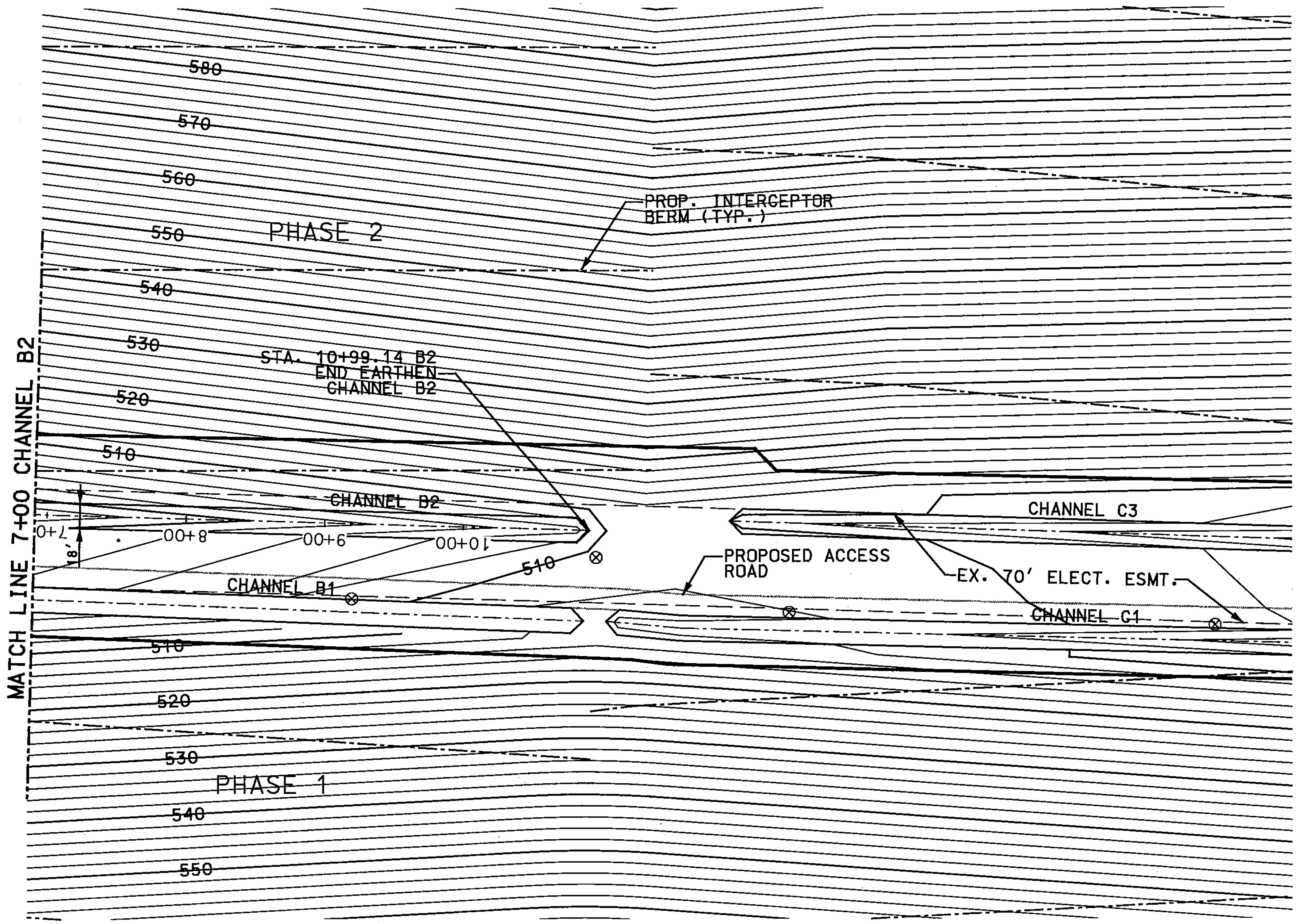

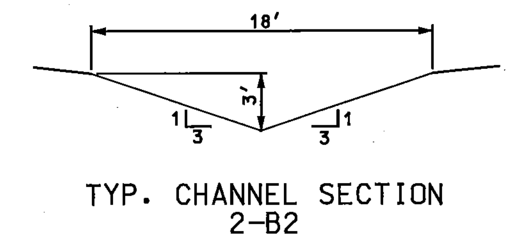

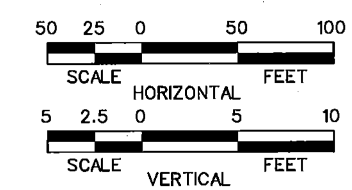

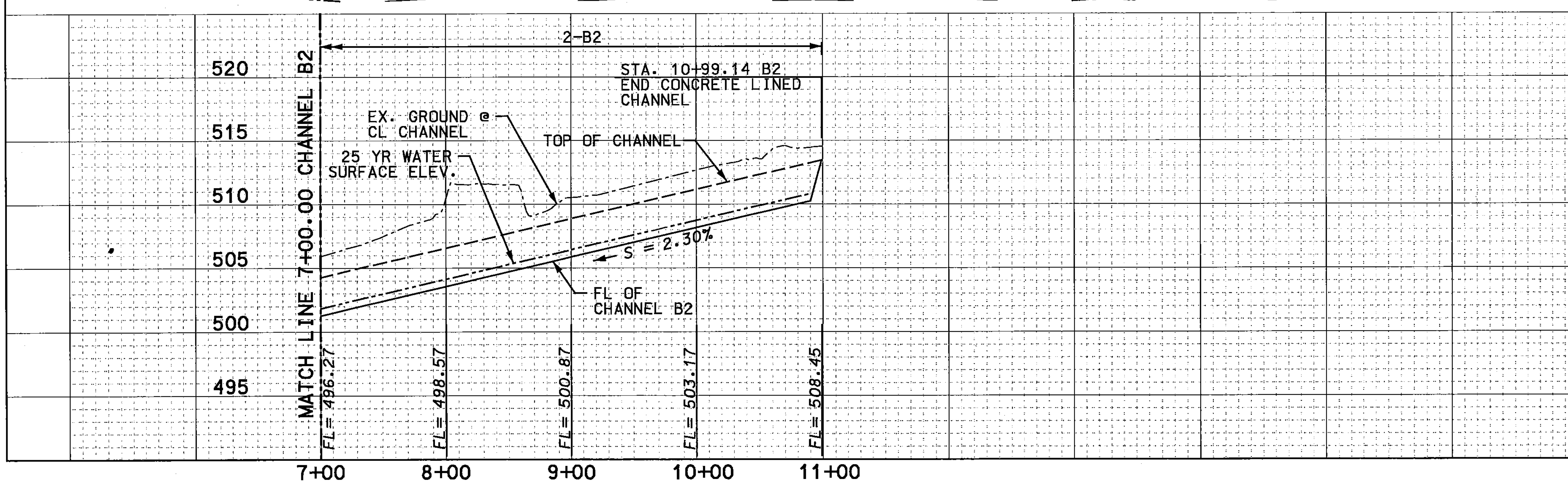

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DRN BY	STA. 7+00 TO STA. 10+99.14
CHK BY	FIGURE III-6.14
APP BY	

CITY OF LAREDO

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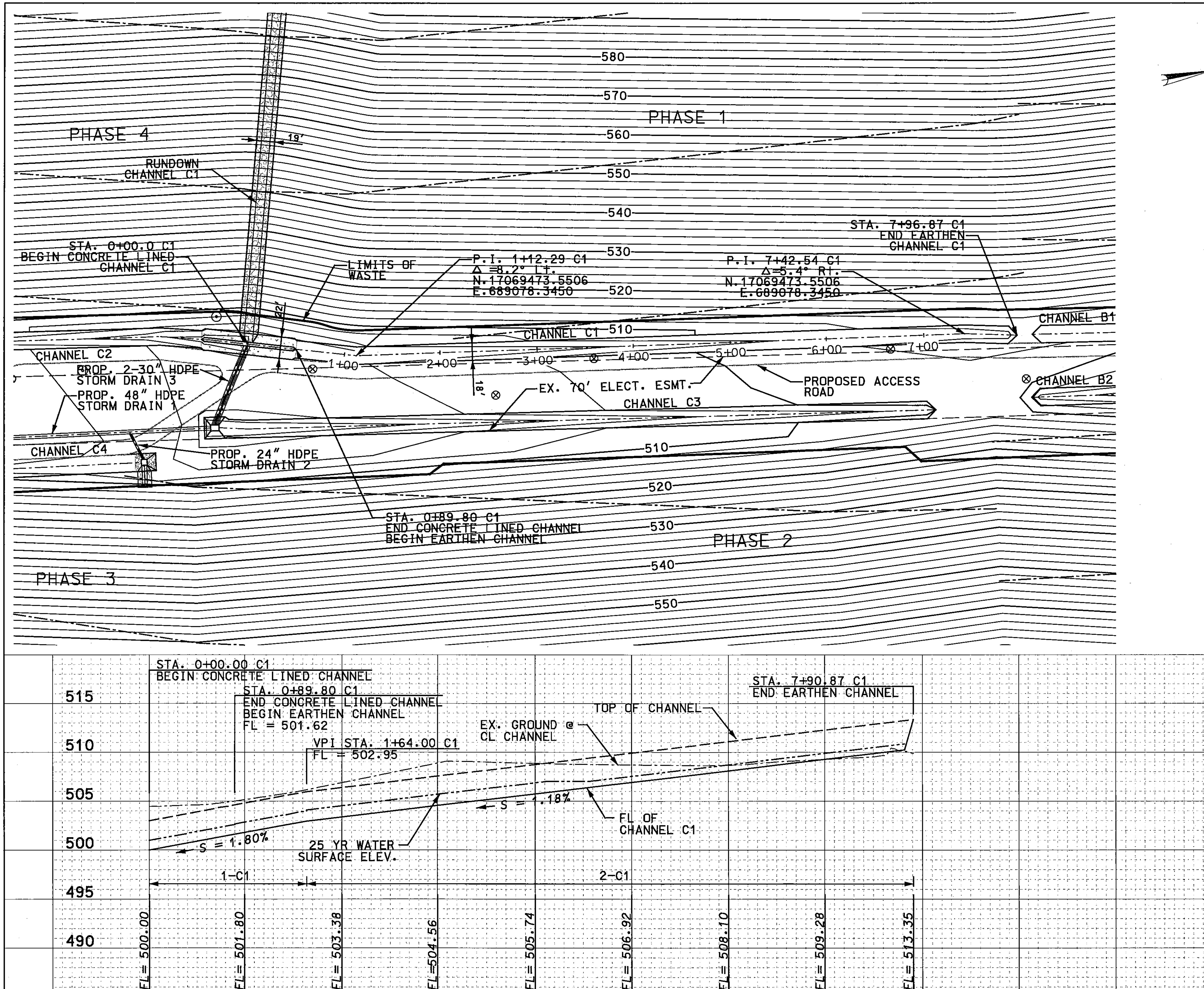
ATTACHMENT: III-6



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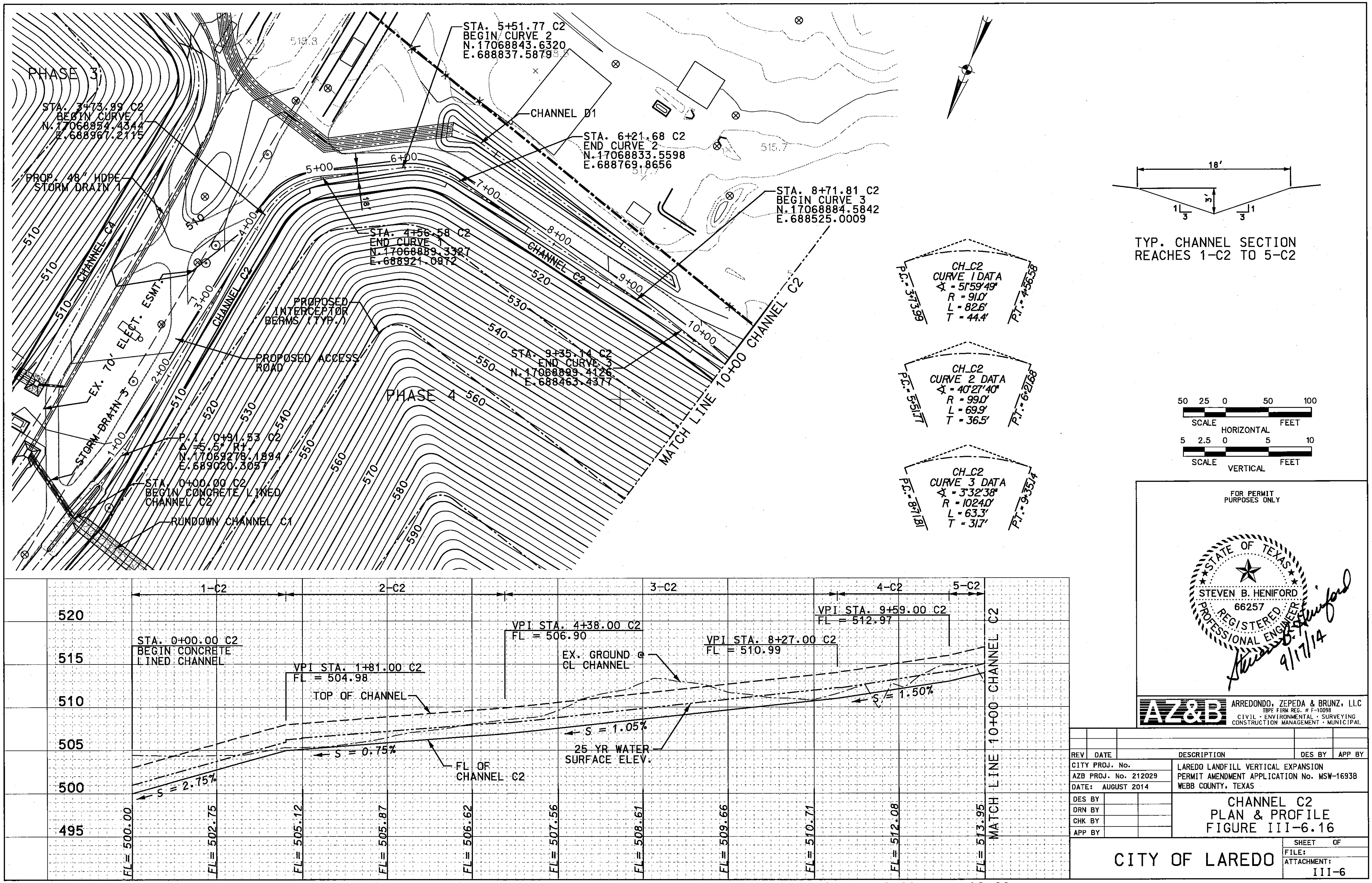
CHANNEL C1
PLAN & PROFILE
FIGURE III-6.15

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6



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APP BY

CHANNEL C2
PLAN & PROFILE
FIGURE III-6.16

CITY OF LAREDO

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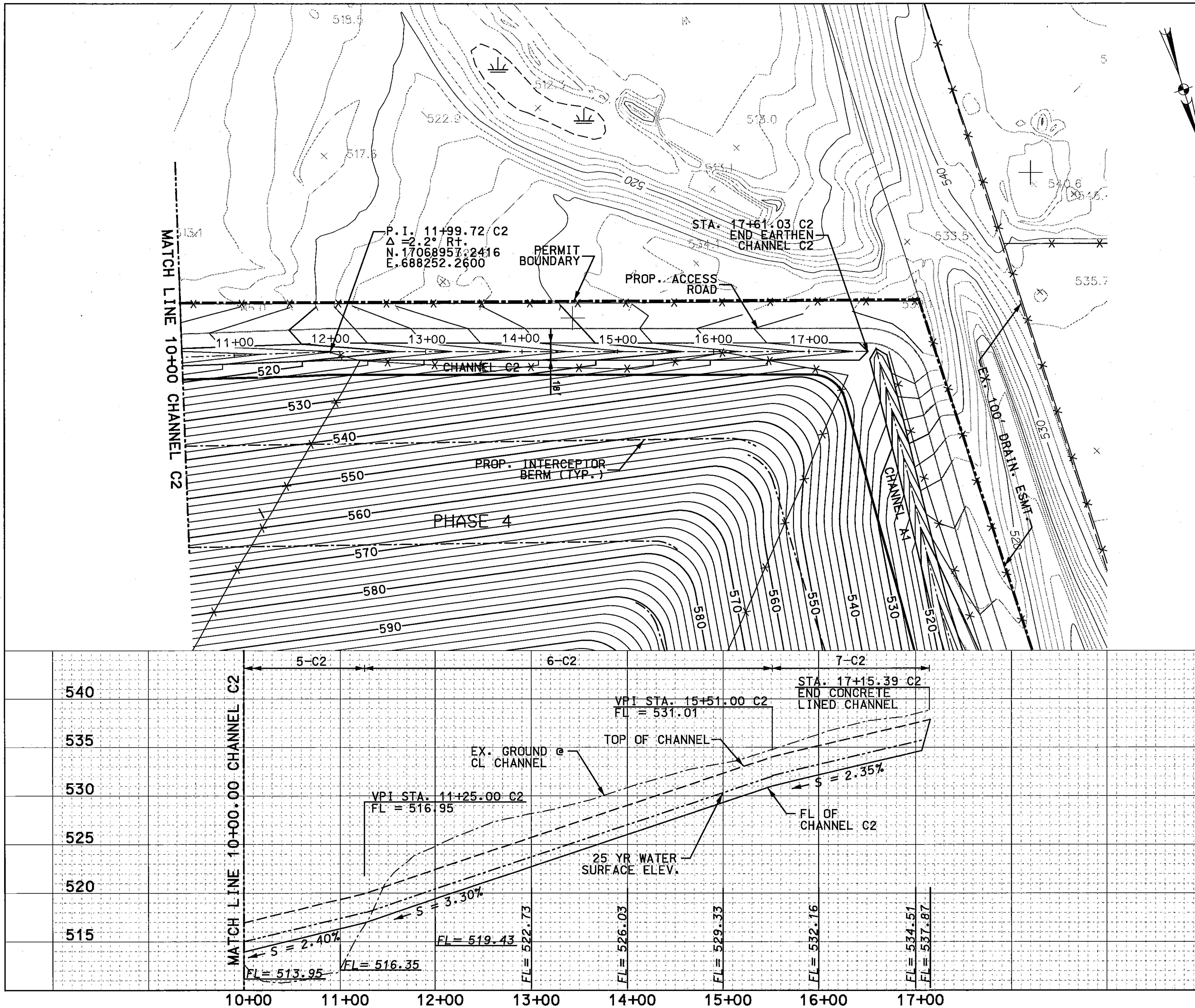
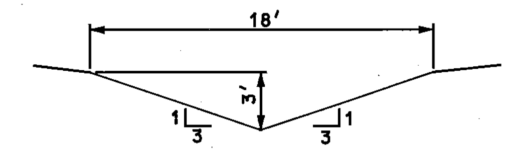
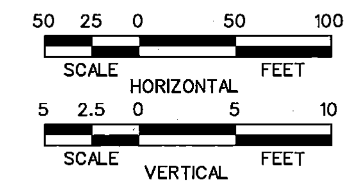
FILE:
ATTACHMENT: III-6





TYP. CHANNEL SECTION
REACHES 5-C2 TO 7-C2



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DRN BY	STA. 10+00 TO STA. 17+61.03
CHK BY	FIGURE III-6.17
APP BY	

CITY OF LAREDO

SHEET OF
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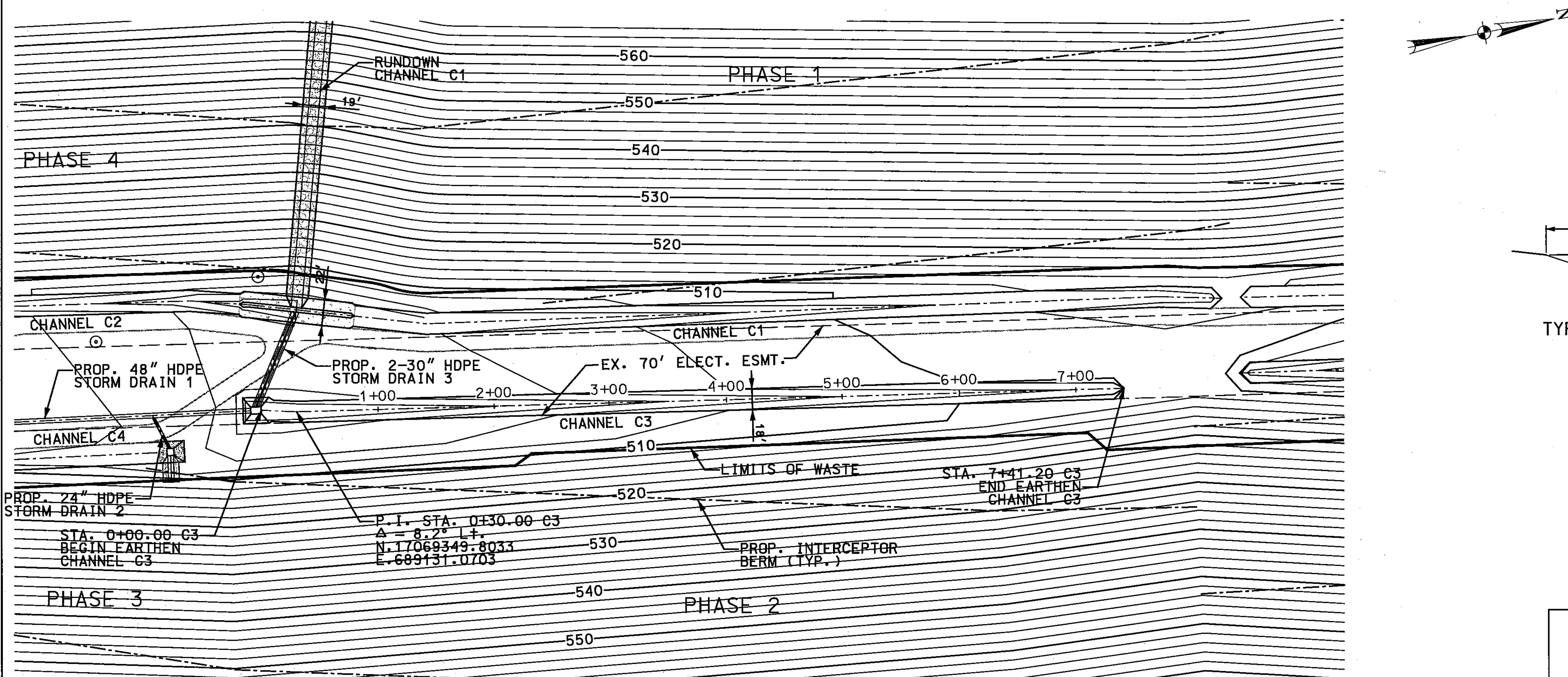
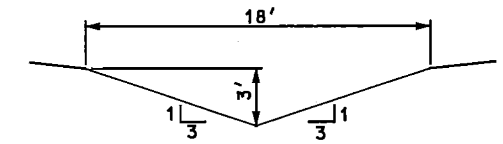
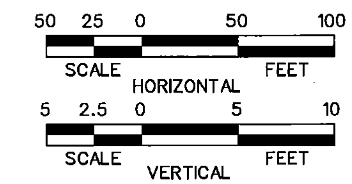
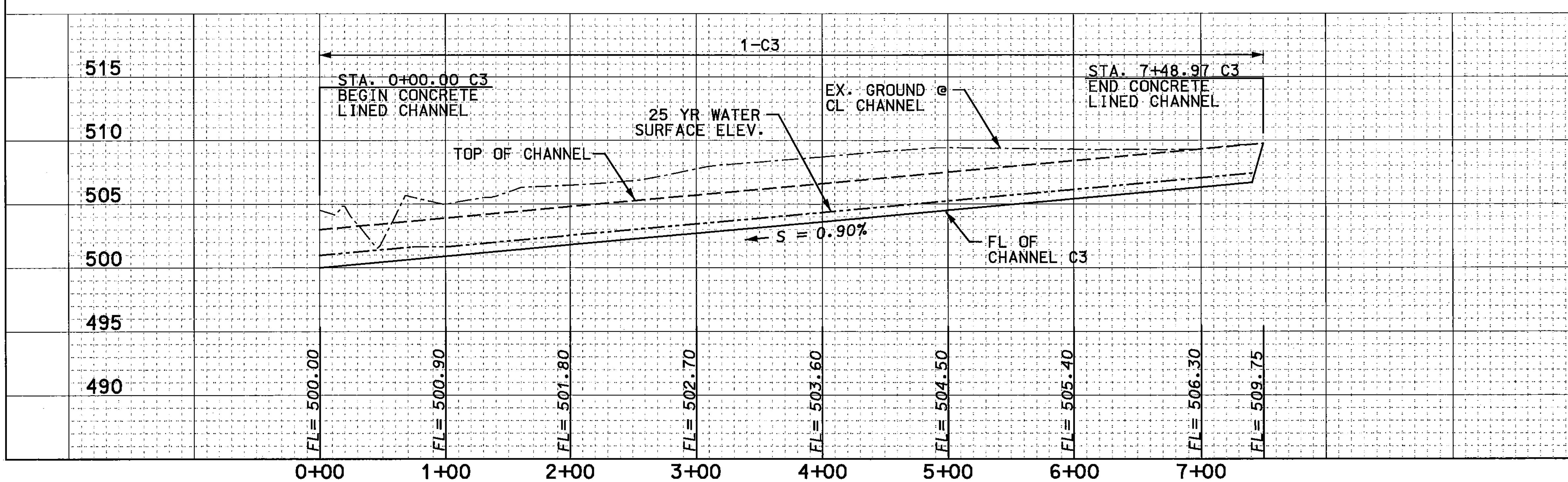
ATTACHMENT:
III.6.17





TYP. CHANNEL SECTION 1-C3





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APP BY

CHANNEL C3
PLAN & PROFILE
FIGURE III-6.18

CITY OF LAREDO

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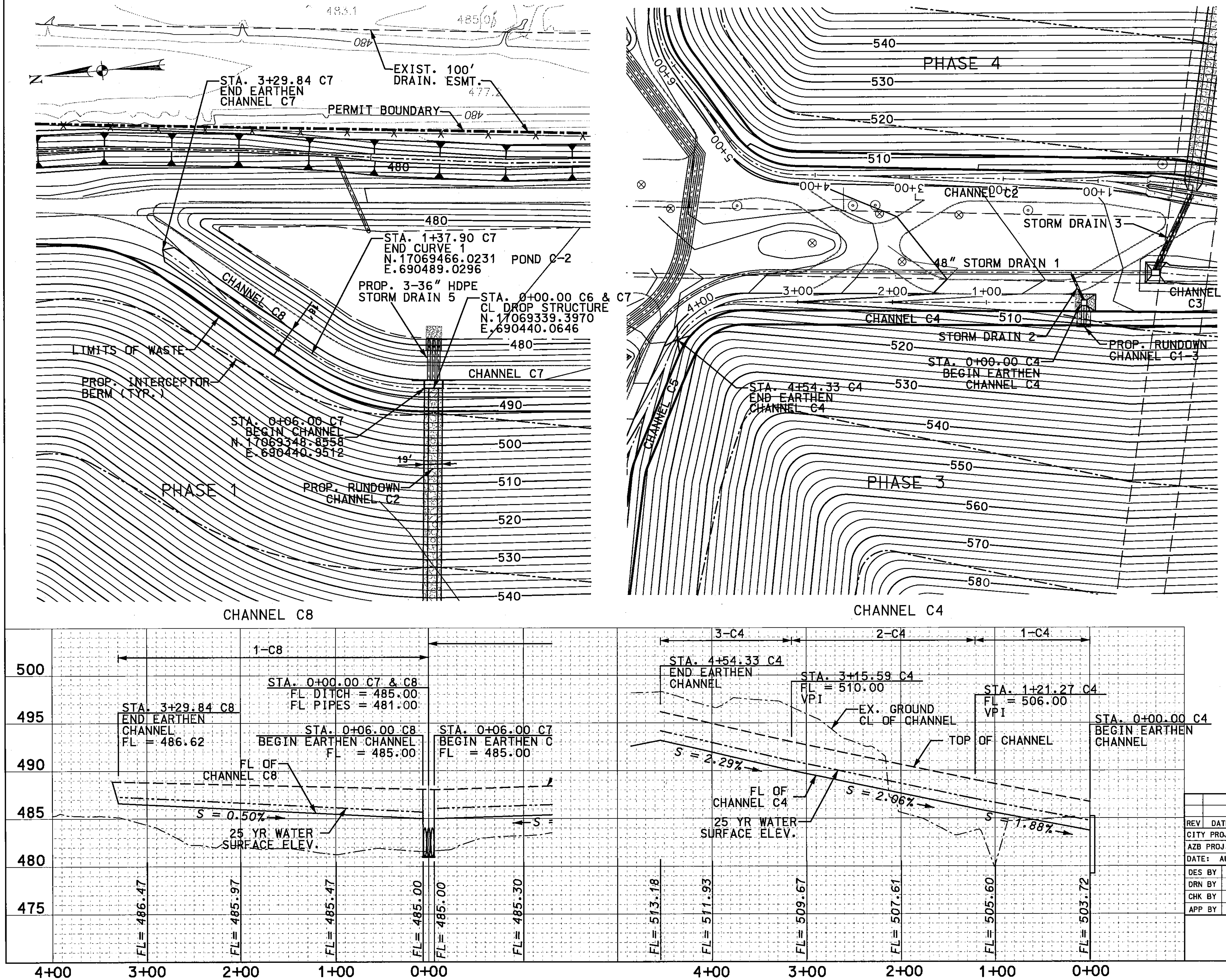
FILE:
ATTACHMENT:
III-6



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STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14

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TBPE FIRM REG. # F-10098
CIVIL · ENVIRONMENTAL · SURVEYING
CONSTRUCTION MANAGEMENT · MUNICIPAL

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LAREDO LANDFILL VERTICAL EXPANSION
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CHANNELS C4 & C8
PLAN & PROFILE
FIGURE III-6.19

CITY OF LAREDO

SHEET OF
FILE:
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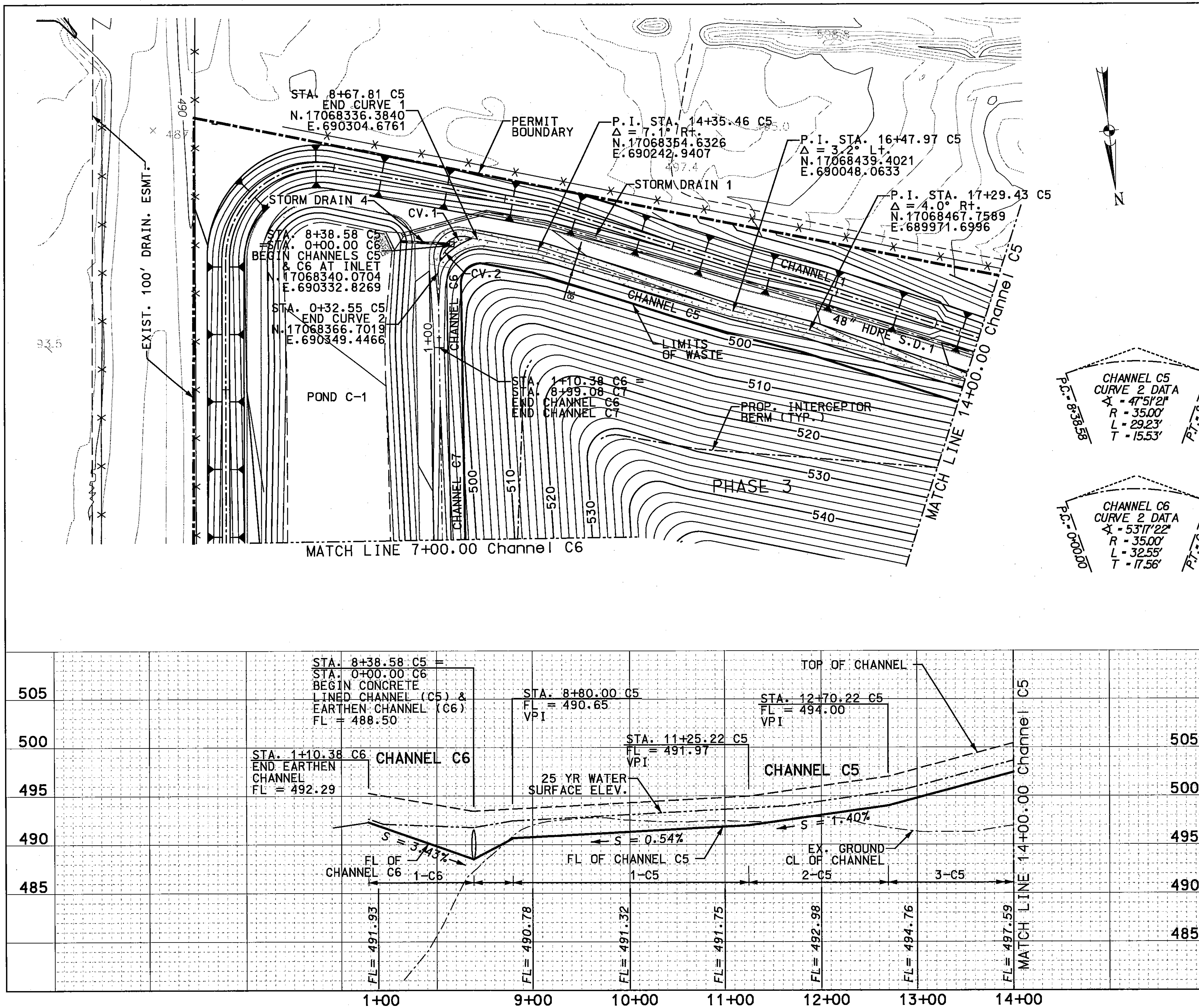

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CHAN C5 & C6 PLAN & PROFILE
STA.8+38.58 TO STA.14+00
FIGURE III-6.-20

CITY OF LAREDO

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FILE:
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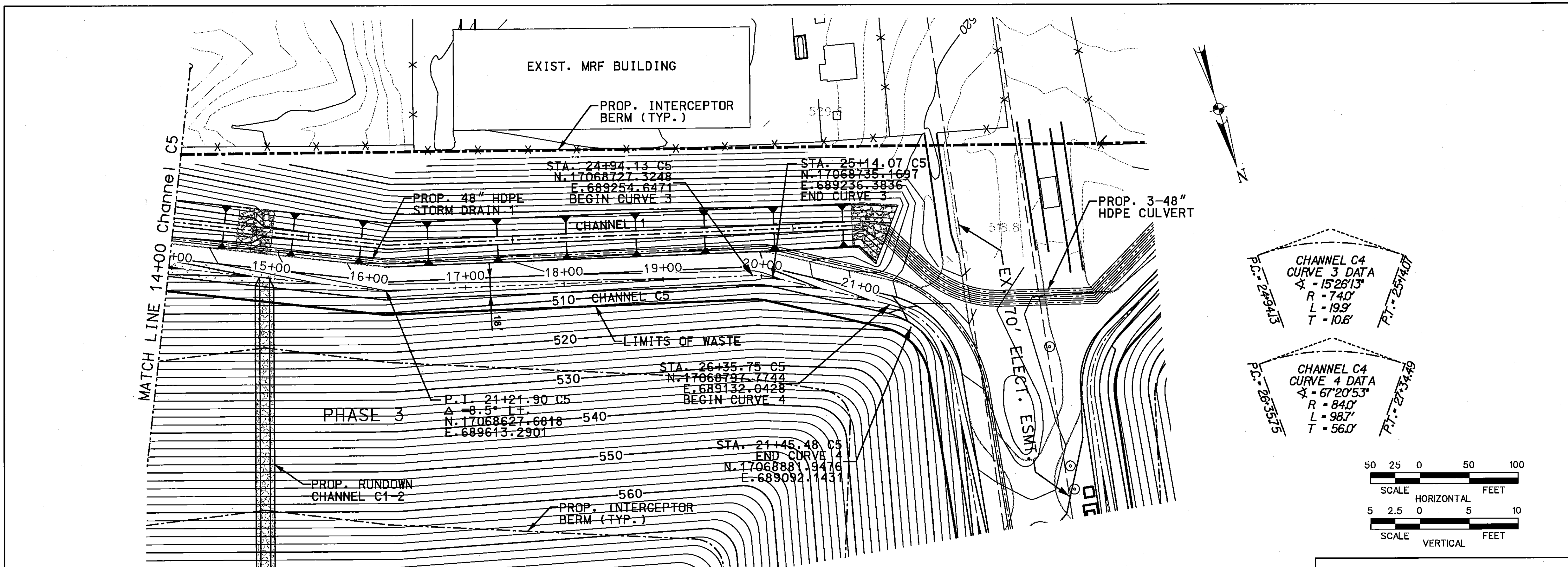
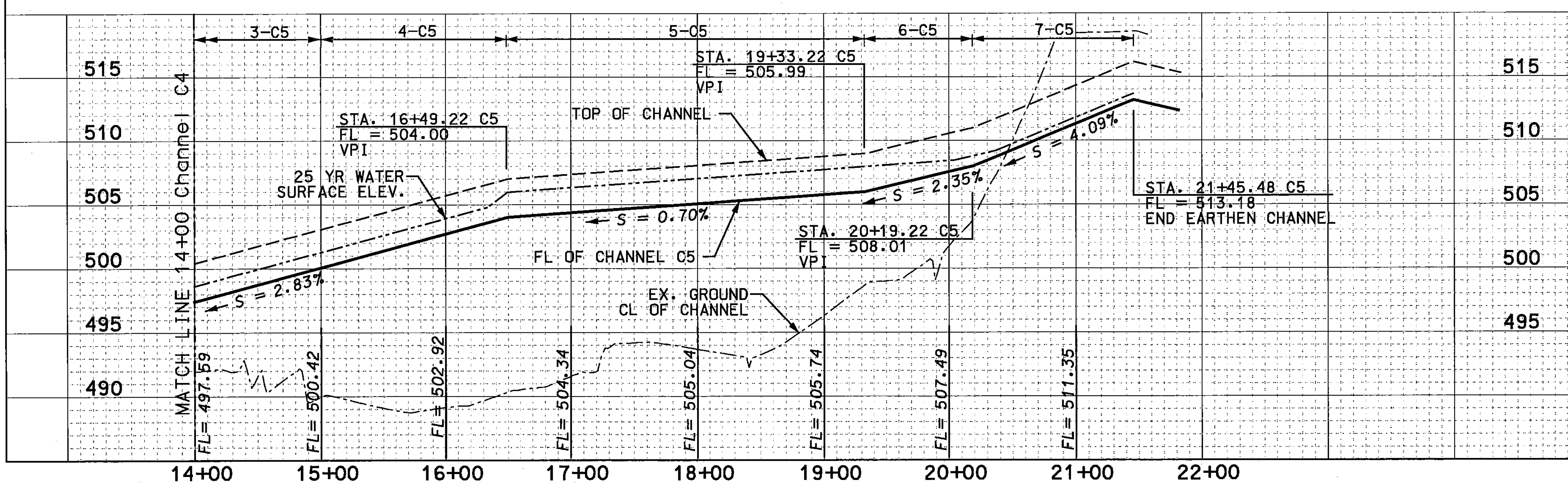
III-6





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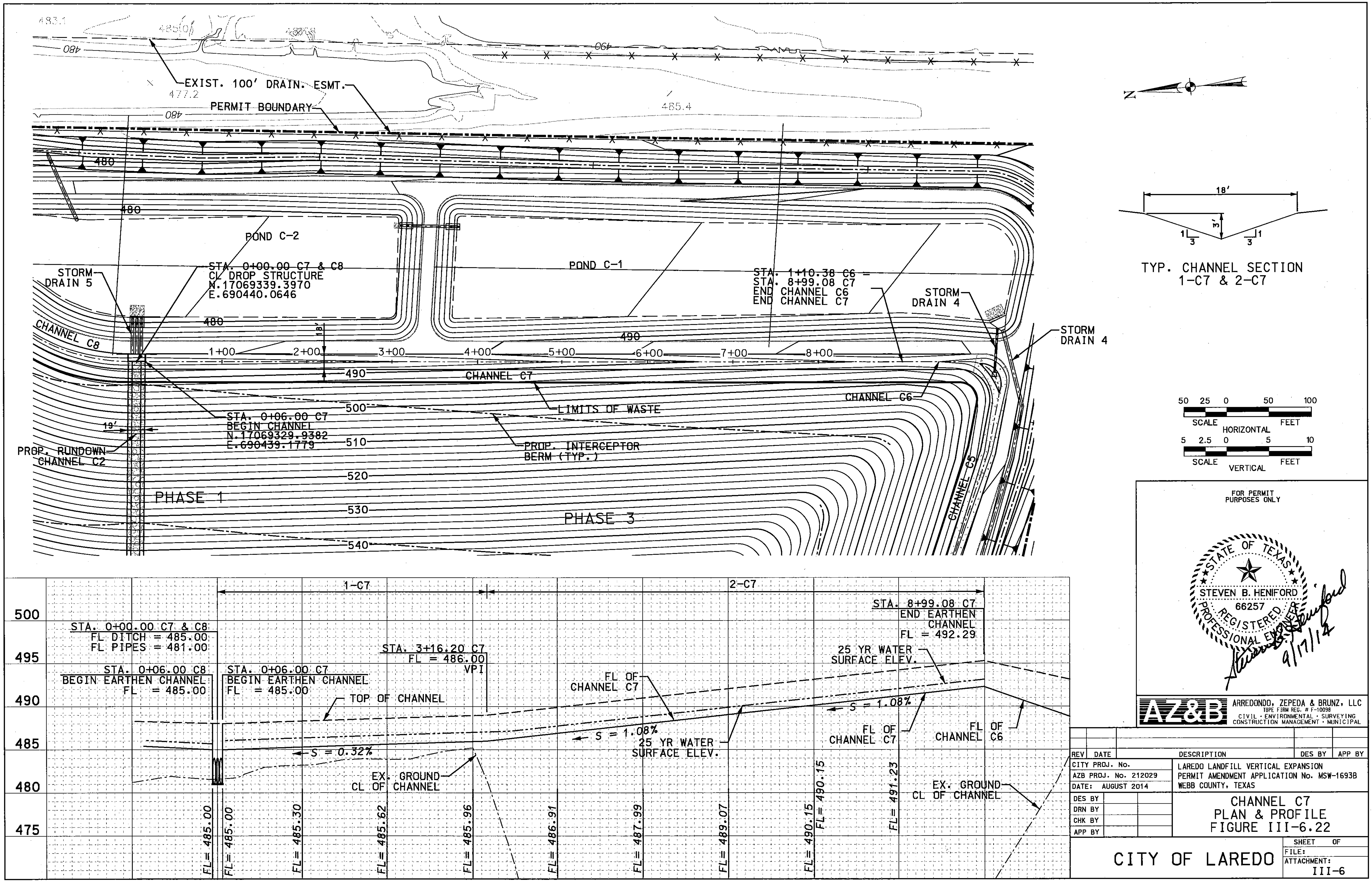
CHAN. C5 PLAN & PROFILE
STA.14+00 TO STA.21+45.48
FIGURE III-6.21

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6


EXIST. 100' DRAIN. ESMT.
PERMIT BOUNDARY
477.2
485.4
480
490
POND C-2
POND C-1
STORM DRAIN 5
STA. 0+00.00 C7 & C8
CL DROP STRUCTURE
N.17069339.3970
E.690440.0646
STA. 1+10.38 C6 = STA. 8+99.08 C7
END CHANNEL C6
END CHANNEL C7
STORM DRAIN 4
CHANNEL C8
18'
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
CHANNEL C7
CHANNEL C6
LIMITS OF WASTE
STA. 0+06.00 C7
BEGIN CHANNEL
N.17069329.9382
E.690439.1779
19'
PROP. RUNDOWN CHANNEL C2
PROP. INTERCEPTOR BERM (TYP.)
500
510
520
530
540
PHASE 1
PHASE 3
CHANNEL C5
18'
3'
1
3
TYP. CHANNEL SECTION
1-C7 & 2-C7
50 25 0 50 100
SCALE HORIZONTAL FEET
5 2.5 0 5 10
SCALE VERTICAL FEET
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1-C7
2-C7
STA. 8+99.08 C7
END EARTHEN CHANNEL
FL = 492.29
STA. 0+00.00 C7 & C8
FL DITCH = 485.00
FL PIPES = 481.00
STA. 3+16.20 C7
FL = 486.00
VPI
25 YR WATER SURFACE ELEV.
STA. 0+06.00 C8
BEGIN EARTHEN CHANNEL
FL = 485.00
STA. 0+06.00 C7
BEGIN EARTHEN CHANNEL
FL = 485.00
FL OF CHANNEL C7
TOP OF CHANNEL
S = 1.08%
FL OF CHANNEL C7
FL OF CHANNEL C6
S = 1.08%
25 YR WATER SURFACE ELEV.
S = 0.32%
EX. GROUND CL OF CHANNEL
EX. GROUND CL OF CHANNEL
500
495
490
485
480
475
FL= 485.00
FL= 485.00
FL= 485.30
FL= 485.62
FL= 485.96
FL= 486.91
FL= 487.99
FL= 489.07
FL= 490.15
FL= 490.15
FL= 491.23
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
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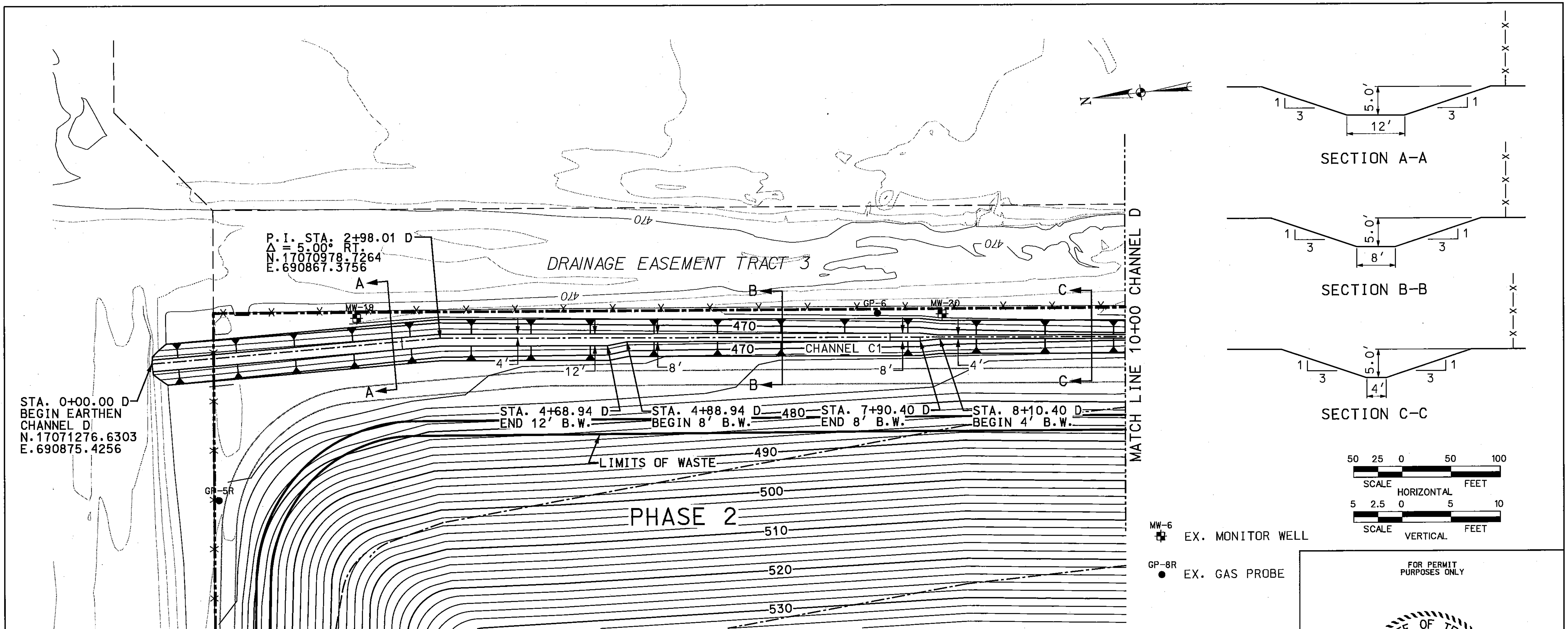
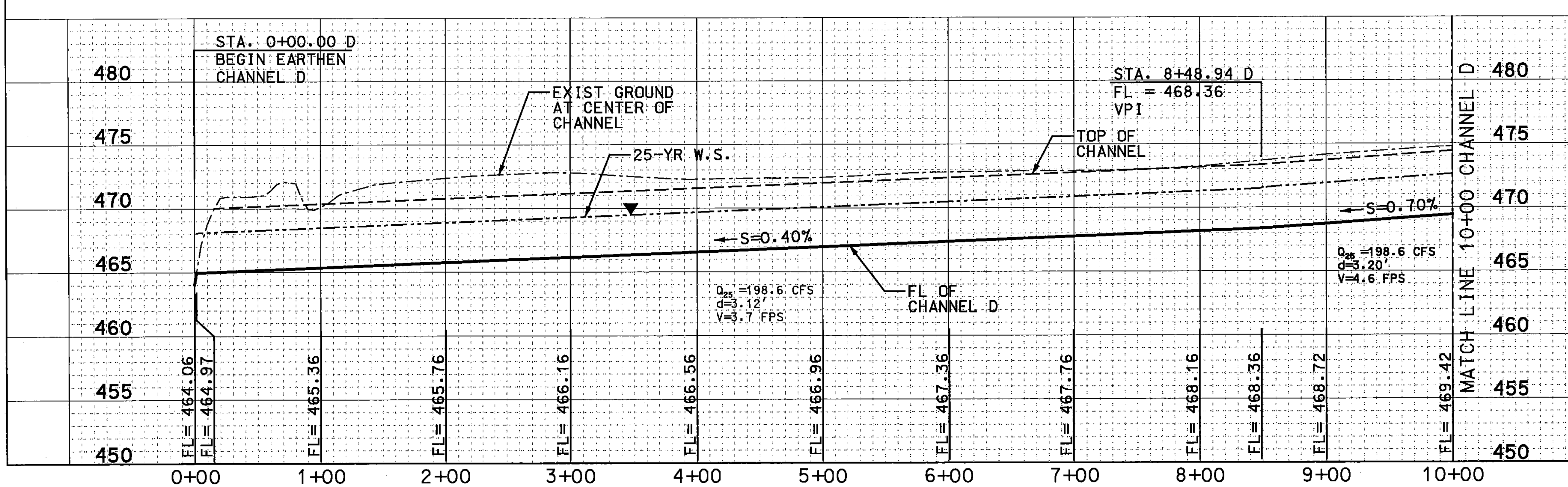
LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS
DES BY
DRN BY
CHK BY
APP BY
CHANNEL C7
PLAN & PROFILE
FIGURE III-6.22
CITY OF LAREDO
SHEET OF
FILE:
ATTACHMENT:
III-6





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PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

DES BY
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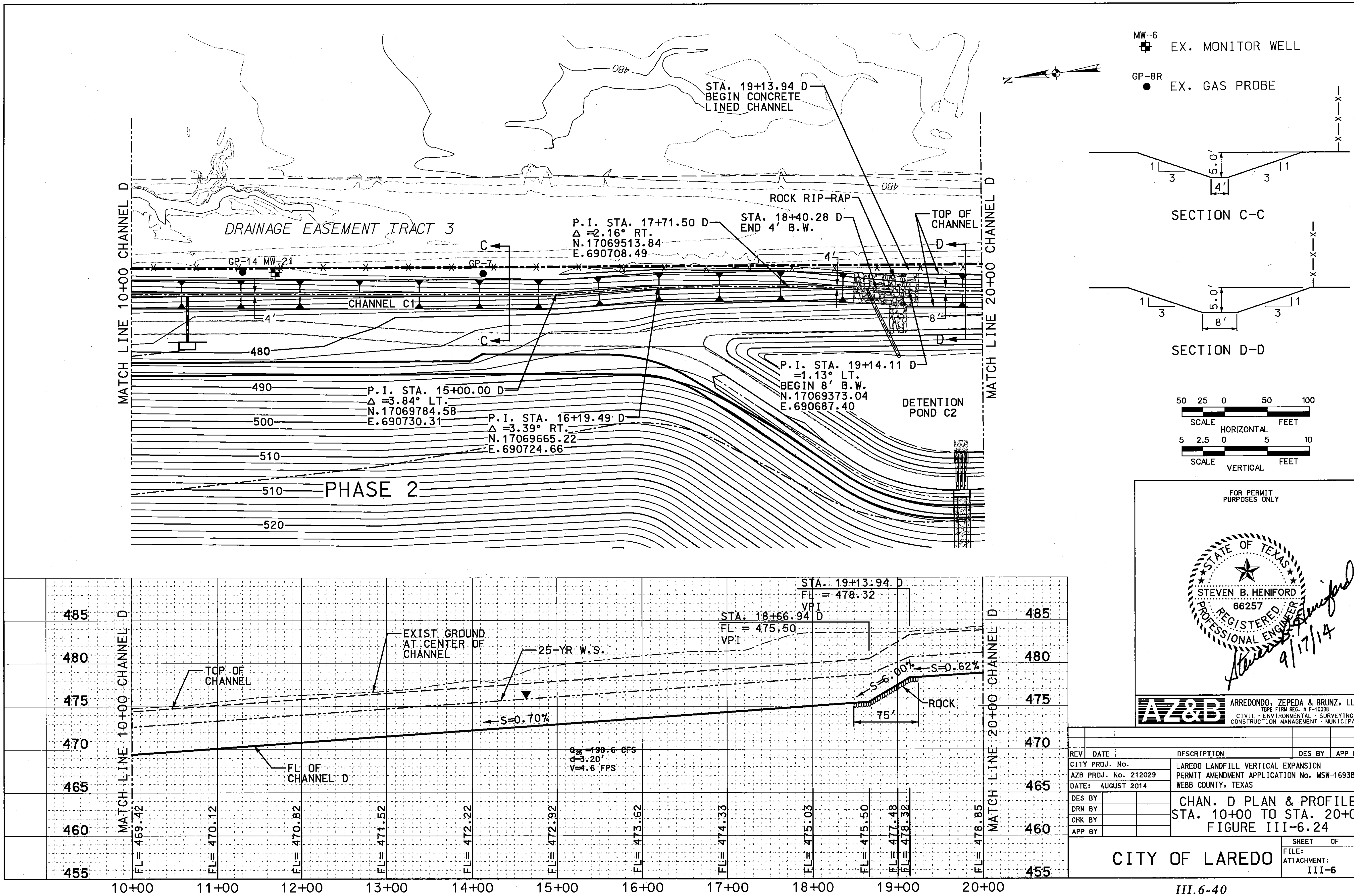
APP BY

CHAN. D PLAN & PROFILE
STA. 0+00 TO STA. 10+00
FIGURE III-6.23

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT:
III-6



MW-6
EX. MONITOR WELL
GP-8R
EX. GAS PROBE
STA. 19+13.94 D
BEGIN CONCRETE
LINED CHANNEL
ROCK RIP-RAP
STA. 18+40.28 D
END 4' B.W.
TOP OF
CHANNEL
P.I. STA. 17+71.50 D
Δ =2.16° RT.
N.17069513.84
E.690708.49
DRAINAGE EASEMENT TRACT 3
GP-14 MW-21
GP-7
CHANNEL C1
MATCH LINE 10+00 CHANNEL D
MATCH LINE 20+00 CHANNEL D
P.I. STA. 15+00.00 D
Δ =3.84° LT.
N.17069784.58
E.690730.31
P.I. STA. 16+19.49 D
Δ =3.39° RT.
N.17069665.22
E.690724.66
P.I. STA. 19+14.11 D
=1.13° LT.
BEGIN 8' B.W.
N.17069373.04
E.690687.40
DETENTION
POND C2
PHASE 2
SECTION C-C
SECTION D-D
SCALE HORIZONTAL FEET
SCALE VERTICAL FEET
STA. 19+13.94 D
FL = 478.32
VPI
STA. 18+66.94 D
FL = 475.50
VPI
EXIST GROUND
AT CENTER OF
CHANNEL
25-YR W.S.
TOP OF
CHANNEL
S=6.00%
S=0.62%
ROCK
75'
S=0.70%
Q_{25} =198.6 CFS
d=3.20'
V=4.6 FPS
FL OF
CHANNEL D
FL= 469.42
FL= 470.12
FL= 470.82
FL= 471.52
FL= 472.22
FL= 472.92
FL= 473.62
FL= 474.33
FL= 475.03
FL= 475.50
FL= 477.48
FL= 478.32
FL= 478.85
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
FOR PERMIT
PURPOSES ONLY
STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED
PROFESSIONAL ENGINEER
9/17/14
AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
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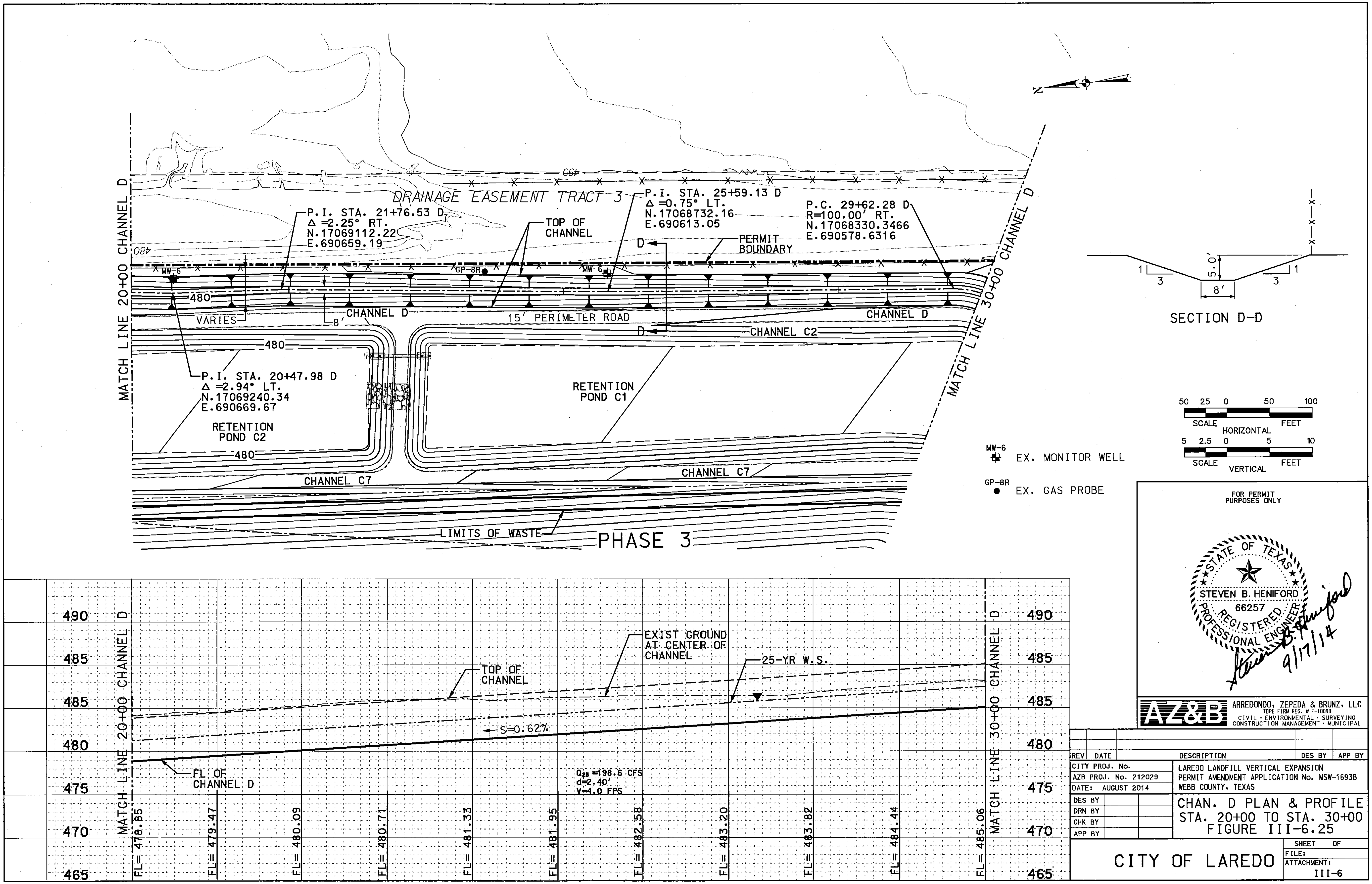
CONSTRUCTION MANAGEMENT · MUNICIPAL
REV DATE DESCRIPTION DES BY APP BY
CITY PROJ. No.
AZB PROJ. No. 212029
DATE: AUGUST 2014
LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS
DES BY
DRN BY
CHK BY
APP BY
CHAN. D PLAN & PROFILE
STA. 10+00 TO STA. 20+00
FIGURE III-6.24
CITY OF LAREDO
SHEET OF
FILE:
ATTACHMENT:
III-6


DRAINAGE EASEMENT TRACT 3
P.I. STA. 21+76.53 D
Δ =2.25° RT.
N.17069112.22
E.690659.19
P.I. STA. 25+59.13 D
Δ =0.75° LT.
N.17068732.16
E.690613.05
P.C. 29+62.28 D
R=100.00' RT.
N.17068330.3466
E.690578.6316
TOP OF CHANNEL
PERMIT BOUNDARY
MATCH LINE 20+00 CHANNEL D
MATCH LINE 30+00 CHANNEL D
CHANNEL D
15' PERIMETER ROAD
CHANNEL C2
VARIES
8'
480
490
P.I. STA. 20+47.98 D
Δ =2.94° LT.
N.17069240.34
E.690669.67
RETENTION POND C2
RETENTION POND C1
CHANNEL C7
LIMITS OF WASTE
PHASE 3
MW-6
GP-8R
SECTION D-D
5.0'
8'
1
3
MW-6 EX. MONITOR WELL
GP-8R EX. GAS PROBE
HORIZONTAL SCALE 50 25 0 50 100 FEET
VERTICAL SCALE 5 2.5 0 5 10 FEET
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STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14
EXIST GROUND AT CENTER OF CHANNEL
TOP OF CHANNEL
25-YR W.S.
S=0.62%
FL OF CHANNEL D
Q_{25} =198.6 CFS
d=2.40'
V=4.0 FPS
490
485
485
480
475
470
465
FL= 478.85
FL= 479.47
FL= 480.09
FL= 480.71
FL= 481.33
FL= 481.95
FL= 482.58
FL= 483.20
FL= 483.82
FL= 484.44
FL= 485.06
20+00
21+00
22+00
23+00
24+00
25+00
26+00
27+00
28+00
29+00
30+00
AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
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CONSTRUCTION MANAGEMENT · MUNICIPAL
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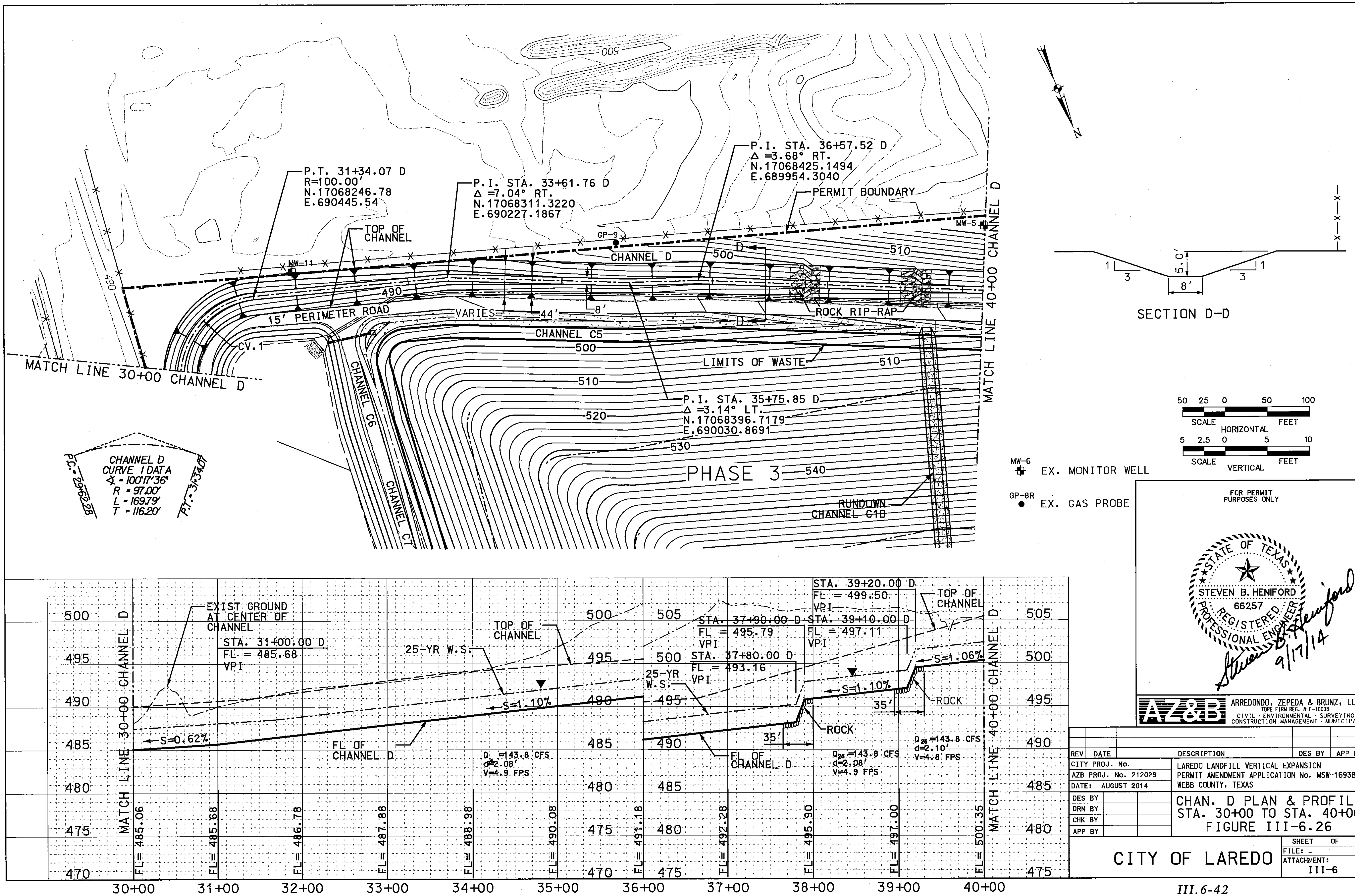
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS
DES BY
DRN BY
CHK BY
APP BY
CHAN. D PLAN & PROFILE
STA. 20+00 TO STA. 30+00
FIGURE III-6.25
CITY OF LAREDO
SHEET OF
FILE:
ATTACHMENT:
III-6



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REV	DATE	DESCRIPTION	DES BY	APP BY

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AZB PROJ. No. 212029
DATE: AUGUST 2014

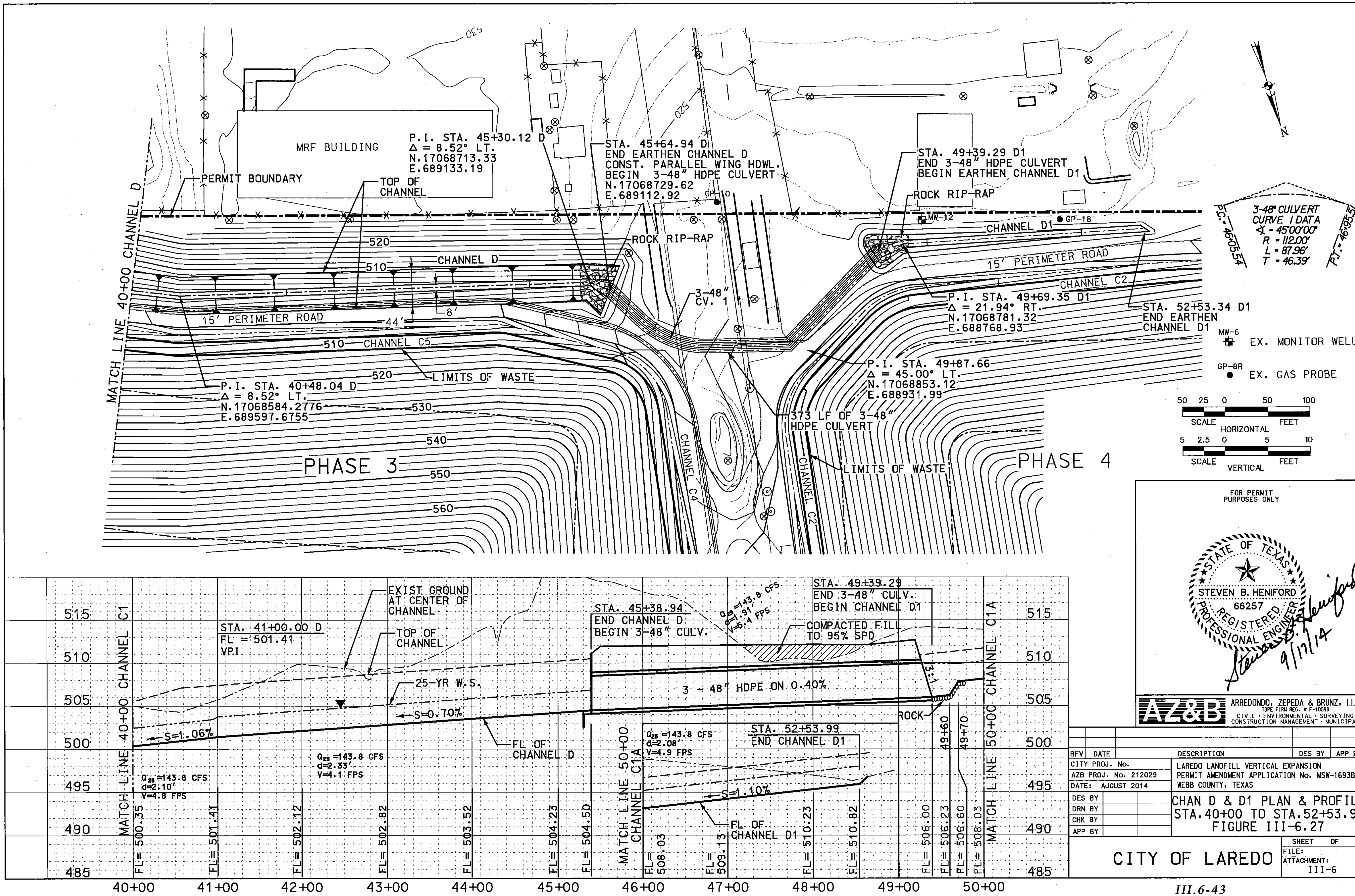
LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

DES BY
DRN BY
CHK BY
APP BY

CHAN. D PLAN & PROFILE
STA. 30+00 TO STA. 40+00
FIGURE III-6.26

CITY OF LAREDO

SHEET OF
FILE: -
ATTACHMENT: III-6



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REV	DATE	DESCRIPTION	DES BY	APP BY

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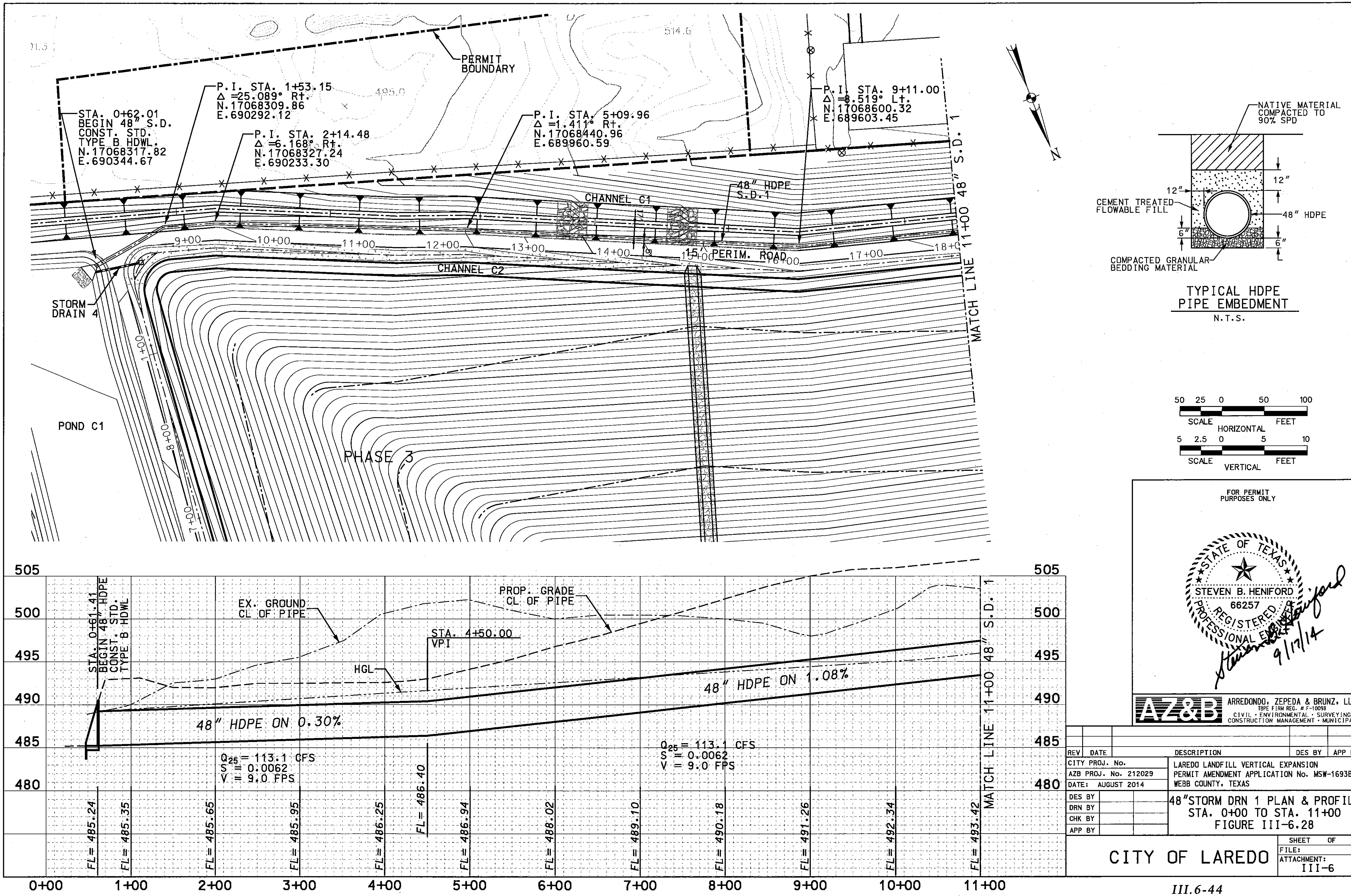
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

DES BY / DRN BY / CHK BY / APP BY

CHAN D & D1 PLAN & PROFILE
STA.40+00 TO STA.52+53.99
FIGURE III-6.27

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6



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WEBB COUNTY, TEXAS

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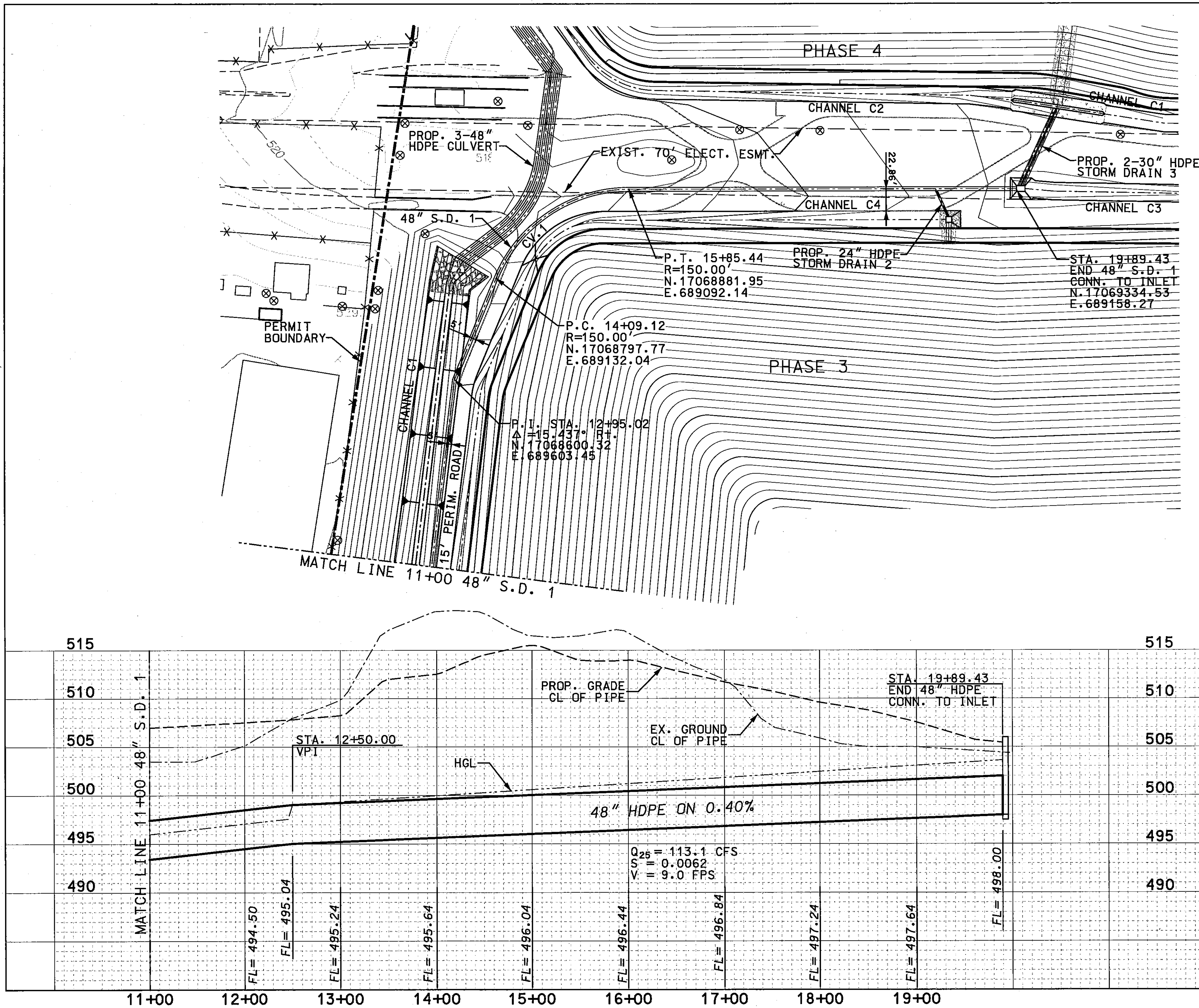
APP BY

48"STORM DRN 1 PLAN & PROFILE
STA. 0+00 TO STA. 11+00
FIGURE III-6.28

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6



N

48" S.D.1
CURVE 1 DATA
Δ = 67°20'54"
R = 150.00'
L = 176.32'
T = 99.94'
P.C. = 13+09.12
P.T. = 14+85.44

SCALE HORIZONTAL: 50 25 0 50 100 FEET

SCALE VERTICAL: 5 2.5 0 5 10 FEET

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STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14

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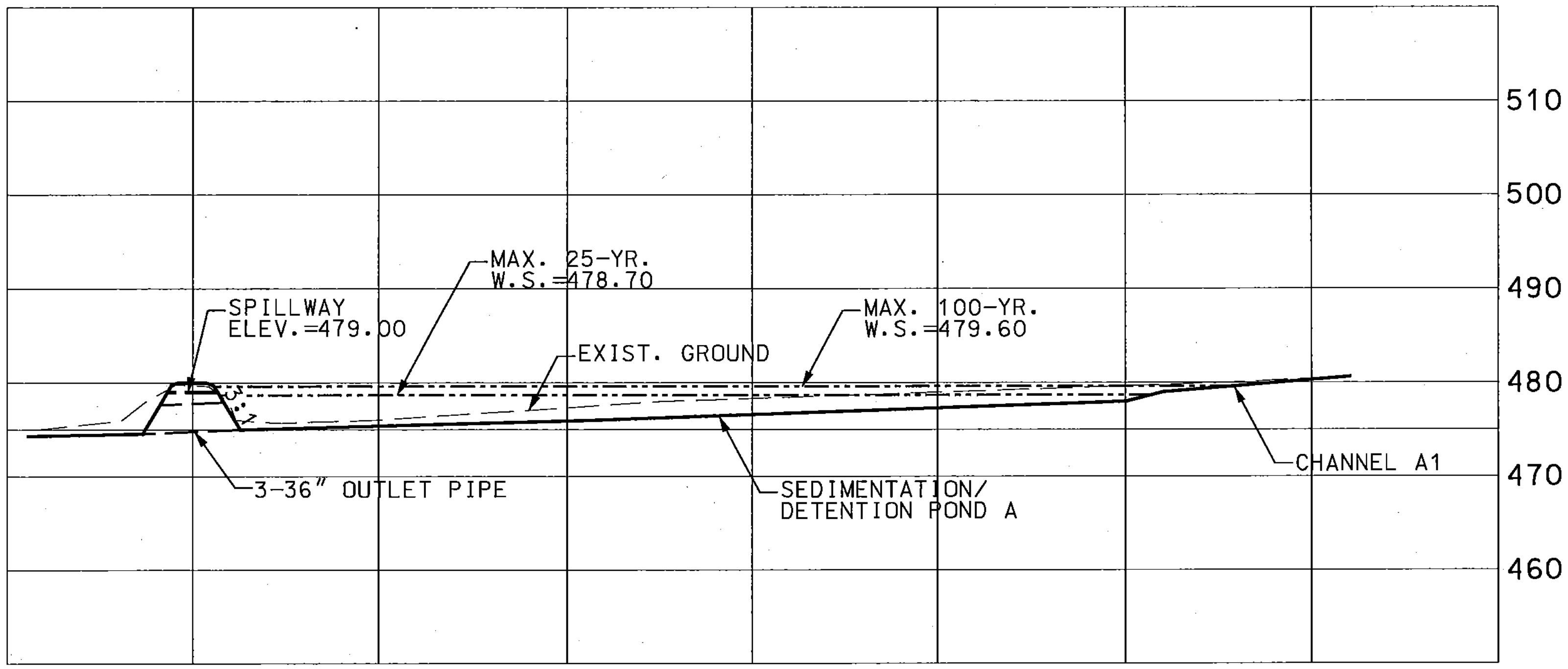
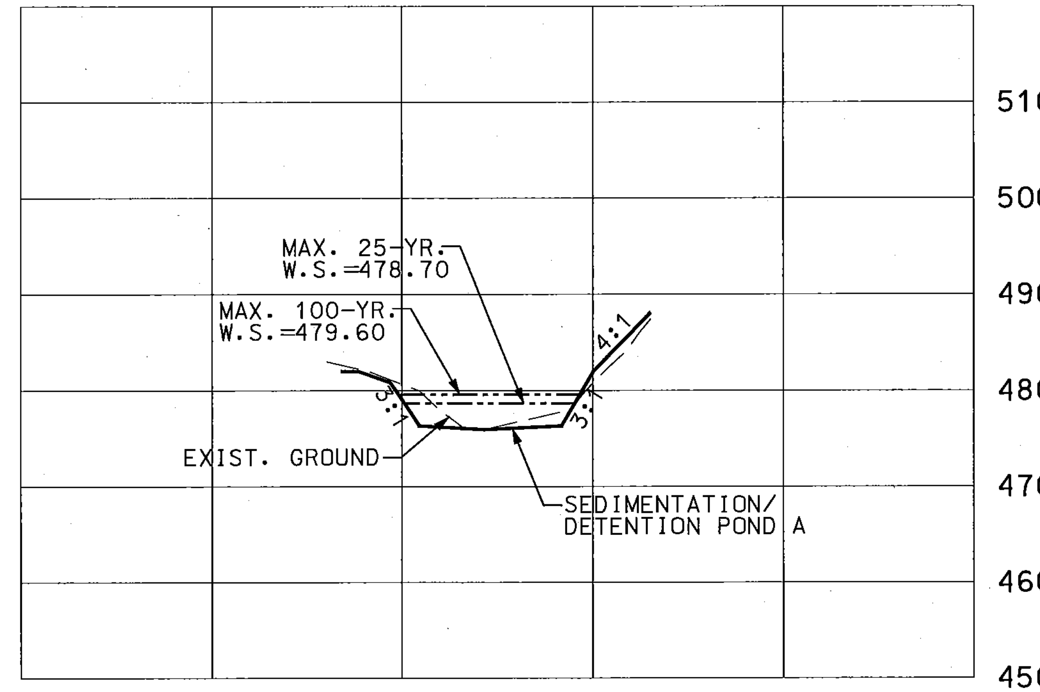
CITY PROJ. No.	LAREDO LANDFILL VERTICAL EXPANSION
AZB PROJ. No. 212029	PERMIT AMENDMENT APPLICATION No. MSW-1693B
DATE: AUGUST 2014	WEBB COUNTY, TEXAS
DES BY	48"STORM DRN 1 PLAN & PROFILE
DRN BY	STA. 11+00 TO END
CHK BY	FIGURE III-6.29
APP BY	

CITY OF LAREDO

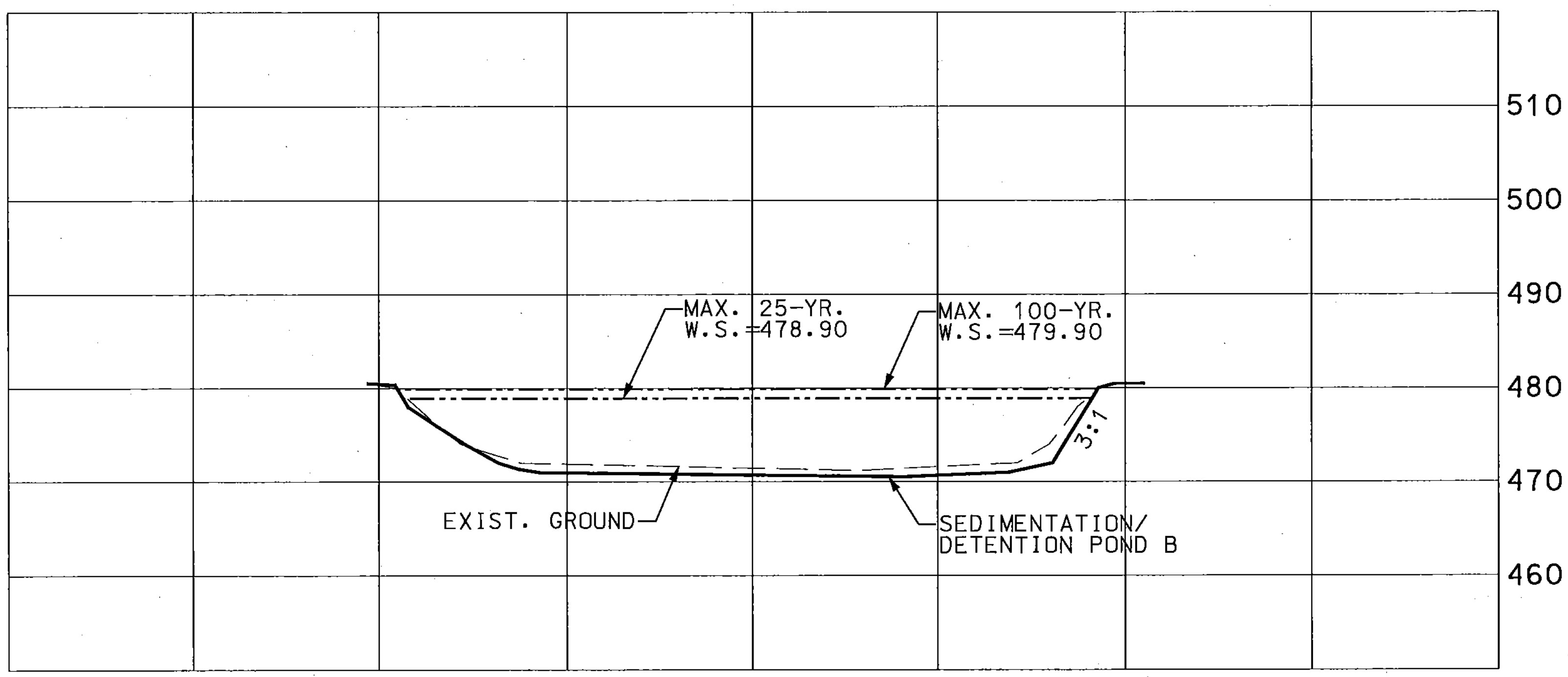
SHEET OF
FILE:
ATTACHMENT: III-6



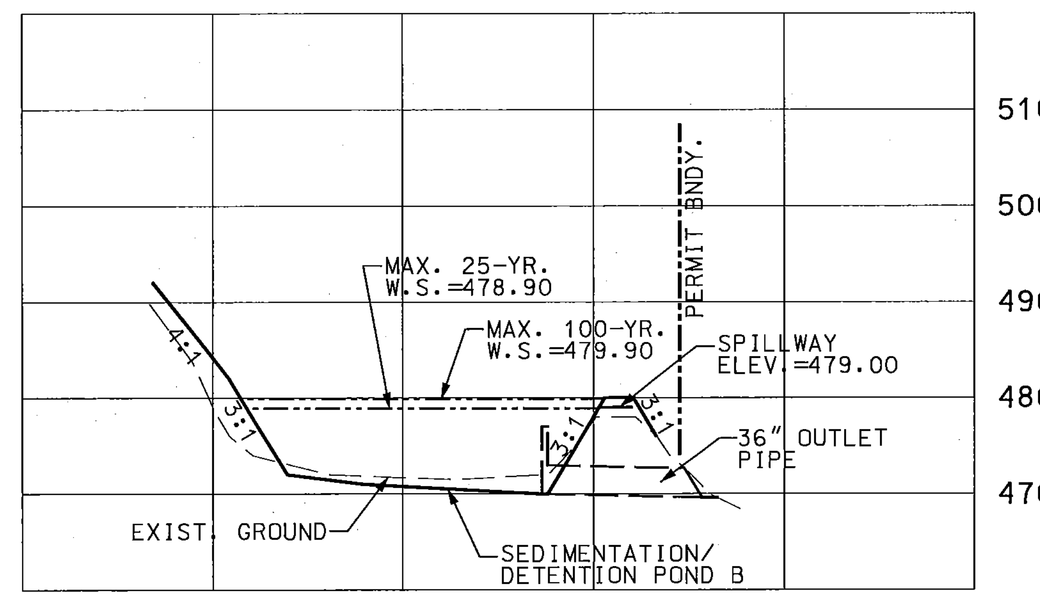
SEDIMENTATION POND A SECTION (A / 6.30)



SEDIMENTATION POND A SECTION (B / 6.30)



SEDIMENTATION POND B SECTION (C / 6.30)



SEDIMENTATION POND B SECTION (D / 6.30)

SCALE 50 25 0 50 100 FEET — HORIZONTAL

SCALE 10 5 0 10 20 FEET — VERTICAL

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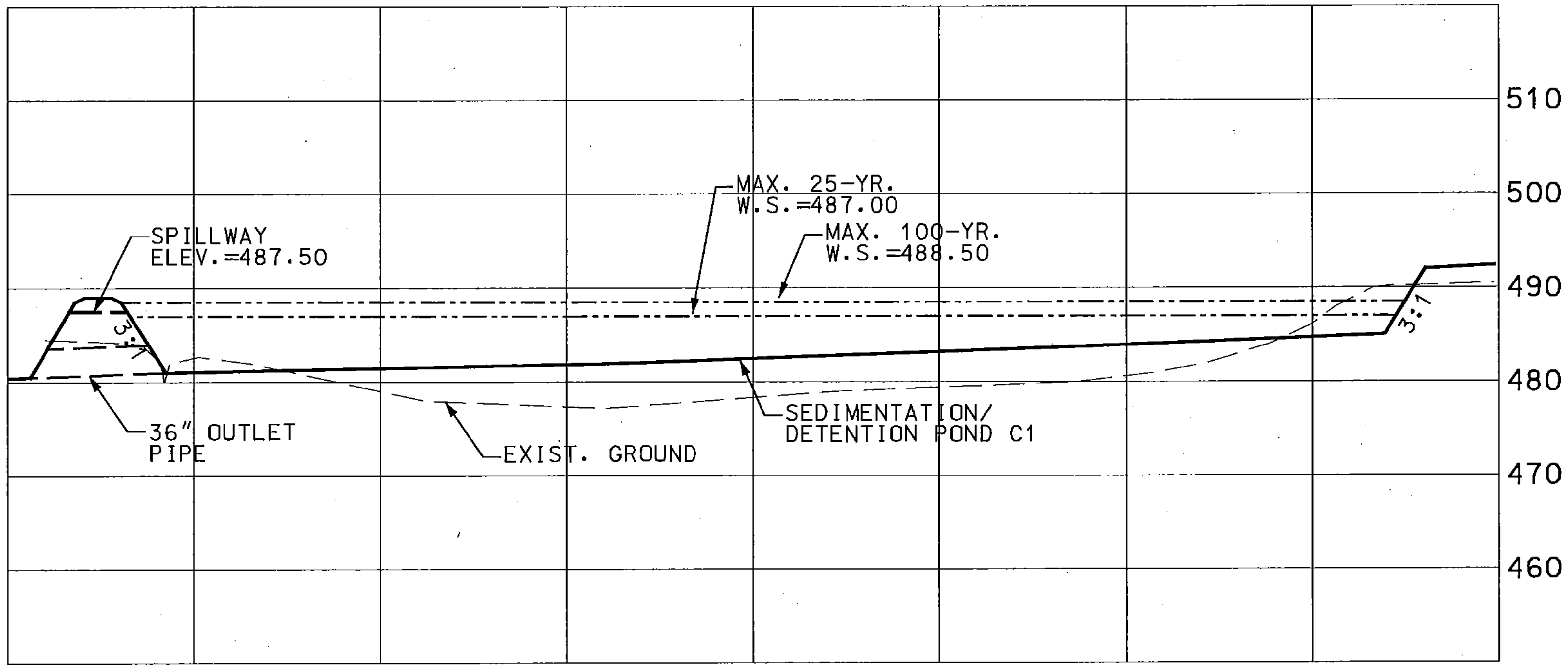
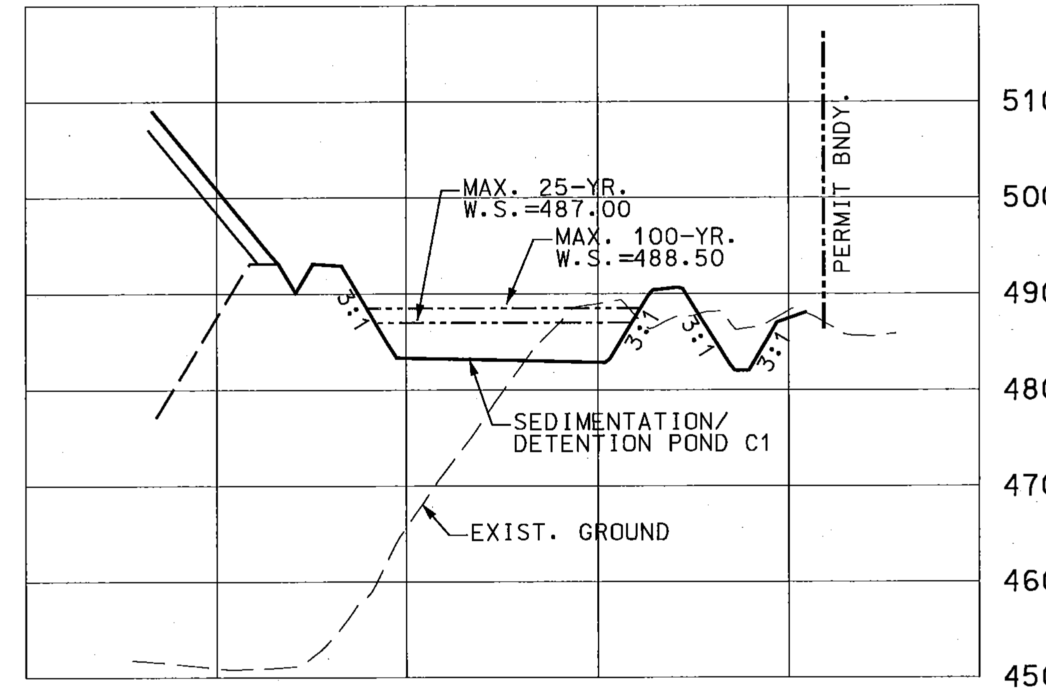
DES BY: SH	SEDIMENTATION/DETENTION POND A & B SECTIONS FIGURE III-6.30
DRN BY: AZB	
CHK BY: SH	
APP BY: MC	

CITY OF LAREDO

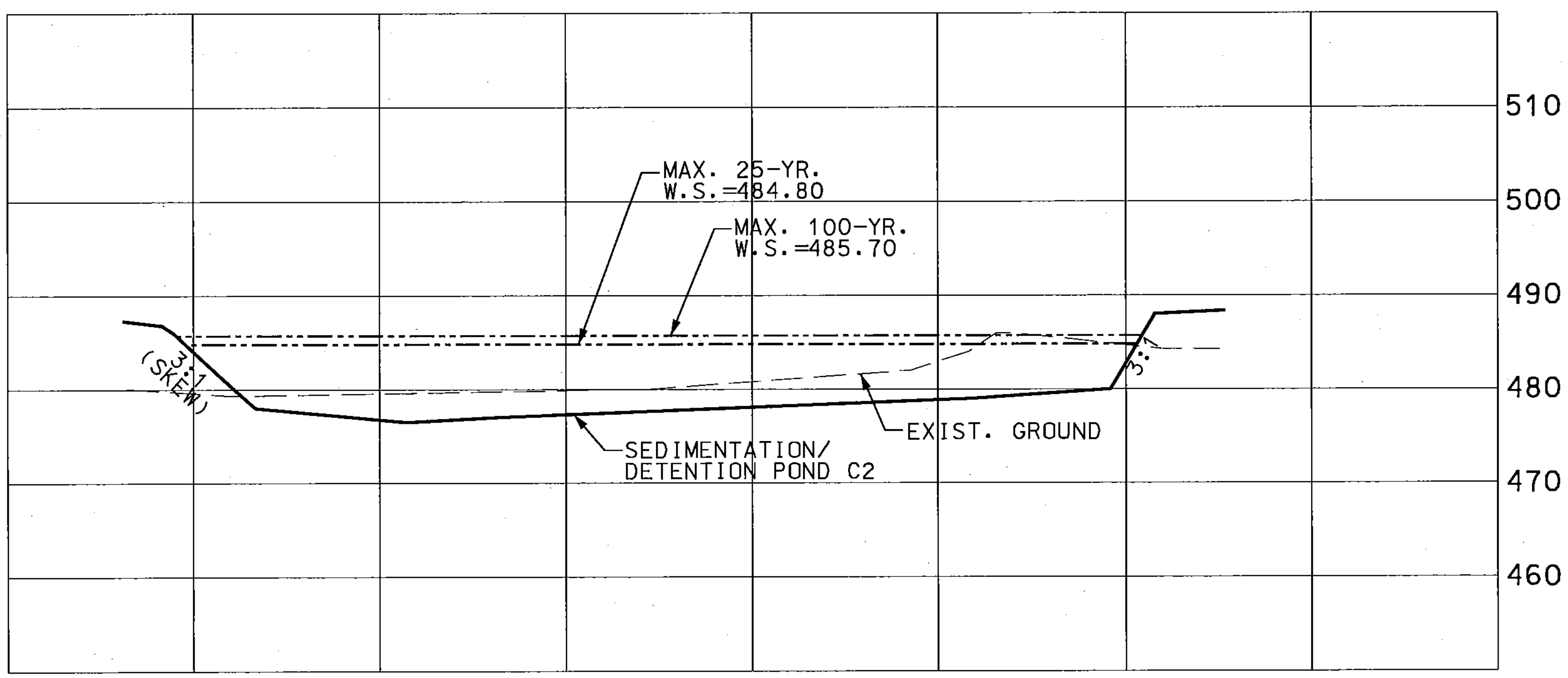
SHEET OF
FILE:
ATTACHMENT: III-6



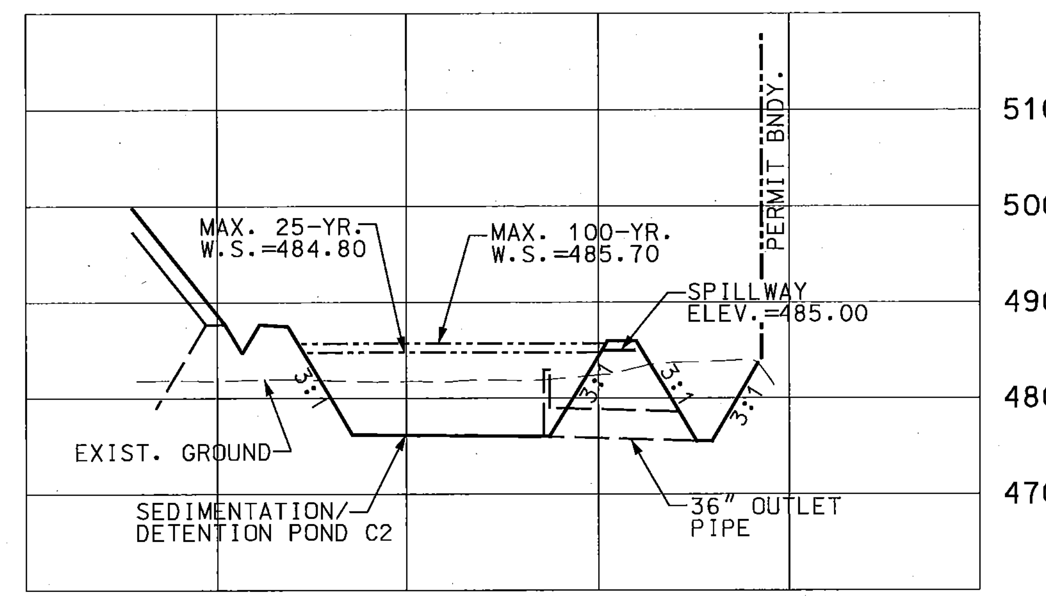
SEDIMENTATION POND C1 SECTION (A / 6.31)



SEDIMENTATION POND C1 SECTION (B / 6.31)



SEDIMENTATION POND C2 SECTION (C / 6.31)



SEDIMENTATION POND C2 SECTION (D / 6.31)

50 25 0 50 100
SCALE HORIZONTAL FEET

10 5 0 10 20
SCALE VERTICAL FEET

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DES BY SH	
DRN BY AZB	
CHK BY SH	
APP BY MC	

SEDIMENTATION/DETENTION POND C1 & C2 SECTIONS
FIGURE III-6.31

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6

Appendix 6A: Drainage Structures – Design Calculations

STATE OF TEXAS
STEVEN B. HENIFORD
66257
LICENSED
PROFESSIONAL ENGINEER

TX F-10098

Steven B. Heniford
9/17/14

EXISTING TIME OF CONCENTRATION CALCULATIONS

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

	Sheet Flow					Sheet Flow (25%)					Shallow Concentrated Flow (Channel or Rundown Channel)				Channelized Flow (Channel)							
Drainage Outfall ID	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	n	a	P_w	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
1	300	3.0	0.15	0.11	12.32					0.00				0.00						0.00	12.3	12.3
2	155	3.0	0.15	0.05	9.96	670	3.0	0.15	0.25	16.88	520	16.13	0.0180	4.00	1780	0.04	12	12.5	0.0175	6.19	37.0	37.0
3	90	3.0	0.15	0.05	6.45	570	3.0	0.15	0.25	14.83	25	16.13	0.0100	0.26						0.00	21.5	21.5
4	400	3.0	0.15	0.05	21.26	450	3.0	0.15	0.25	12.27	300	16.13	0.0625	1.24	920	0.04	12	12.5	0.0320	2.36	37.1	37.1
5	325	3.0	0.15	0.05	18.01	445	3.0	0.15	0.25	12.16	150	16.13	0.0625	0.62	500	0.04	12	12.5	0.0360	1.21	32.0	32.0
6*																						
6A	170	3.0	0.15	0.05	10.72	530	3.0	0.15	0.25	13.99				0	2375	0.04	12	12.5	0.0150	8.92	33.6	33.6
6B	220	3.0	0.15	0.05	13.18	475	3.0	0.15	0.25	12.82				0.00	800	0.04	20	17	0.0080	3.59	29.6	29.6
6C	50	3.0	0.15	0.02	5.81					0.00	400	16.13	0.0625	1.65	3520	0.04	20	17	0.0080	15.80	23.3	23.3

* - Indicates Tc for this outfall location is calculated by HEC-HMS and includes routing of offsite areas

PROPOSED TIME OF CONCENTRATION CALCULATIONS

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

	Sheet Flow					Sheet Flow (25%)					Shallow Concentrated Flow (Channel or Rundown Channel)				Channelized Flow (Channel)							
Drainage Outfall ID	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	n	a	P_w	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
1	300	3.0	0.15	0.11	12.32					0.00				0.00						0.00	12.3	12.3
2*																						
3	85	3.0	0.15	0.05	6.16	200	3.0	0.15	0.25	6.42				0.00						0.00	12.6	12.6
4*																						
5					0.00	160	3.0	0.15	0.25	5.37	660	16.13	0.0300	3.94	10	0.04	12	12.5	0.0100	0.05	9.3	10.0
6*																						
6A	170	3.0	0.15	0.05	10.72	530	3.0	0.15	0.25	13.99				0	2375	0.04	12	12.5	0.0150	8.92	33.6	33.6
6B					0	160	3.0	0.15	0.25	5.37	740	16.13	0.0300	4.41						0	9.8	10.0
6C	45	3.0	0.15	0.02	5.34					0				0	3200	0.04	12	12.5	0.0100	14.71	20.1	20.1

* - Indicates Tc for this outfall location is calculated by HEC-HMS and includes routing of offsite areas

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface

COMPARISON RUNOFF CALCULATIONS

Based on the Rational Method, Q = Area x C x I

Where: $I = Pd_{25}/(Tc / 60)$

EXISTING RUNOFF CALCULATIONS

Outfall #	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
1	LF-1	1.28	0.48	12.3	1.53	7.45	1.95	2.41	4.6	1.5
2[1]	LF-2	35.89	0.48	37.0	2.37	3.84	3.05	4.94	88.6	152.1
3	LF-3	11.49	0.48	21.5	2.02	5.63	2.59	7.22	31.0	39.8
4[1]	LF-4	17.33	0.48	37.1	2.65	4.28	3.45	5.57	1.2	10.8
5	LF-5	26.38	0.48	32.0	2.51	4.71	3.23	6.06	59.6	76.7
6[2]	LF-6A,B,C	107.63							386.5	599.9
	LF-6A[1]	90.28							363.6	549.0
	LF-6B	14.13	0.48	29.6	2.43	4.93	3.12	6.33	33.4	42.9
	LF-6C	3.22	0.48	23.3	2.12	5.47	2.72	7.01	8.5	10.8
Area Total		200.00					Flow Rate Totals[3]		571.50	880.76

PROPOSED RUNOFF CALCULATIONS

Outfall #	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
1	LF-1	1.76	0.48	12.3	1.57	7.64	2.01	2.41	6.5	2.0
2[1]	LF-A	34.86							123.3	204.1
3	LF-3	5.61	0.48	12.6	1.58	7.54	2.02	9.64	20.3	26.0
4[1]	LF-4	44.98							79.0	257.0
5	LF-5	6.33	0.48	10.0	1.45	8.70	1.86	11.16	26.4	33.9
6[2]	LF-C1,2,6B,C	106.46							143.1	511.1
	LF-C1[1]	58.28							54.5	118.8
	LF-C2[1]	32.27							52.6	140.1
	6B	9.77	0.48	10.0	2.43	14.58	3.12	18.72	54.5	87.8
	6C	6.14	0.48	10.0	2.12	12.72	2.72	16.32	28.3	48.1
	Area Total	200.00					Flow Rate Totals[3]		398.59	1034.10

1 - Flow rates are generated by HEC-HMS models and represent detention pond release rates.

2 - Area shown is onsite areas only. Flow rates are generated by HEC-HMS models and include run-on from offsite areas and detention pond release rates.

3 - Individual flow rates from areas 6A, 6B, and 6C are not inluded in summation.

TIME OF CONCENTRATION CALCULATIONS
AREA A

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)					
Drainage Area ID	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
1	95	3.0	0.15	0.05	6.73	70	3.0	0.15	0.25	2.77	380	16.13	0.03	2.27	11.77	11.8
3	135	3.0	0.15	0.05	8.92	145	3.0	0.15	0.25	4.96	240	16.13	0.03	1.43	15.31	15.3
5 (A,B,C)					0.00	150	3.0	0.15	0.25	5.10	680	16.13	0.03	4.06	9.15	10.0

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)					
Drainage Area ID	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
A_1	95	3.0	0.15	0.05	6.73	70	3.0	0.15	0.25	2.77	380	16.13	0.03	2.27	11.77	11.8
A_2	135	3.0	0.15	0.05	8.92	145	3.0	0.15	0.25	4.96	240	16.13	0.03	1.43	15.31	15.3
A_3					0.00	190	3.0	0.15	0.25	6.16	1130	16.13	0.03	6.74	12.90	12.9
A_4					0.00	200	3.0	0.15	0.25	6.42	350	16.13	0.03	2.09	8.50	10.0
A_5					0.00	175	3.0	0.15	0.25	5.77	1330	16.13	0.03	7.93	13.70	13.7
A_6					0.00	190	3.0	0.15	0.25	6.16	500	16.13	0.03	2.98	9.14	10.0
A_7					0.00	175	3.0	0.15	0.25	5.77	1330	16.13	0.03	7.93	13.70	13.7
A_8					0.00	115	3.0	0.15	0.25	4.12	890	16.13	0.03	5.31	9.43	10.0
A_9					0.00	130	3.0	0.15	0.25	4.55	540	16.13	0.03	3.22	7.77	10.0
A_10					0.00	120	3.0	0.15	0.25	4.26	815	16.13	0.0211	5.80	10.06	10.1
A_11					0.00	155	3.0	0.15	0.25	5.23				0.00	5.23	10.0
A_12					0.00	105	3.0	0.15	0.25	3.83	780	16.13	0.03	4.65	8.48	10.0
A_13					0.00	100	3.0	0.15	0.25	3.68				0.00	3.68	10.0

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface

TIME OF CONCENTRATION CALCULATIONS
AREA B

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)					
Drainage Area ID	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
6B1					0.00	120	3.0	0.15	0.25	4.26				0.00	4.26	10.0
6B2					0.00	160	3.0	0.15	0.25	5.37	875	16.13	0.03	5.22	10.59	10.6
6B3					0.00	100	3.0	0.15	0.25	3.68				0.00	3.68	10.0

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)					
Drainage Area ID	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
B_1	70	3.0	0.15	0.05	5.27	140	3.0	0.15	0.25	4.82	240	16.13	0.03	1.43	11.53	11.5
B_2	90	3.0	0.15	0.05	6.45	100	3.0	0.15	0.25	3.68	570	16.13	0.03	3.40	13.53	13.5
B_3					0.00	80	3.0	0.15	0.25	3.08	570	16.13	0.03	3.40	6.48	10.0
B_4					0.00	135	3.0	0.15	0.25	4.68	750	16.13	0.03	4.47	9.16	10.0
B_5					0.00	100	3.0	0.15	0.25	3.68	780	16.13	0.03	4.65	8.34	10.0
B_6					0.00	135	3.0	0.15	0.25	4.68	940	16.13	0.03	5.61	10.29	10.3
B_7					0.00	150	3.0	0.15	0.25	5.10	880	16.13	0.03	5.25	10.35	10.3
B_8					0.00	135	3.0	0.15	0.25	4.68	1120	16.13	0.03	6.68	11.37	11.4
B_9					0.00	90	3.0	0.15	0.25	3.39	985	16.13	0.0295	5.93	9.31	10.0
B_10	90	3.0	0.15	0.05	6.45	75	3.0	0.15	0.25	2.93	665	16.13	0.03	3.97	13.34	13.3
B_11	60	3.0	0.15	0.05	4.66	130	3.0	0.15	0.25	4.55	290	16.13	0.03	1.73	10.94	10.9
B_12					0.00	160	3.0	0.15	0.25	5.37	690	16.13	0.03	4.12	9.48	10.0
B_13					0.00	75	3.0	0.15	0.25	2.93	685	16.13	0.03	4.09	7.01	10.0
B_14					0.00	160	3.0	0.15	0.25	5.37	710	16.13	0.03	4.24	9.60	10.0
B_15					0.00	80	3.0	0.15	0.25	3.08	1045	16.13	0.03	6.23	9.32	10.0
B_16					0.00	140	3.0	0.15	0.25	4.82	730	16.13	0.03	4.35	9.18	10.0
B_17					0.00	120	3.0	0.15	0.25	4.26	1330	16.13	0.03	7.93	12.20	12.2
B_18					0.00	185	3.0	0.15	0.25	6.03	690	16.13	0.023	4.70	10.73	10.7
B_19					0.00	95	3.0	0.15	0.25	3.54				0.00	3.54	10.0
B_20					0.00	105	3.0	0.15	0.25	3.83				0.00	3.83	10.0

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} X\ L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface

TIME OF CONCENTRATION CALCULATIONS
AREA C1

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace or Channel)					
DrainageArea ID	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
C1_1	90	3.0	0.15	0.05	6.45	75	3.0	0.15	0.25	2.93	735	16.13	0.0300	4.38	13.76	13.8
C1-2	45	3.0	0.15	0.05	3.70	130	3.0	0.15	0.25	4.55	145	16.13	0.0300	0.87	9.11	10.0
C1_3					0.00	155	3.0	0.15	0.25	5.23	765	16.13	0.0300	4.56	9.80	10.0
C1_4					0.00	130	3.0	0.15	0.25	4.55	780	16.13	0.0300	4.65	9.20	10.0
C1_5					0.00	145	3.0	0.15	0.25	4.96	780	16.13	0.0300	4.65	9.61	10.0
C1_6					0.00	135	3.0	0.15	0.25	4.68	1180	16.13	0.0300	7.04	11.72	11.7
C1_7					0.00	130	3.0	0.15	0.25	4.55	1510	16.13	0.0300	9.01	13.55	13.6
C1_8					0.00	100	3.0	0.15	0.25	3.68	756	16.13	0.0290	4.59	8.27	10.0
C1_9					0.00	85	3.0	0.15	0.25	3.24	959	16.13	0.0135	8.53	11.76	11.8
C1_10					0.00	160	3.0	0.15	0.25	5.37	585	16.13	0.0300	3.49	8.86	10.0
C1_11					0.00	55	3.0	0.15	0.25	2.28	580	16.13	0.0118	5.52	7.80	10.0
C1_12					0.00	170	3.0	0.15	0.25	5.63	164	16.13	0.0180	1.26	6.90	10.0
C1_13	90	3.0	0.15	0.05	6.45	55	3.0	0.15	0.25	2.28	1315	16.13	0.0300	7.84	16.58	16.6
C1-14					0.00	170	3.0	0.15	0.25	5.63	95	16.13	0.0300	0.57	6.20	10.0
C1_15					0.00	125	3.0	0.15	0.25	4.40	1560	16.13	0.0300	9.31	13.71	13.7
C1_16					0.00	90	3.0	0.15	0.25	3.39	195	16.13	0.0300	1.16	4.55	10.0
C1_17					0.00	125	3.0	0.15	0.25	4.40	1840	16.13	0.0300	10.98	15.38	15.4
C1_18					0.00	95	3.0	0.15	0.25	3.54	360	16.13	0.0300	2.15	5.68	10.0
C1_19					0.00	100	3.0	0.15	0.25	3.68	740	16.13	0.0090	8.06	11.74	11.7
C1_20					0.00	160	3.0	0.15	0.25	5.37	870	16.13	0.0300	5.19	10.56	10.6
C1_21					0.00	165	3.0	0.15	0.25	5.50				0.00	5.50	10.0
C1_22					0.00	105	3.0	0.15	0.25	3.83	212	16.13	0.0338	1.19	5.02	10.0
C1_23					0.00	94	3.0	0.15	0.25	3.51				0.00	3.51	10.0
C1_24					0.00	160	3.0	0.15	0.25	5.37				0.00	5.37	10.0
C1_25					0.00	85	3.0	0.15	0.25	3.24	110	16.13	0.0343	0.61	3.85	10.0
C1_26					0.00	20	3.0	0.15	0.25	1.02				0.00	1.02	10.0

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface

TIME OF CONCENTRATION CALCULATIONS
AREA C2

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)					
Drainage Area ID	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
C2_1	55	3.0	0.15	0.05	4.35	15	3.0	0.15	0.25	0.81	1170	16.13	0.03	6.98	12.14	12.1
C2-2					0.00	110	3.0	0.15	0.25	3.98	320	16.13	0.03	1.91	5.89	10.0
C2_3					0.00	155	3.0	0.15	0.25	5.23	1370	16.13	0.03	8.17	13.40	13.4
C2_4					0.00	160	3.0	0.15	0.25	5.37	480	16.13	0.03	2.86	8.23	10.0
C2_5					0.00	155	3.0	0.15	0.25	5.23	1520	16.13	0.03	9.07	14.30	14.3
C2_6					0.00	165	3.0	0.15	0.25	5.50	660	16.13	0.03	3.94	9.44	10.0
C2_7					0.00	150	3.0	0.15	0.25	5.10	1590	16.13	0.03	9.49	14.58	14.6
C2_8					0.00	170	3.0	0.15	0.25	5.63	850	16.13	0.03	5.07	10.70	10.7
C2_9					0.00	90	3.0	0.15	0.25	3.39	899	16.13	0.0081	10.32	13.71	13.7
C2_10					0.00	60	3.0	0.15	0.25	2.45	330	16.13	0.0055	4.60	7.05	10.0
C2_11					0.00	20	3.0	0.15	0.25	1.02				0.00	1.02	10.0

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8} / (P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface

RUNOFF CALCULATIONS

DRAINAGE AREA A

Terrace	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
A_1	A_1	3.50	0.48	11.8	1.54	7.85	1.97	10.04	13.2	16.9
A_2	A_2	0.74	0.48	15.3	1.72	6.74	2.20	8.62	2.4	3.1
A_3	A_3	4.12	0.48	12.9	1.60	7.44	2.04	9.49	14.7	18.8
A_4	A_4	1.23	0.48	10.0	1.45	8.70	1.86	11.16	5.1	6.6
A_5	A_5	4.50	0.48	13.7	1.64	7.18	2.10	9.20	15.5	19.9
A_6	A_6	1.85	0.48	10.0	1.45	8.70	1.86	11.16	7.7	9.9
A_7	A_7	4.89	0.48	13.7	1.64	7.18	2.10	9.20	16.9	21.6
A_8	A_8	2.72	0.48	10.0	1.45	8.70	1.86	11.16	11.4	14.6
A_9	A_9	1.87	0.48	10.0	1.45	8.70	1.86	11.16	7.8	10.0
A_10	A_10	2.51	0.48	10.1	1.46	8.71	1.86	11.09	10.5	13.4
A_11	A_11	1.30	0.48	10.0	1.45	8.70	1.86	11.16	5.4	7.0
A_12	A_12	2.06	0.48	10.0	1.45	8.70	1.86	11.16	8.6	11.0
A_13	A_13	1.75	0.48	10.0	1.45	8.70	1.86	11.16	7.3	9.4
Area A Total		33.04								

DRAINAGE AREA B

Terrace	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
B_1	B1_1	1.12	0.48	11.5	1.53	7.96	1.95	10.15	4.3	5.5
B_2	B1_2	2.17	0.48	13.5	1.63	7.23	2.08	9.22	7.5	9.6
B_3	B1_3	1.91	0.48	10.0	1.45	8.70	1.86	11.16	8.0	10.2
B_4	B1_4	2.12	0.48	10.0	1.45	8.70	1.86	11.16	8.9	11.4
B_5	B1_5	2.59	0.48	10.0	1.45	8.70	1.86	11.16	10.8	13.9
B_6	B1_6	2.74	0.48	10.3	1.47	8.57	1.88	10.96	11.3	14.4
B_7	B1_7	3.02	0.48	10.3	1.47	8.52	1.88	10.90	12.4	15.8
B_8	B1_8	3.46	0.48	11.4	1.52	8.02	1.95	10.29	13.3	17.1
B_9	B1_8	2.11	0.48	10.0	1.45	8.70	1.86	11.16	8.8	11.3
B_10	B_10	2.59	0.48	13.3	1.62	7.29	2.07	9.31	9.1	11.6
B_11	B_11	0.81	0.48	10.9	1.50	8.23	2.10	11.52	3.2	4.5
B_12	B_12	2.61	0.48	10.0	1.45	8.70	1.86	11.16	10.9	14.0
B_13	B_13	1.79	0.48	10.0	1.45	8.70	1.86	11.16	7.5	9.6
B_14	B_14	2.63	0.48	10.0	1.45	8.70	1.86	11.16	11.0	14.1
B_15	B_15	3.04	0.48	10.0	1.45	8.70	1.86	11.16	12.7	16.3
B_16	B_16	2.43	0.48	10.0	1.45	8.70	1.86	11.16	10.1	13.0
B_17	B_17	3.48	0.48	12.2	1.56	7.67	2.00	9.84	12.8	16.4
B_18	B_18	1.39	0.48	10.7	1.49	8.33	1.90	10.63	5.6	7.1
B_19	B_19	1.00	0.48	10.0	1.45	8.70	1.86	11.16	4.2	5.4
B_20	B_20	2.01	0.48	10.0	1.45	8.70	1.86	11.16	8.4	10.8
Area B Total		45.02								

RUNOFF CALCULATIONS

DRAINAGE AREA C1

Terrace	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
C1_1	C1_1	3.21	0.48	13.8	1.42	6.19	2.10	9.16	9.5	14.1
C1_2	C1_2	1.10	0.48	10.0	1.45	8.70	1.86	11.16	4.6	5.9
C1_3	C1_3	2.76	0.48	10.0	1.45	8.70	1.86	11.16	11.5	14.8
C1_4	C1_4	2.23	0.48	10.0	1.45	8.70	1.86	11.16	9.3	11.9
C1_5	C1_5	2.75	0.48	10.0	1.45	8.70	1.86	11.16	11.5	14.7
C1_6	C1_6	3.49	0.48	11.7	1.54	7.88	1.97	10.08	13.2	16.9
C1_7	C1_7	3.69	0.48	13.6	1.63	7.22	2.10	9.30	12.8	16.5
C1_8	C1_8	1.90	0.48	10.0	1.45	8.70	1.86	11.16	7.9	10.2
C1_9	C1_9	1.90	0.48	11.8	1.54	7.85	1.97	10.05	7.2	9.2
C1_10	C1_10	2.17	0.48	10.0	1.45	8.70	1.86	11.16	9.1	11.6
C1_11	C1_11	0.55	0.48	10.0	1.45	8.70	1.86	11.16	2.3	2.9
C1_12	C1_12	0.82	0.48	10.0	1.45	8.70	1.86	11.16	3.4	4.4
C1_13	C1_13	4.03	0.48	16.6	1.78	6.44	2.28	8.25	12.5	16.0
C1_14	C1_14	0.15	0.48	10.0	1.45	8.70	1.86	11.16	0.6	0.8
C1_15	C1_15	4.48	0.48	13.7	1.64	7.18	2.10	9.19	15.4	19.8
C1_16	C1_16	0.73	0.48	10.0	1.45	8.70	1.86	11.16	3.0	3.9
C1_17	C1_17	5.38	0.48	15.4	1.72	6.71	2.21	8.62	17.3	22.3
C1_18	C1_18	1.42	0.48	10.0	1.45	8.70	1.86	11.16	5.9	7.6
C1_19	C1_19	2.86	0.48	11.7	1.54	7.87	7.88	40.26	10.8	55.3
C1_20	C1_20	3.34	0.48	10.6	1.48	8.41	1.90	10.80	13.5	17.3
C1_21	C1_21	2.40	0.48	10.0	1.45	8.70	1.86	11.16	10.0	12.9
C1_22	C1_22	0.56	0.48	10.0	1.45	8.70	1.86	11.16	2.3	3.0
C1_23	C1_23	1.04	0.48	10.0	1.45	8.70	1.86	11.16	4.3	5.6
C1_24	C1_24	2.03	0.48	10.0	1.45	8.70	1.86	11.16	8.5	10.9
C1_25	C1_25	0.20	0.48	10.0	1.45	8.70	1.86	11.16	0.8	1.1
C1_26	C1_26	3.09	0.48	10.0	1.45	8.70	1.86	11.16	12.9	16.6
Area C1 Total		58.28								

RUNOFF CALCULATIONS

DRAINAGE AREA C2

Terrace	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
C2_1	C2_1	4.07	0.48	12.1	1.56	7.71	1.99	9.84	15.1	19.2
C2_2	C2_2	0.95	0.48	10.0	1.45	8.70	1.86	11.16	4.0	5.1
C2_3	C2_3	4.95	0.48	13.4	1.62	7.25	2.08	9.31	17.2	22.1
C2_4	C2_4	1.63	0.48	10.0	1.45	8.70	1.86	11.16	6.8	8.7
C2_5	C2_5	5.28	0.48	14.3	1.67	7.01	2.13	8.94	17.8	22.7
C2_6	C2_6	2.27	0.48	10.0	1.45	8.70	1.86	11.16	9.5	12.2
C2_7	C2_7	5.86	0.48	14.6	1.68	6.91	2.10	8.64	19.4	24.3
C2_8	C2_8	2.97	0.48	10.7	1.49	8.35	1.90	10.65	11.9	15.2
C2_9	C2_9	1.35	0.48	13.7	1.64	7.18	2.10	9.19	4.7	6.0
C2_10	C2_10	0.41	0.48	10.0	1.45	8.70	1.86	11.16	1.7	2.2
C2_11	C2_11	2.53	0.48	10.0	1.45	8.70	1.86	11.16	10.6	13.6
Area C2 Total		32.27								

TERRACE HYDRAULIC CALCULATIONS

AREA A TERRACES

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
A-1	13.2	0	1.02	4	2.5	3.38	6.95	0.49	0.0300	0.04	3.98	8.16
A-2	2.4	0	0.54	4	2.5	0.95	3.68	0.26	0.0300	0.04	2.60	4.32
A-3	14.7	0	1.06	4	2.5	3.65	7.22	0.51	0.0300	0.04	4.08	8.48
A-4	5.1	0	0.71	4	2.5	1.64	4.84	0.34	0.0300	0.04	3.12	5.68
A-5	15.5	0	1.08	4	2.5	3.79	7.36	0.51	0.0300	0.04	4.13	8.64
A-6	7.7	0	0.83	4	2.5	2.24	5.66	0.40	0.0300	0.04	3.47	6.64
A-7	16.9	0	1.12	4	2.5	4.08	7.63	0.53	0.0300	0.04	4.23	8.96
A-8	11.4	0	0.96	4	2.5	3.00	6.54	0.46	0.0300	0.04	3.82	7.68
A-12	8.6	0	0.84	4	2.5	2.29	5.73	0.40	0.0300	0.04	3.50	6.72

AREA B TERRACES

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
B-1	4.3	0	0.67	4	2.5	1.46	4.57	0.32	0.0300	0.04	3.01	5.36
B-2	7.5	0	0.82	4	2.5	2.19	5.59	0.39	0.0300	0.04	3.44	6.56
B-3	8.0	0	0.84	4	2.5	2.29	5.73	0.40	0.0300	0.04	3.50	6.72
B-4	8.9	0	0.88	4	2.5	2.52	6.00	0.42	0.0300	0.04	3.61	7.04
A-5	10.8	0	0.94	4	2.5	2.87	6.41	0.45	0.0300	0.04	3.77	7.52
B-6	11.3	0	0.96	4	2.5	3.00	6.54	0.46	0.0300	0.04	3.82	7.68
B-7	12.4	0	0.99	4	2.5	3.19	6.75	0.47	0.0300	0.04	3.90	7.92
B-8	13.3	0	1.02	4	2.5	3.38	6.95	0.49	0.0300	0.04	3.98	8.16
B-10	9.1	0	0.89	4	2.5	2.57	6.07	0.42	0.0300	0.04	3.63	7.12
B-11	3.2	0	0.60	4	2.5	1.17	4.09	0.29	0.0300	0.04	2.79	4.80
B-12	10.9	0	0.95	4	2.5	2.93	6.47	0.45	0.0300	0.04	3.79	7.60
B-13	7.5	0	0.82	4	2.5	2.19	5.59	0.39	0.0300	0.04	3.44	6.56
B-14	11.0	0	0.95	4	2.5	2.93	6.47	0.45	0.0300	0.04	3.79	7.60
B-15	12.7	0	1.00	4	2.5	3.25	6.82	0.48	0.0300	0.04	3.93	8.00
B-16	10.1	0	0.92	4	2.5	2.75	6.27	0.44	0.0300	0.04	3.71	7.36
B-17	12.8	0	1.01	4	2.5	3.32	6.88	0.48	0.0300	0.04	3.95	8.08

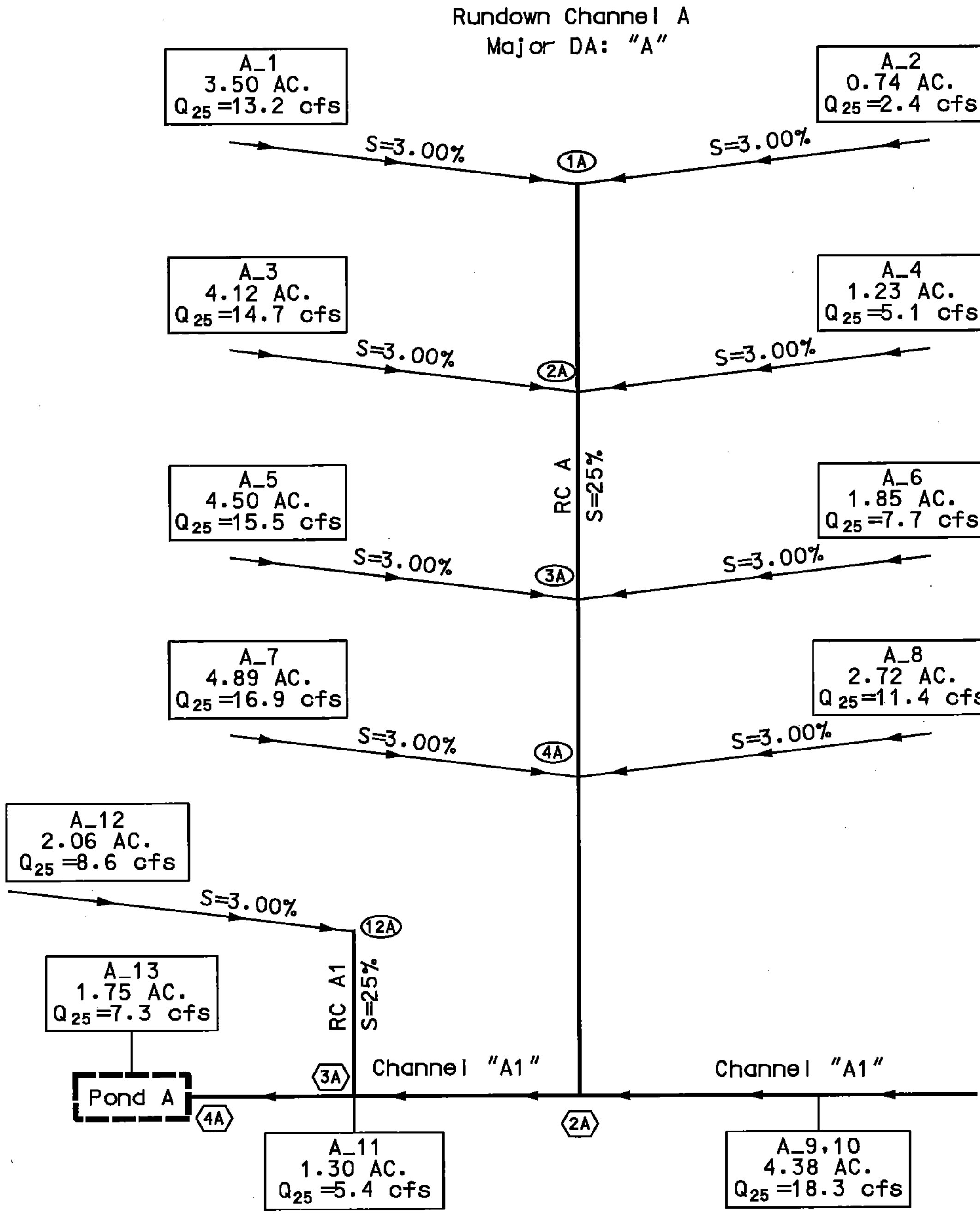
TERRACE HYDRAULIC CALCULATIONS

AREA C1 TERRACES

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
C1_1	9.5	0	0.90	4	2.5	2.63	6.13	0.43	0.0300	0.04	3.66	7.20
C1_2	4.6	0	0.69	4	2.5	1.55	4.70	0.33	0.0300	0.04	3.07	5.52
C1_3	11.5	0	0.97	4	2.5	3.06	6.61	0.46	0.0300	0.04	3.85	7.76
C1_4	9.3	0	0.89	4	2.5	2.57	6.07	0.42	0.0300	0.04	3.63	7.12
C1_5	11.5	0	0.97	4	2.5	3.06	6.61	0.46	0.0300	0.04	3.85	7.76
C1_6	13.2	0	1.02	4	2.5	3.38	6.95	0.49	0.0300	0.04	3.98	8.16
C1_7	12.8	0	1.01	4	2.5	3.32	6.88	0.48	0.0300	0.04	3.95	8.08
C1_10	9.1	0	0.89	4	2.5	2.57	6.07	0.42	0.0300	0.04	3.63	7.12
C1_13	12.5	0	1.00	4	2.5	3.25	6.82	0.48	0.0300	0.04	3.93	8.00
C1_14	0.6	0	0.33	4	2.5	0.35	2.25	0.16	0.0300	0.04	1.87	2.64
C1_15	15.4	0	1.08	4	2.5	3.79	7.36	0.51	0.0300	0.04	4.13	8.64
C1_16	3.0	0	0.59	4	2.5	1.13	4.02	0.28	0.0300	0.04	2.76	4.72
C1_17	17.3	0	1.13	4	2.5	4.15	7.70	0.54	0.0300	0.04	4.26	9.04
C1_18	5.9	0	0.75	4	2.5	1.83	5.11	0.36	0.0300	0.04	3.24	6.00
C1_20	13.5	0	1.03	4	2.5	3.45	7.02	0.49	0.0300	0.04	4.00	8.24

AREA C2 TERRACES

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
C2_1	15.1	0	1.07	4	2.5	3.72	7.29	0.51	0.0300	0.04	4.11	8.56
C2_2	4.0	0	0.65	4	2.5	1.37	4.43	0.31	0.0300	0.04	2.95	5.20
C2_3	17.2	0	1.12	4	2.5	4.08	7.63	0.53	0.0300	0.04	4.23	8.96
C2_4	6.8	0	0.79	4	2.5	2.03	5.38	0.38	0.0300	0.04	3.36	6.32
C2_5	17.8	0	1.14	4	2.5	4.22	7.77	0.54	0.0300	0.04	4.28	9.12
C2_6	9.5	0	0.90	4	2.5	2.63	6.13	0.43	0.0300	0.04	3.66	7.20
C2_7	19.4	0	1.17	4	2.5	4.45	7.97	0.56	0.0300	0.04	4.36	9.36
C2_8	11.9	0	0.98	4	2.5	3.12	6.68	0.47	0.0300	0.04	3.87	7.84



REV	DATE	DESCRIPTION	DES BY	APP BY

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	DESIGN CALCULATIONS
DRN BY	DRAINAGE RUNDOWN
CHK BY	CHANNELS A & A1 DIAGRAM
APP BY	

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
CIVIL · ENVIRONMENTAL · SURVEYING
CONSTRUCTION MANAGEMENT · MUNICIPAL

CITY OF LAREDO

SHEET 1 OF 6
FILE:
ATTACHMENT:
III-6

TIME OF CONCENTRATION CALCULATIONS
RUNDOWN CHANNEL A

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

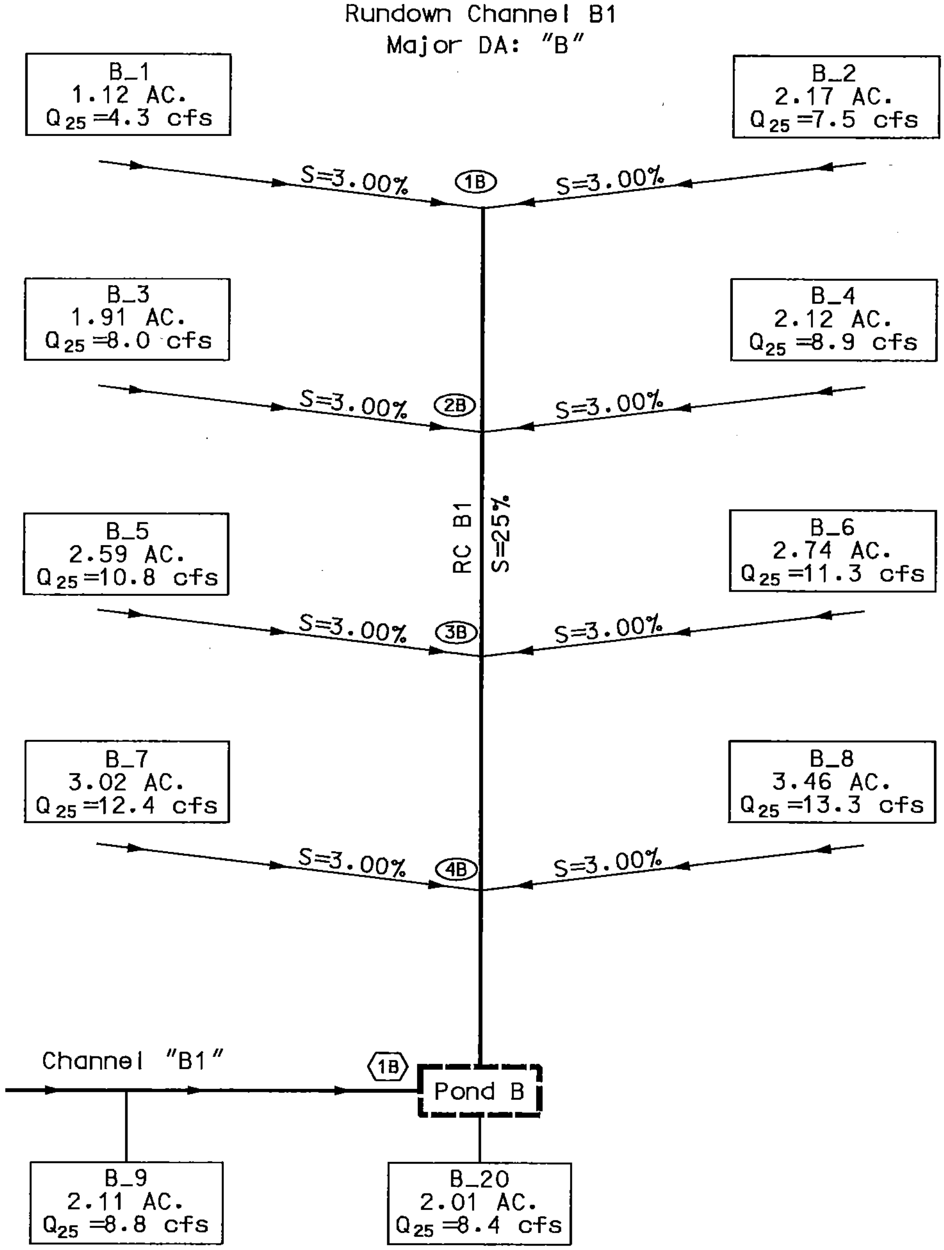
	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Rundown channel)					
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
RDC A																				
A_1	95	3.0	0.15	0.05	6.73	70	3.0	0.15	0.25	2.77	380	16.13	0.03	2.27	155	20.32	0.25	0.25	12.02	12.0
A_2	135	3.0	0.15	0.05	8.92	145	3.0	0.15	0.25	4.96	240	16.13	0.03	1.43	155	20.32	0.25	0.25	15.56	15.6
A_3					0.00	190	3.0	0.15	0.25	6.16	1130	16.13	0.03	6.74	160	20.32	0.25	0.26	15.83	15.8
A_4					0.00	200	3.0	0.15	0.25	6.42	350	16.13	0.03	2.09	160	20.32	0.25	0.26	15.83	15.8
A_5					0.00	175	3.0	0.15	0.25	5.77	1330	16.13	0.03	7.93	160	20.32	0.25	0.26	16.09	16.1
A_6					0.00	190	3.0	0.15	0.25	6.16	500	16.13	0.03	2.98	160	20.32	0.25	0.26	16.09	16.1
A_7					0.00	175	3.0	0.15	0.25	5.77	1330	16.13	0.03	7.93	70	20.32	0.25	0.11	16.20	16.2
A_8					0.00	115	3.0	0.15	0.25	4.12	890	16.13	0.03	5.31	70	20.32	0.25	0.11	16.20	16.2
RDC A1																				
A_12					0.00	105	3.0	0.15	0.25	3.83	780	16.13	0.03	4.65	30	20.32	0.25	0.05	8.53	10.0

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface
where K = 20.32 for paved surface



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
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DESIGN CALCULATIONS
RUNDOWN CHANNEL
B1 DIAGRAM

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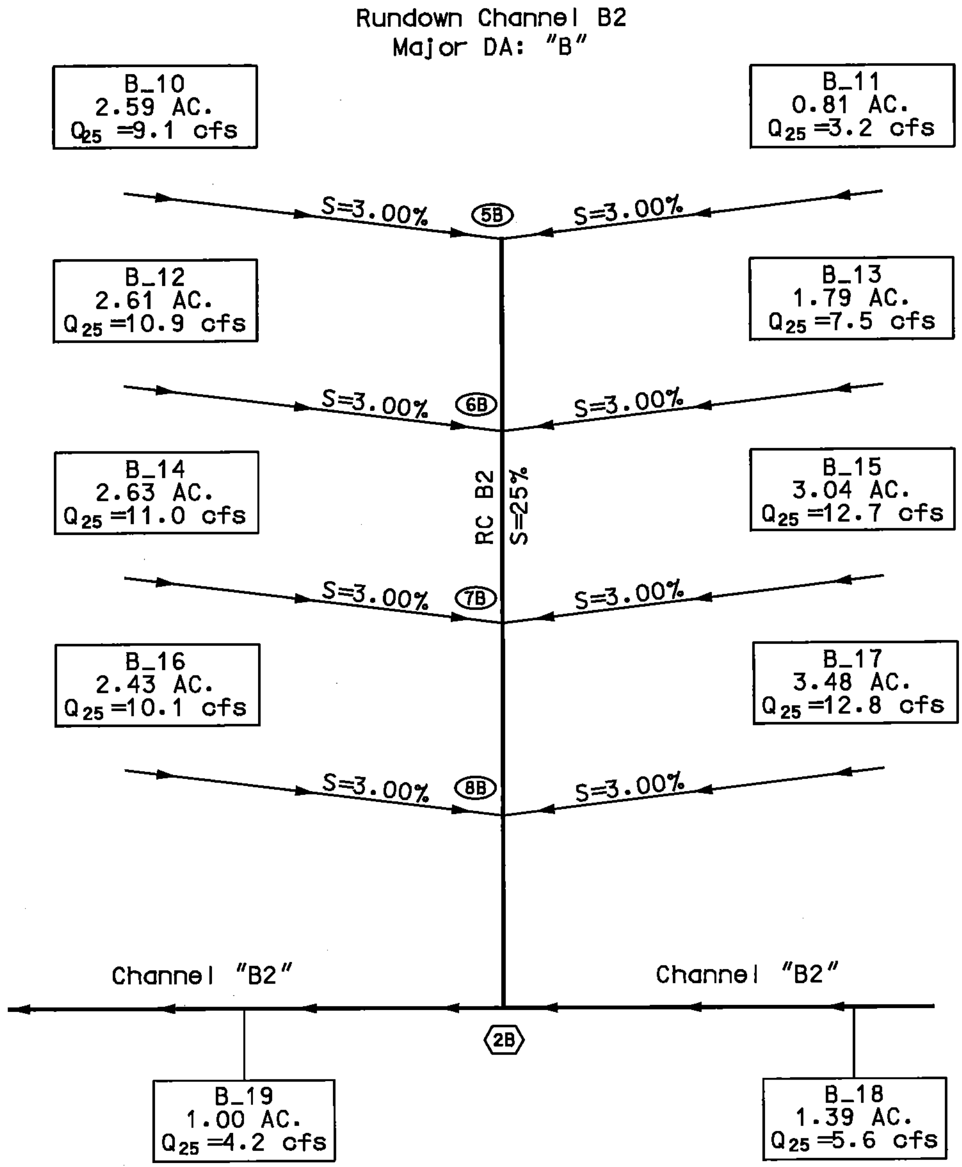

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DESIGN CALCULATIONS
RUNDOWN CHANNEL
B2 DIAGRAM

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TIME OF CONCENTRATION CALCULATIONS
RUNDOWN CHANNELS B1 AND B2

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

RUNDOWN CHANNEL B1

	Sheet Flow (5%)					Sheet Flow (5%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Rundown channel)					
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
B_1	70	3.0	0.15	0.05	5.27	140	3.0	0.15	0.25	4.82	240	16.13	0.03	1.43	160	20.32	0.25	0.26	11.79	11.8
B_2	90	3.0	0.15	0.05	6.45	100	3.0	0.15	0.25	3.68	570	16.13	0.03	3.40	160	20.32	0.25	0.26	13.79	13.8
B_3					0.00	80	3.0	0.15	0.25	3.08	570	16.13	0.03	3.40	160	20.32	0.25	0.26	14.06	14.1
B_4					0.00	135	3.0	0.15	0.25	4.68	750	16.13	0.03	4.47	160	20.32	0.25	0.26	14.06	14.1
B_5					0.00	100	3.0	0.15	0.25	3.68	780	16.13	0.03	4.65	160	20.32	0.25	0.26	14.32	14.3
B_6					0.00	135	3.0	0.15	0.25	4.68	940	16.13	0.03	5.61	160	20.32	0.25	0.26	14.32	14.3
B_7					0.00	150	3.0	0.15	0.25	5.10	880	16.13	0.03	5.25	100	20.32	0.25	0.16	14.48	14.5
B_8					0.00	135	3.0	0.15	0.25	4.68	1120	16.13	0.03	6.68	100	20.32	0.25	0.16	14.48	14.5

RUNDOWN CHANNEL B2

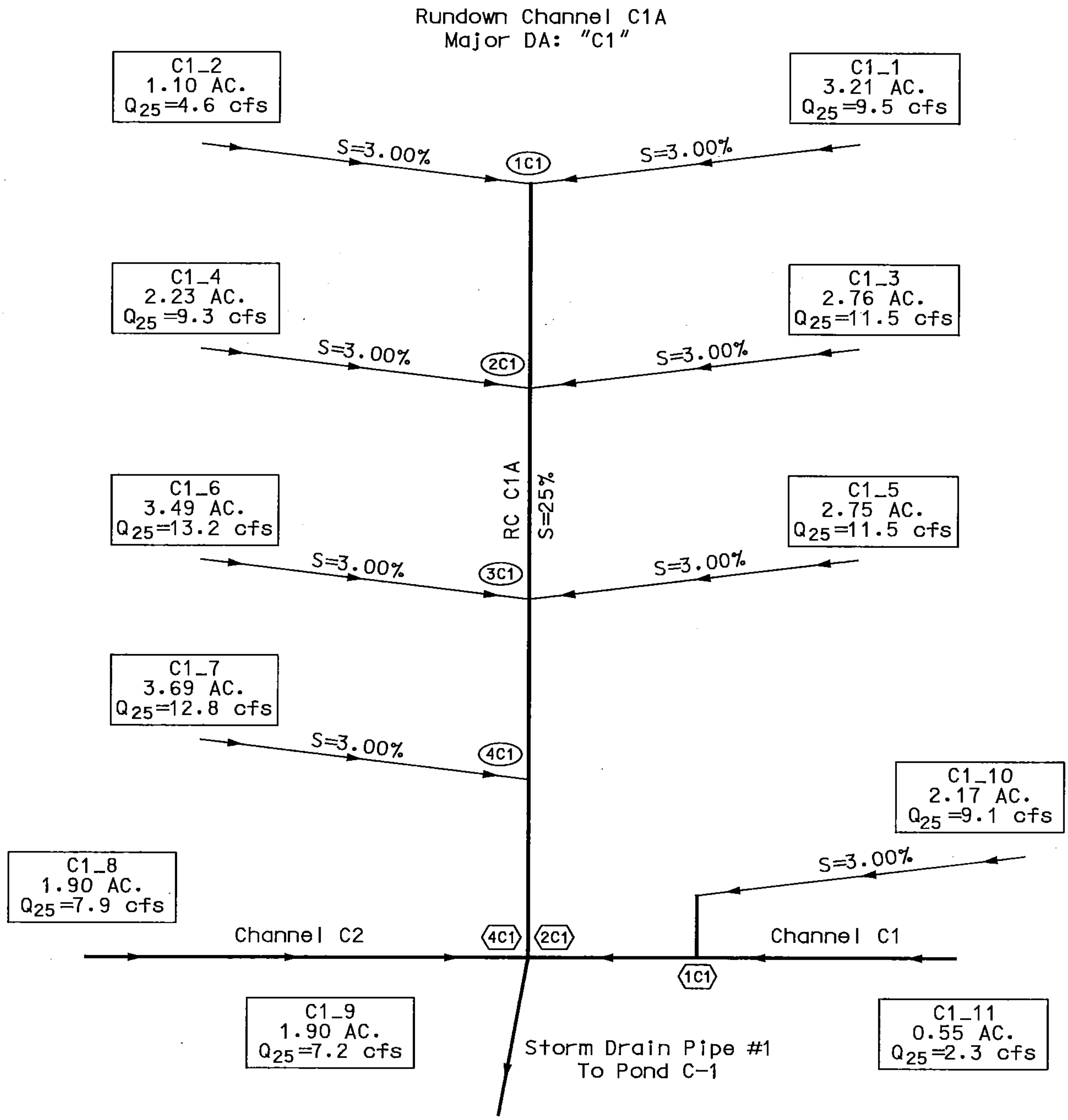
	Sheet Flow (5%)					Sheet Flow (5%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Rundown channel)					
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
B_10	90	3.0	0.15	0.05	6.45	75	3.0	0.15	0.25	2.93	665	16.13	0.03	3.97	160	20.32	0.25	0.26	13.60	13.6
B_11	60	3.0	0.15	0.05	4.66	130	3.0	0.15	0.25	4.55	290	16.13	0.03	1.73	160	20.32	0.25	0.26	11.20	11.2
B_12					0.00	160	3.0	0.15	0.25	5.37	690	16.13	0.03	4.12	160	20.32	0.25	0.26	13.87	13.9
B_13					0.00	75	3.0	0.15	0.25	2.93	685	16.13	0.03	4.09	160	20.32	0.25	0.26	13.87	13.9
B_14					0.00	160	3.0	0.15	0.25	5.37	710	16.13	0.03	4.24	145	20.32	0.25	0.24	14.10	14.1
B_15					0.00	80	3.0	0.15	0.25	3.08	1045	16.13	0.03	6.23	145	20.32	0.25	0.24	14.10	14.1
B_16					0.00	140	3.0	0.15	0.25	4.82	730	16.13	0.03	4.35	15	20.32	0.25	0.02	14.13	14.1
B_17					0.00	120	3.0	0.15	0.25	4.26	1330	16.13	0.03	7.93	15	20.32	0.25	0.02	14.13	14.1

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface
where K = 20.32 for paved surface



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AZB PROJ. No. 212029	PERMIT AMENDMENT APPLICATION No. XXX-XXXXX
DATE: AUGUST 2014	WEBB COUNTY, TEXAS
DES BY	DESIGN CALCULATIONS
DRN BY	RUNDOWN CHANNEL
CHK BY	C1A DIAGRAM
APP BY	

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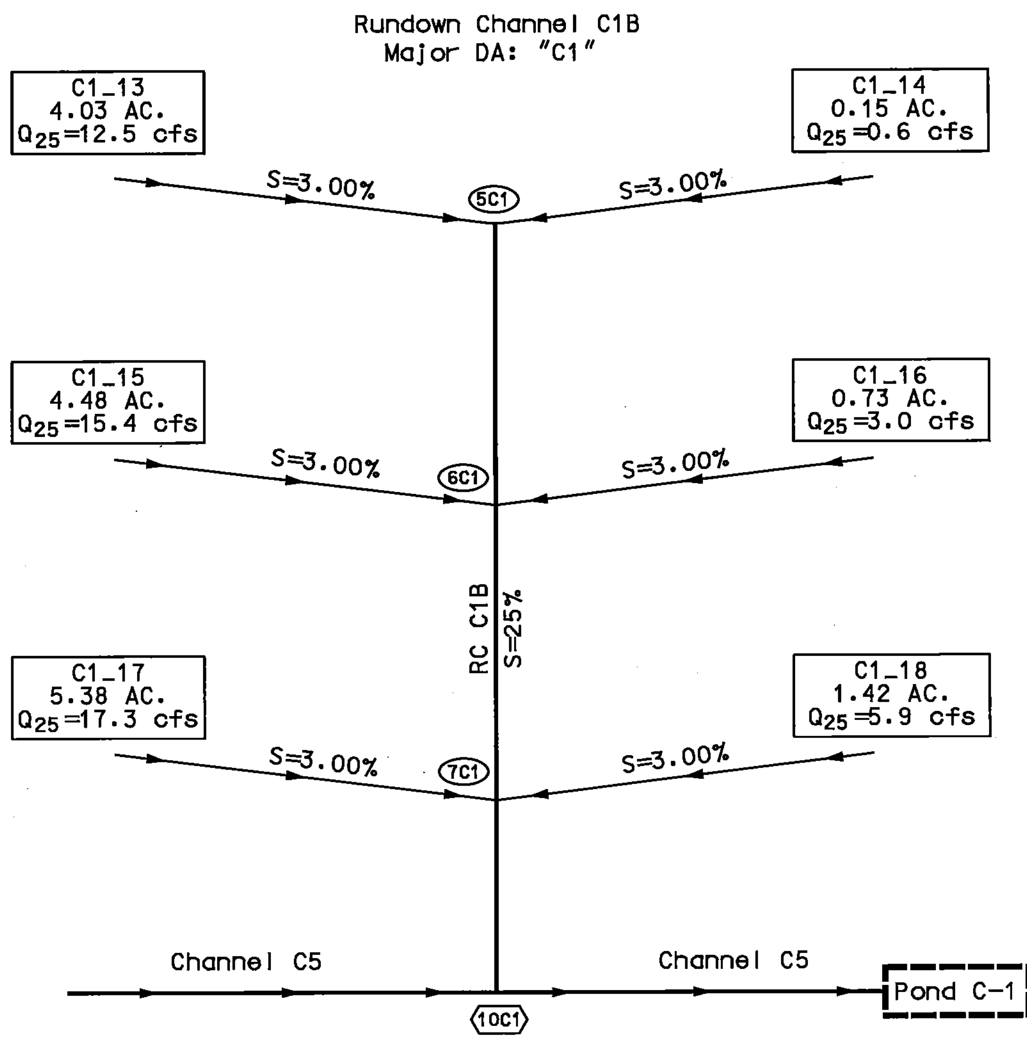

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TIME OF CONCENTRATION CALCULATIONS
RUNDOWN CHANNELS C1A AND C1B

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

RUNDOWN CHANNEL C1A

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Rundown channel)					
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
C1_1	90	3.0	0.15	0.05	6.45	75	3.0	0.15	0.25	2.93	735	16.13	0.03	4.38	160	20.32	0.25	0.26	14.02	14.0
C1-2	45	3.0	0.15	0.05	3.70	130	3.0	0.15	0.25	4.55	145	16.13	0.03	0.87	160	20.32	0.25	0.26	14.02	14.0
C1_3					0.00	155	3.0	0.15	0.25	5.23	765	16.13	0.03	4.56	160	20.32	0.25	0.26	14.28	14.3
C1_4					0.00	130	3.0	0.15	0.25	4.55	780	16.13	0.03	4.65	160	20.32	0.25	0.26	14.28	14.3
C1_5					0.00	145	3.0	0.15	0.25	4.96	780	16.13	0.03	4.65	138	20.32	0.25	0.23	14.51	14.5
C1_6					0.00	135	3.0	0.15	0.25	4.68	1180	16.13	0.03	7.04	138	20.32	0.25	0.23	14.51	14.5
C1_7					0.00	130	3.0	0.15	0.25	4.55	1510	16.13	0.03	9.01	25	20.32	0.25	0.04	14.55	14.6

RUNDOWN CHANNEL C1B

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Rundown channel)					
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
C1_13	90	3.0	0.15	0.05	6.45	55	3.0	0.15	0.25	2.28	1315	16.13	0.03	7.84	160	20.32	0.25	0.26	16.84	16.8
C1-14					0.00	170	3.0	0.15	0.25	5.63	95	16.13	0.03	0.57	160	20.32	0.25	0.26	16.84	16.8
C1_15					0.00	125	3.0	0.15	0.25	4.40	1560	16.13	0.03	9.31	160	20.32	0.25	0.26	17.10	17.1
C1_16					0.00	90	3.0	0.15	0.25	3.39	195	16.13	0.03	1.16	160	20.32	0.25	0.26	17.10	17.1
C1_17					0.00	125	3.0	0.15	0.25	4.40	1835	16.13	0.03	10.95	65	20.32	0.25	0.11	17.21	17.2
C1_18					0.00	95	3.0	0.15	0.25	3.54	360	16.13	0.03	2.15	65	20.32	0.25	0.11	17.21	17.2

RUNDOWN CHANNEL C1C

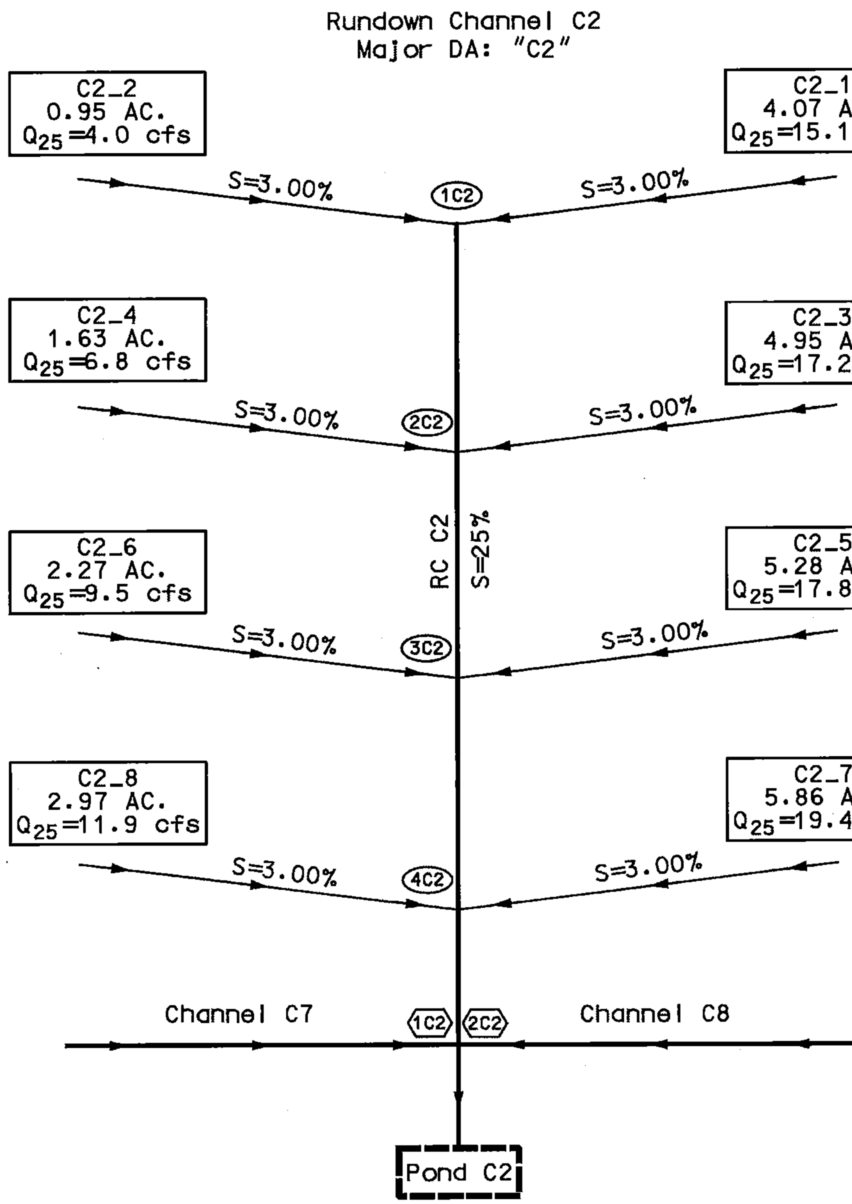
	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Rundown channel)					
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
C1_20					0.00	160	3.0	0.15	0.25	5.37	870	16.13	0.03	5.19	10	20.32	0.25	0.02	10.57	10.6

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface
where K = 20.32 for paved surface



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WEBB COUNTY, TEXAS

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DESIGN CALCULATIONS
RUNDOWN CHANNEL
C2 DIAGRAM

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TIME OF CONCENTRATION CALCULATIONS
RUNDOWN CHANNEL C2

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

RUNDOWN CHANNEL C2

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Rundown channel)					
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
C2_1	55	3.0	0.15	0.05	4.35	15	3.0	0.15	0.25	0.81	1170	16.13	0.03	6.98	160	20.32	0.25	0.26	12.40	12.4
C2-2					0.00	110	3.0	0.15	0.25	3.98	320	16.13	0.03	1.91	160	20.32	0.25	0.26	12.40	12.4
C2_3					0.00	155	3.0	0.15	0.25	5.23	1370	16.13	0.03	8.17	160	20.32	0.25	0.26	12.66	12.7
C2_4					0.00	160	3.0	0.15	0.25	5.37	480	16.13	0.03	2.86	160	20.32	0.25	0.26	12.66	12.7
C2_5					0.00	155	3.0	0.15	0.25	5.23	1520	16.13	0.03	9.07	160	20.32	0.25	0.26	14.56	14.6
C2_6					0.00	165	3.0	0.15	0.25	5.50	660	16.13	0.03	3.94	160	20.32	0.25	0.26	14.56	14.6
C2_7					0.00	150	3.0	0.15	0.25	5.10	1590	16.13	0.03	9.49	10	20.32	0.25	0.02	14.58	14.6
C2_8					0.00	170	3.0	0.15	0.25	5.63	850	16.13	0.03	5.07	10	20.32	0.25	0.02	14.58	14.6

RUNDOWN PIPE C3

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Rundown channel)					
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	t_c (min)	t_c (used)
???					0.00	160	3.0	0.15	0.25	5.37	860	16.13	0.03	5.13				0.00	10.50	10.5

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where $n_{ol} = 0.15$ for short grass prairie
and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface
where K = 20.32 for paved surface

RUNDOWN CHANNEL RUNOFF CALCULATIONS

RUNDOWN CHANNEL A

Design Point	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
1A	A_1 & A_2	4.24	0.48	15.6	1.73	6.67	2.22	8.56	13.6	17.4
2A	A_1 - A_4	9.59	0.48	15.8	1.74	6.60	2.23	8.45	30.4	38.9
3A	A_1 - A_6	15.94	0.48	16.1	1.76	6.56	2.25	8.39	50.2	64.2
4A	A_1 - A_8	23.55	0.48	16.2	1.76	6.52	2.26	8.37	73.7	94.6

RUNDOWN CHANNEL A1

Design Point	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
12A	A_12	2.06	0.48	10.0	1.45	8.70	1.86	11.16	8.6	11.0

RUNDOWN CHANNEL B1

Design Point	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
1B	B1_1 & B1_2	3.29	0.48	13.8	1.64	7.13	2.10	9.13	11.3	14.4
2B	B1_1 - B1_4	7.32	0.48	14.1	1.66	7.09	2.12	9.05	24.9	31.8
3B	B1_1 - B1_6	12.65	0.48	14.3	1.67	7.00	2.13	8.92	42.5	54.2
4B	B1_1 - B1_8	19.13	0.48	14.5	1.68	6.96	2.15	8.91	63.9	81.8

RUNDOWN CHANNEL B2

Design Point	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
5B	B_10 & B_11	3.40	0.48	11.2	1.51	8.09	1.93	10.34	13.2	16.9
6B	B_10 - B_13	7.80	0.48	13.9	1.65	7.14	2.11	9.13	26.7	34.2
7B	B_10 - B_15	13.47	0.48	14.1	1.66	7.06	2.12	9.02	45.7	58.3
8B	B_10 - B_17	19.38	0.48	14.1	1.66	7.05	2.12	9.00	65.6	83.7

RUNDOWN CHANNEL RUNOFF CALCULATIONS

RUNDOWN CHANNEL C1A

Design Point	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
1C1	C1_1 -C1 _2	4.31	0.48	14.0	1.65	7.06	2.10	8.99	14.6	18.6
2C1	C1_1 - C1_4	9.30	0.48	14.3	1.67	7.01	2.13	8.95	31.3	39.9
3C1	C1_1 - C1_6	15.54	0.48	14.5	1.68	6.95	2.15	8.89	51.8	66.3
4C1	C1_1 - C1_7	19.23	0.48	14.6	1.68	6.93	2.15	8.87	63.9	81.8

RUNDOWN CHANNEL C1B

Design Point	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
5C1	C1_13 & C1_14	4.18	0.48	16.8	1.79	6.38	2.30	8.20	12.8	16.4
6C1	C1_13 - C1_16	9.39	0.48	17.1	1.81	6.35	2.32	8.14	28.6	36.7
7C1	C1_13 - C1_18	16.19	0.48	17.2	1.8	6.31	2.32	8.09	49.0	62.9

RUNDOWN CHANNEL C2

Design Point	DA I.D.	Area (acres)	C	Tc (min.)	Pd_{25} (in.)	I_{25} (in./hr.)	Pd_{100} (in.)	I_{100} (in./hr.)	Q_{25} (cfs)	Q_{100} (cfs)
1C2	C2_1 & C2_2	5.02	0.48	12.4	1.57	7.60	2.01	9.73	18.3	23.4
2C2	C2_1 - C2_4	11.60	0.48	12.7	1.59	7.54	2.03	9.62	42.0	53.6
3C2	C2_1 - C2_6	19.15	0.48	14.6	1.68	6.92	2.15	8.86	63.6	81.4
4C2	C2_1 - C2_8	27.98	0.48	14.6	1.68	6.91	2.15	8.85	92.9	118.8

RUNDOWN CHANNEL HYDRAULIC CALCULATIONS

RUNDOWN CHANNEL A

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
1A	13.6	10	0.16	2	2	1.65	10.72	0.15	0.2500	0.025	8.54	10.64
2A	30.4	10	0.26	2	2	2.74	11.16	0.25	0.2500	0.025	11.63	11.04
3A	50.2	10	0.35	2	2	3.75	11.57	0.32	0.2500	0.025	14.01	11.40
4A	73.7	10	0.43	2	2	4.67	11.92	0.39	0.2500	0.025	15.90	11.72

RUNDOWN CHANNEL A1

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
12A	8.6	10	0.12	2	2	1.23	10.54	0.12	0.2500	0.025	7.09	10.48

RUNDOWN CHANNEL B1

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
1B	11.3	10	0.15	2	2	1.55	10.67	0.14	0.2500	0.025	8.19	10.60
2B	24.9	10	0.23	2	2	2.41	11.03	0.22	0.2500	0.025	10.76	10.92
3B	42.5	10	0.31	2	2	3.29	11.39	0.29	0.2500	0.025	12.99	11.24
4B	63.9	10	0.40	2	2	4.32	11.79	0.37	0.2500	0.025	15.21	11.60

RUNDOWN CHANNEL B2

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
5B	13.2	10	0.16	2	2	1.65	10.72	0.15	0.2500	0.025	8.54	10.64
6B	26.7	10	0.24	2	2	2.52	11.07	0.23	0.2500	0.025	11.06	10.96
7B	45.7	10	0.33	2	2	3.52	11.48	0.31	0.2500	0.025	13.51	11.32
8B	65.6	10	0.40	2	2	4.32	11.79	0.37	0.2500	0.025	15.21	11.60

RUNDOWN CHANNEL HYDRAULIC CALCULATIONS

RUNDOWN CHANNEL C1A

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
1C1	14.6	10	0.17	2	2	1.76	10.76	0.16	0.2500	0.025	8.88	10.68
2C1	31.3	10	0.26	2	2	2.74	11.16	0.25	0.2500	0.025	11.63	11.04
3C1	51.8	10	0.35	2	2	3.75	11.57	0.32	0.2500	0.025	14.01	11.40
4C1	63.9	10	0.40	2	2	4.32	11.79	0.37	0.2500	0.025	15.21	11.60

RUNDOWN CHANNEL C1B

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
5C1	12.8	10	0.16	2	2	1.65	10.72	0.15	0.2500	0.025	8.54	10.64
6C1	28.6	10	0.25	2	2	2.63	11.12	0.24	0.2500	0.025	11.35	11.00
7C1	49.0	10	0.34	2	2	3.63	11.52	0.32	0.2500	0.025	13.76	11.36

RUNDOWN CHANNEL C2

Drainage ID/Design Point	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope 1 SS	Side Slope 2 SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
1C2	18.3	10	0.19	2	2	1.97	10.85	0.18	0.2500	0.025	9.53	10.76
2C2	42.0	10	0.31	2	2	3.29	11.39	0.29	0.2500	0.025	12.99	11.24
3C2	63.6	10	0.40	2	2	4.32	11.79	0.37	0.2500	0.025	15.21	11.60
4C2	92.9	10	0.50	2	2	5.50	12.24	0.45	0.2500	0.025	17.43	12.00

CHANNEL TIME OF CONCENTRATION CALCULATIONS

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

CHANNEL A1

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Channel or Rundown Channel)				Channelized Flow (Channel)							
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{ch} (ft)	n	a	P_w	S_{ch} (ft/ft)	t_{ch} (min)	t_c (min)	t_c (used)
Channel A																										
1A					0.00	130	3.0	0.15	0.25	4.55				0.00	231	16.13	0.0625	0.95						0.00	5.5	10.0
-					0.00					0.00				0.00	300	16.13	0.0325	1.72						0.00	7.2	10.0
-					0.00					0.00				0.00	500	16.13	0.0200	3.65						0.00	10.9	10.9
-					0.00					0.00				0.00	400	16.13	0.0225	2.76						0.00	13.6	13.6
2A	135	3.0	0.15	0.05	8.92	145	3.0	0.15	0.25	4.96	240	16.13	0.03	1.43	545	20.32	0.2500	0.89						0.00	16.2	16.2
3A					0.00					0.00				0.00				0.00	400	0.025	12	12.5	0.0160	0.91	17.1	17.1
4A					0.00					0.00				0.00				0.00	100	0.025	12	12.5	0.0160	0.23	17.3	17.3

CHANNEL B1 & B2

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Channel or Rundown Channel)				Channelized Flow (Channel)							
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{ch} (ft)	n	a	P_w	S_{ch} (ft/ft)	t_{ch} (min)	t_c (min)	t_c (used)
Channel B1																										
1B					0.00	90	3.0	0.15	0.25	3.39				0.00	1057	16.13	0.0230	7.20						0.00	10.6	10.6
Channel B2																										
-					0.00	40	3.0	0.15	0.25	1.77				0.00	700	16.13	0.0230	4.77						0.00	6.5	10.0
2B	90	3.0	0.15	0.05	6.45	100	3.0	0.15	0.25	3.68	570	16.13	0.03	3.40	580	20.32	0.2500	0.95						0.00	14.5	14.5
3B					0.00					0.00				0.00				0.00	389	0.025	12	12.5	0.0230	0.74	15.2	15.2

Time of Concentration (t_c)

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

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8} / (P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface
where K = 20.32 for paved surface

Channel Flow Time of Concentration (t_{ch})

$t_{ch} = L_{ch} / (3600 \times (1.49/n) \times R^{2/3} \times S_{ch}^{.5})$ where n = 0.040 for unlined surface
and $R = a/P_w$

CHANNEL TIME OF CONCENTRATION CALCULATIONS

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

CHANNEL C1 To C4

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Channel or Rundown Channel)				Channelized Flow (Channel)							
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{ch} (ft)	n	a	P_w	S_{ch} (ft/ft)	t_{ch} (min)	t_c(min)	t_c (used)
Channel C1																										
1C1					0.00	55	3.0	0.15	0.25	2.28				0.00	580	16.13	0.0118	5.52						0.00	7.8	10.0
2C1					0.00					0.00				0.00	164	16.13	0.0180	1.26						0.00	9.1	10.0
Channel C2																										
-					0.00	100	3.0	0.15	0.25	3.68				0.00	164	16.13	0.0235	1.11						0.00	4.8	10.0
3C1					0.00					0.00				0.00	426	16.13	0.0330	2.42						0.00	7.2	10.0
-					0.00					0.00				0.00	166	16.13	0.0240	1.11						0.00	8.3	10.0
-					0.00					0.00				0.00	132	16.13	0.0150	1.11						0.00	9.4	10.0
-					0.00					0.00				0.00	389	16.13	0.0105	3.92						0.00	13.4	13.4
-					0.00					0.00				0.00	257	16.13	0.0075	3.07						0.00	16.4	16.4
4C1					0.00					0.00				0.00	181	16.13	0.0275	1.13						0.00	17.6	17.6
Channel C3																										
5C1					0.00	100	3.0	0.15	0.25	3.68				0.00	740	16.13	0.0090	8.06						0.00	11.7	11.7
Channel C4																										
-					0.00	105	3.0	0.15	0.25	3.83				0.00	139	16.13	0.0229	0.95						0.00	4.8	10.0
-					0.00					0.00				0.00	194	16.13	0.0206	1.40						0.00	6.2	10.0
6C1					0.00					0.00				0.00	122	16.13	0.0188	0.92						0.00	7.1	10.0

Time of Concentration (t_c)

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

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where $n_{ol} = 0.15$ for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface
where K = 20.32 for paved surface

Channel Flow Time of Concentration (t_{ch})

$t_{ch} = L_{ch} / (3600 \times (1.49/n) \times R^{2/3} \times S_{ch}^{.5})$ where n = 0.040 for unlined surface and $R = a/P_w$

CHANNEL TIME OF CONCENTRATION CALCULATIONS

Natural Resources Conservation Service (NRCS) Method for Estimating t_c

CHANNEL C5 To C8

	Sheet Flow (5%)					Sheet Flow (25%)					Shallow Concentrated Flow (Terrace)				Shallow Concentrated Flow (Channel or Rundown Channel)				Channelized Flow (Channel)							
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{ch} (ft)	n	a	P_w	S_{ch} (ft/ft)	t_{ch} (min)	t_c (min)	t_c (used)
Channel C5																										
-					0.00	105	3.0	0.15	0.25	3.83				0.00	126	16.13	0.0409	0.64						0.00	4.5	10.0
7C1					0.00					0.00				0.00	86	16.13	0.0235	0.58						0.00	5.1	10.0
-					0.00					0.00				0.00	284	16.13	0.0070	3.51						0.00	8.6	10.0
8C1	0	3.0	0.15	0.05	0.00	155	3.0	0.15	0.25	5.23	1520	16.13	0.03	9.07	170	20.32	0.2500	0.28						0.00	14.6	14.6
-					0.00					0.00				0.00				0.00	220	0.025	12	12.5	0.0283	0.38	15.0	15.0
-					0.00					0.00				0.00				0.00	145	0.025	12	12.5	0.0140	0.35	15.3	15.3
-					0.00					0.00				0.00				0.00	245	0.025	12	12.5	0.0054	0.96	16.3	16.3
9C1					0.00					0.00				0.00				0.00	42	0.025	12	12.5	0.0800	0.04	16.3	16.3
Channel C6																										
10C1					0.00	85	3.0	0.15	0.25	3.24				0.00	110	16.13	0.0343	0.61						0.00	3.8	10.0
Channel C7																										
-					0.00	90	3.0	0.15	0.25	3.39				0.00	583	16.13	0.0108	5.80						0.00	9.2	10.0
1C2					0.00					0.00				0.00	316	16.13	0.0032	5.77						0.00	15.0	15.0
Channel C8																										
2C2					0.00	60	3.0	0.15	0.25	2.45				0.00	330	16.13	0.0055	4.60						0.00	7.0	10.0

Time of Concentration (t_c)

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

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where $n_{ol} = 0.15$ for short grass prairie and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface
where K = 20.32 for paved surface

Channel Flow Time of Concentration (t_{ch})

$t_{ch} = L_{ch} / (3600 \times (1.49/n) \times R^{2/3} \times S_{ch}^{.5})$ where n = 0.040 for unlined surface and $R = a/P_w$

CHANNEL RUNOFF CALCULATIONS

CHANNEL A

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q_{25}	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
1A	A_9	0.48	10.0	1.45	8.70	1.86	11.16	1.87	7.8	10.0
-	A_9,10	0.48	16.2	1.76	6.52	2.26	8.37	4.38	13.7	17.6
2A	A_1-11	0.48	17.1	1.81	6.35	2.32	8.13	29.23	89.0	114.1
3A	A_1-12	0.48	17.3	1.82	6.30	2.33	8.06	31.29	94.6	121.1

CHANNEL B1

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
1B	B_9	0.48	10.6	1.48	8.4	1.90	10.8	2.11	8.5	10.9

CHANNEL B2

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
2B	B_18	0.48	14.5	1.68	7.0	2.15	8.9	1.39	4.6	5.9
-	B_10 - 18	0.48	14.5	1.68	7.0	2.15	8.9	21.49	71.8	91.9
3B	B_10 - 19	0.48	15.2	1.71	6.7	2.19	8.6	22.49	72.8	93.2

CHANNEL RUNOFF CALCULATIONS

CHANNEL C1

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
1C1	C1_11	0.48	10.0	1.45	8.7	1.86	11.2	0.55	2.3	2.9
2C1	C1_10 - 12	0.48	10.0	1.45	8.7	1.86	11.2	3.54	14.8	19.0

CHANNEL C2

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
3C1	C1_8	0.48	10.0	1.45	8.7	1.86	11.2	1.90	7.9	10.2
4C1	C1_8, 9	0.48	17.6	1.83	6.3	2.35	8.0	3.80	11.4	14.7

CHANNEL C3

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
5C1	C1_19	0.48	11.7	1.54	7.9	1.97	10.1	2.86	10.8	13.8

CHANNEL C4

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
6C1	C1_21	0.48	10.0	1.45	8.7	1.86	11.2	2.40	10.0	12.9

CHANNEL RUNOFF CALCULATIONS

CHANNEL C5

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
7C1	C1_22	0.48	15.0	1.70	6.8	2.18	8.7	0.56	1.8	2.4
-	C1_23	0.48	15.3	1.72	6.7	2.20	8.6	1.60	5.2	6.6
8C1	C1_13-18, 22-23	0.48	16.3	1.77	6.5	2.26	8.3	17.79	55.8	71.2
9C1	C1_13-18, 22-24	0.48	16.3	1.77	6.5	2.26	8.3	19.82	62.0	79.1

CHANNEL C6

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
10C1	C1_25	0.48	10.0	1.45	8.7	1.86	11.2	0.20	0.8	1.1

CHANNEL C7

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
1C2	C2-9	0.48	15.0	1.70	6.8	2.18	8.7	1.35	4.4	5.7

CHANNEL C8

Drainage ID/Design Point	Contributing Drainage Area I.D.'s	Rational Method Coefficient C	Time of Concen. Tc	Pd_{25}	25-Year Rainfall Intensity I_{25}	Pd_{100}	100-Year Rainfall Intensity I_{100}	Area A	25-Year Flow Rate Q25	100-Year Flow Rate Q_{100}
			(min.)	(in.)	(in./hr.)			(acres)	(cfs)	(cfs)
2C2	C2_10	0.48	10.0	1.45	8.7	1.86	11.2	0.41	1.7	2.2

CHANNEL HYDRAULIC CALCULATIONS

CHANNEL A

Reach I.D.	25-Year Flow Rate Q_{25}	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
6-A1	7.8	0	0.75	3	1.69	4.74	0.36	0.0625	0.04	4.66	4.50
5-A1	7.8	0	1.05	3	3.31	6.64	0.50	0.0325	0.04	4.21	6.30
4-A1	13.7	0	1.15	3	3.97	7.27	0.55	0.0200	0.04	3.51	6.90
3-A1	13.7	0	1.12	3	3.76	7.08	0.53	0.0225	0.04	3.65	6.72
2-A1	89.0	4	1.85	3	17.67	15.70	1.13	0.0160	0.04	5.08	15.10
1-A1	94.6	4	1.90	3	18.43	16.02	1.15	0.0160	0.04	5.16	15.40

CHANNEL B1

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
7-B1	8.5	0	0.94	3	2.65	5.95	0.45	0.0230	0.04	3.29	5.64
6-B1	8.5	0	0.88	3	2.32	5.57	0.42	0.0320	0.04	3.71	5.28
5-B1	8.5	0	0.94	3	2.65	5.95	0.45	0.0230	0.04	3.29	5.64
4-B1	8.5	0	0.91	3	2.48	5.76	0.43	0.0280	0.04	3.55	5.46
3-B1	8.5	0	0.54	3	0.87	3.42	0.26	0.1710	0.025	9.91	3.24
2-B1	8.5	0	0.61	3	1.12	3.86	0.29	0.0900	0.025	7.80	3.66
1-B1	8.5	0	0.68	3	1.39	4.30	0.32	0.0500	0.025	6.25	4.08

CHANNEL B2

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
2-B2	4.6	0	0.75	3	1.69	4.74	0.36	0.0230	0.04	2.83	4.50
1-B2	72.8	3	1.65	3	13.12	13.44	0.98	0.0230	0.04	5.54	12.90

CHANNEL C1

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
2-C1	2.3	0	0.66	3	1.31	4.17	0.31	0.0118	0.04	1.86	3.96
1-C1	14.8	0	1.21	3	4.39	7.65	0.57	0.0180	0.04	3.44	7.26

CHANNEL C2

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
7-C2	7.9	0	0.91	3	2.48	5.76	0.43	0.0235	0.04	3.25	5.46
6-C2	7.9	0	0.85	3	2.17	5.38	0.40	0.0330	0.04	3.68	5.10
5-C2	11.4	0	1.04	3	3.24	6.58	0.49	0.0240	0.04	3.59	6.24
4-C2	11.4	0	1.13	3	3.83	7.15	0.54	0.0150	0.04	3.00	6.78
3-C2	11.4	0	1.21	3	4.39	7.65	0.57	0.0105	0.04	2.63	7.26
2-C2	11.4	0	1.29	3	4.99	8.16	0.61	0.0075	0.04	2.32	7.74
1-C2	11.4	0	1.01	3	3.06	6.39	0.48	0.0275	0.04	3.77	6.06

CHANNEL HYDRAULIC CALCULATIONS

CHANNEL C3

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
1-C3	10.8	0	1.22	3	4.47	7.72	0.58	0.0090	0.04	2.45	7.32

CHANNEL C4

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
3-C4	10.0	0	1.00	3	3.00	6.32	0.47	0.0229	0.04	3.42	6.00
2-C4	10.0	0	1.02	3	3.12	6.45	0.48	0.0206	0.04	3.29	6.12
1-C4	10.0	0	1.03	3	3.18	6.51	0.49	0.0188	0.04	3.16	6.18

CHANNEL C5

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
7-C5	1.8	0	0.49	3	0.72	3.10	0.23	0.0409	0.04	2.84	2.94
6-C5	5.2	0	0.79	3	1.87	5.00	0.37	0.0235	0.04	2.96	4.74
5-C5	55.8	3	1.97	3	17.55	15.46	1.14	0.0070	0.04	3.38	14.82
4-C5	55.8	3	1.15	3	7.42	10.27	0.72	0.0283	0.025	8.05	9.90
3-C5	62.0	3	1.21	3	8.02	10.65	0.75	0.0283	0.025	8.28	10.26
2-C5	62.0	3	1.43	3	10.42	12.04	0.87	0.0140	0.025	6.39	11.58
1-C5	62.0	3	1.78	3	14.85	14.26	1.04	0.0054	0.025	4.49	13.68

CHANNEL C6

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
1-C6	0.8	0	0.36	3	0.39	2.28	0.17	0.0343	0.04	2.12	2.16

CHANNEL C7

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
2-C7	4.4	0	0.84	3	2.12	5.31	0.40	0.0108	0.04	2.09	5.04
1-C7	4.4	0	1.06	3	3.37	6.70	0.50	0.0032	0.04	1.33	6.36

CHANNEL C8

Reach I.D.	25-Year Flow Rate Q25	Bottom Width BW	Flow Depth d	Side Slope SS	Flow Area A	Wetted Perimeter Pw	Hydraulic Radius R	Channel Slope S	Manning's Coefficient n	Velocity V	Top Width W_t
	(cfs)	(feet)	(feet)	(_H : 1 V)	(sq. ft.)	(feet)	(feet)	(ft./ft.)		(fps)	(feet)
1-C8	1.7	0	0.68	3	1.39	4.30	0.32	0.0050	0.04	1.24	4.08

STORM DRAIN TIME OF CONCENTRATION (Tc) AND RUNOFF CALCULATIONS

Drainage Structure I.D.'s	Design Point	Time of Concentration Tc	Tc Source	Contributing Area I.D.'s	Total Contributing Area A	Rational Method Coefficient C	Pd_{25}	25-Year Rainfall Intensity I_{25}	25-Year Flow Rate Q_{25}	Notes
		(minutes)			(acres)		(in.)	(in./hr.)	(cfs)	
Culvert 1			From HEC-HMS Reach							From HEC-HMS Reach
Storm Drain 1	5-C1	17.8	Maximum Tc of Channel C2 plus flow time in Storm Drain 3	C1_1 - 12 & C1_19	29.43	0.48	1.84	6.20	87.6	
	6-C1	18.0		C1_1 - 12 & C1_19 - 21	35.17	0.48	1.85	6.17	104.1	
Storm Drain 2	8-C1	11.7	Maximum Tc of Channel C3	C1_20 & 21	5.74	0.48	1.54	7.90	21.8	
Storm Drain 3	4-C1	17.6	Maximum Tc of Channel C2	C1_1 - 12	26.57	0.48	1.83	6.24	79.6	
Storm Drain 4	9-C1	16.3	Maximum Tc of Channel C5	C1_13 - 18 & C1_22 - 25	20.02	0.48	1.77	6.52	62.6	
Storm Drain 5	1-C2	14.6	Maximum Tc of RDC C2	C2_1 - 8	27.98	0.48	1.68	6.90	92.7	
Storm Drain 6	3-B	15.2	Maximum Tc of Channel B2	B_10 - 19	22.49	0.48	1.71	6.75	72.9	

PERMISSABLE SHEAR STRESS CALCULATIONS FOR CHANNELS

CHANNEL A

Drainage ID/Design Point	25-Year Flow Rate Q_{25}	Hydraulic Radius R	Channel Slope S	Velocity V	Calculated Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
A1	7.8	0.36	0.0625	4.66	1.39	C Veget.	1.00	No
A1	7.8	0.50	0.0325	4.21	1.01	C Veget.	1.00	No
A2	13.7	0.55	0.0200	3.51	0.68	C Veget.	1.00	Yes
A2	13.7	0.53	0.0225	3.65	0.75	C Veget.	1.00	Yes
A3	89.0	1.13	0.0160	5.08	1.12	Conc. Lined	N/A	Yes
A4	94.6	1.15	0.0160	5.16	1.15	Conc. Lined	N/A	Yes

CHANNEL B1

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
B1	8.5	0.45	0.0230	3.29	0.64	C Veget.	1.00	Yes
B2	8.5	0.42	0.0320	3.71	0.83	C Veget.	1.00	Yes
B2	8.5	0.45	0.0230	3.29	0.64	C Veget.	1.00	Yes
B2	8.5	0.43	0.0280	3.55	0.75	C Veget.	1.00	Yes
B2	8.5	0.26	0.1710	9.91	2.73	Conc. Lined	N/A	Yes
B2	8.5	0.29	0.0900	7.80	1.62	Conc. Lined	N/A	Yes
B3	8.5	0.32	0.0500	6.25	1.01	Conc. Lined	N/A	Yes

CHANNEL B2

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
B2-1	71.8	0.36	0.0230	2.83	0.51	C Veget.	1.00	Yes
B2-1	0.0	0.98	0.0230	5.54	1.40	C Veget.	1.00	No

CHANNEL C1

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
C1-1	14.8	0.31	0.0118	1.86	0.23	C Veget.	1.00	Yes
C1-2	0.0	0.57	0.0180	3.44	0.64	C Veget.	1.00	Yes

CHANNEL C2

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
C2-1	11.4	0.43	0.0235	3.25	0.63	C Veget.	1.00	Yes
C2-2	11.4	0.40	0.0330	3.68	0.83	C Veget.	1.00	Yes
C2-3	0.0	0.49	0.0240	3.59	0.74	C Veget.	1.00	Yes
C2-4	0.0	0.54	0.0150	3.00	0.50	C Veget.	1.00	Yes
C2-5	0.0	0.57	0.0105	2.63	0.38	C Veget.	1.00	Yes
C2-6	0.0	0.61	0.0075	2.32	0.29	C Veget.	1.00	Yes
C2-7	0.0	0.48	0.0275	3.77	0.82	C Veget.	1.00	Yes

PERMISSABLE SHEAR STRESS CALCULATIONS
FOR CHANNELS

CHANNEL C3

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Calculated Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
C3-1	10.8	0.58	0.0090	2.45	0.32	C Veget.	1.00	Yes

CHANNEL C4

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Calculated Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
C4-1	10.0	0.47	0.0229	3.42	0.68	C Veget.	1.00	Yes
C4-2	10.0	0.48	0.0206	3.29	0.62	C Veget.	1.00	Yes
C4-3	10.0	0.49	0.0188	3.16	0.57	C Veget.	1.00	Yes

CHANNEL C5

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Calculated Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
C5-1	1.8	0.23	0.0409	2.84	0.59	C Veget.	1.00	Yes
C5-2	5.2	0.37	0.0235	2.96	0.55	C Veget.	1.00	Yes
C5-3	55.8	1.14	0.0070	3.38	0.50	C Veget.	1.00	Yes
C5-4	55.8	0.72	0.0283	8.05	1.28	Conc. Lined	NA	Yes
C5-5	62.0	0.75	0.0283	8.28	1.33	Conc. Lined	NA	Yes
C5-6	62.0	0.87	0.0140	6.39	0.76	Conc. Lined	NA	Yes
C5-7	62.0	1.04	0.0054	4.49	0.35	Conc. Lined	NA	Yes

CHANNEL C6

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Calculated Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
C6-1	0.8	0.17	0.0343	2.12	0.37	C Veget.	1.00	Yes

CHANNEL C7

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Calculated Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
C4-1	4.4	0.40	0.0108	2.09	0.27	C Veget.	1.00	Yes
C4-3	4.4	0.50	0.0032	1.33	0.10	C Veget.	1.00	Yes

CHANNEL C8

Drainage ID/Design Point	25-Year Flow Rate Q25	Hydraulic Radius R	Channel Slope S	Velocity V	Calculated Shear Stress Td	Retardation Class	Max. Allowable Shear Stress	Acceptable?
	(cfs)	(feet)	(ft./ft.)	(fps)	(lbs./sq.ft.)		(lbs./sq.ft.)	
C6-1	1.7	0.32	0.0050	1.24	0.10	C Veget.	1.00	Yes

STORM DRAIN TIME OF CONCENTRATION AND FLOW RATE CALCULATIONS

			Drainage Area						Rainfall Intensity				Design Flow
Design Point sta	Downstream Location sta	Distance feet	Area Designation	Drainage Area acres	Total Drainage Area "A" acres	Runoff Coefficient "C"	Incremental "CA"	Total "CA"	Upstream Time of Concentration min	Travel Time in Conduit min	Downstream Time of Concentration min	Rainfall Intensity (I_{25}) in/hr	Total Discharge (Q_{25}) cfs
STORM DRAIN 1													
19+89.43	19+00.00	89.4	C1_1-12,19	29.43	29.43	0.48	14.13	14.13	16.5	0.21	16.7	6.20	87.6
19+00.00	0+61.41	1838.6	C1_1-12,19,20	3.34	32.77	0.48	1.60	15.73	16.7	3.98	20.7	6.15	96.7
STORM DRAIN 2													
0+60.00	0+00.00	60.0	C1_13-25	22.42	22.42	0.48	10.76	10.76	14.7	0.13	14.8	6.90	74.3
STORM DRAIN 3													
0+30.00	0+00.00	30.0	C1_20	3.34	3.34	0.48	1.60	1.60	10.0	0.09	10.1	8.70	13.9
STORM DRAIN 4													
0+52.00	0+00.00	52.0	C1_13-18, 22-25	20.02	20.02	0.48	9.61	9.61	16.3	0.19	16.5	6.50	62.6
STORM DRAIN 5													
0+44.00	0+00.00	44.0	C2_1-10	29.74	29.74	0.48	14.28	14.28	14.6	0.25	14.9	6.80	97.1
STORM DRAIN 6													
1+07.00	0+00.00	107.0	B2_10-18	22.49	22.49	0.48	10.80	10.80	15.2	0.16	15.4	6.70	72.3
STORM DRAIN 7													
0+55.00	0+00.00	55.0	6B2	2.99	2.99	0.48	1.44	1.44	10.5	0.33	10.8	8.50	12.2

STORM DRAIN HYDRAULIC CALCULATIONS

			Drainage Area						Rainfall Intensity				Design Flow			Design Conduit		Friction Loss		Velocity		Minor Loss						Hydraulic Grade Line		
Design Point	Downstream Location	Distance	Area Designation	Drainage Area	Total Drainage Area "A"	Runoff Coefficient "C"	Incremental "CA"	Total "CA"	Upstream Time of Concentration	Travel Time in Conduit	Downstream Time of Concentration	Rainfall Intensity (I_{25})	Total Discharge (Q_{25})	Inlet Discharge	Conduit Design Discharge	No. of Conduits	Pipe Diameter (Culvert Rise)	Friction Slope "S_f"	Friction Loss	Downstream Velocity (V_2)	Upstream Velocity(V_1)	Downstream Velocity Head ($V_2^2/2g$)	Upstream Velocity Head ($V_1^2/2g$)	Minor Loss Coefficient (k)	Description	$kV_1^2/2g$	Total Minor Loss	Downstream HGL Elevation	Upstream HGL Elevation	Design Point HGL Elevation
sta	sta	feet		acres	acres				min	min	min	in/hr	cfs	cfs	cfs		in	ft/ft	ft	ft/sec	ft/sec	ft	ft			ft	ft			
STORM DRAIN 1																														
19+89.43	19+00.00	89.4	C1_1-12,19	29.43	29.43	0.48	14.13	14.13	17.8	0.21	18.0	6.20	87.6	87.6	87.6	1	48	0.0037	0.332	6.97	0.00	0.75	0.00	0.50	Inlet	0.00	0.75	499.58	499.92	500.67
19+00.00	0+61.41	1838.6	C1_1-12,19,20	5.74	35.17	0.48	2.76	16.88	18.0	3.70	21.7	6.17	104.1	104.1	104.1	1	48	0.0053	9.655	8.28	6.97	1.07	0.75	0.50	Wye	0.38	0.69	489.24	498.89	499.58
STORM DRAIN 2																														
0+32.00	0+00.00	32.0	C1_20 & 21	5.74	5.74	0.48	2.76	2.76	11.7	0.08	11.8	7.90	21.8	21.8	21.8	1	24	0.0093	0.296	6.93	0.00	0.75	0.00	1.50	Inlet	0.00	1.12	498.89	499.19	500.31
STORM DRAIN 3																														
0+88.00	0+00.00	88.0	C1_1 - 12	26.57	26.57	0.48	12.75	12.75	17.6	0.22	17.8	6.24	79.6	79.6	79.6	2	33	0.0057	0.498	6.70	0.00	0.70	0.00	0.50	Wye	0.00	0.70	499.92	500.41	501.11
STORM DRAIN 4																														
0+52.00	0+00.00	52.0	C1_13-18, 22-25	20.02	20.02	0.48	9.61	9.61	16.3	0.26	16.6	6.51	62.6	62.6	62.6	1	42	0.0039	0.201	6.50	0.00	0.66	0.00	0.50	Inlet	0.00	0.66	489.24	489.44	490.10
STORM DRAIN 5																														
0+44.00	0+00.00	44.0	C2_1-8	29.74	29.74	0.48	14.28	14.28	14.6	0.25	14.9	6.80	97.1	97.1	97.1	3	30	0.0062	0.274	6.59	0.00	0.67	0.00	0.50	Inlet	0.00	0.67	485.50	485.77	486.45
STORM DRAIN 6																														
1+07.00	0+00.00	107.0	B_10-19	22.49	22.49	0.48	10.80	10.80	15.2	0.22	15.4	6.75	72.9	72.9	72.9	2	30	0.0079	0.844	7.42	0.00	0.86	0.00	0.50	US End Pipe	0.00	0.86	478.00	478.84	479.70
STORM DRAIN 7																														
0+55.00	0+00.00	55.0	6B2	2.99	2.99	0.48	1.44	1.44	15.2	0.33	15.5	8.50	12.2	12.2	12.2	1	21	0.0059	0.326	5.07	0.00	0.40	0.00	0.50	Inlet	0.00	0.40	478.00	478.33	478.73

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 1 - Summary of Culvert Flows at Crossing: Laredo LF Culvert 1

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
508.25	25-Year	89.10	89.10	0.00	1
512.48	100-Year	390.70	348.81	41.49	12
512.00	Overtopping	337.48	337.48	0.00	Overtopping

Table 2 - Culvert Summary Table: Culvert 1

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)
25-Year	89.10	89.10	508.25	2.255	0.325	1-JS1t	1.591	1.613	1.825	1.825	5.323
100-Year	390.70	348.81	512.48	5.713	6.478	7-M2t	4.000	3.249	3.761	3.761	9.483

****

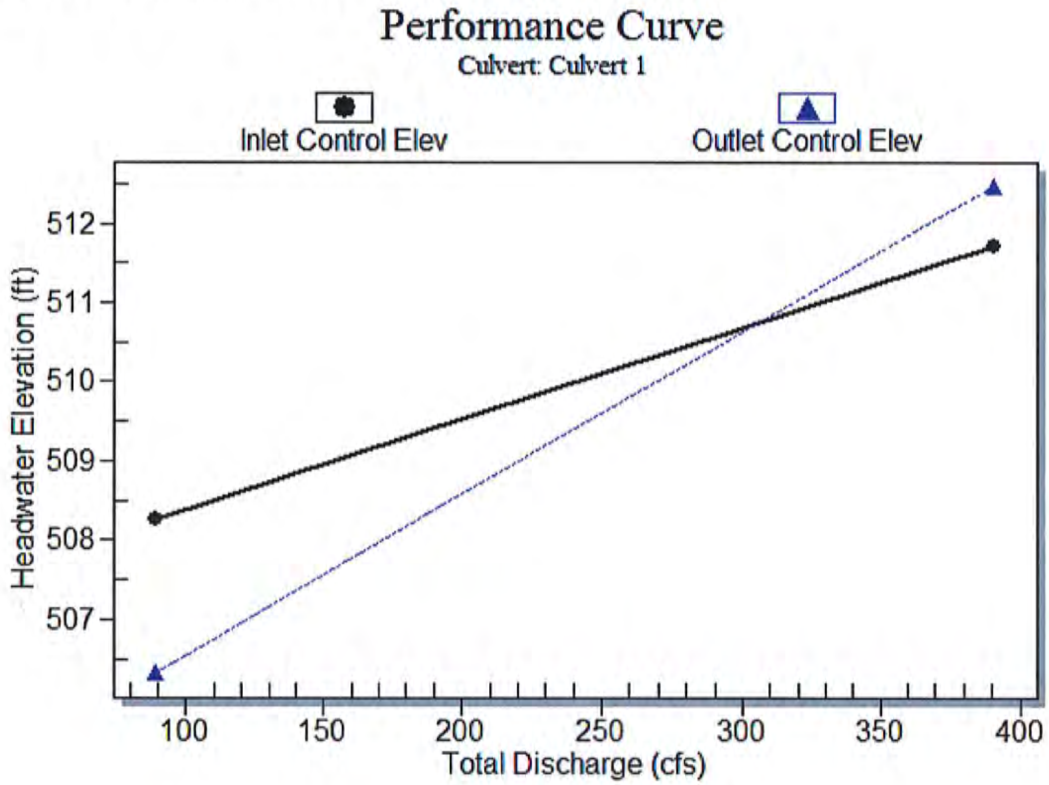
Straight Culvert

Inlet Elevation (invert): 506.00 ft,   Outlet Elevation (invert): 504.50 ft

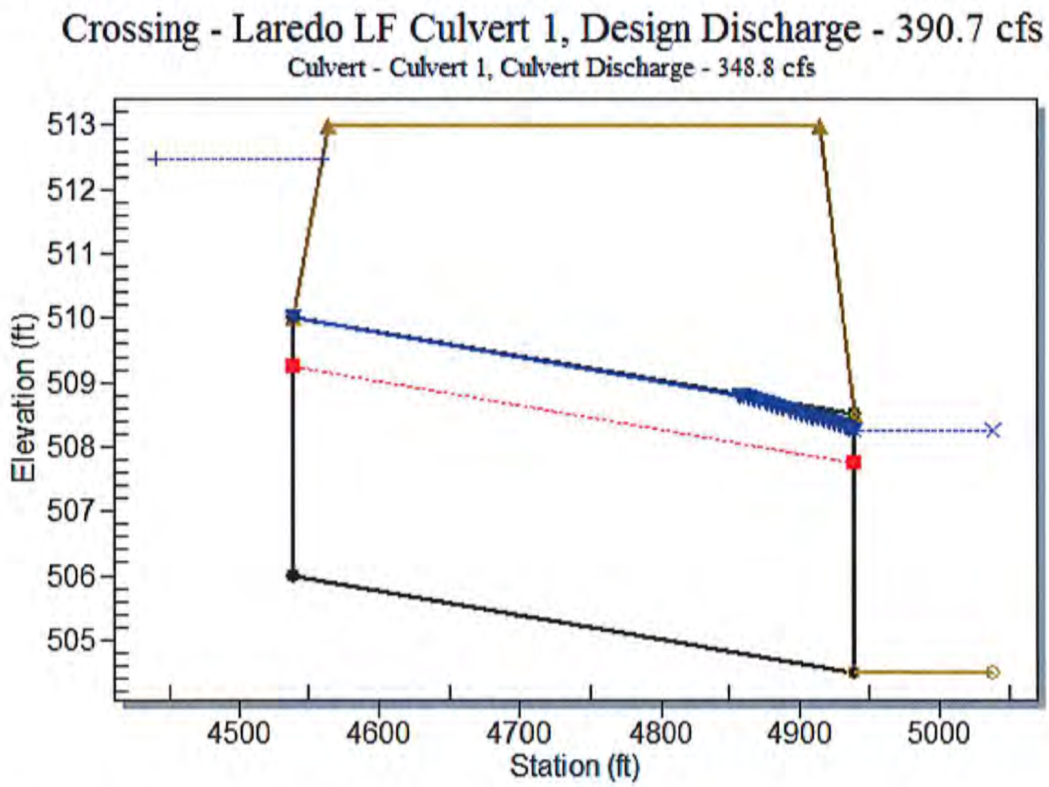
Culvert Length: 400.35 ft,   Culvert Slope: 0.0037

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 4.00 ft

Barrel Material: Smooth HDPE

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Beveled Edge (1:1)

Inlet Depression: NONE

Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 4538.94 ft

Inlet Elevation: 506.00 ft

Outlet Station: 4939.29 ft

Outlet Elevation: 504.50 ft

Number of Barrels: 3

Table 3 - Downstream Channel Rating Curve (Crossing: Laredo LF Culvert 1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
89.10	506.33	1.83	3.62	0.80	0.56
390.70	508.26	3.76	5.39	1.64	0.62

Tailwater Channel Data - Laredo LF Culvert 1

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0070

Channel Manning's n: 0.0400

Channel Invert Elevation: 504.50 ft

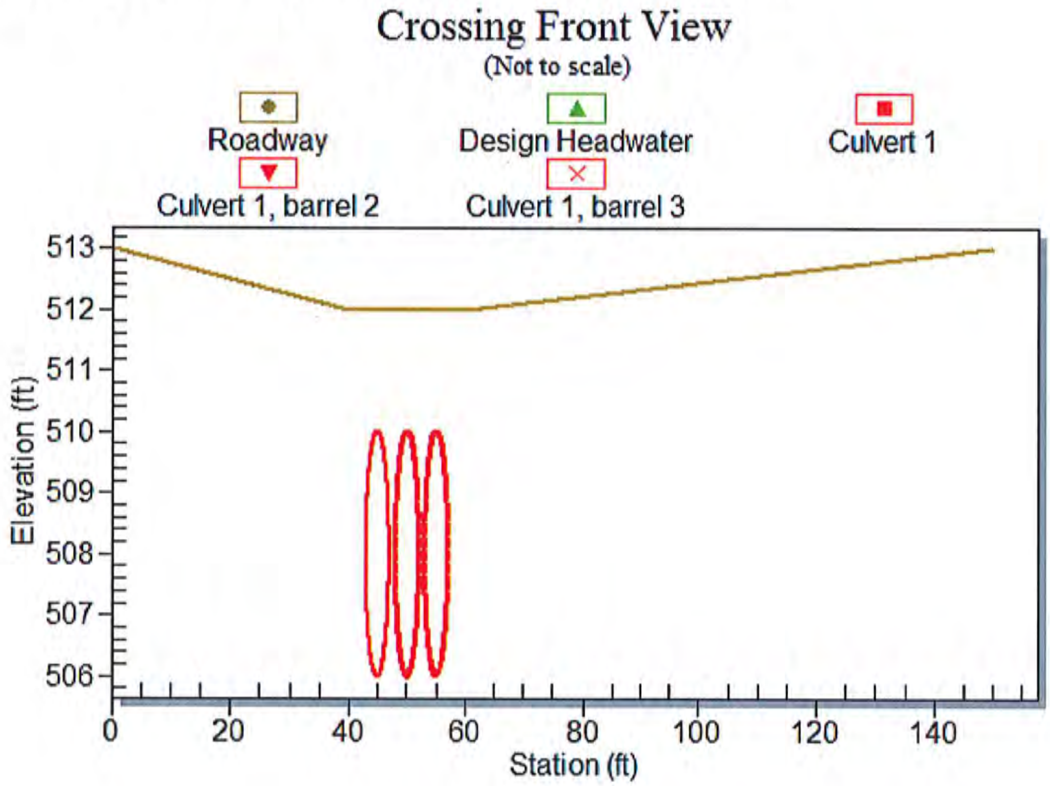
Roadway Data for Crossing: Laredo LF Culvert 1

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Roadway Surface: Paved

Roadway Top Width: 350.00 ft

Crossing Front View (Roadway Profile): Laredo LF Culvert 1



Appendix 6B: Erosion and Sedimentation Control Plan

STATE OF TEXAS
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PROFESSIONAL ENGINEER

TX F-10098

9/17/14

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

2.1 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.

2.2 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.

2.3 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.

2.1 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.

- **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 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.

- **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.

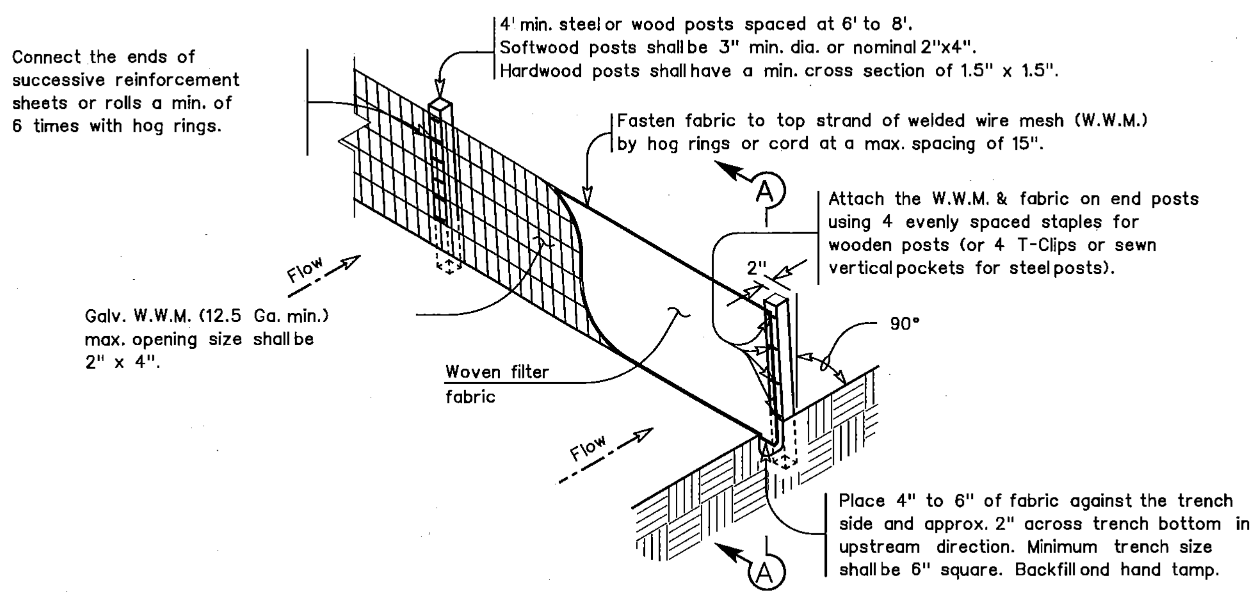
2.1.2 <u>Non-Structural Controls</u> are BMPs that do not involve a structured or engineered solution. They include such measures as site inspection, site maintenance, phased development planning, education, and following stormwater management regulations. The Final Cover Plan identifies the non-structural 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. 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. 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.

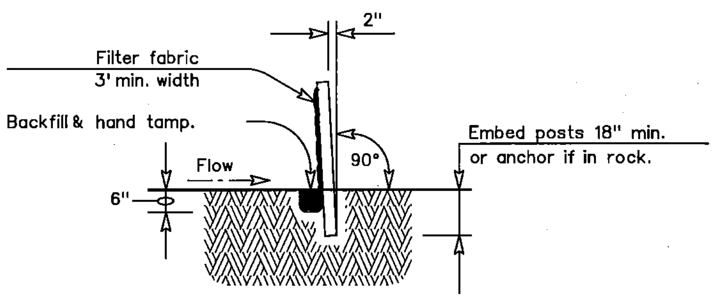
Continual inspection of the site's temporary and permanent erosion control devices will be necessary to identify failures prior to expected rainfall events. Drainage structures will need to be inspected to determine operational capability and to determine remaining holding capacities of sedimentation 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, Appendix A-3.



TEMPORARY SEDIMENT CONTROL FENCE (1 / 6B.1)
NTS

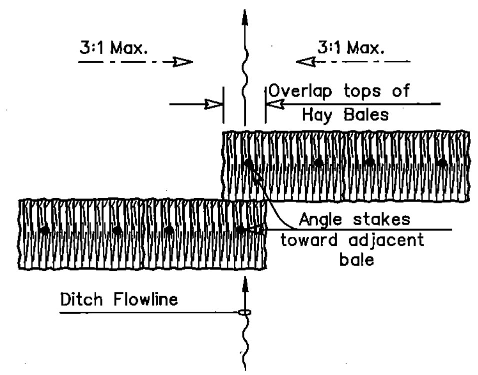


SECTION A-A (2 / 6B.1)
NTS

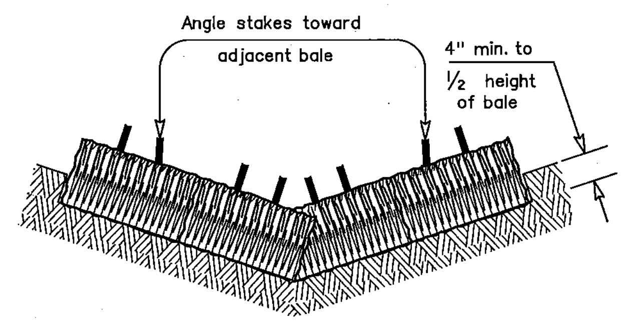
SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a max. flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.



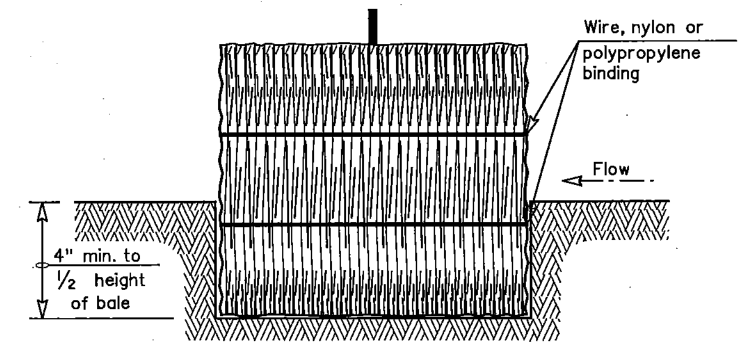
PLAN VIEW (6 / 6B.1)
NTS



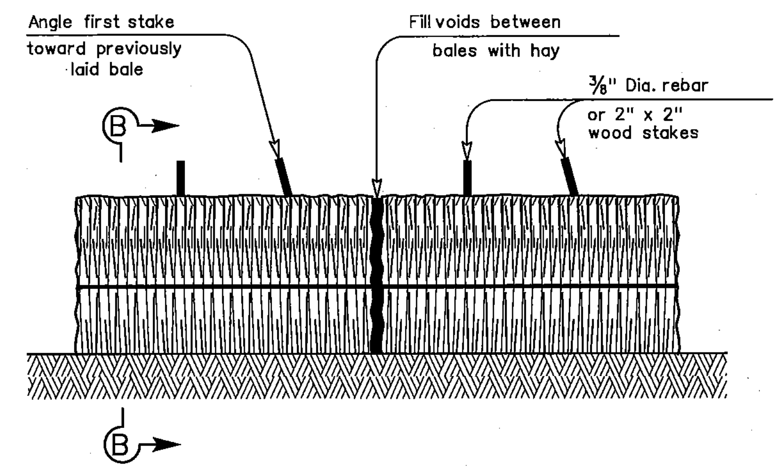
PROFILE VIEW (4 / 6B.1)
NTS

GENERAL NOTES

1. Hay bales shall be a minimum of 30" in length and weigh a minimum of 50 Lbs.
2. Hay bales shall be bound by either wire or nylon or polypropylene string. The bales shall be composed entirely of vegetative matter.
3. Hay bales shall be embedded in the soil a minimum of 4" and where possible ½ the height of the bale.
4. Hay bales shall be placed in a row with ends tightly abutting the adjacent bales. The bales shall be placed with bindings parallel to the ground.
5. Hay bales shall be securely anchored in place with ⅜" Dia. rebar or 2" x 2" wood stakes, driven through the bales. The first stake shall be angled towards the previously laid bale to force the bales together.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.



SECTION B-B (5 / 6B.1)
NTS



BALED HAY FOR EROSION CONTROL (3 / 6B.1)
NTS

FOR PERMIT PURPOSES ONLY

STATE OF TEXAS — STEVEN B. HENIFORD — 66257 — REGISTERED PROFESSIONAL ENGINEER — 9/17/14

REV	DATE	DESCRIPTION	DES BY	APP BY

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

EROSION CONTROL DETAILS
SILT FENCE & HAY BALES
FIGURE III-6B.1

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6B

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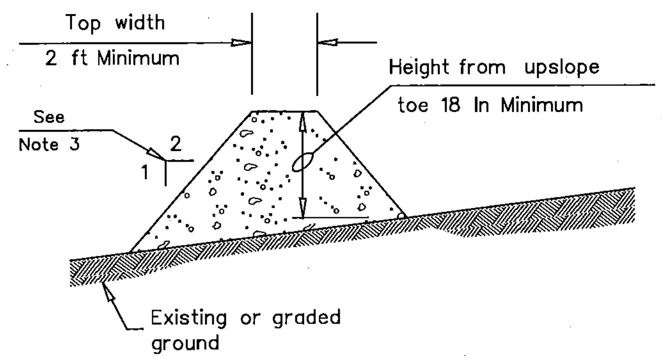
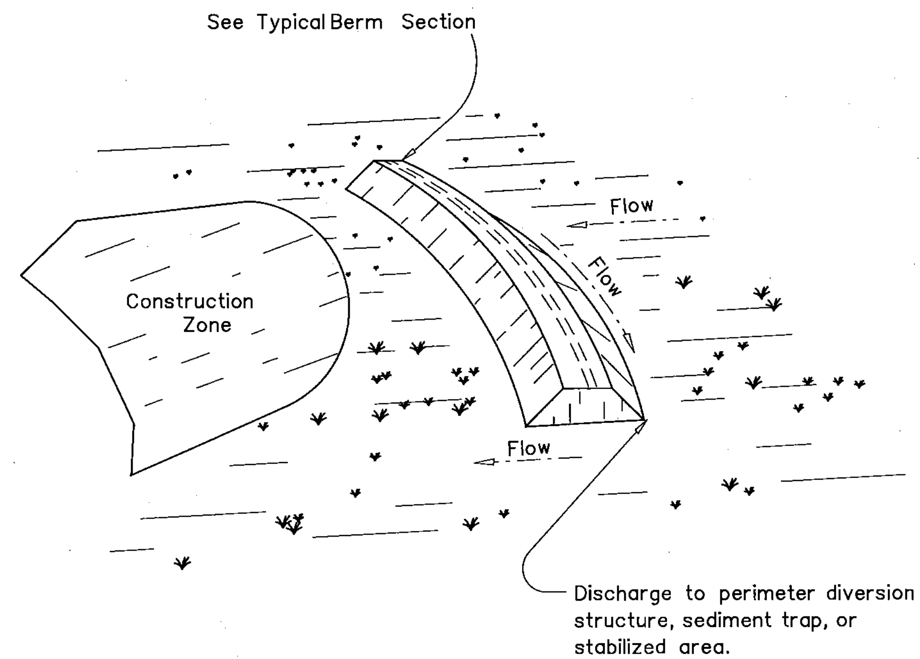
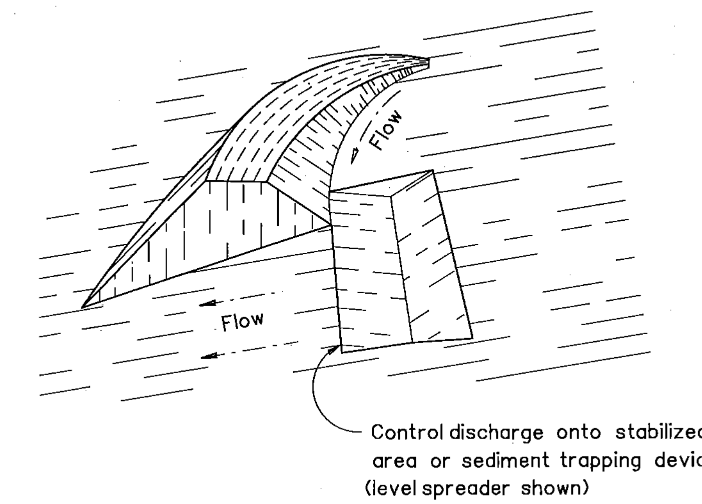


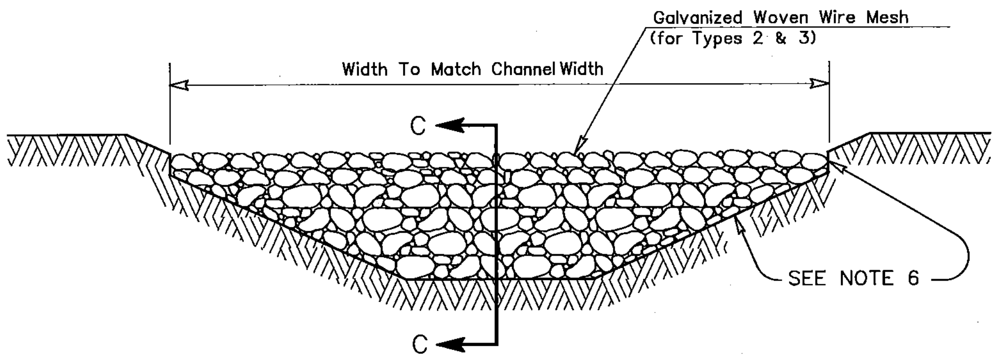
TYPICAL BERM SECTION (1/6B.2)
NTS



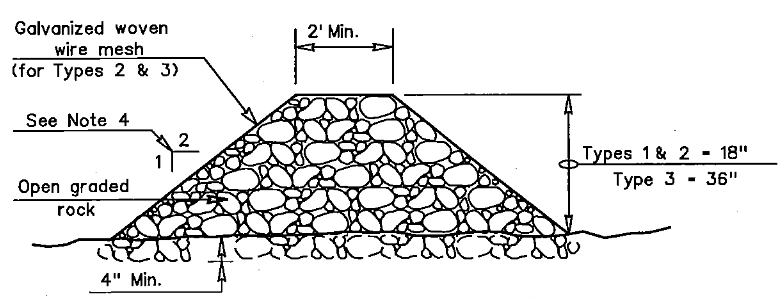
INTERCEPTOR BERM (2/6B.2)
NTS



PERIMETER BERM (3/6B.2)
NTS



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.

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.

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STATE OF TEXAS — STEVEN B. HENIFORD — 66257 — REGISTERED PROFESSIONAL ENGINEER
9/17/14

REV	DATE	DESCRIPTION	DES BY	APP BY

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

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
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Appendix 6C: References

STATE OF TEXAS
STEVEN B. HENIFORD
66257
LICENSED
PROFESSIONAL ENGINEER

TX F-10098 Steven B. Heniford 9/17/14

S_{sh} = sheet flow slope (ft/ft)

Table 4-6: Overland Flow Roughness Coefficients for Use in NRCS Method in Calculating Sheet Flow Travel Time (Not Manning's Roughness Coefficient) (NRCS 1986)

Surface description		n_{ol}
Smooth surfaces (concrete, asphalt, gravel, or bare soil)		0.011
Fallow (no residue)		0.05
Cultivated soils:	Residue $cover \leq 20\%$	0.06
	Residue cover > 20%	0.17
Grass:	Short grass prairie	0.15
	Dense grasses	0.24
	Bermuda	0.41
Range (natural):		0.13
Woods:	Light underbrush	0.40
	Dense underbrush	0.80

Shallow Concentrated Flow

Shallow concentrated flow travel time is computed as:

$$t_{sc} = \frac{L_{sc}}{3600KS_{sc}^{0.5}}$$

Equation 4-18.

Where:

t_{sc} = shallow concentrated flow time (hr.)

L_{sc} = shallow concentrated flow length (ft)

K = 16.13 for unpaved surface, 20.32 for paved surface

S_{sc} = shallow concentrated flow slope (ft/ft)

Channel Flow

Channel flow travel time is computed by dividing the channel distance by the flow rate obtained from Manning's equation. This can be written as:

$$t_{ch} = L_{ch} \Big/ \left((3600 \frac{1.49}{n} R^{\frac{2}{3}} S_{ch}^{\frac{1}{2}}) \right)$$

Equation 4-19.

Where:

t_{ch} = channel flow time (hr.)

L_{ch} = channel flow length (ft)

S_{ch} = channel flow slope (ft/ft)

n = Manning's roughness coefficient

R = channel hydraulic radius (ft), and is equal to $\frac{a}{p_w}$, where: a = cross sectional area (ft^2) and p_w = wetted perimeter (ft), consider the uniform flow velocity based on bank-full flow conditions. That is, the main channel is flowing full without flow in the over-banks. This assumption avoids the significant iteration associated with other methods that employ rainfall intensity or discharges (because rainfall intensity and discharge are dependent on time of concentration).

Manning's Roughness Coefficient Values

Manning's roughness coefficients are used to calculate flows using Manning's equation. Values from American Society of Civil Engineers (ASCE) 1992, FHWA 2001, and Chow 1959 are reproduced in Table 4-7, Table 4-8, and Table 4-9.

Table 4-7: Manning's Roughness Coefficients for Open Channels

Type of channel	Manning's n
A. Natural streams	
1. Minor streams (top width at flood stage < 100 ft)	
a. Clean, straight, full, no rifts or deep pools	0.025-0.033
b. Same as a, but more stones and weeds	0.030-0.040
c. Clean, winding, some pools and shoals	0.033-0.045
d. Same as c, but some weeds and stones	0.035-0.050
e. Same as d, lower stages, more ineffective	0.040-0.055
f. Same as d, more stones	0.045-0.060
g. Sluggish reaches, weedy, deep pools	0.050-0.080
h. Very weedy, heavy stand of timber and underbrush	0.075-0.150
i. Mountain streams with gravel and cobbles, few boulders on bottom	0.030-0.050
j. Mountain streams with cobbles and large boulders on bottom	0.040-0.070
2. Floodplains	
a. Pasture, no brush, short grass	0.025-0.035
b. Pasture, no brush, high grass	0.030-0.050

Table 4-7: Manning's Roughness Coefficients for Open Channels

Type of channel	Manning's n
c. Cultivated areas, no crop	0.020-0.040
d. Cultivated areas, mature row crops	0.025-0.045
e. Cultivated areas, mature field crops	0.030-0.050
f. Scattered brush, heavy weeds	0.035-0.070
g. Light brush and trees in winter	0.035-0.060
h. Light brush and trees in summer	0.040-0.080
i. Medium to dense brush in winter	0.045-0.110
j. Medium to dense brush in summer	0.070-0.160
k. Trees, dense willows summer, straight	0.110-0.200
l. Trees, cleared land with tree stumps, no sprouts	0.030-0.050
m. Trees, cleared land with tree stumps, with sprouts	0.050-0.080
n. Trees, heavy stand of timber, few down trees, flood stage below branches	0.080-0.120
o. Trees, heavy stand of timber, few down trees, flood stage reaching branches	0.100-0.160
3. Major streams (top width at flood stage > 100 ft)	
a. Regular section with no boulders or brush	0.025-0.060
b. Irregular rough section	0.035-0.100
B. Excavated or dredged channels	
1. Earth, straight and uniform	
a. Clean, recently completed	0.016-0.020
b. Clean, after weathering	0.018-0.025
c. Gravel, uniform section, clean	0.022-0.030
d. With short grass, few weeds	0.022-0.033
2. Earth, winding and sluggish	
a. No vegetation	0.023-0.030
b. Grass, some weeds	0.025-0.033
c. Deep weeds or aquatic plants in deep channels	0.030-0.040
d. Earth bottom and rubble sides	0.028-0.035
e. Stony bottom and weedy banks	0.025-0.040
f. Cobble bottom and clean sides	0.030-0.050

Table 4-7: Manning's Roughness Coefficients for Open Channels

Type of channel	Manning's n
g. Winding, sluggish, stony bottom, weedy banks	0.025-0.040
h. Dense weeds as high as flow depth	0.050-0.120
3. Dragline-excavated or dredged	
a. No vegetation	0.025-0.033
b. Light brush on banks	0.035-0.060
4. Rock cuts	
a. Smooth and uniform	0.025-0.040
b. Jagged and irregular	0.035-0.050
5. Unmaintained channels	
a. Dense weeds, high as flow depth	0.050-0.120
b. Clean bottom, brush on sides	0.040-0.080
c. Clean bottom, brush on sides, highest stage	0.045-0.110
d. Dense brush, high stage	0.080-0.140
C. Lined channels	
1. Asphalt	0.013-0.016
2. Brick (in cement mortar)	0.012-0.018
3. Concrete	
a. Trowel finish	0.011-0.015
b. Float finish	0.013-0.016
c. Unfinished	0.014-0.020
d. Gunite, regular	0.016-0.023
e. Gunite, wavy	0.018-0.025
4. Riprap (n-value depends on rock size)	0.020-0.035
5. Vegetal lining	0.030-0.500

Table 4-8: Manning's Coefficients for Streets and Gutters

Type of gutter or pavement	Manning's n
Concrete gutter, troweled finish	0.012
Asphalt pavement: smooth texture	0.013
Asphalt pavement: rough texture	0.016

Table 4-8: Manning's Coefficients for Streets and Gutters

Type of gutter or pavement	Manning's n
Concrete gutter with asphalt pavement: smooth texture	0.013
Concrete gutter with asphalt pavement: rough texture	0.015
Concrete pavement: float finish	0.014
Concrete pavement: broom finish	0.016
Table 4-8 note: For gutters with small slope or where sediment may accumulate, increase n values by 0.02 (USDOT, FHWA 2001).	

Table 4-9: Manning's Roughness Coefficients for Closed Conduits (ASCE 1982, FHWA 2001)

Material		Manning's n
Asbestos-cement pipe		0.011-0.015
Brick		0.013-0.017
Cast iron pipe		
	Cement-lined & seal coated	0.011-0.015
Concrete (monolithic)		
	Smooth forms	0.012-0.014
	Rough forms	0.015-0.017
	Concrete pipe	0.011-0.015
	Box (smooth)	0.012-0.015
Corrugated-metal pipe -- (2-1/2 in. x 1/2 in. corrugations)		
	Plain	0.022-0.026
	Paved invert	0.018-0.022
	Spun asphalt lined	0.011-0.015
	Plastic pipe (smooth)	0.011-0.015
Corrugated-metal pipe -- (2-2/3 in. by 1/2 in. annular)		0.022-0.027
Corrugated-metal pipe -- (2-2/3 in. by 1/2 in. helical)		0.011-0.023
Corrugated-metal pipe -- (6 in. by 1 in. helical)		0.022-0.025
Corrugated-metal pipe -- (5 in. by 1 in. helical)		0.025–0.026
Corrugated-metal pipe -- (3 in. by 1 in. helical)		0.027–0.028
Corrugated-metal pipe -- (6 in. by 2 in. structural plate)		0.033–0.035
Corrugated-metal pipe -- (9 in. by 2-1/2 in. structural plate)		0.033–0.037
Corrugated polyethylene		0.010–0.013
	Smooth	0.009-0.015
	Corrugated	0.018–0.025
Spiral rib metal pipe (smooth)		0.012-0.013

Table 4-9: Manning's Roughness Coefficients for Closed Conduits (ASCE 1982, FHWA 2001)

Material		Manning's n
Vitrified clay		
	Pipes	0.011-0.015
	Liner plates	0.013-0.017
Polyvinyl chloride (PVC) (smooth)		0.009-0.011
Table 4-9 note: Manning's n for corrugated pipes is a function of the corrugation size, pipe size, and whether the corrugations are annular or helical (see USGS 1993).		

Table 4-11: Runoff Coefficients for Rural Watersheds

Watershed characteristic	Extreme	High	Normal	Low
Relief - C_r	0.28-0.35 Steep, rugged terrain with average slopes above 30%	0.20-0.28 Hilly, with average slopes of 10-30%	0.14-0.20 Rolling, with average slopes of 5-10%	0.08-0.14 Relatively flat land, with average slopes of 0-5%
Soil infiltration - C_i	0.12-0.16 No effective soil cover; either rock or thin soil mantle of negligible infiltration capacity	0.08-0.12 Slow to take up water, clay or shallow loam soils of low infiltration capacity or poorly drained	0.06-0.08 Normal; well drained light or medium textured soils, sandy loams	0.04-0.06 Deep sand or other soil that takes up water readily; very light, well-drained soils
Vegetal cover - C_v	0.12-0.16 No effective plant cover, bare or very sparse cover	0.08-0.12 Poor to fair; clean cultivation, crops or poor natural cover, less than 20% of drainage area has good cover	0.06-0.08 Fair to good; about 50% of area in good grassland or woodland, not more than 50% of area in cultivated crops	0.04-0.06 Good to excellent; about 90% of drainage area in good grassland, woodland, or equivalent cover
Surface Storage - C_s	0.10-0.12 Negligible; surface depressions few and shallow, drainageways steep and small, no marshes	0.08-0.10 Well-defined system of small drainageways, no ponds or marshes	0.06-0.08 Normal; considerable surface depression, e.g., storage lakes and ponds and marshes	0.04-0.06 Much surface storage, drainage system not sharply defined; large floodplain storage, large number of ponds or marshes
Table 4-11 note: The total runoff coefficient based on the 4 runoff components is $C = C_r + C_i + C_v + C_s$				

While this approach was developed for application to rural watersheds, it can be used as a check against mixed-use runoff coefficients computed using other methods. In so doing, the designer would use judgment, primarily in specifying C_s, to account for partially developed conditions within the watershed.

Mixed Land Use

For areas with a mixture of land uses, a composite runoff coefficient should be used. The composite runoff coefficient is weighted based on the area of each respective land use and can be calculated as:

where:

A = section area of flow, sq. ft. or m^2

T = width of water surface, ft. or m

d = depth of flow, ft. or m

D = pipe diameter, ft. or m

the $\cos^{-1}(\theta)$ is the principal value in the range $0 \leq \theta \leq \pi$.

Use Equation 6-3 to determine uniform depth. For most shapes, a direct solution of Equation 6-3 for depth is not possible. The Slope Conveyance Procedure discussed in Chapter 7 is applicable. For rectangular shapes, area, A, and wetted perimeter, WP are simple functions of flow depth. For circular pipe, compute area using Equation 6-17, and compute wetted perimeter using Equation 6-19. For other shapes, acquire or derive the relationship from depth of flow, area, and wetted perimeter.

Refer to the table below for recommended Manning's roughness coefficients for conduit.

$$WP = D\cos^{-1}\left(1 - \frac{2d}{D}\right)$$

Equation 6-19.

Roughness Coefficients

The following table provides roughness coefficients for conduits.

Recommended Culvert Conduit Roughness Coefficients

Type of Conduit	n-Value
Concrete Box	0.012
Concrete Pipe	0.012
Smooth-lined metal pipe	0.012
Smooth lined plastic pipe	0.012
Corrugated metal pipe	0.015-0.027
Structural plate pipe	0.027-0.036
Long span structural plate	0.031
Corrugated metal (paved interior)	0.012
Plastic	0.012-0.024

where:

τ_d = maximum shear stress at normal depth (lb./sq.ft.)

R = hydraulic radius (ft.) at ym

S = channel slope (ft./ft.)

$$\tau_d = 9810 \ RS$$

Equation 7-3. (Metric)

where:

t_d = maximum shear stress at normal depth (N/m^2)

R = hydraulic radius (m)

S = channel slope (m/m)

Retardation Class for Lining Materials

Retardance Class	Cover	Condition
A	Weeping Lovegrass	Excellent stand, tall (average 30 in. or 760 mm)
	Yellow Bluestem Ischaemum	Excellent stand, tall (average 36 in. or 915 mm)
B	Kudzu	Very dense growth, uncut
	Bermuda grass	Good stand, tall (average 12 in. or 305 mm)
	Native grass mixture little bluestem, bluestem, blue gamma, other short and long stem medwest grasses	Good stand, unmowed
	Weeping lovegrass	Good Stand, tall (average 24 in. or 610 mm)
	Lespedeza sericea	Good stand, not woody, tall (average 19 in. or 480 mm)
	Alfalfa	Good stand, uncut (average 11 in or 280 mm)
	Weeping lovegrass	Good stand, unmowed (average 13 in. or 330 mm)
	Kudzu	Dense growth, uncut
	Blue gamma	Good stand, uncut (average 13 in. or 330 mm)
C	Crabgrass	Fair stand, uncut (10-to-48 in. or 55-to-1220 mm)
	Bermuda grass	Good stand, mowed (average 6 in. or 150 mm)
	Common lespedeza	Good stand, uncut (average 11 in. or 280 mm)
	Grass-legume mixture: summer (orchard grass redtop, Italian ryegrass, and common lespedeza)	Good stand, uncut (6-8 in. or 150-200 mm)

Retardation Class for Lining Materials

Retardance Class	Cover	Condition
	Centipedegrass	Very dense cover (average 6 in. or 150 mm)
	Kentucky bluegrass	Good stand, headed (6-12 in. or 150-305 mm)
D	Bermuda grass	Good stand, cut to 2.5 in. or 65 mm
	Common lespedeza	Excellent stand, uncut (average 4.5 in. or 115 mm)
	Buffalo grass	Good stand, uncut (3-6 in. or 75-150 mm)
	Grass-legume mixture: fall, spring (orchard grass Italian ryegrass, and common lespedeza	Good Stand, uncut (4-5 in. or 100-125 mm)
	Lespedeza sericea	After cutting to 2 in. or 50 mm (very good before cutting)
E	Bermuda grass	Good stand, cut to 1.5 in. or 40 mm
	Bermuda grass	Burned stubble

Permissible Shear Stresses for Various Linings

Protective Cover	(lb./sq.ft.)	t_p (N/m^2)
Retardance Class A Vegetation (See the "Retardation Class for Lining Materials" table above)	3.70	177
Retardance Class B Vegetation (See the "Retardation Class for Lining Materials" table above)	2.10	101
Retardance Class C Vegetation (See the "Retardation Class for Lining Materials" table above)	1.00	48
Retardance Class D Vegetation (See the "Retardation Class for Lining Materials" table above)	0.60	29
Retardance Class E Vegetation (See the "Retardation Class for Lining Materials" table above)	0.35	17
Woven Paper	0.15	7
Jute Net	0.45	22
Single Fiberglass	0.60	29
Double Fiberglass	0.85	41
Straw W/Net	1.45	69
Curled Wood Mat	1.55	74
Synthetic Mat	2.00	96
Gravel, D_{50} = 1 in. or 25 mm	0.40	19
Gravel, D_{50} = 2 in. or 50 mm	0.80	38
Rock, D_{50} = 6 in. or 150 mm	2.50	120
Rock, D_{50} = 12 in. or 300 mm	5.00	239

Permissible Shear Stresses for Various Linings

Protective Cover	(lb./sq.ft.)	t_p (N/m^2)
6-in. or 50-mm Gabions	35.00	1675
4-in. or 100-mm Geoweb	10.00	479
Soil Cement (8% cement)	>45	>2154
Dycel w/out Grass	>7	>335
Petraflex w/out Grass	>32	>1532
Armorflex w/out Grass	12-20	574-957
Erikamat w/3-in or 75-mm Asphalt	13-16	622-766
Erikamat w/1-in. or 25 mm Asphalt	<5	<239
Armorflex Class 30 with longitudinal and lateral cables, no grass	>34	>1628
Dycel 100, longitudinal cables, cells filled with mortar	<12	<574
Concrete construction blocks, granular filter underlayer	>20	>957
Wedge-shaped blocks with drainage slot	>25	>1197

Trial Runs

To optimize the roadside channel system design, make several trial runs before a final design is achieved. Refer to HEC-15 for more information on channel design techniques and considerations.

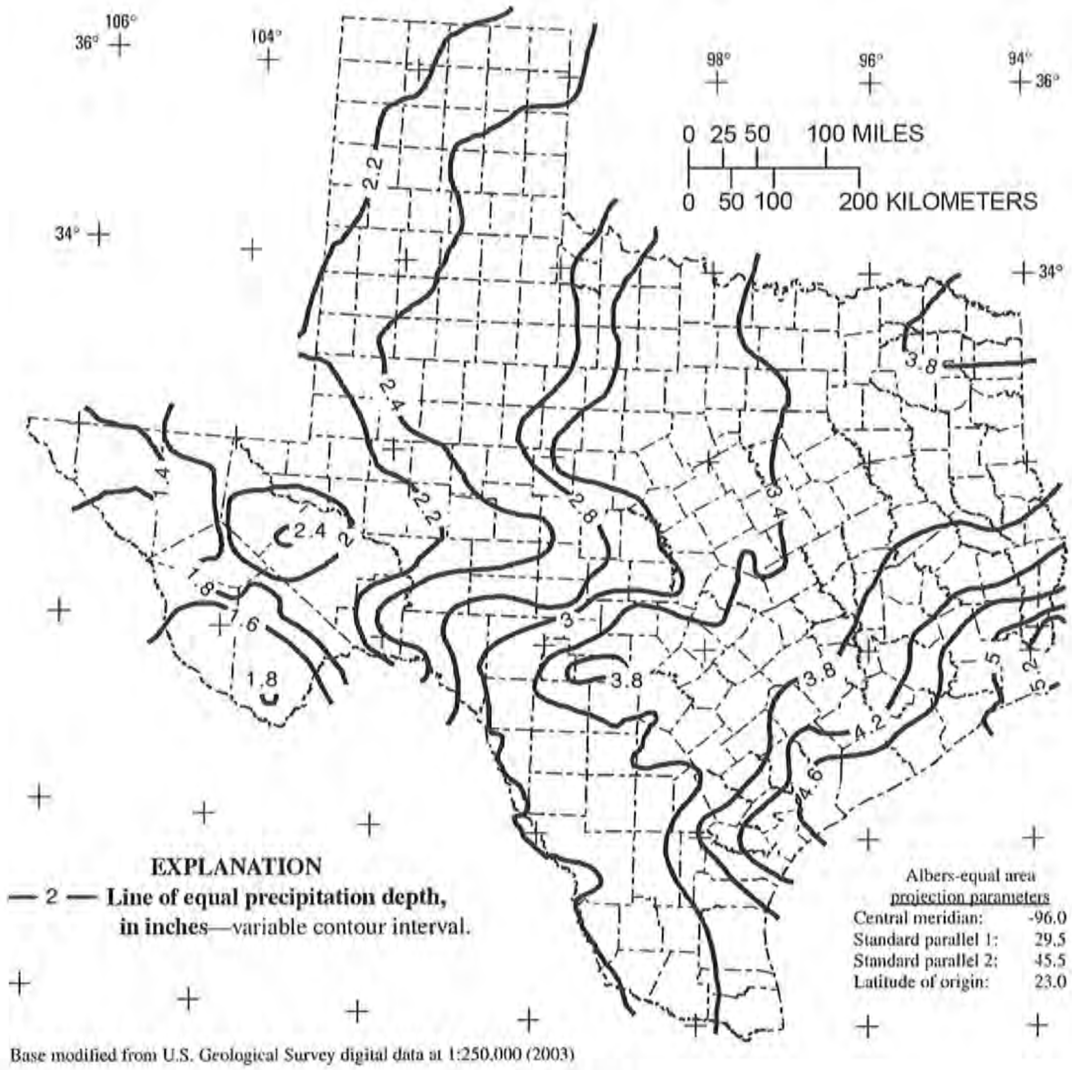
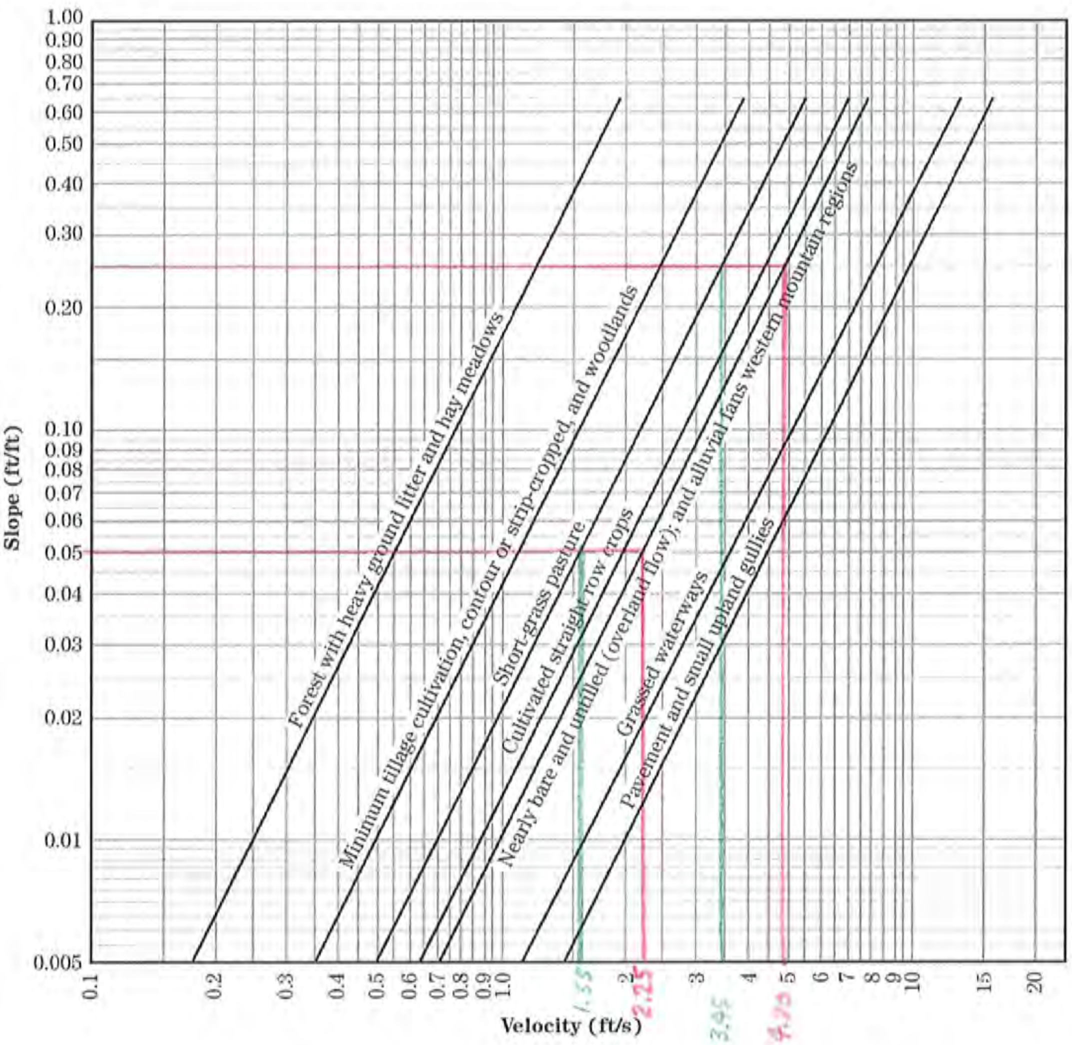


Figure 11. Depth of precipitation for 2-year storm for 1-day duration in Texas.

Figure 15–4 Velocity versus slope for shallow concentrated flow



Velocity Determination For Top Dome and 4:1 Side Slopes

Table 15–3 Equations and assumptions developed from figure 15–4

Flow type	Depth (ft)	Manning's *n*	Velocity equation (ft/s)
Pavement and small upland gullies	0.2	0.025	$V = 20.328(s)^{0.5}$
Grassed waterways	0.4	0.050	$V=16.135(s)^{0.5}$
Nearly bare and untilled (overland flow); and alluvial fans in western mountain regions	0.2	0.051	$V=9.965(s)^{0.5}$
Cultivated straight row crops	0.2	0.058	$V=8.762(s)^{0.5}$
Short-grass pasture	0.2	0.073	$V=6.962(s)^{0.5}$
Minimum tillage cultivation, contour or strip-cropped, and woodlands	0.2	0.101	$V=5.032(s)^{0.5}$
Forest with heavy ground litter and hay meadows	0.2	0.202	$V=2.516(s)^{0.5}$

LAREDO LANDFILL
PART III, ATTACHMENT 6
APPENDIX 6D
Floodplain Analysis

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1. INTRODUCTION

The purpose of this analysis is to demonstrate that development of the site as proposed in this permit amendment will not adversely affect the existing receiving drainage features. This determination will be made by comparing the runoff from the proposed condition 25-year and 100-year events and resulting water surfaces to those of the current conditions. The secondary purpose of this analysis is to provide hydraulic modeling of the four proposed onsite retention/detention ponds.

The subject unnamed tributary of the Tex-Mex Tributary of Chacon Creek was previously studied by Arredondo, Zepeda & Brunz, LLC. to accurately map the 100-year floodplain as it currently relates to the City of Laredo's Landfill. This tributary is located on the north and east sides of the landfill. The study area of the subject tributary is located within Webb County, Texas, north of State Highway 359, south of the Tex-Mex Railroad approximately 2.5 miles east of Loop 20. The results of the study were submitted to the Federal Emergency Management Agency (FEMA) to obtain a Letter of Map Revision (LOMR) for the study area. FEMA processed AZ&B's submittal and issued new effective Flood Insurance Rate Map (FIRM) Panels 48479C1220C and 48479C1385C, dated February 19, 2014. A copy of FIRM Panel 48479C1385C on which the landfill is shown is provided as Figure III.6D-7. The study prepared for FEMA review included the 10-year, 50-year, 100-year and 500-year events and only included an analysis of the existing condition. The complete floodplain analysis supporting the FEMA submittal is included in Part II, Attachment 15 and is not repeated here.

2. EXISTING CONDITIONS

The unnamed tributary flows from south to north along the east boundary of the City of Laredo Landfill and then east to west along the landfill's northern boundary and south of the Tex-Mex railroad. Further to the west, this tributary flows into the Tex-Mex Tributary of Chacon Creek. There are no bridges or culverts along the reach studied. The property to the west of the landfill is phased with light industrial development.

The area of the drainage basin fronting S.H. 359 is developed with light industrial or commercial sites. The majority of the basin which is located south of S.H. 359 is undeveloped and consists of brushy land with little ground cover. Slopes are generally moderate to flat. The greater portion of this basin flows directly into the channel along the east side of the landfill. The smaller portion of the basin flows through the landfill site before discharging into the subject tributary near the landfill's northeast corner. Currently, there is a large borrow pit excavated along this smaller basin's flow path that intercepts and detains flow before it enters the landfill site. Flow begins to discharge at a reduced rate from the excavated pit as it nears its holding capacity. The existing drainage conditions are shown on Figure III-6D.1, Existing Drainage Area Map.

The landfill itself is located within the city limits of Laredo as is the platted portion of the industrial park known as Las Lomas Industrial Park to the east. The undeveloped area east of the landfill and the railroad to the north lie within unincorporated areas of Webb County, Texas.

In 2008, the unnamed tributary was improved to a trapezoidal earthen channel that runs in a variable width drainage easement to accommodate the light industrial development mentioned above. Adjacent to the northwestern corner of the landfill site the channel has standing water. As the water surface rises in this location, flow begins to exit the ponded area and continues flowing downstream to the west. The drainage easement has a minimum width of 100 feet and is located adjacent to and completely outside of the landfill's boundary. The City of Laredo has joint use rights of the easement and maintenance responsibility of the channel.

For the existing on-site flows, as shown on Figure III-6D.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 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 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 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 Pond C and the run-on from a 151.17 acre offsite basin (Areas D1, D2, and D3) that is passed through the site.

3. PROPOSED CONDITIONS

The surface water management system design for the proposed developed condition is presented on Figures III-6D.3 and Figure III-6D.4. 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. There is no change to the existing offsite drainage areas or patterns with the proposed drainage design. For the proposed developed on-site flows, as shown on Figure III-6D.4, Proposed Onsite Drainage Plan, the site is still divided into six separate major drainage areas. The proposed major onsite drainage areas are broken down into multiple sub-areas for onsite drainage structure design purposes.

Area 1, containing 1.76 acres discharges directly into the existing channel along the landfill site's western boundary identified as Outfall 1. Area A containing 34.86 acres, passes through Pond A and discharges from the site near the northwest corner of the landfill site at Outfall 2. Areas 3 and 5 combined contain 11.94 acres and discharges from the site generally as sheet flow along the northern boundary at Outfalls 3 and 5 respectively. Area B contains

44.98 acres, passes through Pond B and discharges to the drainage channel located off of the northern boundary near the center of the site identified as Outfall 4. Areas C1 and C2 contains 106.46 acres combined, passes through Ponds C1 and C2, combines with channelized flow from onsite drainage basins, and is eventually discharged offsite at Outfall 6 at the site's northeast corner in an earthen channel. As is provided in the current permit, the channel mentioned will convey run-on from the 151.17 acre offsite drainage basin to the southwest (Areas D1, D2 and D3 on the Proposed Drainage Area Map). As mentioned above, the flow in this channel is reduced due to the affects of the excavated borrow pit 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 Ponds C1 and C2 and outfall at the northeast corner identified as Outfall 6. Discharge from Pond C2 will be released into this channel.

To analyze the proposed developed condition with the existing condition, the resulting discharge rates for the two conditions will be compared 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 and 100-year, 24-hour storm events.

4. DATA COLLECTION

Existing topographical features of the studied reach of the subject tributary were obtained from photogrammetric survey data coordinated by AZ&B and performed by Aerometric, Inc. in October, 2012. Project survey control data consist of the following:

Horizontal: NAD 83 in State Plane Coordinates – TX St. Plane South (4205)

Vertical: NAVD88

In addition to the obtained survey, topographic maps developed by the United States Geological Service (USGS) 7.5 Minute Series Maps (Laredo East/Laredo South) were utilized to determine the drainage area boundaries.

A site investigation was performed by personnel from AZ&B including the examination of recent aerial photography to determine current land usage.

As-Built Plans for the channelized portion of the unnamed tributary were obtained from the City of Laredo.

5. HYDROLOGY

Hydrologic evaluations were performed in accordance with or combination of the Texas Commission on Environmental Quality (TCEQ) Requirements, City of Laredo Design Manual and Texas Department of Transportation (TxDOT) "Hydraulic Design Manual", October 2011.

Since this project consists of a complex drainage watershed with a total area greater than 200 acres, the United States Army Corps of Engineers (USACE) HEC-HMS computer program was used to calculate peak discharges for the 25-year and 100-year events for the 24-hour storm duration. The Soil Conservation Service (SCS) Unit Hydrograph and Curve Number (CN) Methods were utilized to calculate the peak runoff values for these analyses. Routing of the runoff through the basin was accomplished using the Lag Routing Method for the project reaches.

The Kerby-Kirpich approach from the report "Time-Parameter Estimation for Applicable Texas Watersheds, August 2005" and the "Climatic Adjustments of Natural Resource Conservation Services (NRCS) Runoff Curve Numbers, November 2003" are technical reports that were utilized to develop the Time of Concentration, Lag Time and Adjusted CN values.

The SCS Unit Hydrograph method utilizes the drainage basin input data of basin size in square miles, Curve Number (CN), surface perviousness, and basin lag time in minutes. In conjunction with this, meteorological data in the form of rainfall depth is used to calculate peak runoff rates and total rainfall volumes. Rainfall depths were determined per TxDOT Hydraulic Manual guidelines by utilizing the USGS Scientific Investigations Report 2004–5041 "Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas" while using a Type II rainfall distribution with the SCS Method.

The dominant soil types located within the drainage basins are Jimenez-Quemapo Complex (JQD), Catarina (CaB) and Maverick-Caterina Complex (MCE). The overall soil types for the project area are included in hydrologic soil group C. A map of the project's soil groups is included in Part II, Attachment 15, Appendix A.

Sub-basins were developed for the project drainage areas and composite CN's were calculated for areas with multiple surface conditions utilizing the method described in Technical release 55 "Urban Hydrology for Small Watersheds. The "Climatic Adjustments of Natural Resource Conservation Services (NRCS) Runoff Curve Numbers, November 2003" technical report was used to develop the adjusted CN values for the hydrologic analyses. The following Tables III.6D.1 and III.6D.2 contain the data and the calculated adjusted CN values. Tables III.6D.3 and III.6D.4 contain the hydrologic basin input data and the peak 24-hour discharge rates for the 25-year and 100-year storm frequencies.

The drainage area maps are shown on Figures III-6D-1 through III-6D-4.

The appropriate tables and figures from Technical release 55 referenced in this analysis and the technical report are included in Appendix E.

Table III.6D.1
SCS CURVE NUMBERS
Existing Conditions

DA ID	Total DA	Sub-Area1 DA	Cover Description	Area1 CN Value	Sub-Area2 DA	Cover Description	Area2 CN Value	Average CN Value	Texas Climatic Adjustment (Curve Number (CN) Adjustments)
	(Acres)	(Acres)	*Hydrologic Soils Group - C*		(Acres)	*Hydrologic Soils Group - C*			
A1	16.64	16.64	Open space (Lawns, parks, etc) - Poor	86		--		*86*	**72**
A2	16.67	16.67	Open space (Lawns, parks, etc) - Poor	86		--		*86*	**72**
A3	6.40	6.40	Open space (Lawns, parks, etc) - Poor	86		--		*86*	**72**
A4	101.12	101.12	Pasture, grassland or range - Fair	79		--		*79*	**62**
A5	62.72	17.96	Pasture, grassland or range - Fair	79	44.60	Newly graded area	91	*88*	**75**
A6	79.36	31.59	Pasture, grassland or range - Fair	79	47.60	Newly graded area	91	*86*	**72**
A7	293.12	207.38	Pasture, grassland or range - Fair	79	85.60	Commercial & business	94	*83*	**67**
A8	448.00	448.00	Pasture, grassland or range - Fair	79		--		*79*	**62**
B1	19.84	19.84	Pasture, grassland or range - Fair	79		--		*79*	**62**
B2	23.04	8.18	Pasture, grassland or range - Fair	79	14.90	Commercial & business	94	*89*	76
LF-1	1.28	1.28	Newly graded area	91		--	94	*91*	**80**
LF-2	35.89	35.89	Newly graded area	91		--	94	*91*	**80**
LF-3	11.49	11.49	Newly graded area	91		--	94	*91*	**80**
LF-4	17.33	17.33	Newly graded area	91		--	94	*91*	**80**
LF-5	26.38	26.38	Newly graded area	91		--	94	*91*	**80**
LF-6A	90.28	90.28	Newly graded area	91		--	94	*91*	**80**
LF-6B	14.13	14.13	Newly graded area	91		--	94	*91*	**80**
LF-6C	3.22	3.22	Newly graded area	91		--	94	*91*	**80**
D1	19.20	7.94	Newly graded area	91	11.10	Commercial & business	94	*93*	**80**
D2	19.97	6.75	Pasture, grassland or range - Fair	79	15.40	Commercial & business	94	*89*	**73**
D3	112.00	42.90	Pasture, grassland or range - Fair	79	69.00	Commercial & business	94	*88*	**75**

Table III.6D.2
SCS CURVE NUMBERS
Proposed Conditions

DA ID	Total DA	Sub-Area1 DA	Cover Description	Area1 CN Value	Sub-Area2 DA	Cover Description	Area2 CN Value	Average CN Value	Texas Climatic Adjustment (Curve Number (CN) Adjustments)
	(Acres)	(Acres)	*Hydrologic Soils Group - C*		(Acres)	*Hydrologic Soils Group - C*			
A1	16.64	16.43	Open space (Lawns, parks, etc) - Poor	86		--		*86*	**72**
A2	16.67	16.74	Open space (Lawns, parks, etc) - Poor	86		--		*86*	**72**
A3	6.40	6.34	Open space (Lawns, parks, etc) - Poor	86		--		*86*	**72**
A4	101.12	100.87	Pasture, grassland or range - Fair	79		--		*79*	**62**
A5	62.72	17.96	Pasture, grassland or range - Fair	79	44.60	Newly graded area	91	*88*	**75**
A6	79.36	31.59	Pasture, grassland or range - Fair	79	47.60	Newly graded area	91	*86*	**72**
A7	293.12	207.38	Pasture, grassland or range - Fair	79	85.60	Commercial & business	94	*83*	**67**
A8	448.00	447.84	Pasture, grassland or range - Fair	79		--		*79*	**62**
B1	19.84	20.00	Pasture, grassland or range - Fair	79		--		*79*	**62**
B2	23.04	8.18	Pasture, grassland or range - Fair	79	14.90	Commercial & business	94	*89*	**76**
* D1	19.20	7.94	Newly graded area	91	11.10	Commercial & business		*94*	**85**
D2	19.97	6.75	Pasture, grassland or range - Fair	79	15.40	Commercial & business	94	*89*	**73**
D3	112.00	42.90	Pasture, grassland or range - Fair	79	69.00	Commercial & business	94	*88*	**75**
*LF-1	1.76	1.79	Newly graded area	91		--		*91*	**80**
*LF-3	5.61	5.62	Newly graded area	91		--		*91*	**80**
*LF-5A	3.21	3.16	Newly graded area	91		--		*91*	**80**
*LF-5B	3.12	3.17	Newly graded area	91		--		*91*	**80**
*LF-6B	9.77	9.77	Newly graded area	91		--		*91*	**80**
*LF-5C	6.14	6.14	Newly graded area	91		--		*91*	**80**
* LF-A	34.86	34.88	Newly graded area	91		--		*91*	**80**
* LF-B	44.98	45.02	Newly graded area	91		--		*91*	**80**
* LF-C1	58.28	58.28	Newly graded area	91		--		*91*	**80**
* LF-C2	32.27	32.27	Newly graded area	91		--		*91*	**80**

* Area "CN value" modified or added vs. the existing analysis.

Table III.6D.3
SCS CURVE NUMBER METHOD
DRAINAGE BASIN INPUT DATA
Existing Conditions

HEC-HMS ID	TOTAL AREA (SQ MI)	CN ADJ	LAG TIME (MIN)	Q_{25} (CFS)	Q_{100} (CFS)
A1	0.0260	72	11.9	62.6	97.5
A2	0.0260	72	14.2	56.2	88.2
A3	0.0100	72	10.0	25.5	39.5
A4	0.1580	62	33.8	142.8	247.7
A5	0.0980	75	13.9	234.6	358.8
A6	0.1240	72	12.8	287.0	448.6
A7	0.4580	68	40.0	450.4	741.2
A8	0.7000	62	34.0	583.3	1014.4
B1	0.0310	62	20.9	38.4	66.5
B2	0.0360	76	15.7	83.7	126.3
LF-1	0.0020	80	7.4	7.0	10.3
LF-2	0.0561	80	22.2	119.2	175.6
LF-3	0.0180	80	12.9	51.2	75.2
LF-4	0.0271	80	22.3	57.5	84.7
LF-5	0.0412	80	19.4	94.1	138.9
LF-6A	0.1411	80	20.2	312.9	461.7
LF-6B	0.0221	80	17.8	53.4	78.6
LF-6C	0.0050	80	14.0	13.8	20.3
D1	0.0300	80	11.9	88.7	130.1
D2	0.0312	73	16.4	65.6	101.6
D3	0.1750	75	24.3	307.9	472.4

Table III.6D.4
SCS CURVE NUMBER METHOD
DRAINAGE BASIN INPUT DATA
Proposed Conditions

HEC-HMS ID	TOTAL AREA (SQ MI)	CN ADJ	LAG TIME (MIN)	Q_{25} (CFS)	Q_{100} (CFS)
A1	0.0260	72	11.9	62.6	97.5
A2	0.0260	72	14.2	56.2	88.2
A3	0.0100	72	10.0	25.5	39.5
A4	0.1580	62	33.8	142.8	247.7
A5	0.0980	75	13.9	234.6	358.8
A6	0.1240	72	12.8	287.0	448.6
A7	0.4580	67	40.0	450.4	741.2
A8	0.7000	62	34.0	583.3	1014.4
B1	0.0310	62	20.9	38.4	66.5
B2	0.0360	76	15.7	83.7	126.3
LF-1	0.0028	80	6.4	10.2	14.9
LF-A	0.0545	80	10.4	167.7	245.2
LF-3	0.0087	80	6.0	32.1	46.9
LF-B	0.0703	80	9.1	224.4	330.5
LF-5A	0.0050	80	7.3	17.6	25.8
LF-5B	0.0049	80	6.0	18.1	26.4
LF-C1	0.0911	80	13.0	260.0	382.2
LF-C2	0.0504	80	9.0	170.4	245.0
LF-6B	0.0153	80	6.0	54.5	79.8
LF-6C	0.0096	80	12.0	28.3	41.5
D1	0.0300	85	11.9	88.7	130.1
D2	0.0312	73	16.4	65.6	101.6
D3	0.1750	75	24.3	307.9	472.4

Table III.6D.5
HEC-HMS OUTPUT
Existing Conditions

HEC-HMS Junction ID	25-Yr., 24-Hr. Flow Rate (CFS)	100-Yr., 24-Hr. Flow Rate (CFS)
Junction A4-5	1076.3	1818.9
Junction A3-4	1260.0	2395.5
Junction A2-3	1272.6	2415.5
Junction A1-2	1282.3	2432.9
Outfall	1316.5	2473.0

Table III.6D.6
HEC-HMS OUTPUT
Proposed Conditions

HEC-HMS Junction ID	25-Yr., 24-Hr. Flow Rate (CFS)	100-Yr., 24-Hr. Flow Rate (CFS)
Junction A4-5	1076.3	1818.9
Junction A3-4	1233.6	2421.5
Junction A2-3	1236.3	2419.2
Junction A1-2	1262.3	2454.8
Outfall	1288.9	2469.8

The hydrologic data for the existing and proposed hydraulic models are slightly different to account for modification of drainage patterns upon completion of landfill development. In the existing landfill condition, Sub-basins D2 and D3 are conveyed through the interior of the landfill to the east boundary where it then flows northeast within the landfill boundary and joins the main channel at Junction Point A4-5 (See Drainage Area Map). For the proposed condition, flow from the existing sub-basins D2, D3 and a portion of D1 will be rerouted along the southeast and east boundary of the landfill by a channel and a storm drain and will join the main channel further upstream at Junction Point A3-4 of the HEC-HMS model.

The calculations for hydrologic basin input data for use in the hydrologic model are presented in Appendix A. The hydrologic model output for the existing conditions are presented in Appendix B1 (25-Year) and Appendix B2 (100-Year). The hydrologic model output for the proposed conditions are provided in Appendix B3 (25-Year) and Appendix B4 (100-Year).

6. HYDRAULIC MODELING

The hydraulic analyses of the unnamed tributary were developed and modeled using the USACE's HEC-RAS computer program and are in geo-referenced format. The downstream water surface elevations used in these models are the normal depth elevations for the channel with the corresponding discharges. The two models developed are:

6.1 Existing Conditions Model

The Existing Conditions HEC-RAS model developed represents the surface conditions as surveyed in November of 2013 and shown on Figure III-6D.2. These conditions included heavy silt buildup within the channel constructed in 2008 and surface water handling currently in operation within the boundary of the landfill. The flow data represents flow at key junctions contributed by the landfill and/or neighboring properties along the existing drainage channel which borders the landfill on the east and south boundaries.

The results of the Existing Conditions model show that the 100-year water surface is mostly contained within the current channel. There is still some spread of water onto the landfill's southeast and northeast corners, as well as onto the adjacent undeveloped property, however the spread of water does not encroach onto the waste areas of the landfill. Figure III-6D.5 shows the existing surface conditions, cross section locations, river stations, 100-year water surface elevations and the location of the existing conditions 100-year floodplain limits. The Existing Conditions HEC-RAS model developed represents the surface conditions as surveyed in November of 2013 (shown in Appendix C). These conditions included heavy silt buildup within the channel constructed in 2008 and surface water handling currently in operation within the boundary of the landfill. The flow data represents flow at key junctions contributed by the landfill and/or neighboring properties along the existing drainage channel which borders the landfill on the east and south boundaries.

The results of the AZ&B model show a significant reduction in the width of the 100-year floodplain as compared to the previous FIRM. The modeled 100-year water surface shows that it is mostly contained within the current channel. There is still some spread of water onto the landfill's southeast and northeast corners, as well as onto the adjacent undeveloped property, however the spread of water does not encroach onto the waste areas of the landfill. Figure III-6D.5 shows the existing surface conditions and the location of the existing 100-year floodplain limits.

6.2 Proposed Conditions Model

The Proposed Conditions HEC-RAS model developed represents the existing conditions described above with alterations made to the cross sections on the east boundary of the property (shown in Appendix D). This is where flow from the existing sub-basins D1, D2 and D3 are rerouted along the south and east boundaries of the landfill and will join the main channel further downstream at HEC-HMS Junction Point A3-4. A Proposed Floodplain Exhibit showing the proposed 100-year floodplain, final topography, cross-section locations, river stations and other surface features is included as Figure III-6D.6.

The results of this model show no significant impacts to the water-surface elevations due to the rerouting of the flows from the offsite sub-basins D1, D2 and D3. The 100-year water surface elevation decreased, remained the same, or increased by only 0.02 feet at all cross sections in the study. The spread of water in the proposed condition does not encroach onto any landfill waste areas or sedimentation/detention ponds. Near the southeast corner of the landfill, the 100-year floodplain encroaches onto the proposed channel running along and within the east boundary. At this location, the flow rate for the 100-year event was increased to include the flow in the proposed onsite channel. The following Table III.6D.5 provides a comparison of the existing vs. proposed 100-yr water-surface elevations.

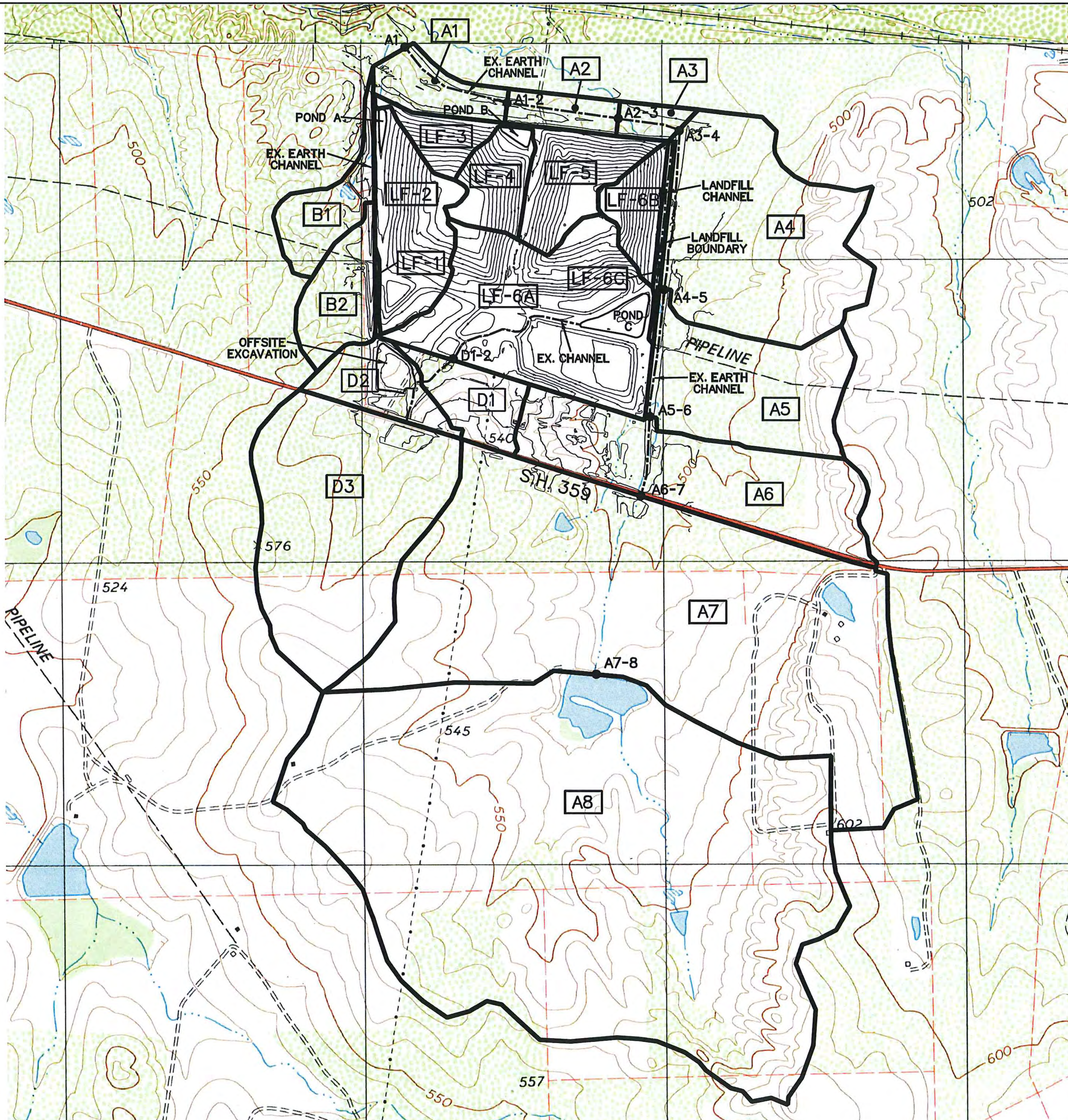
Table III.6D.7
100-YR Water-Surface Comparison

Existing Model					Proposed Model				
HECRAS Section	Total Flow	Channel Velocity	100-Yr. Water Surface Elev.		HECRAS Section	Total Flow	Channel Velocity	100-Yr. Water Surface Elev.	Diff. in Water Surface Elev.
	(cfs)	(fps)	(msl)			(cfs)	(fps)	(msl)	(ft.)
9463	1719.7	3.27	493.38		9463	1719.7	3.30	493.36	**-0.02**
9313	1719.7	6.03	492.42		9313	1719.7	6.16	492.35	**-0.07**
9113	1773.1	4.76	491.54		9113	1773.1	5.35	491.15	**-0.39**
8763	1773.1	4.55	490.05		8763	1919.3	3.92	489.38	**-0.67**
8513	1773.1	5.66	488.49		8513	1989.6	3.73	488.45	**-0.04**
8413	1773.1	7.57	486.96		8413	1773.1	8.35	486.93	**-0.03**
8313	1773.1	5.53	483.40		8313	1773.1	5.53	483.40	**0.00**
8013	1773.1	5.46	481.94		8013	1773.1	5.46	481.94	**0.00**
7613	1818.9	6.14	479.42		7613	1809.8	6.14	479.40	**-0.02**
7213	1818.9	5.37	477.10		7213	1809.8	5.36	477.09	**-0.01**
6813	1818.9	6.08	474.59		6813	1809.8	6.06	474.58	**-0.01**
6713	1818.9	5.35	474.10		6713	1809.8	5.33	474.09	**-0.01**
6513	1818.9	4.07	473.59		6513	1809.8	4.09	473.58	**-0.01**
6113	1818.9	8.18	470.62		6113	1809.8	8.21	470.60	**-0.02**
5974	2395.3	3.81	469.29		5974	2421.5	3.61	469.23	**-0.06**
5650	2395.3	4.50	467.70		5650	2421.5	4.54	467.71	**+0.01**
5400	2415.2	4.23	466.56		5400	2419.2	4.23	466.56	**0.00**
4700	2415.2	3.75	464.10		4700	2419.2	3.74	464.11	**+0.01**
4000	2433.2	3.19	462.47		4000	2454.8	3.20	462.48	**+0.01**
3300	2433.2	2.70	461.27		3300	2454.8	2.72	461.28	**+0.01**
2850	2433.2	2.60	460.35		2850	2454.8	2.60	460.37	**+0.02**
2630	2433.2	3.73	459.50		2630	2454.8	3.75	459.51	**+0.01**
2600	2433.2	3.88	459.30		2600	2454.8	3.91	459.31	**+0.01**
2400	2468.7	3.67	458.15		2400	2469.1	3.67	458.15	**0.00**
2250	2468.7	3.91	457.27		2250	2469.1	3.91	457.27	**0.00**

7. SUMMARY

The tributary is currently shown on the recently issued Federal Emergency Management Agency's (FEMA) effective Flood Insurance Rate Map (FIRM) Panels 48479C1220C and 48479C1385C, dated February 19, 2014 as Zone A. The modeled 100-year water surface shows that it is mostly contained within the current channel. In the existing condition there is still some spread of water onto the landfill's southeast and northeast corners, as well as onto the adjacent undeveloped property.

The expanded study included in this landfill amendment application analyzes the proposed onsite topographic and drainage structure modifications to be made as part of the proposed landfill development. When comparing the existing and proposed conditions, the analyses indicate no significant impacts to the water-surface elevations due to the rerouting of the flows from the existing offsite sub-basins D1, D2, and D3. As in the existing condition, there is still some spread of water onto the landfill's southeast and northeast corners, but this spread of water does not encroach onto any landfill waste areas or sedimentation/detention ponds.



DRAINAGE AREA SUMMARY

AREA I.D.	AREA (Sq. Mi.)	AREA (ACRES)
A1	0.0260	16.4
A2	0.0260	16.7
A3	0.0100	6.4
A4	0.1580	100.9
A5	0.0980	62.6
A6	0.1240	79.2
A7	0.4580	293.0
A8	0.7000	447.8
B1	0.0310	20.0
B2	0.0360	23.1
LF-1	0.0020	1.28
LF-2	0.0561	35.9
LF-3	0.0180	11.5
LF-4	0.0271	17.3
LF-5	0.0412	26.4
LF-6A	0.1411	90.3
LF-6B	0.0221	14.1
LF-6C	0.0050	3.2
D1	0.0300	19.2
D2	0.0312	20.0
D3	0.1750	111.9

LEGEND

A3 AREA I.D.

● A1-2 HEC-HMS JUNCTION POINT

CHANNEL

DRAINAGE AREA BOUNDARY

N

600 300 0 600 1200
SCALE FEET

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
CIVIL · ENVIRONMENTAL · SURVEYING
CONSTRUCTION MANAGEMENT · MUNICIPAL

FOR PERMIT PURPOSES ONLY

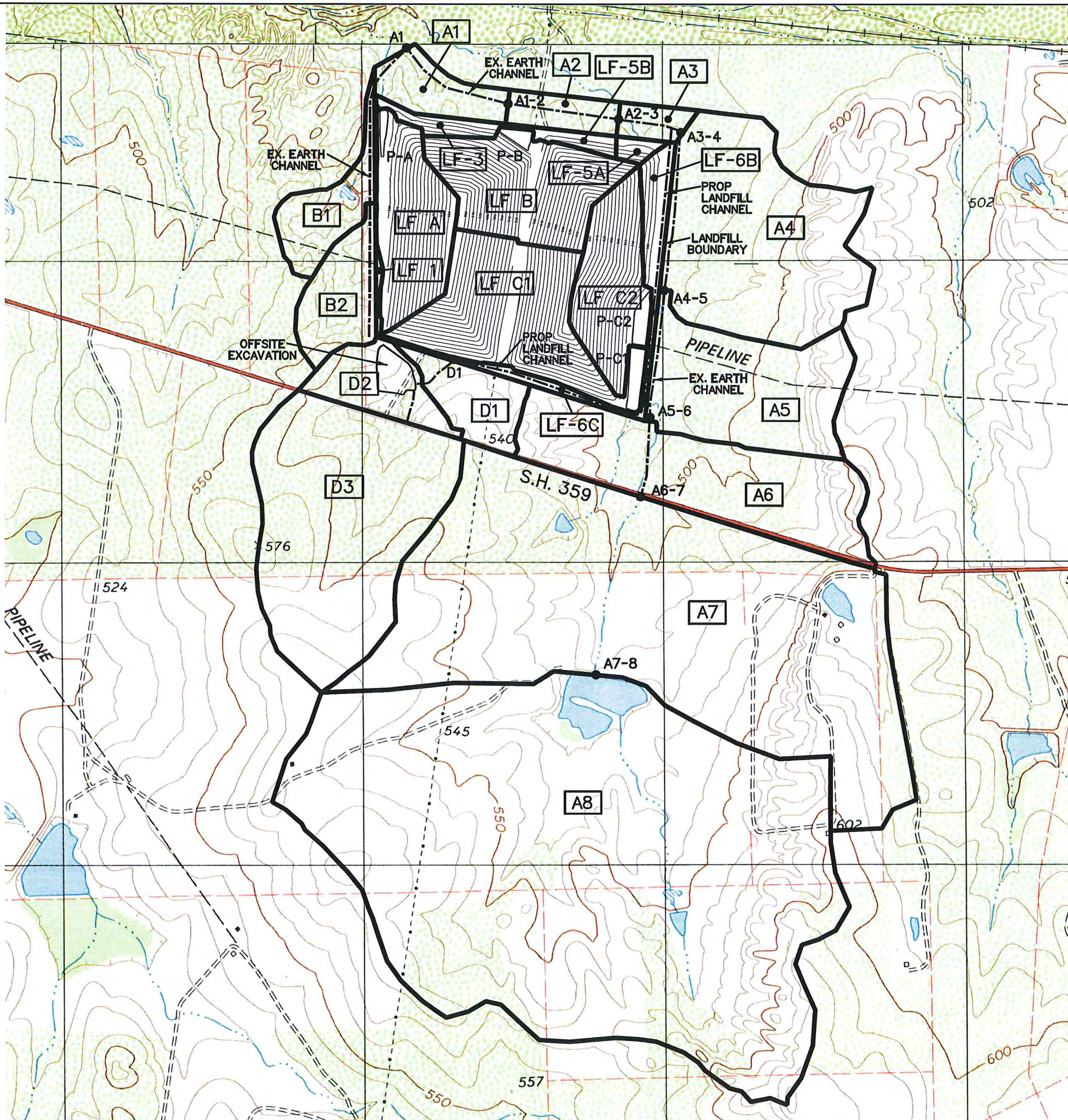
STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14

REV	DATE	DESCRIPTION	DES BY	APP BY

CITY PROJ. No.		LAREDO LANDFILL VERTICAL EXPANSION PERMIT AMENDMENT APPLICATION No. MSW-1693B WEBB COUNTY, TEXAS
AZB PROJ. No. 212029		
DATE: AUGUST 2014		
DES BY	SH	EXISTING DRAINAGE AREA MAP FIGURE III-6D.1
DRN BY	AZB	
CHK BY	SH	
APP BY	MC	

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6



DRAINAGE AREA SUMMARY

AREA I.D.	AREA (Sq. Mi.)	AREA (ACRES)
A1	0.0260	16.4
A2	0.0260	16.7
A3	0.0100	6.4
A4	0.1580	100.9
A5	0.0980	62.6
A6	0.1240	79.2
A7	0.4580	293.0
A8	0.7000	447.8
B1	0.0310	20.0
B2	0.0360	23.1
LF-1	0.0028	1.8
LF-A	0.0545	34.9
LF-3	0.0087	5.6
LF-B	0.0703	45.0
LF-5A	0.0050	3.2
LF-5B	0.0049	3.1
LF-C1	0.0911	58.3
LF-C2	0.0504	32.3
LF-6B	0.0153	9.8
LF-6C	0.0096	6.1
D1	0.0300	19.2
D2	0.0312	20.0
D3	0.1750	119.9

LEGEND

- A3 — AREA I.D.
- ● A1-2 — HEC-HMS JUNCTION POINT
- CHANNEL
- DRAINAGE AREA BOUNDARY

N

600 300 0 600 1200
SCALE FEET

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
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STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14

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

PROPOSED
DRAINAGE AREA MAP
FIGURE III-6D.2

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6

LEGEND

- EXISTING DRAINAGE DITCH
- DRAINAGE DIVIDE
- SEDIMENTATION/DETENTION POND
- FLOW DIRECTION
- DRAINAGE AREA I.D. (2) / AREA (AC.) (32.7)
- OUTFALL POINT
- EFFECTIVE 100-YR. FLOODPLAIN

NOTE:
TOPOGRAPHIC INFORMATION TAKEN FROM AERIAL PHOTO-GRAMMETIC SURVEY PERFORMED BY AEROMETRIC, INC. ON NOVEMBER 15, 2013.

N

200 100 0 200 400
SCALE FEET
HORIZONTAL

FOR PERMIT PURPOSES ONLY

STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14

REV	DATE	DESCRIPTION	DES BY	APP BY

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	EXISTING ONSITE DRAINAGE PLAN FIGURE III-6D.3
DRN BY: AZB	
CHK BY: SH	
APP BY: MC	

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
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CITY OF LAREDO

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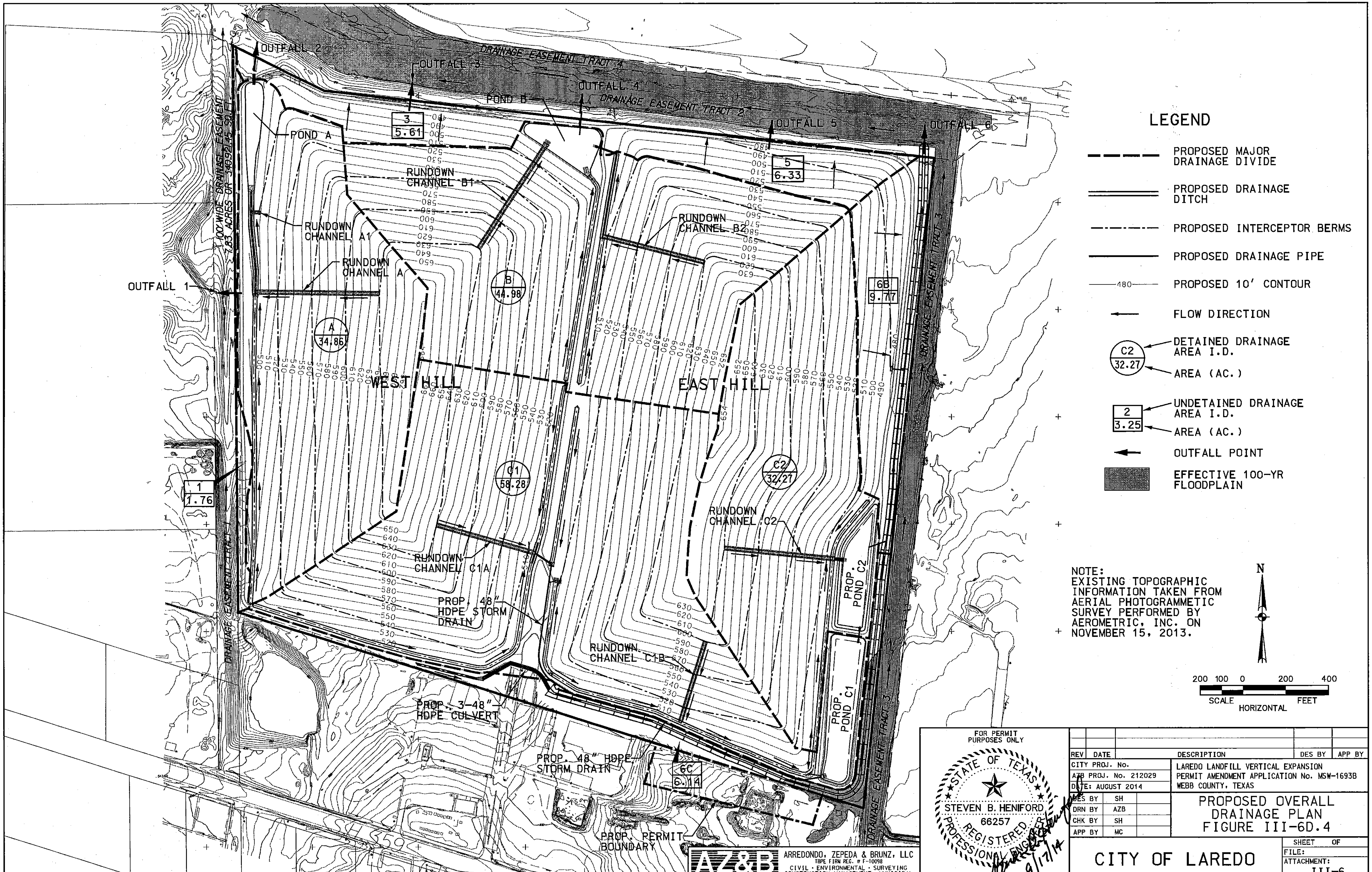
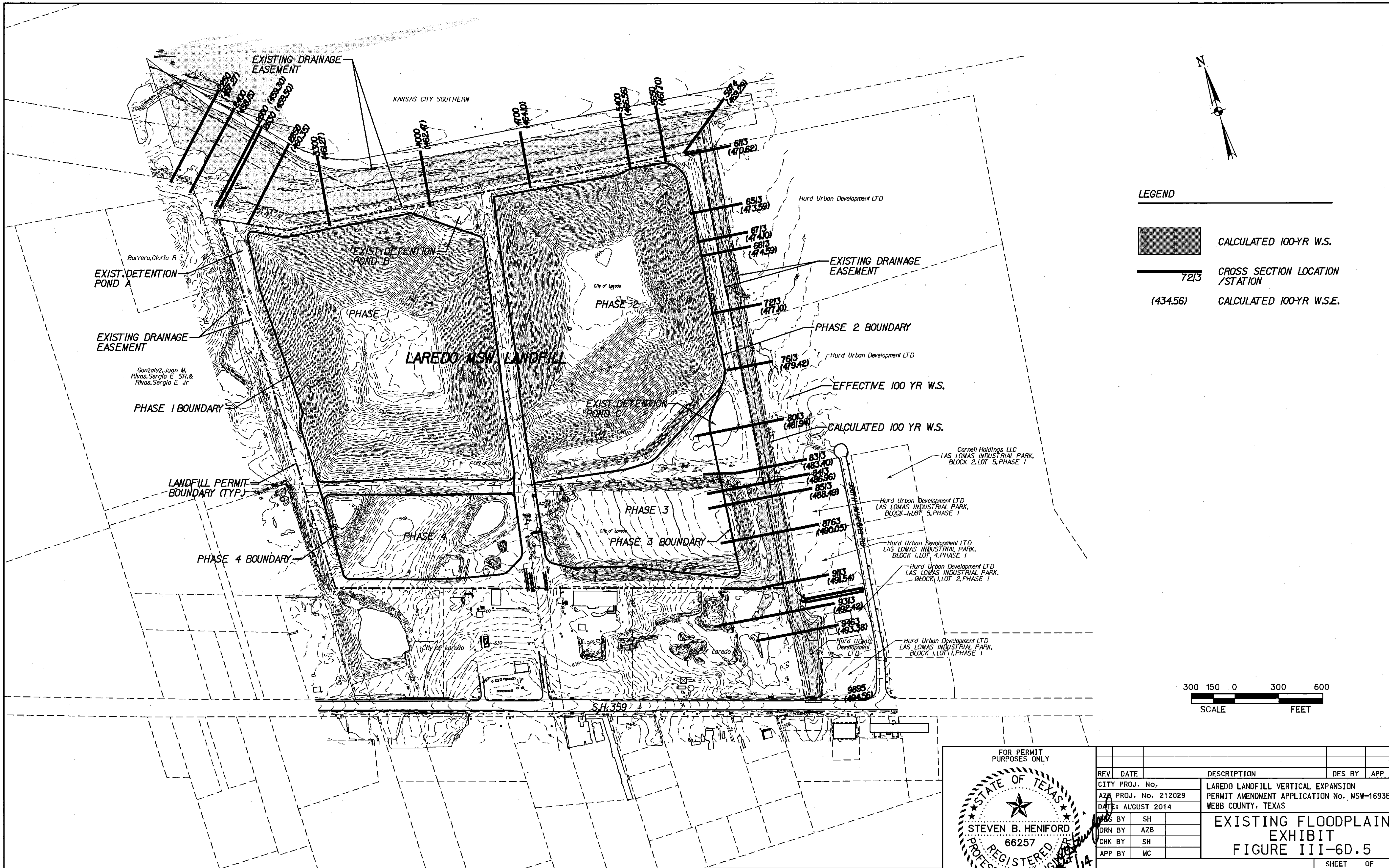
ATTACHMENT: III-6


OUTFALL 1
OUTFALL 2
OUTFALL 3
OUTFALL 4
OUTFALL 5
OUTFALL 6
DRAINAGE EASEMENT TRACT 4
DRAINAGE EASEMENT TRACT 2
DRAINAGE EASEMENT TRACT 3
DRAINAGE EASEMENT TRACT 1
100' WIDE DRAINAGE EASEMENT 7.83 ACRES OR 340,992.45 SQ.FT.
POND A
POND B
RUNDOWN CHANNEL A
RUNDOWN CHANNEL A1
RUNDOWN CHANNEL B1
RUNDOWN CHANNEL B2
RUNDOWN CHANNEL C1A
RUNDOWN CHANNEL C1B
RUNDOWN CHANNEL C2
WEST HILL
EAST HILL
A 34.86
B 44.98
C1 58.28
C2 32.27
1 1.76
3 5.61
5 6.33
6B 9.77
6C 6.14
PROP. 48" HDPE STORM DRAIN
PROP. 3-48" HDPE CULVERT
PROP. 48" HDPE STORM DRAIN
PROP. PERMIT BOUNDARY
PROP. POND C1
PROP. POND C2
SH 359
LEGEND
PROPOSED MAJOR DRAINAGE DIVIDE
PROPOSED DRAINAGE DITCH
PROPOSED INTERCEPTOR BERMS
PROPOSED DRAINAGE PIPE
480 PROPOSED 10' CONTOUR
FLOW DIRECTION
C2 32.27 DETAINED DRAINAGE AREA I.D. AREA (AC.)
2 3.25 UNDETAINED DRAINAGE AREA I.D. AREA (AC.)
OUTFALL POINT
EFFECTIVE 100-YR FLOODPLAIN
NOTE:
EXISTING TOPOGRAPHIC INFORMATION TAKEN FROM AERIAL PHOTOGRAMMETIC SURVEY PERFORMED BY AEROMETRIC, INC. ON NOVEMBER 15, 2013.
N
200 100 0 200 400
SCALE HORIZONTAL FEET
FOR PERMIT PURPOSES ONLY
STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14
REV DATE DESCRIPTION DES BY APP BY
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
PROPOSED OVERALL DRAINAGE PLAN
FIGURE III-6D.4
SHEET OF
FILE:
ATTACHMENT: III-6
CITY OF LAREDO
AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
CIVIL · ENVIRONMENTAL · SURVEYING
CONSTRUCTION MANAGEMENT · MUNICIPAL



FOR PERMIT PURPOSES ONLY

STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14

REV	DATE	DESCRIPTION	DES BY	APP BY

CITY PROJ. No.
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DES BY SH
DRN BY AZB
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APP BY MC

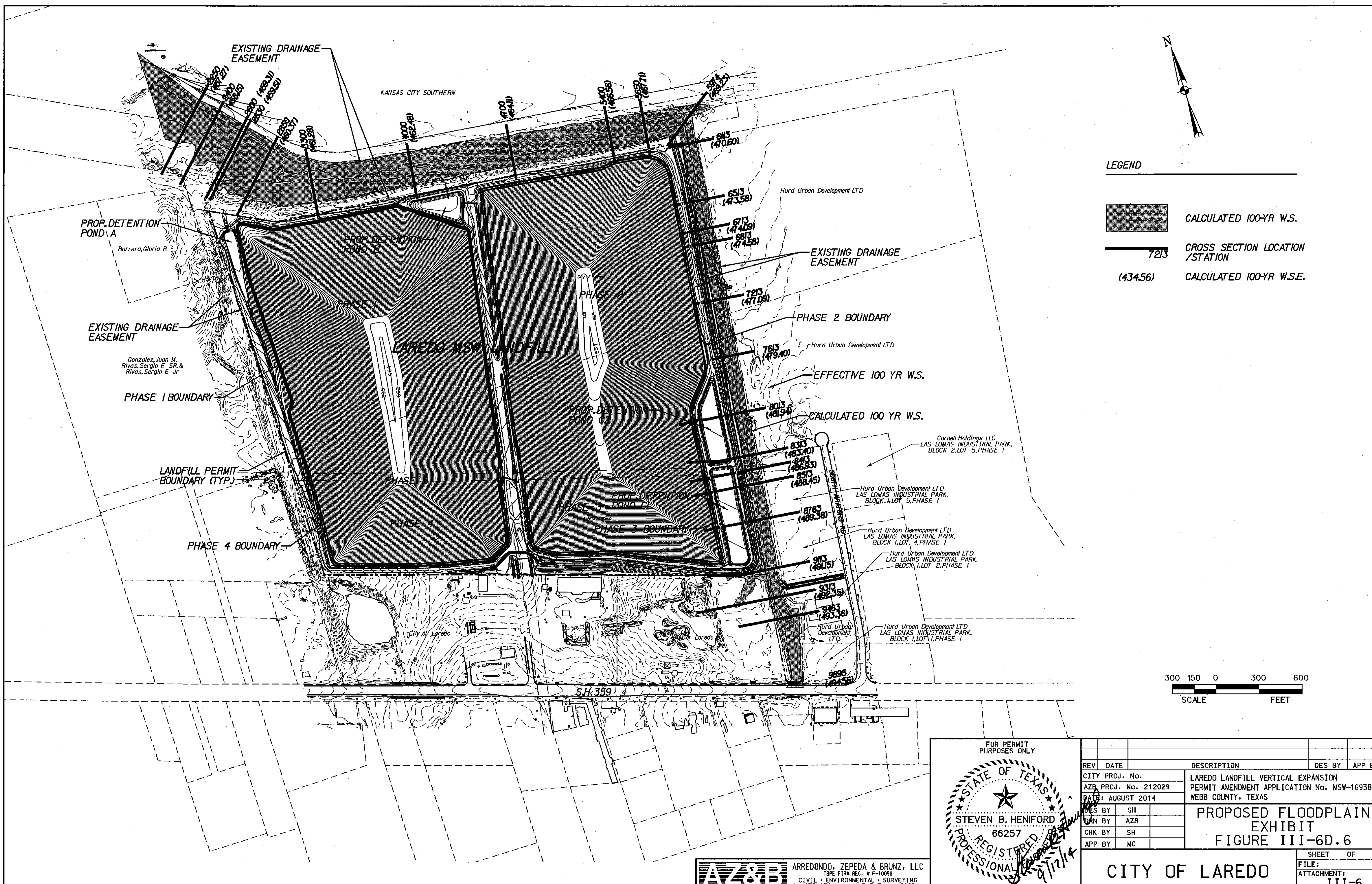
LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS

EXISTING FLOODPLAIN EXHIBIT
FIGURE III-6D.5

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-6

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
CIVIL · ENVIRONMENTAL · SURVEYING
CONSTRUCTION MANAGEMENT · MUNICIPAL


EXISTING DRAINAGE EASEMENT
KANSAS CITY SOUTHERN
PROP. DETENTION POND A
Barrera, Gloria R
PROP. DETENTION POND B
PHASE 1
PHASE 2
LAREDO MSW LANDFILL
EXISTING DRAINAGE EASEMENT
Gonzalez, Juan M, Rivas, Sergio E SR.& Rivas, Sergio E Jr
PHASE 1 BOUNDARY
LANDFILL PERMIT BOUNDARY (TYP.)
PHASE 4 BOUNDARY
PHASE 5
PHASE 4
PHASE 3
PROP. DETENTION POND C2
PROP. DETENTION POND C1
PHASE 3 BOUNDARY
Hurd Urban Development LTD
EXISTING DRAINAGE EASEMENT
PHASE 2 BOUNDARY
EFFECTIVE 100 YR W.S.
CALCULATED 100 YR W.S.
Cornell Holdings LLC LAS LOMAS INDUSTRIAL PARK, BLOCK 2, LOT 5, PHASE I
Hurd Urban Development LTD LAS LOMAS INDUSTRIAL PARK, BLOCK 1, LOT 5, PHASE I
Hurd Urban Development LTD LAS LOMAS INDUSTRIAL PARK, BLOCK 1, LOT 4, PHASE I
Hurd Urban Development LTD LAS LOMAS INDUSTRIAL PARK, BLOCK 1, LOT 2, PHASE I
Hurd Urban Development LTD LAS LOMAS INDUSTRIAL PARK, BLOCK 1, LOT 1, PHASE I
City of Laredo
S.H. 359
6113 (470.60)
6513 (473.58)
6713 (474.09)
6813 (474.58)
7213 (477.09)
7613 (479.40)
8013 (481.94)
8313 (483.40)
8413 (483.93)
8513 (486.45)
8763 (489.38)
9113 (491.15)
9313 (492.35)
9463 (493.36)
9895 (494.56)
N
LEGEND
CALCULATED 100-YR W.S.
7213 CROSS SECTION LOCATION /STATION
(434.56) CALCULATED 100-YR W.S.E.
300 150 0 300 600
SCALE FEET
FOR PERMIT PURPOSES ONLY
STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL
9/12/14
AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
CIVIL · ENVIRONMENTAL · SURVEYING CONSTRUCTION MANAGEMENT · MUNICIPAL
REV DATE DESCRIPTION DES BY APP BY
CITY PROJ. No.
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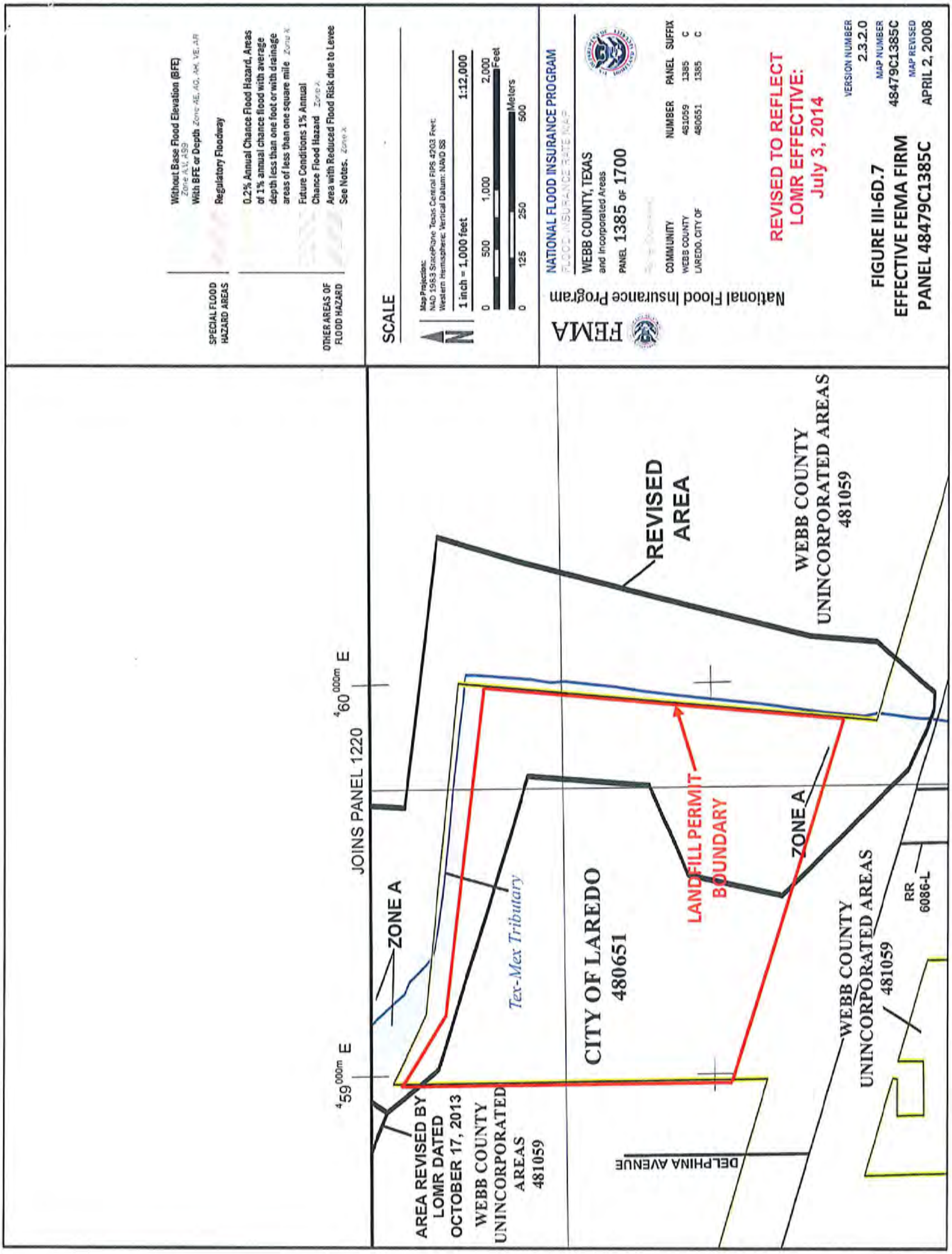
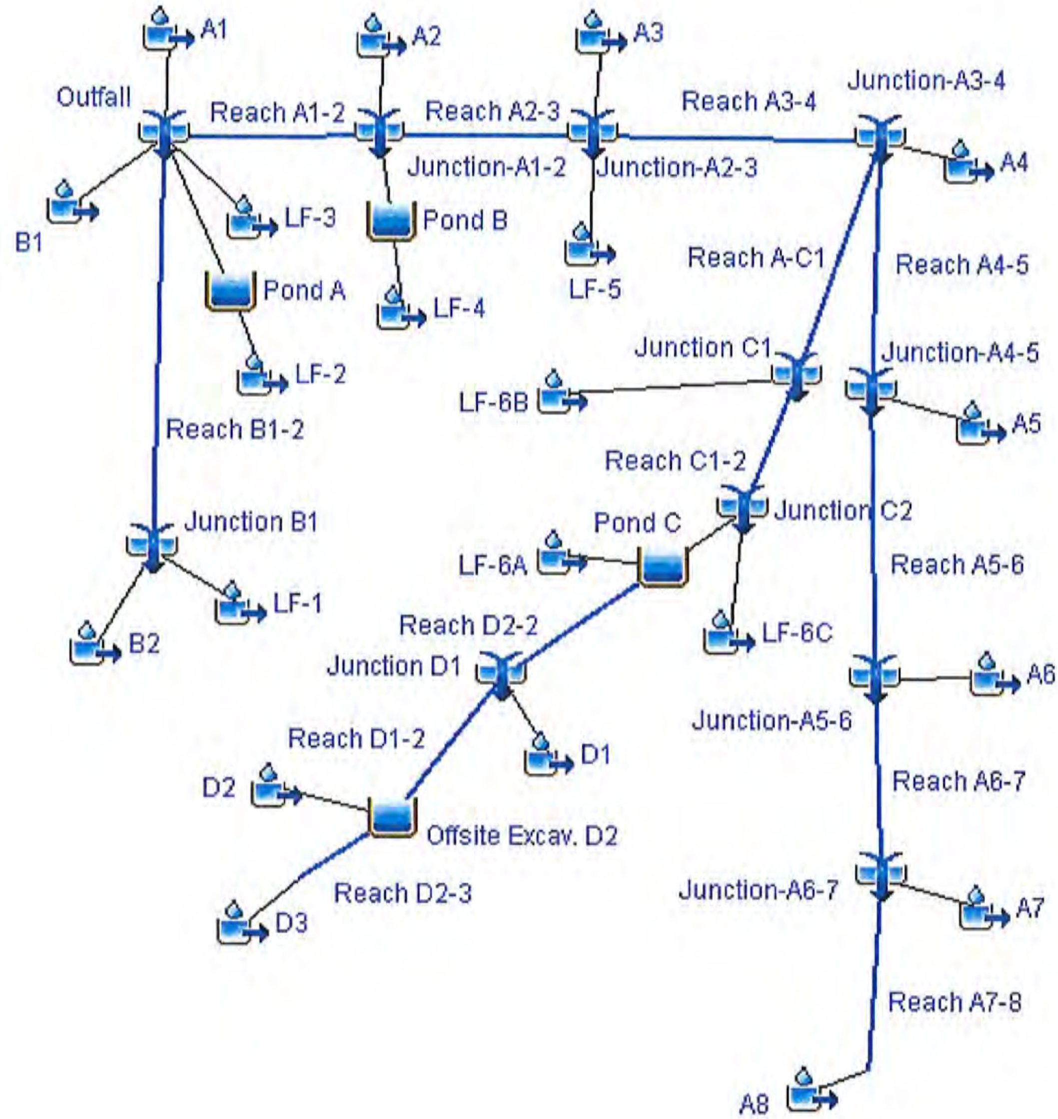
APP BY MC
LAREDO LANDFILL VERTICAL EXPANSION
PERMIT AMENDMENT APPLICATION No. MSW-1693B
WEBB COUNTY, TEXAS
PROPOSED FLOODPLAIN EXHIBIT
FIGURE III-6D.6
CITY OF LAREDO
SHEET OF
FILE:
ATTACHMENT: III-6

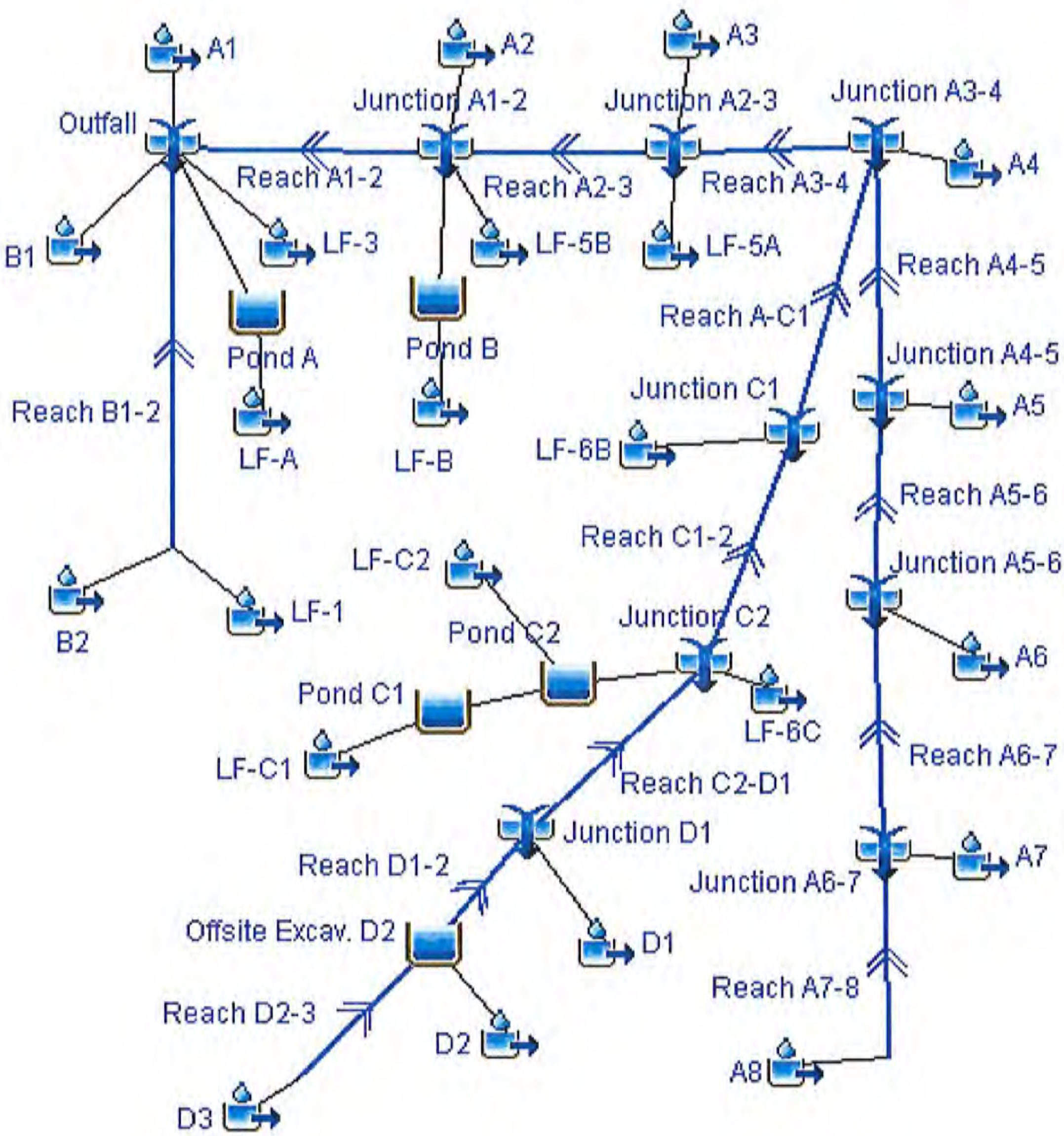

SPECIAL FLOOD HAZARD AREAS
Without Base Flood Elevation (BFE) Zone A,V, A99
With BFE or Depth Zone AE, AO, AH, VE, AR
Regulatory Floodway
0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
Future Conditions 1% Annual Chance Flood Hazard Zone X
Area with Reduced Flood Risk due to Levee See Notes. Zone X
OTHER AREAS OF FLOOD HAZARD
SCALE
N
Map Projection: NAD 1983 StatePlane Texas Central FIPS 4203 Feet; Western Hemisphere; Vertical Datum: NAVD 88
1 inch = 1,000 feet
1:12,000
0 500 1,000 2,000 Feet
0 125 250 500 Meters
FEMA
National Flood Insurance Program
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
WEBB COUNTY, TEXAS
and Incorporated Areas
PANEL 1385 OF 1700
COMMUNITY NUMBER PANEL SUFFIX
WEBB COUNTY 481059 1385 C
LAREDO, CITY OF 480651 1385 C
REVISED TO REFLECT LOMR EFFECTIVE: July 3, 2014
FIGURE III-6D.7
EFFECTIVE FEMA FIRM
PANEL 48479C1385C
VERSION NUMBER 2.3.2.0
MAP NUMBER 48479C1385C
MAP REVISED APRIL 2, 2008
JOINS PANEL 1220
459000m E
460000m E
ZONE A
Tex-Mex Tributary
CITY OF LAREDO 480651
LANDFILL PERMIT BOUNDARY
ZONE A
REVISED AREA
WEBB COUNTY UNINCORPORATED AREAS 481059
WEBB COUNTY UNINCORPORATED AREAS 481059
RR 6086-L
AREA REVISED BY LOMR DATED OCTOBER 17, 2013
WEBB COUNTY UNINCORPORATED AREAS 481059
DELPHINA AVENUE

APPENDIX A
HEC-HMS MODEL INTPUT DATA

Existing Conditions HEC-HMS Model Diagram



Proposed Conditions HEC-HMS Model Diagram



EXISTING T_{lag} CALCULATIONS

Based On Natural Resources Conservation Service (NRCS) Method for Estimating t_c

	Sheet Flow					Sheet Flow (25%)					Shallow Concentrated Flow				Channelized Flow											
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{ch} (ft)	n	a	P_w	S_{ch} (ft/ft)	t_{ch} (min)	t_c (min)	t_c (used)	K-K Lag Time (Developed)	K-K Lag Time (Undeveloped)	Trad. Lag Time	Lag Time Used
A1					0					0				0	1312	0.04	10	20	0.0030	17.02	17.0	17.0	6.8	11.9	10.2	11.9
A2					0					0				0	1278	0.04	10	20	0.0020	20.30	20.3	20.3	8.1	14.2	12.2	14.2
A3					0					0	684	16.13	0.007	8.45	684	0.04	10	20	0.0070	5.81	14.3	14.3	5.7	10.0	8.6	10.0
A4	300	3.0	0.15	0.038	18.85					0	900	16.13	0.009	9.80	2620	0.04	10	20	0.0090	19.62	48.3	48.3	19.3	33.8	29.0	33.8
A5	300	3.0	0.08	0.04	11.17					0	900	16.13	0.012	8.49	2317	0.04	10	20	0.0120	15.03	34.7	34.7	13.9	24.3	20.8	13.9
A6	300	3.0	0.08	0.038	11.40					0	900	16.13	0.012	8.49	1876	0.04	10	20	0.0120	12.17	32.1	32.1	12.8	22.4	19.2	12.8
A7																					58.0	58.0	23.2	40.6	34.8	40.6
A8																					27.0	27.0	10.8	18.9	16.2	18.9
B1	300	3.0	0.15	0.038	18.85					0	900	16.13	0.025	5.88	1426	0.04	10	20	0.0100	10.13	34.9	34.9	13.9	24.4	20.9	20.9
B2	300	3.0	0.08	0.019	15.04					0	900	16.13	0.04	4.65	916	0.04	10	20	0.0100	6.51	26.2	26.2	10.5	18.3	15.7	15.7
1	300	3.0	0.15	0.11	12.32					0				0						0	12.3	12.3	4.9	8.6	7.4	7.4
2	155	3.0	0.15	0.05	9.96	670	3.0	0.15	0.25	16.88	520	16.13	0.0180	4.00	1780	0.04	12	12.5	0.0175	6.19	37.0	37.0	14.8	25.9	22.2	22.2
3	90	3.0	0.15	0.05	6.45	570	3.0	0.15	0.25	14.83	25	16.13	0.0100	0.26						0	21.5	21.5	8.6	15.1	12.9	12.9
4	400	3.0	0.15	0.05	21.26	450	3.0	0.15	0.25	12.27	300	16.13	0.0625	1.24	920	0.04	12	12.5	0.0320	2.36	37.1	37.1	14.9	26.0	22.3	22.3
5A	315	3.0	0.15	0.05	17.56	450	3.0	0.15	0.25	12.27				0	830	0.04	12	12.5	0.0250	2.41	32.3	32.3	12.9	22.6	19.4	19.4
5B	85	3.0	0.15	0.05	6.16	520	3.0	0.15	0.25	13.78				0							19.9	19.9	8.0	14.0	12.0	12.0
6A	170	3.0	0.15	0.05	10.72	530	3.0	0.15	0.25	13.99				0	2375	0.04	12	12.5	0.0150	8.92	33.6	33.6	13.5	23.5	20.2	20.2
6B	220	3.0	0.15	0.05	13.18	475	3.0	0.15	0.25	12.82				0	800	0.04	20	17	0.0080	3.59	29.6	29.6	11.8	20.7	17.8	17.8
6C	50	3.0	0.15	0.02	5.81					0	400	16.13	0.0625	1.65	3520	0.04	20	17	0.0080	15.80	23.3	23.3	9.3	16.3	14.0	14.0
D1	300	3.0	0.10	0.025	16.11						500	16.13	0.0250	3.27	100	0.04	20	17	0.0080	0.45	19.8	19.8	7.9	13.9	11.9	11.9
D2	300	3.0	0.125	0.029	18.15						900	16.13	0.0290	5.46	827	0.04	20	17	0.0080	3.71	27.3	27.3	10.9	19.1	16.4	16.4
D3	300	3.0	0.15	0.019	24.87						900	16.13	0.0190	6.75	1974	0.04	20	17	0.0080	8.86	40.5	40.5	16.2	28.3	24.3	24.3

Time of Concentration (t_c)

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

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8}/(P_2^{.5} \times S_{sh}^{.4})$ where n_{ol} = 0.15 for short grass prairie and 0.08 to 0.125 for partially developed areas and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface

Channel Flow Time of Concentration (t_{ch})

$t_{ch} = L_{ch} / (3600 \times (1.49/n) \times R^{2/3} \times S_{ch}^{.5})$ where n = 0.040 for unlined surface and $R = a/P_w$

Yellow highlight: Indicates the drainage area is greater than 0.25 square miles and therefore Tc and T_{lag} are calculated using the Kerby-Kirpich Method

EXISTING HYDROGRAPH LAG TIME (T_{lag}) CALCULATIONS

Based on Kerby-Kirpich Method Time of Concentration (t_c)
For Areas Greater than 0.25 Square Miles

			Overland Flow						Channel Flow						
DA ID	**DA**	**DA**	**Length L**	**Beg Elev**	**End Elev**	**Slope**	***N***	**t_{ov}**	**Length**	**Beg Elev**	**End Elev**	**Slope**	**t_{ch}**	**Total t_c**	**K-K Lag Time (Undeveloped)**
	(Acres)	**(Sq.Mi.)**	**(ft)**	**(ft)**	**(ft)**	**(ft/ft)**		**(min)**	**(ft)**	**(ft)**	**(ft)**	**(ft/ft)**	**(min)**	**(min)**	**(min)**
A7	292.98	0.4580	1200	602	573	0.024	0.40	36	4100	573	493	0.020	21	57	*40*
A8	447.84	0.7000	800	585	565	0.025	0.40	29	3400	565	510	0.016	20	49	*34*

Time of Concentration (t_c) = $t_{ov} + t_{ch}$

Overland Flow Time of Concentration (t_{ov})

$t_{ov} = K (L \times N)^{0.467} \times S_{ov}^{-0.235}$ where N = 0.40 for average grass cover and K = 0.828

Channelized Flow Time of Concentration (t_{ch})

$t_{ch} = K \times L^{0.770} \times S_{ch}^{-0.385}$ Where: K = 0.0078

Lag Time = $t_c \times 0.7$

PROPOSED T_{lag} CALCULATIONS

Based On Natural Resources Conservation Service (NRCS) Method for Estimating t_c

	Sheet Flow					Sheet Flow (25%)					Shallow Concentrated Flow				Channelized Flow											
Drainage ID/Design Point	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sh} (ft)	P_2 (in)	n_{ol}	S_{sh} (ft/ft)	t_{sh} (min)	L_{sc} (ft)	K	S_{sc} (ft/ft)	t_{sc} (min)	L_{ch} (ft)	n	a	P_w	S_{ch} (ft/ft)	t_{ch} (min)	t_c (min)	t_c (used)	K-K Lag Time (Developed)	K-K Lag Time (Undeveloped)	Trad. Lag Time	Lag Time Used
A1					0					0				0	1312	0.04	10	20	0.0030	17.02	17.0	17.0	6.8	11.9	10.2	11.9
A2					0					0				0	1278	0.04	10	20	0.0020	20.30	20.3	20.3	8.1	14.2	12.2	14.2
A3					0					0	684	16.13	0.007	8.45	684	0.04	10	20	0.0070	5.81	14.3	14.3	5.7	10.0	8.6	10.0
A4	300	3.0	0.15	0.038	18.85					0	900	16.13	0.009	9.80	2620	0.04	10	20	0.0090	19.62	48.3	48.3	19.3	33.8	29.0	33.8
A5	300	3.0	0.08	0.04	11.17					0	900	16.13	0.012	8.49	2317	0.04	10	20	0.0120	15.03	34.7	34.7	13.9	24.3	20.8	13.9
A6	300	3.0	0.08	0.038	11.40					0	900	16.13	0.012	8.49	1876	0.04	10	20	0.0120	12.17	32.1	32.1	12.8	22.4	19.2	12.8
A7																					58.0	58.0	23.2	40.6	34.8	40.6
A8																					27.0	27.0	10.8	18.9	16.2	18.9
B1	300	3.0	0.15	0.038	18.85					0	900	16.13	0.025	5.88	1426	0.04	10	20	0.0100	10.13	34.9	34.9	13.9	24.4	20.9	20.9
B2	300	3.0	0.08	0.019	15.04					0	900	16.13	0.04	4.65	916	0.04	10	20	0.0100	6.51	26.2	26.2	10.5	18.3	15.7	15.7
1	250	3.0	0.15	0.11	10.65					0				0						0	10.7	10.7	4.3	7.5	6.4	6.4
LF-A																					17.3	17.3	6.9	12.1	10.4	10.4
3					0	200	3.0	0.15	0.25	6.42	25	16.13	0.0100	0.26						0	6.7	10.0	4.0	7.0	6.0	6.0
LF-B																					15.2	15.2	6.1	10.6	9.1	9.1
5A	15	3.0	0.15	0.01	2.93	160	3.0	0.15	0.25	5.37	650	16.13	0.0300	3.88						0	12.2	12.2	4.9	8.5	7.3	7.3
5B					0	105	3.0	0.15	0.25	3.83	122	16.13	0.0100	1.26						0	5.1	10.0	4.0	7.0	6.0	6.0
LF-C1																					21.7	21.7	8.7	15.2	13.0	13.0
LF-C2																					15.0	15.0	6.0	10.5	9.0	9.0
6B					0	160	3.0	0.15	0.25	5.37	740	16.13	0.0300	4.41						0	9.8	10.0	4.0	7.0	6.0	6.0
6C	45	3.0	0.15	0.02	5.34					0				0	3200	0.04	12	12.5	0.0100	14.71	20.1	20.1	8.0	14.0	12.0	12.0
D1	300	3.0	0.1	0.025	16.11						500	16.13	0.0250	3.27	100	0.04	20	17	0.0080	0.45	19.8	19.8	7.9	13.9	11.9	11.9
D2	300	3.0	0.125	0.029	18.15						900	16.13	0.0290	5.46	827	0.04	20	17	0.0080	3.71	27.3	27.3	10.9	19.1	16.4	16.4
D3	300	3.0	0.15	0.019	24.87						900	16.13	0.0190	6.75	1974	0.04	20	17	0.0080	8.86	40.5	40.5	16.2	28.3	24.3	24.3

Time of Concentration (t_c)

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

Sheet Flow Time of Concentration (t_{sh})

$t_{sh} = 0.007 \times (n_{ol} \times L_{sh})^{.8} / (P_2^{.5} \times S_{sh}^{.4})$ where $n_{ol} = 0.15$ for short grass prairie and 0.08 to 0.125 for partially developed areas and P_2=3.0 inches

Shallow Concentrated Flow Time of Concentration (t_{sc})

$t_{sc} = L_{sc} / (3600 \times K \times S_{sc}^{.5})$ where K = 16.13 for unpaved surface

Channel Flow Time of Concentration (t_{ch})

$t_{ch} = L_{ch} / (3600 \times (1.49/n) \times R^{2/3} \times S_{ch}^{.5})$ where n = 0.040 for unlined surface and $R = a/P_w$

(Yellow) Indicates the drainage area is greater than 0.25 square miles and therefore Tc and T_{lag} are calculated using the Kerby-Kirpich Method

(Green) Indicates Tlag is calculated from the ending Tc of the channel and/or storm drain that drains into the associated detention pond

PROPOSED HYDROGRAPH LAG TIME (T_{lag}) CALCULATIONS

Based on Kerby-Kirpich Method Time of Concentration (t_c)
For Areas Greater than 0.25 Square Miles

			Overland Flow						Channel Flow						
DA ID	DA	DA	Length	Beg Elev	End Elev	Slope	*N*	t_{ov}	Length	Beg Elev	End Elev	Slope	t_{ch}	Total t_c	K-K Lag Time (Undeveloped)
	(Acres)	(Sq.Mi.)	(ft)	(ft)	(ft)	(ft/ft)		(min)	(ft)	(ft)	(ft)	(ft/ft)	(min)	(min)	(min)
A7	292.98	0.4580	1200	573	553	0.017	0.40	39	3349	553	493	0.018	19	58	*40*
A8	447.84	0.7000	877	539	503	0.041	0.40	27	0	0	0	0.000	0	27	*19*

Time of Concentration (t_c) = $t_{ov} + t_{ch}$

Overland Flow Time of Concentration (t_{ov})

$t_{ov} = K\,(\mathbf{L} \times N)^{0.467} \times S_{ov}^{-0.235}$ where N = 0.40 for average grass cover and K = 0.828

Channelized Flow Time of Concentration (t_{ch})

$t_{ch} = K \times L^{0.770} \times S_{ch}^{-0.385}$ Where: K = 0.0078

Lag Time = $t_c \times 0.7$

PROPOSED CONDITION
HEC-HMS REACH LAG TIMES

Based on Kerby-Kirpich Time of Concentration Data Method

Reach ID	Reach Length	Beg Elev	End Elev	Slope	Tc	K-K Lag Time	Trad. Lag Time
	(ft)	(ft)	(ft)	(ft/ft)	(min)	(min)	(min)
Reach A1-2	1312	459	455	0.003	18	13	11
Reach A2-3	1278	461	459	0.002	21	15	13
Reach A3-4	684	466	461	0.007	8	6	5
Reach A4-5	1745	475	466	0.005	19	13	11
Reach A5-6	1400	487	475	0.009	13	9	8
Reach A6-7	867	493	487	0.007	10	7	6
Reach A7-8	1996	510	493	0.009	17	12	10
Reach B1-2	1477	493	460	0.022	9	7	6
Reach A-C1	600	467.4	464	0.006	8	5	5
Reach C1-2	1276	476	467.4	0.007	13	9	8
Reach C2-D1	3450	510.8	478.3	0.009	25	18	15
Reach D1-2	550	523	518	0.009	6	4	4
Reach D2-3	350	522	518	0.011	4	3	2

EXISTING CONDITION
HEC-HMS REACH LAG TIMES

Based on Kerby-Kirpich Time of Concentration Data Method

Reach ID	Reach Length	Beg Elev	End Elev	Slope	Tc	K-K Lag Time	Trad. Lag Time
	(ft)	(ft)	(ft)	(ft/ft)	(min)	(min)	(min)
Reach A1-2	1312	459	455	0.003	18	13	11
Reach A2-3	1278	461	459	0.002	21	15	13
Reach A3-4	684	466	461	0.007	8	6	5
Reach A4-5	1745	475	466	0.005	19	13	11
Reach A5-6	1400	487	475	0.009	13	9	8
Reach A6-7	867	493	487	0.007	10	7	6
Reach A7-8	1996	510	493	0.009	17	12	10
Reach B1-2	1477	493	460	0.022	9	7	6
Reach A-C1	600	472	468	0.007	7	5	4
Reach C1-2	1080	482	474	0.007	11	8	7
Reach D1-2	550	523	518	0.009	6	4	4
Reach D2-2	2520	513	479.5	0.013	17	12	10
Reach D2-3	350	522	518	0.011	4	3	2

Example Formulas for the Kerby-Kirpich Method:

Stream: ____________
County: ____________

Overland Flow

The Kerby Method

For small watersheds where overland flow is an important component of overall travel time, the Kerby (1959) method can be used. The Kerby equation is

$$T_c = K(L \times N)^{0.467} S^{-0.235},$$

where T_c is the overland flow time of concentration, in minutes; K is a units conversion coefficient, in which $K = 0.828$ for traditional units and $K = 1.44$ for SI units; L is the overland-flow length, in feet or meters as dictated by K; N is a dimensionless retardance coefficient; and S is the dimensionless slope of terrain conveying the overland flow. In the development of the Kerby equation, the length of overland flow was as much as about 1,200 feet (366 meters).

Generalized terrain description	Dimensionless retardance coefficient (N)
Pavement	0.02
Smooth, bare, packed soil	.10
Poor grass, cultivated row crops, or moderately rough packed surfaces	.20
Pasture, average grass	.40
Deciduous forest	.60
Dense grass, coniferous forest, or deciduous forest with deep litter	.80

Tc for Overland Flow

Known:	
Length (ft)	1,200
N	0.30
Slope (ft/ft)	0.017
Find	
Tc (min)	34

Channel Flow

The Kirpich Method

For channel-flow component of runoff, the Kirpich (1940) equation is

$$T_c = KL^{0.770} S^{-0.385},$$

where T_c is the time of concentration, in minutes; K is a units conversion coefficient, in which $K = 0.0078$ for traditional units and $K = 0.0195$ for SI units; L is the channel-flow length, in feet or meters as dictated by K; and S is the dimensionless main-channel slope.

Tc for Channel Flow

Known:	
Length (ft)	2,554
Slope (ft/ft)	0.0086
Find	
Tc (min)	20

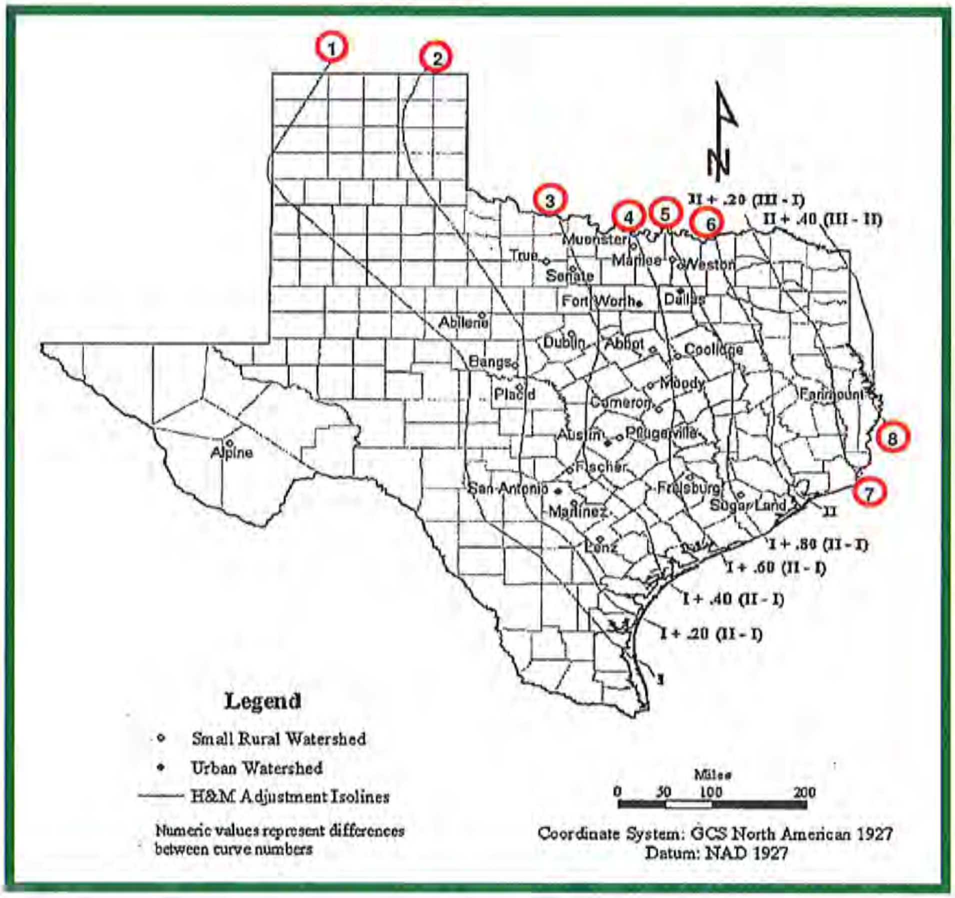
Total Tc (min)	54

Kerby-Kirpich Lag Time (min) for Developed Areas = 0.4 x Tc =	22
Kerby-Kirpich Lag Time (min) for Undeveloped Areas = 0.7 x Tc =	38
Traditional Lag Time (min) = 0.6 x Tc =	33

Used: Kerby-Kirpich Lag Time (min) for Undeveloped Areas = 0.7 x Tc = 38

TEXAS CLIMATIC ADJUSTMENT
(Curve Number (CN) Adjustments)

Stream: ____________
County: ____________



Line No.	Equation	Curve Numbers (CN)			Adjusted CN
		No. to Adjust II *	I	III	
1	I	73	54	87	60
2	I+.20(II-I)	73	54	87	60
3	I+.40(II-I)	73	54	87	62
4	I+.60(II-I)	73	54	87	65
5	I+.80(II-I)	73	54	87	69
6	II	73	54	87	73
7	II+.20(III-I)	73	54	87	80
8	II+.40(III-II)	73	54	87	79

Curver Number used: 60

* Enter whole number only

Climatic Adjustments of Natural Resource Conservation Service (NRCS) Runoff Curve Numbers:
Project TX -00/0-2104-2
November 1, 2003

POND B ELEVATION-DISCHARGE CALCULATIONS

Pond Flowline=	470.00		Orifice Flow Equation	Wier L=	20	ft.	Wier Flow Equation
Orifice Coeff. C=	0.60		q_x = C x A x (2 g h)^.5	Wier El.=	479	msl	Q = 3 x L x h^1.5
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.	

	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 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

POND C2 ELEVATION-DISCHARGE CALCULATIONS

Pond Flowline=	476.00		Orifice Flow Equation	Wier L=	20	ft.	Wier Flow Equation
Orifice Coeff. C=	0.60		q_X = C x A x (2 g h)^.5	Wier El.=	485	msl	Q = 3 x L x h^1.5
Orifice Size (in.)=	3.00			Wier SS=	10	:1	
		# orifices					
Orifice Elev. 1=	477.00	4					
Orifice Elev. 2=	478.25	4		Stack Pipe Top Elev =	483.00	msl	
Orifice Elev. 3=	479.50	4		Stack Pipe Diam.=	3.00	ft.	

	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	0.7	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7
478.0	1.00	0.00	0.00	0.9	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.9
478.5	1.50	0.25	0.00	1.2	0.5	0.0	1.6	0.0	0.0	0.0	0.0	1.6
479.0	2.00	0.75	0.00	1.3	0.8	0.0	2.2	0.0	0.0	0.0	0.0	2.2
479.5	2.50	1.25	0.00	1.5	1.1	0.0	2.6	0.0	0.0	0.0	0.0	2.6
480.0	3.00	1.75	0.50	1.6	1.3	0.7	3.6	0.0	0.0	0.0	0.0	3.6
480.5	3.50	2.25	1.00	1.8	1.4	0.9	4.1	0.0	0.0	0.0	0.0	4.1
481.0	4.00	2.75	1.50	1.9	1.6	1.2	4.6	0.0	0.0	0.0	0.0	4.6
481.5	4.50	3.25	2.00	2.0	1.7	1.3	5.0	0.0	0.0	0.0	0.0	5.0
482.0	5.00	3.75	2.50	2.1	1.8	1.5	5.4	0.0	0.0	0.0	0.0	5.4
482.5	5.50	4.25	3.00	2.2	1.9	1.6	5.8	0.0	0.0	0.0	0.0	5.8
483.0	6.00	4.75	3.50	2.3	2.1	1.8	6.1	0.0	0.0	0.0	0.0	6.1
483.5	6.50	5.25	4.00	2.4	2.2	1.9	6.5	0.5	10.0	0.0	0.0	16.5
484.0	7.00	5.75	4.50	2.5	2.3	2.0	6.8	1.0	28.3	0.0	0.0	35.0
484.5	7.50	6.25	5.00	2.6	2.4	2.1	7.1	1.5	51.9	0.0	0.0	59.0
485.0	8.00	6.75	5.50	2.7	2.5	2.2	7.3	2.0	80.0	0.0	0.0	87.3
485.5	8.50	7.25	6.00	2.8	2.5	2.3	7.6	2.5	111.8	0.5	31.8	151.2
486.0	9.00	7.75	6.50	2.8	2.6	2.4	7.9	3.0	146.9	1.0	120.0	274.8
486.5	9.50	8.25	7.00	2.9	2.7	2.5	8.1	3.5	185.1	1.5	275.6	468.8

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

APPENDIX B1
EXISTING CONDITIONS
25-YEAR
HEC-HMS MODEL OUTPUT

Project: Laredo Existing Simulation Run: 25 year

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, 12:28:39 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A8	0.7000	583.3	01Jan2013, 12:35	2.58
Reach A7-8	0.7000	581.7	01Jan2013, 12:45	2.57
A7	0.4580	450.4	01Jan2013, 12:35	3.06
Junction-A6-7	1.1580	1008.9	01Jan2013, 12:40	2.76
Reach A6-7	1.1580	1004.4	01Jan2013, 12:50	2.76
A6	0.1240	287.0	01Jan2013, 12:05	3.57
Junction-A5-6	1.2820	1045.7	01Jan2013, 12:50	2.84
Reach A5-6	1.2820	1043.9	01Jan2013, 12:55	2.83
A5	0.0980	234.6	01Jan2013, 12:05	3.89
Junction-A4-5	1.3800	1076.3	01Jan2013, 12:55	2.91
Reach A4-5	1.3800	1073.2	01Jan2013, 13:10	2.90
D3	0.1750	307.9	01Jan2013, 12:15	3.88
Reach D2-3	0.1750	306.1	01Jan2013, 12:20	3.88
D2	0.0312	65.6	01Jan2013, 12:10	3.68
Offsite Excav. D2	0.2062	82.5	01Jan2013, 13:10	1.74
Reach D1-2	0.2062	81.7	01Jan2013, 13:15	1.74
D1	0.0300	88.7	01Jan2013, 12:05	4.42
Junction D1	0.2362	89.3	01Jan2013, 13:10	2.08
Reach D2-2	0.2362	89.0	01Jan2013, 13:25	2.07
LF-6A	0.1411	312.9	01Jan2013, 12:15	4.42
Pond C	0.3773	365.9	01Jan2013, 12:20	2.65
LF-6C	0.0051	13.8	01Jan2013, 12:05	4.42
Junction C2	0.3824	373.8	01Jan2013, 12:20	2.68
Reach C1-2	0.3824	362.2	01Jan2013, 12:30	2.67
LF-6B	0.0221	53.4	01Jan2013, 12:10	4.42
Junction C1	0.4045	389.0	01Jan2013, 12:25	2.77

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Reach A-C1	0.4045	389.0	01Jan2013, 12:30	2.76
A4	0.1580	142.8	01Jan2013, 12:30	2.58
Junction-A3-4	1.9425	1260.0	01Jan2013, 13:05	2.85
Reach A3-4	1.9425	1256.6	01Jan2013, 13:10	2.84
LF-5	0.0412	94.1	01Jan2013, 12:10	4.42
A3	0.0100	25.5	01Jan2013, 12:05	3.57
Junction-A2-3	1.9937	1272.6	01Jan2013, 13:10	2.88
Reach A2-3	1.9937	1272.6	01Jan2013, 13:25	2.87
LF-4	0.0271	57.5	01Jan2013, 12:15	4.42
Pond B	0.0271	4.6	01Jan2013, 14:10	2.79
A2	0.0260	56.2	01Jan2013, 12:05	3.57
Junction-A1-2	2.0468	1282.3	01Jan2013, 13:25	2.87
Reach A1-2	2.0468	1278.9	01Jan2013, 13:40	2.86
LF-2	0.0561	119.2	01Jan2013, 12:15	4.42
Pond A	0.0561	94.4	01Jan2013, 12:25	4.53
B2	0.0360	83.7	01Jan2013, 12:10	3.99
LF-1	0.0020	7.0	01Jan2013, 12:00	4.42
Junction B1	0.0380	87.5	01Jan2013, 12:10	4.01
Reach B1-2	0.0380	87.2	01Jan2013, 12:15	4.01
B1	0.0310	38.4	01Jan2013, 12:15	2.58
A1	0.0260	62.6	01Jan2013, 12:05	3.57
LF-3	0.0180	51.2	01Jan2013, 12:05	4.42
Outfall	2.2159	1316.5	01Jan2013, 13:40	2.94

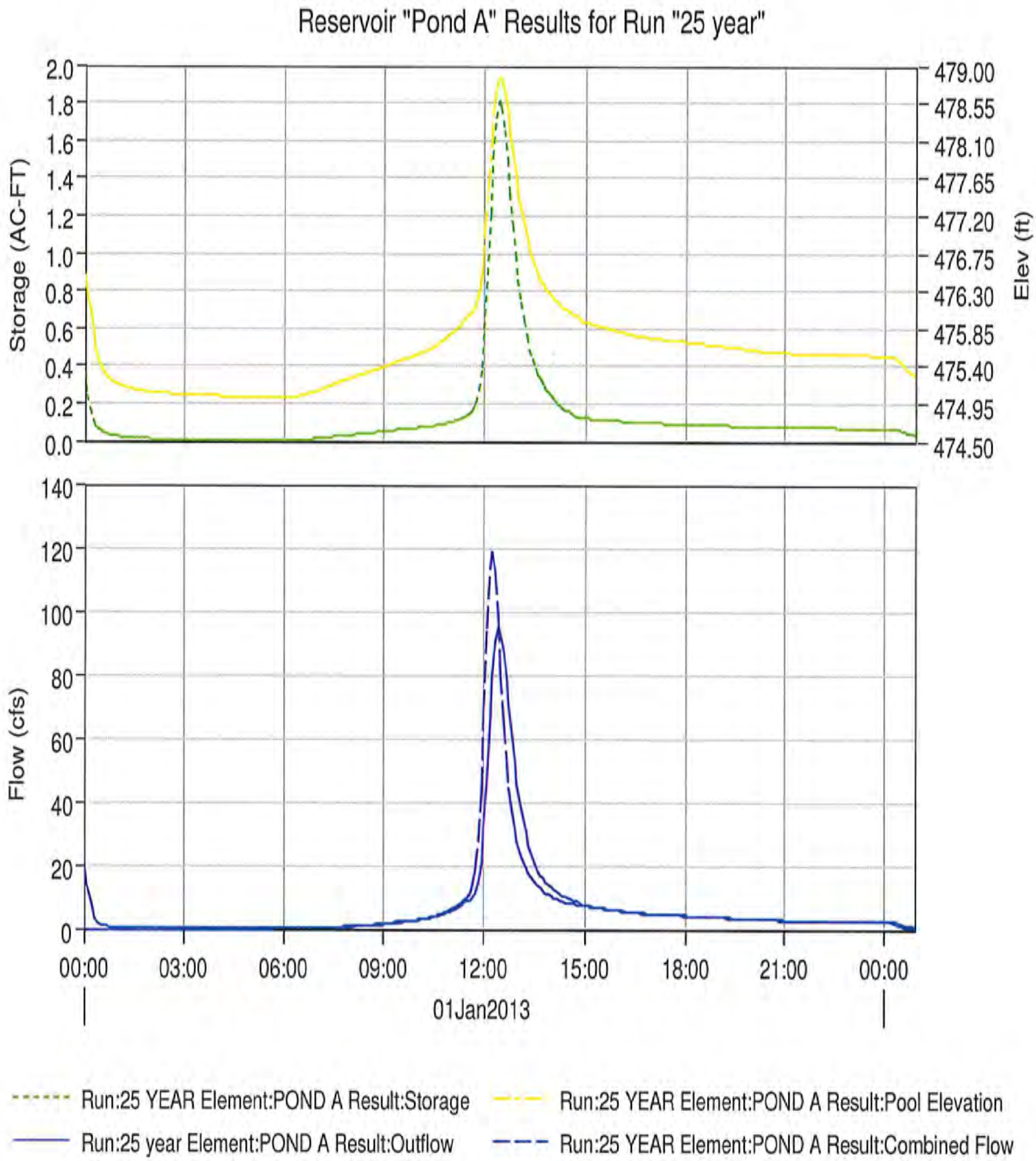
	Project:	Laredo Existing		
	Simulation Run:	25 year	Reservoir:	Pond A

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, 12:28:39	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	119.2 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:15
Peak Outflow :	94.4 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:25
Total Inflow :	4.42 (IN)	Peak Storage :	1.8 (AC-FT)
Total Outflow :	4.53 (IN)	Peak Elevation :	478.9 (FT)


Reservoir "Pond A" Results for Run "25 year"
Storage (AC-FT)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Elev (ft)
479.00
478.55
478.10
477.65
477.20
476.75
476.30
475.85
475.40
474.95
474.50
Flow (cfs)
140
120
100
80
60
40
20
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 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 Existing
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, 12:28:39 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.4	476.5	18.9
01Jan2013	00:05	0.0	0.3	476.3	13.6
01Jan2013	00:10	0.0	0.2	476.1	10.2
01Jan2013	00:15	0.0	0.1	475.8	6.2
01Jan2013	00:20	0.0	0.1	475.6	3.3
01Jan2013	00:25	0.0	0.1	475.5	2.0
01Jan2013	00:30	0.0	0.1	475.4	1.4
01Jan2013	00:35	0.0	0.0	475.3	1.0
01Jan2013	00:40	0.0	0.0	475.3	0.7
01Jan2013	00:45	0.0	0.0	475.2	0.6
01Jan2013	00:50	0.0	0.0	475.2	0.5
01Jan2013	00:55	0.0	0.0	475.2	0.4
01Jan2013	01:00	0.0	0.0	475.2	0.3
01Jan2013	01:05	0.0	0.0	475.2	0.3
01Jan2013	01:10	0.0	0.0	475.2	0.2
01Jan2013	01:15	0.0	0.0	475.1	0.2
01Jan2013	01:20	0.0	0.0	475.1	0.2
01Jan2013	01:25	0.0	0.0	475.1	0.1
01Jan2013	01:30	0.0	0.0	475.1	0.1
01Jan2013	01:35	0.0	0.0	475.1	0.1
01Jan2013	01:40	0.0	0.0	475.1	0.1
01Jan2013	01:45	0.0	0.0	475.1	0.1
01Jan2013	01:50	0.0	0.0	475.1	0.1
01Jan2013	01:55	0.0	0.0	475.1	0.1
01Jan2013	02:00	0.0	0.0	475.1	0.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	475.1	0.1
01Jan2013	02:10	0.0	0.0	475.1	0.1
01Jan2013	02:15	0.0	0.0	475.1	0.1
01Jan2013	02:20	0.0	0.0	475.1	0.1
01Jan2013	02:25	0.0	0.0	475.1	0.1
01Jan2013	02:30	0.0	0.0	475.1	0.0
01Jan2013	02:35	0.0	0.0	475.1	0.0
01Jan2013	02:40	0.0	0.0	475.1	0.0
01Jan2013	02:45	0.0	0.0	475.1	0.0
01Jan2013	02:50	0.0	0.0	475.1	0.0
01Jan2013	02:55	0.0	0.0	475.1	0.0
01Jan2013	03:00	0.0	0.0	475.1	0.0
01Jan2013	03:05	0.0	0.0	475.1	0.0
01Jan2013	03:10	0.0	0.0	475.1	0.0
01Jan2013	03:15	0.0	0.0	475.1	0.0
01Jan2013	03:20	0.0	0.0	475.1	0.0
01Jan2013	03:25	0.0	0.0	475.1	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	0.0	0.0	475.0	0.0
01Jan2013	06:10	0.0	0.0	475.0	0.0
01Jan2013	06:15	0.1	0.0	475.0	0.0
01Jan2013	06:20	0.1	0.0	475.0	0.0
01Jan2013	06:25	0.1	0.0	475.0	0.0
01Jan2013	06:30	0.1	0.0	475.0	0.0
01Jan2013	06:35	0.2	0.0	475.1	0.0
01Jan2013	06:40	0.2	0.0	475.1	0.0
01Jan2013	06:45	0.2	0.0	475.1	0.0
01Jan2013	06:50	0.3	0.0	475.1	0.1
01Jan2013	06:55	0.3	0.0	475.1	0.1
01Jan2013	07:00	0.3	0.0	475.1	0.1
01Jan2013	07:05	0.4	0.0	475.1	0.1
01Jan2013	07:10	0.4	0.0	475.1	0.2

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	0.5	0.0	475.1	0.2
01Jan2013	07:20	0.5	0.0	475.2	0.2
01Jan2013	07:25	0.5	0.0	475.2	0.3
01Jan2013	07:30	0.6	0.0	475.2	0.3
01Jan2013	07:35	0.6	0.0	475.2	0.4
01Jan2013	07:40	0.7	0.0	475.2	0.4
01Jan2013	07:45	0.7	0.0	475.2	0.5
01Jan2013	07:50	0.8	0.0	475.2	0.5
01Jan2013	07:55	0.8	0.0	475.2	0.6
01Jan2013	08:00	0.8	0.0	475.3	0.6
01Jan2013	08:05	0.9	0.0	475.3	0.7
01Jan2013	08:10	0.9	0.0	475.3	0.7
01Jan2013	08:15	1.0	0.0	475.3	0.8
01Jan2013	08:20	1.0	0.0	475.3	0.8
01Jan2013	08:25	1.1	0.0	475.3	0.9
01Jan2013	08:30	1.2	0.0	475.3	0.9
01Jan2013	08:35	1.2	0.0	475.3	1.0
01Jan2013	08:40	1.3	0.0	475.3	1.1
01Jan2013	08:45	1.4	0.0	475.4	1.2
01Jan2013	08:50	1.5	0.0	475.4	1.2
01Jan2013	08:55	1.6	0.1	475.4	1.3
01Jan2013	09:00	1.7	0.1	475.4	1.4
01Jan2013	09:05	1.8	0.1	475.4	1.5
01Jan2013	09:10	1.9	0.1	475.4	1.6
01Jan2013	09:15	2.0	0.1	475.4	1.7
01Jan2013	09:20	2.1	0.1	475.4	1.8
01Jan2013	09:25	2.2	0.1	475.5	1.9
01Jan2013	09:30	2.3	0.1	475.5	2.0
01Jan2013	09:35	2.3	0.1	475.5	2.1
01Jan2013	09:40	2.4	0.1	475.5	2.2
01Jan2013	09:45	2.5	0.1	475.5	2.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	2.6	0.1	475.5	2.4
01Jan2013	09:55	2.7	0.1	475.5	2.5
01Jan2013	10:00	2.8	0.1	475.5	2.6
01Jan2013	10:05	3.0	0.1	475.5	2.7
01Jan2013	10:10	3.2	0.1	475.6	2.9
01Jan2013	10:15	3.3	0.1	475.6	3.0
01Jan2013	10:20	3.5	0.1	475.6	3.2
01Jan2013	10:25	3.8	0.1	475.6	3.4
01Jan2013	10:30	4.0	0.1	475.6	3.6
01Jan2013	10:35	4.3	0.1	475.7	3.8
01Jan2013	10:40	4.5	0.1	475.7	4.1
01Jan2013	10:45	4.8	0.1	475.7	4.4
01Jan2013	10:50	5.2	0.1	475.7	4.7
01Jan2013	10:55	5.6	0.1	475.7	5.0
01Jan2013	11:00	6.0	0.1	475.8	5.4
01Jan2013	11:05	6.4	0.1	475.8	5.8
01Jan2013	11:10	6.9	0.1	475.8	6.3
01Jan2013	11:15	7.5	0.1	475.9	6.8
01Jan2013	11:20	8.2	0.1	475.9	7.4
01Jan2013	11:25	9.0	0.1	476.0	8.1
01Jan2013	11:30	10.0	0.1	476.0	8.8
01Jan2013	11:35	11.2	0.1	476.0	9.2
01Jan2013	11:40	13.5	0.2	476.1	9.9
01Jan2013	11:45	18.2	0.2	476.1	11.4
01Jan2013	11:50	27.6	0.3	476.3	14.4
01Jan2013	11:55	44.2	0.4	476.6	20.6
01Jan2013	12:00	68.3	0.6	477.0	32.3
01Jan2013	12:05	94.7	0.9	477.5	47.0
01Jan2013	12:10	113.9	1.2	478.0	65.3
01Jan2013	12:15	119.2	1.5	478.5	79.9
01Jan2013	12:20	112.2	1.7	478.7	90.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	97.9	1.8	478.9	94.4
01Jan2013	12:30	80.7	1.8	478.8	93.0
01Jan2013	12:35	65.3	1.7	478.7	87.2
01Jan2013	12:40	53.5	1.5	478.4	79.3
01Jan2013	12:45	44.5	1.3	478.2	70.6
01Jan2013	12:50	37.4	1.1	477.9	61.8
01Jan2013	12:55	31.7	1.0	477.7	53.0
01Jan2013	13:00	27.3	0.9	477.4	45.6
01Jan2013	13:05	23.9	0.7	477.3	39.5
01Jan2013	13:10	21.2	0.6	477.1	34.5
01Jan2013	13:15	19.0	0.6	476.9	30.0
01Jan2013	13:20	17.3	0.5	476.8	26.0
01Jan2013	13:25	15.9	0.4	476.7	23.0
01Jan2013	13:30	14.7	0.4	476.6	20.6
01Jan2013	13:35	13.7	0.4	476.5	18.7
01Jan2013	13:40	12.9	0.3	476.4	17.1
01Jan2013	13:45	12.1	0.3	476.4	15.8
01Jan2013	13:50	11.4	0.3	476.3	14.7
01Jan2013	13:55	10.8	0.3	476.3	13.7
01Jan2013	14:00	10.3	0.2	476.2	12.9
01Jan2013	14:05	9.9	0.2	476.2	12.2
01Jan2013	14:10	9.5	0.2	476.2	11.5
01Jan2013	14:15	9.1	0.2	476.1	11.0
01Jan2013	14:20	8.8	0.2	476.1	10.5
01Jan2013	14:25	8.5	0.2	476.1	10.1
01Jan2013	14:30	8.3	0.2	476.1	9.7
01Jan2013	14:35	8.0	0.1	476.0	9.3
01Jan2013	14:40	7.9	0.1	476.0	9.0
01Jan2013	14:45	7.7	0.1	476.0	8.6
01Jan2013	14:50	7.5	0.1	476.0	8.1
01Jan2013	14:55	7.4	0.1	475.9	7.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	7.3	0.1	475.9	7.5
01Jan2013	15:05	7.1	0.1	475.9	7.3
01Jan2013	15:10	7.0	0.1	475.9	7.2
01Jan2013	15:15	6.9	0.1	475.9	7.1
01Jan2013	15:20	6.8	0.1	475.9	6.9
01Jan2013	15:25	6.6	0.1	475.9	6.8
01Jan2013	15:30	6.5	0.1	475.9	6.7
01Jan2013	15:35	6.4	0.1	475.9	6.5
01Jan2013	15:40	6.2	0.1	475.8	6.4
01Jan2013	15:45	6.1	0.1	475.8	6.3
01Jan2013	15:50	6.0	0.1	475.8	6.2
01Jan2013	15:55	5.9	0.1	475.8	6.0
01Jan2013	16:00	5.8	0.1	475.8	5.9
01Jan2013	16:05	5.6	0.1	475.8	5.8
01Jan2013	16:10	5.5	0.1	475.8	5.7
01Jan2013	16:15	5.4	0.1	475.8	5.6
01Jan2013	16:20	5.3	0.1	475.8	5.4
01Jan2013	16:25	5.2	0.1	475.8	5.3
01Jan2013	16:30	5.1	0.1	475.8	5.2
01Jan2013	16:35	5.0	0.1	475.8	5.1
01Jan2013	16:40	5.0	0.1	475.8	5.1
01Jan2013	16:45	4.9	0.1	475.7	5.0
01Jan2013	16:50	4.9	0.1	475.7	5.0
01Jan2013	16:55	4.8	0.1	475.7	4.9
01Jan2013	17:00	4.8	0.1	475.7	4.8
01Jan2013	17:05	4.7	0.1	475.7	4.8
01Jan2013	17:10	4.7	0.1	475.7	4.8
01Jan2013	17:15	4.6	0.1	475.7	4.7
01Jan2013	17:20	4.6	0.1	475.7	4.7
01Jan2013	17:25	4.5	0.1	475.7	4.6
01Jan2013	17:30	4.5	0.1	475.7	4.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	4.4	0.1	475.7	4.5
01Jan2013	17:40	4.4	0.1	475.7	4.5
01Jan2013	17:45	4.4	0.1	475.7	4.4
01Jan2013	17:50	4.3	0.1	475.7	4.4
01Jan2013	17:55	4.3	0.1	475.7	4.3
01Jan2013	18:00	4.2	0.1	475.7	4.3
01Jan2013	18:05	4.2	0.1	475.7	4.2
01Jan2013	18:10	4.1	0.1	475.7	4.2
01Jan2013	18:15	4.1	0.1	475.7	4.2
01Jan2013	18:20	4.0	0.1	475.7	4.1
01Jan2013	18:25	4.0	0.1	475.7	4.1
01Jan2013	18:30	4.0	0.1	475.7	4.0
01Jan2013	18:35	3.9	0.1	475.7	4.0
01Jan2013	18:40	3.9	0.1	475.7	3.9
01Jan2013	18:45	3.8	0.1	475.7	3.9
01Jan2013	18:50	3.8	0.1	475.7	3.8
01Jan2013	18:55	3.7	0.1	475.6	3.8
01Jan2013	19:00	3.7	0.1	475.6	3.8
01Jan2013	19:05	3.6	0.1	475.6	3.7
01Jan2013	19:10	3.6	0.1	475.6	3.7
01Jan2013	19:15	3.5	0.1	475.6	3.6
01Jan2013	19:20	3.5	0.1	475.6	3.6
01Jan2013	19:25	3.5	0.1	475.6	3.5
01Jan2013	19:30	3.4	0.1	475.6	3.5
01Jan2013	19:35	3.4	0.1	475.6	3.4
01Jan2013	19:40	3.3	0.1	475.6	3.4
01Jan2013	19:45	3.3	0.1	475.6	3.4
01Jan2013	19:50	3.2	0.1	475.6	3.3
01Jan2013	19:55	3.2	0.1	475.6	3.3
01Jan2013	20:00	3.1	0.1	475.6	3.2
01Jan2013	20:05	3.1	0.1	475.6	3.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	3.1	0.1	475.6	3.1
01Jan2013	20:15	3.0	0.1	475.6	3.1
01Jan2013	20:20	3.0	0.1	475.6	3.1
01Jan2013	20:25	2.9	0.1	475.6	3.0
01Jan2013	20:30	2.9	0.1	475.6	3.0
01Jan2013	20:35	2.9	0.1	475.6	2.9
01Jan2013	20:40	2.9	0.1	475.6	2.9
01Jan2013	20:45	2.9	0.1	475.6	2.9
01Jan2013	20:50	2.9	0.1	475.6	2.9
01Jan2013	20:55	2.8	0.1	475.6	2.9
01Jan2013	21:00	2.8	0.1	475.6	2.8
01Jan2013	21:05	2.8	0.1	475.6	2.8
01Jan2013	21:10	2.8	0.1	475.6	2.8
01Jan2013	21:15	2.8	0.1	475.6	2.8
01Jan2013	21:20	2.8	0.1	475.6	2.8
01Jan2013	21:25	2.8	0.1	475.6	2.8
01Jan2013	21:30	2.8	0.1	475.6	2.8
01Jan2013	21:35	2.8	0.1	475.6	2.8
01Jan2013	21:40	2.8	0.1	475.6	2.8
01Jan2013	21:45	2.8	0.1	475.6	2.8
01Jan2013	21:50	2.7	0.1	475.5	2.8
01Jan2013	21:55	2.7	0.1	475.5	2.8
01Jan2013	22:00	2.7	0.1	475.5	2.7
01Jan2013	22:05	2.7	0.1	475.5	2.7
01Jan2013	22:10	2.7	0.1	475.5	2.7
01Jan2013	22:15	2.7	0.1	475.5	2.7
01Jan2013	22:20	2.7	0.1	475.5	2.7
01Jan2013	22:25	2.7	0.1	475.5	2.7
01Jan2013	22:30	2.7	0.1	475.5	2.7
01Jan2013	22:35	2.7	0.1	475.5	2.7
01Jan2013	22:40	2.6	0.1	475.5	2.7

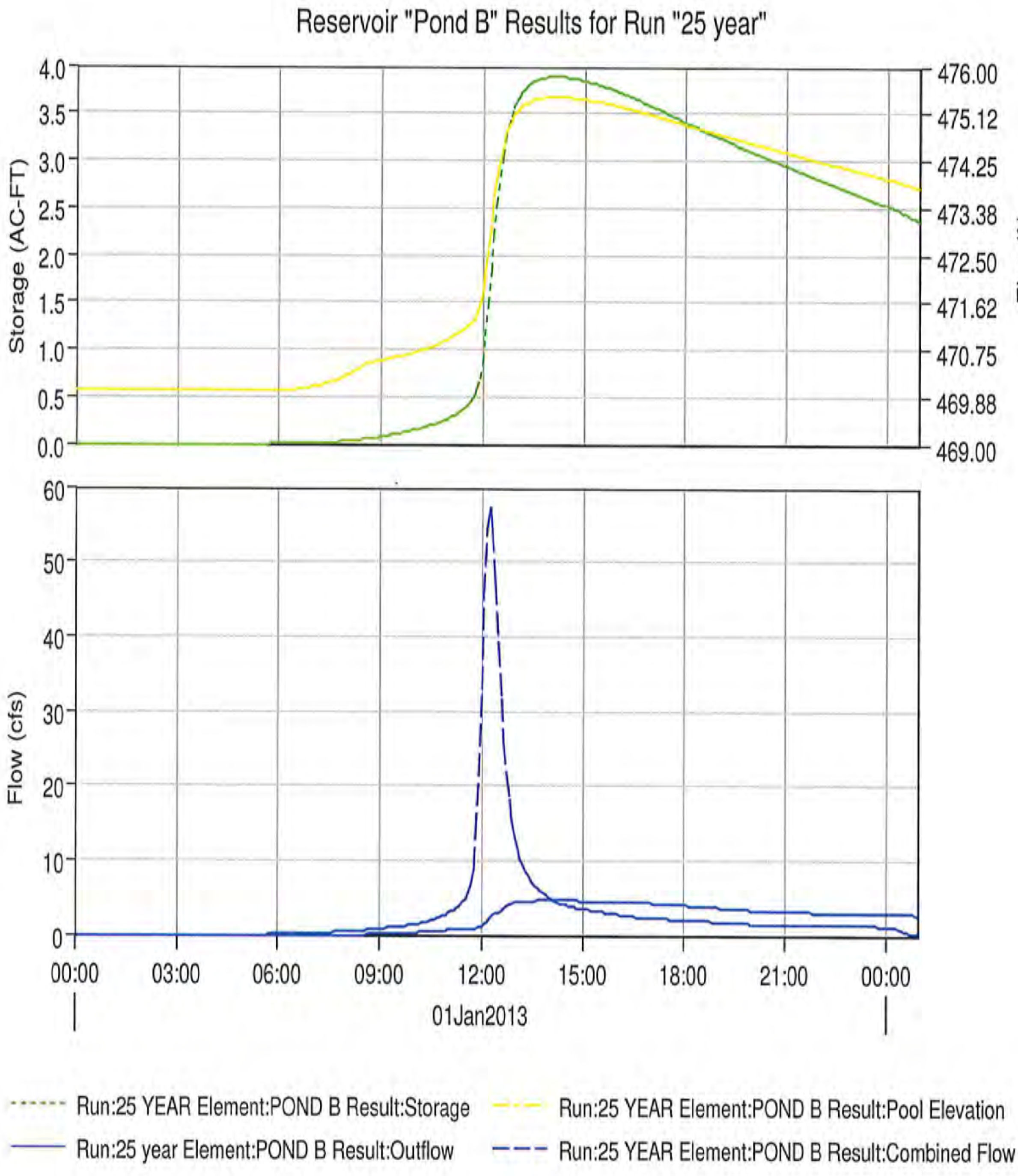
Project: Laredo Existing
Simulation Run: 25 year Reservoir: Pond B

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, 12:28:39	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	57.5 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:15
Peak Outflow :	4.6 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 14:10
Total Inflow :	4.42 (IN)	Peak Storage :	3.9 (AC-FT)
Total Outflow :	2.79 (IN)	Peak Elevation :	475.4 (FT)



Reservoir "Pond B" Results for Run "25 year"
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Storage (AC-FT)
476.00
475.12
474.25
473.38
472.50
471.62
470.75
469.88
469.00
Elev (ft)
60
50
40
30
20
10
0
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 Existing
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 2‹
Compute Time: 17Sep2014, 12:28:39 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

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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	0.0	0.0	470.0	0.0
01Jan2013	06:05	0.0	0.0	470.0	0.0
01Jan2013	06:10	0.0	0.0	470.0	0.0
01Jan2013	06:15	0.0	0.0	470.0	0.0
01Jan2013	06:20	0.0	0.0	470.0	0.0
01Jan2013	06:25	0.1	0.0	470.0	0.0
01Jan2013	06:30	0.1	0.0	470.0	0.0
01Jan2013	06:35	0.1	0.0	470.0	0.0
01Jan2013	06:40	0.1	0.0	470.0	0.0
01Jan2013	06:45	0.1	0.0	470.0	0.0
01Jan2013	06:50	0.1	0.0	470.0	0.0
01Jan2013	06:55	0.2	0.0	470.0	0.0
01Jan2013	07:00	0.2	0.0	470.1	0.0
01Jan2013	07:05	0.2	0.0	470.1	0.0
01Jan2013	07:10	0.2	0.0	470.1	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	0.2	0.0	470.1	0.0
01Jan2013	07:20	0.2	0.0	470.1	0.0
01Jan2013	07:25	0.3	0.0	470.1	0.0
01Jan2013	07:30	0.3	0.0	470.1	0.0
01Jan2013	07:35	0.3	0.0	470.2	0.0
01Jan2013	07:40	0.3	0.0	470.2	0.0
01Jan2013	07:45	0.3	0.0	470.2	0.0
01Jan2013	07:50	0.4	0.0	470.2	0.0
01Jan2013	07:55	0.4	0.0	470.2	0.0
01Jan2013	08:00	0.4	0.0	470.3	0.0
01Jan2013	08:05	0.4	0.0	470.3	0.0
01Jan2013	08:10	0.4	0.0	470.3	0.0
01Jan2013	08:15	0.5	0.0	470.4	0.0
01Jan2013	08:20	0.5	0.0	470.4	0.0
01Jan2013	08:25	0.5	0.0	470.4	0.0
01Jan2013	08:30	0.6	0.0	470.4	0.0
01Jan2013	08:35	0.6	0.1	470.5	0.0
01Jan2013	08:40	0.6	0.1	470.5	0.0
01Jan2013	08:45	0.7	0.1	470.5	0.0
01Jan2013	08:50	0.7	0.1	470.5	0.0
01Jan2013	08:55	0.8	0.1	470.5	0.0
01Jan2013	09:00	0.8	0.1	470.5	0.1
01Jan2013	09:05	0.9	0.1	470.6	0.1
01Jan2013	09:10	0.9	0.1	470.6	0.1
01Jan2013	09:15	1.0	0.1	470.6	0.1
01Jan2013	09:20	1.0	0.1	470.6	0.1
01Jan2013	09:25	1.1	0.1	470.6	0.1
01Jan2013	09:30	1.1	0.1	470.6	0.2
01Jan2013	09:35	1.1	0.1	470.6	0.2
01Jan2013	09:40	1.2	0.1	470.6	0.2
01Jan2013	09:45	1.2	0.1	470.7	0.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	1.3	0.1	470.7	0.2
01Jan2013	09:55	1.3	0.1	470.7	0.3
01Jan2013	10:00	1.4	0.2	470.7	0.3
01Jan2013	10:05	1.4	0.2	470.7	0.3
01Jan2013	10:10	1.5	0.2	470.7	0.3
01Jan2013	10:15	1.6	0.2	470.8	0.4
01Jan2013	10:20	1.7	0.2	470.8	0.4
01Jan2013	10:25	1.8	0.2	470.8	0.4
01Jan2013	10:30	1.9	0.2	470.8	0.4
01Jan2013	10:35	2.1	0.2	470.8	0.5
01Jan2013	10:40	2.2	0.2	470.9	0.5
01Jan2013	10:45	2.3	0.2	470.9	0.5
01Jan2013	10:50	2.5	0.3	470.9	0.6
01Jan2013	10:55	2.7	0.3	470.9	0.6
01Jan2013	11:00	2.9	0.3	471.0	0.7
01Jan2013	11:05	3.1	0.3	471.0	0.7
01Jan2013	11:10	3.3	0.3	471.0	0.7
01Jan2013	11:15	3.6	0.3	471.1	0.7
01Jan2013	11:20	4.0	0.4	471.1	0.7
01Jan2013	11:25	4.3	0.4	471.1	0.7
01Jan2013	11:30	4.8	0.4	471.2	0.8
01Jan2013	11:35	5.4	0.4	471.2	0.8
01Jan2013	11:40	6.5	0.5	471.3	0.8
01Jan2013	11:45	8.8	0.5	471.3	0.8
01Jan2013	11:50	13.3	0.6	471.4	0.9
01Jan2013	11:55	21.2	0.7	471.6	1.0
01Jan2013	12:00	32.8	0.9	471.8	1.1
01Jan2013	12:05	45.5	1.1	472.2	1.2
01Jan2013	12:10	54.8	1.5	472.6	1.5
01Jan2013	12:15	57.5	1.8	473.1	2.3
01Jan2013	12:20	54.2	2.2	473.6	2.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	47.4	2.5	474.0	2.9
01Jan2013	12:30	39.2	2.8	474.3	3.1
01Jan2013	12:35	31.7	3.0	474.5	3.2
01Jan2013	12:40	26.0	3.2	474.7	3.6
01Jan2013	12:45	21.6	3.4	474.9	3.9
01Jan2013	12:50	18.1	3.5	475.0	4.2
01Jan2013	12:55	15.4	3.6	475.1	4.3
01Jan2013	13:00	13.2	3.6	475.1	4.3
01Jan2013	13:05	11.6	3.7	475.2	4.4
01Jan2013	13:10	10.3	3.7	475.3	4.5
01Jan2013	13:15	9.2	3.8	475.3	4.5
01Jan2013	13:20	8.4	3.8	475.3	4.5
01Jan2013	13:25	7.7	3.8	475.3	4.5
01Jan2013	13:30	7.1	3.8	475.4	4.6
01Jan2013	13:35	6.7	3.8	475.4	4.6
01Jan2013	13:40	6.2	3.9	475.4	4.6
01Jan2013	13:45	5.9	3.9	475.4	4.6
01Jan2013	13:50	5.5	3.9	475.4	4.6
01Jan2013	13:55	5.2	3.9	475.4	4.6
01Jan2013	14:00	5.0	3.9	475.4	4.6
01Jan2013	14:05	4.8	3.9	475.4	4.6
01Jan2013	14:10	4.6	3.9	475.4	4.6
01Jan2013	14:15	4.4	3.9	475.4	4.6
01Jan2013	14:20	4.3	3.9	475.4	4.6
01Jan2013	14:25	4.1	3.9	475.4	4.6
01Jan2013	14:30	4.0	3.9	475.4	4.6
01Jan2013	14:35	3.9	3.9	475.4	4.6
01Jan2013	14:40	3.8	3.9	475.4	4.6
01Jan2013	14:45	3.7	3.9	475.4	4.6
01Jan2013	14:50	3.6	3.9	475.4	4.6
01Jan2013	14:55	3.6	3.9	475.4	4.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	3.5	3.8	475.4	4.6
01Jan2013	15:05	3.5	3.8	475.4	4.6
01Jan2013	15:10	3.4	3.8	475.4	4.6
01Jan2013	15:15	3.3	3.8	475.4	4.6
01Jan2013	15:20	3.3	3.8	475.3	4.5
01Jan2013	15:25	3.2	3.8	475.3	4.5
01Jan2013	15:30	3.1	3.8	475.3	4.5
01Jan2013	15:35	3.1	3.8	475.3	4.5
01Jan2013	15:40	3.0	3.8	475.3	4.5
01Jan2013	15:45	3.0	3.8	475.3	4.5
01Jan2013	15:50	2.9	3.8	475.3	4.5
01Jan2013	15:55	2.8	3.7	475.3	4.5
01Jan2013	16:00	2.8	3.7	475.3	4.5
01Jan2013	16:05	2.7	3.7	475.2	4.4
01Jan2013	16:10	2.7	3.7	475.2	4.4
01Jan2013	16:15	2.6	3.7	475.2	4.4
01Jan2013	16:20	2.5	3.7	475.2	4.4
01Jan2013	16:25	2.5	3.7	475.2	4.4
01Jan2013	16:30	2.5	3.7	475.2	4.4
01Jan2013	16:35	2.4	3.6	475.2	4.4
01Jan2013	16:40	2.4	3.6	475.2	4.4
01Jan2013	16:45	2.4	3.6	475.1	4.3
01Jan2013	16:50	2.4	3.6	475.1	4.3
01Jan2013	16:55	2.3	3.6	475.1	4.3
01Jan2013	17:00	2.3	3.6	475.1	4.3
01Jan2013	17:05	2.3	3.6	475.1	4.3
01Jan2013	17:10	2.3	3.5	475.1	4.3
01Jan2013	17:15	2.2	3.5	475.1	4.3
01Jan2013	17:20	2.2	3.5	475.0	4.2
01Jan2013	17:25	2.2	3.5	475.0	4.2
01Jan2013	17:30	2.2	3.5	475.0	4.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	2.1	3.5	475.0	4.2
01Jan2013	17:40	2.1	3.5	475.0	4.2
01Jan2013	17:45	2.1	3.4	475.0	4.1
01Jan2013	17:50	2.1	3.4	474.9	4.1
01Jan2013	17:55	2.1	3.4	474.9	4.1
01Jan2013	18:00	2.0	3.4	474.9	4.0
01Jan2013	18:05	2.0	3.4	474.9	4.0
01Jan2013	18:10	2.0	3.4	474.9	4.0
01Jan2013	18:15	2.0	3.4	474.9	3.9
01Jan2013	18:20	2.0	3.4	474.9	3.9
01Jan2013	18:25	1.9	3.3	474.8	3.9
01Jan2013	18:30	1.9	3.3	474.8	3.9
01Jan2013	18:35	1.9	3.3	474.8	3.8
01Jan2013	18:40	1.9	3.3	474.8	3.8
01Jan2013	18:45	1.8	3.3	474.8	3.8
01Jan2013	18:50	1.8	3.3	474.8	3.7
01Jan2013	18:55	1.8	3.3	474.8	3.7
01Jan2013	19:00	1.8	3.2	474.7	3.7
01Jan2013	19:05	1.8	3.2	474.7	3.7
01Jan2013	19:10	1.7	3.2	474.7	3.6
01Jan2013	19:15	1.7	3.2	474.7	3.6
01Jan2013	19:20	1.7	3.2	474.7	3.6
01Jan2013	19:25	1.7	3.2	474.7	3.5
01Jan2013	19:30	1.7	3.2	474.7	3.5
01Jan2013	19:35	1.6	3.2	474.6	3.5
01Jan2013	19:40	1.6	3.1	474.6	3.5
01Jan2013	19:45	1.6	3.1	474.6	3.4
01Jan2013	19:50	1.6	3.1	474.6	3.4
01Jan2013	19:55	1.5	3.1	474.6	3.4
01Jan2013	20:00	1.5	3.1	474.6	3.3
01Jan2013	20:05	1.5	3.1	474.6	3.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	1.5	3.1	474.5	3.3
01Jan2013	20:15	1.5	3.1	474.5	3.3
01Jan2013	20:20	1.4	3.0	474.5	3.2
01Jan2013	20:25	1.4	3.0	474.5	3.2
01Jan2013	20:30	1.4	3.0	474.5	3.2
01Jan2013	20:35	1.4	3.0	474.5	3.2
01Jan2013	20:40	1.4	3.0	474.5	3.2
01Jan2013	20:45	1.4	3.0	474.4	3.2
01Jan2013	20:50	1.4	3.0	474.4	3.2
01Jan2013	20:55	1.4	3.0	474.4	3.2
01Jan2013	21:00	1.4	2.9	474.4	3.1
01Jan2013	21:05	1.4	2.9	474.4	3.1
01Jan2013	21:10	1.3	2.9	474.4	3.1
01Jan2013	21:15	1.3	2.9	474.4	3.1
01Jan2013	21:20	1.3	2.9	474.3	3.1
01Jan2013	21:25	1.3	2.9	474.3	3.1
01Jan2013	21:30	1.3	2.9	474.3	3.1
01Jan2013	21:35	1.3	2.9	474.3	3.1
01Jan2013	21:40	1.3	2.8	474.3	3.1
01Jan2013	21:45	1.3	2.8	474.3	3.1
01Jan2013	21:50	1.3	2.8	474.3	3.1
01Jan2013	21:55	1.3	2.8	474.3	3.1
01Jan2013	22:00	1.3	2.8	474.2	3.0
01Jan2013	22:05	1.3	2.8	474.2	3.0
01Jan2013	22:10	1.3	2.8	474.2	3.0
01Jan2013	22:15	1.3	2.8	474.2	3.0
01Jan2013	22:20	1.3	2.8	474.2	3.0
01Jan2013	22:25	1.3	2.7	474.2	3.0
01Jan2013	22:30	1.3	2.7	474.2	3.0
01Jan2013	22:35	1.3	2.7	474.1	3.0
01Jan2013	22:40	1.3	2.7	474.1	3.0

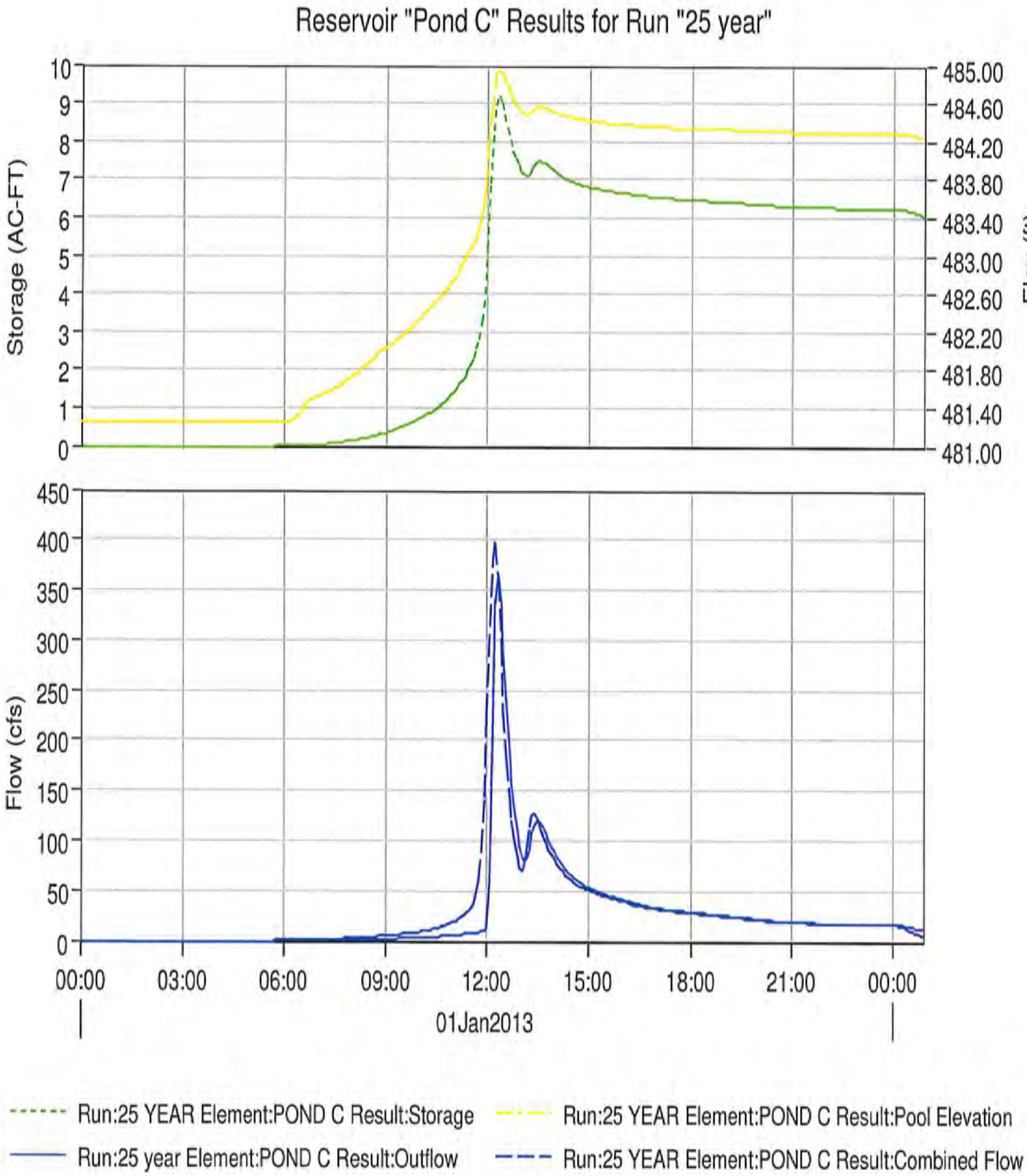
Project: Laredo Existing
Simulation Run: 25 year Reservoir: Pond C

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, 12:28:39	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	397.6 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:15
Peak Outflow :	365.9 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:20
Total Inflow :	2.95 (IN)	Peak Storage :	9.2 (AC-FT)
Total Outflow :	2.65 (IN)	Peak Elevation :	485.0 (FT)



Reservoir "Pond C" Results for Run "25 year"
Storage (AC-FT)
Elev (ft)
10
9
8
7
6
5
4
3
2
1
0
485.00
484.60
484.20
483.80
483.40
483.00
482.60
482.20
481.80
481.40
481.00
Flow (cfs)
450
400
350
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 C Result:Storage
Run:25 YEAR Element:POND C Result:Pool Elevation
Run:25 year Element:POND C Result:Outflow
Run:25 YEAR Element:POND C Result:Combined Flow

Project: Laredo Existing
Simulation Run: 25 year Reservoir: Pond C

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 25 year 2
Compute Time: 17Sep2014, 12:28:39 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.0	481.2	0.0
01Jan2013	00:05	0.0	0.0	481.2	0.0
01Jan2013	00:10	0.0	0.0	481.2	0.0
01Jan2013	00:15	0.0	0.0	481.2	0.0
01Jan2013	00:20	0.0	0.0	481.2	0.0
01Jan2013	00:25	0.0	0.0	481.2	0.0
01Jan2013	00:30	0.0	0.0	481.2	0.0
01Jan2013	00:35	0.0	0.0	481.2	0.0
01Jan2013	00:40	0.0	0.0	481.2	0.0
01Jan2013	00:45	0.0	0.0	481.2	0.0
01Jan2013	00:50	0.0	0.0	481.2	0.0
01Jan2013	00:55	0.0	0.0	481.2	0.0
01Jan2013	01:00	0.0	0.0	481.2	0.0
01Jan2013	01:05	0.0	0.0	481.2	0.0
01Jan2013	01:10	0.0	0.0	481.2	0.0
01Jan2013	01:15	0.0	0.0	481.2	0.0
01Jan2013	01:20	0.0	0.0	481.2	0.0
01Jan2013	01:25	0.0	0.0	481.2	0.0
01Jan2013	01:30	0.0	0.0	481.2	0.0
01Jan2013	01:35	0.0	0.0	481.2	0.0
01Jan2013	01:40	0.0	0.0	481.2	0.0
01Jan2013	01:45	0.0	0.0	481.2	0.0
01Jan2013	01:50	0.0	0.0	481.2	0.0
01Jan2013	01:55	0.0	0.0	481.2	0.0
01Jan2013	02:00	0.0	0.0	481.2	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	481.2	0.0
01Jan2013	02:10	0.0	0.0	481.2	0.0
01Jan2013	02:15	0.0	0.0	481.2	0.0
01Jan2013	02:20	0.0	0.0	481.2	0.0
01Jan2013	02:25	0.0	0.0	481.2	0.0
01Jan2013	02:30	0.0	0.0	481.2	0.0
01Jan2013	02:35	0.0	0.0	481.2	0.0
01Jan2013	02:40	0.0	0.0	481.2	0.0
01Jan2013	02:45	0.0	0.0	481.2	0.0
01Jan2013	02:50	0.0	0.0	481.2	0.0
01Jan2013	02:55	0.0	0.0	481.2	0.0
01Jan2013	03:00	0.0	0.0	481.2	0.0
01Jan2013	03:05	0.0	0.0	481.2	0.0
01Jan2013	03:10	0.0	0.0	481.2	0.0
01Jan2013	03:15	0.0	0.0	481.2	0.0
01Jan2013	03:20	0.0	0.0	481.2	0.0
01Jan2013	03:25	0.0	0.0	481.2	0.0
01Jan2013	03:30	0.0	0.0	481.2	0.0
01Jan2013	03:35	0.0	0.0	481.2	0.0
01Jan2013	03:40	0.0	0.0	481.2	0.0
01Jan2013	03:45	0.0	0.0	481.2	0.0
01Jan2013	03:50	0.0	0.0	481.2	0.0
01Jan2013	03:55	0.0	0.0	481.2	0.0
01Jan2013	04:00	0.0	0.0	481.2	0.0
01Jan2013	04:05	0.0	0.0	481.2	0.0
01Jan2013	04:10	0.0	0.0	481.2	0.0
01Jan2013	04:15	0.0	0.0	481.2	0.0
01Jan2013	04:20	0.0	0.0	481.2	0.0
01Jan2013	04:25	0.0	0.0	481.2	0.0
01Jan2013	04:30	0.0	0.0	481.2	0.0
01Jan2013	04:35	0.0	0.0	481.2	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	04:40	0.0	0.0	481.2	0.0
01Jan2013	04:45	0.0	0.0	481.2	0.0
01Jan2013	04:50	0.0	0.0	481.2	0.0
01Jan2013	04:55	0.0	0.0	481.2	0.0
01Jan2013	05:00	0.0	0.0	481.2	0.0
01Jan2013	05:05	0.0	0.0	481.2	0.0
01Jan2013	05:10	0.0	0.0	481.2	0.0
01Jan2013	05:15	0.0	0.0	481.2	0.0
01Jan2013	05:20	0.0	0.0	481.2	0.0
01Jan2013	05:25	0.0	0.0	481.2	0.0
01Jan2013	05:30	0.0	0.0	481.2	0.0
01Jan2013	05:35	0.0	0.0	481.2	0.0
01Jan2013	05:40	0.0	0.0	481.2	0.0
01Jan2013	05:45	0.0	0.0	481.3	0.0
01Jan2013	05:50	0.0	0.0	481.3	0.0
01Jan2013	05:55	0.0	0.0	481.3	0.0
01Jan2013	06:00	0.0	0.0	481.3	0.0
01Jan2013	06:05	0.1	0.0	481.3	0.0
01Jan2013	06:10	0.1	0.0	481.3	0.0
01Jan2013	06:15	0.2	0.0	481.3	0.0
01Jan2013	06:20	0.3	0.0	481.3	0.0
01Jan2013	06:25	0.4	0.0	481.3	0.0
01Jan2013	06:30	0.5	0.0	481.4	0.0
01Jan2013	06:35	0.6	0.0	481.4	0.1
01Jan2013	06:40	0.7	0.0	481.4	0.1
01Jan2013	06:45	0.8	0.0	481.5	0.2
01Jan2013	06:50	0.9	0.0	481.5	0.2
01Jan2013	06:55	1.0	0.0	481.5	0.2
01Jan2013	07:00	1.1	0.0	481.5	0.2
01Jan2013	07:05	1.2	0.0	481.5	0.3
01Jan2013	07:10	1.3	0.0	481.5	0.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	1.5	0.1	481.6	0.3
01Jan2013	07:20	1.6	0.1	481.6	0.3
01Jan2013	07:25	1.7	0.1	481.6	0.4
01Jan2013	07:30	1.8	0.1	481.6	0.4
01Jan2013	07:35	2.0	0.1	481.6	0.4
01Jan2013	07:40	2.1	0.1	481.6	0.5
01Jan2013	07:45	2.2	0.1	481.7	0.5
01Jan2013	07:50	2.3	0.1	481.7	0.6
01Jan2013	07:55	2.5	0.1	481.7	0.6
01Jan2013	08:00	2.6	0.2	481.7	0.7
01Jan2013	08:05	2.7	0.2	481.7	0.8
01Jan2013	08:10	2.9	0.2	481.8	0.8
01Jan2013	08:15	3.0	0.2	481.8	0.9
01Jan2013	08:20	3.2	0.2	481.8	1.0
01Jan2013	08:25	3.4	0.2	481.8	1.1
01Jan2013	08:30	3.6	0.2	481.9	1.2
01Jan2013	08:35	3.8	0.3	481.9	1.3
01Jan2013	08:40	4.1	0.3	481.9	1.4
01Jan2013	08:45	4.3	0.3	482.0	1.5
01Jan2013	08:50	4.6	0.3	482.0	1.7
01Jan2013	08:55	4.9	0.3	482.0	1.7
01Jan2013	09:00	5.2	0.4	482.0	1.8
01Jan2013	09:05	5.5	0.4	482.1	1.9
01Jan2013	09:10	5.9	0.4	482.1	2.0
01Jan2013	09:15	6.2	0.4	482.1	2.1
01Jan2013	09:20	6.5	0.5	482.1	2.2
01Jan2013	09:25	6.8	0.5	482.1	2.3
01Jan2013	09:30	7.1	0.5	482.2	2.4
01Jan2013	09:35	7.3	0.6	482.2	2.6
01Jan2013	09:40	7.5	0.6	482.2	2.7
01Jan2013	09:45	7.8	0.6	482.3	2.8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	8.0	0.7	482.3	3.0
01Jan2013	09:55	8.4	0.7	482.3	3.1
01Jan2013	10:00	8.8	0.7	482.3	3.3
01Jan2013	10:05	9.3	0.8	482.4	3.4
01Jan2013	10:10	9.8	0.8	482.4	3.6
01Jan2013	10:15	10.4	0.9	482.4	3.8
01Jan2013	10:20	11.0	0.9	482.5	4.0
01Jan2013	10:25	11.7	1.0	482.5	4.2
01Jan2013	10:30	12.5	1.0	482.5	4.4
01Jan2013	10:35	13.3	1.1	482.6	4.6
01Jan2013	10:40	14.2	1.1	482.6	4.8
01Jan2013	10:45	15.1	1.2	482.6	5.0
01Jan2013	10:50	16.2	1.3	482.7	5.2
01Jan2013	10:55	17.4	1.3	482.7	5.4
01Jan2013	11:00	18.7	1.4	482.8	5.7
01Jan2013	11:05	20.2	1.5	482.8	6.0
01Jan2013	11:10	21.8	1.6	482.9	6.3
01Jan2013	11:15	23.6	1.7	482.9	6.7
01Jan2013	11:20	25.8	1.9	483.0	7.1
01Jan2013	11:25	28.4	2.0	483.0	7.4
01Jan2013	11:30	31.4	2.2	483.1	7.7
01Jan2013	11:35	35.4	2.3	483.1	8.1
01Jan2013	11:40	42.9	2.5	483.2	8.5
01Jan2013	11:45	58.0	2.8	483.3	9.1
01Jan2013	11:50	88.6	3.3	483.4	9.9
01Jan2013	11:55	143.9	4.0	483.7	10.8
01Jan2013	12:00	224.5	5.2	484.0	12.1
01Jan2013	12:05	314.3	6.9	484.4	60.2
01Jan2013	12:10	381.3	8.3	484.7	224.0
01Jan2013	12:15	397.6	9.0	484.9	333.8
01Jan2013	12:20	361.8	9.2	485.0	365.9

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	296.8	9.0	484.9	338.9
01Jan2013	12:30	231.4	8.7	484.8	287.9
01Jan2013	12:35	181.5	8.3	484.8	234.7
01Jan2013	12:40	146.5	8.0	484.7	190.4
01Jan2013	12:45	120.2	7.8	484.6	156.3
01Jan2013	12:50	99.9	7.6	484.6	129.8
01Jan2013	12:55	84.7	7.4	484.5	109.1
01Jan2013	13:00	73.4	7.2	484.5	93.2
01Jan2013	13:05	69.7	7.1	484.5	82.2
01Jan2013	13:10	88.2	7.1	484.5	80.5
01Jan2013	13:15	113.6	7.2	484.5	90.9
01Jan2013	13:20	126.0	7.3	484.5	106.1
01Jan2013	13:25	126.5	7.4	484.6	117.0
01Jan2013	13:30	121.0	7.5	484.6	120.8
01Jan2013	13:35	113.3	7.5	484.6	118.7
01Jan2013	13:40	105.4	7.4	484.6	113.4
01Jan2013	13:45	98.0	7.4	484.5	106.9
01Jan2013	13:50	91.6	7.3	484.5	100.3
01Jan2013	13:55	86.0	7.2	484.5	94.1
01Jan2013	14:00	81.0	7.2	484.5	88.5
01Jan2013	14:05	76.6	7.1	484.5	83.5
01Jan2013	14:10	72.7	7.1	484.5	79.0
01Jan2013	14:15	69.1	7.0	484.5	74.9
01Jan2013	14:20	65.9	7.0	484.5	71.3
01Jan2013	14:25	63.1	7.0	484.5	68.0
01Jan2013	14:30	60.6	6.9	484.4	65.0
01Jan2013	14:35	58.4	6.9	484.4	62.4
01Jan2013	14:40	56.5	6.9	484.4	60.1
01Jan2013	14:45	54.8	6.9	484.4	58.0
01Jan2013	14:50	53.3	6.8	484.4	56.2
01Jan2013	14:55	51.9	6.8	484.4	54.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	50.7	6.8	484.4	53.1
01Jan2013	15:05	49.6	6.8	484.4	51.8
01Jan2013	15:10	48.5	6.8	484.4	50.6
01Jan2013	15:15	47.5	6.8	484.4	49.4
01Jan2013	15:20	46.6	6.7	484.4	48.4
01Jan2013	15:25	45.7	6.7	484.4	47.4
01Jan2013	15:30	44.8	6.7	484.4	46.5
01Jan2013	15:35	43.9	6.7	484.4	45.6
01Jan2013	15:40	43.1	6.7	484.4	44.7
01Jan2013	15:45	42.3	6.7	484.4	43.8
01Jan2013	15:50	41.4	6.7	484.4	43.0
01Jan2013	15:55	40.7	6.7	484.4	42.2
01Jan2013	16:00	39.9	6.7	484.4	41.4
01Jan2013	16:05	39.1	6.6	484.4	40.6
01Jan2013	16:10	38.3	6.6	484.4	39.8
01Jan2013	16:15	37.5	6.6	484.4	39.0
01Jan2013	16:20	36.7	6.6	484.4	38.3
01Jan2013	16:25	36.0	6.6	484.4	37.5
01Jan2013	16:30	35.4	6.6	484.4	36.8
01Jan2013	16:35	34.8	6.6	484.4	36.1
01Jan2013	16:40	34.2	6.6	484.4	35.5
01Jan2013	16:45	33.7	6.6	484.4	34.9
01Jan2013	16:50	33.2	6.6	484.4	34.4
01Jan2013	16:55	32.7	6.5	484.4	33.8
01Jan2013	17:00	32.3	6.5	484.4	33.3
01Jan2013	17:05	31.9	6.5	484.4	32.9
01Jan2013	17:10	31.6	6.5	484.4	32.5
01Jan2013	17:15	31.2	6.5	484.4	32.1
01Jan2013	17:20	30.9	6.5	484.4	31.7
01Jan2013	17:25	30.5	6.5	484.3	31.3
01Jan2013	17:30	30.1	6.5	484.3	31.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	29.8	6.5	484.3	30.6
01Jan2013	17:40	29.6	6.5	484.3	30.3
01Jan2013	17:45	29.3	6.5	484.3	30.0
01Jan2013	17:50	29.0	6.5	484.3	29.7
01Jan2013	17:55	28.7	6.5	484.3	29.4
01Jan2013	18:00	28.4	6.5	484.3	29.1
01Jan2013	18:05	28.1	6.5	484.3	28.8
01Jan2013	18:10	27.8	6.5	484.3	28.5
01Jan2013	18:15	27.5	6.5	484.3	28.2
01Jan2013	18:20	27.2	6.5	484.3	27.9
01Jan2013	18:25	27.0	6.5	484.3	27.6
01Jan2013	18:30	26.7	6.4	484.3	27.4
01Jan2013	18:35	26.4	6.4	484.3	27.1
01Jan2013	18:40	26.1	6.4	484.3	26.8
01Jan2013	18:45	25.8	6.4	484.3	26.5
01Jan2013	18:50	25.5	6.4	484.3	26.2
01Jan2013	18:55	25.2	6.4	484.3	25.9
01Jan2013	19:00	24.9	6.4	484.3	25.6
01Jan2013	19:05	24.7	6.4	484.3	25.4
01Jan2013	19:10	24.4	6.4	484.3	25.1
01Jan2013	19:15	24.1	6.4	484.3	24.8
01Jan2013	19:20	23.8	6.4	484.3	24.5
01Jan2013	19:25	23.5	6.4	484.3	24.2
01Jan2013	19:30	23.2	6.4	484.3	24.0
01Jan2013	19:35	23.0	6.4	484.3	23.7
01Jan2013	19:40	22.7	6.4	484.3	23.4
01Jan2013	19:45	22.4	6.4	484.3	23.1
01Jan2013	19:50	22.0	6.4	484.3	22.8
01Jan2013	19:55	21.7	6.4	484.3	22.5
01Jan2013	20:00	21.4	6.4	484.3	22.3
01Jan2013	20:05	21.2	6.3	484.3	22.0

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	20.9	6.3	484.3	21.7
01Jan2013	20:15	20.6	6.3	484.3	21.4
01Jan2013	20:20	20.4	6.3	484.3	21.2
01Jan2013	20:25	20.1	6.3	484.3	20.9
01Jan2013	20:30	19.9	6.3	484.3	20.6
01Jan2013	20:35	19.7	6.3	484.3	20.4
01Jan2013	20:40	19.5	6.3	484.3	20.1
01Jan2013	20:45	19.3	6.3	484.3	19.9
01Jan2013	20:50	19.2	6.3	484.3	19.7
01Jan2013	20:55	19.0	6.3	484.3	19.6
01Jan2013	21:00	18.9	6.3	484.3	19.4
01Jan2013	21:05	18.7	6.3	484.3	19.2
01Jan2013	21:10	18.6	6.3	484.3	19.1
01Jan2013	21:15	18.5	6.3	484.3	18.9
01Jan2013	21:20	18.5	6.3	484.3	18.8
01Jan2013	21:25	18.4	6.3	484.3	18.7
01Jan2013	21:30	18.3	6.3	484.3	18.6
01Jan2013	21:35	18.2	6.3	484.3	18.5
01Jan2013	21:40	18.2	6.3	484.3	18.4
01Jan2013	21:45	18.1	6.3	484.3	18.4
01Jan2013	21:50	18.1	6.3	484.3	18.3
01Jan2013	21:55	18.0	6.3	484.3	18.2
01Jan2013	22:00	18.0	6.3	484.3	18.2
01Jan2013	22:05	17.9	6.3	484.3	18.1
01Jan2013	22:10	17.8	6.3	484.3	18.0
01Jan2013	22:15	17.8	6.3	484.3	18.0
01Jan2013	22:20	17.7	6.3	484.3	17.9
01Jan2013	22:25	17.7	6.3	484.3	17.9
01Jan2013	22:30	17.6	6.3	484.3	17.8
01Jan2013	22:35	17.5	6.3	484.3	17.7
01Jan2013	22:40	17.5	6.3	484.3	17.7

APPENDIX B2
EXISTING CONDITIONS
100-YEAR HEC-HMS OUTPUT

Project: Laredo Existing Simulation Run: 100 year

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, 12:28:56 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A8	0.7000	1014.4	01Jan2013, 12:30	4.34
Reach A7-8	0.7000	1013.0	01Jan2013, 12:45	4.33
A7	0.4580	741.2	01Jan2013, 12:35	4.95
Junction-A6-7	1.1580	1719.7	01Jan2013, 12:40	4.57
Reach A6-7	1.1580	1705.2	01Jan2013, 12:50	4.57
A6	0.1240	448.6	01Jan2013, 12:05	5.58
Junction-A5-6	1.2820	1773.1	01Jan2013, 12:45	4.67
Reach A5-6	1.2820	1771.8	01Jan2013, 12:55	4.66
A5	0.0980	358.8	01Jan2013, 12:05	5.95
Junction-A4-5	1.3800	1818.9	01Jan2013, 12:55	4.75
Reach A4-5	1.3800	1809.8	01Jan2013, 13:10	4.74
D3	0.1750	472.4	01Jan2013, 12:15	5.95
Reach D2-3	0.1750	467.8	01Jan2013, 12:20	5.95
D2	0.0312	101.6	01Jan2013, 12:10	5.71
Offsite Excav. D2	0.2062	383.2	01Jan2013, 12:35	3.82
Reach D1-2	0.2062	375.6	01Jan2013, 12:40	3.81
D1	0.0300	130.1	01Jan2013, 12:05	6.57
Junction D1	0.2362	396.5	01Jan2013, 12:40	4.16
Reach D2-2	0.2362	392.6	01Jan2013, 12:50	4.16
LF-6A	0.1411	461.7	01Jan2013, 12:10	6.57
Pond C	0.3773	549.4	01Jan2013, 12:20	4.75
LF-6C	0.0051	20.3	01Jan2013, 12:05	6.57
Junction C2	0.3824	561.0	01Jan2013, 12:20	4.78
Reach C1-2	0.3824	553.4	01Jan2013, 12:25	4.77
LF-6B	0.0221	78.6	01Jan2013, 12:10	6.57
Junction C1	0.4045	600.9	01Jan2013, 12:25	4.87

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Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Reach A-C1	0.4045	600.9	01Jan2013, 12:30	4.86
A4	0.1580	247.7	01Jan2013, 12:30	4.34
Junction-A3-4	1.9425	2395.5	01Jan2013, 13:10	4.73
Reach A3-4	1.9425	2394.7	01Jan2013, 13:15	4.73
LF-5	0.0412	138.9	01Jan2013, 12:10	6.57
A3	0.0100	39.5	01Jan2013, 12:05	5.58
Junction-A2-3	1.9937	2415.5	01Jan2013, 13:15	4.77
Reach A2-3	1.9937	2415.5	01Jan2013, 13:30	4.75
LF-4	0.0271	84.7	01Jan2013, 12:15	6.57
Pond B	0.0271	10.2	01Jan2013, 13:30	4.28
A2	0.0260	88.2	01Jan2013, 12:05	5.58
Junction-A1-2	2.0468	2432.9	01Jan2013, 13:30	4.75
Reach A1-2	2.0468	2419.0	01Jan2013, 13:40	4.74
LF-2	0.0561	175.6	01Jan2013, 12:15	6.57
Pond A	0.0561	152.3	01Jan2013, 12:25	6.68
B2	0.0360	126.3	01Jan2013, 12:10	6.08
LF-1	0.0020	10.3	01Jan2013, 12:00	6.57
Junction B1	0.0380	131.8	01Jan2013, 12:10	6.10
Reach B1-2	0.0380	131.8	01Jan2013, 12:15	6.10
B1	0.0310	66.5	01Jan2013, 12:15	4.35
A1	0.0260	97.5	01Jan2013, 12:05	5.58
LF-3	0.0180	75.2	01Jan2013, 12:05	6.57
Outfall	2.2159	2473.0	01Jan2013, 13:40	4.83

Project: Laredo Existing

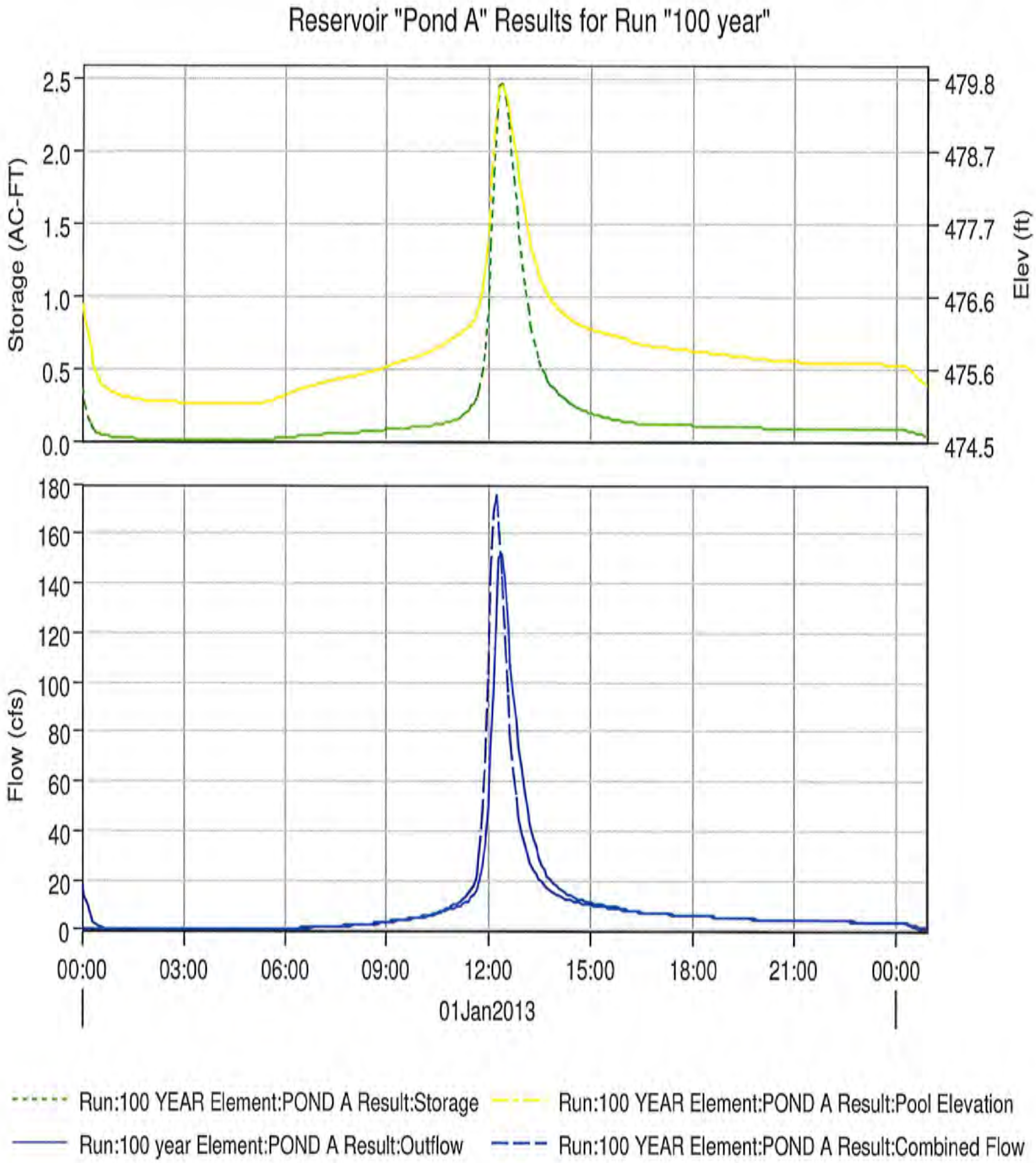
Simulation Run: 100 year Reservoir: Pond A

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, 12:28:56	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	175.6 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:15
Peak Outflow :	152.3 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:25
Total Inflow :	6.57 (IN)	Peak Storage :	2.5 (AC-FT)
Total Outflow :	6.68 (IN)	Peak Elevation :	479.7 (FT)



Reservoir "Pond A" Results for Run "100 year"
Storage (AC-FT)
Elev (ft)
Flow (cfs)
2.5
2.0
1.5
1.0
0.5
0.0
479.8
478.7
477.7
476.6
475.6
474.5
180
160
140
120
100
80
60
40
20
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 Existing
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, 12:28:56 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.4	476.5	18.9
01Jan2013	00:05	0.0	0.3	476.3	13.6
01Jan2013	00:10	0.0	0.2	476.1	10.2
01Jan2013	00:15	0.0	0.1	475.8	6.2
01Jan2013	00:20	0.0	0.1	475.6	3.3
01Jan2013	00:25	0.0	0.1	475.5	2.0
01Jan2013	00:30	0.0	0.1	475.4	1.4
01Jan2013	00:35	0.0	0.0	475.3	1.0
01Jan2013	00:40	0.0	0.0	475.3	0.7
01Jan2013	00:45	0.0	0.0	475.2	0.6
01Jan2013	00:50	0.0	0.0	475.2	0.5
01Jan2013	00:55	0.0	0.0	475.2	0.4
01Jan2013	01:00	0.0	0.0	475.2	0.3
01Jan2013	01:05	0.0	0.0	475.2	0.3
01Jan2013	01:10	0.0	0.0	475.2	0.2
01Jan2013	01:15	0.0	0.0	475.1	0.2
01Jan2013	01:20	0.0	0.0	475.1	0.2
01Jan2013	01:25	0.0	0.0	475.1	0.1
01Jan2013	01:30	0.0	0.0	475.1	0.1
01Jan2013	01:35	0.0	0.0	475.1	0.1
01Jan2013	01:40	0.0	0.0	475.1	0.1
01Jan2013	01:45	0.0	0.0	475.1	0.1
01Jan2013	01:50	0.0	0.0	475.1	0.1
01Jan2013	01:55	0.0	0.0	475.1	0.1
01Jan2013	02:00	0.0	0.0	475.1	0.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	475.1	0.1
01Jan2013	02:10	0.0	0.0	475.1	0.1
01Jan2013	02:15	0.0	0.0	475.1	0.1
01Jan2013	02:20	0.0	0.0	475.1	0.1
01Jan2013	02:25	0.0	0.0	475.1	0.1
01Jan2013	02:30	0.0	0.0	475.1	0.0
01Jan2013	02:35	0.0	0.0	475.1	0.0
01Jan2013	02:40	0.0	0.0	475.1	0.0
01Jan2013	02:45	0.0	0.0	475.1	0.0
01Jan2013	02:50	0.0	0.0	475.1	0.0
01Jan2013	02:55	0.0	0.0	475.1	0.0
01Jan2013	03:00	0.0	0.0	475.1	0.0
01Jan2013	03:05	0.0	0.0	475.1	0.0
01Jan2013	03:10	0.0	0.0	475.1	0.0
01Jan2013	03:15	0.0	0.0	475.1	0.0
01Jan2013	03:20	0.0	0.0	475.1	0.0
01Jan2013	03:25	0.0	0.0	475.1	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	0.1	0.0	475.0	0.0
01Jan2013	05:05	0.1	0.0	475.0	0.0
01Jan2013	05:10	0.1	0.0	475.0	0.0
01Jan2013	05:15	0.2	0.0	475.1	0.0
01Jan2013	05:20	0.2	0.0	475.1	0.0
01Jan2013	05:25	0.2	0.0	475.1	0.0
01Jan2013	05:30	0.3	0.0	475.1	0.1
01Jan2013	05:35	0.3	0.0	475.1	0.1
01Jan2013	05:40	0.4	0.0	475.1	0.1
01Jan2013	05:45	0.4	0.0	475.1	0.1
01Jan2013	05:50	0.5	0.0	475.1	0.2
01Jan2013	05:55	0.5	0.0	475.2	0.2
01Jan2013	06:00	0.6	0.0	475.2	0.3
01Jan2013	06:05	0.6	0.0	475.2	0.3
01Jan2013	06:10	0.7	0.0	475.2	0.4
01Jan2013	06:15	0.7	0.0	475.2	0.4
01Jan2013	06:20	0.8	0.0	475.2	0.5
01Jan2013	06:25	0.9	0.0	475.2	0.6
01Jan2013	06:30	0.9	0.0	475.3	0.6
01Jan2013	06:35	1.0	0.0	475.3	0.7
01Jan2013	06:40	1.0	0.0	475.3	0.8
01Jan2013	06:45	1.1	0.0	475.3	0.9
01Jan2013	06:50	1.2	0.0	475.3	0.9
01Jan2013	06:55	1.2	0.0	475.3	1.0
01Jan2013	07:00	1.3	0.0	475.3	1.1
01Jan2013	07:05	1.3	0.0	475.3	1.1
01Jan2013	07:10	1.4	0.0	475.4	1.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	1.5	0.0	475.4	1.3
01Jan2013	07:20	1.5	0.1	475.4	1.3
01Jan2013	07:25	1.6	0.1	475.4	1.4
01Jan2013	07:30	1.7	0.1	475.4	1.5
01Jan2013	07:35	1.7	0.1	475.4	1.5
01Jan2013	07:40	1.8	0.1	475.4	1.6
01Jan2013	07:45	1.9	0.1	475.4	1.7
01Jan2013	07:50	1.9	0.1	475.4	1.7
01Jan2013	07:55	2.0	0.1	475.4	1.8
01Jan2013	08:00	2.0	0.1	475.5	1.9
01Jan2013	08:05	2.1	0.1	475.5	1.9
01Jan2013	08:10	2.2	0.1	475.5	2.0
01Jan2013	08:15	2.3	0.1	475.5	2.1
01Jan2013	08:20	2.3	0.1	475.5	2.2
01Jan2013	08:25	2.4	0.1	475.5	2.3
01Jan2013	08:30	2.6	0.1	475.5	2.3
01Jan2013	08:35	2.7	0.1	475.5	2.5
01Jan2013	08:40	2.8	0.1	475.5	2.6
01Jan2013	08:45	3.0	0.1	475.5	2.7
01Jan2013	08:50	3.1	0.1	475.6	2.8
01Jan2013	08:55	3.3	0.1	475.6	3.0
01Jan2013	09:00	3.5	0.1	475.6	3.1
01Jan2013	09:05	3.6	0.1	475.6	3.3
01Jan2013	09:10	3.8	0.1	475.6	3.5
01Jan2013	09:15	4.0	0.1	475.6	3.7
01Jan2013	09:20	4.1	0.1	475.7	3.8
01Jan2013	09:25	4.3	0.1	475.7	4.0
01Jan2013	09:30	4.4	0.1	475.7	4.2
01Jan2013	09:35	4.5	0.1	475.7	4.3
01Jan2013	09:40	4.6	0.1	475.7	4.4
01Jan2013	09:45	4.8	0.1	475.7	4.6

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	4.9	0.1	475.7	4.7
01Jan2013	09:55	5.1	0.1	475.7	4.8
01Jan2013	10:00	5.3	0.1	475.7	5.0
01Jan2013	10:05	5.5	0.1	475.8	5.2
01Jan2013	10:10	5.8	0.1	475.8	5.4
01Jan2013	10:15	6.1	0.1	475.8	5.7
01Jan2013	10:20	6.4	0.1	475.8	6.0
01Jan2013	10:25	6.7	0.1	475.8	6.3
01Jan2013	10:30	7.1	0.1	475.9	6.6
01Jan2013	10:35	7.5	0.1	475.9	7.0
01Jan2013	10:40	8.0	0.1	475.9	7.4
01Jan2013	10:45	8.5	0.1	475.9	7.9
01Jan2013	10:50	9.0	0.1	476.0	8.4
01Jan2013	10:55	9.6	0.1	476.0	8.8
01Jan2013	11:00	10.2	0.1	476.0	9.1
01Jan2013	11:05	11.0	0.2	476.0	9.4
01Jan2013	11:10	11.7	0.2	476.1	9.9
01Jan2013	11:15	12.7	0.2	476.1	10.4
01Jan2013	11:20	13.7	0.2	476.1	11.1
01Jan2013	11:25	15.0	0.2	476.2	11.9
01Jan2013	11:30	16.4	0.2	476.2	12.9
01Jan2013	11:35	18.4	0.3	476.3	14.1
01Jan2013	11:40	22.0	0.3	476.4	15.7
01Jan2013	11:45	29.1	0.4	476.5	18.5
01Jan2013	11:50	43.4	0.5	476.7	24.0
01Jan2013	11:55	68.2	0.6	477.1	34.3
01Jan2013	12:00	103.4	0.9	477.6	49.9
01Jan2013	12:05	141.6	1.4	478.2	72.2
01Jan2013	12:10	168.8	1.8	478.9	95.9
01Jan2013	12:15	175.6	2.3	479.4	128.6
01Jan2013	12:20	164.4	2.5	479.7	150.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	142.8	2.5	479.7	152.3
01Jan2013	12:30	117.5	2.4	479.6	140.2
01Jan2013	12:35	94.6	2.2	479.3	123.1
01Jan2013	12:40	77.4	2.0	479.1	105.8
01Jan2013	12:45	64.2	1.8	478.9	94.5
01Jan2013	12:50	53.7	1.6	478.6	84.3
01Jan2013	12:55	45.5	1.4	478.3	74.4
01Jan2013	13:00	39.0	1.2	478.0	65.2
01Jan2013	13:05	34.0	1.0	477.8	56.0
01Jan2013	13:10	30.1	0.9	477.5	48.4
01Jan2013	13:15	27.0	0.8	477.3	42.3
01Jan2013	13:20	24.5	0.7	477.2	37.3
01Jan2013	13:25	22.5	0.6	477.0	33.3
01Jan2013	13:30	20.8	0.6	476.9	29.6
01Jan2013	13:35	19.4	0.5	476.8	26.4
01Jan2013	13:40	18.2	0.5	476.7	23.9
01Jan2013	13:45	17.0	0.4	476.6	21.9
01Jan2013	13:50	16.1	0.4	476.6	20.3
01Jan2013	13:55	15.2	0.4	476.5	18.9
01Jan2013	14:00	14.5	0.3	476.4	17.7
01Jan2013	14:05	13.9	0.3	476.4	16.7
01Jan2013	14:10	13.3	0.3	476.4	15.8
01Jan2013	14:15	12.8	0.3	476.3	15.1
01Jan2013	14:20	12.4	0.3	476.3	14.4
01Jan2013	14:25	12.0	0.3	476.3	13.8
01Jan2013	14:30	11.6	0.2	476.2	13.3
01Jan2013	14:35	11.3	0.2	476.2	12.8
01Jan2013	14:40	11.0	0.2	476.2	12.4
01Jan2013	14:45	10.8	0.2	476.2	12.0
01Jan2013	14:50	10.6	0.2	476.2	11.7
01Jan2013	14:55	10.4	0.2	476.1	11.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	10.2	0.2	476.1	11.1
01Jan2013	15:05	10.0	0.2	476.1	10.9
01Jan2013	15:10	9.8	0.2	476.1	10.6
01Jan2013	15:15	9.6	0.2	476.1	10.4
01Jan2013	15:20	9.5	0.2	476.1	10.2
01Jan2013	15:25	9.3	0.2	476.1	10.0
01Jan2013	15:30	9.1	0.2	476.1	9.8
01Jan2013	15:35	8.9	0.2	476.0	9.6
01Jan2013	15:40	8.7	0.2	476.0	9.4
01Jan2013	15:45	8.6	0.1	476.0	9.3
01Jan2013	15:50	8.4	0.1	476.0	9.1
01Jan2013	15:55	8.2	0.1	476.0	8.9
01Jan2013	16:00	8.1	0.1	476.0	8.7
01Jan2013	16:05	7.9	0.1	476.0	8.3
01Jan2013	16:10	7.7	0.1	476.0	8.0
01Jan2013	16:15	7.5	0.1	475.9	7.8
01Jan2013	16:20	7.4	0.1	475.9	7.6
01Jan2013	16:25	7.2	0.1	475.9	7.4
01Jan2013	16:30	7.1	0.1	475.9	7.3
01Jan2013	16:35	7.0	0.1	475.9	7.2
01Jan2013	16:40	7.0	0.1	475.9	7.1
01Jan2013	16:45	6.9	0.1	475.9	7.0
01Jan2013	16:50	6.8	0.1	475.9	6.9
01Jan2013	16:55	6.7	0.1	475.9	6.8
01Jan2013	17:00	6.7	0.1	475.9	6.8
01Jan2013	17:05	6.6	0.1	475.9	6.7
01Jan2013	17:10	6.5	0.1	475.9	6.6
01Jan2013	17:15	6.5	0.1	475.9	6.6
01Jan2013	17:20	6.4	0.1	475.9	6.5
01Jan2013	17:25	6.3	0.1	475.8	6.4
01Jan2013	17:30	6.2	0.1	475.8	6.3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	6.2	0.1	475.8	6.3
01Jan2013	17:40	6.1	0.1	475.8	6.2
01Jan2013	17:45	6.1	0.1	475.8	6.1
01Jan2013	17:50	6.0	0.1	475.8	6.1
01Jan2013	17:55	6.0	0.1	475.8	6.0
01Jan2013	18:00	5.9	0.1	475.8	6.0
01Jan2013	18:05	5.8	0.1	475.8	5.9
01Jan2013	18:10	5.8	0.1	475.8	5.8
01Jan2013	18:15	5.7	0.1	475.8	5.8
01Jan2013	18:20	5.6	0.1	475.8	5.7
01Jan2013	18:25	5.6	0.1	475.8	5.7
01Jan2013	18:30	5.5	0.1	475.8	5.6
01Jan2013	18:35	5.5	0.1	475.8	5.5
01Jan2013	18:40	5.4	0.1	475.8	5.5
01Jan2013	18:45	5.3	0.1	475.8	5.4
01Jan2013	18:50	5.2	0.1	475.8	5.3
01Jan2013	18:55	5.2	0.1	475.8	5.3
01Jan2013	19:00	5.1	0.1	475.8	5.2
01Jan2013	19:05	5.1	0.1	475.8	5.2
01Jan2013	19:10	5.0	0.1	475.8	5.1
01Jan2013	19:15	4.9	0.1	475.7	5.0
01Jan2013	19:20	4.9	0.1	475.7	5.0
01Jan2013	19:25	4.8	0.1	475.7	4.9
01Jan2013	19:30	4.8	0.1	475.7	4.8
01Jan2013	19:35	4.7	0.1	475.7	4.8
01Jan2013	19:40	4.6	0.1	475.7	4.7
01Jan2013	19:45	4.6	0.1	475.7	4.7
01Jan2013	19:50	4.5	0.1	475.7	4.6
01Jan2013	19:55	4.4	0.1	475.7	4.5
01Jan2013	20:00	4.4	0.1	475.7	4.5
01Jan2013	20:05	4.3	0.1	475.7	4.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	4.3	0.1	475.7	4.3
01Jan2013	20:15	4.2	0.1	475.7	4.3
01Jan2013	20:20	4.2	0.1	475.7	4.2
01Jan2013	20:25	4.1	0.1	475.7	4.2
01Jan2013	20:30	4.1	0.1	475.7	4.1
01Jan2013	20:35	4.0	0.1	475.7	4.1
01Jan2013	20:40	4.0	0.1	475.7	4.1
01Jan2013	20:45	4.0	0.1	475.7	4.0
01Jan2013	20:50	4.0	0.1	475.7	4.0
01Jan2013	20:55	3.9	0.1	475.7	4.0
01Jan2013	21:00	3.9	0.1	475.7	4.0
01Jan2013	21:05	3.9	0.1	475.7	3.9
01Jan2013	21:10	3.9	0.1	475.7	3.9
01Jan2013	21:15	3.9	0.1	475.7	3.9
01Jan2013	21:20	3.9	0.1	475.7	3.9
01Jan2013	21:25	3.9	0.1	475.7	3.9
01Jan2013	21:30	3.8	0.1	475.7	3.9
01Jan2013	21:35	3.8	0.1	475.7	3.9
01Jan2013	21:40	3.8	0.1	475.7	3.8
01Jan2013	21:45	3.8	0.1	475.7	3.8
01Jan2013	21:50	3.8	0.1	475.7	3.8
01Jan2013	21:55	3.8	0.1	475.7	3.8
01Jan2013	22:00	3.8	0.1	475.6	3.8
01Jan2013	22:05	3.8	0.1	475.6	3.8
01Jan2013	22:10	3.7	0.1	475.6	3.8
01Jan2013	22:15	3.7	0.1	475.6	3.8
01Jan2013	22:20	3.7	0.1	475.6	3.7
01Jan2013	22:25	3.7	0.1	475.6	3.7
01Jan2013	22:30	3.7	0.1	475.6	3.7
01Jan2013	22:35	3.7	0.1	475.6	3.7
01Jan2013	22:40	3.7	0.1	475.6	3.7

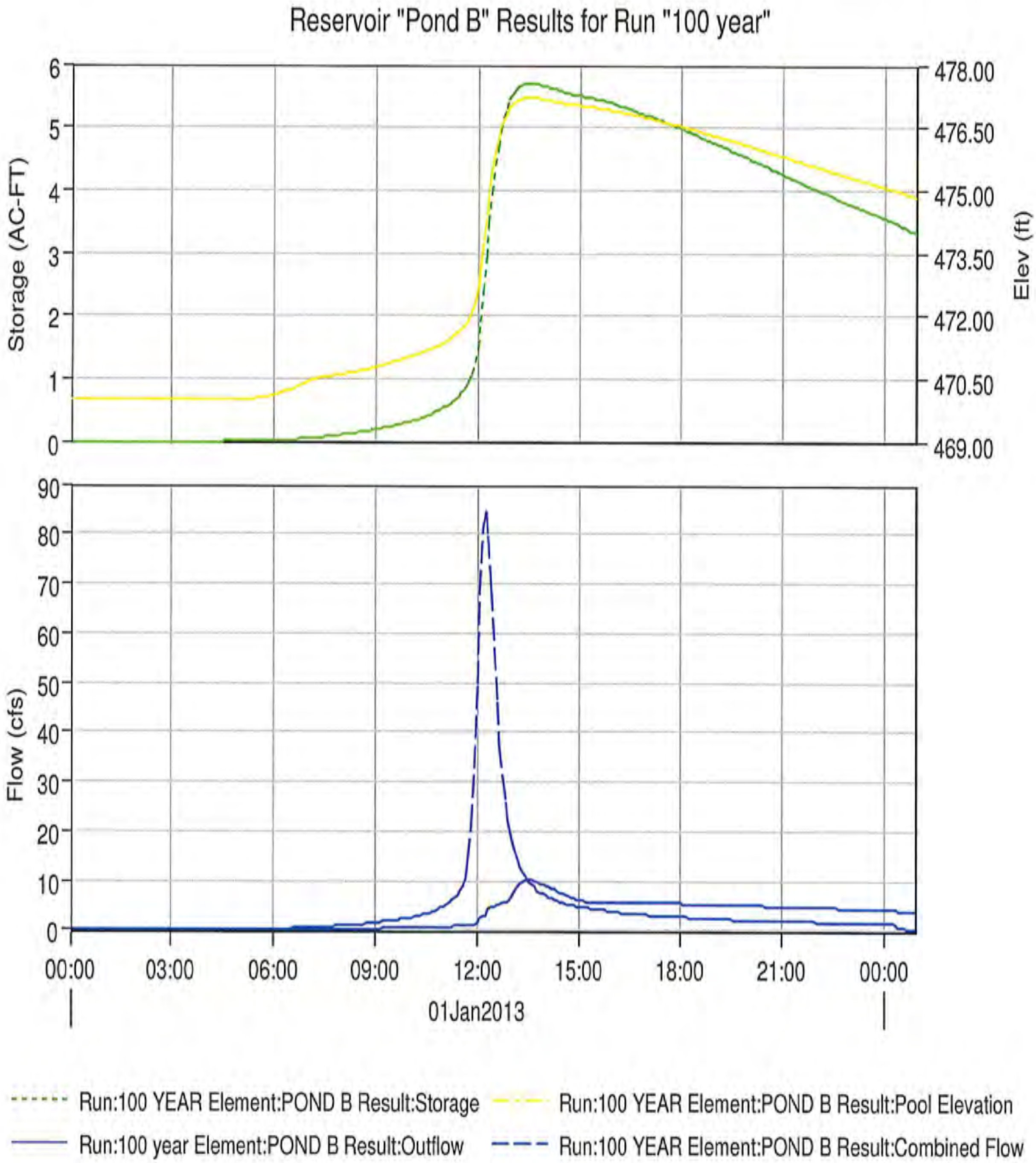
Project: Laredo Existing
Simulation Run: 100 year Reservoir: Pond B

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, 12:28:56	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	84.7 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:15
Peak Outflow :	10.2 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 13:30
Total Inflow :	6.57 (IN)	Peak Storage :	5.7 (AC-FT)
Total Outflow :	4.28 (IN)	Peak Elevation :	477.2 (FT)



Reservoir "Pond B" Results for Run "100 year"
Storage (AC-FT)
Elev (ft)
Flow (cfs)
0
1
2
3
4
5
6
469.00
470.50
472.00
473.50
475.00
476.50
478.00
0
10
20
30
40
50
60
70
80
90
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2013
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 Existing
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, 12:28:56 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	0.1	0.0	470.0	0.0
01Jan2013	05:15	0.1	0.0	470.0	0.0
01Jan2013	05:20	0.1	0.0	470.0	0.0
01Jan2013	05:25	0.1	0.0	470.0	0.0
01Jan2013	05:30	0.1	0.0	470.0	0.0
01Jan2013	05:35	0.2	0.0	470.0	0.0
01Jan2013	05:40	0.2	0.0	470.1	0.0
01Jan2013	05:45	0.2	0.0	470.1	0.0
01Jan2013	05:50	0.2	0.0	470.1	0.0
01Jan2013	05:55	0.3	0.0	470.1	0.0
01Jan2013	06:00	0.3	0.0	470.1	0.0
01Jan2013	06:05	0.3	0.0	470.1	0.0
01Jan2013	06:10	0.3	0.0	470.1	0.0
01Jan2013	06:15	0.4	0.0	470.2	0.0
01Jan2013	06:20	0.4	0.0	470.2	0.0
01Jan2013	06:25	0.4	0.0	470.2	0.0
01Jan2013	06:30	0.4	0.0	470.2	0.0
01Jan2013	06:35	0.5	0.0	470.3	0.0
01Jan2013	06:40	0.5	0.0	470.3	0.0
01Jan2013	06:45	0.5	0.0	470.3	0.0
01Jan2013	06:50	0.6	0.0	470.4	0.0
01Jan2013	06:55	0.6	0.0	470.4	0.0
01Jan2013	07:00	0.6	0.0	470.4	0.0
01Jan2013	07:05	0.6	0.1	470.5	0.0
01Jan2013	07:10	0.7	0.1	470.5	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	0.7	0.1	470.5	0.0
01Jan2013	07:20	0.7	0.1	470.5	0.0
01Jan2013	07:25	0.8	0.1	470.5	0.1
01Jan2013	07:30	0.8	0.1	470.5	0.1
01Jan2013	07:35	0.8	0.1	470.6	0.1
01Jan2013	07:40	0.9	0.1	470.6	0.1
01Jan2013	07:45	0.9	0.1	470.6	0.1
01Jan2013	07:50	0.9	0.1	470.6	0.1
01Jan2013	07:55	1.0	0.1	470.6	0.1
01Jan2013	08:00	1.0	0.1	470.6	0.2
01Jan2013	08:05	1.0	0.1	470.6	0.2
01Jan2013	08:10	1.1	0.1	470.6	0.2
01Jan2013	08:15	1.1	0.1	470.6	0.2
01Jan2013	08:20	1.1	0.1	470.7	0.2
01Jan2013	08:25	1.2	0.1	470.7	0.2
01Jan2013	08:30	1.2	0.1	470.7	0.3
01Jan2013	08:35	1.3	0.2	470.7	0.3
01Jan2013	08:40	1.4	0.2	470.7	0.3
01Jan2013	08:45	1.4	0.2	470.7	0.3
01Jan2013	08:50	1.5	0.2	470.7	0.3
01Jan2013	08:55	1.6	0.2	470.8	0.4
01Jan2013	09:00	1.7	0.2	470.8	0.4
01Jan2013	09:05	1.7	0.2	470.8	0.4
01Jan2013	09:10	1.8	0.2	470.8	0.5
01Jan2013	09:15	1.9	0.2	470.8	0.5
01Jan2013	09:20	2.0	0.2	470.9	0.5
01Jan2013	09:25	2.1	0.2	470.9	0.5
01Jan2013	09:30	2.1	0.3	470.9	0.6
01Jan2013	09:35	2.2	0.3	470.9	0.6
01Jan2013	09:40	2.2	0.3	471.0	0.6
01Jan2013	09:45	2.3	0.3	471.0	0.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	2.4	0.3	471.0	0.7
01Jan2013	09:55	2.5	0.3	471.0	0.7
01Jan2013	10:00	2.6	0.3	471.0	0.7
01Jan2013	10:05	2.7	0.3	471.1	0.7
01Jan2013	10:10	2.8	0.3	471.1	0.7
01Jan2013	10:15	2.9	0.4	471.1	0.7
01Jan2013	10:20	3.1	0.4	471.1	0.7
01Jan2013	10:25	3.3	0.4	471.1	0.8
01Jan2013	10:30	3.4	0.4	471.2	0.8
01Jan2013	10:35	3.6	0.4	471.2	0.8
01Jan2013	10:40	3.8	0.5	471.2	0.8
01Jan2013	10:45	4.1	0.5	471.3	0.8
01Jan2013	10:50	4.3	0.5	471.3	0.8
01Jan2013	10:55	4.6	0.5	471.3	0.8
01Jan2013	11:00	4.9	0.5	471.4	0.8
01Jan2013	11:05	5.3	0.6	471.4	0.9
01Jan2013	11:10	5.7	0.6	471.5	0.9
01Jan2013	11:15	6.1	0.6	471.5	0.9
01Jan2013	11:20	6.6	0.7	471.6	0.9
01Jan2013	11:25	7.2	0.7	471.6	1.0
01Jan2013	11:30	7.9	0.8	471.7	1.0
01Jan2013	11:35	8.9	0.8	471.8	1.1
01Jan2013	11:40	10.6	0.9	471.8	1.1
01Jan2013	11:45	14.0	1.0	471.9	1.2
01Jan2013	11:50	20.8	1.1	472.1	1.2
01Jan2013	11:55	32.7	1.2	472.3	1.3
01Jan2013	12:00	49.6	1.5	472.7	1.6
01Jan2013	12:05	68.0	1.9	473.2	2.3
01Jan2013	12:10	81.2	2.4	473.8	2.8
01Jan2013	12:15	84.7	3.0	474.4	3.2
01Jan2013	12:20	79.5	3.5	475.0	4.2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	69.2	4.0	475.5	4.7
01Jan2013	12:30	57.0	4.4	475.9	5.0
01Jan2013	12:35	45.9	4.7	476.2	5.3
01Jan2013	12:40	37.5	4.9	476.5	5.5
01Jan2013	12:45	31.2	5.1	476.7	5.6
01Jan2013	12:50	26.1	5.3	476.8	5.8
01Jan2013	12:55	22.1	5.4	476.9	5.9
01Jan2013	13:00	19.0	5.5	477.0	6.8
01Jan2013	13:05	16.5	5.6	477.1	8.1
01Jan2013	13:10	14.6	5.6	477.2	9.0
01Jan2013	13:15	13.1	5.7	477.2	9.6
01Jan2013	13:20	11.9	5.7	477.2	10.0
01Jan2013	13:25	10.9	5.7	477.2	10.1
01Jan2013	13:30	10.1	5.7	477.2	10.2
01Jan2013	13:35	9.4	5.7	477.2	10.1
01Jan2013	13:40	8.8	5.7	477.2	10.0
01Jan2013	13:45	8.3	5.7	477.2	9.8
01Jan2013	13:50	7.8	5.7	477.2	9.6
01Jan2013	13:55	7.4	5.7	477.2	9.4
01Jan2013	14:00	7.0	5.6	477.2	9.1
01Jan2013	14:05	6.7	5.6	477.1	8.8
01Jan2013	14:10	6.4	5.6	477.1	8.5
01Jan2013	14:15	6.2	5.6	477.1	8.3
01Jan2013	14:20	6.0	5.6	477.1	8.0
01Jan2013	14:25	5.8	5.6	477.1	7.7
01Jan2013	14:30	5.6	5.6	477.1	7.5
01Jan2013	14:35	5.5	5.6	477.1	7.3
01Jan2013	14:40	5.3	5.5	477.1	7.0
01Jan2013	14:45	5.2	5.5	477.0	6.8
01Jan2013	14:50	5.1	5.5	477.0	6.6
01Jan2013	14:55	5.0	5.5	477.0	6.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	4.9	5.5	477.0	6.2
01Jan2013	15:05	4.8	5.5	477.0	6.1
01Jan2013	15:10	4.8	5.5	477.0	5.9
01Jan2013	15:15	4.7	5.5	477.0	5.9
01Jan2013	15:20	4.6	5.5	477.0	5.9
01Jan2013	15:25	4.5	5.5	477.0	5.9
01Jan2013	15:30	4.4	5.4	477.0	5.9
01Jan2013	15:35	4.3	5.4	477.0	5.9
01Jan2013	15:40	4.2	5.4	476.9	5.9
01Jan2013	15:45	4.1	5.4	476.9	5.8
01Jan2013	15:50	4.1	5.4	476.9	5.8
01Jan2013	15:55	4.0	5.4	476.9	5.8
01Jan2013	16:00	3.9	5.4	476.9	5.8
01Jan2013	16:05	3.8	5.4	476.9	5.8
01Jan2013	16:10	3.7	5.3	476.9	5.8
01Jan2013	16:15	3.6	5.3	476.9	5.8
01Jan2013	16:20	3.6	5.3	476.8	5.8
01Jan2013	16:25	3.5	5.3	476.8	5.8
01Jan2013	16:30	3.4	5.3	476.8	5.8
01Jan2013	16:35	3.4	5.3	476.8	5.7
01Jan2013	16:40	3.4	5.3	476.8	5.7
01Jan2013	16:45	3.3	5.2	476.8	5.7
01Jan2013	16:50	3.3	5.2	476.8	5.7
01Jan2013	16:55	3.3	5.2	476.7	5.7
01Jan2013	17:00	3.2	5.2	476.7	5.7
01Jan2013	17:05	3.2	5.2	476.7	5.7
01Jan2013	17:10	3.2	5.2	476.7	5.7
01Jan2013	17:15	3.1	5.1	476.7	5.6
01Jan2013	17:20	3.1	5.1	476.7	5.6
01Jan2013	17:25	3.0	5.1	476.6	5.6
01Jan2013	17:30	3.0	5.1	476.6	5.6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	3.0	5.1	476.6	5.6
01Jan2013	17:40	3.0	5.0	476.6	5.6
01Jan2013	17:45	2.9	5.0	476.6	5.6
01Jan2013	17:50	2.9	5.0	476.6	5.5
01Jan2013	17:55	2.9	5.0	476.5	5.5
01Jan2013	18:00	2.8	5.0	476.5	5.5
01Jan2013	18:05	2.8	5.0	476.5	5.5
01Jan2013	18:10	2.8	4.9	476.5	5.5
01Jan2013	18:15	2.8	4.9	476.5	5.5
01Jan2013	18:20	2.7	4.9	476.4	5.5
01Jan2013	18:25	2.7	4.9	476.4	5.4
01Jan2013	18:30	2.7	4.9	476.4	5.4
01Jan2013	18:35	2.6	4.8	476.4	5.4
01Jan2013	18:40	2.6	4.8	476.4	5.4
01Jan2013	18:45	2.6	4.8	476.4	5.4
01Jan2013	18:50	2.5	4.8	476.3	5.4
01Jan2013	18:55	2.5	4.8	476.3	5.4
01Jan2013	19:00	2.5	4.7	476.3	5.3
01Jan2013	19:05	2.5	4.7	476.3	5.3
01Jan2013	19:10	2.4	4.7	476.3	5.3
01Jan2013	19:15	2.4	4.7	476.2	5.3
01Jan2013	19:20	2.4	4.7	476.2	5.3
01Jan2013	19:25	2.3	4.6	476.2	5.3
01Jan2013	19:30	2.3	4.6	476.2	5.2
01Jan2013	19:35	2.3	4.6	476.2	5.2
01Jan2013	19:40	2.2	4.6	476.1	5.2
01Jan2013	19:45	2.2	4.6	476.1	5.2
01Jan2013	19:50	2.2	4.5	476.1	5.2
01Jan2013	19:55	2.1	4.5	476.1	5.2
01Jan2013	20:00	2.1	4.5	476.1	5.1
01Jan2013	20:05	2.1	4.5	476.0	5.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	2.1	4.5	476.0	5.1
01Jan2013	20:15	2.0	4.4	476.0	5.1
01Jan2013	20:20	2.0	4.4	476.0	5.1
01Jan2013	20:25	2.0	4.4	475.9	5.1
01Jan2013	20:30	2.0	4.4	475.9	5.0
01Jan2013	20:35	1.9	4.4	475.9	5.0
01Jan2013	20:40	1.9	4.3	475.9	5.0
01Jan2013	20:45	1.9	4.3	475.9	5.0
01Jan2013	20:50	1.9	4.3	475.8	5.0
01Jan2013	20:55	1.9	4.3	475.8	5.0
01Jan2013	21:00	1.9	4.2	475.8	4.9
01Jan2013	21:05	1.9	4.2	475.8	4.9
01Jan2013	21:10	1.9	4.2	475.8	4.9
01Jan2013	21:15	1.9	4.2	475.7	4.9
01Jan2013	21:20	1.9	4.2	475.7	4.9
01Jan2013	21:25	1.9	4.1	475.7	4.9
01Jan2013	21:30	1.9	4.1	475.7	4.8
01Jan2013	21:35	1.9	4.1	475.7	4.8
01Jan2013	21:40	1.9	4.1	475.6	4.8
01Jan2013	21:45	1.9	4.1	475.6	4.8
01Jan2013	21:50	1.8	4.0	475.6	4.8
01Jan2013	21:55	1.8	4.0	475.6	4.8
01Jan2013	22:00	1.8	4.0	475.5	4.7
01Jan2013	22:05	1.8	4.0	475.5	4.7
01Jan2013	22:10	1.8	4.0	475.5	4.7
01Jan2013	22:15	1.8	3.9	475.5	4.7
01Jan2013	22:20	1.8	3.9	475.5	4.7
01Jan2013	22:25	1.8	3.9	475.4	4.6
01Jan2013	22:30	1.8	3.9	475.4	4.6
01Jan2013	22:35	1.8	3.9	475.4	4.6
01Jan2013	22:40	1.8	3.8	475.4	4.6

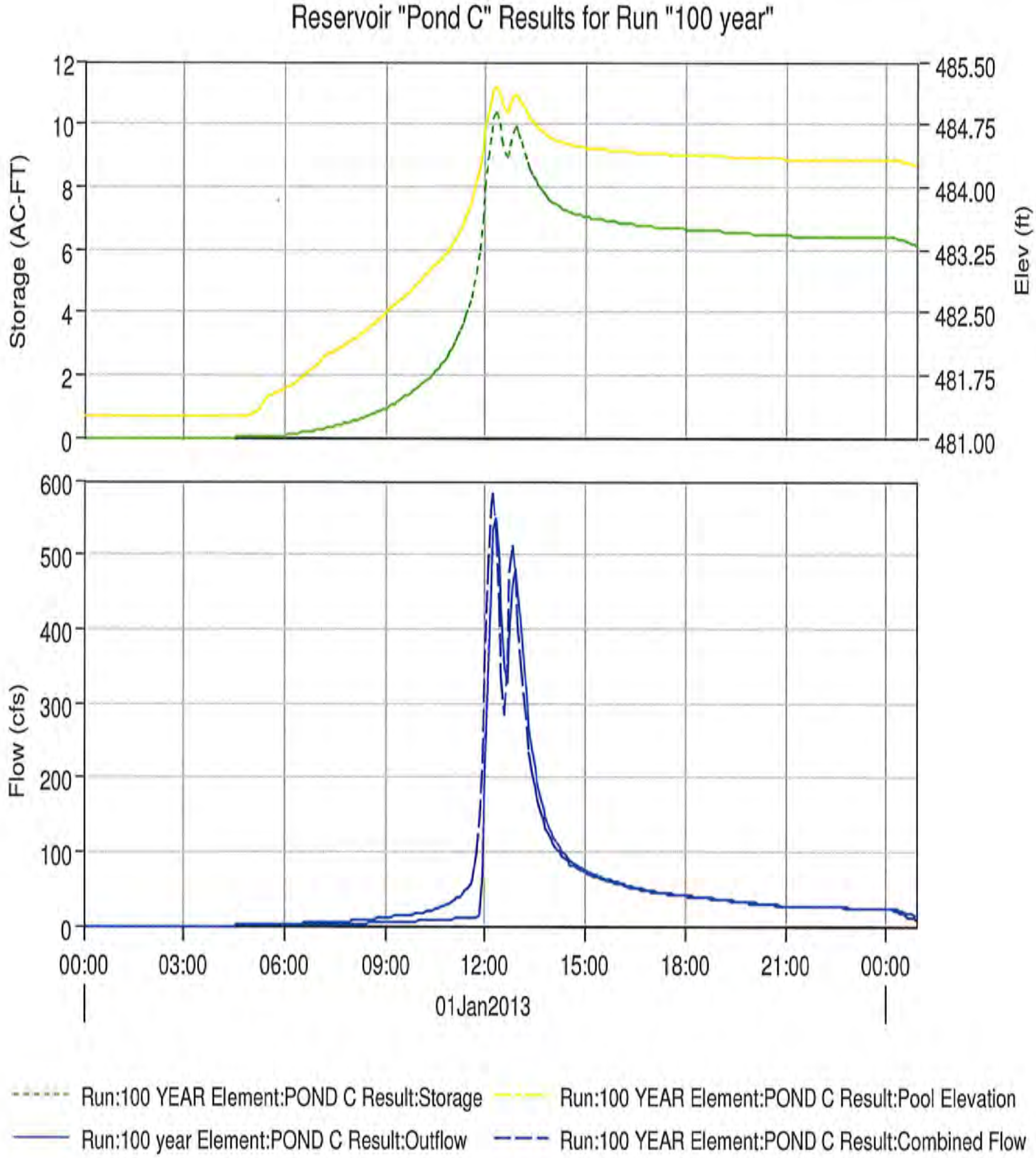
Project: Laredo Existing
Simulation Run: 100 year Reservoir: Pond C

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, 12:28:56	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	584.3 (CFS)	Date/Time of Peak Inflow :	01Jan2013, 12:15
Peak Outflow :	549.4 (CFS)	Date/Time of Peak Outflow :	01Jan2013, 12:20
Total Inflow :	5.06 (IN)	Peak Storage :	10.4 (AC-FT)
Total Outflow :	4.75 (IN)	Peak Elevation :	485.2 (FT)



Reservoir "Pond C" Results for Run "100 year"
Storage (AC-FT)
Elev (ft)
Flow (cfs)
12
10
8
6
4
2
0
485.50
484.75
484.00
483.25
482.50
481.75
481.00
600
500
400
300
200
100
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 C Result:Storage
Run:100 YEAR Element:POND C Result:Pool Elevation
Run:100 year Element:POND C Result:Outflow
Run:100 YEAR Element:POND C Result:Combined Flow

Project: Laredo Existing
Simulation Run: 100 year Reservoir: Pond C

Start of Run: 01Jan2013, 00:00 Basin Model: Basin 1
End of Run: 02Jan2013, 00:55 Meteorologic Model: 100 year 2
Compute Time: 17Sep2014, 12:28:56 Control Specifications: Contr

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	00:00	0.0	0.0	481.2	0.0
01Jan2013	00:05	0.0	0.0	481.2	0.0
01Jan2013	00:10	0.0	0.0	481.2	0.0
01Jan2013	00:15	0.0	0.0	481.2	0.0
01Jan2013	00:20	0.0	0.0	481.2	0.0
01Jan2013	00:25	0.0	0.0	481.2	0.0
01Jan2013	00:30	0.0	0.0	481.2	0.0
01Jan2013	00:35	0.0	0.0	481.2	0.0
01Jan2013	00:40	0.0	0.0	481.2	0.0
01Jan2013	00:45	0.0	0.0	481.2	0.0
01Jan2013	00:50	0.0	0.0	481.2	0.0
01Jan2013	00:55	0.0	0.0	481.2	0.0
01Jan2013	01:00	0.0	0.0	481.2	0.0
01Jan2013	01:05	0.0	0.0	481.2	0.0
01Jan2013	01:10	0.0	0.0	481.2	0.0
01Jan2013	01:15	0.0	0.0	481.2	0.0
01Jan2013	01:20	0.0	0.0	481.2	0.0
01Jan2013	01:25	0.0	0.0	481.2	0.0
01Jan2013	01:30	0.0	0.0	481.2	0.0
01Jan2013	01:35	0.0	0.0	481.2	0.0
01Jan2013	01:40	0.0	0.0	481.2	0.0
01Jan2013	01:45	0.0	0.0	481.2	0.0
01Jan2013	01:50	0.0	0.0	481.2	0.0
01Jan2013	01:55	0.0	0.0	481.2	0.0
01Jan2013	02:00	0.0	0.0	481.2	0.0

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	02:05	0.0	0.0	481.2	0.0
01Jan2013	02:10	0.0	0.0	481.2	0.0
01Jan2013	02:15	0.0	0.0	481.2	0.0
01Jan2013	02:20	0.0	0.0	481.2	0.0
01Jan2013	02:25	0.0	0.0	481.2	0.0
01Jan2013	02:30	0.0	0.0	481.2	0.0
01Jan2013	02:35	0.0	0.0	481.2	0.0
01Jan2013	02:40	0.0	0.0	481.2	0.0
01Jan2013	02:45	0.0	0.0	481.2	0.0
01Jan2013	02:50	0.0	0.0	481.2	0.0
01Jan2013	02:55	0.0	0.0	481.2	0.0
01Jan2013	03:00	0.0	0.0	481.2	0.0
01Jan2013	03:05	0.0	0.0	481.2	0.0
01Jan2013	03:10	0.0	0.0	481.2	0.0
01Jan2013	03:15	0.0	0.0	481.2	0.0
01Jan2013	03:20	0.0	0.0	481.2	0.0
01Jan2013	03:25	0.0	0.0	481.2	0.0
01Jan2013	03:30	0.0	0.0	481.2	0.0
01Jan2013	03:35	0.0	0.0	481.2	0.0
01Jan2013	03:40	0.0	0.0	481.2	0.0
01Jan2013	03:45	0.0	0.0	481.2	0.0
01Jan2013	03:50	0.0	0.0	481.2	0.0
01Jan2013	03:55	0.0	0.0	481.2	0.0
01Jan2013	04:00	0.0	0.0	481.2	0.0
01Jan2013	04:05	0.0	0.0	481.2	0.0
01Jan2013	04:10	0.0	0.0	481.2	0.0
01Jan2013	04:15	0.0	0.0	481.2	0.0
01Jan2013	04:20	0.0	0.0	481.2	0.0
01Jan2013	04:25	0.0	0.0	481.2	0.0
01Jan2013	04:30	0.0	0.0	481.2	0.0
01Jan2013	04:35	0.0	0.0	481.3	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	04:40	0.0	0.0	481.3	0.0
01Jan2013	04:45	0.0	0.0	481.3	0.0
01Jan2013	04:50	0.0	0.0	481.3	0.0
01Jan2013	04:55	0.1	0.0	481.3	0.0
01Jan2013	05:00	0.2	0.0	481.3	0.0
01Jan2013	05:05	0.3	0.0	481.3	0.0
01Jan2013	05:10	0.4	0.0	481.3	0.0
01Jan2013	05:15	0.5	0.0	481.4	0.0
01Jan2013	05:20	0.6	0.0	481.4	0.1
01Jan2013	05:25	0.8	0.0	481.4	0.1
01Jan2013	05:30	0.9	0.0	481.5	0.2
01Jan2013	05:35	1.1	0.0	481.5	0.2
01Jan2013	05:40	1.2	0.0	481.5	0.2
01Jan2013	05:45	1.4	0.0	481.5	0.3
01Jan2013	05:50	1.5	0.0	481.5	0.3
01Jan2013	05:55	1.7	0.1	481.6	0.3
01Jan2013	06:00	1.9	0.1	481.6	0.3
01Jan2013	06:05	2.0	0.1	481.6	0.4
01Jan2013	06:10	2.2	0.1	481.6	0.4
01Jan2013	06:15	2.4	0.1	481.6	0.5
01Jan2013	06:20	2.5	0.1	481.7	0.5
01Jan2013	06:25	2.7	0.1	481.7	0.6
01Jan2013	06:30	2.9	0.1	481.7	0.7
01Jan2013	06:35	3.1	0.2	481.7	0.7
01Jan2013	06:40	3.3	0.2	481.8	0.8
01Jan2013	06:45	3.4	0.2	481.8	0.9
01Jan2013	06:50	3.6	0.2	481.8	1.0
01Jan2013	06:55	3.8	0.2	481.9	1.1
01Jan2013	07:00	4.0	0.2	481.9	1.2
01Jan2013	07:05	4.2	0.3	481.9	1.4
01Jan2013	07:10	4.4	0.3	482.0	1.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	4.5	0.3	482.0	1.6
01Jan2013	07:20	4.7	0.3	482.0	1.7
01Jan2013	07:25	4.9	0.3	482.0	1.8
01Jan2013	07:30	5.1	0.4	482.0	1.9
01Jan2013	07:35	5.3	0.4	482.1	1.9
01Jan2013	07:40	5.6	0.4	482.1	2.0
01Jan2013	07:45	5.8	0.4	482.1	2.1
01Jan2013	07:50	5.9	0.5	482.1	2.2
01Jan2013	07:55	6.1	0.5	482.1	2.3
01Jan2013	08:00	6.3	0.5	482.2	2.4
01Jan2013	08:05	6.5	0.5	482.2	2.5
01Jan2013	08:10	6.8	0.6	482.2	2.6
01Jan2013	08:15	7.0	0.6	482.2	2.7
01Jan2013	08:20	7.3	0.6	482.3	2.9
01Jan2013	08:25	7.6	0.7	482.3	3.0
01Jan2013	08:30	7.9	0.7	482.3	3.1
01Jan2013	08:35	8.3	0.7	482.3	3.3
01Jan2013	08:40	8.8	0.8	482.4	3.4
01Jan2013	08:45	9.2	0.8	482.4	3.6
01Jan2013	08:50	9.7	0.8	482.4	3.8
01Jan2013	08:55	10.2	0.9	482.5	4.0
01Jan2013	09:00	10.8	0.9	482.5	4.2
01Jan2013	09:05	11.3	1.0	482.5	4.3
01Jan2013	09:10	11.8	1.0	482.5	4.5
01Jan2013	09:15	12.4	1.1	482.6	4.6
01Jan2013	09:20	12.9	1.1	482.6	4.8
01Jan2013	09:25	13.3	1.2	482.6	5.0
01Jan2013	09:30	13.7	1.2	482.7	5.1
01Jan2013	09:35	14.0	1.3	482.7	5.3
01Jan2013	09:40	14.3	1.4	482.7	5.5
01Jan2013	09:45	14.7	1.4	482.8	5.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	09:50	15.1	1.5	482.8	5.9
01Jan2013	09:55	15.7	1.6	482.8	6.1
01Jan2013	10:00	16.3	1.6	482.9	6.3
01Jan2013	10:05	17.1	1.7	482.9	6.6
01Jan2013	10:10	17.9	1.8	482.9	6.8
01Jan2013	10:15	18.8	1.8	483.0	7.1
01Jan2013	10:20	19.8	1.9	483.0	7.3
01Jan2013	10:25	21.0	2.0	483.0	7.5
01Jan2013	10:30	22.2	2.1	483.1	7.7
01Jan2013	10:35	23.5	2.2	483.1	7.9
01Jan2013	10:40	24.9	2.3	483.1	8.1
01Jan2013	10:45	26.4	2.5	483.2	8.3
01Jan2013	10:50	28.1	2.6	483.2	8.6
01Jan2013	10:55	29.9	2.7	483.3	8.9
01Jan2013	11:00	32.0	2.9	483.3	9.2
01Jan2013	11:05	34.3	3.0	483.4	9.5
01Jan2013	11:10	36.8	3.2	483.4	9.8
01Jan2013	11:15	39.7	3.4	483.5	10.1
01Jan2013	11:20	43.0	3.6	483.6	10.4
01Jan2013	11:25	47.0	3.9	483.6	10.7
01Jan2013	11:30	51.6	4.1	483.7	11.0
01Jan2013	11:35	57.9	4.4	483.8	11.3
01Jan2013	11:40	69.4	4.8	483.9	11.8
01Jan2013	11:45	92.5	5.3	484.1	12.1
01Jan2013	11:50	139.1	6.0	484.2	12.4
01Jan2013	11:55	221.5	7.0	484.5	68.3
01Jan2013	12:00	340.0	8.0	484.7	186.7
01Jan2013	12:05	469.9	8.9	484.9	329.3
01Jan2013	12:10	564.5	9.7	485.1	453.7
01Jan2013	12:15	584.3	10.2	485.2	532.8
01Jan2013	12:20	528.8	10.4	485.2	549.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	12:25	432.0	10.0	485.1	501.4
01Jan2013	12:30	335.5	9.5	485.0	425.6
01Jan2013	12:35	284.2	9.0	484.9	346.3
01Jan2013	12:40	355.3	8.9	484.9	326.9
01Jan2013	12:45	475.7	9.3	485.0	389.5
01Jan2013	12:50	513.0	9.8	485.1	457.5
01Jan2013	12:55	472.9	9.9	485.1	481.6
01Jan2013	13:00	412.1	9.7	485.1	455.1
01Jan2013	13:05	355.0	9.4	485.0	409.4
01Jan2013	13:10	306.4	9.1	484.9	354.3
01Jan2013	13:15	266.4	8.8	484.9	307.5
01Jan2013	13:20	234.0	8.6	484.8	269.1
01Jan2013	13:25	207.6	8.4	484.8	237.5
01Jan2013	13:30	186.1	8.2	484.7	211.6
01Jan2013	13:35	168.4	8.0	484.7	190.2
01Jan2013	13:40	153.7	7.9	484.7	171.8
01Jan2013	13:45	141.3	7.8	484.6	156.8
01Jan2013	13:50	131.1	7.7	484.6	144.4
01Jan2013	13:55	122.6	7.6	484.6	134.0
01Jan2013	14:00	115.3	7.5	484.6	125.3
01Jan2013	14:05	108.8	7.4	484.6	117.7
01Jan2013	14:10	103.1	7.4	484.5	111.1
01Jan2013	14:15	98.0	7.3	484.5	105.3
01Jan2013	14:20	93.4	7.3	484.5	100.0
01Jan2013	14:25	89.3	7.2	484.5	95.4
01Jan2013	14:30	85.8	7.2	484.5	91.2
01Jan2013	14:35	82.6	7.2	484.5	87.5
01Jan2013	14:40	79.9	7.1	484.5	84.3
01Jan2013	14:45	77.5	7.1	484.5	81.4
01Jan2013	14:50	75.4	7.1	484.5	78.9
01Jan2013	14:55	73.5	7.1	484.5	76.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	15:00	71.7	7.0	484.5	74.6
01Jan2013	15:05	70.1	7.0	484.5	72.8
01Jan2013	15:10	68.6	7.0	484.5	71.1
01Jan2013	15:15	67.2	7.0	484.5	69.5
01Jan2013	15:20	65.9	7.0	484.5	68.1
01Jan2013	15:25	64.6	7.0	484.5	66.7
01Jan2013	15:30	63.4	6.9	484.4	65.4
01Jan2013	15:35	62.1	6.9	484.4	64.1
01Jan2013	15:40	60.9	6.9	484.4	62.9
01Jan2013	15:45	59.8	6.9	484.4	61.7
01Jan2013	15:50	58.6	6.9	484.4	60.5
01Jan2013	15:55	57.5	6.9	484.4	59.4
01Jan2013	16:00	56.4	6.9	484.4	58.2
01Jan2013	16:05	55.2	6.8	484.4	57.1
01Jan2013	16:10	54.1	6.8	484.4	56.0
01Jan2013	16:15	52.9	6.8	484.4	54.9
01Jan2013	16:20	51.8	6.8	484.4	53.7
01Jan2013	16:25	50.8	6.8	484.4	52.7
01Jan2013	16:30	49.9	6.8	484.4	51.6
01Jan2013	16:35	49.1	6.8	484.4	50.7
01Jan2013	16:40	48.3	6.8	484.4	49.8
01Jan2013	16:45	47.6	6.8	484.4	49.0
01Jan2013	16:50	46.8	6.7	484.4	48.2
01Jan2013	16:55	46.1	6.7	484.4	47.5
01Jan2013	17:00	45.6	6.7	484.4	46.8
01Jan2013	17:05	45.1	6.7	484.4	46.2
01Jan2013	17:10	44.6	6.7	484.4	45.6
01Jan2013	17:15	44.1	6.7	484.4	45.0
01Jan2013	17:20	43.5	6.7	484.4	44.5
01Jan2013	17:25	43.0	6.7	484.4	44.0
01Jan2013	17:30	42.5	6.7	484.4	43.5

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	17:35	42.1	6.7	484.4	43.0
01Jan2013	17:40	41.7	6.7	484.4	42.5
01Jan2013	17:45	41.3	6.7	484.4	42.1
01Jan2013	17:50	40.9	6.7	484.4	41.7
01Jan2013	17:55	40.4	6.7	484.4	41.3
01Jan2013	18:00	40.0	6.6	484.4	40.8
01Jan2013	18:05	39.6	6.6	484.4	40.4
01Jan2013	18:10	39.2	6.6	484.4	40.0
01Jan2013	18:15	38.8	6.6	484.4	39.6
01Jan2013	18:20	38.4	6.6	484.4	39.2
01Jan2013	18:25	38.0	6.6	484.4	38.8
01Jan2013	18:30	37.6	6.6	484.4	38.4
01Jan2013	18:35	37.2	6.6	484.4	38.0
01Jan2013	18:40	36.8	6.6	484.4	37.6
01Jan2013	18:45	36.3	6.6	484.4	37.2
01Jan2013	18:50	35.9	6.6	484.4	36.7
01Jan2013	18:55	35.5	6.6	484.4	36.3
01Jan2013	19:00	35.1	6.6	484.4	35.9
01Jan2013	19:05	34.7	6.6	484.4	35.5
01Jan2013	19:10	34.3	6.6	484.4	35.1
01Jan2013	19:15	33.9	6.6	484.4	34.7
01Jan2013	19:20	33.4	6.6	484.4	34.3
01Jan2013	19:25	33.0	6.5	484.4	33.9
01Jan2013	19:30	32.7	6.5	484.4	33.5
01Jan2013	19:35	32.3	6.5	484.4	33.1
01Jan2013	19:40	31.9	6.5	484.4	32.7
01Jan2013	19:45	31.4	6.5	484.4	32.3
01Jan2013	19:50	31.0	6.5	484.4	31.9
01Jan2013	19:55	30.5	6.5	484.3	31.5
01Jan2013	20:00	30.1	6.5	484.3	31.1
01Jan2013	20:05	29.7	6.5	484.3	30.7

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	29.4	6.5	484.3	30.3
01Jan2013	20:15	29.0	6.5	484.3	29.9
01Jan2013	20:20	28.6	6.5	484.3	29.5
01Jan2013	20:25	28.2	6.5	484.3	29.1
01Jan2013	20:30	27.9	6.5	484.3	28.8
01Jan2013	20:35	27.6	6.5	484.3	28.4
01Jan2013	20:40	27.3	6.5	484.3	28.1
01Jan2013	20:45	27.1	6.5	484.3	27.8
01Jan2013	20:50	26.9	6.4	484.3	27.5
01Jan2013	20:55	26.7	6.4	484.3	27.3
01Jan2013	21:00	26.5	6.4	484.3	27.0
01Jan2013	21:05	26.3	6.4	484.3	26.8
01Jan2013	21:10	26.1	6.4	484.3	26.6
01Jan2013	21:15	26.0	6.4	484.3	26.4
01Jan2013	21:20	25.9	6.4	484.3	26.3
01Jan2013	21:25	25.8	6.4	484.3	26.1
01Jan2013	21:30	25.7	6.4	484.3	26.0
01Jan2013	21:35	25.6	6.4	484.3	25.9
01Jan2013	21:40	25.5	6.4	484.3	25.8
01Jan2013	21:45	25.5	6.4	484.3	25.7
01Jan2013	21:50	25.4	6.4	484.3	25.6
01Jan2013	21:55	25.3	6.4	484.3	25.5
01Jan2013	22:00	25.2	6.4	484.3	25.4
01Jan2013	22:05	25.1	6.4	484.3	25.4
01Jan2013	22:10	25.0	6.4	484.3	25.3
01Jan2013	22:15	24.9	6.4	484.3	25.2
01Jan2013	22:20	24.9	6.4	484.3	25.1
01Jan2013	22:25	24.8	6.4	484.3	25.0
01Jan2013	22:30	24.7	6.4	484.3	24.9
01Jan2013	22:35	24.6	6.4	484.3	24.9
01Jan2013	22:40	24.5	6.4	484.3	24.8

APPENDIX B3
PROPOSED CONDITIONS
25-YEAR HEC-HMS OUTPUT

Project: Laredo Proposed Simulation Run: 25 year

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

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A8	0.7000	583.3	01Jan2013, 12:35	2.58
Reach A7-8	0.7000	581.7	01Jan2013, 12:45	2.57
A7	0.4580	450.4	01Jan2013, 12:35	3.06
Junction A6-7	1.1580	1008.9	01Jan2013, 12:40	2.76
Reach A6-7	1.1580	1004.4	01Jan2013, 12:50	2.76
A6	0.1240	287.0	01Jan2013, 12:05	3.57
Junction A5-6	1.2820	1045.7	01Jan2013, 12:50	2.84
Reach A5-6	1.2820	1043.9	01Jan2013, 12:55	2.83
A5	0.0980	234.6	01Jan2013, 12:05	3.89
Junction A4-5	1.3800	1076.3	01Jan2013, 12:55	2.91
Reach A4-5	1.3800	1073.2	01Jan2013, 13:10	2.90
D3	0.1750	307.9	01Jan2013, 12:15	3.88
Reach D2-3	0.1750	306.1	01Jan2013, 12:20	3.88
D2	0.0312	65.6	01Jan2013, 12:10	3.68
Offsite Excav. D2	0.2062	82.5	01Jan2013, 13:10	1.74
Reach D1-2	0.2062	81.7	01Jan2013, 13:15	1.74
D1	0.0300	88.7	01Jan2013, 12:05	4.42
Junction D1	0.2362	89.3	01Jan2013, 13:10	2.08
Reach C2-D1	0.2362	89.1	01Jan2013, 13:30	2.07
LF-C1	0.0911	260.0	01Jan2013, 12:05	4.42
Pond C1	0.0911	62.3	01Jan2013, 12:35	4.34
LF-C2	0.0504	170.4	01Jan2013, 12:00	4.88
Pond C2	0.1415	76.6	01Jan2013, 12:50	3.60
LF-6C	0.0096	28.3	01Jan2013, 12:05	4.42
Junction C2	0.3873	161.5	01Jan2013, 13:30	2.68
Reach C1-2	0.3873	160.1	01Jan2013, 13:40	2.68

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
LF-6B	0.0153	54.5	01Jan2013, 12:00	4.42
Junction C1	0.4026	162.8	01Jan2013, 13:40	2.74
Reach A-C1	0.4026	162.8	01Jan2013, 13:45	2.74
A4	0.1580	142.8	01Jan2013, 12:30	2.58
Junction A3-4	1.9406	1233.6	01Jan2013, 13:10	2.84
Reach A3-4	1.9406	1233.1	01Jan2013, 13:15	2.84
A3	0.0100	25.5	01Jan2013, 12:05	3.57
LF-5A	0.0050	17.6	01Jan2013, 12:00	4.42
Junction A2-3	1.9556	1236.3	01Jan2013, 13:15	2.84
Reach A2-3	1.9556	1236.3	01Jan2013, 13:30	2.83
LF-B	0.0703	224.4	01Jan2013, 12:00	4.42
Pond B	0.0703	79.0	01Jan2013, 12:20	3.30
A2	0.0260	56.2	01Jan2013, 12:05	3.57
LF-5B	0.0049	18.1	01Jan2013, 12:00	4.42
Junction A1-2	2.0568	1262.3	01Jan2013, 13:30	2.86
Reach A1-2	2.0568	1257.7	01Jan2013, 13:40	2.85
LF-A	0.0545	167.7	01Jan2013, 12:05	4.42
Pond A	0.0545	122.3	01Jan2013, 12:10	4.41
B2	0.0360	83.7	01Jan2013, 12:10	3.99
LF-1	0.0028	10.2	01Jan2013, 12:00	4.42
Reach B1-2	0.0388	88.4	01Jan2013, 12:15	4.02
B1	0.0310	38.4	01Jan2013, 12:15	2.58
A1	0.0260	62.6	01Jan2013, 12:05	3.57
LF-3	0.0087	32.1	01Jan2013, 12:00	4.42
Outfall	2.2158	1288.9	01Jan2013, 13:40	2.92

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

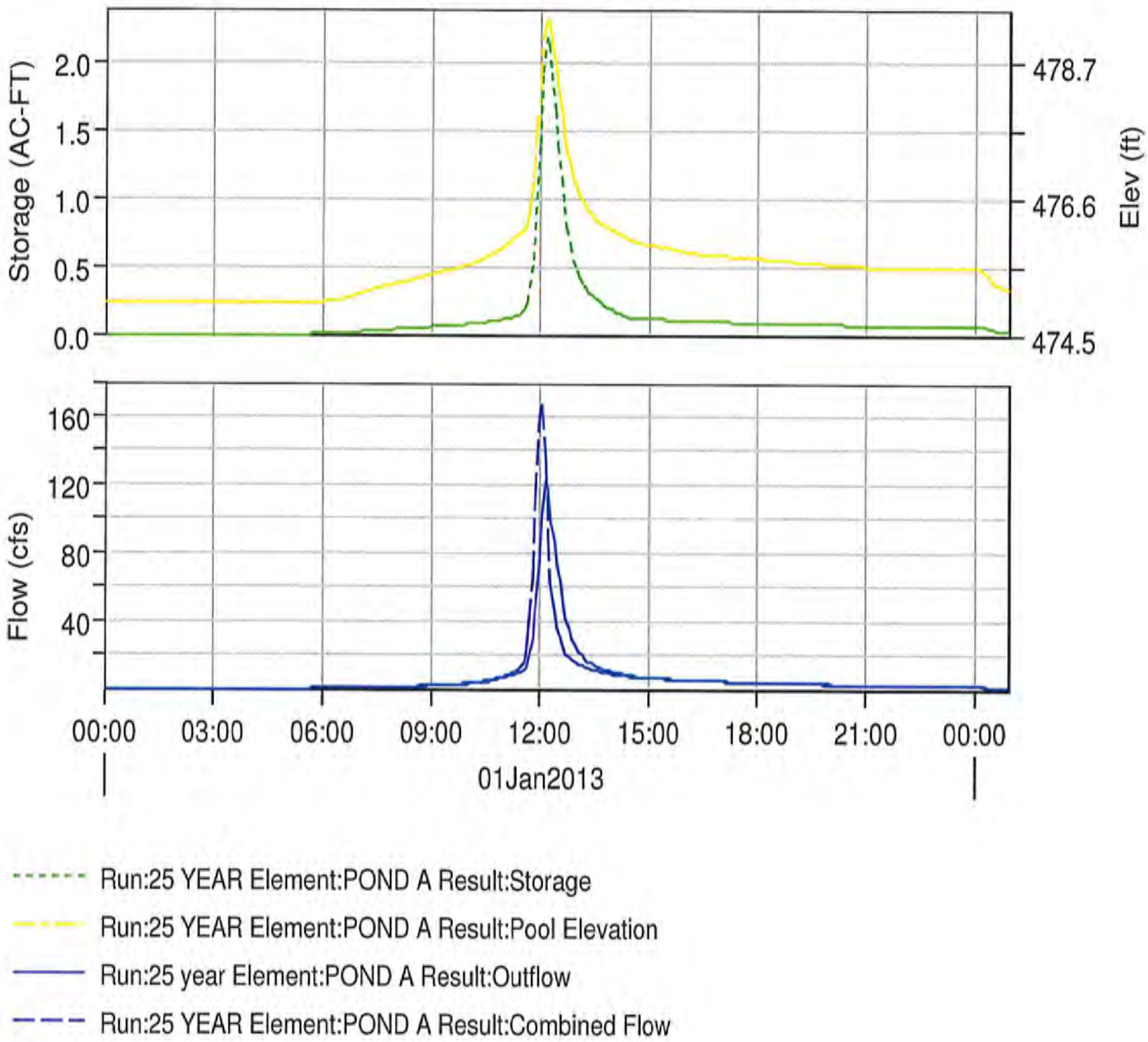
Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	25 year 24 hr
Compute Time:	17Sep2014, 11:13:14	Control Specifications:	Control 1

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"



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 2
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

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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

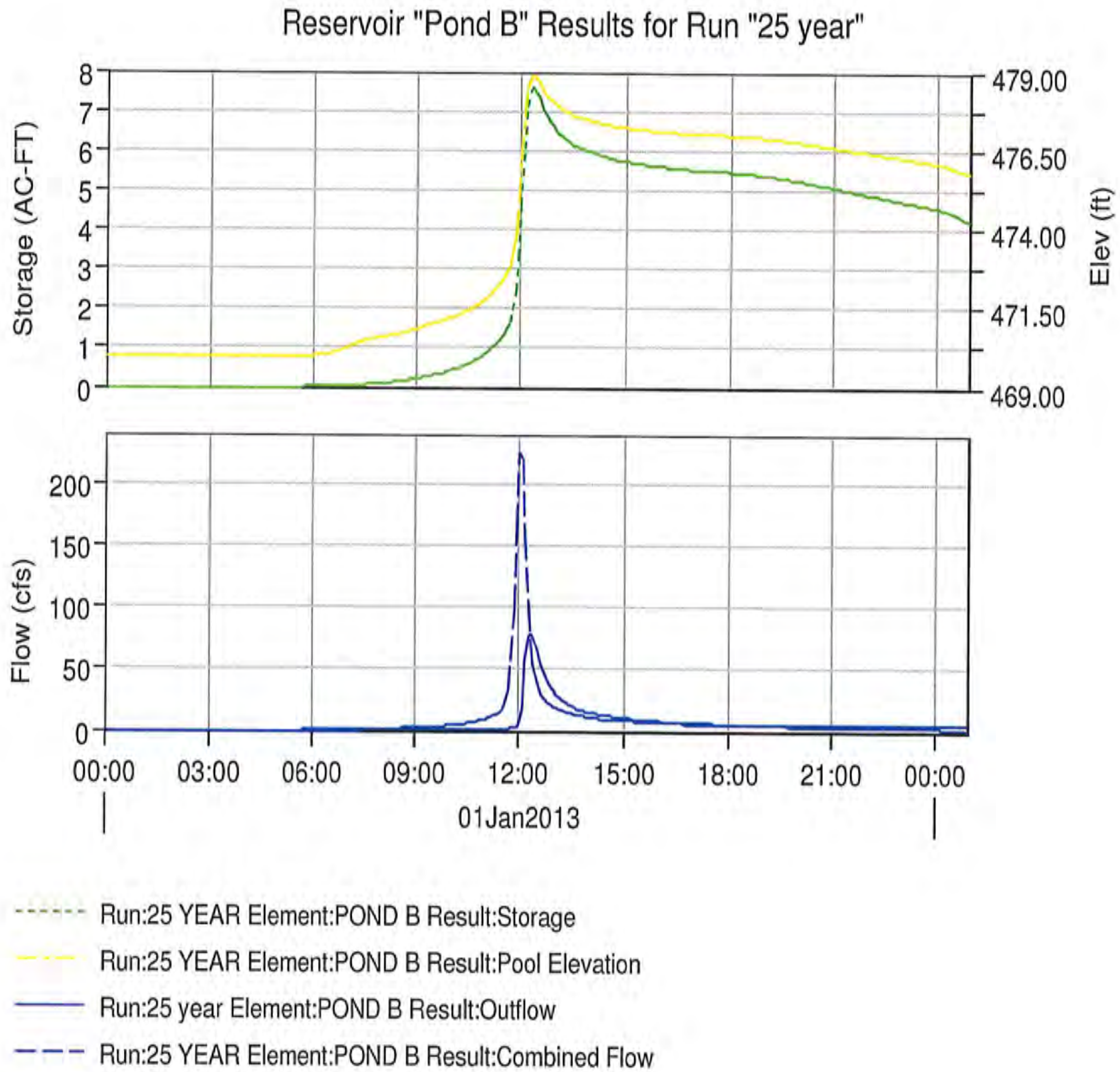
	Project:	Laredo Proposed		
	Simulation Run:	25 year	Reservoir:	Pond B

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:	25 year	Reservoir:	Pond C1

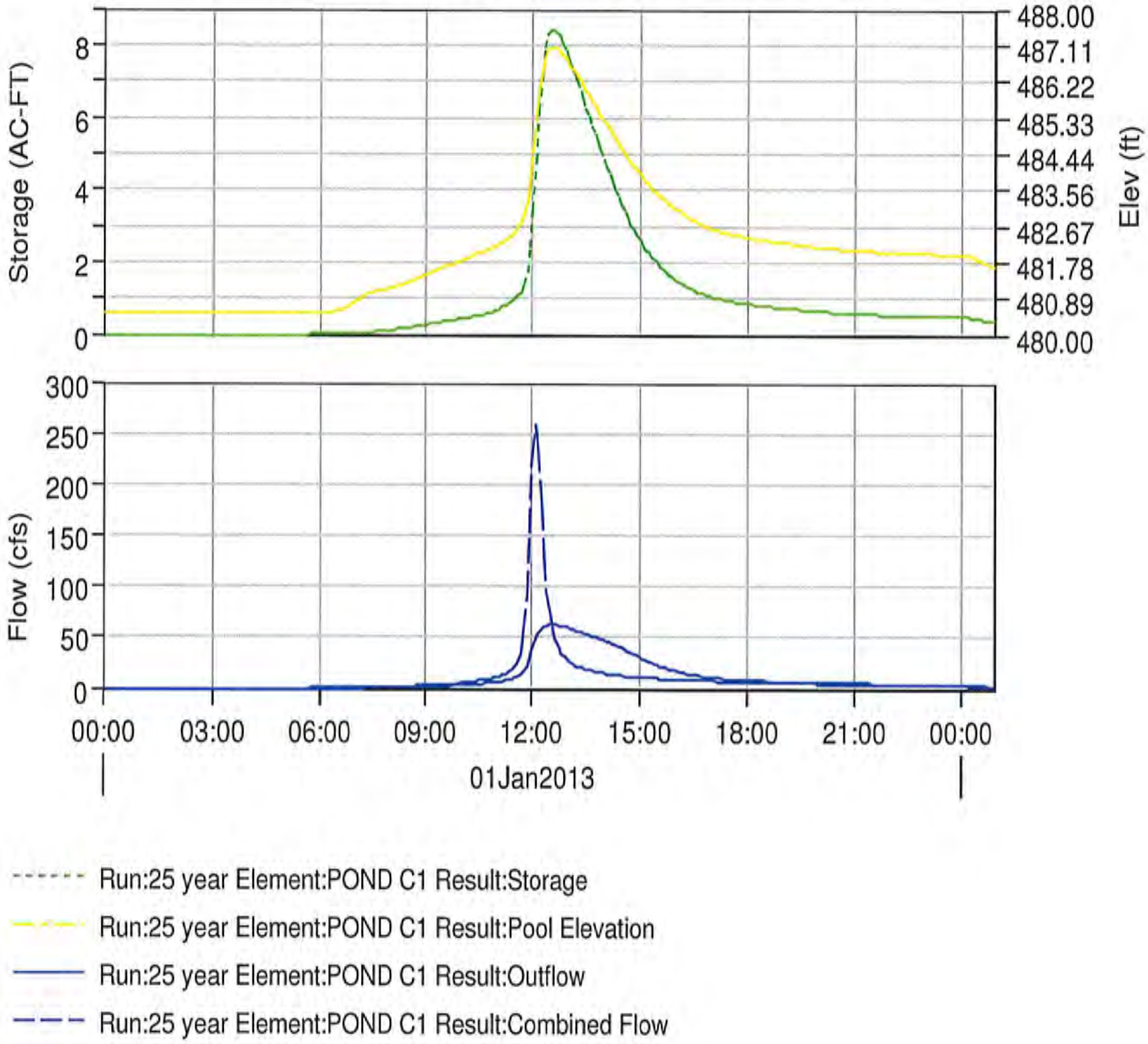
Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	25 year 24 hr
Compute Time:	17Sep2014, 11:13:14	Control Specifications:	Control 1

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"



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

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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	0.0	0.0	480.5	0.0
01Jan2013	04:55	0.0	0.0	480.5	0.0
01Jan2013	05:00	0.0	0.0	480.5	0.0
01Jan2013	05:05	0.0	0.0	480.5	0.0
01Jan2013	05:10	0.0	0.0	480.5	0.0
01Jan2013	05:15	0.0	0.0	480.5	0.0
01Jan2013	05:20	0.0	0.0	480.5	0.0
01Jan2013	05:25	0.0	0.0	480.5	0.0
01Jan2013	05:30	0.0	0.0	480.5	0.0
01Jan2013	05:35	0.0	0.0	480.5	0.0
01Jan2013	05:40	0.0	0.0	480.5	0.0
01Jan2013	05:45	0.0	0.0	480.5	0.0
01Jan2013	05:50	0.0	0.0	480.5	0.0
01Jan2013	05:55	0.0	0.0	480.5	0.0
01Jan2013	06:00	0.0	0.0	480.5	0.0
01Jan2013	06:05	0.1	0.0	480.5	0.0
01Jan2013	06:10	0.1	0.0	480.5	0.0
01Jan2013	06:15	0.2	0.0	480.5	0.0
01Jan2013	06:20	0.2	0.0	480.5	0.0
01Jan2013	06:25	0.3	0.0	480.6	0.0
01Jan2013	06:30	0.4	0.0	480.6	0.0
01Jan2013	06:35	0.4	0.0	480.6	0.0
01Jan2013	06:40	0.5	0.0	480.6	0.0
01Jan2013	06:45	0.5	0.0	480.7	0.0
01Jan2013	06:50	0.6	0.0	480.7	0.0
01Jan2013	06:55	0.6	0.0	480.8	0.0
01Jan2013	07:00	0.7	0.0	480.8	0.0
01Jan2013	07:05	0.8	0.0	480.9	0.0
01Jan2013	07:10	0.8	0.0	480.9	0.0

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Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	07:15	0.9	0.0	481.0	0.0
01Jan2013	07:20	1.0	0.1	481.0	0.0
01Jan2013	07:25	1.0	0.1	481.0	0.0
01Jan2013	07:30	1.1	0.1	481.0	0.0
01Jan2013	07:35	1.2	0.1	481.1	0.0
01Jan2013	07:40	1.2	0.1	481.1	0.0
01Jan2013	07:45	1.3	0.1	481.1	0.0
01Jan2013	07:50	1.4	0.1	481.1	0.1
01Jan2013	07:55	1.4	0.1	481.1	0.1
01Jan2013	08:00	1.5	0.1	481.2	0.1
01Jan2013	08:05	1.6	0.1	481.2	0.1
01Jan2013	08:10	1.7	0.1	481.2	0.2
01Jan2013	08:15	1.8	0.2	481.2	0.2
01Jan2013	08:20	1.9	0.2	481.2	0.3
01Jan2013	08:25	2.0	0.2	481.3	0.3
01Jan2013	08:30	2.1	0.2	481.3	0.4
01Jan2013	08:35	2.3	0.2	481.3	0.5
01Jan2013	08:40	2.4	0.2	481.3	0.6
01Jan2013	08:45	2.6	0.2	481.4	0.6
01Jan2013	08:50	2.8	0.2	481.4	0.8
01Jan2013	08:55	2.9	0.3	481.4	0.9
01Jan2013	09:00	3.1	0.3	481.5	1.0
01Jan2013	09:05	3.3	0.3	481.5	1.1
01Jan2013	09:10	3.5	0.3	481.5	1.3
01Jan2013	09:15	3.6	0.3	481.6	1.4
01Jan2013	09:20	3.8	0.3	481.6	1.6
01Jan2013	09:25	3.9	0.3	481.6	1.8
01Jan2013	09:30	4.0	0.4	481.6	1.9
01Jan2013	09:35	4.1	0.4	481.7	2.1
01Jan2013	09:40	4.2	0.4	481.7	2.3
01Jan2013	09:45	4.4	0.4	481.7	2.5

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

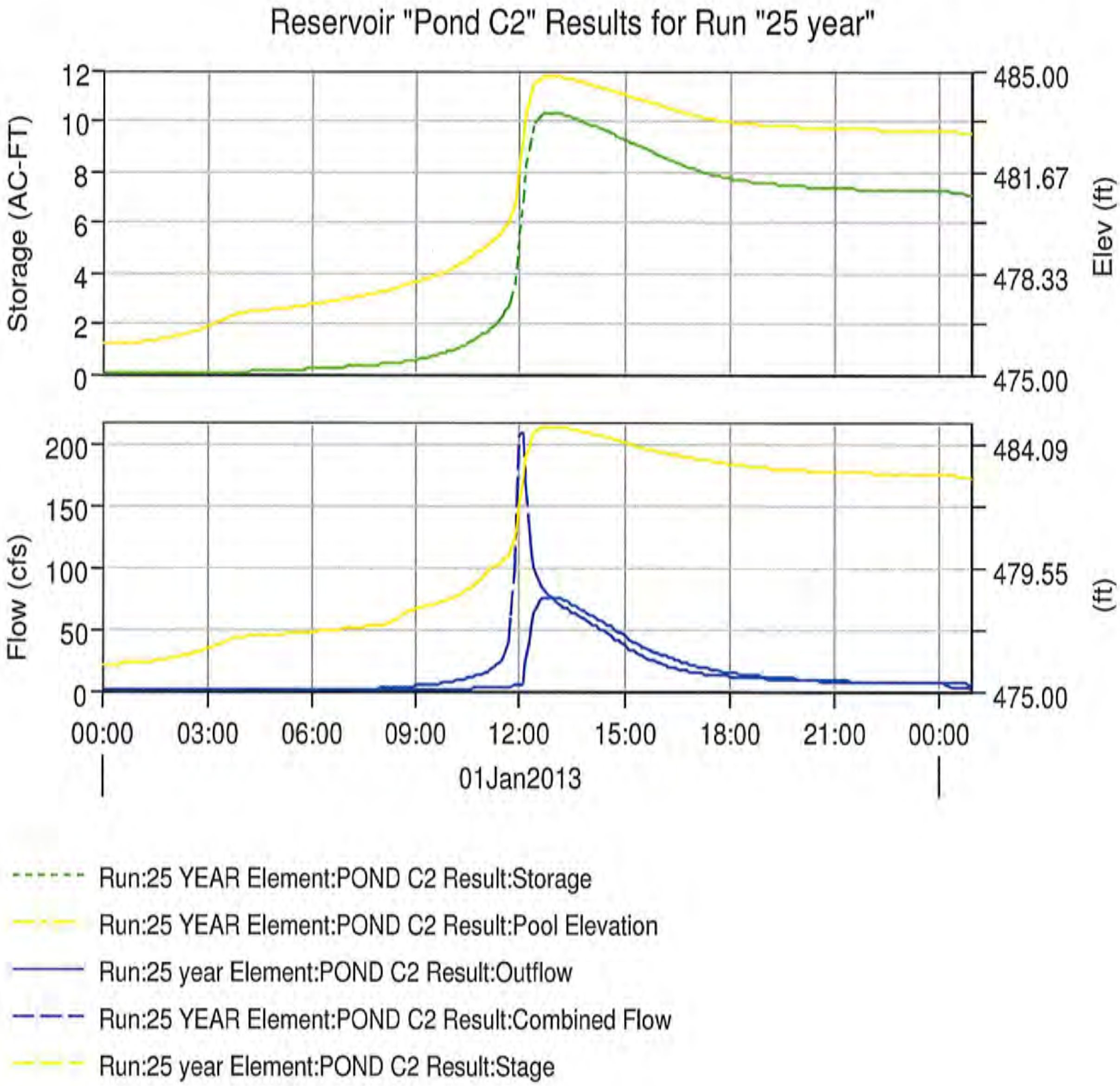
Project: Laredo Proposed
Simulation Run: 25 year Reservoir: Pond C2

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"
Storage (AC-FT)
Elev (ft)
485.00
481.67
478.33
475.00
Flow (cfs)
(ft)
484.09
479.55
475.00
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2013
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 2·
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

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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

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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

APPENDIX B4
PROPOSED CONDITIONS
100-YEAR HEC-HMS OUTPUT

Project: Laredo Proposed Simulation Run: 100 year

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

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A8	0.7000	1014.4	01Jan2013, 12:30	4.34
Reach A7-8	0.7000	1013.0	01Jan2013, 12:45	4.33
A7	0.4580	741.2	01Jan2013, 12:35	4.95
Junction A6-7	1.1580	1719.7	01Jan2013, 12:40	4.57
Reach A6-7	1.1580	1705.2	01Jan2013, 12:50	4.57
A6	0.1240	448.6	01Jan2013, 12:05	5.58
Junction A5-6	1.2820	1773.1	01Jan2013, 12:45	4.67
Reach A5-6	1.2820	1771.8	01Jan2013, 12:55	4.66
A5	0.0980	358.8	01Jan2013, 12:05	5.95
Junction A4-5	1.3800	1818.9	01Jan2013, 12:55	4.75
Reach A4-5	1.3800	1809.8	01Jan2013, 13:10	4.74
D3	0.1750	472.4	01Jan2013, 12:15	5.95
Reach D2-3	0.1750	467.8	01Jan2013, 12:20	5.95
D2	0.0312	101.6	01Jan2013, 12:10	5.71
Offsite Excav. D2	0.2062	383.2	01Jan2013, 12:35	3.82
Reach D1-2	0.2062	375.6	01Jan2013, 12:40	3.81
D1	0.0300	130.1	01Jan2013, 12:05	6.57
Junction D1	0.2362	396.5	01Jan2013, 12:40	4.16
Reach C2-D1	0.2362	390.7	01Jan2013, 12:55	4.15
LF-C1	0.0911	382.2	01Jan2013, 12:05	6.57
Pond C1	0.0911	156.9	01Jan2013, 12:25	6.49
LF-C2	0.0504	245.0	01Jan2013, 12:00	7.04
Pond C2	0.1415	215.8	01Jan2013, 12:25	5.73
LF-6C	0.0096	41.5	01Jan2013, 12:05	6.57
Junction C2	0.3873	514.5	01Jan2013, 12:55	4.79
Reach C1-2	0.3873	504.9	01Jan2013, 13:05	4.78

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
LF-6B	0.0153	79.8	01Jan2013, 12:00	6.57
Junction C1	0.4026	510.2	01Jan2013, 13:05	4.85
Reach A-C1	0.4026	510.2	01Jan2013, 13:10	4.84
A4	0.1580	247.7	01Jan2013, 12:30	4.34
Junction A3-4	1.9406	2421.5	01Jan2013, 13:10	4.73
Reach A3-4	1.9406	2414.6	01Jan2013, 13:15	4.72
A3	0.0100	39.5	01Jan2013, 12:05	5.58
LF-5A	0.0050	25.8	01Jan2013, 12:00	6.57
Junction A2-3	1.9556	2419.2	01Jan2013, 13:15	4.73
Reach A2-3	1.9556	2419.2	01Jan2013, 13:30	4.71
LF-B	0.0703	330.5	01Jan2013, 12:00	6.57
Pond B	0.0703	257.0	01Jan2013, 12:10	5.30
A2	0.0260	88.2	01Jan2013, 12:05	5.58
LF-5B	0.0049	26.4	01Jan2013, 12:00	6.57
Junction A1-2	2.0568	2454.8	01Jan2013, 13:30	4.75
Reach A1-2	2.0568	2427.3	01Jan2013, 13:45	4.73
LF-A	0.0545	245.2	01Jan2013, 12:05	6.57
Pond A	0.0545	209.7	01Jan2013, 12:10	6.57
B2	0.0360	126.3	01Jan2013, 12:10	6.08
LF-1	0.0028	14.9	01Jan2013, 12:00	6.57
Reach B1-2	0.0388	133.5	01Jan2013, 12:15	6.11
B1	0.0310	66.5	01Jan2013, 12:15	4.35
A1	0.0260	97.5	01Jan2013, 12:05	5.58
LF-3	0.0087	46.9	01Jan2013, 12:00	6.57
Outfall	2.2158	2469.8	01Jan2013, 13:45	4.81

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

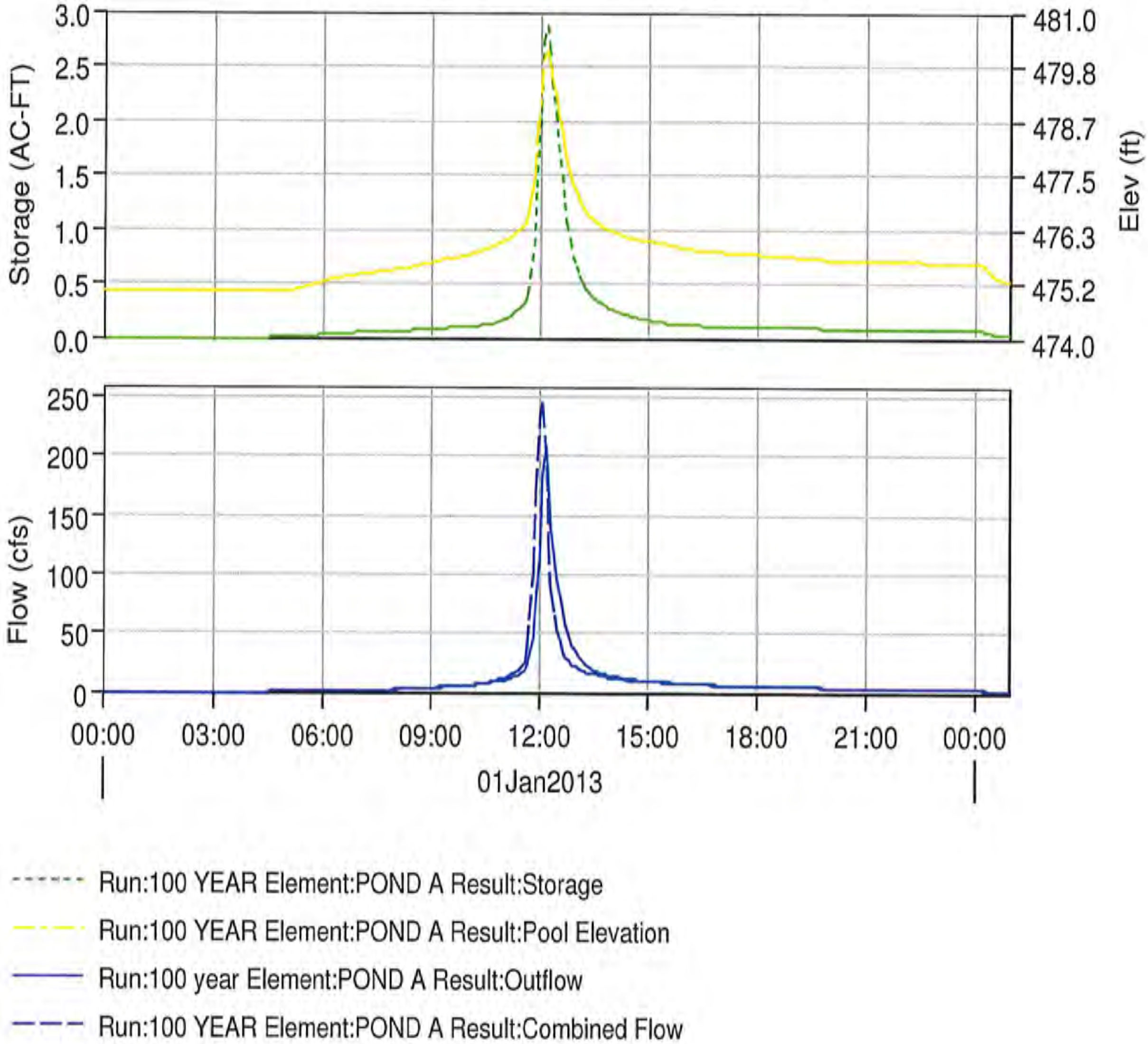
Start of Run:	01Jan2013, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2013, 00:55	Meteorologic Model:	100 year 24 hr
Compute Time:	17Sep2014, 11:11:16	Control Specifications:	Control 1

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"



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	04:40	0.0	0.0	475.0	0.0
01Jan2013	04:45	0.0	0.0	475.0	0.0
01Jan2013	04:50	0.1	0.0	475.0	0.0
01Jan2013	04:55	0.1	0.0	475.0	0.0
01Jan2013	05:00	0.1	0.0	475.0	0.0
01Jan2013	05:05	0.2	0.0	475.0	0.0
01Jan2013	05:10	0.2	0.0	475.0	0.0
01Jan2013	05:15	0.3	0.0	475.0	0.0
01Jan2013	05:20	0.3	0.0	475.1	0.0
01Jan2013	05:25	0.4	0.0	475.1	0.0
01Jan2013	05:30	0.4	0.0	475.1	0.1
01Jan2013	05:35	0.5	0.0	475.1	0.1
01Jan2013	05:40	0.5	0.0	475.1	0.1
01Jan2013	05:45	0.6	0.0	475.1	0.2
01Jan2013	05:50	0.6	0.0	475.2	0.3
01Jan2013	05:55	0.7	0.0	475.2	0.3
01Jan2013	06:00	0.7	0.0	475.2	0.4
01Jan2013	06:05	0.8	0.0	475.2	0.4
01Jan2013	06:10	0.8	0.0	475.2	0.5
01Jan2013	06:15	0.9	0.0	475.3	0.6
01Jan2013	06:20	0.9	0.0	475.3	0.7
01Jan2013	06:25	1.0	0.0	475.3	0.7
01Jan2013	06:30	1.1	0.0	475.3	0.8
01Jan2013	06:35	1.1	0.0	475.3	0.9
01Jan2013	06:40	1.2	0.0	475.3	1.0
01Jan2013	06:45	1.2	0.0	475.3	1.0
01Jan2013	06:50	1.3	0.0	475.3	1.1
01Jan2013	06:55	1.4	0.0	475.4	1.2
01Jan2013	07:00	1.4	0.0	475.4	1.2
01Jan2013	07:05	1.5	0.0	475.4	1.3
01Jan2013	07:10	1.5	0.1	475.4	1.4

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

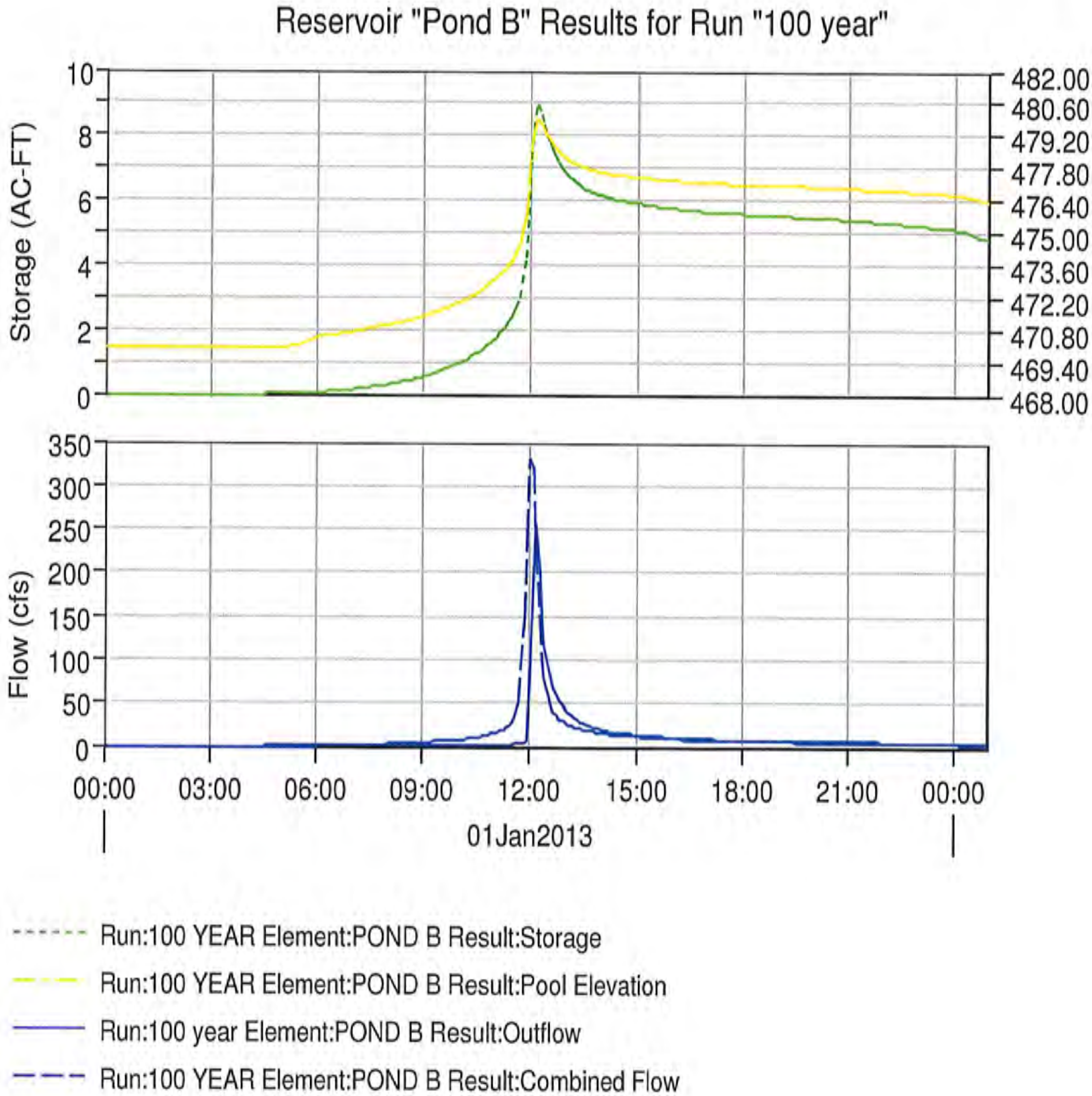
Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2013	20:10	4.0	0.1	475.7	4.1
01Jan2013	20:15	3.9	0.1	475.7	4.0
01Jan2013	20:20	3.9	0.1	475.7	4.0
01Jan2013	20:25	3.9	0.1	475.7	3.9
01Jan2013	20:30	3.9	0.1	475.7	3.9
01Jan2013	20:35	3.8	0.1	475.7	3.9
01Jan2013	20:40	3.8	0.1	475.7	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

	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"
Storage (AC-FT)
Elev (ft)
Flow (cfs)
0
2
4
6
8
10
482.00
480.60
479.20
477.80
476.40
475.00
473.60
472.20
470.80
469.40
468.00
350
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: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: 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	0.1	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

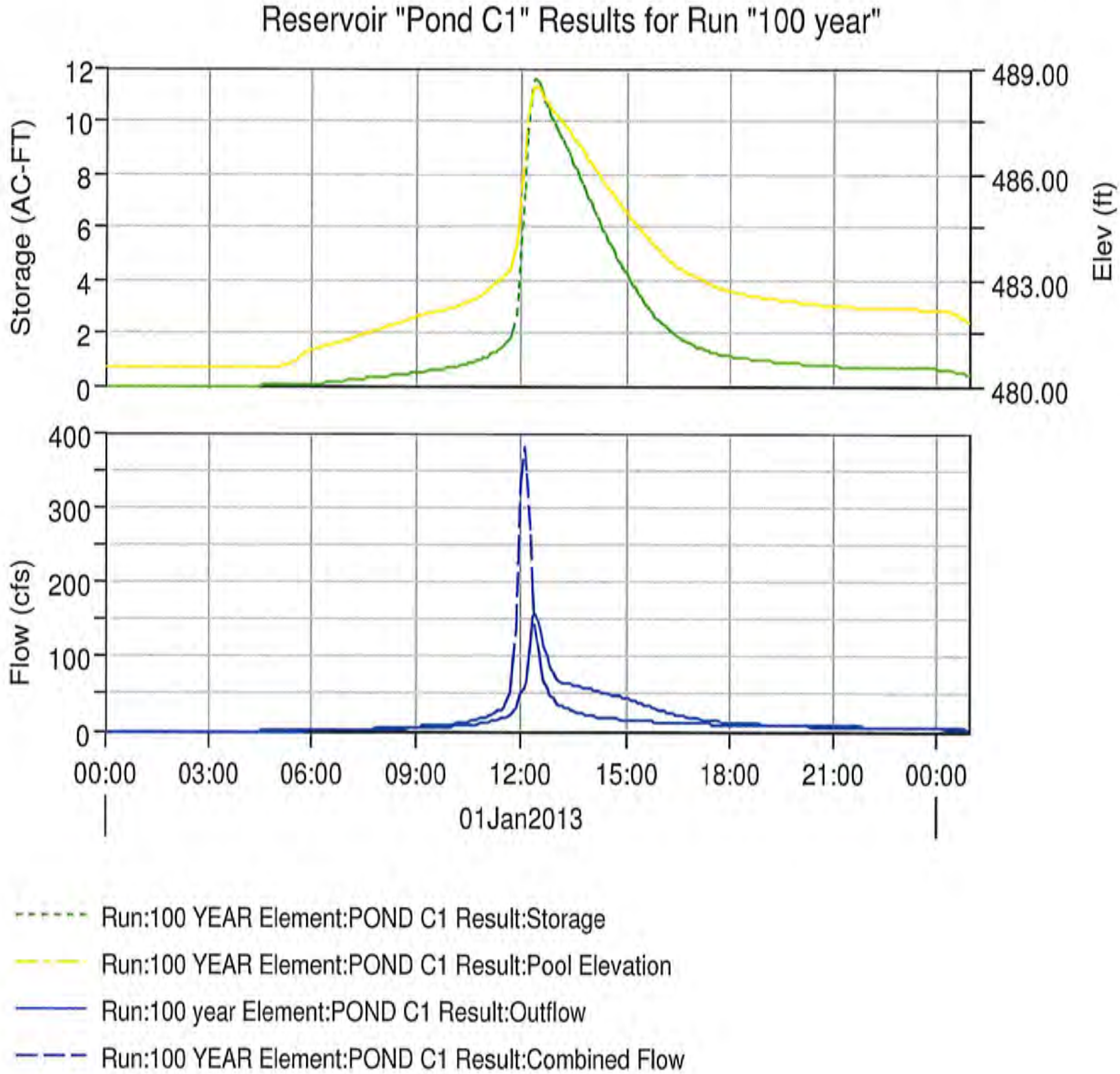
Project: Laredo Proposed
Simulation Run: 100 year Reservoir: Pond C1

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"
Storage (AC-FT)
Elev (ft)
Flow (cfs)
12
10
8
6
4
2
0
489.00
486.00
483.00
480.00
400
300
200
100
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 C1 Result:Storage
Run:100 YEAR Element:POND C1 Result:Pool Elevation
Run:100 year Element:POND C1 Result:Outflow
Run:100 YEAR Element:POND C1 Result:Combined Flow

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

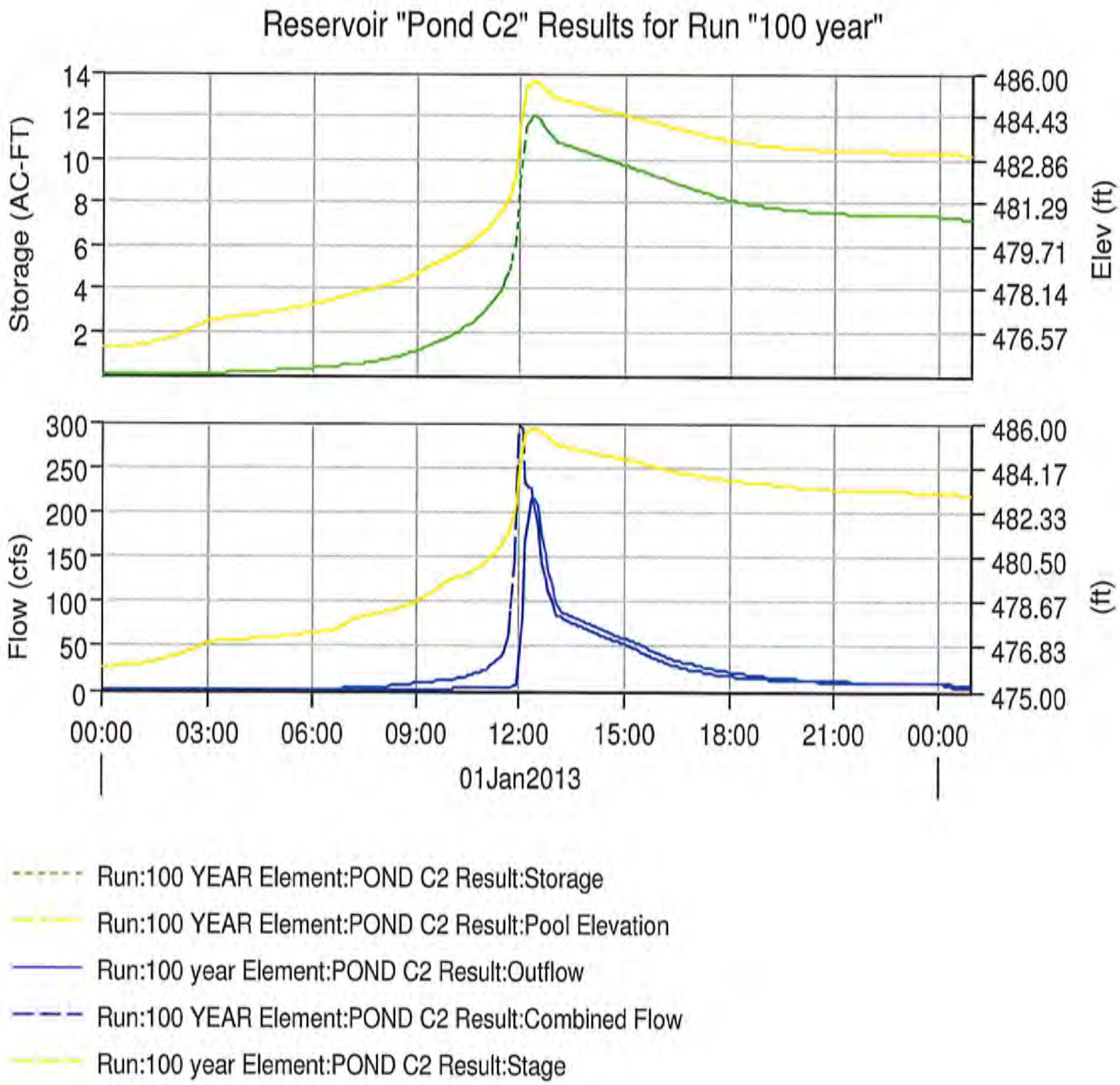
Project: Laredo Proposed
Simulation Run: 100 year Reservoir: Pond C2

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: 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	0.1	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

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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

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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 C
EXISTING CONDITIONS
HEC-RAS MODEL

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX   XXXX        XXXX      XX     XXXX
X     X  X       X    X       X   X    X  X   X
X     X  X       X            X   X   X    X  X
XXXXXXX  XXXX    X      XXX   XXXX    XXXXXX   XXXX
X     X  X       X            X  X    X    X       X
X     X  X       X    X       X   X   X    X       X
X     X  XXXXXX   XXXX        X    X  X    X  XXXXX
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PROJECT DATA
Project Title: Laredo Landfill-LOMR-14-06-0556P
Project File : LaredoExisting.prj
Run Date and Time: 9/23/2014 11:15:49 AM

Project in English units

PLAN DATA

Plan Title: Existing Laredo Landfill
Plan File : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part III\c-Attachments\Attachment 6\Floodplain Models\Existing HEC-RAS\LaredoExisting.p01

Geometry Title: Existing Laredo Landfill GeoReferenced
Geometry File : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part III\c-Attachments\Attachment 6\Floodplain Models\Existing HEC-RAS\LaredoExisting.g01

Flow Title   : Existing Laredo Landfill Flow Data
Flow File   : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part III\c-Attachments\Attachment 6\Floodplain Models\Existing HEC-RAS\LaredoExisting.f01

Plan Summary Information:

Number of:				
Cross Sections =	26	Multiple Openings =	0
Culverts =	0	Inline Structures =	0
Bridges =	0	Lateral Structures =	0

Computational Information
- Water surface calculation tolerance = 0.01
- Critical depth calculation tolerance = 0.01
- Maximum number of iterations = 20
- Maximum difference tolerance = 0.3
- Flow tolerance factor = 0.001

Computation Options
- Critical depth computed only where necessary
- Conveyance Calculation Method: At breaks in n values only
- Friction Slope Method: Average Conveyance
- Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Existing Laredo Landfill Flow Data
Flow File : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part III\c-Attachments\Attachment 6\Floodplain Models\Existing HEC-RAS\LaredoExisting.f01

Flow Data (cfs)

River	Reach	RS	25 yr	100 yr
Perimeter Ditch	Laredo Landfill	9895	1008.9	1719.7
Perimeter Ditch	Laredo Landfill	9113	1045.7	1773.1
Perimeter Ditch	Laredo Landfill	7613	1076.3	1818.9
Perimeter Ditch	Laredo Landfill	5974	1260	2395.5
Perimeter Ditch	Laredo Landfill	5400	1272.6	2415.5
Perimeter Ditch	Laredo Landfill	4000	1282.3	2433.9
Perimeter Ditch	Laredo Landfill	2400	1316.5	2473

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Perimeter Ditch	Laredo Landfill	25 yr		Normal S = 0.006
Perimeter Ditch	Laredo Landfill	100 yr		Normal S = 0.006

GEOMETRY DATA

Geometry Title: Existing Laredo Landfill GeoReferenced
Geometry File : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part III\C-Attachments\Attachment 6\Floodplain Models\Existing HEC-RAS\LaredoExisting.g01

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 9895

INPUT
Description: US Section from Morrison Study(RS 24281)
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-484	500	0	498.75	4	498.49	24	494.42	29	493.46
45	490.74	48	490.21	50	489.04	55	488.76	60	488.84
61	490.24	85	493.26	91	494.12	97	495.54	124	500.17
130	501.13	174	503.06	243	504.07				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-484	.04	29	.045	85	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
29	85	420	432	440	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-484	-23.81	502.5	F
143.39	243	502.71	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 9463

INPUT
Description: East Ditch Sta. 9+50
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	493.55	3.61	493.55	4.75	493.55	9.26	493.55	13.4	493.55
15.21	493.55	16.92	493.55	21.85	493.74	22.94	493.78	25.73	493.98
31.59	494.26	35.06	494.57	40.56	495.04	41.06	495.09	48.56	495.11
56.07	495.1	59.75	495.07	63.15	495.05	81.68	495.02	84.41	495.03
85.93	495.04	110.45	494.88	110.93	494.88	113.59	494.88	132.84	494.92
133.59	494.92	134.54	494.92	135.4	494.93	139.02	494.9	159.86	495.02
171.22	494.98	184.93	494.83	185.45	494.83	200.94	495.57	201.94	495.61
202.66	495.59	213.41	495.15	246.18	495.2	247.54	495.2	248.09	495.08
264.71	491.27	266.86	490.87	280.41	488.36	282.04	488.06	286.88	488.03
321.98	487.87	326.56	488.75	343.1	492.22	346.07	491.7	357.53	489.42
360.48	489.59	363.02	489.9	365.5	490.78	368.6	491.21	371.72	491.26
375.66	490.98	379.77	490.78	388.99	490.69	391.1	490.85	394.39	491.2
395.29	491.22	399.02	491.55	401.6	491.79	410.92	492.56	421.63	493.65
422.01	493.69	422.4	493.73	432.32	494.45	433.09	494.51	434.26	494.74
441.68	496.24	451.54	497.58	452.11	497.67	461.52	499.11	465.67	499.37
466.08	499.39	473.93	499.88	477.24	500.06	482.81	500.1	483.42	500.1
488.84	500.26	491.32	500.29	495.26	500.39	497.7	500.42	502.87	500.49
506.42	500.46	507.67	500.47	508.88	500.48	527.89	500.75	531.19	500.79
535.35	500.79	537.45	500.79	538.72	500.8	541.7	500.83	546.08	500.76
546.39	500.76	553.1	500.82	553.91	500.81	555.09	500.82		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	247.54	.045	434.26	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
247.54	434.26	150	150	150	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	197.39	497.73	F
445.99	555.09	499.75	F

Left Levee Station= 203.26 Elevation= 495.62

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 9313

INPUT
Description: East Ditch Sta. 11+00
Station Elevation Data num= 141

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	498.49	9	498.34	17.55	498.28	34.33	498	44.6	497.71
59.66	497.1	60.36	497.09	62.94	497.05	66.08	497	81.45	496.86
83.04	496.83	85.28	496.8	86.82	496.78	107.53	496.29	108.07	496.28
109.03	496.25	110.25	496.21	110.74	496.2	112.71	496.09	114.93	495.97
116.41	495.89	129.68	495.22	140.61	494.85	147.26	494.64	155.66	494.24
157.62	494.15	160.27	494.02	180.17	493.71	185.24	493.58	202.65	493.34
210.74	493.31	212.89	493.28	216.06	493.24	221.15	493.17	233.16	493.15
243.6	492.71	250.03	492.39	254.29	492.2	261.97	491.8	264.76	491.82
265.74	491.81	273.59	491.82	277.45	491.81	279.18	491.81	283.66	491.76
290.13	491.77	292.02	491.77	293.22	491.77	299.31	491.8	303.97	491.94
307.29	492.05	310.55	492.18	311.25	492.21	312.73	492.25	320.97	492.5
336.94	492.81	361.13	493.05	386.5	493.52	392.03	493.49	411.76	493.34
425.94	493.43	431.92	493.44	436.76	493.42	443.04	493.52	448.68	493.55
459.66	494.71	460.31	494.78	464.92	493.58	468.39	492.7	482.16	493.1
485.46	493.2	491.29	493.29	508.93	493.59	515.97	491.99	522.44	490.52
534.97	487.96	539.5	487.99	578.34	488.2	587.45	489.83	596.74	491.54
600.48	492.12	606.31	493.13	615.76	494.87	616.4	494.99	617.67	495.04
632.4	495.74	636.84	495.84	638.55	495.88	639.44	495.89	646.2	496.05
647.82	496.06	653.18	496.07	657.11	496.08	662.26	496.07	664.05	496.15
664.42	496.16	665.56	496.18	671.37	496.21	673.03	496.23	678.3	496.26
678.81	496.27	681.36	496.32	685.95	496.37	689.17	496.44	692.91	496.48
694.6	496.52	699.66	496.71	701.16	496.73	704.03	496.88	706.73	496.9
715.27	497.11	721.5	497.14	722.33	497.16	722.87	497.16	729.2	497.19
729.82	497.2	736.3	497.23	736.77	497.23	743.4	497.27	743.74	497.27
750.51	497.3	757.62	497.34	760.1	497.35	762.04	497.36	767.07	497.41
773.99	497.48	780.9	497.54	781.35	497.54	787.82	497.6	788.43	497.6
794.73	497.66	795.52	497.67	801.64	497.72	802.59	497.73	808.57	497.78
809.67	497.79	815.48	497.84	816.76	497.85	818.6	497.86	819.96	497.87
823.44	497.9								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	508.93	.045	615.76	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
508.93	615.76	200	200	200	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	457.98	495.68	F
624.1	823.44	496.09	F

Left Levee Station= 459.93 Elevation= 494.83

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 9113

INPUT
Description: East Ditch Sta. 13+00
Station Elevation Data num= 269

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	510.76	1.4	510.67	4.45	510.51	6.87	510.42	9.98	510.25
13.86	510.12	17.03	509.94	20.84	509.81	24.08	509.63	27.83	509.5
28.32	509.47	31.96	509.46	35.16	509.35	39.21	509.28	42.32	509.17
42.68	509.16	46.63	509.12	49.66	509.01	51.14	508.96	54.21	508.85
58.09	508.71	61.25	508.6	61.88	508.55	65.57	508.29	68.9	508.17
72.43	507.93	75.92	507.81	77.86	507.79	81.42	507.75	84.85	507.63
88.44	507.59	91.85	507.47	94.42	507.37	98	507.34	99.89	507.32
103.25	507.17	106.91	507.14	110.21	507	113.93	506.97	117.18	506.82
120.5	506.68	121.91	506.6	125.3	506.41	128.98	506.25	132.24	505.88

136.15	505.71	139.1	505.38	139.47	505.36	143.59	505.18	146.42	505.03
150.64	504.84	153.38	504.7	157.7	504.51	160.34	504.37	161.79	504.3
166.2	504.1	168.78	503.96	169.43	503.93	173.93	503.73	176.42	503.6
180.94	503.4	183.41	503.27	187.96	503.07	190.4	502.95	194.99	502.74
197.38	502.62	202.01	502.41	204.38	502.29	209.03	502.08	211.37	501.96
216.04	501.75	218.35	501.63	223.07	501.42	225.34	501.31	229.72	501.11
231.96	501	236.75	500.77	237.84	500.74	240.01	500.68	244.85	500.44
246.96	500.38	251.85	500.15	253.92	500.09	258.86	499.85	260.87	499.79
265.88	499.55	267.82	499.5	272.89	499.25	274.77	499.2	279.9	498.95
280.82	498.85	285.99	498.6	287.78	498.41	293.02	498.16	294.76	497.98
300.05	497.73	301.72	497.55	307.19	497.29	308.82	497.23	314.19	496.98
315.81	496.91	321.19	496.66	322.8	496.6	328.19	496.34	329.78	496.28
335.2	496.02	336.76	495.96	337.25	495.94	342.71	495.81	343.4	495.78
344.89	495.73	350.41	495.6	351.84	495.55	357.43	495.42	358.8	495.37
364.45	495.24	365.75	495.2	371.47	495.06	372.71	495.02	378.49	494.89
379.66	494.85	385.51	494.71	386.24	494.7	392.15	494.56	393.22	494.55
399.19	494.41	400.21	494.4	406.22	494.26	407.19	494.25	412.97	494.11
413.89	494.1	420	494.02	420.88	494.01	427.04	493.94	427.86	493.93
434.07	493.85	434.83	493.82	441.1	493.74	441.82	493.72	448.14	493.64
448.8	493.61	455.17	493.54	455.78	493.51	462.2	493.44	462.77	493.42
463.07	493.41	469.52	493.34	470.05	493.33	476.53	493.25	477.01	493.25
483.53	493.17	483.98	493.16	490.53	493.08	490.95	493.08	497.68	493
498.07	492.99	504.66	492.91	505.01	492.91	511.64	492.83	511.96	492.82
513.14	492.81	519.83	492.77	526.83	492.72	533.83	492.68	541	492.63
547.85	492.58	554.85	492.52	561.84	492.46	568.84	492.41	575.83	492.35
576.2	492.35	582.82	492.29	583.26	492.29	589.82	492.24	590.34	492.23
596.84	492.18	597.41	492.17	603.83	492.12	607.72	492.09	608.41	492.08
614.66	491.95	615.44	491.95	621.6	491.82	622.45	491.81	628.54	491.69
629.48	491.68	635.48	491.56	636.51	491.55	642.42	491.43	643.54	491.42
649.36	491.3	650.57	491.29	656.31	491.17	657.59	491.16	663.27	491.05
664.64	491.04	670.21	490.93	671.65	490.92	677.17	490.82	678.68	490.81
681.62	490.75	683.18	490.74	688.61	490.61	690.22	490.6	695.61	490.48
697.26	490.47	702.6	490.34	704.3	490.33	709.59	490.21	711.34	490.2
716.59	490.08	717.32	490.08	722.49	489.96	724.33	489.94	729.46	489.82
731.34	489.81	736.42	489.69	738.36	489.67	738.76	489.67	743.8	489.56
745.78	489.59	747.88	489.54	748.19	489.54	750.14	489.56	755.31	489.58
757.08	489.6	762.43	489.63	764.03	489.64	769.56	489.67	770.5	489.68
776.21	489.7	777.53	489.68	790.25	489.84	791.33	489.86	801.63	490.22
809.5	490.49	814.51	490.69	825.85	491.08	833.43	489.72	837.97	488.91
847.32	487.47	851.17	486.86	855.74	486.94	868.31	487.14	869.44	487.16
872.64	487.24	899.51	487.91	908.14	489.57	909.12	489.75	910.44	490.14
917.65	492.29	920.74	493.02	925.56	494.18	930.42	494.34	934.91	494.46
957.11	495.13	957.49	495.13	979.97	495.1	987.95	495.21	1014.73	495.46
1029.62	495.63	1044.92	495.82	1063.56	495.91	1075.1	495.9	1097.49	496.21
1105.28	496.25	1131.43	496.23	1135.46	496.26	1141.8	496.29		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	825.85	.045	925.56	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
825.85	925.56	350	350	350	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	752.05	494.67	F
931.86	1141.8	495.3	F

Left Levee Station= 823.19 Elevation= 491.11

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 8763

INPUT
Description: East Ditch Sta. 16+50
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1391.5	490.1	1400.91	490.06	1408.82	489.88	1413.26	489.74	1425.27	489.17
1432.71	488.54	1440.91	488.15	1446.09	488.08	1449.99	487.18	1455.44	486.29
1458.54	486.4	1469.33	486.78	1483.55	488.34	1486.18	488.63	1489.38	488.35
1497.65	487.6	1503.41	486.91	1512.41	485.83	1519.77	485.78	1524.35	485.75
1528.05	485.73	1554.24	486.45	1561.57	486.65	1563.96	486.89	1569.58	487.49
1578.82	488.52	1581.16	488.79	1581.81	488.73	1582.61	488.79	1584.89	489.12
1587.16	489.33	1587.64	489.38	1589.57	489.69	1590.79	490.13	1593.76	491.17
1595.41	491.64	1599.88	491.8	1620.47	492.5	1630.57	492.49	1646.5	492.47
1654.94	492.66	1660.38	492.78	1666.96	492.91	1672.11	492.89	1697.15	492.91
1699.29	492.96	1718.62	493.25	1727.33	493.37	1753.59	493.23	1757.46	493.24
1780.81	493.51	1787.7	493.6	1796.31	493.69	1802.55	493.78		

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Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta     n Val
  1391.5      .04  1486.18     .045  1595.41       .04

Bank Sta: Left    Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
       1486.18  1595.41                250      250     250                .1      .3
Ineffective Flow     num=        2
   Sta L    Sta R    Elev   Permanent
  1391.5  1461.38  492.15       F
    1598  1802.55  493.24       F
Left Levee      Station= 1485.35      Elevation=   488.73

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill      RS: 8513

INPUT
Description: East Ditch Sta. 19+00
Station Elevation Data     num=       53
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
 1395.21   488.89  1399.78   488.89  1400.54   488.78   1401.1   488.78  1406.86   488.03
 1409.21   488.07  1427.06   487.66  1431.39   487.78  1434.55   487.79  1435.11    487.8
 1436.04   487.79  1440.51   487.85  1452.72   487.94  1453.06   487.98  1456.82   487.31
 1464.56      486  1473.85   486.19  1482.56   486.37  1497.78   487.61  1498.61   487.67
 1499.41    487.6  1514.82   486.16  1523.29   485.41  1527.01   485.07  1539.41   484.47
 1541.39   484.37  1543.12   484.43   1544.8   484.48  1577.81    485.6  1582.82   486.32
 1588.62   487.16  1591.38   487.52   1595.6   488.06  1597.88   488.71  1599.06   489.05
 1604.37   490.24  1605.55   490.49   1629.4   491.19  1633.32   491.29  1640.25    491.3
 1664.59   491.31   1668.7   491.37  1683.46    491.5  1696.05   491.63  1713.65   491.67
 1735.61   491.84  1743.83   491.92  1750.41   491.93  1774.01      492  1803.48   492.28
 1804.19   492.28  1809.94    492.4  1819.21    492.6

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta     n Val
 1395.21      .04  1498.61     .045  1604.37       .04

Bank Sta: Left    Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
       1498.61  1604.37                100      100     100                .1      .3
Ineffective Flow     num=        2
   Sta L    Sta R    Elev   Permanent
 1395.21  1470.83  490.07       F
 1608.88  1819.21  491.64       F
Left Levee      Station= 1498.83      Elevation=   487.75

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill      RS: 8413

INPUT
Description: East Ditch Sta. 20+00
Station Elevation Data     num=       70
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
 1393.59   487.96     1394   488.28  1395.89   488.03  1399.87   488.19  1400.79   488.21
 1405.96    488.1  1412.31   488.11  1413.74   487.99  1414.68   487.95  1422.07   487.13
 1433.47   486.05  1436.35   486.06  1439.29      486  1442.18   485.95  1443.59   485.93
 1443.97   485.92  1446.77   485.92  1453.81   486.09   1454.7   486.07   1459.1      486
 1462.68   485.95  1463.32   485.95  1470.99    485.9  1472.72   485.89  1491.99   486.25
 1492.38   486.26  1493.71   486.31  1507.73   486.84   1524.2    485.5  1526.57   485.31
 1527.22   485.22   1535.8   483.89  1541.46   483.61  1543.94   483.57  1550.64   483.53
 1551.18   483.57     1556   483.86  1556.55   483.65  1557.15   483.42  1558.26   483.01
 1562.31   481.33  1563.46   481.73  1567.28   484.06  1569.34   484.17  1584.74   484.94
 1585.64   485.06  1598.41   486.69  1602.04   486.52  1602.81   486.51  1604.85   487.02
 1605.63   487.12  1607.44   487.41  1614.21   489.91  1614.82   490.13  1618.71   490.22
 1639.19   490.68  1659.35   490.74  1675.39   490.79  1680.62   490.81  1692.76   490.87
 1703.74   490.96   1711.7      491  1730.92   491.15  1741.92   491.16  1758.11   491.26
  1772.1   491.41  1785.29   491.52  1802.28   491.51   1823.5   491.82  1828.35   491.88

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta     n Val
 1393.59      .04  1507.73     .045  1614.21       .04

Bank Sta: Left    Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
       1507.73  1614.21                100      100     100                .1      .3
Ineffective Flow     num=        2
```

Sta L	Sta R	Elev	Permanent
1393.59	1461.71	488.87	F
1622.63	1828.35	491.16	F

Left Levee Station= 1507.29 Elevation= 486.94

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 8313

INPUT
Description: East Ditch Sta. 21+00
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
913.01	485.24	938.7	485.33	970.73	485.47	978.92	485.54	986.91	485.75
990.21	485.85	991.23	485.88	1002.11	486.18	1002.61	486.18	1018.03	486.42
1018.73	486.26	1024.86	484.86	1029.13	483.41	1032.99	482.11	1037.56	480.95
1045.59	478.92	1058.29	478.64	1061.85	478.56	1065.98	478.52	1068.81	478.5
1073.24	478.47	1077.59	478.54	1081.99	478.61	1085.22	478.69	1096.19	478.9
1099.33	479.66	1111.65	482.63	1114.35	483.21	1125.01	485.65	1135.24	486.44
1140.79	486.77	1144.89	486.77	1145.28	486.82	1148.77	486.81	1149.66	486.76
1152.67	486.8	1153.7	486.84	1159.58	486.86	1159.88	486.87	1163.19	486.88
1163.59	486.88	1165.89	486.86	1170.39	486.94	1171.46	486.96	1173.74	487
1175.74	487.12	1182.81	487.46	1186.72	487.67	1188.97	487.74	1198.85	487.33
1203.88	487.1	1207.95	487.05	1212.07	486.94	1213.97	486.92	1214.35	486.92
1219.34	486.75	1222.44	486.65	1225.21	486.73	1230.79	486.9	1232.23	486.79
1236.96	486.7	1239.9	486.46	1243.64	486.36	1244.64	486.37	1247.5	486.37
1250.95	486.37	1252.29	486.46	1257.01	486.57	1265.24	487.54	1266.74	487.65
1268.86	488.13	1282.33	489.15	1285.49	489.39	1292.12	489.55	1300.91	489.68
1320.7	490.07	1331.09	490.42	1338.03	490.63				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
913.01	.04	1018.03	.045	1144.89	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
1018.03	1144.89	300	300	300	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
913.01	997.77	487.8	F
1149.88	1338.03	487.89	F

Left Levee Station= 1010.55 Elevation= 486.42

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 8013

INPUT
Description: East Ditch Sta. 24+00
Station Elevation Data num= 44

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
449.33	482.67	468.6	482.93	490.23	483.1	499.1	483.43	514.58	484.33
535.38	484.16	543.26	484.03	547.45	484.07	554.3	484.14	561.77	484.21
574.9	480.26	575.36	480.12	576.05	479.96	580	479.06	586.66	477.53
599.02	477.3	600.75	477.27	604.54	477.25	613.88	477.2	614.65	477.19
623.88	476.96	624.56	476.94	625.34	476.96	637.01	477.24	654.4	481.42
654.93	481.54	655.61	481.68	669.44	484.58	684.73	484.26	691.53	484.11
706.42	484.9	707.88	484.99	726.13	485.49	736.16	485.76	736.69	485.76
747.79	485.81	751.75	485.79	755.65	485.85	761.38	485.93	766.27	485.97
772.33	486.08	778.46	486.12	779.93	486.12	782.17	486.12		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
449.33	.04	561.77	.045	669.44	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
561.77	669.44	400	400	400	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
449.33	499.8	485.59	F
683.26	782.17	485.89	F

Left Levee Station= 517 Elevation= 484.37

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 7613

INPUT
Description: East Ditch Sta. 28+00
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	485.05	.75	485.03	4.75	484.93	11.22	483.61	20.52	481.7
23.96	481.53	30.11	481.2	34.59	481.05	38.54	480.93	41.89	480.89
45.91	480.88	48.37	480.29	50.48	479.8	54.17	480.6	57.98	481.45
75.44	480.61	84.36	480.05	86.92	479.78	90.12	479.32	92.9	478.74
95.12	478.49	97.37	477.86	99.52	477.37	101.95	476.83	103.93	476.46
105.16	476.12	105.89	475.9	106.76	475.87	114.44	475.47	124.01	475.45
129.54	475.45	134.59	475.32	139.61	475.2	144.8	475.08	153.51	475.24
163.03	475.4	174.24	477.87	177.84	478.51	189.78	480.64	202.91	481.17
208.84	481.4	213.07	481.4	224.33	481.37	246.47	481.57	253.52	481.59
256.45	481.59	262.2	481.56	263.25	481.5	282.91	480.41	293	479.85
304.79	479.25	305.31	479.3						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	57.98	.045	189.78	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
57.98	189.78	400	400	400	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	55.64	482.4	F
200.65	305.31	482.41	F

Left Levee Station= 57.46 Elevation= 481.56
Right Levee Station= 244.66 Elevation= 481.6

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 7213

INPUT
Description: East Ditch Sta. 32+00
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	483.25	7.34	481.94	24.74	479.21	28.75	478.57	34.3	478.5
49.52	478.3	51.35	478.94	52.69	479.4	55.66	480.17	56.62	480.42
58.61	480.31	70.99	479.61	77.87	477.05	79.58	476.42	81.27	476.37
88.31	476.17	90.38	476.81	91.32	477.11	107.79	477.75	118.25	478.15
120.55	477.63	129.05	475.69	134.4	474.51	140.91	473.09	144.84	472.95
147.17	472.85	150.7	472.96	158.22	473.2	162.64	473.09	170.5	472.91
172.13	472.4	177.59	470.49	179.1	470.24	180.99	469.91	184.55	469.81
186.21	469.76	186.75	469.74	189.27	469.98	190.16	471.76	190.43	473.34
190.86	473.34	191.66	473.29	196.12	473.82	197.81	474.03	202.77	474.88
207.06	475.63	212.49	476.58	221.22	478.07	229.96	478.14	236.92	477.9
240.42	477.77	244.33	477.97	256.19	478.53	272.74	478.35	275.96	478.32
277.22	478.32	292.87	478.38	293.8	478.38	307.22	478.4	321.42	478.53
335.46	478.69								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	118.25	.045	221.22	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
118.25	221.22	400	400	400	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	98.5	479.87	F
232.35	335.46	480.05	F

Left Levee Station= 116.29 Elevation= 478.19

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 6813

INPUT
Description: East Ditch Sta. 36+00
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
52.07	476.07	55.33	477.21	56.59	477.18	59.1	477.1	63.9	476.96

67.24	476.86	76.3	473.62	76.64	473.5	77.85	473.4	80.16	473.2
80.69	473.2	84.4	473.14	86.85	473.97	88.55	474.56	106.95	474.67
115.39	474.71	125.22	473.06	128.84	472.44	130.57	472.26	141.7	471.06
146.72	471.1	154.12	471.15	161.23	471.03	166.65	470.91	176.46	470.58
179.18	470.42	180.28	469.97	182.81	468.52	186.04	468.56	189.56	468.6
190.47	468.61	191.61	468.86	195.39	469.63	196.04	470.45	197.6	472.29
199.8	472.68	202.66	473.19	204.98	473.8	208.96	474.83	217.42	475.57
219.23	475.75	221.98	475.89	228.83	476.21	238.59	476.32	245.38	476.38
256.84	476.54	260.28	476.56	262.14	476.59	266.1	477.07	266.75	476.87
269.03	476.86	270.66	476.97	273.59	476.72	274.36	476.64	276.55	476.45
279.85	476.15	283.23	475.7	283.76	475.62	285	475.5	287.07	475.29
289.64	475.43	291.27	475.53	307.66	475.57	310.86	475.55	319.62	475.46
329.26	475.52	331.71	475.55						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
52.07	.04	115.39	.045	208.96	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
115.39	208.96	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
52.07	98.05	477.09	F
221.17	331.71	477.14	F

Left Levee Station= 102.61 Elevation= 474.71
Right Levee Station= 264.5 Elevation= 477

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 6713

INPUT
Description: East Ditch Sta. 37+00
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
56.23	474.99	58.87	476.19	68.26	475.83	70.47	475.75	80.04	472.65
84.14	472.02	85.84	472.17	88.36	472.38	92.07	473.89	93.37	474.42
100.65	474.48	119.84	474.66	127.84	473.33	133.08	472.45	135.81	471.2
139.94	469.26	143.96	469.14	146.45	469.07	147.69	469.12	148.43	469.22
155.42	469.47	157.1	469.52	157.29	469.51	162.27	468.93	167.42	468.24
168.96	468.15	171.03	468.03	175.01	468.11	175.87	468.13	176.82	468.2
177.64	468.32	182.6	469.11	183.97	469.81	192.18	470.71	196.82	470.93
199.12	471.06	203.87	472.03	204.73	472.19	216.26	474.01	216.76	474.1
217.26	474.14	228.17	475.07	229.7	475.15	237.84	475.54	243.53	475.62
247.93	475.68	252.84	475.59	257.85	475.49	262.67	475.21	269.52	474.7
277.49	474.81	283.6	474.92	287.59	475.01	294.63	475.09	306.28	475.16
310.46	475.18	313.42	475.2	315.3	475.2	332.35	475.01	336.57	474.96

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
56.23	.04	119.84	.045	228.17	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
119.84	228.17	200	200	200	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
56.23	100.78	477.73	F
231.66	336.57	477.61	F

Left Levee Station= 106.25 Elevation= 474.6
Right Levee Station= 246.25 Elevation= 475.71

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 6513

INPUT
Description: East Ditch Sta. 39+00
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
70.25	474.15	70.94	474.27	80.98	474.19	82.7	474.18	83.79	473.73
90.11	471.14	91.56	471.11	93.3	471.07	97.78	471.35	98.46	471.39
99.57	471.66	104.91	472.96	114.89	472.99	131.11	473.07	136.82	471.66
139.67	470.96	148.52	468.73	150.58	468.21	152.37	468.12	157.74	467.87
165.88	468.41	166.54	468.45	167.07	468.45	179.51	468.39	180.29	468.39
184.81	468.38	195.12	468.36	205.51	468.74	214.11	469.04	219.89	469.89

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  220.24  469.94  226.76   471.1  229.57   471.8  236.31  473.42  238.57  474.12
  240.35  474.61  244.84  475.26  246.79  475.54  254.36  475.89  255.82  475.94
  257.27  475.93  261.07   475.9  265.08  475.85  265.49  475.77  273.37  474.33
  288.45  474.02  290.85  473.96  305.44  473.65  306.94  473.62  316.83   473.7
  333.53  473.74  348.61  473.65

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   70.25     .04  131.11    .045  238.57     .04

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
        131.11  238.57                400     400     400               .1       .3
Ineffective Flow      num=         2
   Sta L   Sta R    Elev   Permanent
   70.25  112.64  475.36        F
  246.25  348.61  476.29        F
Left Levee       Station=   84.14       Elevation=  474.16
Right Levee      Station=  258.11       Elevation=  476.01

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill     RS: 6113

INPUT
Description: East Ditch Sta. 43+00
Station Elevation Data      num=       70
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  473.74    4.37  473.82    5.43  473.82   11.74  473.71   12.41  473.71
   12.93   473.7   18.52  473.44   19.01  473.43    25.8  472.86   27.72  472.81
   32.92  472.54   33.23  472.52   33.94   472.5   38.27  472.49   45.12  472.47
    47.3  472.46   47.83  472.45   48.61   472.4   53.41  472.05   58.21  471.87
   64.95  471.91    65.4  471.91   70.08  471.83   71.09  471.81   75.78  471.33
   79.42  471.09   81.24  470.87   83.03  470.45   86.84  470.39   87.17  470.35
   94.12   469.7   99.05  469.24  106.38  468.32  108.15   468.1  109.91  468.11
  112.24  468.15  120.57  468.08  123.08  468.07  127.51  468.05  129.73  468.11
  133.33  468.21   135.5  468.19  145.93  468.13  155.23  468.06  163.14  468.01
  171.51  467.94  177.17  468.28   179.4  468.42  184.25  468.95  184.57  469.02
   187.8   469.8  189.74  470.46  193.02  471.57  198.78  472.08   202.4  472.43
  209.45  472.24  214.68   472.1     216  471.98  216.36  471.94   221.3  471.36
  223.36  471.14  242.49  470.84  245.52  470.81  260.37  470.62  264.16  470.54
   274.4  470.63  275.26  470.64  276.19  470.65  302.56  470.88  305.31  470.91

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   71.09    .045   202.4     .04

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
         71.09   202.4                110     139     200               .1       .3
Ineffective Flow      num=         2
   Sta L   Sta R    Elev   Permanent
       0   60.77  473.45        F
  205.24  305.31  473.54        F
Right Levee      Station=  204.64       Elevation=    472.5

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill     RS: 5974

INPUT
Description: East Ditch Sta. 44+39
Station Elevation Data      num=      124
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  471.41    3.14  471.39   10.38  471.39   12.11  471.38   18.07  471.38
   21.09  471.37   25.76  471.37   29.65  471.34   33.09  471.33   38.49  471.28
   40.75  471.27   47.34  471.21   48.08   471.2   55.72  471.12   56.17  471.08
   56.78  471.01   64.63  470.19   70.25  469.56   71.91  469.27   73.35  468.98
   76.82  468.31   80.62  467.49   81.83  467.18   86.92  466.13   87.36  465.86
   89.03  464.89   91.78  463.88   93.62  464.16   96.42  464.63    98.7     465
  100.34  465.29  100.94  465.31  108.56  465.54   110.7  465.68  113.62  465.78
  115.18  465.86   119.4  466.08  125.02  466.32  125.46  466.35  126.91  466.43
  131.46  466.61  133.75  466.57  134.52  466.56   139.4  466.49   141.9  466.45
  150.75  466.35  156.13  466.35  158.86  466.32   166.9  466.35  169.26  466.42
  176.15  466.62  180.88   466.6  182.88   466.6  189.63  466.68  193.97  466.72
  198.06  466.77  205.41  466.85  206.68  466.86  207.28  466.86   215.4  466.92
  217.35  466.93  220.85  466.95  227.34  466.97  228.87  466.96  232.67  466.98
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236.05	467.25	239.6	467.47	242.55	467.68	245.61	467.85	250.45	468.19
253.4	468.35	259.1	468.8	259.42	468.83	260.88	469	269.44	469.94
272.9	470.31	276.81	469.94	277.47	469.88	283.63	469.26	287.2	468.73
287.9	468.63	291.04	468.44	291.92	468.29	292.64	468.22	298.32	467.43
301.53	467.33	305.81	467.37	307.37	467.36	309.56	467.37	315.08	467.36
318.78	467.28	326.23	467.06	326.65	466.9	329.51	465.95	332.07	465.14
332.52	464.94	341.12	466.97	345.2	467.87	350.44	469.17	351.66	469.47
359.09	470.97	359.63	471.23	360.36	471.34	362.32	471.62	367.99	472.02
371.88	472.28	374.93	472.49	378.79	472.75	381.99	472.8	383.01	472.83
389.44	472.95	392.74	473.03	396.92	473.12	402.47	473.27	404.46	473.31
411.43	473.52	412.11	473.53	419.69	473.7	421.06	473.74	428.41	473.87
431.29	473.96	437.14	474.07	441.52	474.21	441.99	474.22		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	56.17	.045	360.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
56.17	360.36	190	324	380	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	49.14	473.27	F
365.68	441.99	473.05	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 5650

INPUT
Description: North Ditch Sta. 56+50
Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	474.81	7.01	473.36	10.26	472.67	11.21	472.42	13.17	471.93
19.86	471.95	24.48	471.95	27.93	472.13	28.29	472.14	29.4	472.11
36.92	471.84	37.85	471.79	39.11	471.72	59.28	471.21	64.67	471.06
69.07	469.95	69.63	469.81	73.23	469.05	82.78	467.05	94.66	463.78
97.06	463.13	97.93	463.16	112.82	463.78	114.27	463.81	133.28	464.24
147.71	463.67	148.26	463.65	151.96	463.51	154.16	464.06	160.67	465.82
172.08	465.66	183.71	465.52	200.19	465.64	200.87	465.87	208.45	468.39
210.38	467.85	217.2	465.89	232.09	465.43	244.64	465.06	256	464.86
263.46	464.73	267.92	464.9	274.77	465.16	283.4	467.22	288.73	468.48
295.31	469.84	299.29	470.67	309.79	470.72	320.49	470.78	345.27	471.44
363.87	471.94	369.78	472.01	374.96	472.07				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	64.67	.045	299.29	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
64.67	299.29	250	250	250	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	61.59	472.27	F
302.7	374.96	472.1	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 5400

INPUT
Description: North Ditch Sta. 54+00
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	477.81	.63	477.66	6.76	476.23	9.33	475.59	12.99	474.74
13.59	474.6	14.01	474.39	15.82	473.45	23.93	473.45	27.8	473.45
34.14	473.68	36.52	472.39	39.17	472.24	52.12	471.52	55.96	471.05
59.89	470.51	71.66	467.66	75.47	466.73	78.46	465.99	89.61	463.18
95	462.75	95.34	462.72	95.93	462.44	97.66	461.62	98.22	461.73
99.27	461.91	102.49	462.55	104.31	462.2	108.71	461.41	112.26	462.04
112.85	462.13	118	462.16	140.82	462.23	147.46	462.3	154.37	462.39
156.3	462.42	163.83	463.68	170.17	464.3	175.99	464.91	189.46	464.51
190.62	464.47	191.53	464.79	201.54	468.21	208.13	465.09	209.52	464.48
212.38	464.3	219.63	463.86	239.85	464.28	263.1	464.75	276.25	464.4
279.41	464.32	287.9	466.17	293.38	467.36	304.45	468.59	306.1	468.78
308.81	468.87	319	469.29	319.46	469.24	337.94	469.72	363.58	470.43

372.9	470.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	71.66	.045	306.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
71.66	306.1	700	700	700	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	66.83	471.1	F
309.58	372.9	471.77	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 4700

INPUT
Description: North Ditch Sta. 47+00
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	481.35	.91	481.22	4.94	480.14	16.24	479.96	17.73	480.22
18.23	480.32	25.83	480	27.91	479.91	30.25	479.26	34.85	477.93
43.01	477.43	49.29	477.03	73.38	468.45	74.53	468.04	75.03	467.89
95.19	461.64	100.78	460.56	103.16	460.12	112.09	459.74	127.19	459.09
129.38	459.49	129.75	459.56	132.64	458.98	134.64	459	135.63	458.98
152.31	458.99	167.61	458.99	176.56	458.99	180.95	459.52	186.63	460.15
188.23	460.34	193.15	460.89	208.48	460.82	209.04	460.82	209.42	460.89
218.83	463.33	226.61	461.98	227	461.91	241.7	462.69	243.31	462.78
255.69	463.75	260.42	463.24	262.08	463.1	280.84	462.68	295.47	462.34
297.73	462.74	304.36	464.11	311.53	464.75	317.31	465.35	329.14	466.37
329.53	466.4	347.51	466.72	360.38	466.97	374.99	467.07		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	75.03	.045	329.53	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
75.03	329.53	700	700	700	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	69.12	474	F
332.51	374.99	473.2	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 4000

INPUT
Description: North Ditch Sta. 40+00
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	477.14	4.08	475.9	5.05	475.61	6.45	474.79	11.46	471.88
15.79	471.32	24.02	470.25	36.61	469.63	47.05	469.1	61.67	468.15
66.4	467.86	75.35	465.23	86.67	461.92	97.59	460.14	110.13	458.08
209.58	458.08	212.06	458.73	214.9	459.47	225.05	459.5	228.63	459.51
231.47	459.78	236.43	460.26	240.13	460.08	243.81	459.89	246.79	460.09
251.89	460.48	257.1	460.29	261.06	460.14	279.41	459.62	285.4	459.44
303.19	460.43	310.54	460.84	315.1	461.49	330.35	463.62	341.31	464.13
357.06	464.94	369.7	465.3	373.9	465.41				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	86.67	.045	330.35	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
86.67	330.35	700	700	700	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	81.57	468.93	F
338.08	373.9	469.04	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 3300

INPUT
Description: North Ditch Sta. 33+00
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	473.07	.41	473.03	3.37	472.72	6.32	473.52	7.49	473.83
8.29	473.64	9.86	473.25	19.12	472.93	21.14	472.86	21.82	472.51
24.47	471.11	25.59	471.08	39.33	470.69	46.9	470.36	56.19	470
71.42	466.63	84.75	463.63	104.56	459.32	110.29	458.08	248.28	458.08
262.46	458.79	272.38	459.27	286.27	459.28	304.83	459.43	306.15	459.4
307.94	459.36	309.91	459.29	314.8	459.12	318.85	458.79	323.38	458.42
329.45	457.93	336.17	457.39	342.54	457.32	347.87	457.24	358.65	457.1
360.81	457.07	364.32	457.02	367.54	456.97	370.69	456.93	375.39	457.37
380.23	457.83	386.16	458.39	392.29	458.98	396.73	459.7	400.68	460.31
406.87	461.29	413.84	462.37	417.07	462.44	419.55	462.49	424.73	462.57
437.26	462.87	437.58	462.88	449.84	463.01	456.21	463.09	461.84	463.14
468.1	463.21								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	104.56	.045	413.84	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
104.56	413.84	510	500	370	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	82.31	467.25	F
425.88	468.1	466.73	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 2850

INPUT
Description: North Ditch Sta. 28+50
Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	475.12	2.7	475.16	5.61	475.02	8.42	474.91	10.97	474.94
14.59	474.89	21.42	474.67	21.85	474.67	24.75	474.64	28.29	474.6
34.16	474.47	35.09	474.43	38.5	474.29	46.2	473.98	52.67	473.72
56.1	473.59	67.22	473.26	69.41	473.18	69.89	473.07	70.41	472.95
88.91	468.75	103.49	465.34	104.41	465.12	105.39	464.89	123.87	459.51
126.93	458.08	258.69	458.08	269.22	458.3	273.16	458.36	281.66	458.52
289.96	458.63	294.19	458.71	306.64	458.86	307.5	458.87	309.3	458.92
312.74	459.12	320.55	459.59	324.53	459.56	329.45	459.52	337.16	459.49
361.3	459.37	368.78	459.38	376.24	459.26	389.99	459.05	403.78	458.66
411.2	458.58	418.61	458.44	432.42	458.27	446.26	457.83	453.63	457.53
461.06	457.06	464.07	456.88	471.08	456.45	478.88	455.96	491.28	456.33
497.14	456.5	512.02	455.66	515.66	455.46	531.93	457.62	534.94	458.04
546.07	459.85	557.29	461.68	566.08	462.19	571.51	462.51	578.58	462.52
593.64	462.54								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	123.87	.045	557.29	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
123.87	557.29	220	220	220	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	104.18	467.65	F
563.64	593.64	467.4	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 2630

INPUT
Description: North Ditch Sta. 26+30
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.9	1.63	468.52	3.5	468.87	8	468.63	8.3	468.55
18.98	468.29	22.12	468.17	26.93	469.39	30.4	470.19	36.79	468.43

43.3	466.62	49.13	465	51.85	464.32	56.61	462.9	62.05	461.62
65.87	460.99	70.14	460.4	73.44	459.88	81.03	458.9	81.89	458.88
90.83	458.69	93.12	458.64	98.32	458.51	101.26	458.44	105.28	458.36
109.53	458.27	112.03	458.26	116.79	458.16	118.02	458.16	120.76	458.08
121.74	458.08	131.37	458.08	136.78	458.73	140.06	459.18	142.58	459.5
145.12	459.87	145.76	459.85	146.56	459.85	151.42	459.84	154.81	459.84
157.55	459.96	159.53	460.07	164.05	460.29	169.47	460.61	170.99	460.56
171.98	460.53	181.95	460.2	186.41	460.05	190.03	459.92	195.83	459.66
198.92	459.59	199.8	459.55	205.62	459.39	209.46	459.22	213.16	459.1
215.32	459.03	230.72	459.05	236.08	459.18	240.39	459.06	243.15	458.97
254.64	458.73	283.92	458.64	284.5	458.64	326.29	458.44	326.63	458.43
326.97	458.44	347.85	458.29	368.66	458.11	369.06	458.1	369.46	458.09
390.27	457.82	411.03	457.73	411.49	457.72	411.94	457.71	432.7	457.04
453.41	456.69	453.91	456.69	454.49	456.68	455.6	456.67	478	456.43
479.99	456.37	499.17	455.82	516.21	454.82	516.58	454.79	517.19	454.76
518.51	454.84	541.84	456.33	556.36	459.12	562.53	460.31	569.16	460.7
575.35	461.07	583.59	461.07	599.92	461.08	609.55	462.14	610.76	462.27
611.15	462.27	612.93	462.27						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	169.47	.045	562.53	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
169.47	562.53	30	30	30	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	159.38	463.92	F
575.02	612.93	463.96	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 2600

INPUT
Description: North Ditch Sta. 26+00
Station Elevation Data num= 114

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.01	.44	470.92	2.47	470.36	8.27	468.59	12.06	468.55
21.07	468.45	24.24	468.33	25.29	468.28	28.8	468.15	35.68	467.81
37.77	467.69	40.91	467.55	45.91	468.06	52.84	468.56	53.62	468.37
54.79	468.11	62.43	466.68	65.32	466.08	66.55	465.85	71.11	465.18
74.53	464.89	75.81	464.78	79.99	464.55	82.67	464.45	87.23	464.19
88.09	464.16	90.33	464.08	95	463.81	96.92	463.67	99.42	463.73
102.74	463.85	105.03	463.93	106.89	464	109.64	463.42	111.65	463.05
112.32	462.96	115.28	462.39	120.51	461.82	121.92	461.86	123.45	461.84
128.49	461.88	135.16	461.71	135.82	461.72	136.71	461.65	137.15	461.63
143.56	461.23	144.7	461.18	148.41	460.96	152.4	460.81	155.01	460.67
160.03	460.48	161.84	460.39	174.45	459.87	174.84	459.85	175.07	459.85
177.12	459.97	178.46	460.04	179.65	460.02	182.64	460	184.93	459.91
190.91	459.73	192.68	459.67	197.32	459.52	200.52	459.4	201.12	459.38
204.26	459.28	204.79	459.26	225	459.13	225.39	459.11	226.1	459.11
232.53	459.05	235.93	459.01	253.85	458.79	263.03	458.71	272.09	458.65
296.37	458.52	305.46	458.47	314.57	458.35	326.67	458.23	338.74	458.25
347.88	458.21	357.05	458.05	369.1	457.8	381.11	457.58	390.31	457.45
399.53	457.3	411.52	457.22	423.49	456.98	432.74	456.83	442.01	456.85
453.95	456.72	467.47	456.6	469.36	456.59	478.05	456.5	479.09	456.46
499.6	455.73	505.2	455.38	517.2	454.63	517.65	454.6	535.65	455.79
542.54	456.24	557.87	459.18	559.31	459.45	561.83	459.94	562.18	460
576.26	460.82	576.83	460.85	580.85	460.85	600.54	460.82	605.76	461.41
611.95	462.11	616.32	462.11	617.33	462.11	617.92	462.08		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	174.84	.045	562.18	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
174.84	562.18	200	200	200	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	157.08	463.44	F
575.59	617.92	463.37	F

CROSS SECTION

RIVER: Perimeter Ditch

REACH: Laredo Landfill RS: 2400

INPUT
Description: North Ditch Sta. 24+00
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.28	1.58	468.77	4.9	468.66	9.16	468.6	11	468.61
12.44	468.62	14.42	468.61	18.21	468.61	23.57	468.55	25.75	468.51
26.71	468.46	27.97	468.39	33.26	468.18	36.66	468.06	40.2	467.8
43.35	466.45	43.97	466.1	44.77	466.03	47.09	465.96	47.89	465.96
55.9	465.6	57.65	465.58	59.94	465.64	67.27	464.86	70.46	464.78
71.84	464.65	84.59	463.74	86.3	463.56	90.44	463.22	93.43	462.87
94.48	462.72	97.47	462.35	100.88	461.84	107.61	460.92	108.68	460.77
117.17	460.01	125.42	459.26	126.61	459.24	127.39	459.23	140.33	459.03
150.21	458.8	153.98	458.73	159.54	458.57	170.46	458.39	174.63	458.33
176.24	458.34	181.62	458.3	199.64	458.35	217.71	458.05	220.86	458.05
223.99	457.99	242.07	458.05	260.19	458.11	263.28	458.2	266.37	458.14
284.5	457.66	302.68	457.28	305.71	457.19	308.74	457.16	326.92	456.88
345.16	456.4	348.14	456.35	351.11	456.31	369.35	456.22	387.64	456.22
390.56	456.19	393.48	456.17	411.78	455.82	430.12	455.81	432.99	455.81
435.85	455.79	454.2	455.74	472.6	455.37	478.1	455.24	479.98	455.21
487.97	455.07	494.54	454.95	504.3	454.45	521.32	453.57	529.1	453.99
529.75	454.02	551.74	455.1	552.07	455.08	553.1	455.24	554.14	455.38
557.48	455.92	577.76	458.79	579.43	458.76	584.66	458.89	586.93	458.95
590.23	459.04	606.32	459.47	609.83	459.81	619.78	460.73	621.86	460.73
624.91	460.73	628.87	460.61	631.62	460.51	635.56	460.52		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	127.39	.045	577.76	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
127.39	577.76	150	150	150	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	116.95	462.95	F
589.35	635.56	461.96	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 2250

INPUT
Description: North Ditch Sta. 22+50
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	465.89	5.56	465.4	6.69	465.32	16.21	465.03	19.21	464.89
34.45	464.14	35.23	464.07	36.82	464.04	43.46	463.91	50.57	461.96
53.5	461	65.73	458.4	68.12	458.54	74.73	459	80.29	459.23
81.17	459.45	86.39	459.62	87.54	459.69	90.63	459.49	96.94	459.31
103.63	459.12	109.62	458.99	114.95	459.02	127.31	458.87	149.91	458.62
155.69	458.55	159.12	458.53	178.62	458.5	198.17	458.29	199.84	458.26
201.49	458.19	221.05	457.54	240.66	456.99	242.26	456.97	243.87	456.97
263.48	456.95	283.14	456.8	286.24	456.7	305.9	456.01	325.62	455.5
327.12	455.48	328.61	455.48	348.33	455.55	368.1	455.13	369.54	455.09
370.98	455.08	390.75	454.89	410.58	454.73	411.97	454.73	413.35	454.72
433.18	454.76	453.06	454.83	454.39	454.82	455.72	454.84	489.78	454.75
502.22	454.76	509.37	454.28	522.83	453.35	526.07	453.13	535.05	454.12
545.38	455.24	549.48	455.68	574.71	458.45	579.42	458.52	591.11	458.68
604.68	458.67	609.09	458.67	617.38	459.21	625.53	459.74	626.78	459.74
630.49	459.74	638.15	459.27	645.5	458.84	656.87	459.35	661.23	459.55
665.79	459.55	666.53	459.55	667.53	459.47	672.01	459.13	680.74	458.29
685.19	457.87	690.36	458.52	691.48	458.67				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	87.54	.045	574.71	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
87.54	574.71	0	0	0	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	79.12	461.5	F
581.9	691.48	461.04	F

Right Levee Station= 623.18 Elevation= 459.75

SUMMARY OF MANNING'S N VALUES

River:Perimeter Ditch

Reach	River Sta.	n1	n2	n3
Laredo Landfill	9895	.04	.045	.04
Laredo Landfill	9463	.04	.045	.04
Laredo Landfill	9313	.04	.045	.04
Laredo Landfill	9113	.04	.045	.04
Laredo Landfill	8763	.04	.045	.04
Laredo Landfill	8513	.04	.045	.04
Laredo Landfill	8413	.04	.045	.04
Laredo Landfill	8313	.04	.045	.04
Laredo Landfill	8013	.04	.045	.04
Laredo Landfill	7613	.04	.045	.04
Laredo Landfill	7213	.04	.045	.04
Laredo Landfill	6813	.04	.045	.04
Laredo Landfill	6713	.04	.045	.04
Laredo Landfill	6513	.04	.045	.04
Laredo Landfill	6113	.04	.045	.04
Laredo Landfill	5974	.04	.045	.04
Laredo Landfill	5650	.04	.045	.04
Laredo Landfill	5400	.04	.045	.04
Laredo Landfill	4700	.04	.045	.04
Laredo Landfill	4000	.04	.045	.04
Laredo Landfill	3300	.04	.045	.04
Laredo Landfill	2850	.04	.045	.04
Laredo Landfill	2630	.04	.045	.04
Laredo Landfill	2600	.04	.045	.04
Laredo Landfill	2400	.04	.045	.04
Laredo Landfill	2250	.04	.045	.04

SUMMARY OF REACH LENGTHS

River: Perimeter Ditch

Reach	River Sta.	Left	Channel	Right
Laredo Landfill	9895	420	432	440
Laredo Landfill	9463	150	150	150
Laredo Landfill	9313	200	200	200
Laredo Landfill	9113	350	350	350
Laredo Landfill	8763	250	250	250
Laredo Landfill	8513	100	100	100
Laredo Landfill	8413	100	100	100
Laredo Landfill	8313	300	300	300
Laredo Landfill	8013	400	400	400
Laredo Landfill	7613	400	400	400
Laredo Landfill	7213	400	400	400
Laredo Landfill	6813	100	100	100
Laredo Landfill	6713	200	200	200
Laredo Landfill	6513	400	400	400
Laredo Landfill	6113	110	139	200
Laredo Landfill	5974	190	324	380
Laredo Landfill	5650	250	250	250
Laredo Landfill	5400	700	700	700
Laredo Landfill	4700	700	700	700
Laredo Landfill	4000	700	700	700
Laredo Landfill	3300	510	500	370
Laredo Landfill	2850	220	220	220
Laredo Landfill	2630	30	30	30
Laredo Landfill	2600	200	200	200
Laredo Landfill	2400	150	150	150
Laredo Landfill	2250	0	0	0

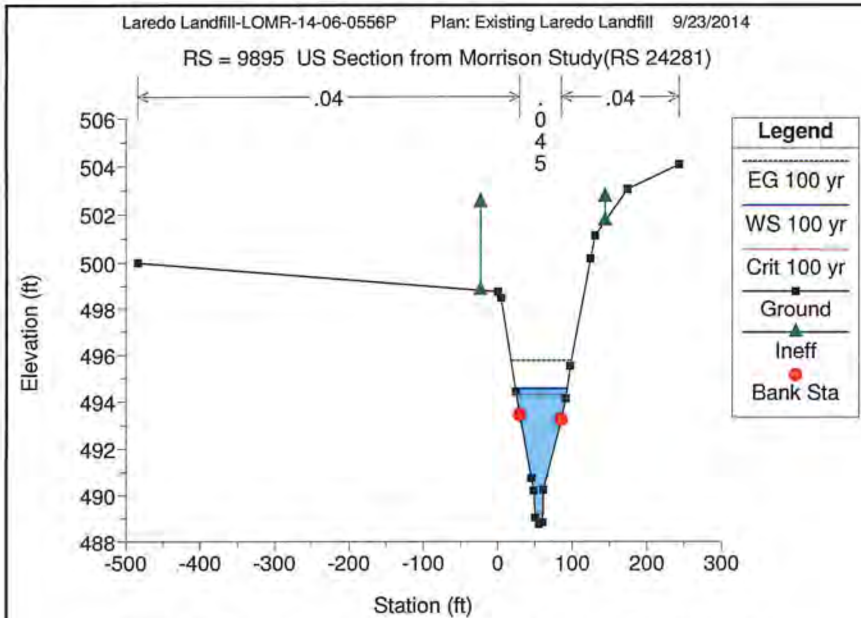
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Perimeter Ditch

Reach	River Sta.	Contr.	Expan.

Laredo Landfill	9895	.1	.3
Laredo Landfill	9463	.1	.3
Laredo Landfill	9313	.1	.3
Laredo Landfill	9113	.1	.3
Laredo Landfill	8763	.1	.3
Laredo Landfill	8513	.1	.3
Laredo Landfill	8413	.1	.3
Laredo Landfill	8313	.1	.3
Laredo Landfill	8013	.1	.3
Laredo Landfill	7613	.1	.3
Laredo Landfill	7213	.1	.3
Laredo Landfill	6813	.1	.3
Laredo Landfill	6713	.1	.3
Laredo Landfill	6513	.1	.3
Laredo Landfill	6113	.1	.3
Laredo Landfill	5974	.1	.3
Laredo Landfill	5650	.1	.3
Laredo Landfill	5400	.1	.3
Laredo Landfill	4700	.1	.3
Laredo Landfill	4000	.1	.3
Laredo Landfill	3300	.1	.3
Laredo Landfill	2850	.1	.3
Laredo Landfill	2630	.1	.3
Laredo Landfill	2600	.1	.3
Laredo Landfill	2400	.1	.3
Laredo Landfill	2250	.1	.3

HEC-RAS Plan: Exist River: Perimeter Ditch Reach: Laredo Landfill Profile: 100 yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Laredo Landfill	9895	100 yr	1719.70	488.76	494.56	494.31	495.76	0.014520	8.85	199.66	69.53	0.85
Laredo Landfill	9463	100 yr	1719.70	487.87	493.38	491.31	493.55	0.002092	3.27	525.95	163.50	0.32
Laredo Landfill	9313	100 yr	1719.70	487.96	492.42	491.27	492.98	0.007037	6.03	285.41	88.12	0.59
Laredo Landfill	9113	100 yr	1773.10	486.86	491.54	490.36	491.85	0.004153	4.76	410.65	277.93	0.46
Laredo Landfill	8763	100 yr	1773.10	485.73	490.05	488.79	490.38	0.004258	4.55	388.47	189.39	0.46
Laredo Landfill	8513	100 yr	1773.10	484.37	488.49	487.78	488.96	0.007654	5.66	321.14	193.75	0.60
Laredo Landfill	8413	100 yr	1773.10	481.33	486.96	486.96	487.80	0.018599	7.57	249.70	180.70	0.90
Laredo Landfill	8313	100 yr	1773.10	478.47	483.40	481.81	483.87	0.004934	5.53	320.74	86.02	0.50
Laredo Landfill	8013	100 yr	1773.10	476.94	481.94	480.34	482.40	0.004832	5.46	324.99	87.55	0.50
Laredo Landfill	7613	100 yr	1818.90	475.08	479.42	478.36	480.00	0.007524	6.14	296.14	93.49	0.61
Laredo Landfill	7213	100 yr	1818.90	469.74	477.10	475.43	477.55	0.004940	5.37	338.89	92.69	0.49
Laredo Landfill	6813	100 yr	1818.90	468.52	474.59	473.47	475.16	0.007263	6.08	299.27	91.93	0.59
Laredo Landfill	6713	100 yr	1818.90	468.03	474.10	472.34	474.54	0.004792	5.35	340.11	93.53	0.49
Laredo Landfill	6513	100 yr	1818.90	467.87	473.59	471.19	473.85	0.002272	4.07	454.50	152.73	0.35
Laredo Landfill	6113	100 yr	1818.90	467.94	470.62	470.62	471.65	0.023489	8.18	222.44	107.88	1.00
Laredo Landfill	5974	100 yr	2395.50	463.88	469.29	468.12	469.52	0.004151	3.81	627.95	259.43	0.43
Laredo Landfill	5650	100 yr	2395.50	463.13	467.70	466.60	468.02	0.005145	4.50	532.19	201.28	0.49
Laredo Landfill	5400	100 yr	2415.50	461.41	466.56	465.31	466.84	0.004252	4.23	571.12	205.25	0.45
Laredo Landfill	4700	100 yr	2415.50	458.98	464.10	462.12	464.32	0.003044	3.75	644.62	217.08	0.38
Laredo Landfill	4000	100 yr	2433.90	458.08	462.47	460.58	462.63	0.001946	3.19	764.38	237.31	0.31
Laredo Landfill	3300	100 yr	2433.90	456.93	461.27	459.53	461.38	0.001581	2.71	903.86	311.16	0.28
Laredo Landfill	2850	100 yr	2433.90	455.46	460.36	458.99	460.46	0.002161	2.60	938.36	428.20	0.31
Laredo Landfill	2630	100 yr	2433.90	454.76	459.51	458.62	459.72	0.005692	3.72	653.42	423.23	0.49
Laredo Landfill	2600	100 yr	2433.90	454.60	459.30	458.40	459.54	0.006475	3.88	627.27	355.05	0.51
Laredo Landfill	2400	100 yr	2473.00	453.57	458.15	457.06	458.36	0.005322	3.67	673.41	357.45	0.47
Laredo Landfill	2250	100 yr	2473.00	453.13	457.28	456.36	457.51	0.006002	3.91	631.81	333.51	0.50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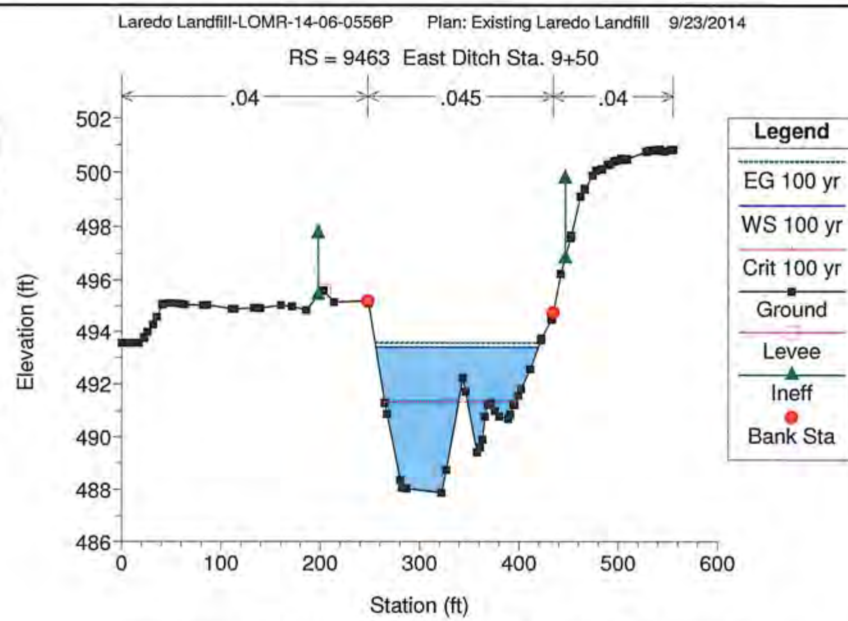
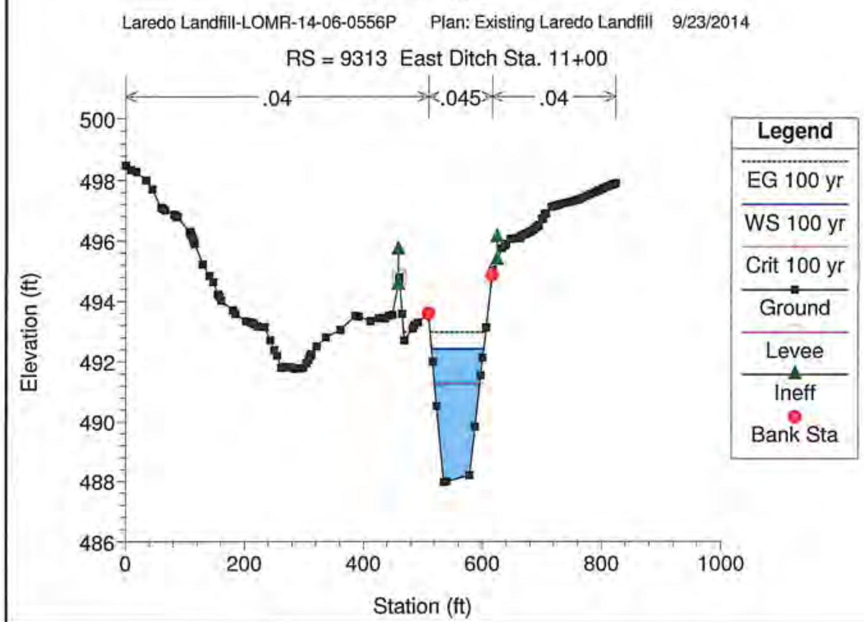
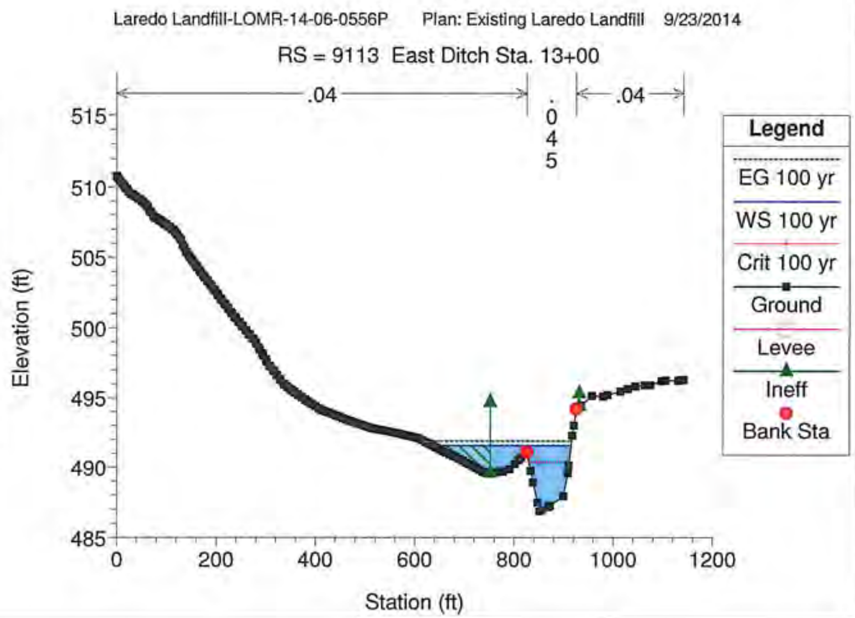
RS = 9895 US Section from Morrison Study(RS 24281)
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
506
504
502
500
498
496
494
492
490
488
-500
-400
-300
-200
-100
0
100
200
300


Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 9463 East Ditch Sta. 9+50
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
502
500
498
496
494
492
490
488
486
0
100
200
300
400
500
600


Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 9313 East Ditch Sta. 11+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
500
498
496
494
492
490
488
486
0
200
400
600
800
1000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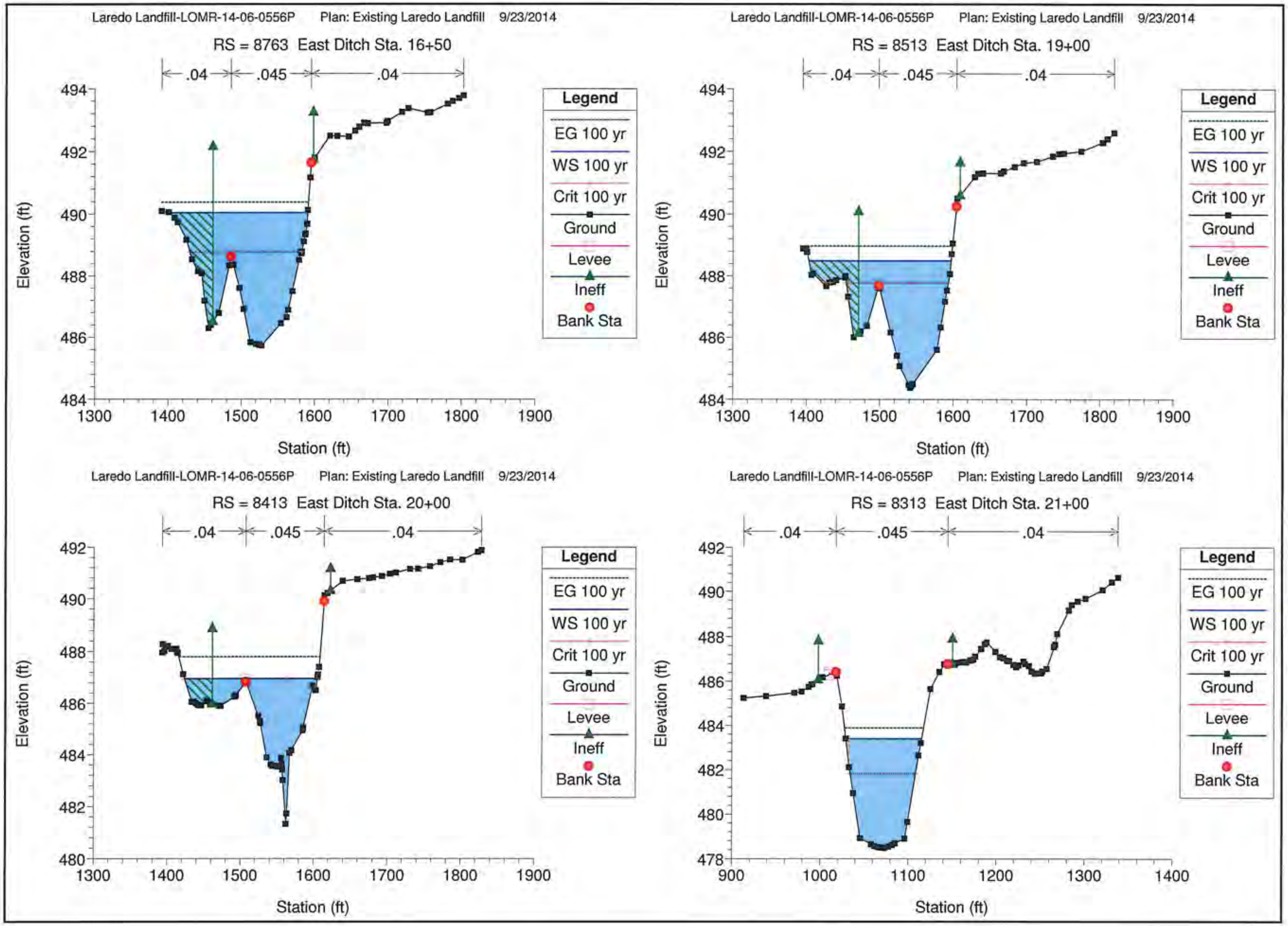
RS = 9113 East Ditch Sta. 13+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
515
510
505
500
495
490
485
0
200
400
600
800
1000
1200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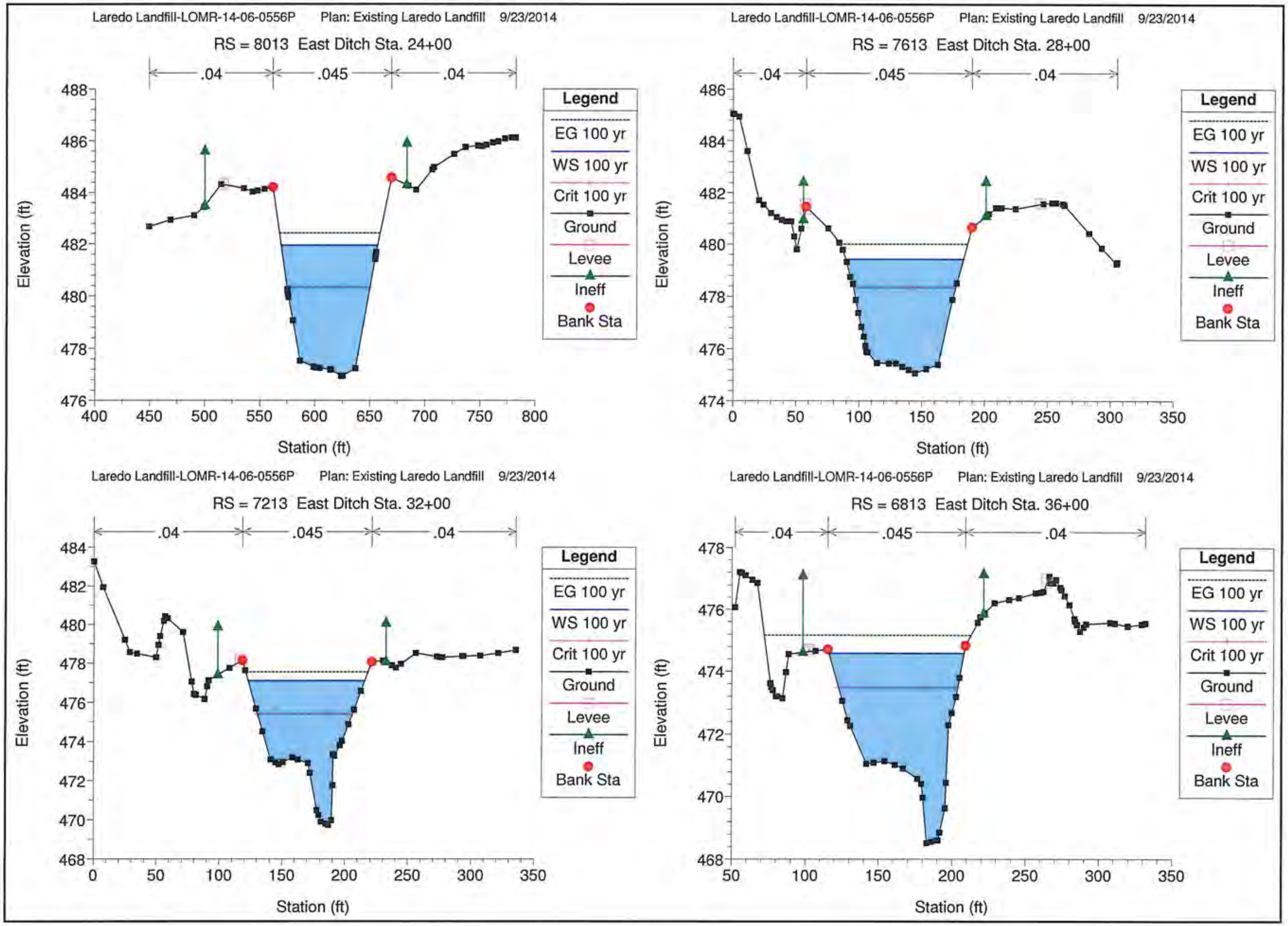
RS = 8763 East Ditch Sta. 16+50
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 8513 East Ditch Sta. 19+00
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 8413 East Ditch Sta. 20+00
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 8313 East Ditch Sta. 21+00
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta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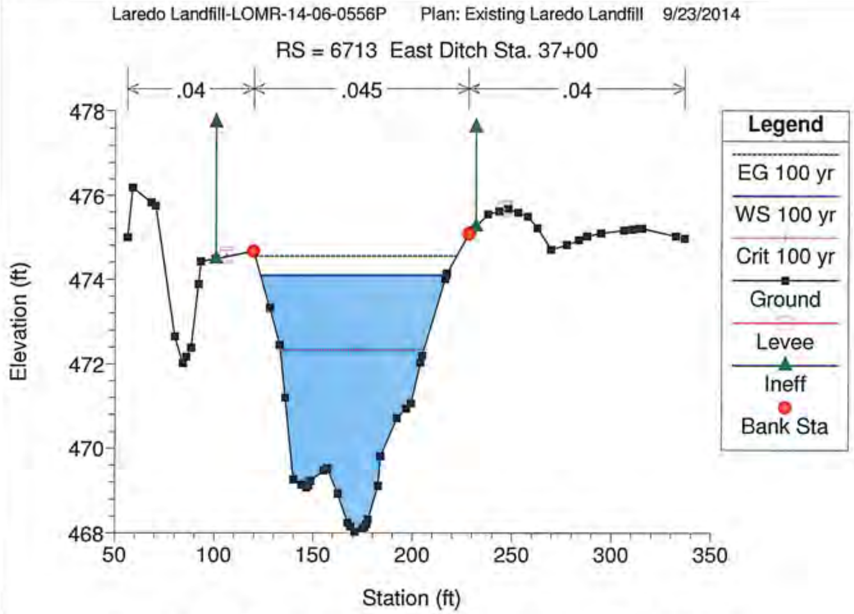
RS = 8013 East Ditch Sta. 24+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 7613 East Ditch Sta. 28+00
Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 7213 East Ditch Sta. 32+00
Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 6813 East Ditch Sta. 36+00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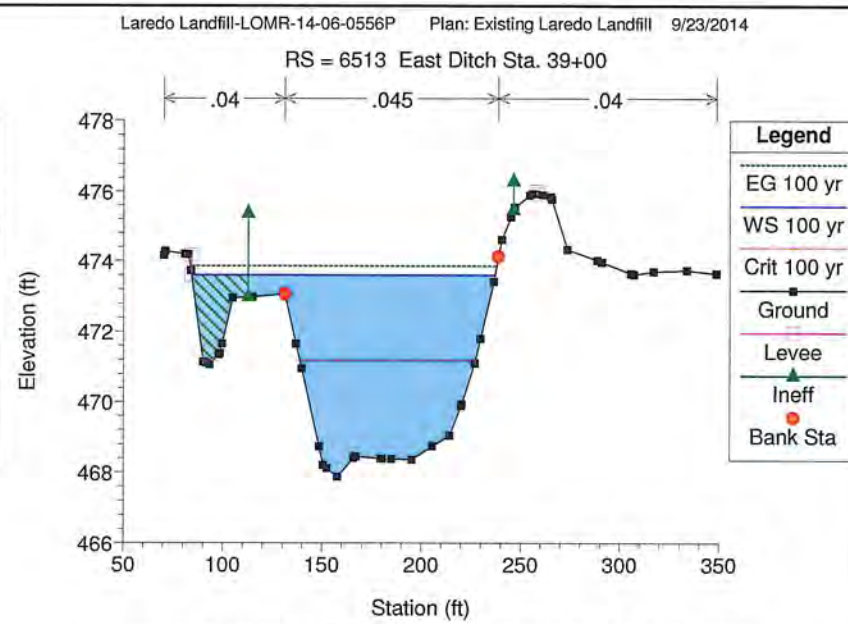
RS = 6713 East Ditch Sta. 37+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
478
476
474
472
470
468
50
100
150
200
250
300
350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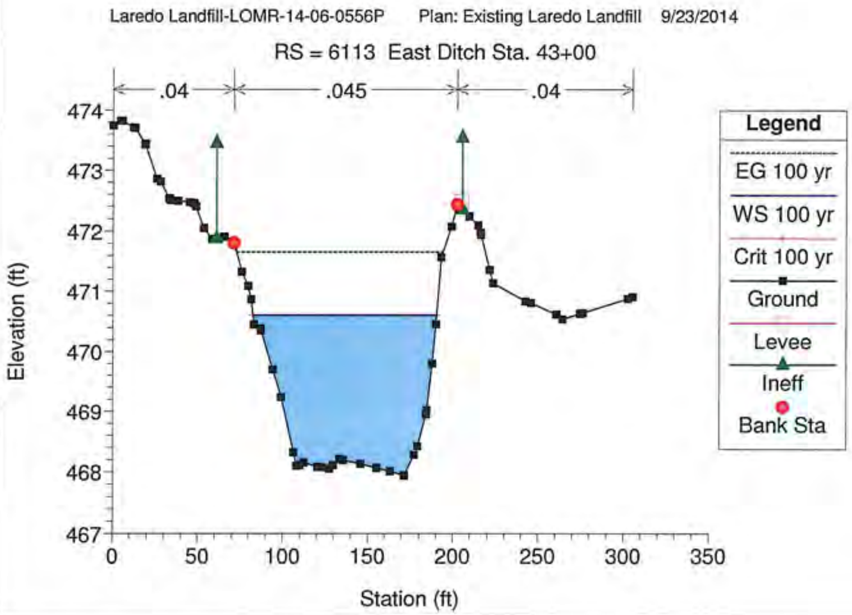
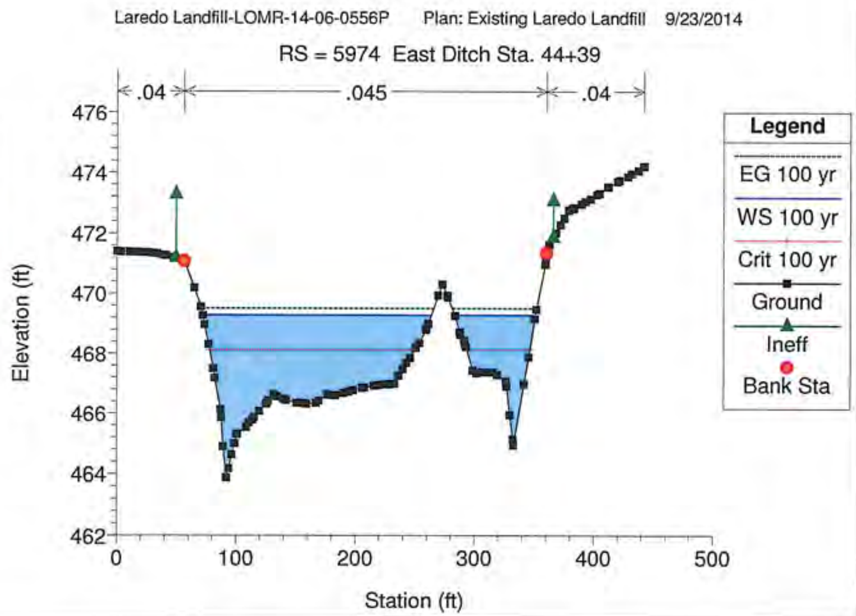
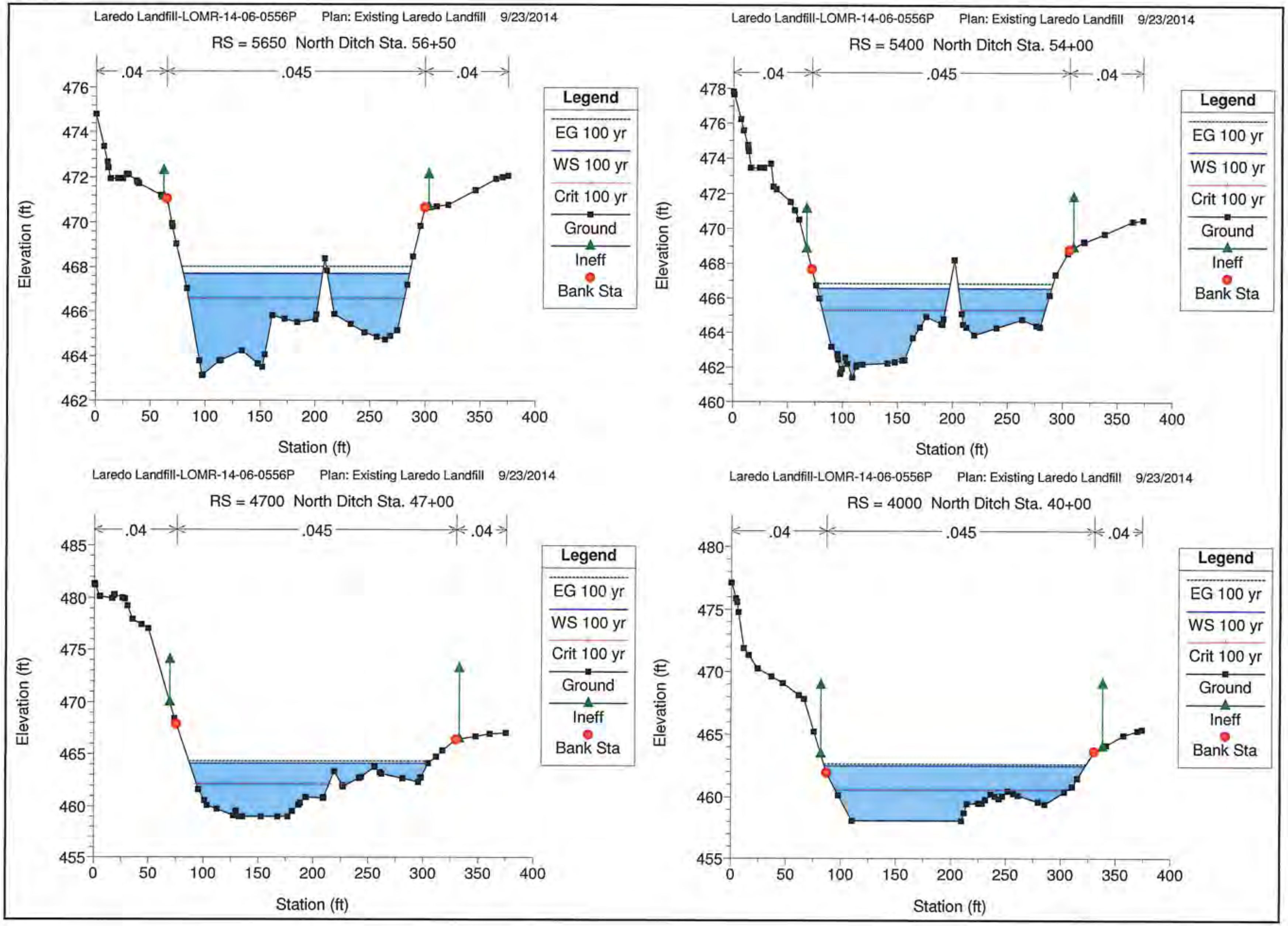
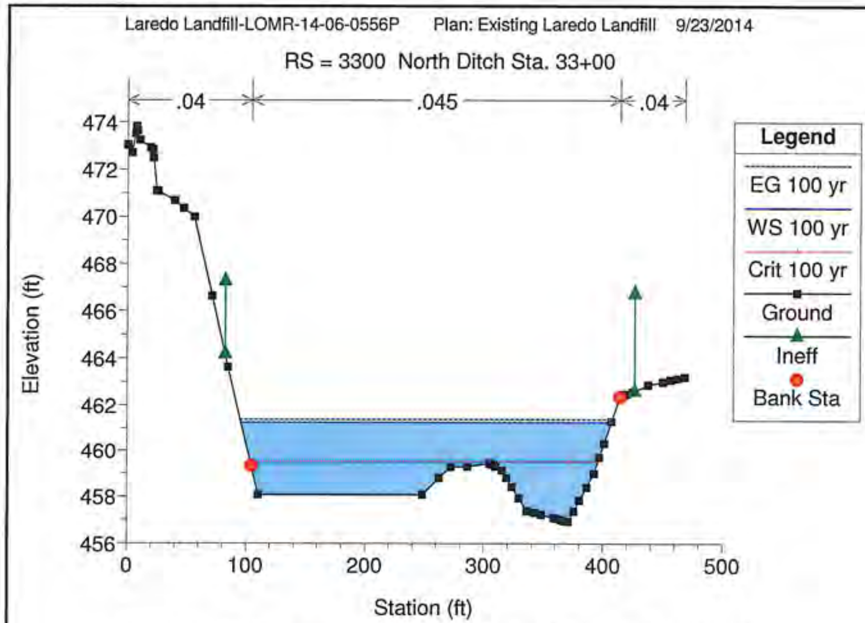
RS = 6513 East Ditch Sta. 39+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
478
476
474
472
470
468
466
50
100
150
200
250
300
350

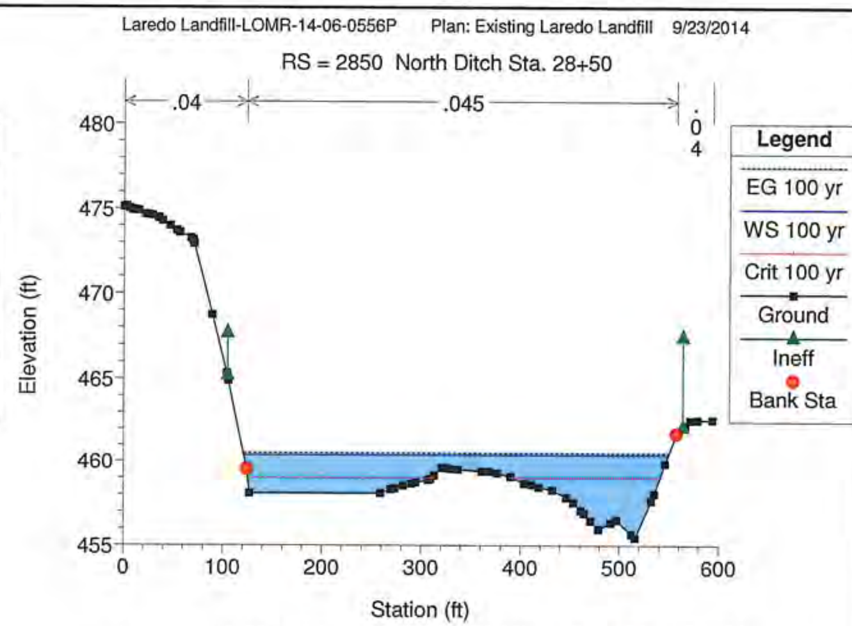

Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 6113 East Ditch Sta. 43+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
474
473
472
471
470
469
468
467
0
50
100
150
200
250
300
350


Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 5974 East Ditch Sta. 44+39
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
476
474
472
470
468
466
464
462
0
100
200
300
400
500



Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 5650 North Ditch Sta. 56+50
Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 5400 North Ditch Sta. 54+00
Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 4700 North Ditch Sta. 47+00
Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 4000 North Ditch Sta. 40+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 3300 North Ditch Sta. 33+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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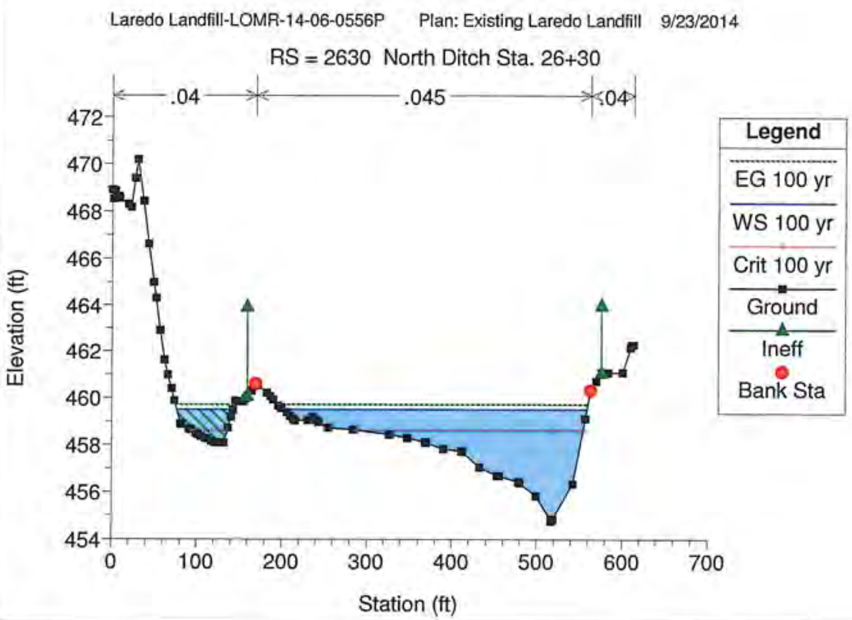
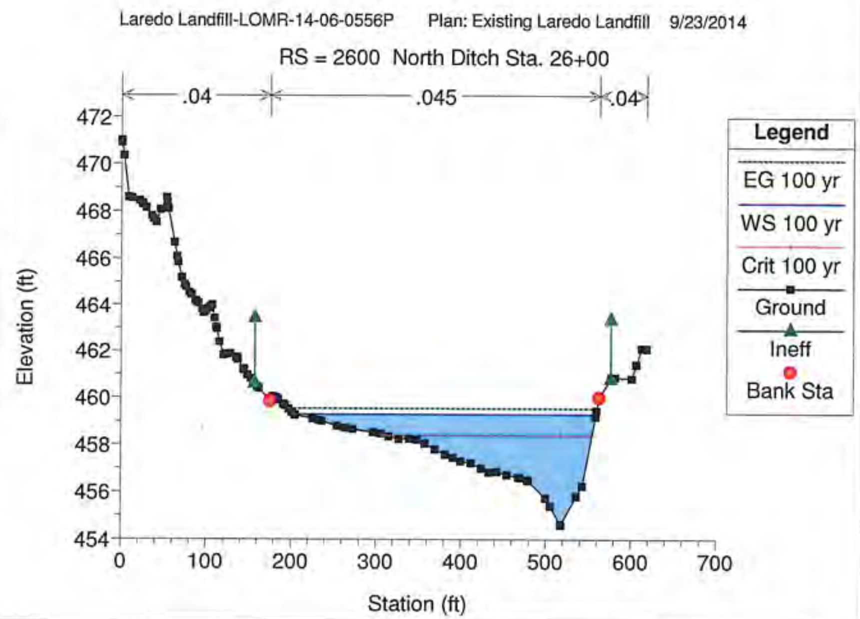
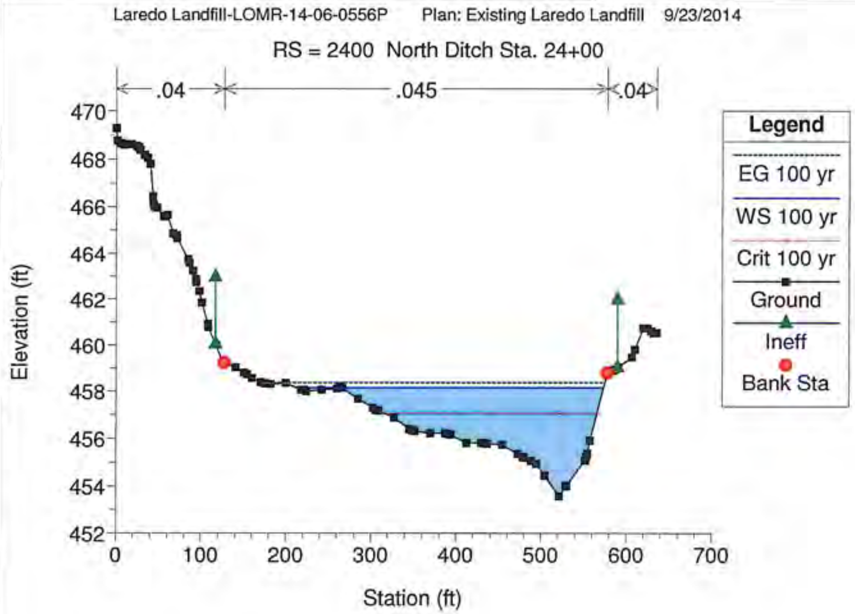
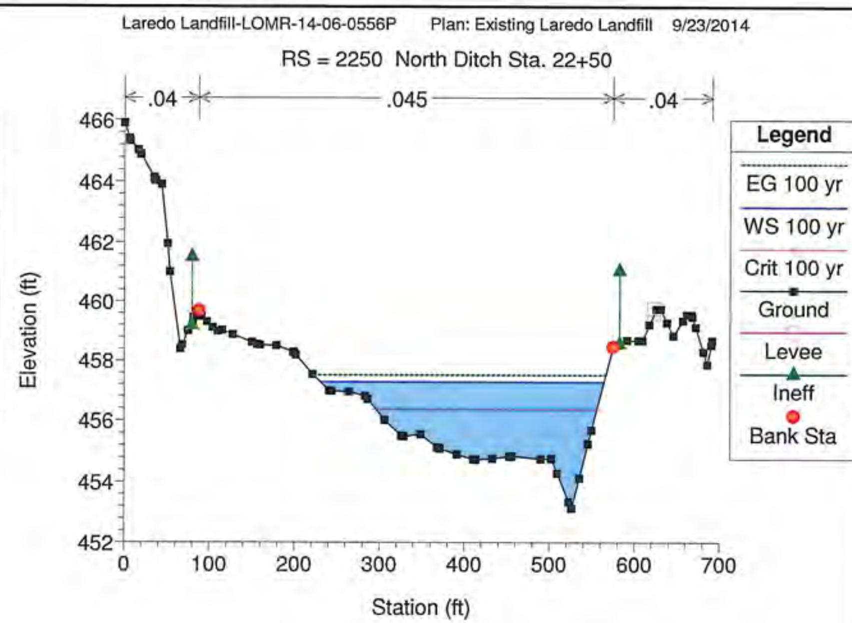
RS = 2850 North Ditch Sta. 28+50
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 2630 North Ditch Sta. 26+30
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

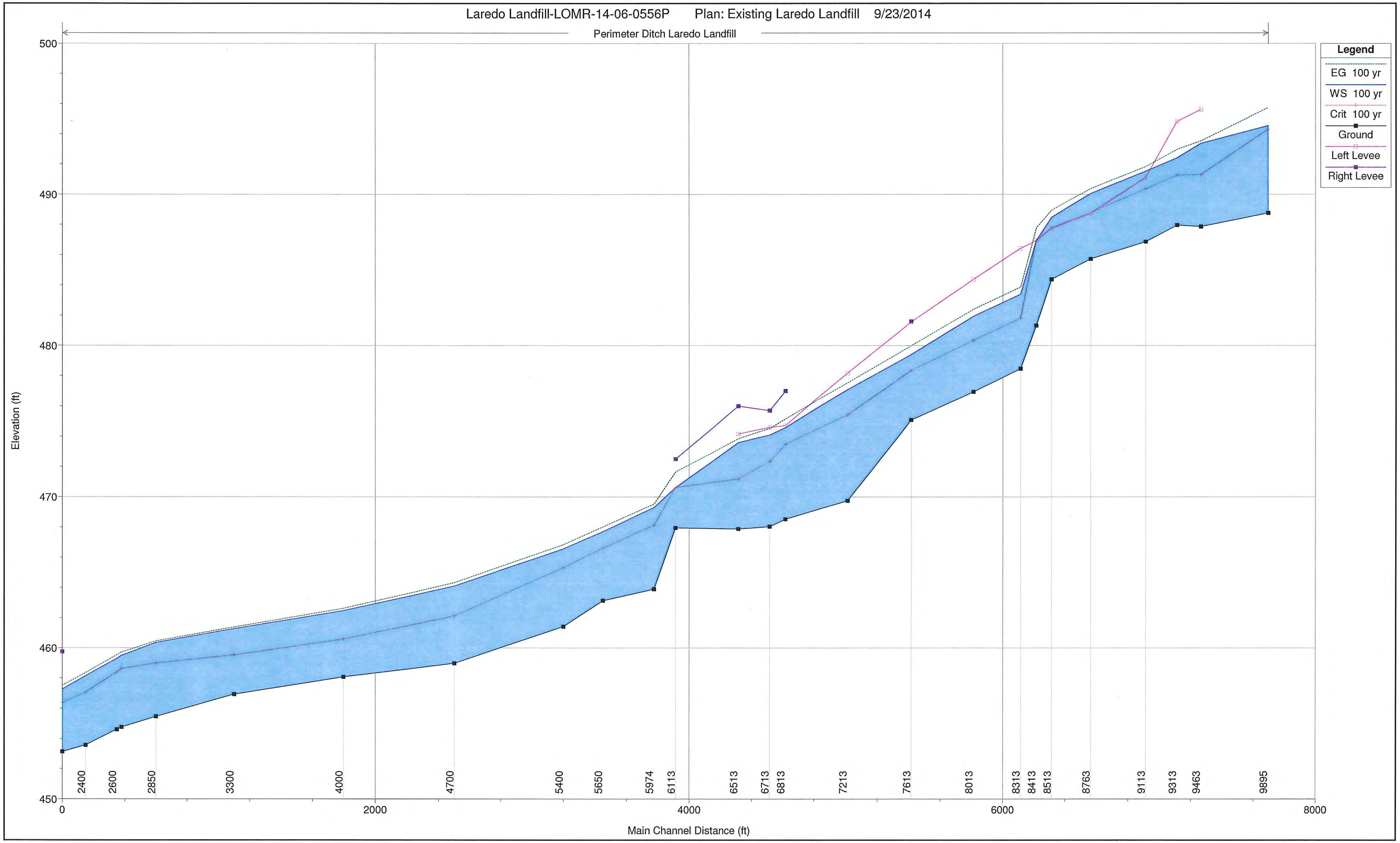

Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 2600 North Ditch Sta. 26+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)



Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 2400 North Ditch Sta. 24+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)



Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
RS = 2250 North Ditch Sta. 22+50
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Laredo Landfill-LOMR-14-06-0556P Plan: Existing Laredo Landfill 9/23/2014
Perimeter Ditch Laredo Landfill
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Left Levee
Right Levee
Elevation (ft)
Main Channel Distance (ft)
500
490
480
470
460
450
0
2000
4000
6000
8000
2400
2600
2850
3300
4000
4700
5400
5650
5974
6113
6513
6713
6813
7213
7613
8013
8313
8413
8513
8763
9113
9313
9463
9895

APPENDIX D
PROPOSED CONDITIONS
HEC-RAS MODEL

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX   XXXX        XXXX     XX    XXXX
X     X  X       X    X       X   X   X  X  X
X     X  X       X            X   X  X    X X
XXXXXXX  XXXX    X      XXX   XXXX   XXXXXX  XXXX
X     X  X       X            X X    X    X      X
X     X  X       X    X       X  X   X    X      X
X     X  XXXXXX   XXXX        X   X  X    X XXXXX
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PROJECT DATA
Project Title: Laredo Landfill-GeoReferenced
Project File : Laredoproposed.prj
Run Date and Time: 9/23/2014 11:33:37 AM

Project in English units

PLAN DATA

Plan Title: Proposed Laredo Landfill
Plan File : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part III\c-Attachments\Attachment 6\Floodplain Models\Proposed HEC-RAS\Laredoproposed.p02

Geometry Title: Proposed Laredo Landfill GeoReferenced
Geometry File : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part III\c-Attachments\Attachment 6\Floodplain Models\Proposed HEC-RAS\Laredoproposed.g03

Flow Title : Proposed Laredo Landfill Flow Data
Flow File : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part III\c-Attachments\Attachment 6\Floodplain Models\Proposed HEC-RAS\Laredoproposed.f02

Plan Summary Information:

Number of:				
Cross Sections	= 25	Multiple Openings	=	0
Culverts	= 0	Inline Structures	=	0
Bridges	= 0	Lateral Structures	=	0

Computational Information
- Water surface calculation tolerance = 0.01
- Critical depth calculation tolerance = 0.01
- Maximum number of iterations = 20
- Maximum difference tolerance = 0.3
- Flow tolerance factor = 0.001

Computation Options
- Critical depth computed only where necessary
- Conveyance Calculation Method: At breaks in n values only
- Friction Slope Method: Average Conveyance
- Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Proposed Laredo Landfill Flow Data
Flow File : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part III\c-Attachments\Attachment 6\Floodplain Models\Proposed HEC-RAS\Laredoproposed.f02

Flow Data (cfs)

River	Reach	RS	25 yr	100 yr
Perimeter Ditch	Laredo Landfill	9463	1008.9	1719.7
Perimeter Ditch	Laredo Landfill	9113	1045.7	1773.1
Perimeter Ditch	Laredo Landfill	7613	1076.3	1818.9
Perimeter Ditch	Laredo Landfill	5974	1233.6	2421.5
Perimeter Ditch	Laredo Landfill	5400	1236.3	2419.2
Perimeter Ditch	Laredo Landfill	4000	1262.3	2454.8
Perimeter Ditch	Laredo Landfill	2400	1288.9	2469.8

```
Boundary Conditions

  River            Reach            Profile                               Upstream                Downstream

  Perimeter Ditch Laredo Landfill 25 yr                                                        Normal S = 0.006
  Perimeter Ditch Laredo Landfill 100 yr                                                       Normal S = 0.006


GEOMETRY DATA

Geometry Title: Proposed Laredo Landfill GeoReferenced
Geometry File : p:\Proj\212029 Laredo Landfill\Permit\Permit Background Info\Part
III\c-Attachments\Attachment 6\Floodplain Models\Proposed HEC-RAS\Laredoproposed.g03

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill      RS: 9463

INPUT
Description: East Ditch Sta. 9+50
Station Elevation Data     num=       99
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0   493.55     3.61   493.55     4.75   493.55     9.26   493.55     13.4   493.55
   15.21   493.55    16.92   493.55    21.85   493.74    22.94   493.78    25.73   493.98
   31.59   494.26    35.06   494.57    40.56   495.04    41.06   495.09    48.56   495.11
   56.07    495.1    59.75   495.07    63.15   495.05    81.68   495.02    84.41   495.03
   85.93   495.04   110.45   494.88   110.93   494.88   113.59   494.88   132.84   494.92
  133.59   494.92   134.54   494.92    135.4   494.93   139.02    494.9   159.86   495.02
  171.22   494.98   184.93   494.83   185.45   494.83   200.94   495.57   201.94   495.61
  202.66   495.59   213.41   495.15   246.18    495.2   247.54    495.2   248.09   495.08
  264.71   491.27   266.86   490.87   280.41   488.36   282.04   488.06   286.88   488.03
  321.98   487.87   326.56   488.75    343.1   492.22   346.07    491.7   357.53   489.42
  360.48   489.59   363.02    489.9    365.5   490.78    368.6   491.21   371.72   491.26
  375.66   490.98   379.77   490.78   388.99   490.69    391.1   490.85   394.39    491.2
  395.29   491.22   399.02   491.55    401.6   491.79   410.92   492.56   421.63   493.65
  422.01   493.69    422.4   493.73   432.32   494.45   433.09   494.51   434.26   494.74
  441.68   496.24   451.54   497.58   452.11   497.67   461.52   499.11   465.67   499.37
  466.08   499.39   473.93   499.88   477.24   500.06   482.81    500.1   483.42    500.1
  488.84   500.26   491.32   500.29   495.26   500.39    497.7   500.42   502.87   500.49
  506.42   500.46   507.67   500.47   508.88   500.48   527.89   500.75   531.19   500.79
  535.35   500.79   537.45   500.79   538.72    500.8    541.7   500.83   546.08   500.76
  546.39   500.76    553.1   500.82   553.91   500.81   555.09   500.82

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
       0      .04   247.54     .045   434.26      .04

Bank Sta: Left    Right    Lengths: Left Channel    Right      Coeff Contr.     Expan.
          247.54  434.26              150      150      150                .1         .3
Ineffective Flow       num=       2
   Sta L    Sta R     Elev  Permanent
       0   197.39   497.73        F
  445.99   555.09   499.75        F
Left Levee       Station=  203.26       Elevation=  495.62

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill      RS: 9313

INPUT
Description: East Ditch Sta. 11+00
Station Elevation Data     num=      141
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0   498.49        9   498.34    17.55   498.28    34.33      498     44.6   497.71
   59.66    497.1    60.36   497.09    62.94   497.05    66.08      497    81.45   496.86
   83.04   496.83    85.28    496.8    86.82   496.78   107.53   496.29   108.07   496.28
  109.03   496.25   110.25   496.21   110.74    496.2   112.71   496.09   114.93   495.97
  116.41   495.89   129.68   495.22   140.61   494.85   147.26   494.64   155.66   494.24
  157.62   494.15   160.27   494.02   180.17   493.71   185.24   493.58   202.65   493.34
  210.74   493.31   212.89   493.28   216.06   493.24   221.15   493.17   233.16   493.15
   243.6   492.71   250.03   492.39   254.29    492.2   261.97    491.8   264.76   491.82
```

265.74	491.81	273.59	491.82	277.45	491.81	279.18	491.81	283.66	491.76
290.13	491.77	292.02	491.77	293.22	491.77	299.31	491.8	303.97	491.94
307.29	492.05	310.55	492.18	311.25	492.21	312.73	492.25	320.97	492.5
336.94	492.81	361.13	493.05	386.5	493.52	392.03	493.49	411.76	493.34
425.94	493.43	431.92	493.44	436.76	493.42	443.04	493.52	448.68	493.55
459.66	494.71	460.31	494.78	464.92	493.58	468.39	492.7	482.16	493.1
485.46	493.2	491.29	493.29	508.93	493.59	515.97	491.99	522.44	490.52
534.97	487.96	539.5	487.99	578.34	488.2	587.45	489.83	596.74	491.54
600.48	492.12	606.31	493.13	615.76	494.87	616.4	494.99	617.67	495.04
632.4	495.74	636.84	495.84	638.55	495.88	639.44	495.89	646.2	496.05
647.82	496.06	653.18	496.07	657.11	496.08	662.26	496.07	664.05	496.15
664.42	496.16	665.56	496.18	671.37	496.21	673.03	496.23	678.3	496.26
678.81	496.27	681.36	496.32	685.95	496.37	689.17	496.44	692.91	496.48
694.6	496.52	699.66	496.71	701.16	496.73	704.03	496.88	706.73	496.9
715.27	497.11	721.5	497.14	722.33	497.16	722.87	497.16	729.2	497.19
729.82	497.2	736.3	497.23	736.77	497.23	743.4	497.27	743.74	497.27
750.51	497.3	757.62	497.34	760.1	497.35	762.04	497.36	767.07	497.41
773.99	497.48	780.9	497.54	781.35	497.54	787.82	497.6	788.43	497.6
794.73	497.66	795.52	497.67	801.64	497.72	802.59	497.73	808.57	497.78
809.67	497.79	815.48	497.84	816.76	497.85	818.6	497.86	819.96	497.87
823.44	497.9								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	508.93	.045	615.76	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
508.93	615.76	200	200	200	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	457.98	495.68	F
624.1	823.44	496.09	F

Left Levee Station= 459.93 Elevation= 494.83

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 9113

INPUT
Description: East Ditch Sta. 13+00
Station Elevation Data num= 202

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
431.01	492.73	431.59	492.72	433.72	492.71	434.55	492.7	439.11	492.66
439.43	492.66	441.6	492.64	442.28	492.63	442.77	492.63	444.83	492.61
447.3	492.59	449.72	492.57	450.51	492.56	454.82	492.53	457.28	492.5
458.23	492.49	462.72	492.44	463.51	492.43	464.82	492.42	467.25	492.39
469.07	492.37	473.58	492.31	474.37	492.3	474.83	492.3	477.24	492.28
481.31	492.24	482.1	492.23	484.83	492.21	487.22	492.18	489.04	492.17
489.81	492.16	494.35	492.12	494.82	492.11	497.21	492.09	497.52	492.09
502.08	492.05	502.85	492.04	504.83	492.02	507.21	492	509.79	491.98
510.56	491.97	514.83	491.93	517.2	491.91	517.64	491.9	518.4	491.9
522.99	491.86	523.74	491.85	524.83	491.84	527.19	491.82	530.7	491.79
531.44	491.79	532	491.78	534.83	491.76	537.2	491.74	538.97	491.73
539.7	491.73	544.32	491.7	544.83	491.7	547.18	491.69	552.01	491.66
552.75	491.66	554.83	491.65	557.16	491.64	559.71	491.63	560.44	491.63
564.83	491.61	567.14	491.6	568.12	491.59	572.77	491.57	573.51	491.57
574.83	491.56	577.13	491.55	580.45	491.53	581.19	491.53	584.83	491.52
587.09	491.5	588.12	491.49	588.85	491.49	593.69	491.45	594.43	491.44
594.84	491.44	597.05	491.42	601.35	491.38	602.08	491.37	602.53	491.36
604.83	491.34	606.99	491.32	609.43	491.3	610.16	491.29	614.84	491.24
616.95	491.22	617.76	491.21	622.56	491.16	623.28	491.16	624.84	491.14
626.9	491.12	630.16	491.09	630.88	491.08	634.84	491.04	636.86	491.02
637.75	491.01	638.46	491	643.34	490.96	644.05	490.95	644.84	490.94
648.94	490.88	649.64	490.87	652.85	490.83	654.84	490.8	656.53	490.78
657.26	490.77	661.5	490.72	662.01	490.71	665.05	490.67	668.84	490.63
669.36	490.62	670.88	490.6	675.26	490.55	676.95	490.52	678.15	490.48
678.61	490.46	679.41	490.46	681.6	490.44	684.04	490.42	686.65	490.41
688.47	490.39	690.97	490.38	693.87	490.36	696.01	490.35	697.46	490.33
697.92	490.34	701.1	490.36	702.41	490.35	704.86	490.37	708.32	490.4
709.56	490.4	711.81	490.41	714.92	490.44	715.55	490.44	716.05	490.44
716.89	490.44	720.93	490.45	722.36	490.44	724	490.44	728.32	490.45
729.95	490.44	731.11	490.44	732.53	490.44	735.72	490.41	737.67	490.4
738.22	490.39	738.62	490.39	743.59	489.58	745.77	489.61	747.87	489.54
748.18	489.54	750.14	489.56	755.31	489.58	757.08	489.6	762.43	489.63
764.03	489.64	769.55	489.67	770.5	489.68	776.2	489.7	777.52	489.68
790.25	489.84	791.33	489.86	801.63	490.22	809.5	490.49	814.51	490.69
825.85	491.08	833.43	489.72	837.97	488.91	847.31	487.47	851.17	486.86

855.74	486.94	868.3	487.14	869.44	487.16	872.64	487.24	899.51	487.91
908.13	489.57	909.12	489.75	910.44	490.14	917.65	492.29	920.74	493.02
925.56	494.18	930.42	494.34	934.9	494.46	957.11	495.13	957.48	495.13
979.97	495.1	987.95	495.21	1014.73	495.46	1029.62	495.63	1044.91	495.82
1063.55	495.91	1075.09	495.9	1097.49	496.21	1105.28	496.25	1131.43	496.23
1135.46	496.26	1141.8	496.29						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
431.01	.04	825.85	.045	925.56	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
825.85	925.56	350	350	350	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
431.01	717.29	493.19	F
931.86	1141.8	495.3	F

Left Levee Station= 823.19 Elevation= 491.11

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 8763

INPUT
Description: East Ditch Sta. 16+50
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1412.22	491.85	1424.67	492.1	1427.22	492.15	1427.82	491.95	1428.26	492.15
1444.83	486.63	1455.02	483.23	1459.94	483.23	1463.02	483.23	1469.95	485.54
1471.37	486.02	1471.89	486.19	1472.48	486.38	1473.14	486.61	1473.92	486.86
1474.81	487.16	1475.13	487.27	1475.88	487.52	1476.24	487.64	1477.15	487.94
1477.59	488.09	1478.7	488.46	1479.25	488.64	1480.64	489.1	1481.02	489.23
1483.55	488.94	1485.4	488.73	1486.18	488.63	1489.38	488.35	1497.65	487.6
1503.41	486.91	1512.41	485.83	1519.77	485.78	1524.36	485.75	1528.05	485.73
1554.24	486.45	1561.57	486.65	1563.96	486.89	1569.58	487.49	1578.82	488.52
1581.16	488.79	1581.82	488.73	1582.61	488.79	1584.89	489.12	1587.16	489.33
1587.64	489.38	1589.57	489.69	1590.79	490.13	1593.76	491.17	1595.41	491.64
1599.89	491.8	1620.47	492.5	1630.57	492.49	1646.5	492.47	1654.94	492.66
1660.38	492.78	1666.96	492.91	1672.12	492.89	1697.15	492.91	1699.29	492.96
1718.62	493.25	1727.33	493.37	1753.59	493.23	1757.47	493.24	1780.81	493.51
1787.7	493.6	1796.31	493.69	1802.55	493.78				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1412.22	.04	1481.02	.045	1587.16	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
1481.02	1587.16	250	250	250	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1412.22	1466.81	492.56	F
1589	1802.55	493.24	F

Left Levee Station= 1485.35 Elevation= 488.73

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 8513

INPUT
Description: East Ditch Sta. 19+00
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1426.27	490.12	1429.47	490.18	1441.28	490.42	1442.14	490.13	1442.3	490.43
1444.34	489.75	1468.39	481.73	1469	481.73	1476.38	481.73	1477.78	482.2
1480.73	483.18	1481.35	483.39	1482.11	483.64	1483.22	484.01	1483.59	484.13
1484.91	484.57	1485.48	484.76	1487.65	485.49	1488.7	485.83	1493.04	487.28
1494.38	487.73	1497.77	487.69	1498.61	487.67	1499.4	487.6	1514.82	486.16
1523.29	485.41	1527	485.07	1539.41	484.47	1541.39	484.37	1543.12	484.43
1544.8	484.48	1577.81	485.6	1582.82	486.32	1588.61	487.16	1591.37	487.52
1595.6	488.06	1597.87	488.71	1599.06	489.05	1604.37	490.24	1605.55	490.49
1629.39	491.19	1633.31	491.29	1640.25	491.3	1664.58	491.31	1668.7	491.37
1683.46	491.5	1696.04	491.63	1713.64	491.67	1735.6	491.84	1743.82	491.92
1750.4	491.93	1774.01	492	1803.47	492.28	1804.19	492.28	1809.93	492.4
1819.2	492.6								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1426.27	.04	1497.77	.045	1599.06	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
1497.77	1599.06	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1426.27	1482.58	490.67	F
1608.88	1819.2	491.64	F

Left Levee Station= 1498.83 Elevation= 487.75

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 8413

INPUT
Description: East Ditch Sta. 20+00
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1436.03	489.32	1437.78	489.35	1451.02	489.62	1451.66	489.41	1451.97	489.57
1463.28	485.8	1477.29	481.13	1480.77	481.13	1485.3	481.13	1493.12	483.74
1493.9	484	1494.35	484.15	1494.86	484.32	1495.39	484.49	1496.02	484.71
1496.74	484.95	1497.55	485.22	1498.51	485.53	1499.62	485.9	1499.97	486.02
1500.69	486.26	1501.11	486.4	1502.22	486.77	1502.71	486.94	1503.3	487.13
1504.86	487.03	1507.72	486.84	1524.19	485.5	1526.57	485.31	1527.21	485.22
1535.8	483.89	1541.46	483.61	1543.93	483.57	1550.64	483.53	1551.18	483.57
1556	483.86	1556.54	483.65	1557.15	483.42	1558.25	483.01	1562.31	481.33
1563.45	481.73	1567.28	484.06	1569.34	484.17	1584.73	484.94	1585.64	485.06
1598.4	486.69	1602.04	486.52	1602.81	486.51	1604.84	487.02	1605.63	487.12
1607.44	487.41	1614.21	489.91	1614.81	490.13	1618.71	490.22	1639.18	490.68
1659.34	490.74	1675.38	490.79	1680.61	490.81	1692.76	490.87	1703.73	490.96
1711.7	491	1730.92	491.15	1741.91	491.16	1758.1	491.26	1772.1	491.41
1785.29	491.52	1802.28	491.51	1823.5	491.82	1828.35	491.88		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1436.03	.04	1503.3	.045	1607.44	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
1503.3	1607.44	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1436.03	1485.87	489.57	F
1622.63	1828.35	491.16	F

Left Levee Station= 1507.29 Elevation= 486.94

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 8313

INPUT
Description: East Ditch Sta. 21+00
Station Elevation Data num= 88

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
945.67	488.32	953.73	488.49	955.18	488.52	957.13	488.55	960.67	488.63
961.76	488.26	962.33	488.24	962.55	488.59	981.68	482.22	986.74	480.53
992.92	480.53	994.74	480.53	1008.64	485.17	1009.36	485.4	1010.12	485.66
1010.96	485.94	1011.91	486.26	1012.25	486.37	1012.74	486.53	1018.03	486.42
1018.72	486.26	1024.85	484.86	1029.12	483.41	1032.98	482.11	1037.56	480.95
1045.58	478.92	1058.28	478.64	1061.84	478.56	1065.97	478.52	1068.81	478.5
1073.23	478.47	1077.58	478.54	1081.99	478.61	1085.21	478.69	1096.18	478.9
1099.32	479.66	1111.64	482.63	1114.34	483.21	1125	485.65	1135.24	486.44
1140.78	486.77	1144.89	486.77	1145.27	486.82	1148.76	486.81	1149.65	486.76
1152.66	486.8	1153.69	486.84	1159.57	486.86	1159.88	486.87	1163.19	486.88
1163.58	486.88	1165.88	486.86	1170.38	486.94	1171.46	486.96	1173.73	487
1175.73	487.12	1182.81	487.46	1186.71	487.67	1188.96	487.74	1198.84	487.33
1203.87	487.1	1207.94	487.05	1212.06	486.94	1213.96	486.92	1214.35	486.92
1219.34	486.75	1222.44	486.65	1225.2	486.73	1230.79	486.9	1232.23	486.79
1236.95	486.7	1239.89	486.46	1243.63	486.36	1244.63	486.37	1247.5	486.37
1250.95	486.37	1252.29	486.46	1257.01	486.57	1265.23	487.54	1266.73	487.65
1268.86	488.13	1282.32	489.15	1285.49	489.39	1292.12	489.55	1300.9	489.68
1320.69	490.07	1331.08	490.42	1338.03	490.63				

Manning's n Values num= 3

```
     Sta     n Val      Sta    n Val      Sta    n Val
  945.67       .04  1018.03     .045     1125      .04

Bank Sta: Left    Right    Lengths: Left Channel    Right      Coeff Contr.    Expan.
       1018.03    1125               300      300     300                .1        .3
Ineffective Flow      num=        2
   Sta L    Sta R     Elev   Permanent
  945.67     1007    488.4        F
 1149.88  1338.03   487.89        F
Left Levee       Station= 1010.55      Elevation=  486.42
Right Levee      Station= 1186.99      Elevation=  487.78

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill      RS: 8013

INPUT
Description: East Ditch Sta. 24+00
Station Elevation Data     num=       59
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
   485.2   486.45   486.21   486.47    500.2   486.75   500.61   486.61   504.84    485.2
  505.26   485.38   506.83   486.62   518.18   482.84   530.51   478.73   534.83   478.73
  538.51   478.73   548.22   481.96   548.98   482.21   549.78   482.48   550.57   482.74
  551.45   483.04   552.09   483.25    552.8   483.49   553.24   483.63   554.08   483.92
   554.6   484.09   555.61   484.42   556.51   484.73   557.69   484.61   561.76   484.21
  574.89   480.26   575.36   480.12   576.04   479.96   579.99   479.06   586.65   477.53
  599.01    477.3   600.74   477.27   604.53   477.25   613.87    477.2   614.64   477.19
  623.87   476.96   624.55   476.94   625.33   476.96      637   477.24   654.39   481.42
  654.92   481.54    655.6   481.68   669.44   484.58   684.72   484.26   691.52   484.11
  706.41    484.9   707.87   484.99   726.12   485.49   736.15   485.76   736.68   485.76
  747.78   485.81   751.74   485.79   755.64   485.85   761.37   485.93   766.26   485.97
  772.32   486.08   778.46   486.12   779.93   486.12   782.16   486.12

Manning's n Values         num=        3
     Sta     n Val      Sta    n Val      Sta    n Val
   485.2       .04   556.51     .045   669.44      .04

Bank Sta: Left    Right    Lengths: Left Channel    Right      Coeff Contr.    Expan.
        556.51   669.44              400      400     400                .1        .3
Ineffective Flow      num=        2
   Sta L    Sta R     Elev   Permanent
   485.2    554.1   486.61        F
  683.26   782.16   485.89        F
Left Levee       Station=   557.89     Elevation=  484.98

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill      RS: 7613

INPUT
Description: East Ditch Sta. 28+00
Station Elevation Data     num=       55
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0   485.05      .75   485.03     4.75   484.93    11.22   483.61    20.52    481.7
   23.96   481.49    29.86   481.08    37.51   478.54    38.18   478.31    40.63   477.49
   52.59   473.51    53.52   473.51    54.59   473.51    55.52   473.51    56.59   473.51
   67.35   477.09    77.34   480.42    77.94   480.62    78.89   480.55    84.36   480.05
   86.92   479.78    90.12   479.32     92.9   478.74    95.12   478.49    97.37   477.86
   99.52   477.37   101.95   476.83   103.93   476.46   105.16   476.12   105.89    475.9
  106.76   475.87   114.44   475.47   124.01   475.45   129.54   475.45   134.59   475.32
  139.61    475.2    144.8   475.08   153.51   475.24   163.03    475.4   174.24   477.87
  177.84   478.51   189.78   480.64   202.91   481.17   208.84    481.4   213.07    481.4
  224.33   481.37   246.47   481.57   253.52   481.59   256.45   481.59    262.2   481.56
  263.25    481.5   282.91   480.41      293   479.85   304.79   479.25   305.31    479.3

Manning's n Values         num=        3
     Sta     n Val      Sta    n Val      Sta    n Val
       0       .04    78.89     .045   189.78      .04

Bank Sta: Left    Right    Lengths: Left Channel    Right      Coeff Contr.    Expan.
         78.89   189.78              400      400     400                .1        .3
Ineffective Flow      num=        2
   Sta L    Sta R     Elev   Permanent
       0       75   482.45        F
  200.65   305.31   482.41        F
```

Left Levee Station= 78.8 Elevation= 480.69
Right Levee Station= 244.66 Elevation= 481.6

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 7213

INPUT
Description: East Ditch Sta. 32+00
Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
51.35	478.94	52.69	479.4	55.66	480.05	56.17	480.16	58.19	479.49
61.64	478.34	71.09	475.19	84.42	470.75	85.35	470.75	86.41	470.75
87.35	470.75	88.41	470.75	98.03	473.95	102.09	475.3	108.77	477.53
109.28	477.7	118.25	478.15	120.55	477.63	129.05	475.69	134.4	474.51
140.91	473.09	144.84	472.95	147.17	472.85	150.7	472.96	158.22	473.2
162.64	473.09	170.5	472.91	172.13	472.4	177.6	470.49	179.1	470.24
180.99	469.91	184.55	469.81	186.21	469.76	186.75	469.74	189.27	469.98
190.16	471.76	190.43	473.34	190.86	473.34	191.66	473.29	196.12	473.82
197.81	474.03	202.77	474.88	207.06	475.63	212.49	476.58	221.22	478.07
229.96	478.14	236.92	477.9	240.42	477.77	244.33	477.97	256.19	478.53
272.74	478.35	275.96	478.32	277.22	478.32	292.87	478.38	293.8	478.38
307.22	478.4	321.42	478.53	335.46	478.69				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
51.35	.04	118.25	.045	221.22	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
118.25	221.22	400	400	400	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
51.35	114.35	479.98	F
232.35	335.46	480.05	F

Left Levee Station= 116.29 Elevation= 478.19

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 6813

INPUT
Description: East Ditch Sta. 36+00
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
52.07	476.07	53.13	476.63	53.76	476.98	66.36	472.78	77.76	469.01
84.55	469.01	90.92	469.01	97.34	471.11	108.01	474.68	113.28	474.71
115.39	474.71	125.22	473.06	128.84	472.44	130.57	472.26	141.7	471.06
146.72	471.1	154.12	471.15	161.23	471.03	166.65	470.91	176.46	470.58
179.18	470.42	180.28	469.97	182.81	468.52	186.04	468.56	189.56	468.6
190.47	468.61	191.61	468.86	195.39	469.63	196.04	470.45	197.6	472.29
199.8	472.68	202.66	473.19	204.98	473.8	208.96	474.83	217.42	475.57
219.23	475.75	221.98	475.89	228.83	476.21	238.59	476.32	245.38	476.38
256.84	476.54	260.28	476.56	262.14	476.59	266.1	477.07	266.75	476.87
269.03	476.86	270.66	476.97	273.59	476.72	274.36	476.64	276.55	476.45
279.85	476.15	283.22	475.7	283.76	475.62	285	475.5	287.07	475.29
289.64	475.43	291.27	475.53	307.66	475.57	310.86	475.55	319.62	475.46
329.26	475.52	331.71	475.55						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
52.07	.04	115.39	.045	208.96	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
115.39	208.96	100	100	100	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
52.07	107.41	476.88	F
221.17	331.71	477.14	F

Left Levee Station= 112.09 Elevation= 474.82
Right Levee Station= 264.5 Elevation= 477

CROSS SECTION

RIVER: Perimeter Ditch

REACH: Laredo Landfill   RS: 6713

INPUT
Description: East Ditch Sta. 37+00
Station Elevation Data   num=   64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
58.87	476.19	68.26	475.83	70.47	475.75	72.19	472.18	73.95	471.6
76.02	470.9	78.56	470.06	82.55	468.77	89.62	468.77	96.69	468.77
103.06	470.86	105.03	471.51	107.5	472.34	114.3	474.6	116.31	474.62
119.84	474.66	127.84	473.33	133.08	472.45	135.81	471.2	139.94	469.26
143.96	469.14	146.45	469.07	147.69	469.12	148.43	469.22	155.42	469.47
157.1	469.52	157.29	469.51	162.27	468.93	167.42	468.24	168.96	468.15
171.03	468.03	175.01	468.11	175.87	468.13	176.82	468.2	177.64	468.32
182.6	469.11	183.97	469.81	192.18	470.71	196.82	470.93	199.12	471.06
203.87	472.03	204.73	472.19	216.26	474.01	216.76	474.1	217.26	474.14
228.17	475.07	229.7	475.15	237.84	475.54	243.53	475.62	247.93	475.68
252.84	475.59	257.85	475.49	262.67	475.21	269.52	474.7	277.49	474.81
283.6	474.92	287.59	475.01	294.63	475.09	306.28	475.16	310.46	475.18
313.42	475.2	315.3	475.2	332.35	475.01	336.57	474.96		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
58.87	.04	119.84	.045	228.17	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
119.84	228.17	200	200	200	.1	.3

Ineffective Flow   num=   2

Sta L	Sta R	Elev	Permanent
58.87	111.11	476.86	F
231.66	336.57	477.61	F

Left Levee   Station= 117.44   Elevation= 474.74
Right Levee   Station= 246.25   Elevation= 475.71

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill   RS: 6513

INPUT
Description: East Ditch Sta. 39+00
Station Elevation Data   num=   64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	480.31	11.82	478.17	18.7	476.93	31.28	474.4	44.72	471.7
52.51	471.71	65.47	471.72	68.05	473.03	70.25	474.15	70.94	474.27
80.98	474.19	82.7	474.18	83.65	471.33	84.12	471.33	91.17	468.98
94.07	468.01	99.79	468.01	102.27	468	105.62	468	109.83	468
115.11	469.77	115.92	470.04	117.31	470.5	126.58	473.76	127.71	473.83
131.11	473.07	136.82	471.66	139.67	470.96	148.52	468.73	150.58	468.21
152.37	468.12	157.74	467.87	165.88	468.41	166.54	468.45	167.07	468.45
179.51	468.39	180.29	468.39	184.81	468.38	195.12	468.36	205.51	468.74
214.11	469.04	219.89	469.89	220.24	469.94	226.76	471.1	229.57	471.8
236.31	473.42	238.57	474.12	240.35	474.61	244.84	475.26	246.79	475.54
254.36	475.89	255.82	475.94	257.27	475.93	261.07	475.9	265.08	475.85
265.49	475.77	273.37	474.33	288.45	474.02	290.85	473.96	305.44	473.65
306.94	473.62	316.83	473.7	333.53	473.74	348.61	473.65		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	131.11	.045	238.57	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
131.11	238.57	400	400	400	.1	.3

Ineffective Flow   num=   2

Sta L	Sta R	Elev	Permanent
0	121.07	474.67	F
246.25	348.61	476.29	F

Left Levee   Station= 127.31   Elevation= 473.89
Right Levee   Station= 258.11   Elevation= 476.01

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill   RS: 6113

INPUT
Description: East Ditch Sta. 43+00
Station Elevation Data   num=   60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	473.74	4.37	473.82	5.43	473.82	11.74	473.71	12.41	473.71
12.93	473.7	18.52	473.44	19.01	473.43	25.8	472.86	27.72	472.81
32.92	472.54	32.92	471.8	34.47	471.39	45.78	467.63	71.92	467.62
81.01	470.65	82.06	470.51	83.03	470.45	86.84	470.39	87.17	470.35
94.12	469.7	99.05	469.24	106.38	468.32	108.15	468.1	109.91	468.11
112.24	468.15	120.57	468.08	123.08	468.07	127.51	468.05	129.73	468.11
133.33	468.21	135.5	468.19	145.93	468.13	155.23	468.06	163.14	468.01
171.51	467.94	177.17	468.28	179.4	468.42	184.25	468.95	184.57	469.02
187.8	469.8	189.74	470.46	193.02	471.57	198.78	472.08	202.4	472.43
209.45	472.24	214.68	472.1	216	471.98	216.36	471.94	221.3	471.36
223.36	471.14	242.49	470.84	245.52	470.81	260.37	470.62	264.16	470.54
274.4	470.63	275.26	470.64	276.19	470.65	302.56	470.88	305.31	470.91

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	86.84	.045	202.4	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
86.84	202.4	110	139	200	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	77.52	472.18	F
205.24	305.31	473.54	F

Left Levee Station= 81.5 Elevation= 470.66
Right Levee Station= 204.64 Elevation= 472.5

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 5974

INPUT
Description: East Ditch Sta. 44+39
Station Elevation Data num= 124

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.41	.2	471.39	3.14	471.39	10.38	471.39	12.11	471.38
18.07	471.38	21.09	471.37	25.76	471.37	29.65	471.34	33.09	471.33
38.49	471.28	40.75	471.27	47.34	471.21	48.08	471.09	49.11	470.93
51.55	470.63	55.39	470.16	59.42	469.17	60.35	468.93	63.85	468.06
76.17	465.01	76.35	464.97	84.5	464.94	86.31	464.94	89.46	464.93
91.16	464.92	91.78	463.88	93.62	464.16	96.42	464.63	98.7	465
100.34	465.29	100.94	465.31	108.56	465.54	110.7	465.68	113.62	465.78
115.18	465.86	119.4	466.08	125.02	466.32	125.46	466.35	126.91	466.43
131.46	466.61	133.75	466.57	134.52	466.56	139.4	466.49	141.9	466.45
150.75	466.35	156.13	466.35	158.86	466.32	166.9	466.35	169.26	466.42
176.15	466.62	180.88	466.6	182.88	466.6	189.63	466.68	193.97	466.72
198.06	466.77	205.41	466.85	206.68	466.86	207.28	466.86	215.4	466.92
217.35	466.93	220.85	466.95	227.34	466.97	228.87	466.96	232.67	466.98
236.05	467.25	239.6	467.47	242.55	467.68	245.61	467.85	250.45	468.19
253.4	468.35	259.1	468.8	259.42	468.83	260.88	469	269.44	469.94
272.9	470.31	276.81	469.94	277.47	469.88	283.63	469.26	287.2	468.73
287.9	468.63	291.04	468.44	291.92	468.29	292.64	468.22	298.32	467.43
301.53	467.33	305.81	467.37	307.37	467.36	309.56	467.37	315.08	467.36
318.78	467.28	326.23	467.06	326.65	466.9	329.51	465.95	332.07	465.14
332.52	464.94	341.12	466.97	345.2	467.87	350.44	469.17	351.66	469.47
359.09	470.97	359.63	471.23	360.36	471.34	362.32	471.62	367.99	472.02
371.88	472.28	374.93	472.49	378.79	472.75	381.99	472.8	383.01	472.83
389.44	472.95	392.74	473.03	396.92	473.12	402.47	473.27	404.46	473.31
411.43	473.52	412.11	473.53	419.69	473.7	421.06	473.74	428.41	473.87
431.29	473.96	437.14	474.07	441.52	474.21	441.99	474.22		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	55.39	.045	360.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
55.39	360.36	190	324	380	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	49.14	473.27	F
365.68	441.99	473.05	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 5650

INPUT
Description: North Ditch Sta. 56+50
Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	474.81	7.01	473.36	10.26	472.67	11.21	472.42	13.17	471.93
19.86	471.95	24.48	471.95	27.93	472.13	28.29	472.14	29.4	472.11
36.92	471.84	37.85	471.79	39.11	471.72	59.28	471.21	64.67	471.06
69.07	469.95	69.63	469.81	73.23	469.05	82.78	467.05	94.66	463.78
97.06	463.13	97.93	463.16	112.82	463.78	114.27	463.81	133.28	464.24
147.71	463.67	148.26	463.65	151.96	463.51	154.16	464.06	160.67	465.82
172.08	465.66	183.71	465.52	200.19	465.64	200.87	465.87	208.45	468.39
210.38	467.85	217.2	465.89	232.09	465.43	244.64	465.06	256	464.86
263.46	464.73	267.92	464.9	274.77	465.16	283.4	467.22	288.73	468.48
295.31	469.84	299.29	470.67	309.79	470.72	320.49	470.78	345.27	471.44
363.87	471.94	369.78	472.01	374.96	472.07				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	64.67	.045	299.29	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
64.67	299.29	250	250	250	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	61.59	472.27	F
302.7	374.96	472.1	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 5400

INPUT
Description: North Ditch Sta. 54+00
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	477.81	.63	477.66	6.76	476.23	9.33	475.59	12.99	474.74
13.59	474.6	14.01	474.39	15.82	473.45	23.93	473.45	27.8	473.45
34.14	473.68	36.52	472.39	39.17	472.24	52.12	471.52	55.96	471.05
59.89	470.51	71.66	467.66	75.47	466.73	78.46	465.99	89.61	463.18
95	462.75	95.34	462.72	95.93	462.44	97.66	461.62	98.22	461.73
99.27	461.91	102.49	462.55	104.31	462.2	108.71	461.41	112.26	462.04
112.85	462.13	118	462.16	140.82	462.23	147.46	462.3	154.37	462.39
156.3	462.42	163.83	463.68	170.17	464.3	175.99	464.91	189.46	464.51
190.62	464.47	191.53	464.79	201.54	468.21	208.13	465.09	209.52	464.48
212.38	464.3	219.63	463.86	239.85	464.28	263.1	464.75	276.25	464.4
279.41	464.32	287.9	466.17	293.38	467.36	304.45	468.59	306.1	468.78
308.81	468.87	319	469.29	319.46	469.24	337.94	469.72	363.58	470.43
372.9	470.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	71.66	.045	306.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
71.66	306.1	700	700	700	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	66.83	471.1	F
309.58	372.9	471.77	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 4700

INPUT
Description: North Ditch Sta. 47+00
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	481.35	.91	481.22	4.94	480.14	16.24	479.96	17.73	480.22
18.23	480.32	25.83	480	27.91	479.91	30.25	479.26	34.85	477.93
43.01	477.43	49.29	477.03	73.38	468.45	74.53	468.04	75.03	467.89
95.19	461.64	100.78	460.56	103.16	460.12	112.09	459.74	127.19	459.09
129.38	459.49	129.75	459.56	132.64	458.98	134.64	459	135.63	458.98
152.31	458.99	167.61	458.99	176.56	458.99	180.95	459.52	186.63	460.15

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   188.23  460.34  193.15  460.89  208.48  460.82  209.04  460.82  209.42  460.89
   218.83  463.33  226.61  461.98     227  461.91   241.7  462.69  243.31  462.78
   255.69  463.75  260.42  463.24  262.08   463.1  280.84  462.68  295.47  462.34
   297.73  462.74  304.36  464.11  311.53  464.75  317.31  465.35  329.14  466.37
   329.53   466.4  347.51  466.72  360.38  466.97  374.99  467.07

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   75.03    .045  329.53     .04

Bank Sta: Left   Right     Lengths: Left Channel    Right       Coeff Contr.    Expan.
         75.03  329.53               700     700      700               .1        .3
Ineffective Flow       num=        2
   Sta L   Sta R    Elev  Permanent
       0   69.12     474       F
  332.51  374.99   473.2       F

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill      RS: 4000

INPUT
Description: North Ditch Sta. 40+00
Station Elevation Data      num=       38
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  477.14    4.08   475.9    5.05  475.61    6.45  474.79   11.46  471.88
   15.79  471.32   24.02  470.25   36.61  469.63   47.05   469.1   61.67  468.15
    66.4  467.86   75.35  465.23   86.67  461.92   97.59  460.14  110.13  458.08
  209.58  458.08  212.06  458.73   214.9  459.47  225.05   459.5  228.63  459.51
  231.47  459.78  236.43  460.26  240.13  460.08  243.81  459.89  246.79  460.09
  251.89  460.48   257.1  460.29  261.06  460.14  279.41  459.62   285.4  459.44
  303.19  460.43  310.54  460.84   315.1  461.49  330.35  463.62  341.31  464.13
  357.06  464.94   369.7   465.3   373.9  465.41

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04   86.67    .045  330.35     .04

Bank Sta: Left   Right     Lengths: Left Channel    Right       Coeff Contr.    Expan.
         86.67  330.35               700     700      700               .1        .3
Ineffective Flow       num=        2
   Sta L   Sta R    Elev  Permanent
       0   81.57  468.93       F
  338.08   373.9  469.04       F

CROSS SECTION


RIVER: Perimeter Ditch
REACH: Laredo Landfill      RS: 3300

INPUT
Description: North Ditch Sta. 33+00
Station Elevation Data      num=       56
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  473.07     .41  473.03    3.37  472.72    6.32  473.52    7.49  473.83
    8.29  473.64    9.86  473.25   19.12  472.93   21.14  472.86   21.82  472.51
   24.47  471.11   25.59  471.08   39.33  470.69    46.9  470.36   56.19     470
   71.42  466.63   84.75  463.63  104.56  459.32  110.29  458.08  248.28  458.08
  262.46  458.79  272.38  459.27  286.27  459.28  304.83  459.43  306.15   459.4
  307.94  459.36  309.91  459.29   314.8  459.12  318.85  458.79  323.38  458.42
  329.45  457.93  336.17  457.39  342.54  457.32  347.87  457.24  358.65   457.1
  360.81  457.07  364.32  457.02  367.54  456.97  370.69  456.93  375.39  457.37
  380.23  457.83  386.16  458.39  392.29  458.98  396.73   459.7  400.68  460.31
  406.87  461.29  413.84  462.37  417.07  462.44  419.55  462.49  424.73  462.57
  437.26  462.87  437.58  462.88  449.84  463.01  456.21  463.09  461.84  463.14
   468.1  463.21

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04  104.56    .045  413.84     .04

Bank Sta: Left   Right     Lengths: Left Channel    Right       Coeff Contr.    Expan.
        104.56  413.84               510     500      370               .1        .3
Ineffective Flow       num=        2
   Sta L   Sta R    Elev  Permanent
       0   82.31  467.25       F
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425.88	468.1	466.73	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 2850

INPUT
Description: North Ditch Sta. 28+50
Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	475.12	2.7	475.16	5.61	475.02	8.42	474.91	10.97	474.94
14.59	474.89	21.42	474.67	21.85	474.67	24.75	474.64	28.29	474.6
34.16	474.47	35.09	474.43	38.5	474.29	46.2	473.98	52.67	473.72
56.1	473.59	67.22	473.26	69.41	473.18	69.89	473.07	70.41	472.95
88.91	468.75	103.49	465.34	104.41	465.12	105.39	464.89	123.87	459.51
126.93	458.08	258.69	458.08	269.22	458.3	273.16	458.36	281.66	458.52
289.96	458.63	294.19	458.71	306.64	458.86	307.5	458.87	309.3	458.92
312.74	459.12	320.55	459.59	324.53	459.56	329.45	459.52	337.16	459.49
361.3	459.37	368.78	459.38	376.24	459.26	389.99	459.05	403.78	458.66
411.2	458.58	418.61	458.44	432.42	458.27	446.26	457.83	453.63	457.53
461.06	457.06	464.07	456.88	471.08	456.45	478.88	455.96	491.28	456.33
497.14	456.5	512.02	455.66	515.66	455.46	531.93	457.62	534.94	458.04
546.07	459.85	557.29	461.68	566.08	462.19	571.51	462.51	578.58	462.52
593.64	462.54								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	123.87	.045	557.29	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
123.87	557.29	220	220	220	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	104.18	467.65	F
563.64	593.64	467.4	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 2630

INPUT
Description: North Ditch Sta. 26+30
Station Elevation Data num= 97

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	468.9	1.63	468.52	3.5	468.87	8	468.63	8.3	468.55
18.98	468.29	22.12	468.17	26.93	469.39	30.4	470.19	36.79	468.43
43.3	466.62	49.13	465	51.85	464.32	56.61	462.9	62.05	461.62
65.87	460.99	70.14	460.4	73.44	459.88	81.03	458.9	81.89	458.88
90.83	458.69	93.12	458.64	98.32	458.51	101.26	458.44	105.28	458.36
109.53	458.27	112.03	458.26	116.79	458.16	118.02	458.16	120.76	458.08
121.74	458.08	131.37	458.08	136.78	458.73	140.06	459.18	142.58	459.5
145.12	459.87	145.76	459.85	146.56	459.85	151.42	459.84	154.81	459.84
157.55	459.96	159.53	460.07	164.05	460.29	169.47	460.61	170.99	460.56
171.98	460.53	181.95	460.2	186.41	460.05	190.03	459.92	195.83	459.66
198.92	459.59	199.8	459.55	205.62	459.39	209.46	459.22	213.16	459.1
215.32	459.03	230.72	459.05	236.08	459.18	240.39	459.06	243.15	458.97
254.64	458.73	283.92	458.64	284.5	458.64	326.29	458.44	326.63	458.43
326.97	458.44	347.85	458.29	368.66	458.11	369.06	458.1	369.46	458.09
390.27	457.82	411.03	457.73	411.49	457.72	411.94	457.71	432.7	457.04
453.41	456.69	453.91	456.69	454.49	456.68	455.6	456.67	478	456.43
479.99	456.37	499.17	455.82	516.21	454.82	516.58	454.79	517.19	454.76
518.51	454.84	541.84	456.33	556.36	459.12	562.53	460.31	569.16	460.7
575.35	461.07	583.59	461.07	599.92	461.08	609.55	462.14	610.76	462.27
611.15	462.27	612.93	462.27						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	169.47	.045	562.53	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
169.47	562.53	30	30	30	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	159.38	463.92	F
575.02	612.93	463.96	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill   RS: 2600

INPUT
Description: North Ditch Sta. 26+00
Station Elevation Data   num=   114

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	471.01	.44	470.92	2.47	470.36	8.27	468.59	12.06	468.55
21.07	468.45	24.24	468.33	25.29	468.28	28.8	468.15	35.68	467.81
37.77	467.69	40.91	467.55	45.91	468.06	52.84	468.56	53.62	468.37
54.79	468.11	62.43	466.68	65.32	466.08	66.55	465.85	71.11	465.18
74.53	464.89	75.81	464.78	79.99	464.55	82.67	464.45	87.23	464.19
88.09	464.16	90.33	464.08	95	463.81	96.92	463.67	99.42	463.73
102.74	463.85	105.03	463.93	106.89	464	109.64	463.42	111.65	463.05
112.32	462.96	115.28	462.39	120.51	461.82	121.92	461.86	123.45	461.84
128.49	461.88	135.16	461.71	135.82	461.72	136.71	461.65	137.15	461.63
143.56	461.23	144.7	461.18	148.41	460.96	152.4	460.81	155.01	460.67
160.03	460.48	161.84	460.39	174.45	459.87	174.84	459.85	175.07	459.85
177.12	459.97	178.46	460.04	179.65	460.02	182.64	460	184.93	459.91
190.91	459.73	192.68	459.67	197.32	459.52	200.52	459.4	201.12	459.38
204.26	459.28	204.79	459.26	225	459.13	225.39	459.11	226.1	459.11
232.53	459.05	235.93	459.01	253.85	458.79	263.03	458.71	272.09	458.65
296.37	458.52	305.46	458.47	314.57	458.35	326.67	458.23	338.74	458.25
347.88	458.21	357.05	458.05	369.1	457.8	381.11	457.58	390.31	457.45
399.53	457.3	411.52	457.22	423.49	456.98	432.74	456.83	442.01	456.85
453.95	456.72	467.47	456.6	469.36	456.59	478.05	456.5	479.09	456.46
499.6	455.73	505.2	455.38	517.2	454.63	517.65	454.6	535.65	455.79
542.54	456.24	557.87	459.18	559.31	459.45	561.83	459.94	562.18	460
576.26	460.82	576.83	460.85	580.85	460.85	600.54	460.82	605.76	461.41
611.95	462.11	616.32	462.11	617.33	462.11	617.92	462.08		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	174.84	.045	562.18	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
174.84	562.18	200	200	200	.1	.3

Ineffective Flow   num=   2

Sta L	Sta R	Elev	Permanent
0	157.08	463.44	F
575.59	617.92	463.37	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill   RS: 2400

INPUT
Description: North Ditch Sta. 24+00
Station Elevation Data   num=   99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	469.28	1.58	468.77	4.9	468.66	9.16	468.6	11	468.61
12.44	468.62	14.42	468.61	18.21	468.61	23.57	468.55	25.75	468.51
26.71	468.46	27.97	468.39	33.26	468.18	36.66	468.06	40.2	467.8
43.35	466.45	43.97	466.1	44.77	466.03	47.09	465.96	47.89	465.96
55.9	465.6	57.65	465.58	59.94	465.64	67.27	464.86	70.46	464.78
71.84	464.65	84.59	463.74	86.3	463.56	90.44	463.22	93.43	462.87
94.48	462.72	97.47	462.35	100.88	461.84	107.61	460.92	108.68	460.77
117.17	460.01	125.42	459.26	126.61	459.24	127.39	459.23	140.33	459.03
150.21	458.8	153.98	458.73	159.54	458.57	170.46	458.39	174.63	458.33
176.24	458.34	181.62	458.3	199.64	458.35	217.71	458.05	220.86	458.05
223.99	457.99	242.07	458.05	260.19	458.11	263.28	458.2	266.37	458.14
284.5	457.66	302.68	457.28	305.71	457.19	308.74	457.16	326.92	456.88
345.16	456.4	348.14	456.35	351.11	456.31	369.35	456.22	387.64	456.22
390.56	456.19	393.48	456.17	411.78	455.82	430.12	455.81	432.99	455.81
435.85	455.79	454.2	455.74	472.6	455.37	478.1	455.24	479.98	455.21
487.97	455.07	494.54	454.95	504.3	454.45	521.32	453.57	529.1	453.99
529.75	454.02	551.74	455.1	552.07	455.08	553.1	455.24	554.14	455.38
557.48	455.92	577.76	458.79	579.43	458.76	584.66	458.89	586.93	458.95
590.23	459.04	606.32	459.47	609.83	459.81	619.78	460.73	621.86	460.73
624.91	460.73	628.87	460.61	631.62	460.51	635.56	460.52		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val

0	.04	127.39	.045	577.76	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Contr.	Expan.
127.39	577.76	150	150	150	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	116.95	462.95	F
589.35	635.56	461.96	F

CROSS SECTION

RIVER: Perimeter Ditch
REACH: Laredo Landfill RS: 2250

INPUT
Description: North Ditch Sta. 22+50
Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	465.89	5.56	465.4	6.69	465.32	16.21	465.03	19.21	464.89
34.45	464.14	35.23	464.07	36.82	464.04	43.46	463.91	50.57	461.96
53.5	461	65.73	458.4	68.12	458.54	74.73	459	80.29	459.23
81.17	459.45	86.39	459.62	87.54	459.69	90.63	459.49	96.94	459.31
103.63	459.12	109.62	458.99	114.95	459.02	127.31	458.87	149.91	458.62
155.69	458.55	159.12	458.53	178.62	458.5	198.17	458.29	199.84	458.26
201.49	458.19	221.05	457.54	240.66	456.99	242.26	456.97	243.87	456.97
263.48	456.95	283.14	456.8	286.24	456.7	305.9	456.01	325.62	455.5
327.12	455.48	328.61	455.48	348.33	455.55	368.1	455.13	369.54	455.09
370.98	455.08	390.75	454.89	410.58	454.73	411.97	454.73	413.35	454.72
433.18	454.76	453.06	454.83	454.39	454.82	455.72	454.84	489.78	454.75
502.22	454.76	509.37	454.28	522.83	453.35	526.07	453.13	535.05	454.12
545.38	455.24	549.48	455.68	574.71	458.45	579.42	458.52	591.11	458.68
604.68	458.67	609.09	458.67	617.38	459.21	625.53	459.74	626.78	459.74
630.49	459.74	638.15	459.27	645.5	458.84	656.87	459.35	661.23	459.55
665.79	459.55	666.53	459.55	667.53	459.47	672.01	459.13	680.74	458.29
685.19	457.87	690.36	458.52	691.48	458.67				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	87.54	.045	574.71	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Contr.	Expan.
87.54	574.71	0	0	0	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	79.12	461.5	F
581.9	691.48	461.04	F

Right Levee Station= 623.18 Elevation= 459.75

SUMMARY OF MANNING'S N VALUES

River:Perimeter Ditch

Reach	River Sta.	n1	n2	n3
Laredo Landfill	9463	.04	.045	.04
Laredo Landfill	9313	.04	.045	.04
Laredo Landfill	9113	.04	.045	.04
Laredo Landfill	8763	.04	.045	.04
Laredo Landfill	8513	.04	.045	.04
Laredo Landfill	8413	.04	.045	.04
Laredo Landfill	8313	.04	.045	.04
Laredo Landfill	8013	.04	.045	.04
Laredo Landfill	7613	.04	.045	.04
Laredo Landfill	7213	.04	.045	.04
Laredo Landfill	6813	.04	.045	.04
Laredo Landfill	6713	.04	.045	.04
Laredo Landfill	6513	.04	.045	.04
Laredo Landfill	6113	.04	.045	.04
Laredo Landfill	5974	.04	.045	.04
Laredo Landfill	5650	.04	.045	.04
Laredo Landfill	5400	.04	.045	.04
Laredo Landfill	4700	.04	.045	.04
Laredo Landfill	4000	.04	.045	.04
Laredo Landfill	3300	.04	.045	.04
Laredo Landfill	2850	.04	.045	.04
Laredo Landfill	2630	.04	.045	.04

Laredo Landfill	2600	.04	.045	.04
Laredo Landfill	2400	.04	.045	.04
Laredo Landfill	2250	.04	.045	.04

SUMMARY OF REACH LENGTHS

River: Perimeter Ditch

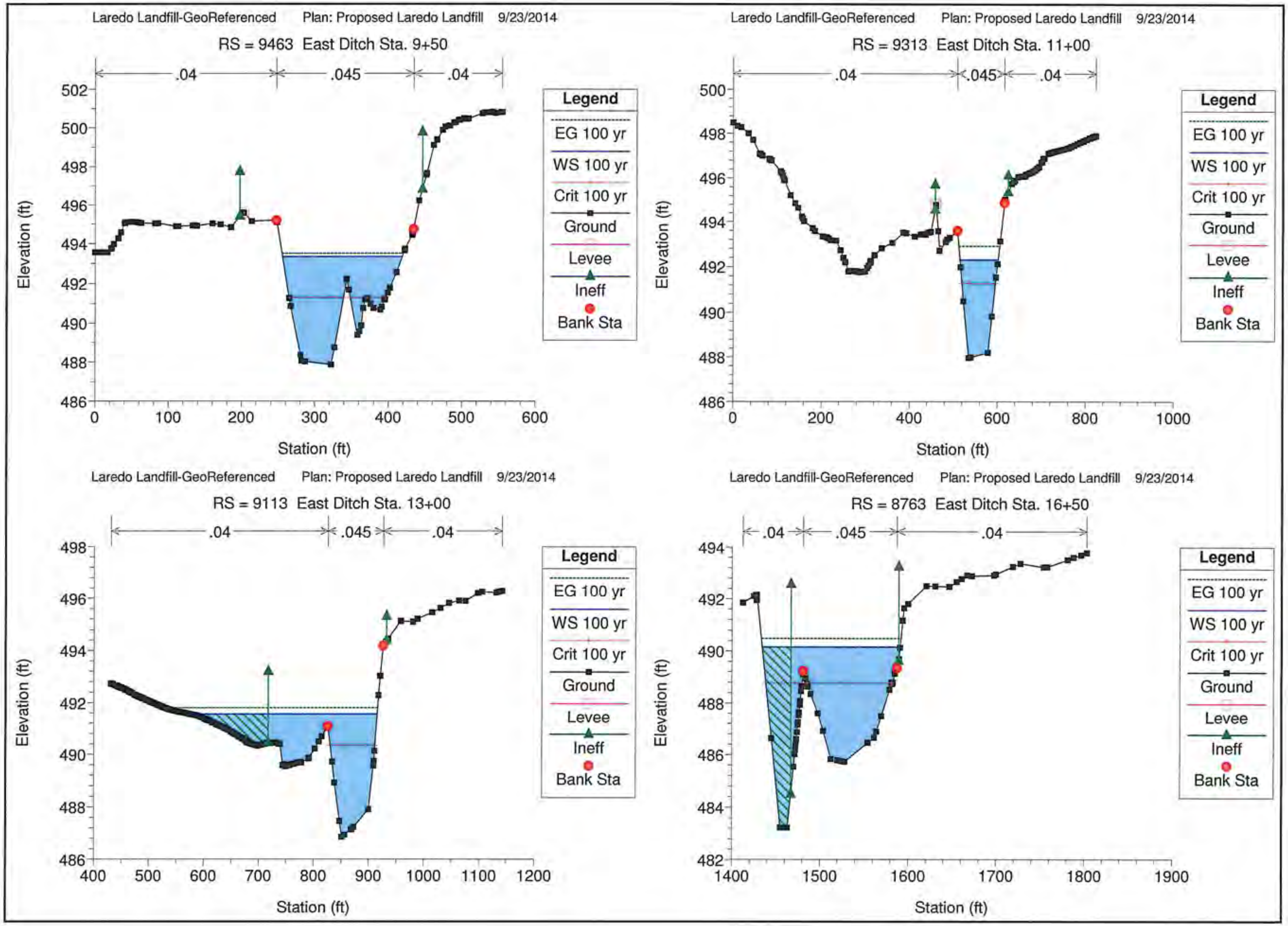
Reach	River Sta.	Left	Channel	Right
Laredo Landfill	9463	150	150	150
Laredo Landfill	9313	200	200	200
Laredo Landfill	9113	350	350	350
Laredo Landfill	8763	250	250	250
Laredo Landfill	8513	100	100	100
Laredo Landfill	8413	100	100	100
Laredo Landfill	8313	300	300	300
Laredo Landfill	8013	400	400	400
Laredo Landfill	7613	400	400	400
Laredo Landfill	7213	400	400	400
Laredo Landfill	6813	100	100	100
Laredo Landfill	6713	200	200	200
Laredo Landfill	6513	400	400	400
Laredo Landfill	6113	110	139	200
Laredo Landfill	5974	190	324	380
Laredo Landfill	5650	250	250	250
Laredo Landfill	5400	700	700	700
Laredo Landfill	4700	700	700	700
Laredo Landfill	4000	700	700	700
Laredo Landfill	3300	510	500	370
Laredo Landfill	2850	220	220	220
Laredo Landfill	2630	30	30	30
Laredo Landfill	2600	200	200	200
Laredo Landfill	2400	150	150	150
Laredo Landfill	2250	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Perimeter Ditch

Reach	River Sta.	Contr.	Expan.
Laredo Landfill	9463	.1	.3
Laredo Landfill	9313	.1	.3
Laredo Landfill	9113	.1	.3
Laredo Landfill	8763	.1	.3
Laredo Landfill	8513	.1	.3
Laredo Landfill	8413	.1	.3
Laredo Landfill	8313	.1	.3
Laredo Landfill	8013	.1	.3
Laredo Landfill	7613	.1	.3
Laredo Landfill	7213	.1	.3
Laredo Landfill	6813	.1	.3
Laredo Landfill	6713	.1	.3
Laredo Landfill	6513	.1	.3
Laredo Landfill	6113	.1	.3
Laredo Landfill	5974	.1	.3
Laredo Landfill	5650	.1	.3
Laredo Landfill	5400	.1	.3
Laredo Landfill	4700	.1	.3
Laredo Landfill	4000	.1	.3
Laredo Landfill	3300	.1	.3
Laredo Landfill	2850	.1	.3
Laredo Landfill	2630	.1	.3
Laredo Landfill	2600	.1	.3
Laredo Landfill	2400	.1	.3
Laredo Landfill	2250	.1	.3

HEC-RAS Plan: Prop River: Perimeter Ditch Reach: Laredo Landfill Profile: 100 yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Laredo Landfill	9463	100 yr	1719.70	487.87	493.34	491.31	493.51	0.002173	3.31	519.19	162.91	0.33
Laredo Landfill	9313	100 yr	1719.70	487.96	492.30	491.27	492.91	0.007804	6.25	275.18	86.93	0.62
Laredo Landfill	9113	100 yr	1773.10	486.86	491.56	490.35	491.81	0.003467	4.36	462.75	339.84	0.42
Laredo Landfill	8763	100 yr	1773.10	485.73	490.14	488.78	490.48	0.004157	4.57	383.10	156.53	0.45
Laredo Landfill	8513	100 yr	1773.10	484.37	488.29	487.75	488.89	0.010321	6.26	284.58	147.70	0.69
Laredo Landfill	8413	100 yr	1773.10	481.33	486.94	486.94	487.69	0.013906	6.45	260.49	141.16	0.77
Laredo Landfill	8313	100 yr	1773.10	478.47	483.40	481.81	483.87	0.004931	5.53	320.79	86.02	0.50
Laredo Landfill	8013	100 yr	1773.10	476.94	481.95	480.34	482.41	0.004816	5.45	325.34	87.59	0.50
Laredo Landfill	7613	100 yr	1818.90	475.08	479.42	478.36	480.00	0.007526	6.14	296.10	93.48	0.61
Laredo Landfill	7213	100 yr	1818.90	469.74	477.10	475.43	477.55	0.004943	5.37	338.81	92.69	0.49
Laredo Landfill	6813	100 yr	1818.90	468.52	474.60	473.48	475.17	0.007235	6.07	299.68	91.98	0.59
Laredo Landfill	6713	100 yr	1818.90	468.03	474.10	472.36	474.55	0.004769	5.34	340.77	93.64	0.49
Laredo Landfill	6513	100 yr	1818.90	467.87	473.59	471.18	473.85	0.002307	4.10	444.35	108.08	0.35
Laredo Landfill	6113	100 yr	1818.90	467.94	470.61	470.61	471.66	0.022582	8.22	222.04	108.69	0.99
Laredo Landfill	5974	100 yr	2421.50	463.88	469.23	467.96	469.43	0.003606	3.61	670.66	270.64	0.40
Laredo Landfill	5650	100 yr	2421.50	463.13	467.71	466.62	468.03	0.005215	4.54	533.58	201.39	0.49
Laredo Landfill	5400	100 yr	2419.20	461.41	466.56	465.31	466.84	0.004261	4.23	571.29	205.26	0.45
Laredo Landfill	4700	100 yr	2419.20	458.98	464.11	462.12	464.33	0.003018	3.74	647.05	217.20	0.38
Laredo Landfill	4000	100 yr	2454.80	458.08	462.48	460.60	462.64	0.001949	3.20	768.07	237.47	0.31
Laredo Landfill	3300	100 yr	2454.80	456.93	461.28	459.53	461.40	0.001585	2.72	907.99	311.31	0.28
Laredo Landfill	2850	100 yr	2454.80	455.46	460.37	459.00	460.47	0.002153	2.60	944.38	428.34	0.31
Laredo Landfill	2630	100 yr	2454.80	454.76	459.51	458.63	459.73	0.005736	3.75	655.42	423.55	0.49
Laredo Landfill	2600	100 yr	2454.80	454.60	459.31	458.42	459.54	0.006553	3.91	628.32	355.15	0.52
Laredo Landfill	2400	100 yr	2469.80	453.57	458.15	457.06	458.36	0.005306	3.67	673.58	357.52	0.47
Laredo Landfill	2250	100 yr	2469.80	453.13	457.27	456.37	457.51	0.006002	3.91	631.26	333.44	0.50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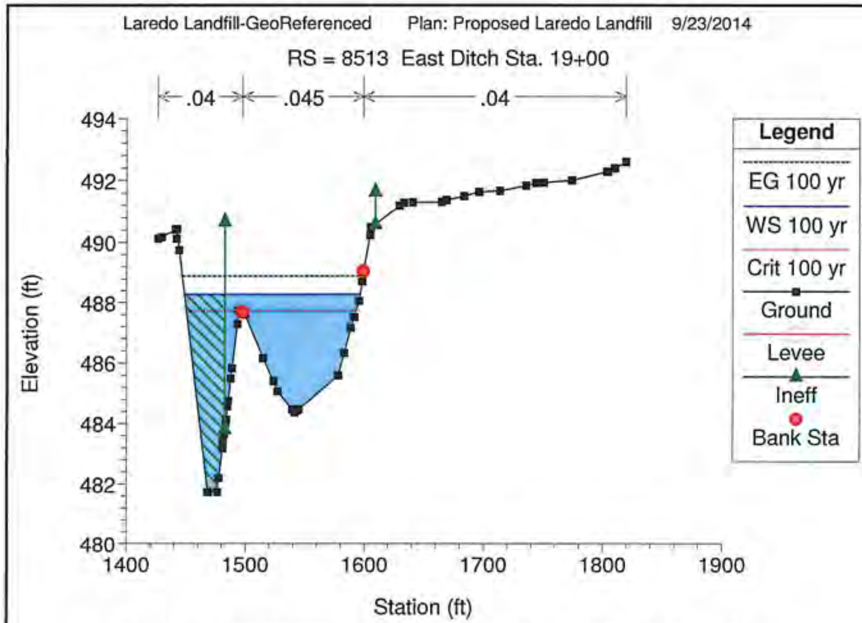
RS = 9463 East Ditch Sta. 9+50
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 9313 East Ditch Sta. 11+00
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 9113 East Ditch Sta. 13+00
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 8763 East Ditch Sta. 16+50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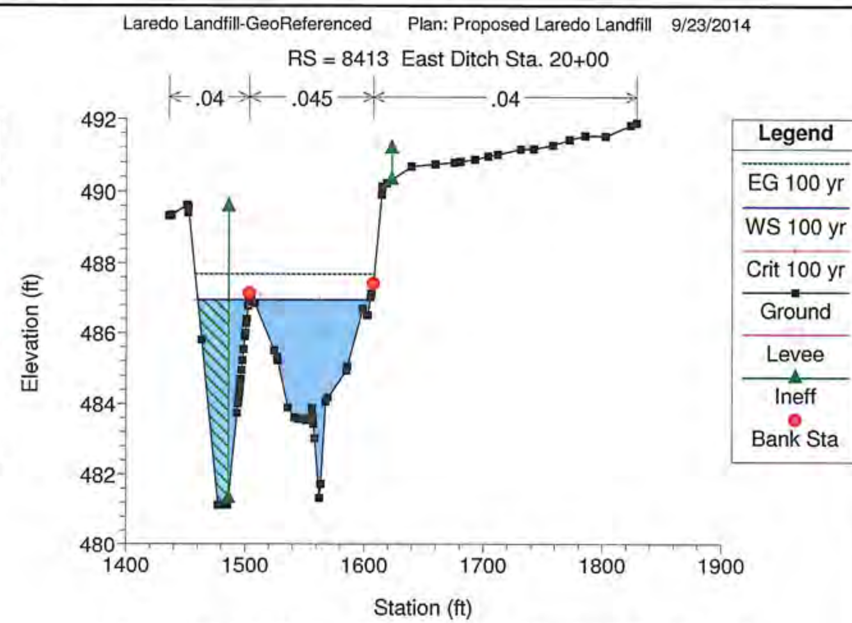
.04
.045
.04
Elevation (ft)
Station (ft)
494
492
490
488
486
484
482
480
1400
1500
1600
1700
1800
1900
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta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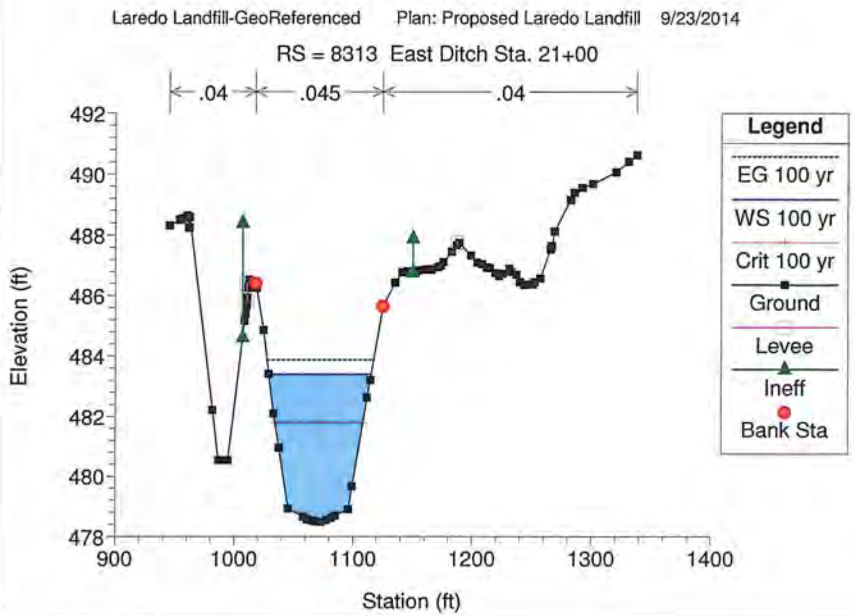
.04
.045
.04
Elevation (ft)
Station (ft)
492
490
488
486
484
482
480
1400
1500
1600
1700
1800
1900
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta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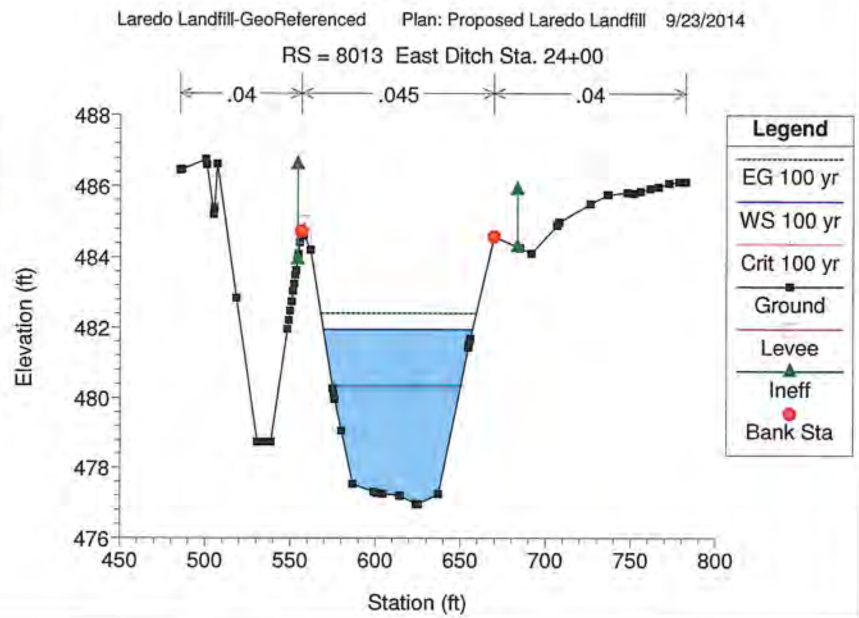
.04
.045
.04
Elevation (ft)
Station (ft)
492
490
488
486
484
482
480
478
900
1000
1100
1200
1300
1400
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta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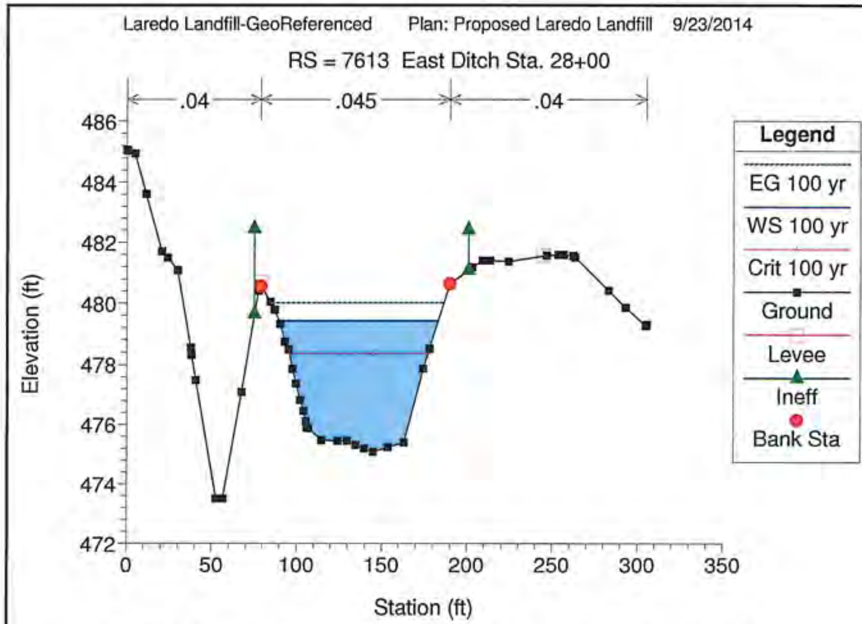
RS = 8013 East Ditch Sta. 24+00
.04
.045
.04
Elevation (ft)
Station (ft)
488
486
484
482
480
478
476
450
500
550
600
650
700
750
800
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta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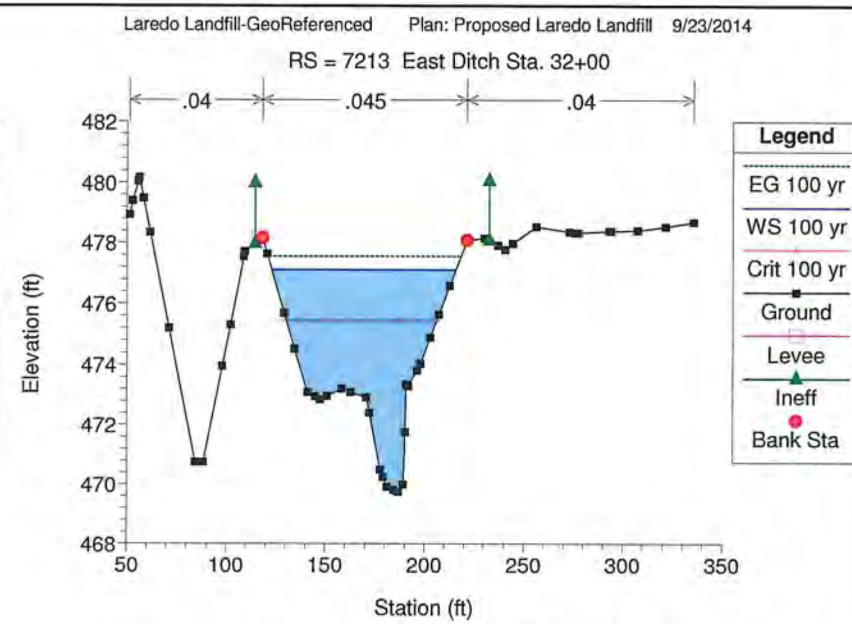
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta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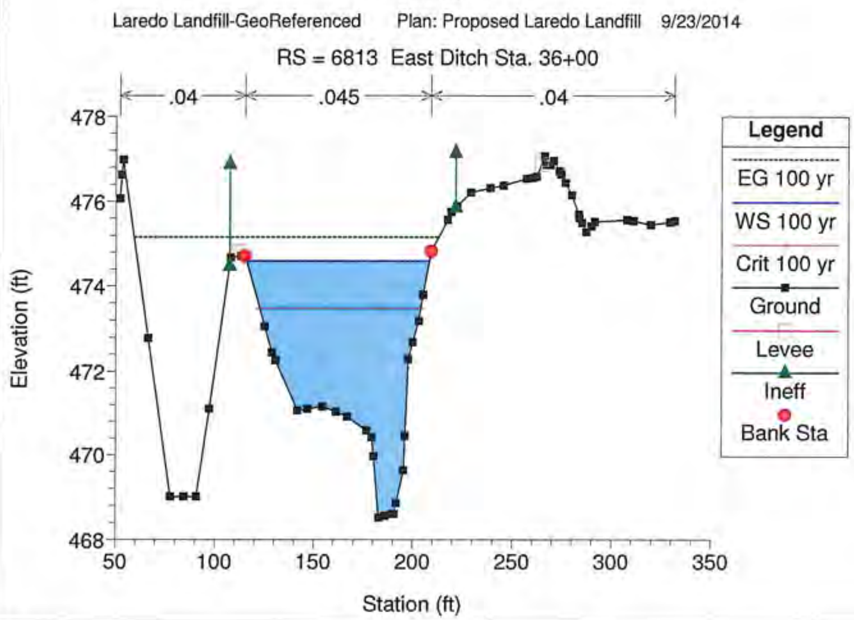
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta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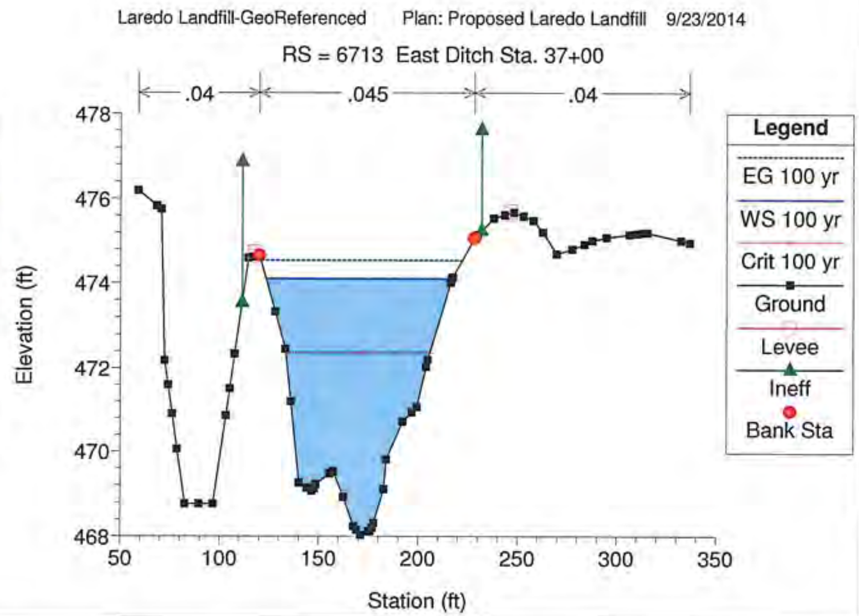
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta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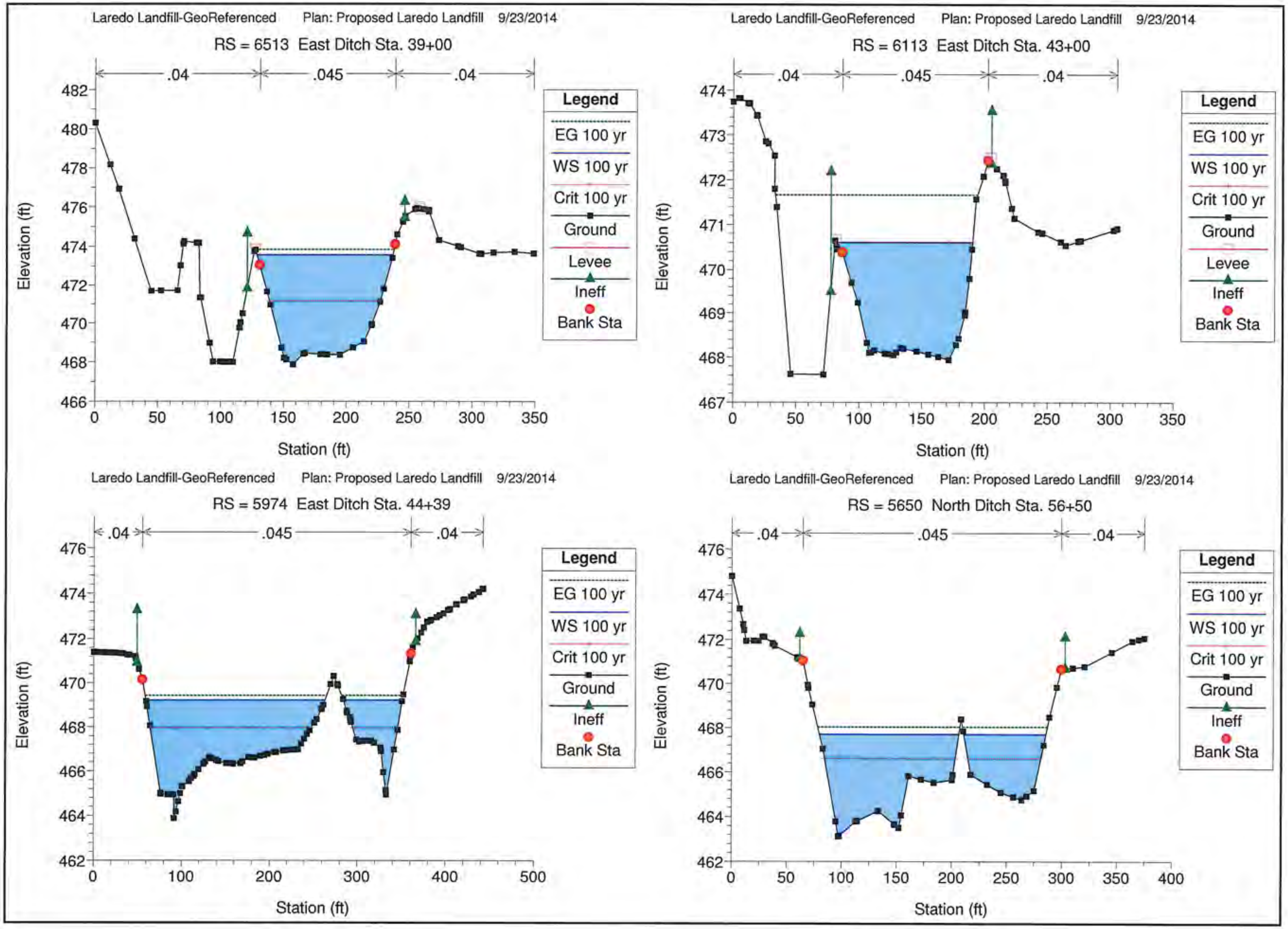
RS = 6713 East Ditch Sta. 37+00
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta



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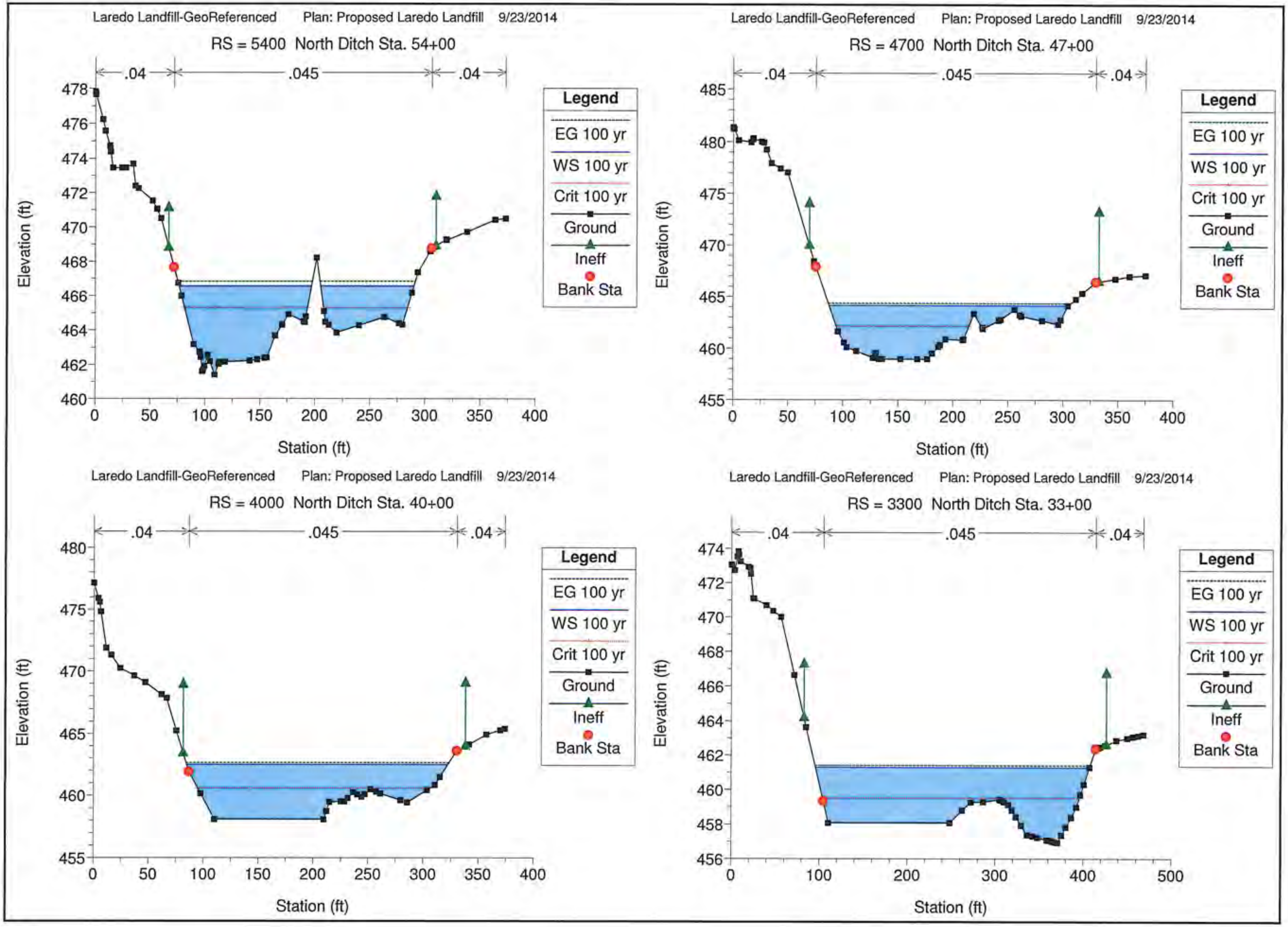
RS = 6513 East Ditch Sta. 39+00
.04 .045 .04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 6113 East Ditch Sta. 43+00
.04 .045 .04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 5974 East Ditch Sta. 44+39
.04 .045 .04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 5650 North Ditch Sta. 56+50
.04 .045 .04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta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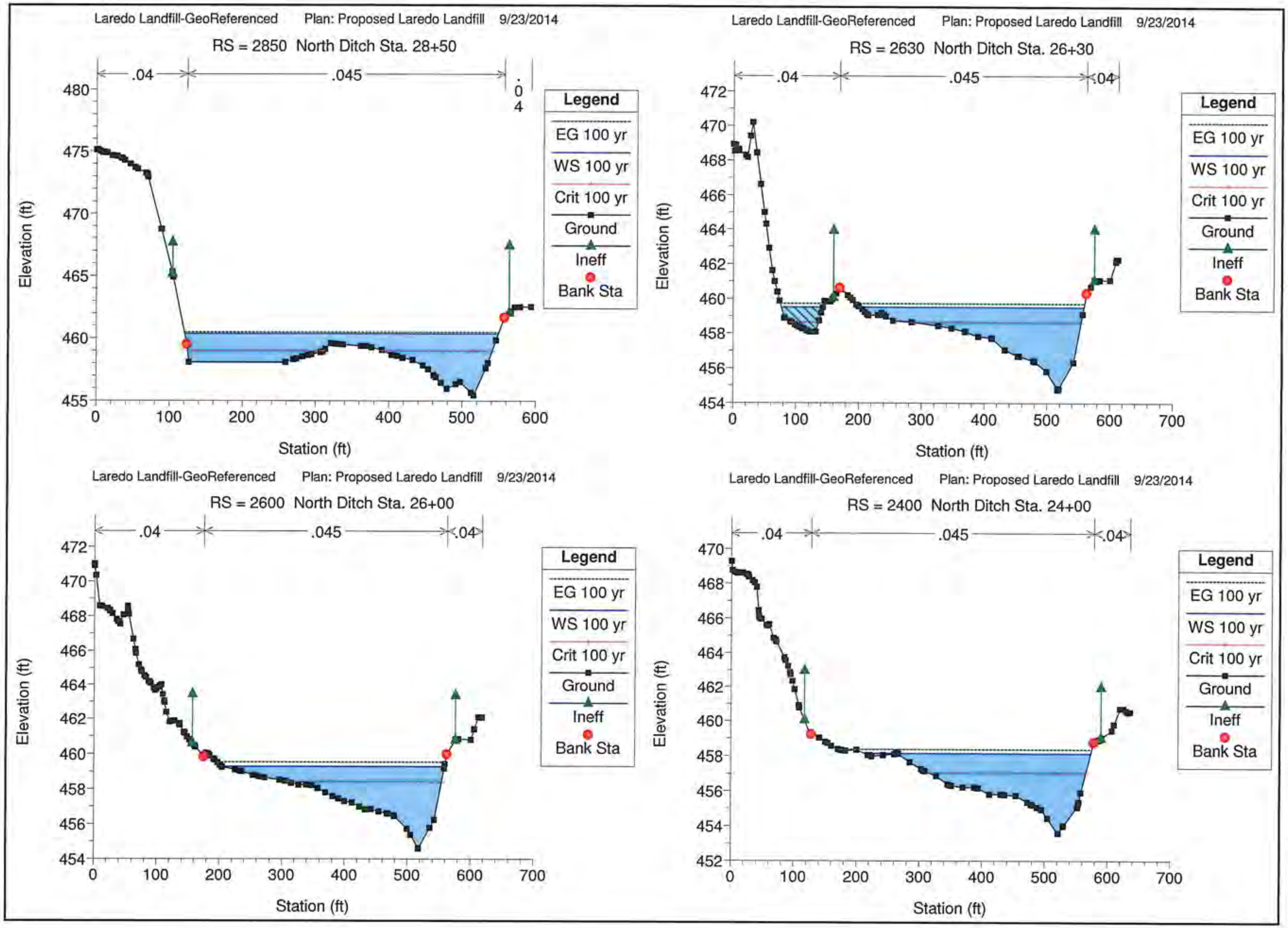
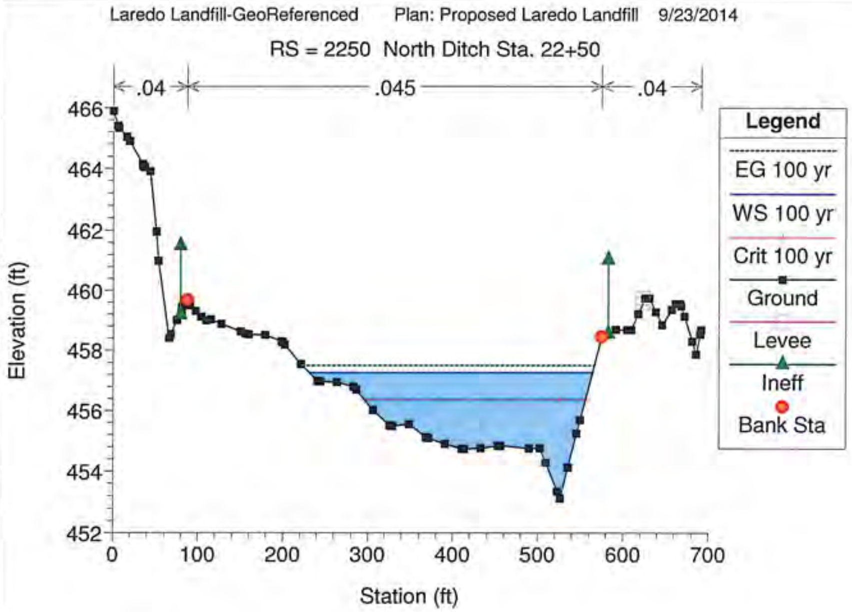
RS = 5400 North Ditch Sta. 54+00
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 4700 North Ditch Sta. 47+00
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 4000 North Ditch Sta. 40+00
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 3300 North Ditch Sta. 33+00
.04
.045
.04
Elevation (ft)
Station (ft)
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta


Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 2850 North Ditch Sta. 28+50
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 2630 North Ditch Sta. 26+30
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 2600 North Ditch Sta. 26+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
RS = 2400 North Ditch Sta. 24+00
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)



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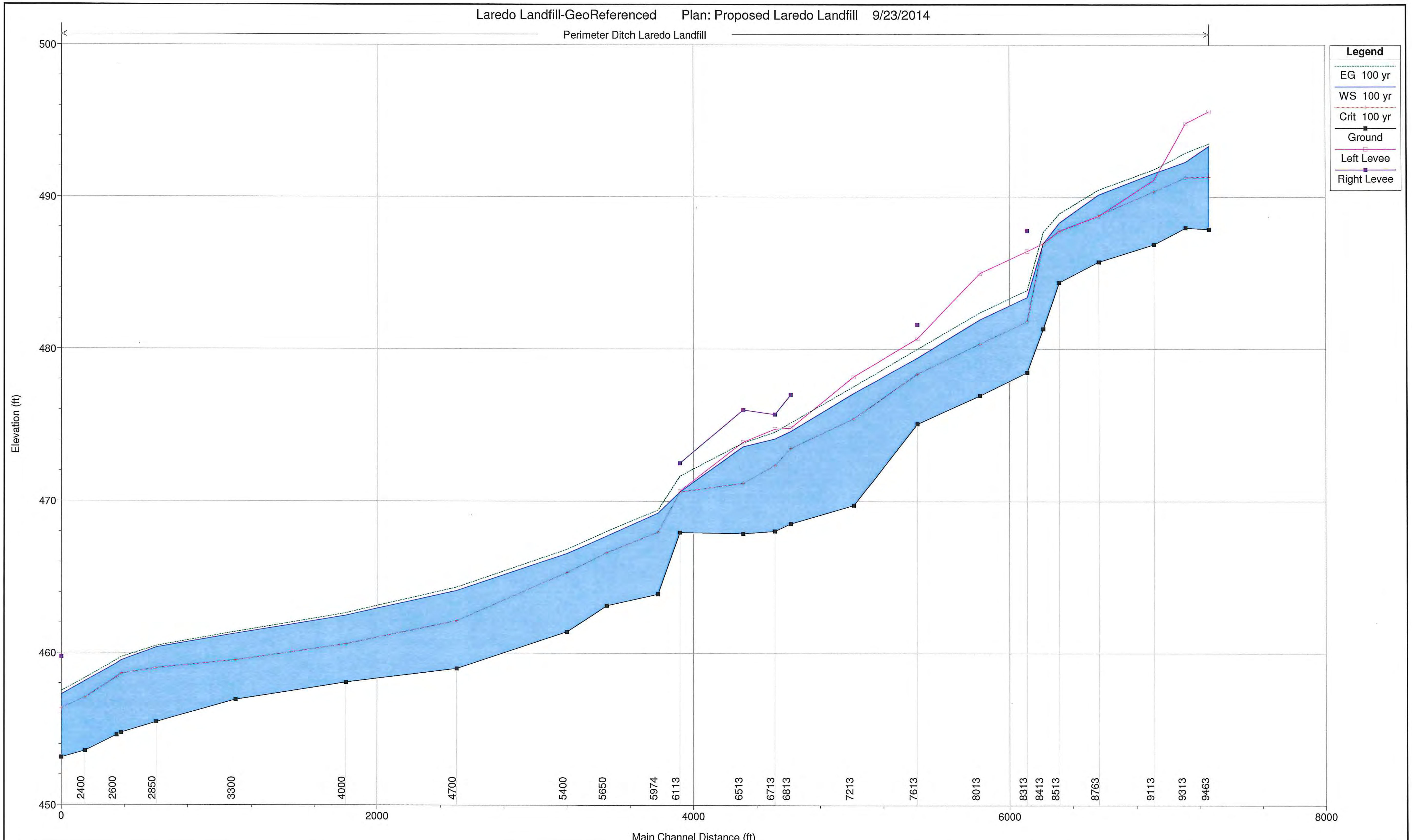
RS = 2250 North Ditch Sta. 22+50
.04
.045
.04
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
466
464
462
460
458
456
454
452
0
100
200
300
400
500
600
700
Station (ft)


Laredo Landfill-GeoReferenced Plan: Proposed Laredo Landfill 9/23/2014
Perimeter Ditch Laredo Landfill
Legend
EG 100 yr
WS 100 yr
Crit 100 yr
Ground
Left Levee
Right Levee
Elevation (ft)
Main Channel Distance (ft)
500
490
480
470
460
450
0
2000
4000
6000
8000
2400
2600
2850
3300
4000
4700
5400
5650
5974
6113
6513
6713
6813
7213
7613
8013
8313
8413
8513
8763
9113
9313
9463

APPENDIX E
HYDROLOGICAL & HYDRAULIC
REFERENCE MATERIAL

Literature/Manual/Specification References Used

William A. Scharffenberg and Mathew J. Flemming; "Hydrologic Modeling System, HEC-HMS User's Manual Version 3.5" US Army Corps of Engineers, Hydrologic Engineering Center. August 2010

Arlen D. Feldman; "Hydrologic Modeling System, HEC-HMS Technical Reference Manual" US Army Corps of Engineers, Hydrologic Engineering Center. March 2000

Brunner, Gary W; "HEC-RAS, River Analysis System User's Manual Version 4.1" US Army Corps of Engineers, Hydrologic Engineering Center. January 2010

Brunner, Gary W; "HEC-RAS, River Analysis System Reference Manual Version 4.1" US Army Corps of Engineers, Hydrologic Engineering Center. January 2010

Texas Department of Transportation; "Hydraulic Design Manual". October 2011

Federal Emergency Management Agency; "Flood Insurance Study" Webb County, Texas and Incorporated Areas. April 2, 2008

U.S. Department of the Interior, U.S. Geological Survey; "Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas", Scientific Investigations Report 2004-5041

U.S. Department of the Interior, U.S. Geological Survey; "Time-Parameter Estimation for Applicable Texas Watersheds", Research Report 0–4696–2. August 2005

Texas Department of Transportation; "Climatic Adjustments of Natural Resource Conservation Service (NRCS) Runoff Curve Numbers", Research Report Number 0-2104-2. October 2003

b. Recommended SCS Method "CN" Values

SCS Runoff Curve Numbers For Urban Areas and Agricultural Lands					
Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average % impervious area[1]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc).					
Poor condition (grass cover 50%)..............		68	79	86	89
Fair condition (grass cover 50% to 75%)........		49	69	79	84
Good condition (grass cover 75%)...........		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right of way).....................		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right of way)......................		98	98	98	98
Paved; open ditches (Including right of way)...................		83	89	92	93
Gravel (including right of way)...........		76	85	89	91
Dirt (including right of way)...............		72	82	87	89
Urban districts:					
Commercial and business..............	85	89	92	94	95
Industrial.............................	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses).........	65	77	85	90	92
1/4 acre.............................	38	61	75	83	87
1/3 acre..............................	30	57	72	81	86
1/2 acre..............................	25	54	70	80	85
1 acre................................	20	51	68	79	84
2 acres...............................	12	46	65	77	82
Developing urban areas Newly graded areas (pervious areas only, no vegetation)................................		77	86	91	94
Agricultural Lands Grassland, or range-continuous forage for grazing	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay.		30	58	71	78
Brush-weed-grass mixture with brush the major element [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods--grass combination (orchard or tree farm) [4]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods [5]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average % impervious area[1]	A	B	C	D
Farmsteads--buildings, lanes, driveways and surrounding lots.		59	74	82	86

[1] The average percent impervious area shown was used to develop the composite curve numbers. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a curve number of 98 and pervious areas are considered equivalent to open space in good hydrologic condition.

[2] Poor: less than 50 percent ground cover or heavily grazed with no mulch.
Fair: 50 to 75 percent ground cover and not heavily grazed.
Good: greater than 75 percent ground cover and lightly or only occasionally grazed.

[3] Poor: less than 50 percent ground cover.
Fair: 50 to 75 percent ground cover.
Good: greater than 75 percent ground cover.

[4] Curve numbers shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover. Other combinations of conditions may be computed from the curve numbers for woods and pasture.

[5] Poor: Forest litter, small trees and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Source: Soil Conservation Service. TR-55: Urban Hydrology for Small Watersheds

3. ALLOWABLE MANNING'S "n" COEFFICIENTS

Type of channel and description	Minimum	Normal	Maximum
A. Closed Conduits Flowing Partly Full			
A-1. Metal			
a. Brass, smooth	0.009	0.010	0.013
b. Steel			
1. Lock bar and welded	0.010	0.012	0.014
2. Riveted and spiral	0.013	0.016	0.017
c. Cast iron	0.010	0.013	0.014
1. Coated			

Type of channel and description	Minimum	Normal	Maximum
g. Masonry			
1. Cemented rubble	0.017	0.025	0.030
2. Dry rubble	0.023	0.032	0.035
h. Dressed ashler	0.013	0.015	0.017
i. Asphalt			
1. Smooth	0.013	0.013	-
2. Rough	0.016	0.016	-
j. Vegetal lining	0.030	-	0.500
C. Excavated or Dredged			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.050
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, rush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush high stage	0.080	0.100	0.140
D. Natural Streams			
D-1. Minor streams (top width at flood stage <100 ft)	0.250	0.030	0.033
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033

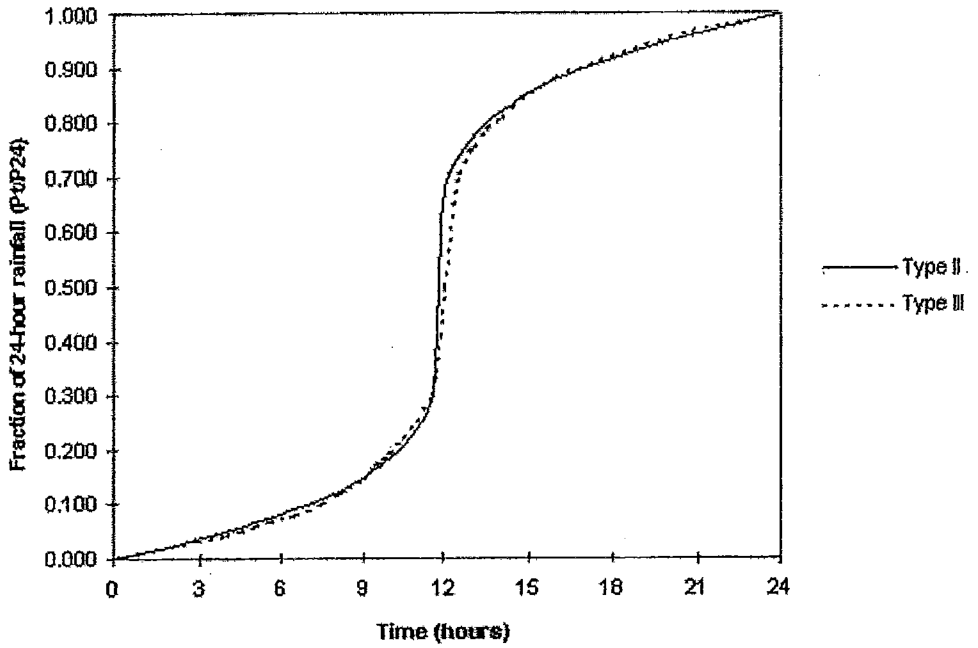


Figure 4-14. NRCS 24-hour rainfall distributions (NRCS 1986)

Table 4-13: NRCS 24-Hour Rainfall Distributions

Time, t (hours)	Fraction of 24-hour rainfall	
	Type II	Type III
0	0.000	0.000
2	0.022	0.020
4	0.048	0.043
6	0.080	0.072
7	0.098	0.089
8	0.120	0.115
8.5	0.133	0.130
9	0.147	0.148
9.5	0.163	0.167
9.75	0.172	0.178
10	0.181	0.189
10.5	0.204	0.216
11	0.235	0.250

Table 4-13: NRCS 24-Hour Rainfall Distributions

Time, t (hours)	Fraction of 24-hour rainfall	
	Type II	Type III
11.5	0.283	0.298
11.75	0.357	0.339
12	0.663	0.500
12.5	0.735	0.702
13	0.772	0.751
13.5	0.799	0.785
14	0.820	0.811
16	0.880	0.886
20	0.952	0.957
24	1.000	1.000

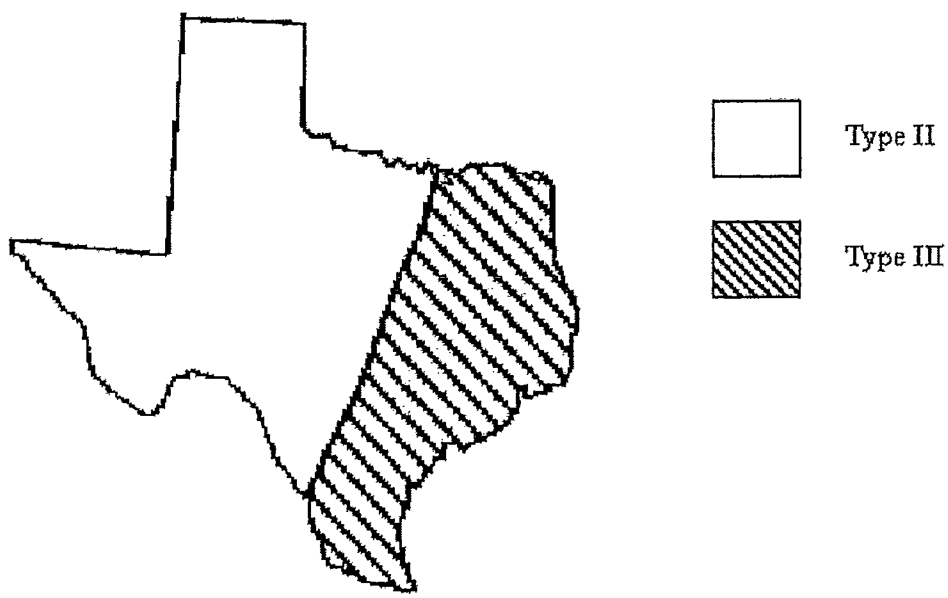


Figure 4-15. Rainfall distribution types in Texas (TR-55 1986)

Use the following steps to develop a rainfall hyetograph:

1. Determine the rainfall depth (P_d) for the desired design frequency and location.
2. Use Figure 4-15 to determine the distribution type.
3. Select an appropriate time increment for computation of runoff hydrograph ordinates. An increment equal 1/5 or 1/6 of the time of concentration is adequate for most analyses.

Where:

I_A = initial abstraction (in.)

C_L = constant loss rate (in./hr.)

L = main channel length (mi.)

D = 0 for undeveloped watersheds, 1 for developed watersheds

R = 0 for non-rocky watersheds, 1 for rocky watersheds

CN = NRCS curve number

In the above equations, L is defined as "the length in stream-course miles of the longest defined channel shown in a 30-meter digital elevation model from the approximate watershed headwaters to the outlet" (TxDOT 0-4193-7).

NRCS Curve Number Loss Model

NRCS has developed a procedure to divide total depth of rainfall into soil retention, initial abstractions, and effective rainfall. This parameter is referred to as a curve number (*CN*). The *CN* is based on soil type, land use, and vegetative cover of the watershed. The maximum possible soil retention is estimated using a parameter that represents the impermeability of the land in a watershed. Theoretically, *CN* can range from 0 (100% rainfall infiltration) to 100 (impervious). In practice, based on values tabulated in NRCS 1986, the lowest *CN* the designer will likely encounter is 30, and the maximum *CN* is 98.

Hydrologic Soil Groups

Soil properties influence the relationship between rainfall and runoff by affecting the rate of infiltration. NRCS divides soils into four hydrologic soil groups based on infiltration rates (Groups A-D). Urbanization has an effect on soil groups, as well. See Table 4-18 for more information.

Table 4-18: Hydrologic Soil Groups

Soil group	Description	Soil type	Range of loss rates	
			(in./hr.)	(mm/hr.)
A	Low runoff potential due to high infiltration rates even when saturated	Deep sand, deep loess, aggregated silts	0.30-0.45	7.6-11.4
B	Moderately low runoff potential due to moderate infiltration rates when saturated	Shallow loess, sandy loam	0.15-0.30	3.8-7.6

Table 4-18: Hydrologic Soil Groups

Soil group	Description	Soil type	Range of loss rates (in./hr.)	Range of loss rates (mm/hr.)
C	Moderately high runoff potential due to slow infiltration rates Soils in which a layer near the surface impedes the downward movement of water or soils with moderately fine to fine texture	Clay loams, shallow sandy loam, soils low in organic content, and soils usually high in clay	0.05-0.15	1.3-3.8
D	High runoff potential due to very slow infiltration rates	Soils that swell significantly when wet, heavy plastic clays, and certain saline soils	0.00-0.05	1.3

Estimating the CN

Rainfall infiltration losses depend primarily on soil characteristics and land use (surface cover). The NRCS method uses a combination of soil conditions and land use to assign runoff *CN*s. Suggested runoff curve numbers are provided in Table 4-19, Table 4-20, Table 4-21, and Table 4-22. Note that *CN*s are whole numbers.

For a watershed that has variability in land cover and soil type, a composite *CN* is calculated and weighted by area.

Table 4-19: Runoff Curve Numbers For Urban Areas

Cover type and hydrologic condition	Average percent impervious area	A	B	C	D
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm drains (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91

Table 4-19 notes: Values are for average runoff condition, and $I_a = 0.2S$.
The average percent impervious area shown was used to develop the composite CNs.
Other assumptions are: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition.

Table 4-21: Runoff Curve Numbers For Other Agricultural Lands

Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range-continuous forage for grazing	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow – continuous grass, protected from grazing and generally mowed for hay	-	30	58	71	78
Brush – brush-weed-grass mixture, with brush the major element	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods – grass combination (orchard or tree farm)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads – buildings, lanes, driveways, and surrounding lots	-	59	74	82	86

Table 4-21 notes: Values are for average runoff condition, and $I_a = 0.2S$. Pasture: Poor is < 50% ground cover or heavily grazed with no mulch, Fair is 50% to 75% ground cover and not heavily grazed, and Good is > 75% ground cover and lightly or only occasionally grazed. Meadow: Poor is < 50% ground cover, Fair is 50% to 75% ground cover, Good is > 75% ground cover. Woods/grass: CNs shown were computed for areas with 50 percent grass (pasture) cover. Other combinations of conditions may be computed from CNs for woods and pasture. Woods: Poor = forest litter, small trees, and brush destroyed by heavy grazing or regular burning. Fair = woods grazed but not burned and with some forest litter covering the soil. Good = woods protected from grazing and with litter and brush adequately covering soil.

Table 4-22: Runoff Curve Numbers For Arid And Semi-arid Rangelands

Cover type	Hydrologic condition	A	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Saltbush, greasewood, creosote-bush, blackbrush, bursage, palo verde, mesquite, and cactus	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

Table 4-22 notes: Values are for average runoff condition, and $I_a = 0.2S$. Hydrologic Condition: Poor = < 30% ground cover (litter, grass, and brush overstory), Fair = 30% to 70% ground cover, Good = > 70% ground cover. Curve numbers for Group A have been developed only for desert shrub.

Main channel slope is computed as the change in elevation from the watershed divide to the watershed outlet divided by the curvilinear distance of the main channel (primary flow path) between the watershed divide and the outlet.

No watersheds with low topographic slopes are available in the underlying database. Therefore, the guidance described here is not applicable to watersheds with limited topographic slope. Such watersheds are predominant in the High Plains and Coastal Regions of Texas.

The Kerby Method

For small watersheds where overland flow is an important component of overall travel time, the Kerby method can be used. The Kerby equation is

$$t_{ov} = K(L \times N)^{0.467} S^{-0.235}$$

Equation 4-14.

Where:

t_{ov} = overland flow time of concentration, in minutes

K = a units conversion coefficient, in which K = 0.828 for traditional units and K = 1.44 for *SI* units

L = the overland-flow length, in feet or meters as dictated by K

N = a dimensionless retardance coefficient

S = the dimensionless slope of terrain conveying the overland flow

In the development of the Kerby equation, the length of overland flow was as much as about 1,200 feet (366 meters). Hence, this length is considered an upper limit and shorter values in practice generally are expected. The dimensionless retardance coefficient used is similar in concept to the well-known Manning's roughness coefficient; however, for a given type of surface, the retardance coefficient for overland flow will be considerably larger than for open-channel flow. Typical values for the retardance coefficient are listed in Table 4-5.

Table 4-5: Kerby Equation Retardance Coefficient Values

Generalized terrain description	Dimensionless retardance coefficient (N)
Pavement	0.02
Smooth, bare, packed soil	0.10
Poor grass, cultivated row crops, or moderately rough packed surfaces	0.20
Pasture, average grass	0.40
Deciduous forest	0.60

Table 4-5: Kerby Equation Retardance Coefficient Values

Generalized terrain description	Dimensionless retardance coefficient (N)
Dense grass, coniferous forest, or deciduous forest with deep litter	0.80

The Kirpich Method

For channel-flow component of runoff, the Kirpich equation is:

$$t_{ov} = K(L \times N)^{0.467} S^{-0.235}$$

Equation 4-15.

Where:

t_{ch} = the time of concentration, in minutes

K = a units conversion coefficient, in which K = 0.0078 for traditional units and K = 0.0195 for *SI* units

L = the channel flow length, in feet or meters as dictated by K

S = the dimensionless main-channel slope

Application of the Kerby-Kirpich Method

An example (shown below) illustrating application of the Kerby-Kirpich method is informative. For example, suppose a hydraulic design is needed to convey runoff from a small watershed with a drainage area of 0.5 square miles. On the basis of field examination and topographic maps, the length of the main channel from the watershed outlet (the design point) to the watershed divide is 5,280 feet. Elevation of the watershed at the outlet is 700 feet. From a topographic map, elevation along the main channel at the watershed divide is estimated to be 750 feet. The analyst assumes that overland flow will have an appreciable contribution to the time of concentration for the watershed. The analyst estimates that the length of overland flow is about 500 feet and that the slope for the overland-flow component is 2 percent (S = 0.02). The area representing overland flow is average grass (N = 0.40). For the overland-flow t_c, the analyst applies the Kerby equation,

$$t_{ov} = 0.828(500 \times 0.40)^{0.467}(0.02)^{-0.235}$$

from which t_{ov} is about 25 minutes. For the channel t_{ch}, the analyst applies the Kirpich equation, but first dimensionless main-channel slope is required,

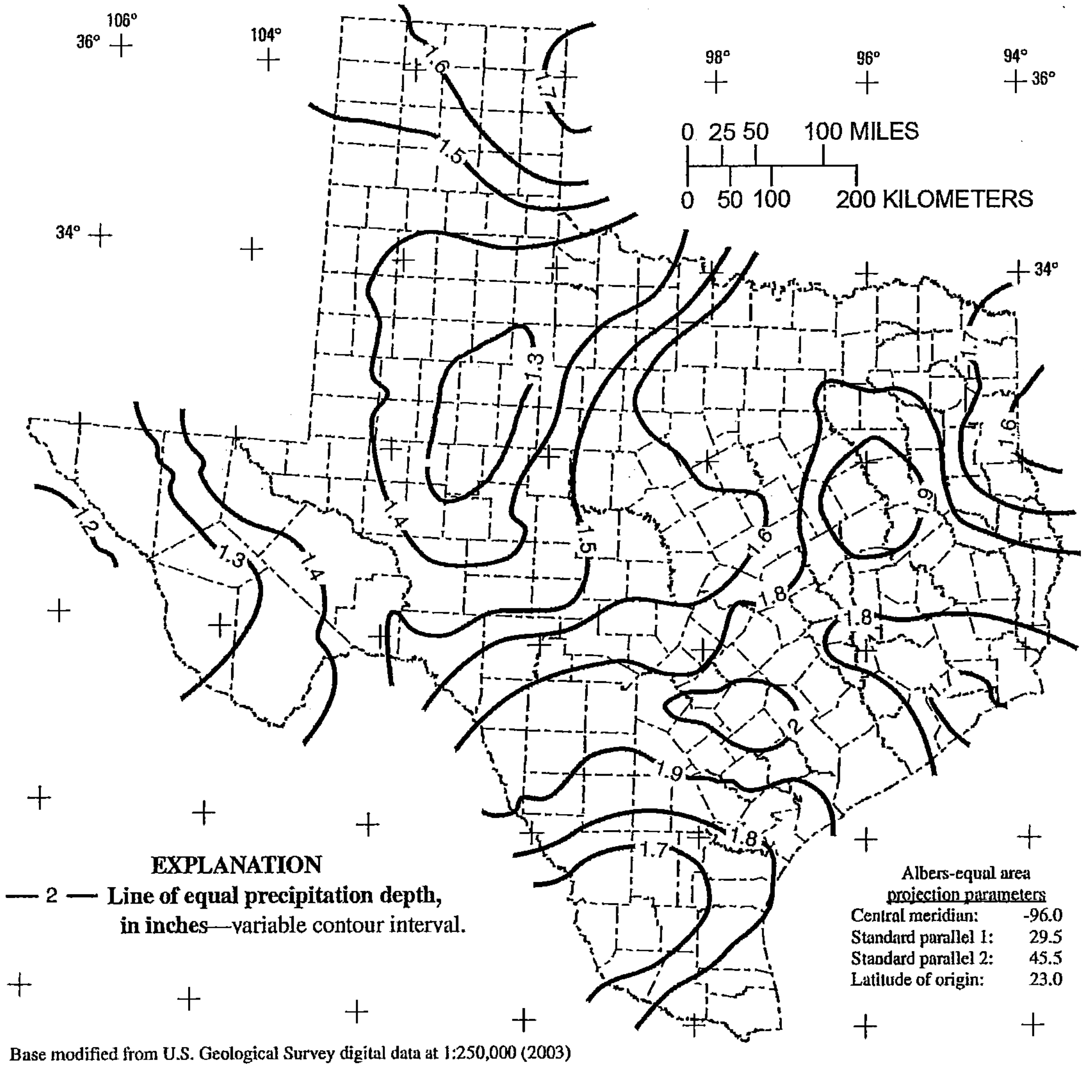


Figure 40. Depth of precipitation for 25-year storm for 15-minute duration in Texas.

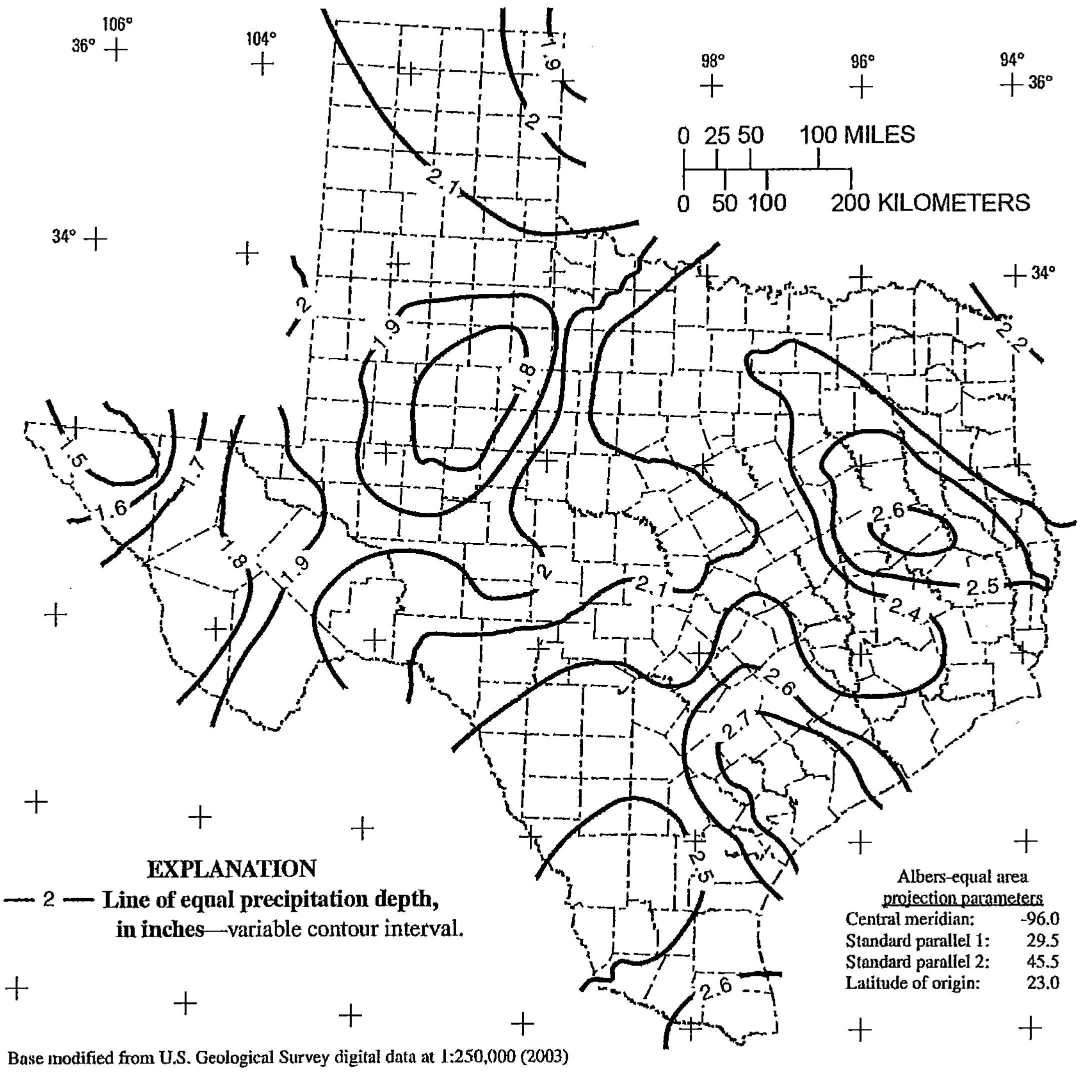


Figure 41. Depth of precipitation for 25-year storm for 30-minute duration in Texas.

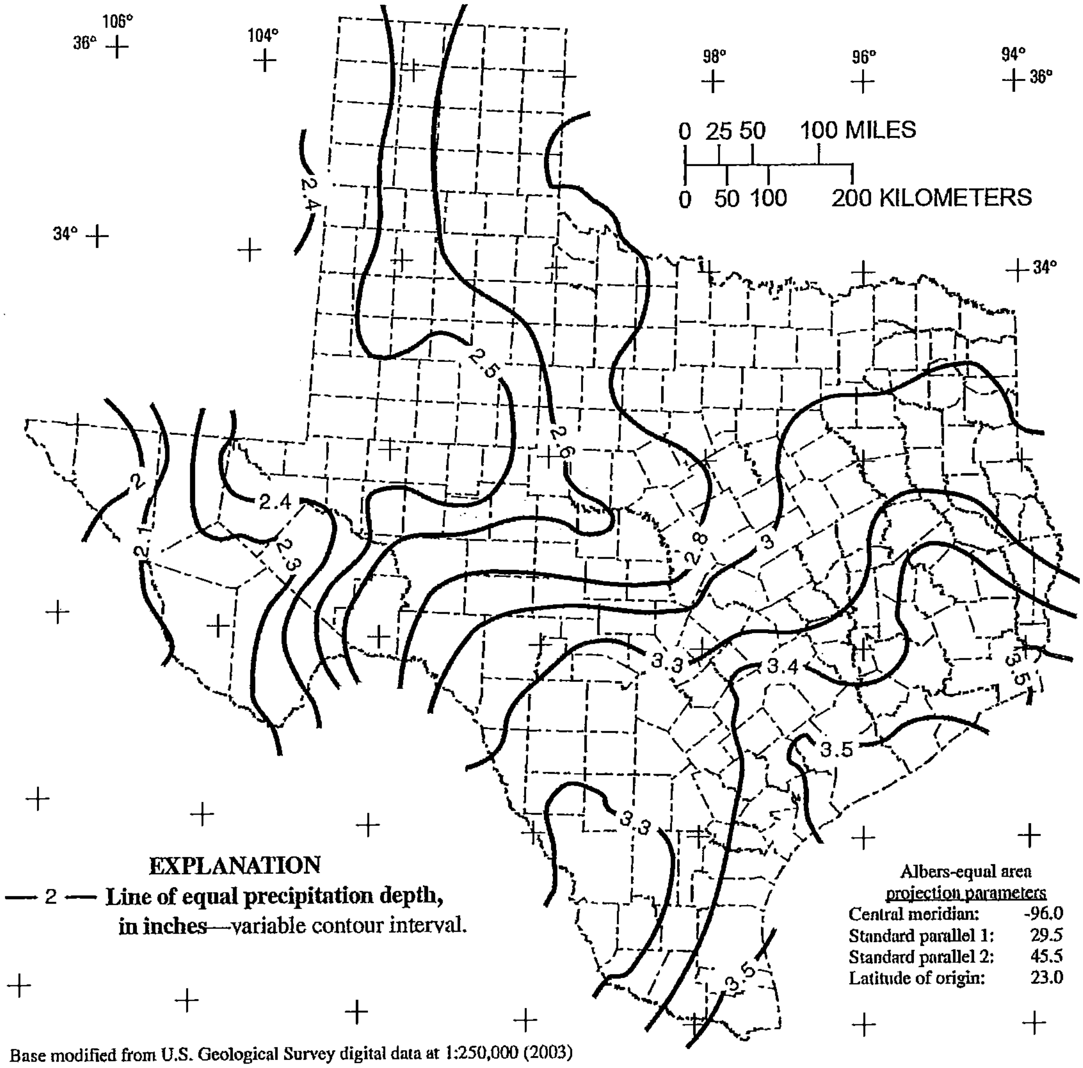
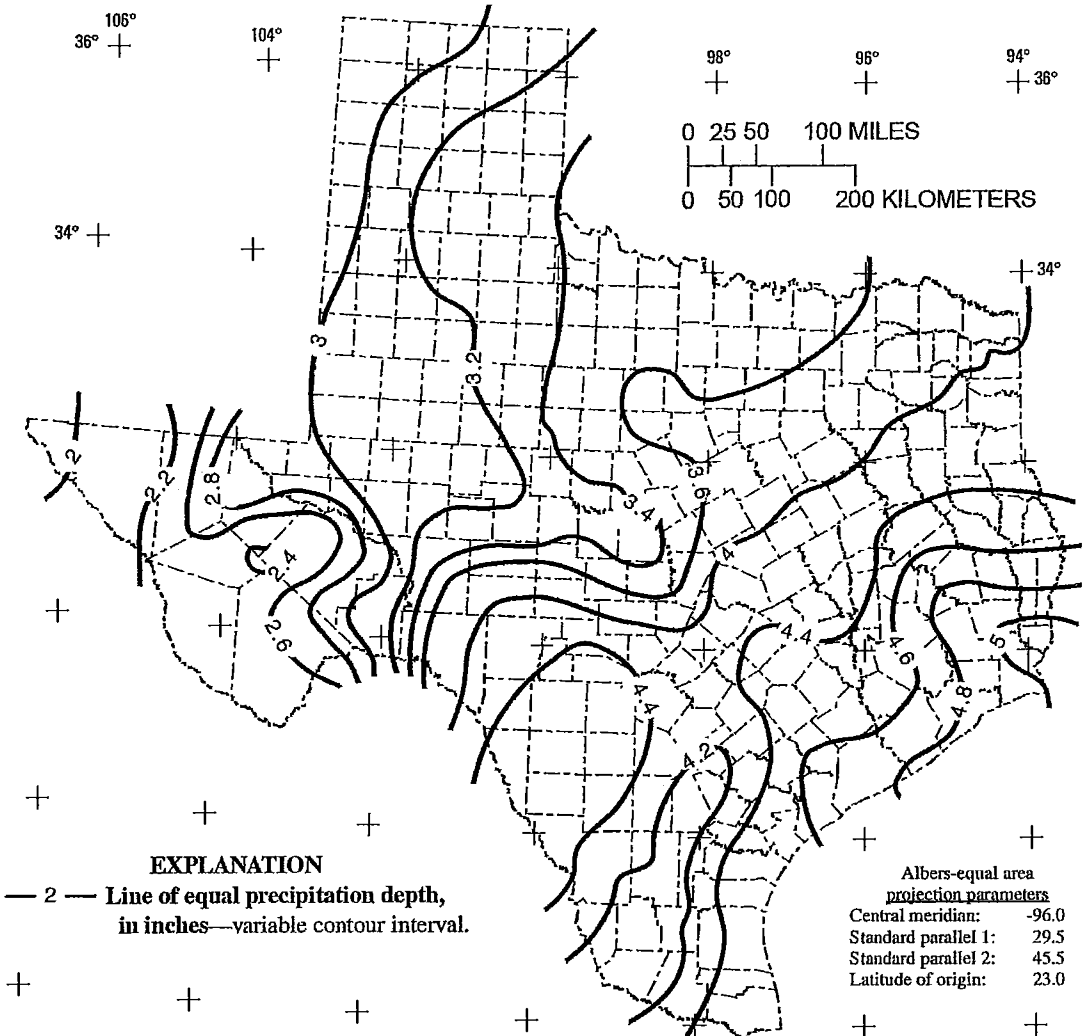


Figure 42. Depth of precipitation for 25-year storm for 1-hour duration in Texas.



Base modified from U.S. Geological Survey digital data at 1:250,000 (2003)

Figure 43. Depth of precipitation for 25-year storm for 2-hour duration in Texas.

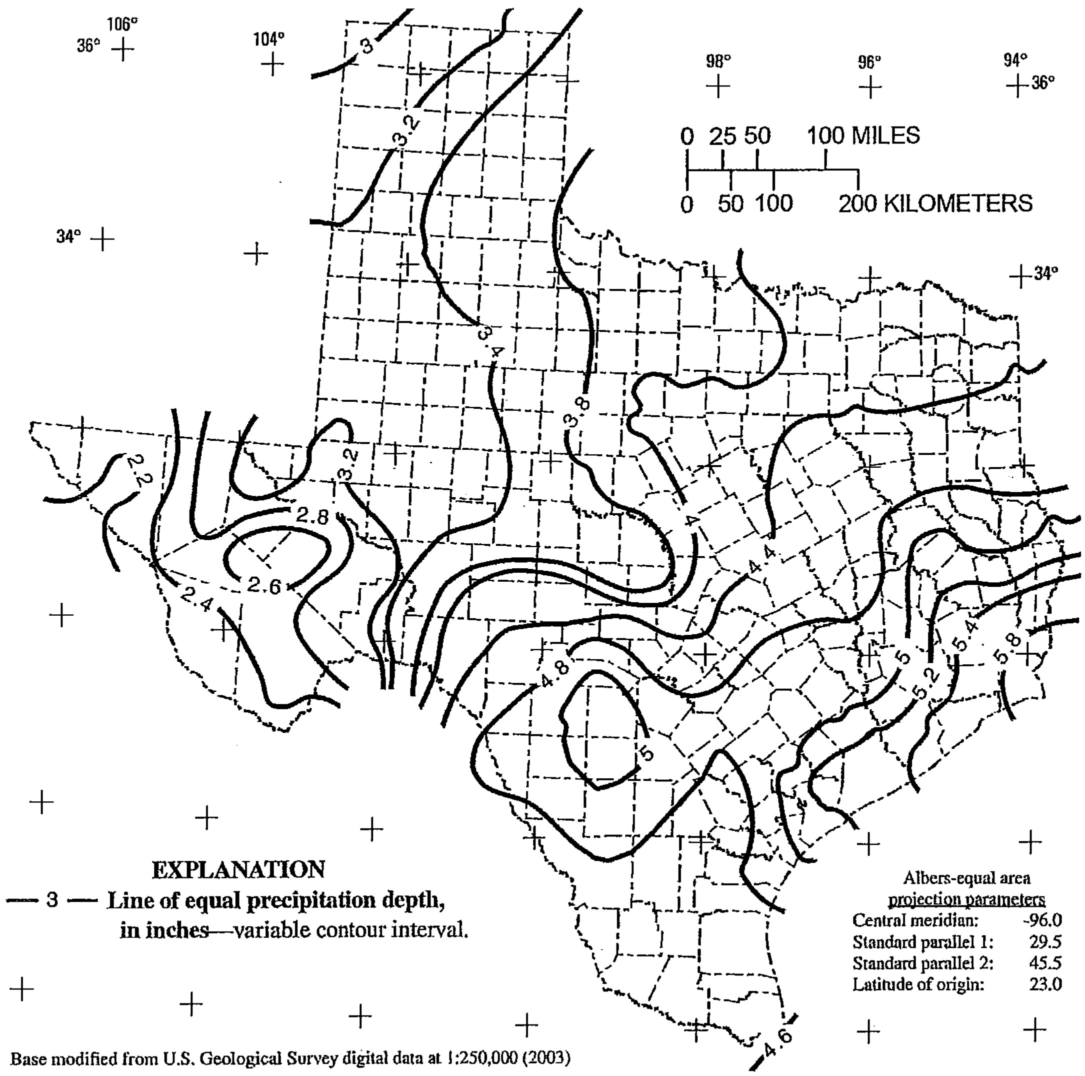


Figure 44. Depth of precipitation for 25-year storm for 3-hour duration in Texas.

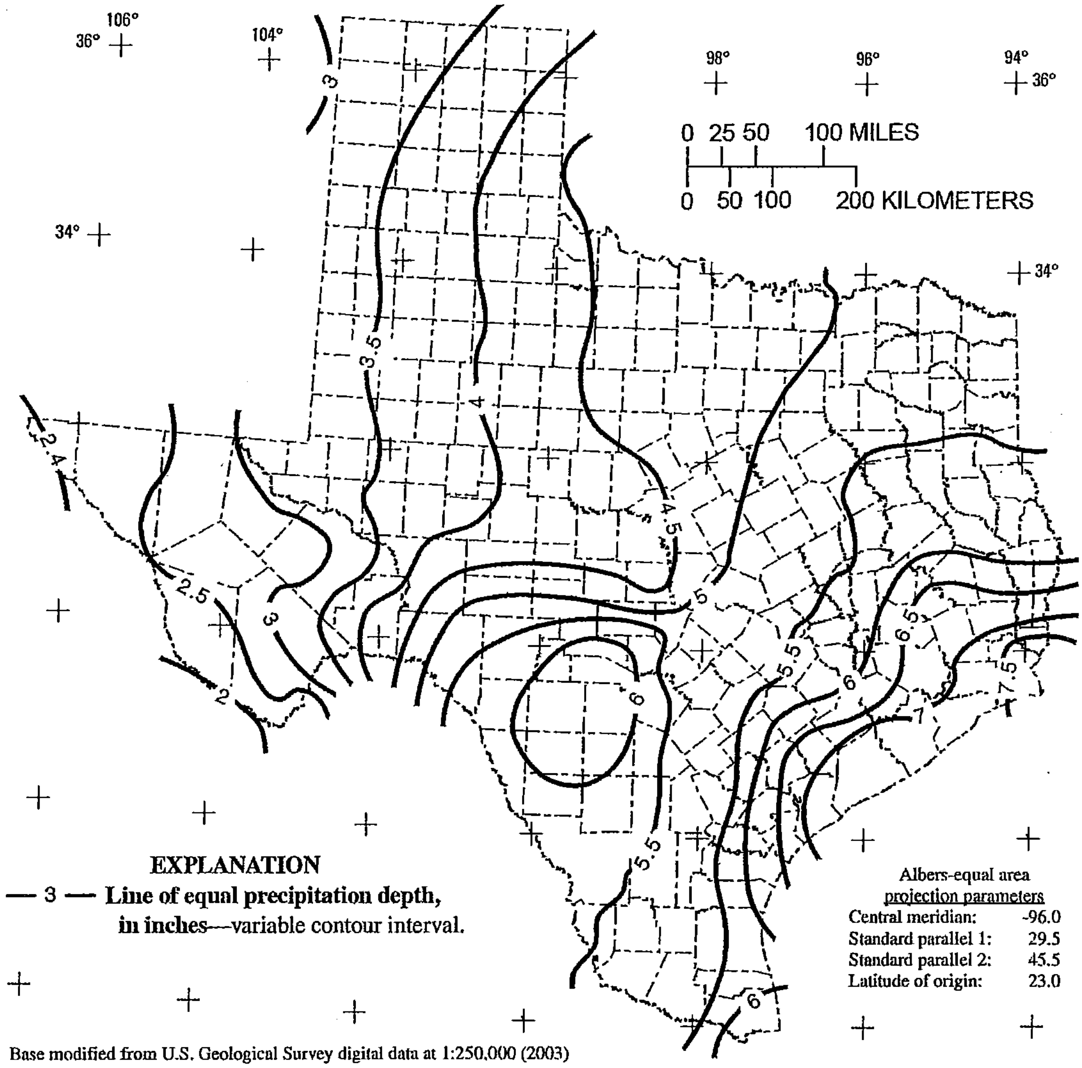


Figure 45. Depth of precipitation for 25-year storm for 6-hour duration in Texas.

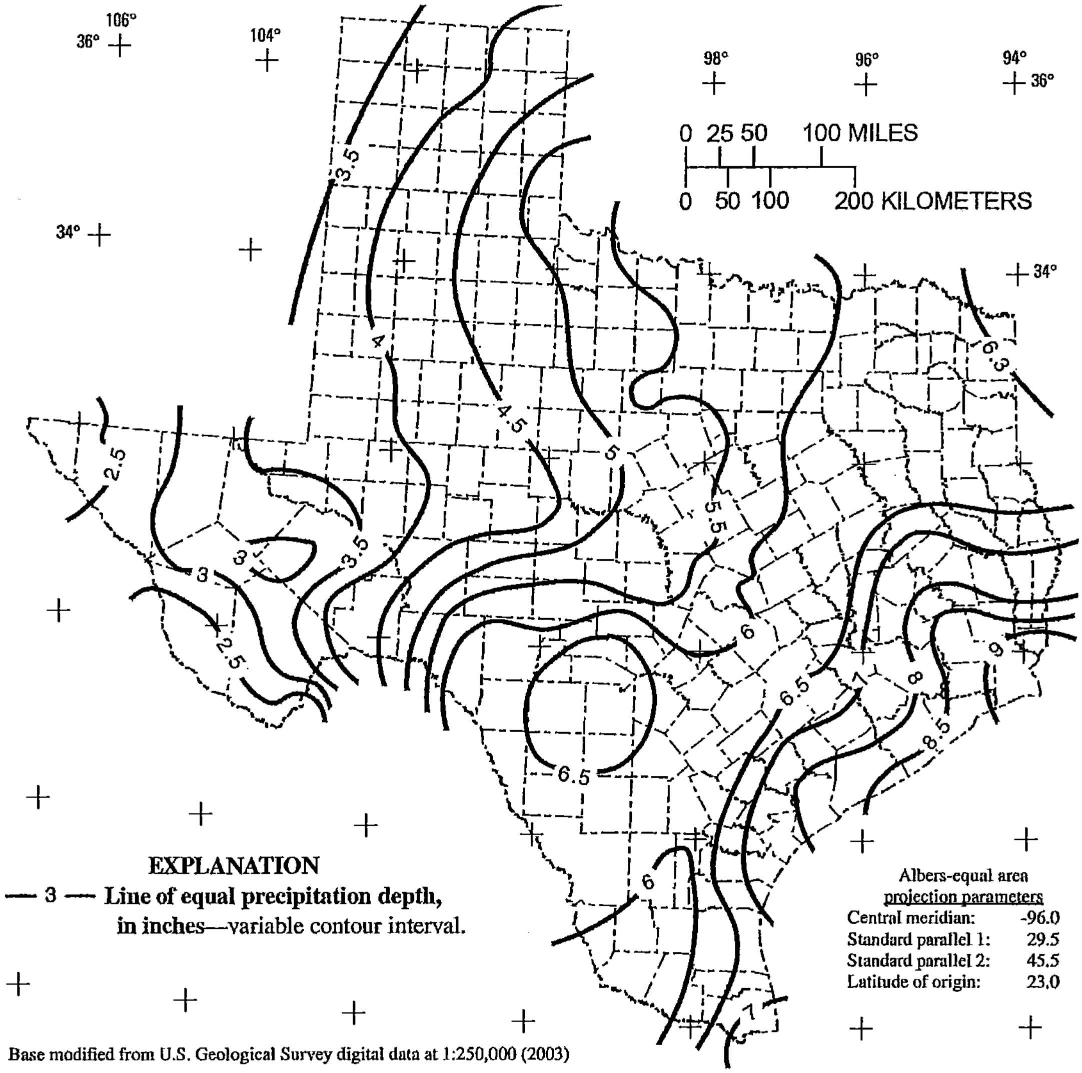


Figure 46. Depth of precipitation for 25-year storm for 12-hour duration in Texas.

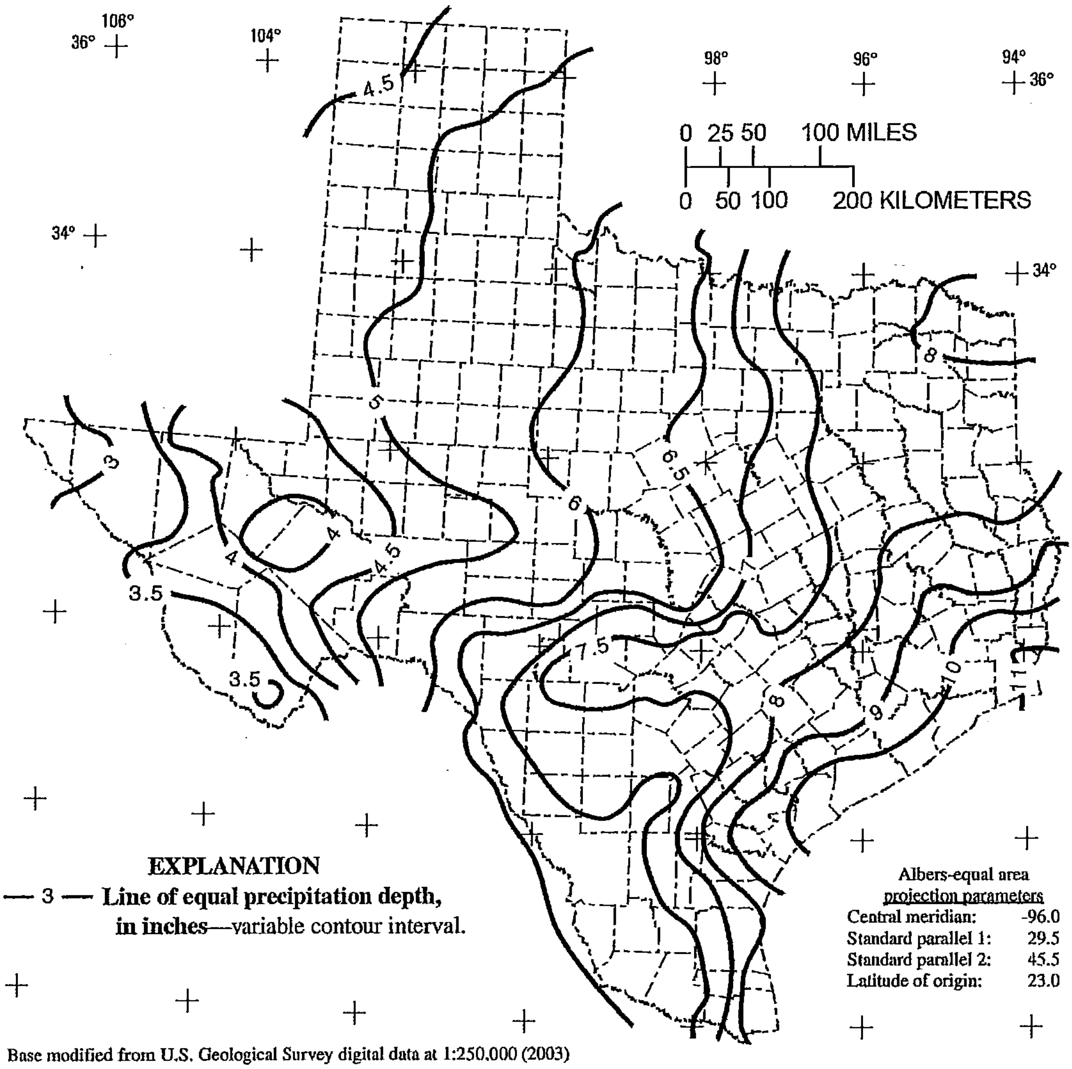


Figure 47. Depth of precipitation for 25-year storm for 1-day duration in Texas.

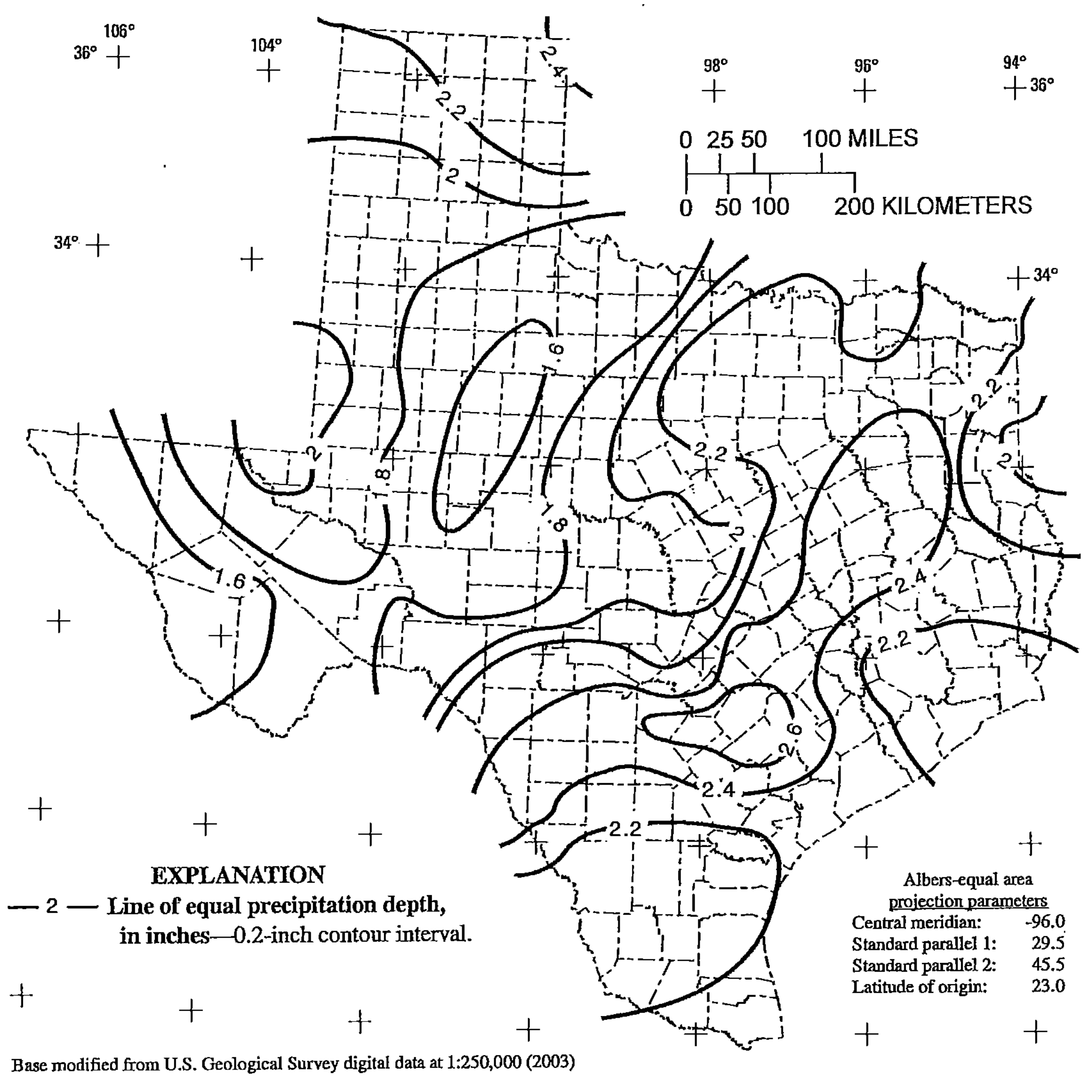


Figure 64. Depth of precipitation for 100-year storm for 15-minute duration in Texas.

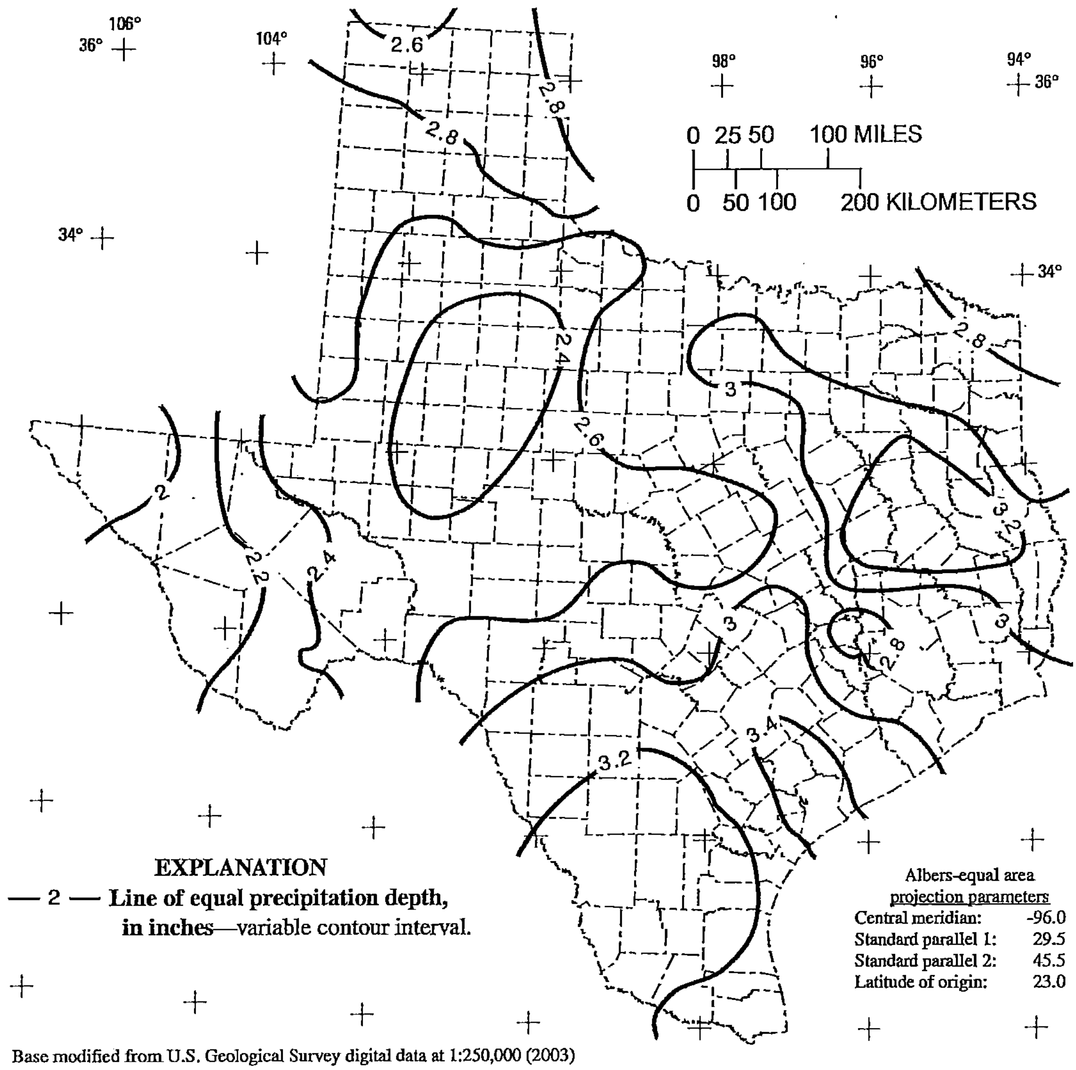


Figure 65. Depth of precipitation for 100-year storm for 30-minute duration in Texas.

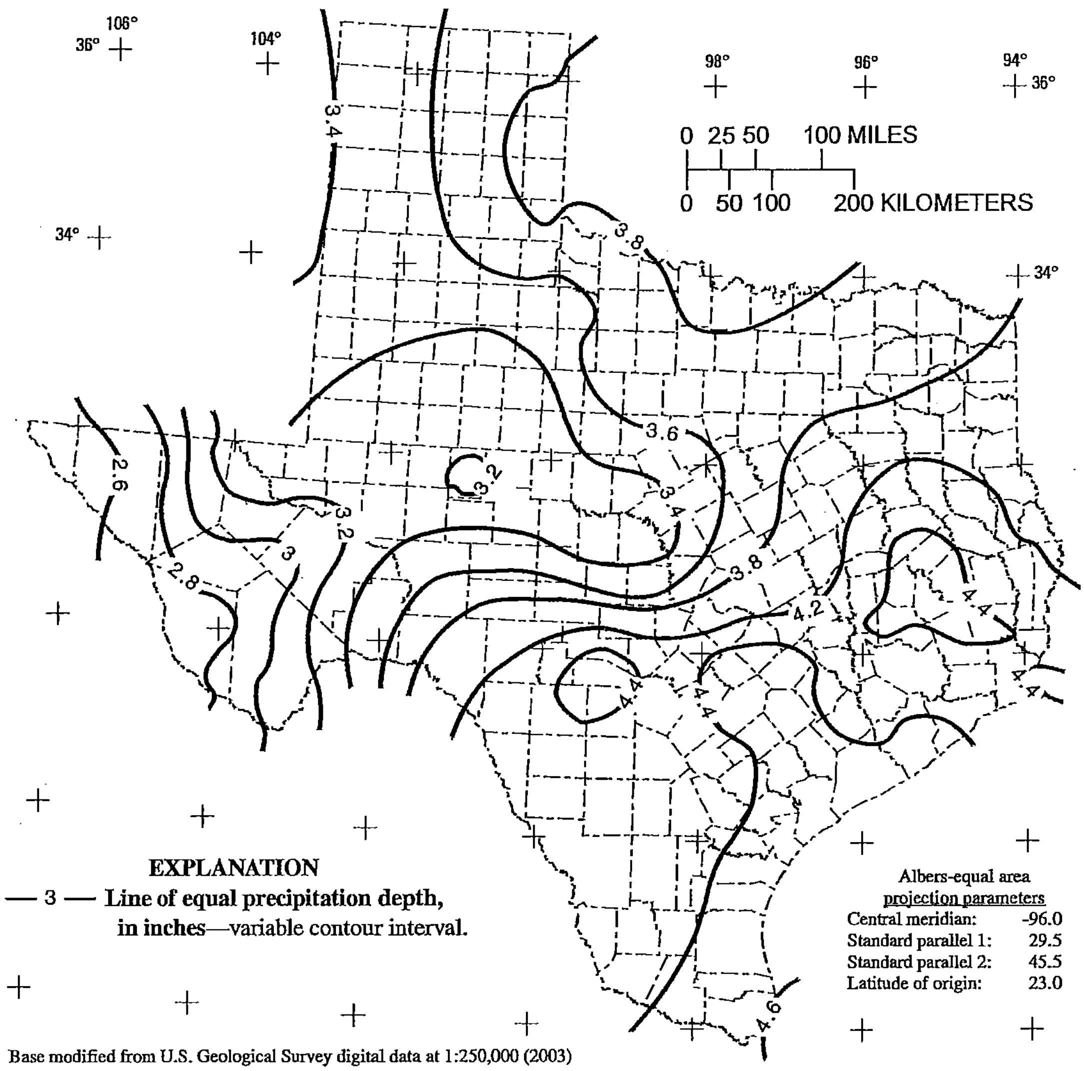
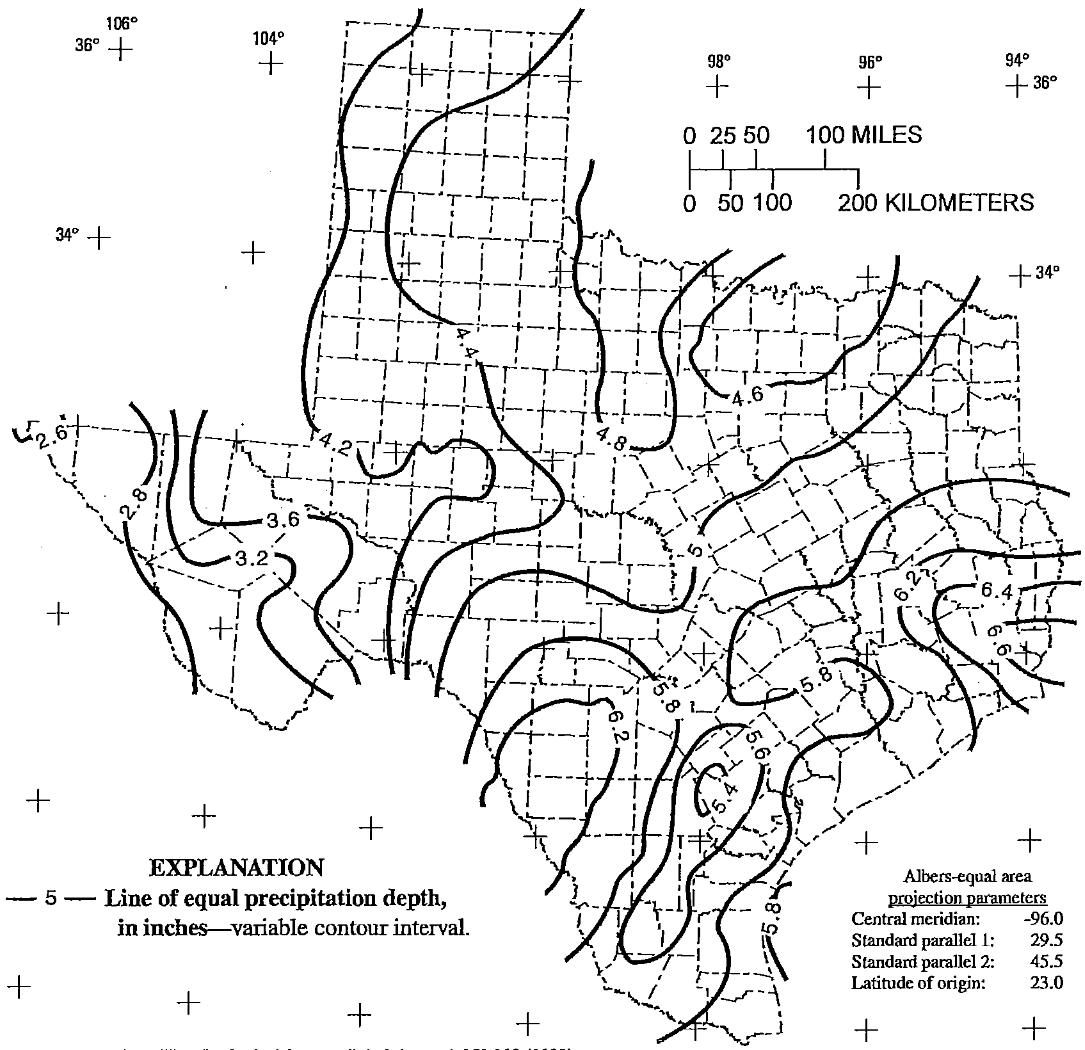


Figure 66. Depth of precipitation for 100-year storm for 1-hour duration in Texas.



Base modified from U.S. Geological Survey digital data at 1:250,000 (2003)

Figure 67. Depth of precipitation for 100-year storm for 2-hour duration in Texas.

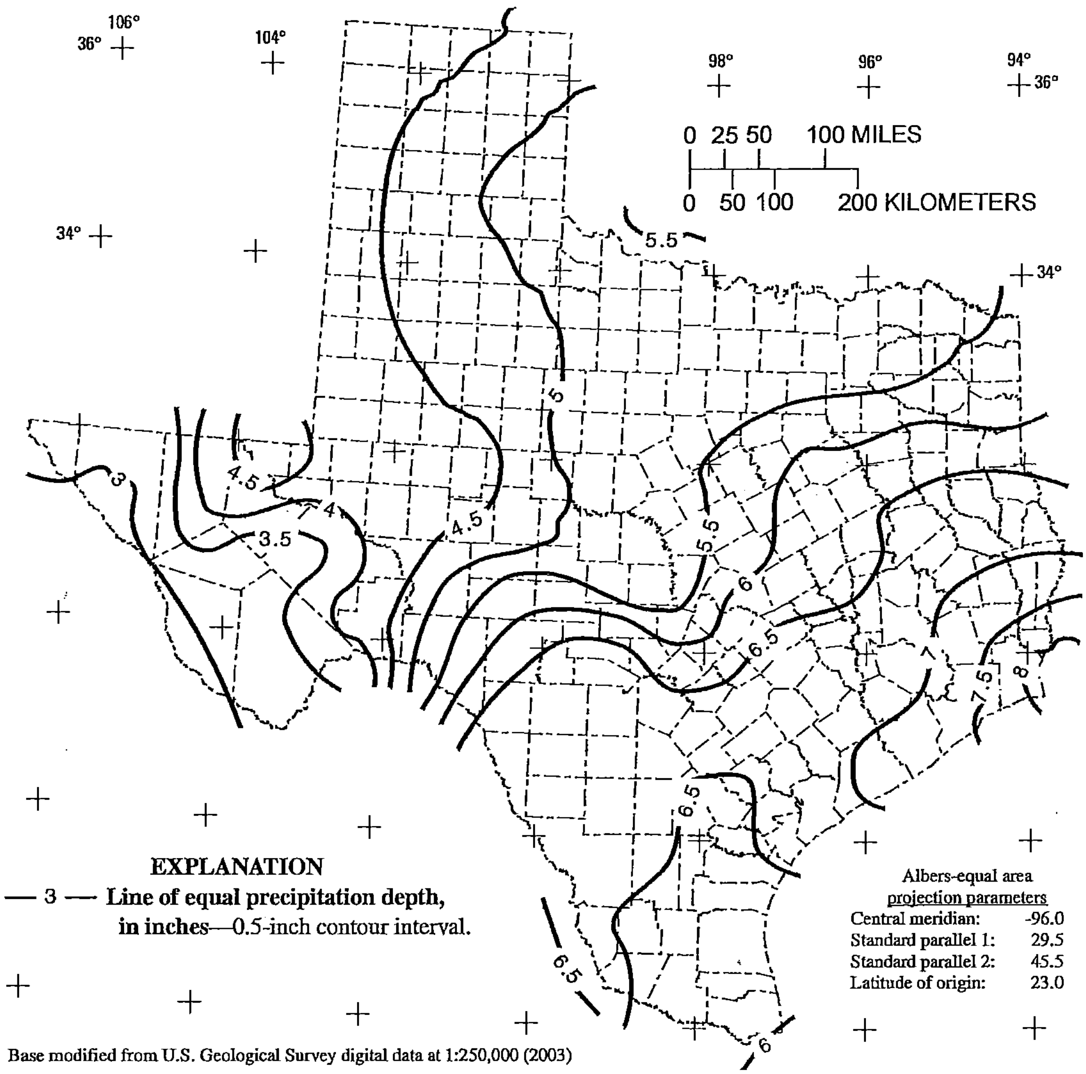


Figure 68. Depth of precipitation for 100-year storm for 3-hour duration in Texas.

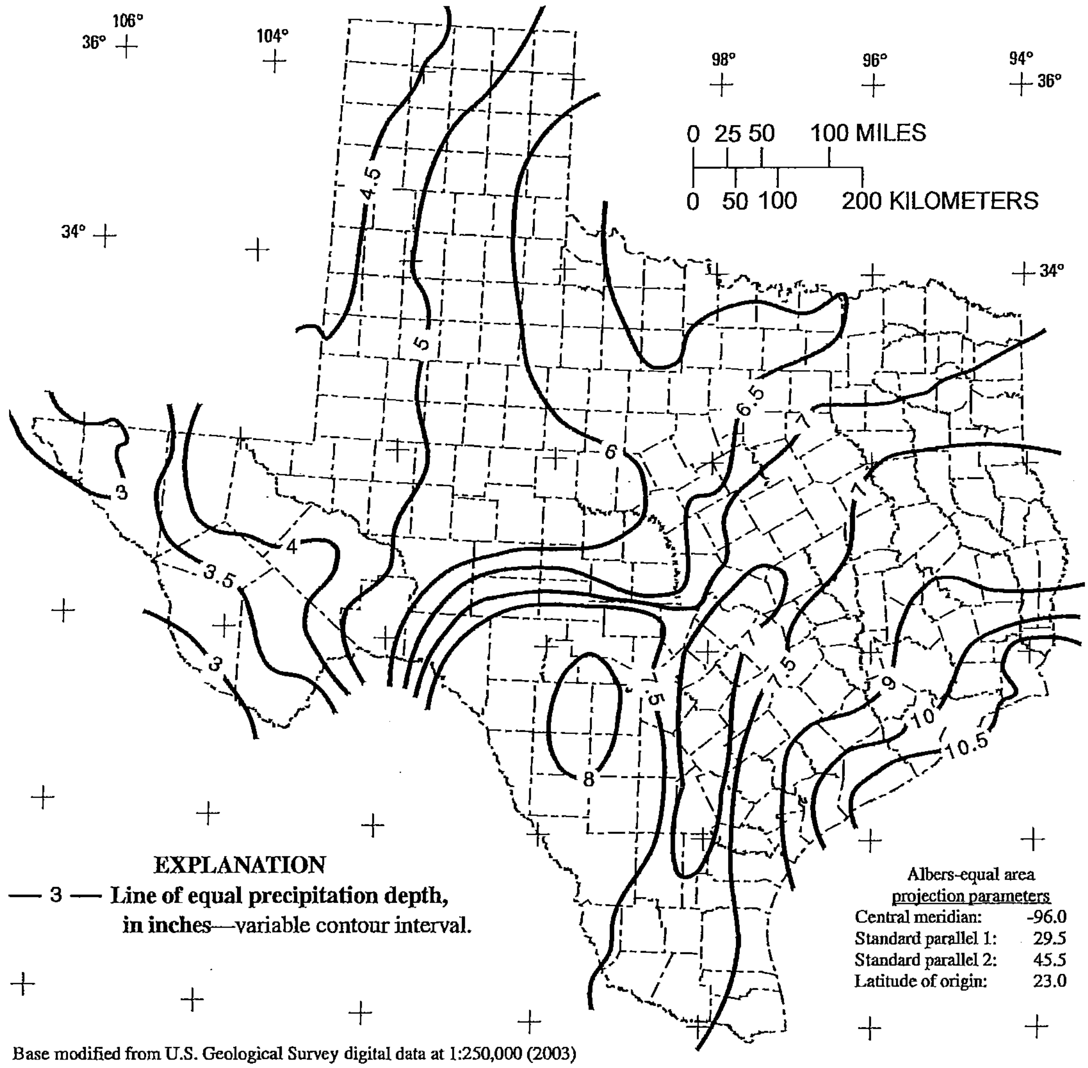


Figure 69. Depth of precipitation for 100-year storm for 6-hour duration in Texas.

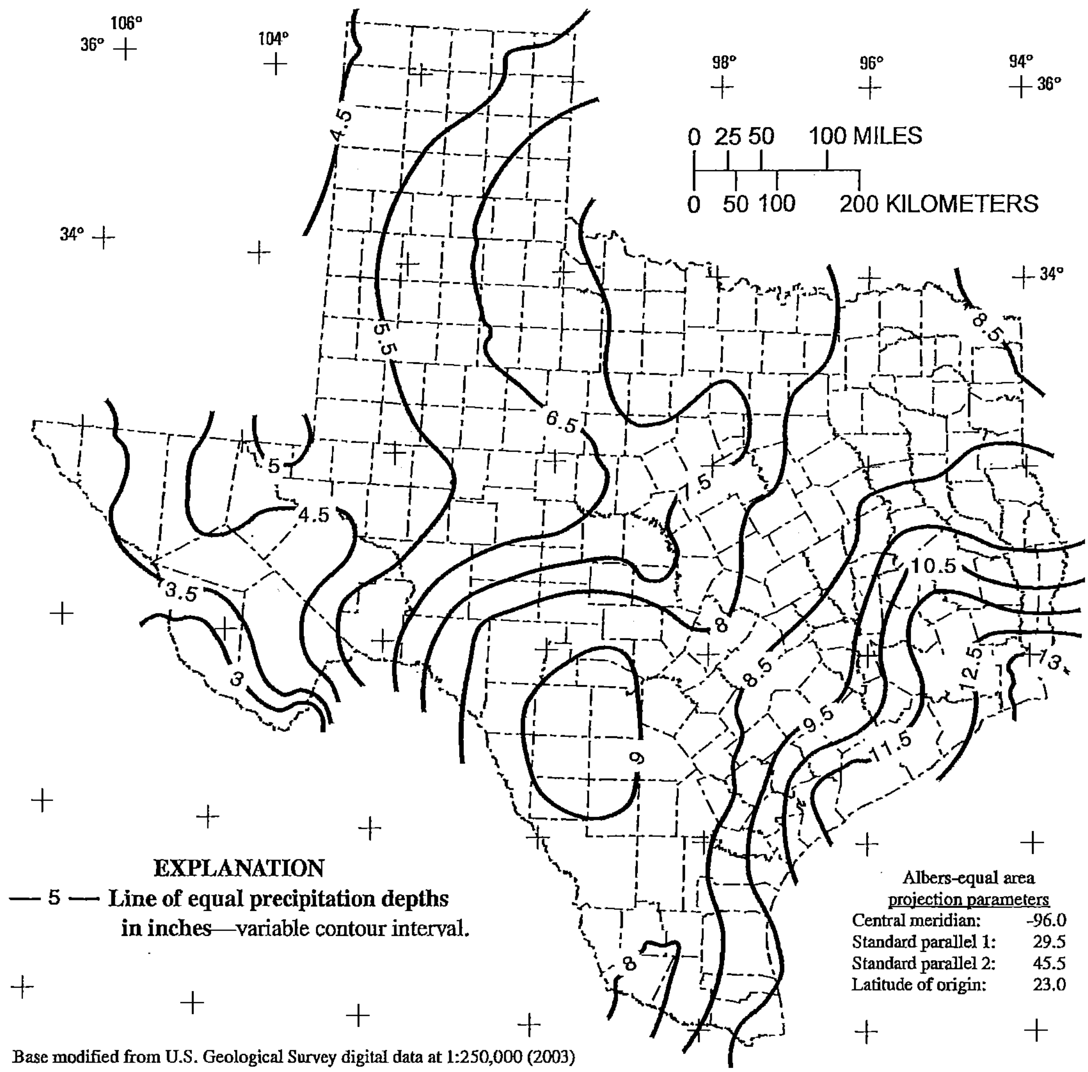


Figure 70. Depth of precipitation for 100-year storm for 12-hour duration in Texas.

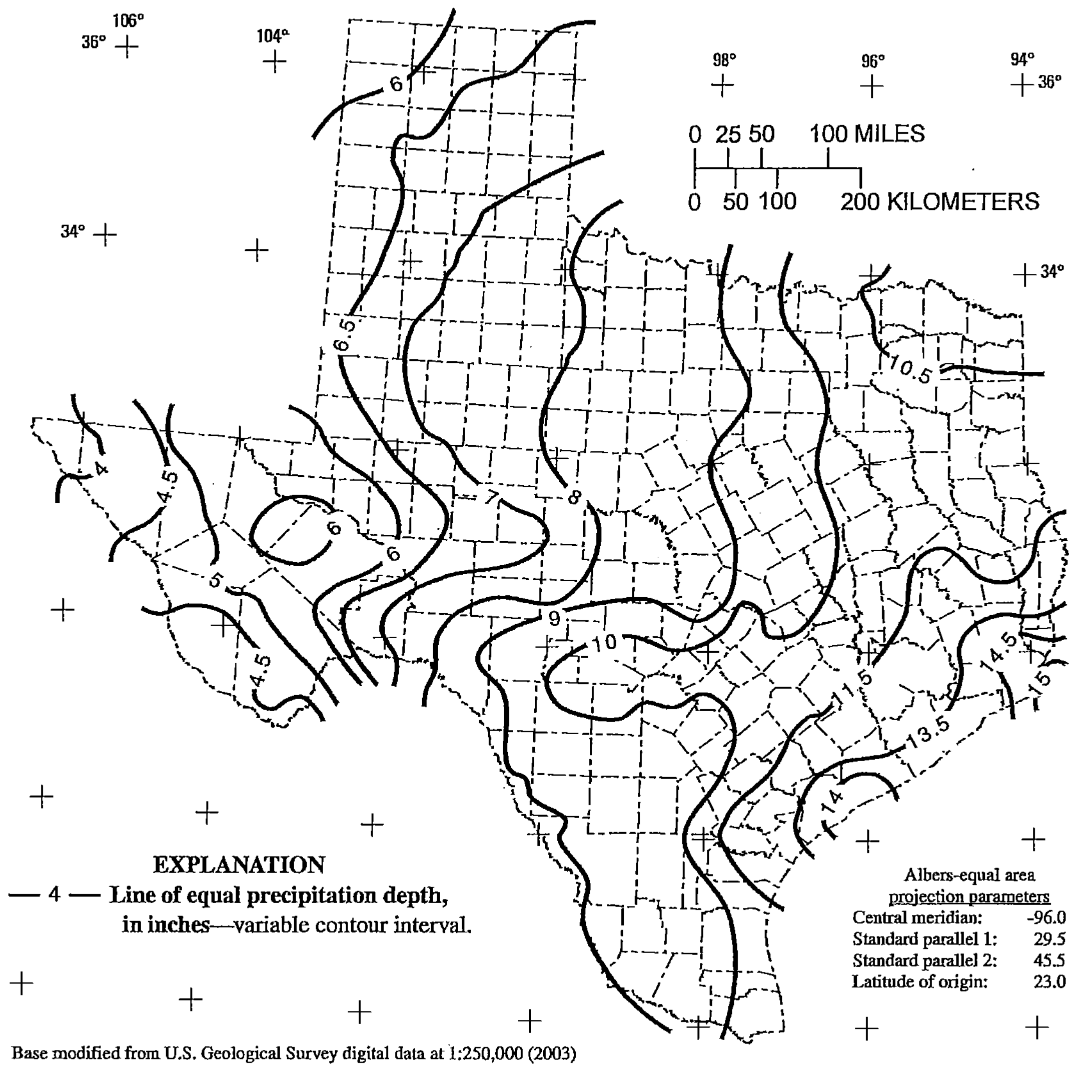


Figure 71. Depth of precipitation for 100-year storm for 1-day duration in Texas.

Appendix 6E: Floodplain Correspondence

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Laredo Webb County Texas COMMUNITY NO.: 480651	FILL	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
IDENTIFIER	Laredo Landfill	APPROXIMATE LATITUDE AND LONGITUDE: 27.490, -99.403 SOURCE: Precision Mapping Streets DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 48479C1220 C DATE: April 2, 2008 TYPE: FIRM* NO.: 48479C1385 C DATE: April 2, 2008	NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map

FLOODING SOURCE AND REVISED REACH

Tex-Mex Tributary - Just upstream of Highway 359 to approximately 7,500 feet upstream of Highway 359

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Tex-Mex Tributary	Zone A	Zone A	YES	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 481059 **Name:** Webb County, Texas

AFFECTED MAP PANELS	AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: NO.: 48479C1220 C DATE: April 2, 2008 TYPE: NO.: 48479C1385 C DATE: April 2, 2008	NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that any permits required by Federal or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This revision has met our criteria for removing an area from the 1-percent-annual-chance floodplain to reflect the placement of fill. However, we encourage you to require that the lowest adjacent grade and lowest floor (including basement) of any structure placed within the subject area be elevated to or above the Base (1-percent-annual-chance) Flood Elevation.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Frank Pagano
Director, Mitigation Division
Federal Emergency Management Agency, Region VI
Federal Regional Center, Room 206
800 North Loop 288
Denton, TX 76209
(940) 898-5127

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

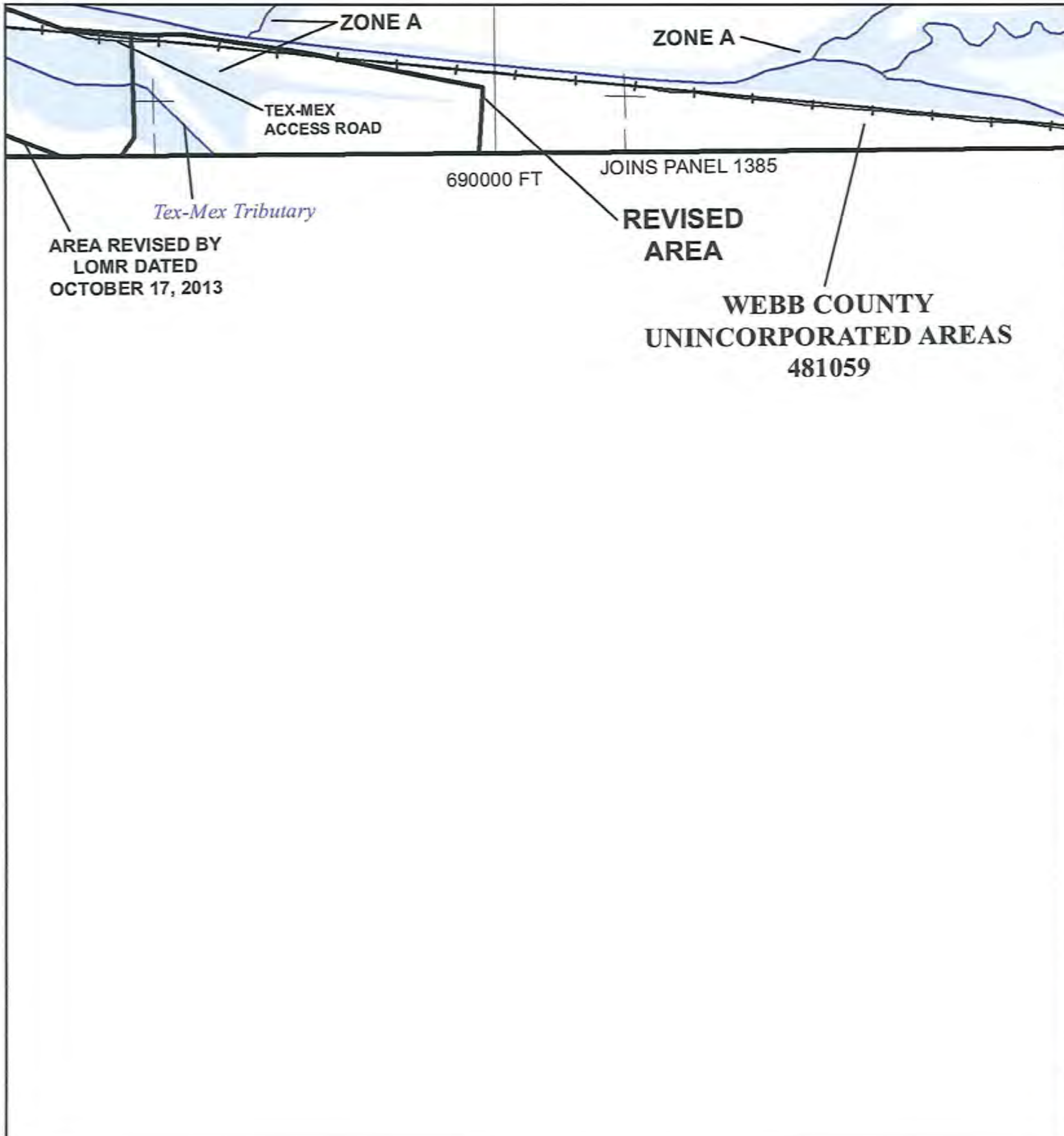
A notice of changes will be published in the Federal Register. This information also will be published in your local newspaper on or about the dates listed below and through FEMA's Flood Hazard Mapping Web site at https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp.

LOCAL NEWSPAPER Name: *Laredo Morning Times*
Dates: 02/26/2014 and 03/05/2014

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90 day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration



SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) *Zone A,V, A99*
		With BFE or Depth *Zone AE, AO, AH, VE, AR*
		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
OTHER AREAS OF FLOOD HAZARD		Future Conditions 1% Annual Chance Flood Hazard *Zone X*
		Area with Reduced Flood Risk due to Levee See Notes. *Zone X*

SCALE

Map Projection:
NAD 1983 StatePlane Texas Central FIPS 4203 Feet;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

WEBB COUNTY, TEXAS
and Incorporated Areas

PANEL **1220** OF **1700**

Panel Contains:

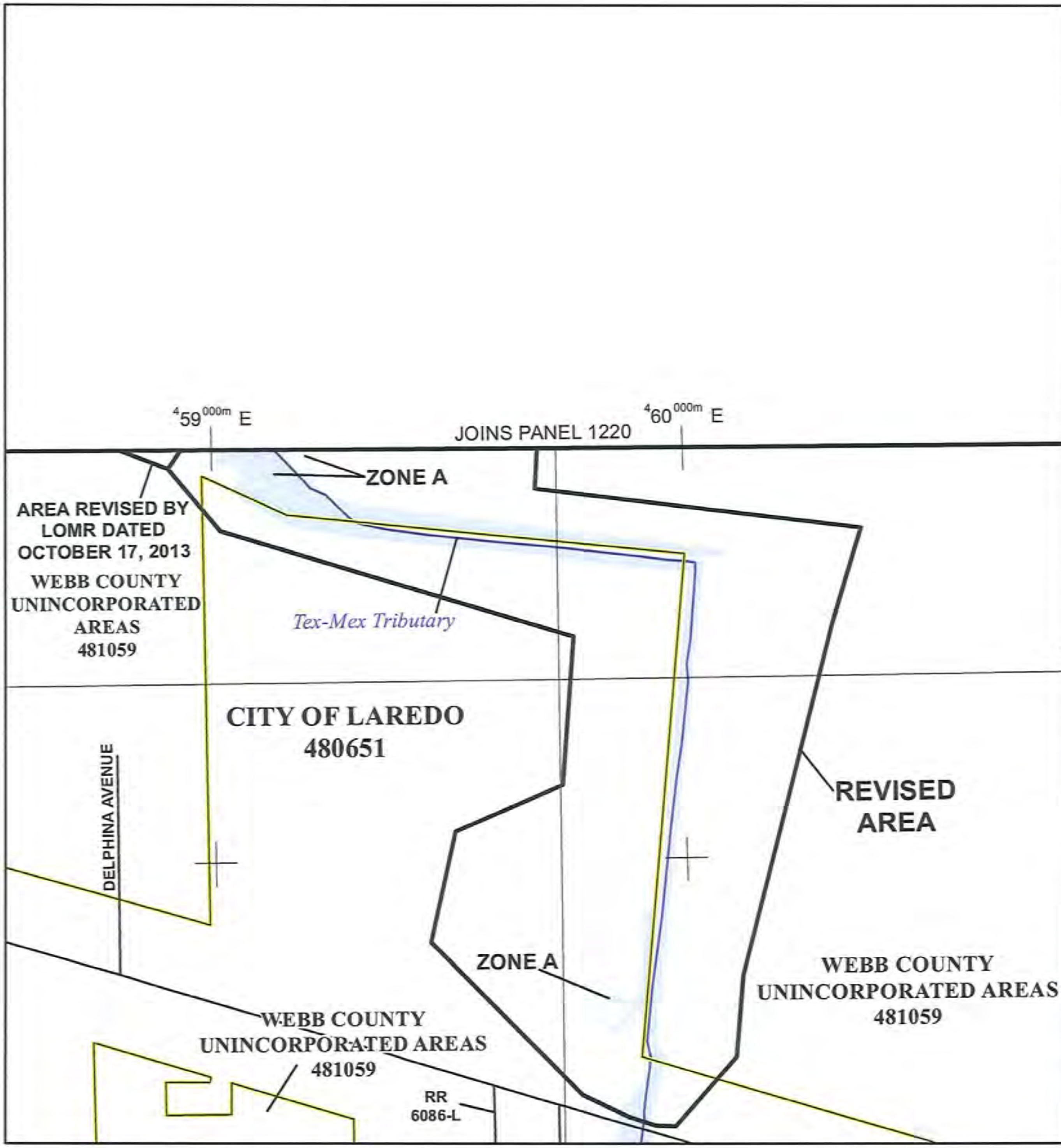
COMMUNITY	NUMBER	PANEL	SUFFIX
WEBB COUNTY	481059	1220	C
LAREDO, CITY OF	480651	1220	C

REVISED TO REFLECT LOMR EFFECTIVE:
July 3, 2014

VERSION NUMBER
2.3.2.0

MAP NUMBER
48479C1220C

MAP REVISED
APRIL 2, 2008



SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*

SCALE

N

Map Projection:
NAD 1983 StatePlane Texas Central FIPS 4203 Feet; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet — 1:12,000

0 — 500 — 1,000 — 2,000 Feet

0 — 125 — 250 — 500 Meters

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

WEBB COUNTY, TEXAS
and Incorporated Areas

PANEL **1385** OF **1700**

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
WEBB COUNTY	481059	1385	C
LAREDO, CITY OF	480651	1385	C

REVISED TO REFLECT LOMR EFFECTIVE: July 3, 2014

VERSION NUMBER
2.3.2.0

MAP NUMBER
48479C1385C

MAP REVISED
APRIL 2, 2008

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
Attachment 7
Final Contour Map

STATE OF TEXAS
STEVEN B. HENIFORD
66257
LICENSED
PROFESSIONAL ENGINEER

TX F-10098
9/17/14

LAREDO LANDFILL
PART III
Attachment 7
Final Contour Map

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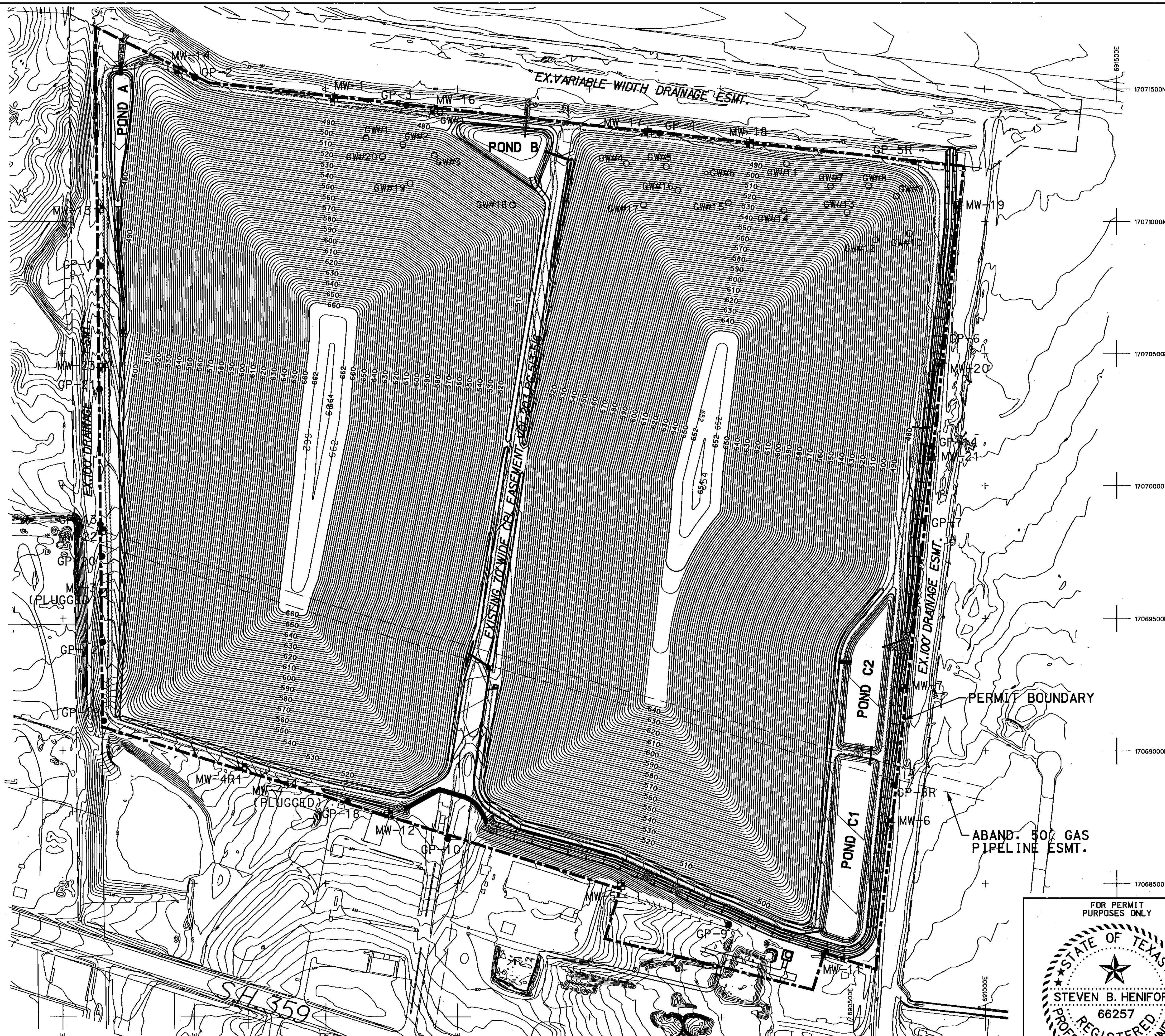
STATE OF TEXAS
STEVEN B. HENIFORD
66257
LICENSED
PROFESSIONAL ENGINEER

TX F-10098

9/17/14



LEGEND

- PERMIT BOUNDARY
- PHASE BOUNDARY
- CELL BOUNDARY
- 640 — 10' CONTOUR
- 2' CONTOUR
- EXISTING GAS PROBE
- EXISTING GAS WELL
- EXISTING GROUNDWATER MONITOR WELL
- PLUGGED & ABANDONED GROUNDWATER MONITOR WELL
- STATE PLANE COORDINATES (691500E, 17071500N)

AZ&B ARREDONDO, ZEPEDA & BRUNZ, LLC
TBPE FIRM REG. # F-10098
CIVIL · ENVIRONMENTAL · SURVEYING
CONSTRUCTION MANAGEMENT · MUNICIPAL

FOR PERMIT PURPOSES ONLY

STATE OF TEXAS
STEVEN B. HENIFORD
66257
REGISTERED PROFESSIONAL ENGINEER
9/17/14

REV	DATE	DESCRIPTION	DES BY	APP BY

CITY PROJ. No.	LAREDO LANDFILL VERTICAL EXPANSION PERMIT AMENDMENT APPLICATION No. MSW-1693B WEBB COUNTY, TEXAS
AZB PROJ. No. 212029	
DATE: AUGUST 2014	
DES BY SH	FINAL CONTOUR MAP FIGURE III-7.1
DRN BY AZB	
CHK BY SH	
APP BY MC	

CITY OF LAREDO

SHEET OF
FILE:
ATTACHMENT: III-7

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
Attachment 8
Closure and Post-Closure Cost Estimate

LAREDO LANDFILL
PART III
Attachment 8
Closure and Post-Closure Cost Estimate

Please refer to III.12 and III.13.

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
Attachment 9
Applicant's Statement

LAREDO LANDFILL
PART III
Attachment 9
Applicant's Statement

Please refer to Part I.