



APPENDICES



APPENDIX A FLOOD PLAIN STUDY, FEBRUARY 2004

APPENDIX 2.4.1 FLOOD PLAIN STUDY



ATTACHMENT II.F.

FLOOD PLAIN STUDY

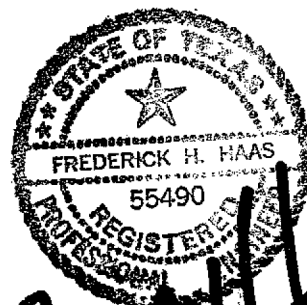
**FEBRUARY 2004
(REVISED DECEMBER 2004
AND MARCH 2006)**

Prepared for:

**Waste Control Specialists LLC
Andrews, Texas**

Prepared by:

**Frederick H. Haas, P.E.
812 West Eleventh Street
Austin, Texas 78701**



This document is issued for interim review purposes only.

Handwritten signature and date: 3/31/06

Frederick H. Haas, P.E., No. 55490

TABLE OF CONTENTS

SECTION	PAGE
1.0 INTRODUCTION	1-1
2.0 DESCRIPTION OF WATERSHED	2-1
3.0 DESCRIPTION OF HYDROLOGIC ANALYSIS	3-1
4.0 DESCRIPTION OF HYDRAULIC ANALYSIS.....	4-1
5.0 SUMMARY OF RESULTS.....	5-1
6.0 IMPACT OF DEVELOPMENT OF THE LOW LEVEL AND BYPRODUCT FACILITY ON THE FLOODPLAIN	6-1
7.0 IMPACT OF CHANGES IN ANTECEDENT MOISTURE CONDITION ON THE FLOODPLAIN	7-1

LIST OF TABLES

TABLE

II.F.1	100-YEAR PEAK DISCHARGE
II.F.2	100-YEAR WATER SURFACE ELEVATIONS
II.F.3	500-YEAR AND PMP PEAK DISCHARGE
II.F.4	500-YEAR WATER SURFACE ELEVATIONS
II.F.5	PMP WATER SURFACE ELEVATIONS
II.F.6	DEVELOPED LOW LEVEL & BYPRODUCT FACILITY 100-YEAR PEAK DISCHARGE
II.F.7	DEVELOPED LOW LEVEL & BYPRODUCT FACILITY 100-YEAR WATER SURFACE ELEVATIONS
II.F.8	DEVELOPED LOW LEVEL & BYPRODUCT FACILITY 500-YEAR AND PMP PEAK DISCHARGE
II.F.9	DEVELOPED LOW LEVEL & BYPRODUCT FACILITY 500-YEAR WATER SURFACE ELEVATIONS
II.F.10	DEVELOPED LOW LEVEL & BYPRODUCT FACILITY PMP WATER SURFACE ELEVATIONS
II.F.11	100-YEAR PEAK DISCHARGE, ANTECEDENT MOISTURE CONDITION II
II.F.12	100-YEAR WATER SURFACE ELEVATIONS, ANTECEDENT MOISTURE CONDITION II
II.F.13	500-YEAR AND PMP PEAK DISCHARGE, ANTECEDENT MOISTURE CONDITION II
II.F.14	500-YEAR WATER SURFACE ELEVATIONS, ANTECEDENT MOISTURE CONDITION II
II.F.15	PMP WATER SURFACE ELEVATIONS, ANTECEDENT MOISTURE CONDITION II
II.F.16	100-YEAR PEAK DISCHARGE, ANTECEDENT MOISTURE CONDITION III
II.F.17	100-YEAR WATER SURFACE ELEVATIONS, ANTECEDENT MOISTURE CONDITION III
II.F.18	500-YEAR AND PMP PEAK DISCHARGE, ANTECEDENT MOISTURE CONDITION III

LIST OF TABLES - continued

TABLE

II.F.19 500-YEAR WATER SURFACE ELEVATIONS, ANTECEDENT MOISTURE CONDITION
III

II.F.20 PMP WATER SURFACE ELEVATIONS, ANTECEDENT MOISTURE CONDITION III

LIST OF FIGURES

FIGURE

II.F.1 DRAINAGE AREA MAP

II.F.2 SOILS MAP

II.F.3 PHOTOGRAPHS

II.F.4 FLOODPLAIN MAP

II.F.5 DEVELOPED LOW LEVEL & BYPRODUCT FACILITY DRAINAGE AREA MAP

II.F.6 DEVELOPED LOW LEVEL & BYPRODUCT FACILITY SOILS MAP

LIST OF APPENDICES

APPENDIX

- A DRAINAGE CALCULATIONS
- B HEC-HMS MODEL FOR THE CALCULATION OF THE 100-YEAR PEAK DISCHARGES
- C HEC-RAS MODEL FOR THE CALCULATION OF THE 100-YEAR WATER SURFACE PROFILE
- D HEC-HMS MODEL FOR THE CALCULATION OF THE 500-YEAR PEAK DISCHARGES
- E HEC-HMS MODEL FOR THE CALCULATION OF THE PMP PEAK DISCHARGES
- F HEC-RAS MODEL FOR THE CALCULATION OF THE 500-YEAR AND PMP WATER SURFACE PROFILES
- G HEC-HMS MODEL FOR THE CALCULATION OF THE DEVELOPED LOW LEVEL & BYPRODUCT FACILITY 100-YEAR PEAK DISCHARGES
- H HEC-RAS MODEL FOR THE CALCULATION OF THE DEVELOPED LOW LEVEL & BYPRODUCT FACILITY 100-YEAR WATER SURFACE PROFILES
- I HEC-HMS MODEL FOR THE CALCULATION OF THE DEVELOPED LOW LEVEL & BYPRODUCT FACILITY 500-YEAR PEAK DISCHARGES
- J HEC-HMS MODEL FOR THE CALCULATION OF THE DEVELOPED LOW LEVEL & BYPRODUCT FACILITY PMP PEAK DISCHARGES
- K HEC-RAS MODEL FOR THE CALCULATION OF THE DEVELOPED LOW LEVEL & BYPRODUCT FACILITY 500-YEAR AND PMP WATER SURFACE PROFILES
- L HEC-HMS 100-YEAR MODEL FOR THE CALCULATION OF THE 100-YEAR PEAK DISCHARGE, ANTECEDENT MOISTURE CONDITION II
- M HEC-RAS MODEL FOR THE CALCULATION OF THE 100-YEAR WATER SURFACE PROFILE, ANTECEDENT MOISTURE CONDITION II
- N HEC-RAS MODEL FOR THE CALCULATION OF THE 500-YEAR WATER SURFACE PROFILE, ANTECEDENT MOISTURE CONDITION II
- O HEC-HMS MODEL FOR THE CALCULATION OF THE PMP PEAK DISCHARGE, ANTECEDENT MOISTURE CONDITION II
- P HEC-RAS MODEL FOR THE CALCULATION OF THE 500-YEAR AND PMP WATER SURFACE PROFILES, ANTECEDENT MOISTURE CONDITION II

LIST OF APPENDICES - continued

APPENDIX

- Q HEC-HMS MODEL FOR THE CALCULATION OF THE 100-YEAR PEAK DISCHARGE, ANTECEDENT MOISTURE CONDITION III
- R HEC-RAS MODEL FOR THE CALCULATION OF THE 100-YEAR WATER SURFACE PROFILE, ANTECEDENT MOISTURE CONDITION III
- S HEC-HMS MODEL FOR THE CALCULATION OF THE 500-YEAR PEAK DISCHARGE, ANTECEDENT MOISTURE CONDITION III
- T HEC-HMS MODEL FOR THE CALCULATION OF THE PMP PEAK DISCHARGE, ANTECEDENT MOISTURE CONDITION III
- U HEC-RAS MODEL FOR THE CALCULATION OF THE 500-YEAR AND PMP WATER SURFACE PROFILES, ANTECEDENT MOISTURE CONDITION III



1.0 INTRODUCTION

The following report presents the results of a hydrologic and hydraulic analysis for Waste Control Specialist LLC (WCS) Andrews County, Texas Facility. This report is prepared in support of the licensing and permitting activities at the WCS facility. In accordance with applicable requirements, this analysis identifies the location of the 100-year floodplain to determine its location with respect to the facility. There are no maps of special flood hazard areas for this location published by the Federal Emergency Management Agency (FEMA). This analysis also identifies the location of the floodplain resulting from the 500-year frequency storm event and the Probable Maximum Precipitation (PMP).

This report includes the following items.

- Description of watershed
- Description of hydrologic analysis
- Description of hydraulic analysis
- Summary of Results



2.0 DESCRIPTION OF WATERSHED

There is a draw that crosses the southern portion of the facility. This draw crosses the facility north of the RCRA permit boundary and south of the process area. The draw flows from east to west across the facility. The draw crosses under the access road west of the facility through six (6) - 29 inches by 18 inches corrugated metal pipe-arch culverts. The draw continues south and west downstream and crosses under State Highway 176 through two (2) - 43 inches by 27 inches corrugated metal pipe-arch culverts. After crossing the state highway the draw continues to the west and south downstream and ultimately drains into Monument Draw.

The contributing watershed to the draw that crosses the facility contains about 1350 acres (2.1 square miles). This contributing watershed is divided into six (6) sub areas (Drainage Areas 1A, 1B, 3, 4, 5A, & 5B) to model the runoff into the draw within the facility. There is another drainage area (Drainage Area 6) downstream of the access road that contributes runoff to the reach of the draw between the access road and the state highway. There is also a drainage area (Drainage Area 7) adjacent to State Highway 176 that crosses the access road through an 18 inches diameter corrugated metal pipe. This area contributes runoff to the two (2) - 43 inches by 27 inches corrugated metal pipe-arch culverts under State Highway 176.

There is a playa/depression in the area near the northeast corner of the facility. The contributing watershed (Drainage Area 2) that drains into this depression contains about 680 acres (1.1 square miles). This watershed was modeled to determine if the runoff is contained within the depression or if there is an overflow that contributes runoff to the draw that crosses the facility. The results indicate that Drainage Area 2 does not discharge from the playa/depression during the 100 and 500-year frequency storm events.

The Drainage Area Map is included as Figure II.F.1.

The watershed is characterized by gently rolling terrain with slopes ranging from about one-half percent (0.5%) to about four and a half percent (4.5%). The average slope in the watershed is about one percent (1%). The land is mostly undeveloped except for the facility and the highway. The cover type is desert shrub. The hydrologic condition of the cover ranges from fair in the southern portion of the watershed to poor in the northern portion of the watershed.



The watershed is located in Andrews County. The *Soil Survey of Andrews County Texas*, prepared by the USDA, Soil Conservation Service (SCS) shows the watershed contains soils from the Blakeney, Faskin, Ima, Jalmar, Kimbrough, Ratliff, and Triomas series. These soils are classified with the hydrologic groups A, B and C. Group A soils have high infiltration and transmission rates. Group B soils have moderate infiltration and transmission rates. Group C soils have low infiltration and transmission rates. The soils map is included as Figure II.F.2. Please note that the SCS has changed its name since the publication of this document to the National Resources Conservation Service (NRCS).

3.0 DESCRIPTION OF HYDROLOGIC ANALYSIS

The watershed runoff is modeled using the U.S. Army Corps of Engineers Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS), version 2.2.1. The existing 100-year and 500-year storm events and the PMP are the only conditions modeled.

The rainfall amount for the 100-year frequency storm event is taken from the U.S. Weather Bureau, Technical Paper 40, (TP-40). A 24-hour storm duration is used. The 100-year 24-hour rainfall amount from TP-40 for this facility is six (6) inches. An SCS type II rainfall distribution is used.

The rainfall amount for the 500-year frequency storm event is calculated based on the procedure in *Depth-Duration Frequency of Precipitation for Texas, Water Resources Investigations Report 98-4044*, W.H. Asquith, U.S. Geological Survey, 1998. The General Logistic (GLO) Distribution Equation is used to determine the precipitation depth for the 500-year storm event. The parameter, K , in the GLO distribution is a shape parameter. It is estimated to be between -0.20 and -0.22 for the 24-hour storm event. The shape parameter, K , estimate of -0.20 results in the 500-year 24-hour rainfall amount for this facility of 8.71 inches. The shape parameter, K , estimate of -0.22 results in the 500-year 24-hour rainfall amount for this facility of 9.24 inches. Each of these precipitation amounts is input into the HEC-HMS model. The results of the HEC-HMS model are input into HEC-RAS to determine the sensitivity of the 500-year water surface elevation to the shape parameter, K . The water surface elevations change less than one inch (from 0.48 inches to 0.96 inches). Therefore, the value of the shape parameter, K , does not have a significant impact on the resulting 500-year water surface elevation. Based on the information in the reference, the shape parameter, K , is estimated to be closer to -0.20 than -0.22 . A 24-hour storm duration is used. The 500-year 24-hour rainfall amount for this facility is 8.71 inches. An SCS type II rainfall distribution is used. Both the HEC-HMS model results from the sensitivity analysis for the shape parameter, K , are included in Appendix D. Both the HEC-RAS model results from the sensitivity analysis for the shape parameter, K , are included in Appendix F.

The rainfall amount for the Probable Maximum Precipitation (PMP) is calculated based on the procedure in *Hydrometeorological Report No. 51, Probable Maximum Precipitation Estimates*,

United States East of the 105th Meridian, Schreiner and Riedel, National Weather Service. A 72-hour storm duration is used. The rainfall is distributed based on the procedure outlined in *Hydrometeorological Report No. 52, Application of Probable Maximum Precipitation Estimates – United States East of the 105th Meridian*, Hansen, Schreiner and Miller, National Weather Service (HMR 52). Two temporal sequences are modeled to determine which distribution produces the greatest runoff. One temporal sequence conforms to Figure 3 from HMR 52 and the other conforms to the example provided in the stepwise procedure Section 7.1.E, HMR 52. The temporal sequence from Figure 3, HMR 52 provides the greatest runoff and the results from that model are included in this report.

The SCS dimensionless unit hydrograph method is used for this model. The method requires curve numbers to indicate the runoff potential of a hydrologic soil-cover complex and watershed lag to model watershed response.

The curve number is computed based on land use, cover type, hydrologic condition and soil group. A dry antecedent moisture condition (AMC I) is used to compute the curve number. The amount of precipitation occurring in the five days preceding the storm in question is an indication of the antecedent moisture condition of the soil. *Texas Engineering Technical Note, Hydrology, No. 210-18-TX5, Estimating Runoff for Conservation Practices*, Figure 1 shows the average condition runoff curve number in West Texas is AMC I. This publication also states that when an adjusted AMC results in a curve number less than 60 then a curve number of 60 will be selected as the minimally applicable number.

The curve number computed for Drainage Area 1A is 62. The curve number computed for Drainage Areas 1B, 2, 3, 4, 5A, 5B, 6 and 7 is 60.

The watershed lag is the time from the center of mass of excess rainfall to the time to peak for an SCS unit hydrograph. Lag is empirically estimated as six-tenths (0.6) of the time of concentration. The time of concentration is the time it takes for runoff to travel from the hydraulically most remote part of a watershed to a point of consideration. In hydrograph analysis it represents the time from the end of excess rainfall to the point of inflection of an SCS unit hydrograph. Time of concentration is computed by determining the travel times for different segments of the flow path. The segments consist of sheet flow, shallow concentrated flow and

concentrated flow. The sheet flow and shallow concentrated flow components are calculated using the equations from USDA SCS *Technical Release 55, Urban Hydrology for Small Watersheds*. Concentrated flow is calculated based on the flow velocity for the channel. Channel velocities are calculated using Manning's Equation or they are estimated based on the results of the hydraulic model.

The lag time for drainage area 1A is eighty-six (86) minutes. The lag time for drainage area 1B is forty-four (44) minutes. The lag time for drainage area 2 is sixty-five (65) minutes, but does not contribute to the runoff in the draw. The lag time for drainage area 3 is forty-four (44) minutes. The lag time for drainage area 4 is thirty-nine (39) minutes. The lag time for drainage area 5A is thirty-eight (38) minutes. The lag time for drainage area 5B is fifty-three (53) minutes. The lag time for drainage area 6 is thirty (30) minutes. The lag time for drainage area 7 is sixty-four (64) minutes.

Hydrographs are routed through the stream reaches using the Lag model. The Lag model simply translates the hydrograph ordinates by a specified duration. The travel times are estimated using the velocities from the results of the hydraulic model or by calculating the velocity using Manning's Equation. The lag for Reach 1 is thirty-five (35) minutes. The lag for Reach 1A is seventeen (17) minutes. The lag for Reach 1B is three (3) minutes. The lag for Reach 2 is fifteen (15) minutes. The lag for Reach 3 is seventeen (17) minutes. The lag for Reach 4 is twenty-one (21) minutes. The lag for Reach 5 is fourteen (14) minutes. The lag for Reach 6 is zero (0) minutes.

Storage, elevation, and outflow curves are developed for the playa/depression to determine the effect of the storage on the runoff from the area.

Calculations for the parameters used in the HEC-HMS model are included in the Drainage Calculations, Appendix A.



4.0 DESCRIPTION OF HYDRAULIC ANALYSIS

The water surface elevations are determined using the U.S. Army Corps of Engineers Hydrologic Engineering Center's River Analysis System (HEC-RAS), version 3.0.1.

Cross sections for the model are taken from an Aerial Survey Map prepared by Cooper Aerial Surveys Co. This information is supplemented with ground elevations taken from a field survey by West Texas Consultants, Inc. This topographic information is then used to estimate the location of the 100-year, 500-year, and PMP water surfaces through the facility.

The starting station for the model is at the inlet to the culverts under State Highway 176 downstream of the facility. This is about 1700 feet downstream of the access road. Additional sections are located in this downstream reach to determine the sensitivity of the model to the downstream water surface elevation. Different starting water surface elevations are input to determine any impact on the 100-year water surface within the facility. The top of the Highway is greater than elevation 3405 based on information provided for the flow line elevation and the size of the existing culverts. The starting water surface elevations range from 3404.5 to 3407 msl. The water surface elevations within the facility are the same regardless of the starting water surface elevation. The elevation of the 100-year water surface at the RCRA permit line where the floodplain exits the facility (Section 2989) is 3414.32. The elevation of the 500-year water surface at the RCRA permit line is 3414.57. The elevation of the PMP water surface at the RCRA permit line is 3415.54.

The Manning's n value for the draw and overbanks is 0.033 based on an earth channel with minor irregularity and low vegetation. There is no difference in the material or vegetation for the draw or its overbanks. Photographs of six (6) - 29 inches by 18 inches corrugated metal pipe-arch culverts under the access road and a representative section of the draw are included as Figure II.F.3.

Calculations for the parameters used in the HEC-RAS model are included in the Drainage Calculations, Appendix A.



5.0 SUMMARY OF RESULTS

The 100-year peak discharges for each drainage area as determined by the HEC-HMS model are shown in Table II.F.1. The HEC-HMS model for the calculation of the 100-year peak discharges for each drainage area is included in Appendix B.

The 100-year peak discharge at the access road is about 790 cubic feet per second. The playa/depression contains all the runoff from drainage area 2.

The 100-year water surface elevations through the facility as determined by HEC-RAS are shown in Table II.F.2. The HEC-RAS model for the calculation of the water surface profile is included in Appendix C. The limits of the 100-year floodplain based on the topographic information provided and the location of the cross-sections are shown on Figure II.F.4, Floodplain Map.

The 100-year peak discharge flows over the access road at the six (6) - 29 inches by 18 inches corrugated metal pipe-arch culverts. The maximum depth of flow over the road during the 100-year storm event is about one (1) foot.

The 100-year floodplain of the draw is generally characterized as shallow and wide. The maximum depths of flow in the sections through the facility range from less than one half (0.5) of a foot to less than two (2) feet. The average maximum depth in the sections through the facility is about one (1) foot. The width of the floodplain ranges from about one hundred (100) feet to about seven hundred and fifty (750) feet. The average width of the floodplain through the facility is about three hundred and fifty (350) feet. The velocity of flow for the 100-year storm event within the draw through the facility is less than about four (4) feet per second.

The 500-year peak discharges for each drainage area as determined by the HEC-HMS model are shown in Table II.F.3. The HEC-HMS model for the calculation of the 500-year peak discharges for each drainage area is included in Appendix D.

The 500-year water surface elevations through the facility as determined by HEC-RAS are shown in Table II.F.4. The HEC-RAS model for the calculation of the water surface profile is



included in Appendix F. The limits of the 500-year floodplain based on the topographic information provided and the location of the cross-sections are shown on Figure II.F.4, Floodplain Map.

The PMP peak discharges for each drainage area as determined by the HEC-HMS model are shown in Table II.F.3. The HEC-HMS model for the calculation of the PMP peak discharges for each drainage area is included in Appendix E.

The PMP water surface elevations through the facility as determined by HEC-RAS are shown in Table II.F.5. The HEC-RAS model for the calculation of the water surface profile is included in Appendix F. The limits of the PMP floodplain based on the topographic information provided and the location of the cross-sections are shown on Figure II.F.4, Floodplain Map.



6.0 IMPACT OF DEVELOPMENT OF THE LOW LEVEL AND BYPRODUCT FACILITY ON THE FLOODPLAIN

There is a temporary diversion ditch (Primary Ditch) north of the Low Level and Byproduct Facility. This ditch intercepts rainfall runoff from the north and directs it around the facility. As a result, a total of about 96 acres of the runoff from drainage areas 4 and 3 are diverted into drainage area 1. The impact of this diversion is modeled as described previously.

Runoff is modeled for the 100-year and 500-year storm events and the PMP using HEC-HMS. These models are changed to reflect the presence of the diversion ditch. It is assumed that all the possible runoff from each storm event is captured and diverted by the ditch. This is a conservative assumption since the maximum amount of runoff diverted will produce the greatest difference in the floodplain (i.e. if the diversion ditch does not convey the runoff then the floodplain remains as calculated previously). Drainage areas, lag times, curve numbers, and routing through stream reaches are adjusted as necessary. The Developed Low Level & Byproduct Facility Drainage Area Map is included as Figure II.F.5. Table II.F.6 summarizes the 100-year peak discharge. Results of the 100-year HEC-HMS model for the Developed Low Level & Byproduct Facility are included in Appendix G. Results of the 500-year HEC-HMS model for the Developed Low Level & Byproduct Facility are included in Appendix I. Results of the PMP HEC-HMS model for the Developed Low Level & Byproduct Facility are included in Appendix J. Table II.F.8 summarizes the 500-year and PMP peak discharges.

Water surface profiles are modeled for the 100-year and 500-year storm events and the PMP using HEC-RAS. The flowrate for these models is changed to reflect the runoff calculated by the HEC-HMS models. Table II.F.7 summarizes the 100-year water surface elevations. The results of the HEC-RAS model for 100-year storm with the Developed Low Level & Byproduct Facility in operation are included in Appendix H. The results of the HEC-RAS model for 500-year storm and PMP with the Developed Low Level & Byproduct Facility in operation are included in Appendix K. Table II.F.9 summarizes the 500-year water surface elevations. Table II.F.10 summarizes the PMP water surface elevations.

The water surface elevation increases by a maximum of less than one inch between sections 9690 and 8130 (about 1600 feet) for the 100-year storm event. The remaining water surface



elevations are about the same for the 9700-foot long floodplain reach through the site. The water surface elevation increases by a maximum of less than one and one half inches between sections 9690 and 8130 (about 1600 feet) for the 500-year storm event. The remaining water surface elevations are about the same for the 9700-foot long floodplain reach through the site. The water surface elevation increase ranges from five and four tenths and eight and one half inches between sections 9690 and 7717 (about 2000 feet) for the PMP. The remaining water surface elevations are about the same for the 9700-foot long floodplain reach through the site.

There are no structures in the vicinity of the floodplain that are affected by this minor increase in the water surface elevation that occurs over a small reach of the floodplain. Furthermore, the diversion ditch is temporary. It will direct water around the Low Level and Byproduct Facility during the operation of the facility. The diversion ditch will be filled in and the natural drainage patterns will be restored after the final grades are restored to the facility.

In conclusion, the impact of the diversion of runoff from the north around the Low Level and Byproduct Facility is insignificant in the magnitude of the increase in water surface elevation, limited in length of affected reach, and it is temporary.



7.0 IMPACT OF CHANGES IN ANTECEDENT MOISTURE CONDITION ON THE FLOODPLAIN

The floodplain determined as discussed in Sections 1.0 through 5.0 of this report and depicted on Figure II.F.4, Floodplain Map, is the current floodplain for the draw that crosses the southern portion of the facility. It is also the floodplain for the draw for the foreseeable future assuming there are no improvements to the floodplain. If there are some unforeseen climatic changes that occur in the distant future that also changes the climate of west Texas from semi-arid to tropical or wet, then the antecedent moisture condition of the soil will also change. The antecedent moisture condition of the soil is indicated by the amount of precipitation occurring in the five days preceding the storm in question. As discussed in Section 3, Description of Hydrologic Analysis, AMC I is the average condition runoff curve number in west Texas. Curve numbers based on AMC II and AMC III are modeled to determine the sensitivity of the floodplain to the Antecedent Moisture Condition of the soil. AMC I represents dry conditions, AMC II represents average moisture conditions, and AMC III represents a watershed that is practically saturated from antecedent rains.

The curve numbers for each drainage basin increase as the Antecedent Moisture Condition of the soil becomes wetter. As a result the runoff also increases. This increase in runoff becomes less significant as the magnitude of the storm increases. As the magnitude of the storm increases, the percentage of the direct runoff from rainfall increases so the affect of the curve number decreases.

The increase in water surface elevation for the 100-year storm event from AMC I to AMC II is an average of 0.28 feet (about three inches). This increase ranges from 0.2 feet to 0.36 feet. The increase in water surface elevation for the 100-year storm event from AMC I to AMC III is an average of 0.45 feet (about five inches). This increase ranges from 0.35 feet to 0.55 feet. The increase in water surface elevation for the 500-year storm event from AMC I to AMC II is an average of 0.25 feet (about three inches). This increase ranges from 0.2 feet to 0.31 feet. The increase in water surface elevation for the 500-year storm event from AMC I to AMC III is an average of 0.39 feet (about five inches). This increase ranges from 0.30 feet to 0.47 feet. The increase in water surface elevation for the PMP from AMC I to AMC II is an average of 0.05 feet (less than one inch). This increase ranges from 0.0 feet to 0.08 feet. The increase in water



surface elevation for the PMP from AMC I to AMC III is an average of 0.08 feet (less than one inch). This increase ranges from 0.0 feet to 0.15 feet.

The increase in the water surface elevation resulting from an increase in the Antecedent Moisture Condition of the soil will not impact the facility. The maximum increases are for the 100-year water surface profile and that is only about one-half of a foot. The increase in the water surface elevation resulting for an increase in the Antecedent Moisture Condition of the soil for the most extreme storm, the PMP, is less than two inches at its maximum. The existing ground around the Low Level and Byproduct Facility is at a minimum about twenty feet above the elevation of the PMP water surface in the area. Based on the location of the facility with respect to the floodplain these minor increases in water surface elevation resulting from increased Antecedent Moisture Condition of the soil are insignificant and will not impact the facility.

The 100-year peak discharge for Antecedent Moisture Condition II is shown in Table II.F.11. The 100-year water surface elevations for Antecedent Moisture Condition II are shown in Table II.F.12. The 500-year peak and PMP discharge for Antecedent Moisture Condition II is shown in Table II.F.13. The 500-year water surface elevations for Antecedent Moisture Condition II are shown in Table II.F.14. The PMP water surface elevations for Antecedent Moisture Condition II are shown in Table II.F.15. The 100-year peak discharge for Antecedent Moisture Condition III is shown in Table II.F.16. The 100-year water surface elevations for Antecedent Moisture Condition III are shown in Table II.F.17. The 500-year peak and PMP discharge for Antecedent Moisture Condition III is shown in Table II.F.18. The 500-year water surface elevations for Antecedent Moisture Condition III are shown in Table II.F.19. The PMP water surface elevations for Antecedent Moisture Condition III are shown in Table II.F.20.

The HEC-HMS model for the calculation of the 100-year peak discharges for Antecedent Moisture Condition II is included in Appendix L. The HEC-RAS model for the calculation of the 100-year water surface profile for Antecedent Moisture Condition II is included in Appendix M. The HEC-HMS model for the calculation of the 500-year peak discharges for Antecedent Moisture Condition II is included in Appendix N. The HEC-HMS model for the calculation of the PMP peak discharges for Antecedent Moisture Condition II is included in Appendix O. The



HEC-RAS model for the calculation of the 500-year and PMP water surface profiles for Antecedent Moisture Condition II are included in Appendix P. The HEC-HMS model for the calculation of the 100-year peak discharges for Antecedent Moisture Condition III is included in Appendix Q. The HEC-RAS model for the calculation of the 100-year water surface profile for Antecedent Moisture Condition III is included in Appendix R. The HEC-HMS model for the calculation of the 500-year peak discharges for Antecedent Moisture Condition III is included in Appendix S. The HEC-HMS model for the calculation of the PMP peak discharges for Antecedent Moisture Condition III is included in Appendix T. The HEC-RAS model for the calculation of the 500-year and PMP water surface profiles for Antecedent Moisture Condition III are included in Appendix U.



TABLES

Table II.F.1

100-Year Peak Discharge

Drainage Area/Junction	100 Year Flowrate (cfs)
Drainage Area 2	440
Playa/Depression	0
Drainage Area 1A	257
Junction 1A	325
Junction 1	364
Junction 2	687
Junction 3	790

Table II.F.2**100-Year Water Surface Elevations**

Section	100 Year Flowrate (cfs)	100 Year WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	257	3478.09	1.09	1.71	266.62
11337	257	3470.06	1.06	3.96	117.70
10937	257	3465.38	1.38	3.45	101.30
10288	257	3456.67	0.67	3.57	187.76
9690	325	3451.19	1.19	2.13	250.83
9009	325	3446.12	1.12	3.57	169.88
8130	325	3441.25	1.25	1.84	273.95
7717	325	3438.44	0.64	3.64	223.91
7253	364	3436.09	1.09	1.28	491.10
6343	687	3430.46	0.46	3.65	469.62
5363	687	3426.02	1.02	1.41	739.57
4221	790	3420.71	0.71	4.01	402.25
3489	790	3416.92	1.91	1.66	743.33
2989	790	3414.32	0.52	3.36	600.34

Table II.F.3

500-Year And PMP Peak Discharge

Drainage Area/Junction	500 Year Flowrate (cfs)	PMP Flowrate (cfs)
Drainage Area 2	949	2726
Playa/Depression	0	2194
Drainage Area 1A	533	1768
Junction 1A	677	2568
Junction 1	770	4793
Junction 2	1496	6409
Junction 3	1717	6969

Table II.F.4**500-Year Water Surface Elevations**

Section	500 Year Flowrate (cfs)	500 Year WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	533	3478.39	1.39	2.31	306.92
11337	533	3470.41	1.41	5.03	132.24
10937	533	3465.80	1.80	4.31	130.37
10288	533	3456.93	0.93	4.13	250.47
9690	677	3451.55	1.55	2.64	325.16
9009	677	3446.51	1.51	3.89	252.56
8130	677	3441.63	1.63	2.28	355.10
7717	677	3438.71	0.91	4.26	284.67
7253	770	3436.41	1.41	1.75	523.18
6343	1496	3430.75	0.75	4.53	524.36
5363	1496	3426.40	1.40	1.94	851.92
4221	1717	3421.06	1.06	4.81	517.17
3489	1717	3417.25	2.25	2.14	1002.71
2989	1717	3414.57	0.77	4.34	629.71

Table II.F.5**PMP-Year Water Surface Elevations**

Section	PMP Flowrate (cfs)	PMP WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	1768	3479.22	2.22	3.61	417.81
11337	1768	3471.40	2.40	7.37	173.86
10937	1768	3466.73	2.73	6.57	197.71
10288	1768	3457.50	1.50	5.03	466.54
9690	2568	3452.40	2.40	4.32	473.42
9009	2568	3447.55	2.55	4.66	472.01
8130	2568	3442.51	2.51	3.85	498.79
7717	2568	3439.61	1.81	5.19	449.87
7253	4793	3437.73	2.73	4.15	656.51
6343	6409	3431.79	1.79	6.69	787.68
5363	6409	3427.60	2.60	3.49	1207.27
4221	6969	3422.09	2.09	6.36	1009.59
3489	6969	3418.33	3.33	3.59	1076.90
2989	6969	3415.54	1.74	6.56	879.23

Table II.F.6

**Developed Low-Level and Byproduct Facility
100-Year Peak Discharge**

Drainage Area/Junction	100 Year Flowrate (cfs)
Drainage Area 2	440
Playa/Depression	0
Drainage Area 1A	257
Junction 1A	385
Junction 1	406
Junction 2	679
Junction 3	770

Table II.F.7
Developed Low-Level and Byproduct Facility
100-Year Water Surface Elevations

Section	100 Year Flowrate (cfs)	100 Year WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	257	3478.09	1.09	1.71	266.62
11337	257	3470.06	1.06	3.96	117.70
10937	257	3465.38	1.38	3.45	101.30
10288	257	3456.67	0.67	3.57	187.76
9690	385	3451.27	1.27	2.23	266.72
9009	385	3446.20	1.20	3.65	186.98
8130	385	3441.33	1.33	1.93	291.13
7717	385	3438.49	0.69	3.79	235.89
7253	406	3436.11	1.10	1.39	492.58
6343	679	3430.47	0.46	3.60	469.90
5363	679	3426.01	1.01	1.41	737.55
4221	770	3420.70	0.70	3.99	399.36
3489	770	3416.90	1.90	1.64	739.55
2989	770	3414.31	0.51	3.33	599.61

Table II.F.8
Developed Low-Level and Byproduct Facility
500-Year And PMP Peak Discharge

Drainage Area/Junction	500 Year Flowrate (cfs)	PMP Flowrate (cfs)
Drainage Area 2	949	2726
Playa/Depression	0	2194
Drainage Area 1A	533	1768
Junction 1A	828	4796
Junction 1	872	4942
Junction 2	1470	6399
Junction 3	1668	6955

Table II.F.9

**Developed Low-Level and Byproduct Facility
500-Year Water Surface Elevations**

Section	500 Year Flowrate (cfs)	500 Year WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	533	3478.39	1.39	2.31	306.92
11337	533	3470.41	1.41	5.03	132.24
10937	533	3465.80	1.80	4.31	130.37
10288	533	3456.93	0.93	4.13	250.47
9690	828	3451.67	1.67	2.79	349.80
9009	828	3446.63	1.63	4.04	277.44
8130	828	3441.76	1.76	2.41	382.07
7717	828	3438.80	1.00	4.48	304.12
7253	872	3436.44	1.44	1.91	526.19
6343	1470	3430.74	0.74	4.51	522.87
5363	1470	3426.38	1.38	1.93	847.50
4221	1668	3421.05	1.05	4.76	511.16
3489	1668	3417.23	2.23	2.12	1001.82
2989	1668	3414.56	0.76	4.28	628.05

Table II.F.10**Developed Low-Level and Byproduct Facility
PMP - Water Surface Elevations**

Section	PMP Flowrate (cfs)	PMP WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	1768	3479.22	2.22	3.61	417.81
11337	1768	3471.40	2.40	7.37	173.86
10937	1768	3466.73	2.73	6.57	197.71
10288	1768	3457.50	1.50	5.03	466.54
9690	4796	3453.03	3.03	5.43	560.63
9009	4796	3448.10	3.10	5.69	579.12
8130	4796	3443.22	3.22	4.75	590.61
7717	4796	3440.06	2.26	6.74	521.44
7253	4942	3437.75	2.75	4.24	658.36
6343	6399	3431.80	1.80	6.68	788.09
5363	6399	3427.59	2.59	3.49	1206.47
4221	6955	3422.09	2.09	6.35	1009.43
3489	6955	3418.33	3.33	3.58	1076.73
2989	6955	3415.53	1.73	6.56	878.78

Table II.F.11

**100-Year Peak Discharge
Antecedent Moisture Condition II**

Drainage Area/Junction	100 Year Flowrate (cfs)
Drainage Area 2	744
Playa/Depression	0
Drainage Area 1A	257
Junction 1A	611
Junction 1	697
Junction 2	1328
Junction 3	1500

Table II.F.12**100-Year Water Surface Elevations
Antecedent Moisture Condition II**

Section	100 Year Flowrate (cfs)	100 Year WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	488	3478.35	1.35	2.23	301.04
11337	488	3470.36	1.36	4.87	130.23
10937	488	3465.74	1.74	4.21	126.27
10288	488	3456.90	0.90	4.04	242.43
9690	611	3451.49	1.49	2.56	313.59
9009	611	3446.45	1.45	3.84	239.94
8130	611	3441.57	1.57	2.21	342.53
7717	611	3438.66	0.86	4.18	274.48
7253	697	3436.35	1.35	1.69	517.58
6343	1328	3430.70	0.70	4.37	514.6
5363	1328	3426.33	1.33	1.85	830.57
4221	1501	3420.99	0.99	4.67	483.60
3489	1501	3417.18	2.18	2.05	998.9
2989	1501	3414.52	0.72	4.14	623.28

Table II.F.13

**500-Year And PMP Peak Discharge
Antecedent Moisture Condition II**

Drainage Area/Junction	500 Year Flowrate (cfs)	PMP Flowrate (cfs)
Drainage Area 2	1343	2805
Playa/Depression	0	2380
Drainage Area 1A	818	1833
Junction 1A	1032	2662
Junction 1	1201	5170
Junction 2	2315	6871
Junction 3	2625	7467

Table II.F.14**500-Year Water Surface Elevations
Antecedent Moisture Condition II**

Section	500 Year Flowrate (cfs)	500 Year WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	818	3478.64	1.64	2.70	340.14
11337	818	3470.67	1.67	5.89	143.25
10937	818	3466.11	2.11	4.88	152.46
10288	818	3457.15	1.15	4.08	402.08
9690	1032	3451.81	1.81	2.97	378.22
9009	1032	3446.77	1.77	4.19	307.32
8130	1032	3441.91	1.91	2.56	413.44
7717	1032	3438.91	1.11	4.70	328.51
7253	1201	3436.66	1.66	2.11	548.75
6343	2315	3430.98	0.98	5.08	568.22
5363	2315	3426.68	1.68	2.32	934.95
4221	2625	3421.33	1.33	5.21	648.13
3489	2625	3417.51	2.51	2.45	1016.94
2989	2625	3414.77	0.97	5.02	651.07

Table II.F.15**PMP-Year Water Surface Elevations
Antecedent Moisture Condition II**

Section	PMP Flowrate (cfs)	PMP WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	1833	3479.26	2.26	3.66	421.93
11337	1833	3471.45	2.45	7.43	175.84
10937	1833	3466.73	2.73	6.81	197.77
10288	1833	3457.54	1.54	4.94	474.18
9690	2662	3452.41	2.41	4.45	474.74
9009	2662	3447.61	2.61	4.59	485.14
8130	2662	3442.51	2.51	3.98	499.24
7717	2662	3439.69	1.89	5.00	463.57
7253	5170	3437.80	2.80	4.32	663.98
6343	6871	3431.88	1.88	6.95	836.71
5363	6871	3427.67	2.67	3.60	1229.57
4221	7467	3422.16	2.16	6.45	1031.21
3489	7467	3418.39	3.39	3.72	1083.03
2989	7467	3415.64	1.84	6.54	894.76

Table II.F.16

**100-Year Peak Discharge
Antecedent Moisture Condition III**

Drainage Area/Junction	100 Year Flowrate (cfs)
Drainage Area 2	1108
Playa/Depression	0
Drainage Area 1A	645
Junction 1A	817
Junction 1	966
Junction 2	1873
Junction 3	2128

Table II.F.17**100-Year Water Surface Elevations
Antecedent Moisture Condition III**

Section	100 Year Flowrate (cfs)	100 Year WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	645	3478.49	1.49	2.49	320.33
11337	645	3470.53	1.53	5.36	137.13
10937	645	3465.93	1.93	4.57	139.30
10288	645	3457.07	1.07	3.87	349.93
9690	817	3451.66	1.66	2.78	348.04
9009	817	3446.62	1.62	4.03	275.79
8130	817	3441.75	1.75	2.40	380.21
7717	817	3438.79	0.99	4.47	302.82
7253	966	3436.53	1.53	1.92	535.68
6343	1873	3430.86	0.86	4.82	545.10
5363	1873	3426.53	1.53	2.13	892.02
4221	2128	3421.19	1.19	5.0	581.33
3489	2128	3417.37	2.37	2.30	1009.36
2989	2128	3414.67	0.87	4.64	640.02

Table II.F.18

**500-Year And PMP Peak Discharge
Antecedent Moisture Condition III**

Drainage Area/Junction	500 Year Flowrate (cfs)	PMP Flowrate (cfs)
Drainage Area 2	1741	2847
Playa/Depression	0	2519
Drainage Area 1A	976	1850
Junction 1A	1242	2689
Junction 1	1483	5399
Junction 2	2888	7144
Junction 3	3286	7766

Table II.F.19**500-Year Water Surface Elevations
Antecedent Moisture Condition III**

Section	500 Year Flowrate (cfs)	500 Year WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	976	3478.76	1.75	2.90	355.40
11337	976	3470.81	1.81	6.21	149.13
10937	976	3466.24	2.24	5.21	162.01
10288	976	3457.22	1.22	4.31	413.97
9690	1242	3451.93	1.93	3.13	404.17
9009	1242	3446.90	1.90	4.31	334.67
8130	1242	3442.03	2.03	2.73	437.11
7717	1242	3439.01	1.21	4.88	350.81
7253	1483	3436.81	1.81	2.29	563.87
6343	2888	3431.11	1.11	5.44	583.36
5363	2888	3426.84	1.84	2.54	934.24
4221	3286	3421.49	1.49	5.39	728.53
3489	3286	3417.66	2.66	2.66	1025.44
2989	3286	3414.95	1.15	5.40	788.45

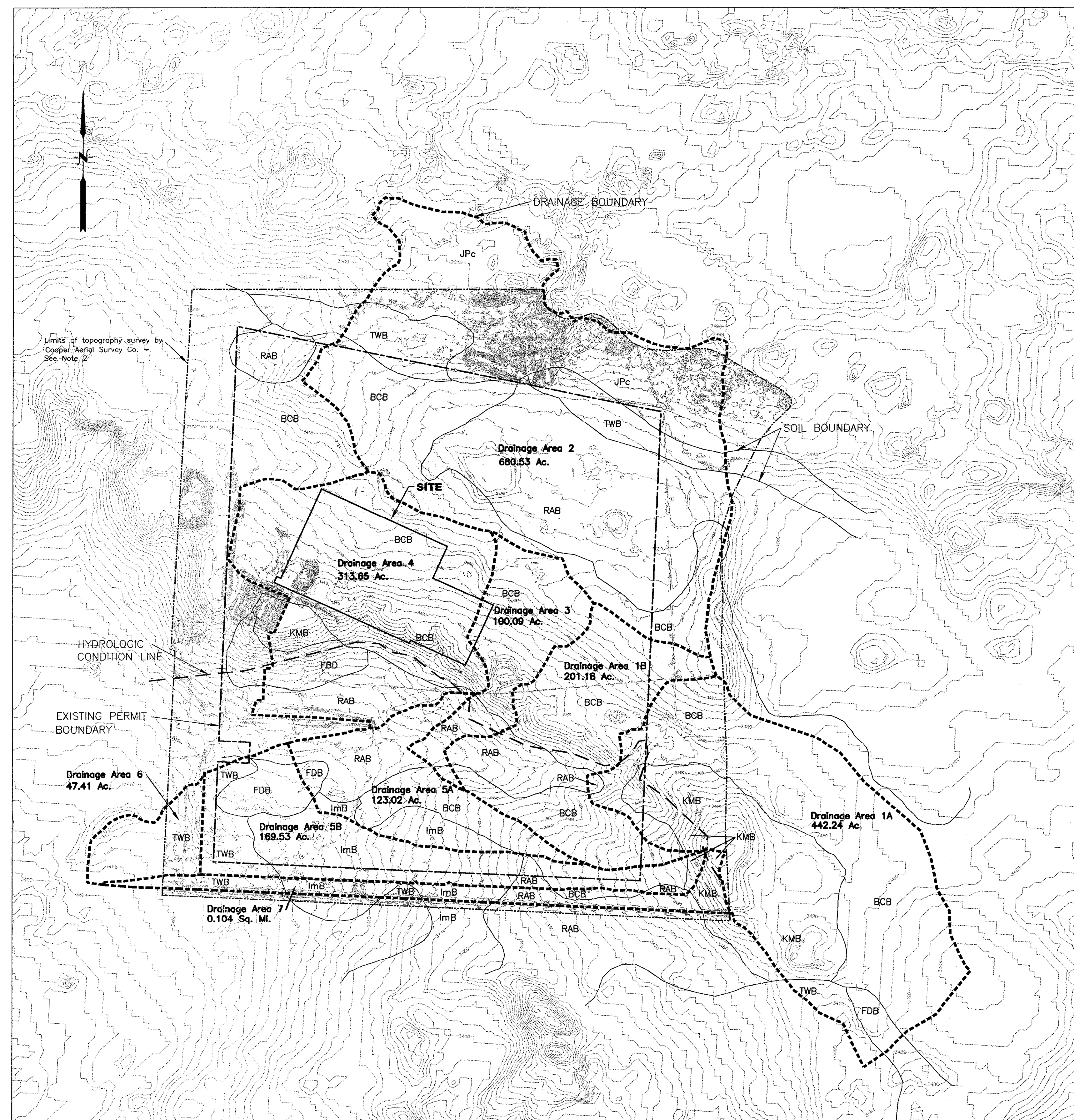
Table II.F.20

**PMP-Year Water Surface Elevations
Antecedent Moisture Condition III**

Section	PMP Flowrate (cfs)	PMP WSEL (msl)	Maximum Depth (ft)	Channel Velocity (fps)	Top Width (ft)
12674	1850	3479.26	2.26	3.69	422.29
11337	1850	3471.47	2.47	7.39	176.84
10937	1850	3466.72	2.72	6.91	197.22
10288	1850	3457.57	1.57	4.82	479.25
9690	2689	3452.40	2.40	4.52	473.62
9009	2689	3447.65	2.65	4.51	492.15
8130	2689	3442.50	2.50	4.06	497.59
7717	2689	3439.74	1.94	4.84	471.42
7253	5399	3437.84	2.84	4.42	667.97
6343	7144	3431.94	1.94	6.76	867.12
5363	7144	3427.72	2.72	3.65	1242.81
4221	7766	3422.20	2.20	6.51	1043.46
3489	7766	3418.44	3.44	3.78	1087.51
2989	7766	3415.68	1.88	6.62	900.85



FIGURES



LEGEND

———	SOIL BOUNDARY
———	HYDROLOGIC CONDITION
-----	DRAINAGE AREA BOUNDARY
-----	LIMITS OF TOPOGRAPHIC SURVEY BY COOPER AERIAL SURVEY CO.
-----	EXISTING PERMIT BOUNDARY

SYMBOL	GROUP	NAME
JPC	A	Jalmar
TWB	B	Triomas
BCB	B	Blakeney
RAB	B	Ratliff
FDB	B	Faskin
ImB	B	Ima
KMB	C	Kimbrough

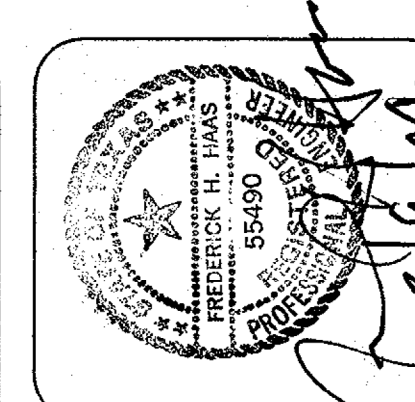


Diana G. Dworaczynski
10/14/04
Sealed for evidence
of addition of site
boundary.

NOTES:

- Soil information taken from the Soil Conservation Service Soil Survey of Andrews County, Texas issued August 1974.
- Existing topographic information within the limits shown is provided by Cooper Aerial Survey Co., 11402 N. Cave Creek Road, Phoenix, AZ 85020, (602) 678-5111, Fax: (602) 678-5228, 1-800-229-2279.
- Existing topographic information outside the limits shown is based on a digital elevation model (DEM) provided by The Texas Natural Resources Information System (TNRIS).
- Hydrologic condition north of the line is considered poor. Hydrologic condition south of the line is considered fair.
- Permit boundary information provided by Waste Control Specialists LLC.

Soil Map
SCALE: 1" = 100'



FREDERICK H. HAAS, P.E.
CONSULTING ENGINEER
988 A. SMITH ROAD
AUSTIN, TEXAS 78759
503-75-5650
FAX 503-474-0465



WASTE CONTROL SPECIALISTS LLC
Andrews County, Texas

DGD	DGD	FH	WCS
DESIGNED BY:	CHECKED BY:	DATE:	REVISED:
2/09/04			
JOB NAME:	DRAWING NAME:		

II.F.2



6 - 29" x 18" CMP ARCH CULVERTS
UNDER THE ACCESS ROAD



SECTION OF THE DRAW


Frederick M. Haas
 2/9/04


FREDERICK M. HAAS, P.E.
 CONSULTING ENGINEER
 3613A SUMMIT BEND
 AUSTIN, TEXAS 78759
 512-478-8580

DATE ISSUED: 02/09/04

PURPOSE: PERMIT RENEWAL

PROJECT: WASTE CONTROL SPECIALISTS LLC
 ANDREWS COUNTY, TEXAS
 RCRA PERMIT RENEWAL

SHEET TITLE: PHOTOGRAPHS

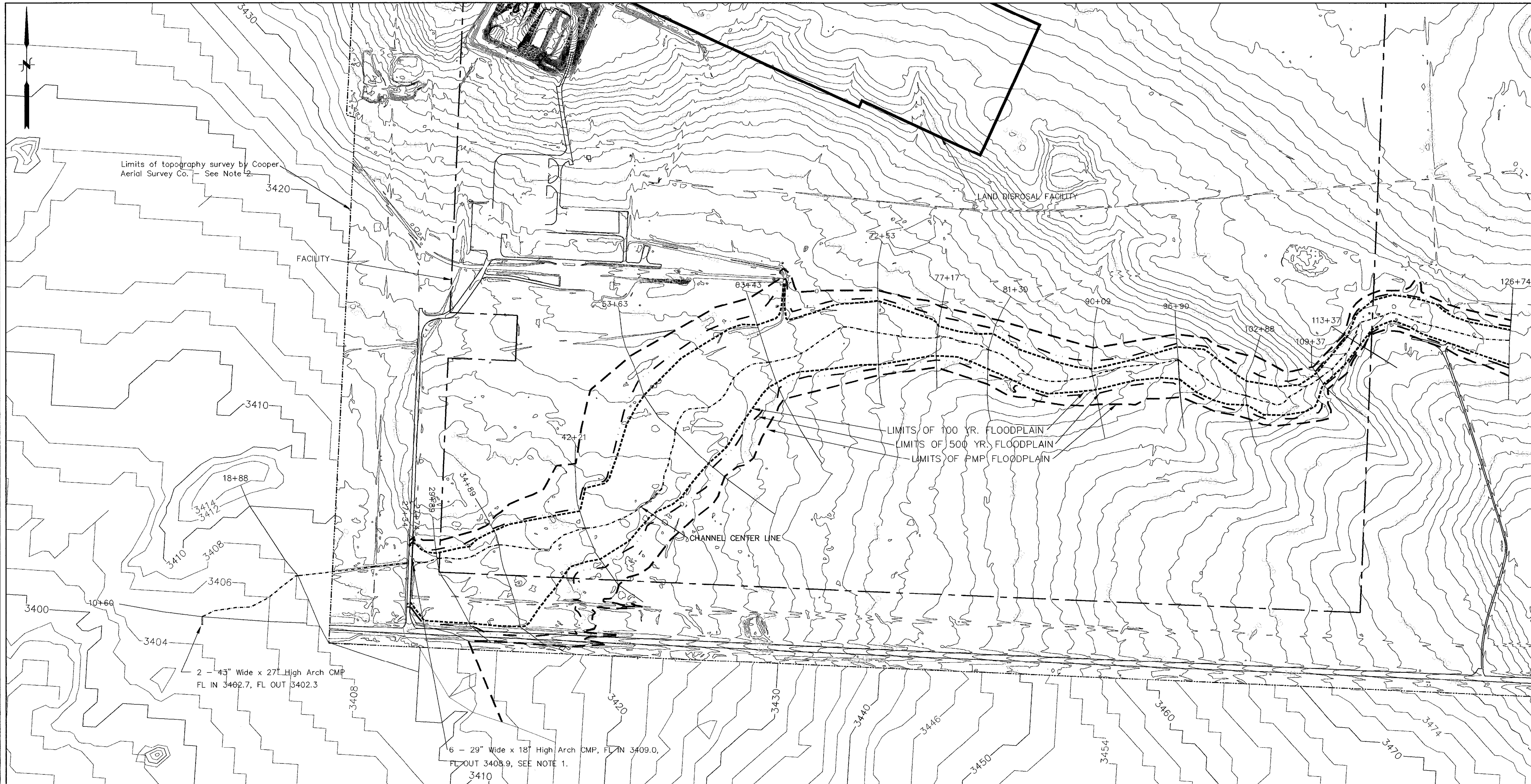
DES BY OGD	DRAW BY OGD	CHK BY FHH	DRAWING NAME: D:\WCS\DRAW\WCS_FLOODPLAIN\DWG\	REV.
SCALE: N.T.S.	SHEET 1 OF 1	FIGURE NO. 11F.3		

NOTES:

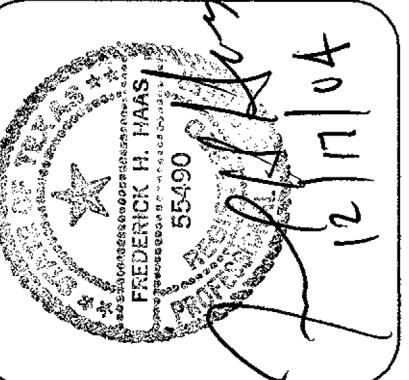
- Existing pipe sizes taken from field observation. Pipe flowlines taken from Survey by West Texas Consultants, Inc., 305 NW Ave. C, Andrews, TX 79714, (915) 523-2181, Fax: (915) 524-2346, dated 10/07/06.
- Existing topographic information within the limits shown is provided by Cooper Aerial Survey Co., 11402 N. Cave Creek Road, Phoenix, AZ 85020, (602) 678-5111 Fax: (602) 678-5228, 1-800-229-2279.
- Existing topographic information outside the limits shown is based on a digital elevation model (DEM) provided by The Texas Natural Resources Information System (TNRIS).
- Facility boundary and Land Disposal Facility information provided by Waste Control Specialists LLC.

LEGEND

- PROBABLE MAXIMUM PRECIPITATION FLOODPLAIN LIMITS
- 500 YEAR FLOODPLAIN LIMITS
- 100 YEAR FLOODPLAIN LIMITS
- LIMITS OF TOPOGRAPHIC SURVEY BY COOPER AERIAL SURVEY CO.
- FACILITY
- CHANNEL CENTER LINE
- 34+89 CHANNEL CROSS-SECTION LOCATION



FLOODPLAIN MAP
SCALE: 1" = 400'

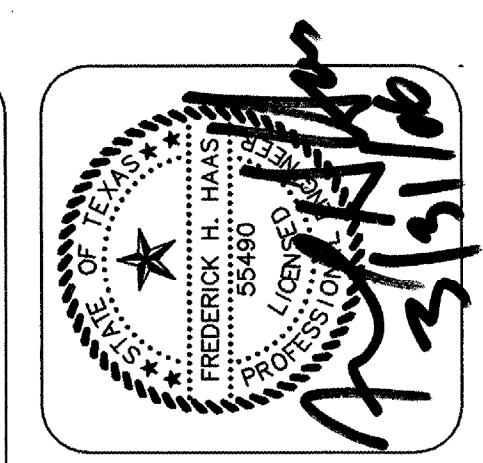


FREDERICK H. HAAS, P.E.
CONSULTING ENGINEER
3803 A. SUMMIT BLDG.
AUSTIN, TEXAS 78759
512-478-6590
FAX 512-474-9463

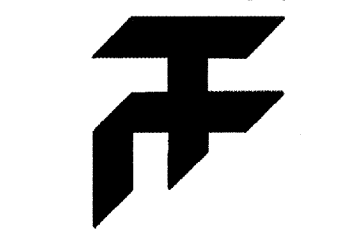
WASTE CONTROL SPECIALISTS LLC
Andrews County, Texas

DRAWN BY:	DGD	DESIGNED BY:	DGD	CHECKED BY:	FHH	DATE:	12/15/04	REVISED:	WCS	JOB NAME:	FLDPLAINAPR2	DRAWING NAME:	FLDPLAINAPR2
-----------	-----	--------------	-----	-------------	-----	-------	----------	----------	-----	-----------	--------------	---------------	--------------

II.F.4



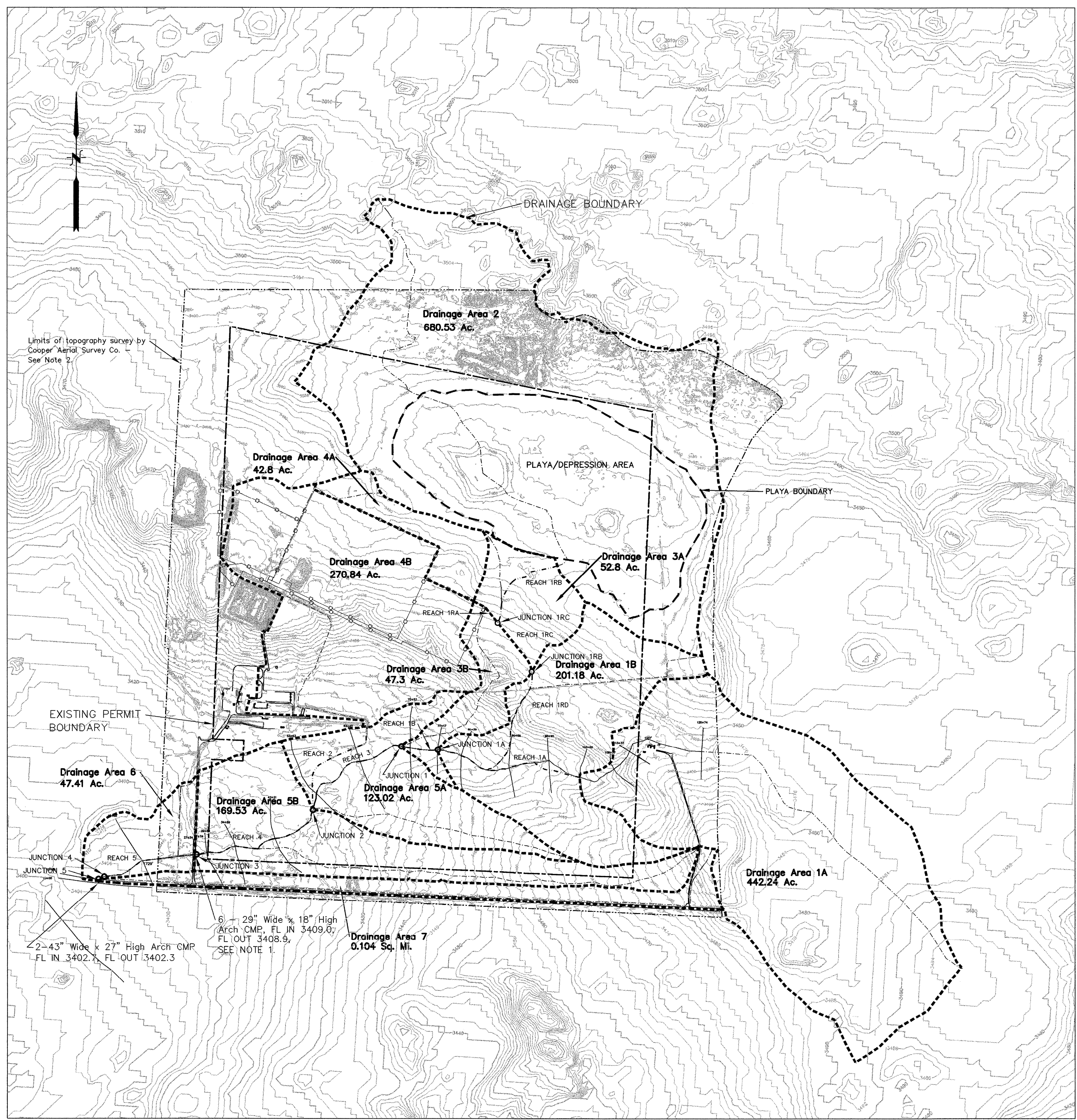
FREDERICK H. HAAS, P.E.
CONSULTING ENGINEER
88 WEST 11TH ST., STE 205
AUSTIN, TEXAS 78701
512-478-5580
FAX 512-474-9463



WASTE CONTROL SPECIALISTS LLC
Andrews County, Texas

DRAWN BY:	DGD	WCS
DESIGNED BY:	DGD	DRAINAGE MAP
CHECKED BY:	FHH	
DATE:	03/06	
REVISED:		
JOB NAME:		
DRAWING NAME:		

II.F.5



LEGEND

- PLAYA AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- LIMITS OF TOPOGRAPHIC SURVEY BY COOPER AERIAL SURVEY CO.
- EXISTING PERMIT BOUNDARY
- REACH LENGTH
- TRAVEL TIME FLOW PATH
- JUNCTION

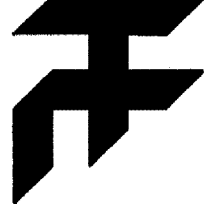
NOTES:

- Existing pipe sizes taken from field observation. Pipe flowlines taken from Survey by West Texas Consultants, Inc., 305 NW Ave. C, Andrews, TX 79714, (915) 523-2181, Fax: (915) 524-2346, dated 10/07/96.
- Existing topographic information within the limits shown is provided by Cooper Aerial Survey Co., 11402 N. Cave Creek Road, Phoenix, AZ 85020, (602) 678-5111 Fax: (602) 678-5228, 1-800-229-2279.
- Existing topographic information outside the limits shown is based on a digital elevation model (DEM) provided by The Texas Natural Resources Information System (TNRIS).
- Permit boundary and facility information provided by Waste Control Specialists LLC.

Developed Low Level &
Byproduct Facility Drainage Area Map
SCALE: 1" = 1000'



FREDERICK H. HAAS, P.E.
CONSULTING ENGINEER
802 WEST 11TH ST., STE 205
AUSTIN, TEXAS 78701
512-478-9590
FAX 512-474-8463



WASTE CONTROL SPECIALISTS LLC
Andrews County, Texas

DGD	DGD	FHH	WCS
		03/31/06	Soils Map
DRAWN BY:	DESIGNED BY:	CHECKED BY:	DATE:
		REVISED:	JOB NAME:
			DRAWING NAME:

II.F.6

LEGEND

- SOIL BOUNDARY
- HYDROLOGIC CONDITION
- DRAINAGE AREA BOUNDARY
- LIMITS OF TOPOGRAPHIC SURVEY BY COOPER AERIAL SURVEY CO.
- EXISTING PERMIT BOUNDARY

SYMBOL	GROUP	NAME
JPC	A	Jalmar
TWB	B	Triomas
BCB	B	Blakeney
RAB	B	Ratliff
FDB	B	Faskin
Imb	B	Ima
KMB	C	Kimbrough

- NOTES:
- Soil information taken from the Soil Conservation Service Soil Survey of Andrews County, Texas issued August 1974.
 - Existing topographic information within the limits shown is provided by Cooper Aerial Survey Co., 11402 N. Cave Creek Road, Phoenix, AZ 85020, (602) 678-5111, Fax: (602) 678-5228, 1-800-229-2279.
 - Existing topographic information outside the limits shown is based on a digital elevation model (DEM) provided by The Texas Natural Resources Information System (TNRIS).
 - Hydrologic condition north of the line is considered poor. Hydrologic condition south of the line is considered fair.
 - Permit boundary information provided by Waste Control Specialists LLC.

Developed Low Level & Byproduct Facility Soils Map

SCALE: 1" = 100'

