MID VALLEY AIRPORT - T65

PRELIMINARY AIRPORT MASTER DRAINAGE PLAN

TxDOT CSJ No. 1421WESLA

KSA Project No. WSL.007

SEPTEMBER, 2016

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PRELIMINARY
MID VALLEY AIRPORT
MASTER DRAINAGE PLAN
Weslaco, Texas
Mid Valley
Airport
Weslaco Texas

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1.0 INTRODUCTION

Mid Valley Airport - T65 (Airport) intends to continue developing the existing airport and acquire additional adjacent property for future development. This Airport Master Drainage Plan will serve as a guide for laying out drainage infrastructure to accommodate the future Airport development. The purpose of this drainage study is to evaluate detention options to mitigate additional runoff created by the anticipated future development and make recommendations for the Airport to consider. The project is located 2 miles northeast of Weslaco just north of Interstate Highway-2 (IH-2) as can be seen on Exhibit 1.

KSA Engineers, Inc. prepared the hydrologic analysis based on the Natural Resource Conservation Service (NRCS) *Urban Hydrology for Small Watersheds* TR-55 dated June 1986 and the Federal Aviation Administration's (FAA) Advisory Circular (AC) 150/5320-5D dated 8/15/2013. KSA used the SCS (Soil Conservation Service) method to calculate the amount of runoff from the Airport for each storm event. The hydrologic parameters were analyzed in ESRI's Geographic Information Systems (GIS) and AutoCAD (CAD). The parameters were input into the US Army Corps of Engineer's Hydrologic Modeling System (HEC-HMS) Version 4.1 to calculate runoff and size sufficient detention to mitigate additional flows.

2.0 PROJECT DESCRIPTION

The Airport is located north of IH-2, east of the wastewater treatment plant (WWTP) and south of an irrigation canal. The future development will take place centrally on the east and west side of Runway 13-31. The site currently has no detention and all existing runoff flows offsite into drainage channels that flow east.

The Airport will develop approximately 14 acres that will potentially consist of buildings, apron, roads, parking, taxiways and office space. The resulting additional flows due to an increase in impervious area will be mitigated by detention. This study will present detention alternatives to mitigate future flows.

The Airport is located in Hidalgo County's Drainage District No. 1. The Airport is not located in the FEMA 1% (100-year) floodplain as shown in Exhibit 2. The Airport is located in Hidalgo County on FIRM Panel 4803490005B dated March 4, 1980.

3.0 STORM WATER DESIGN REQUIREMENTS

The City of Weslaco requires detention to temporarily store excess runoff from the additional impervious area that will be constructed by the future development. Detention will be designed to reduce the post-development peak discharge to less than pre-development. On-site detention shall be designed to detain any runoff in excess of the pre-development 25-year storm and the detained flow shall be released at an existing 10-year storm rate.

The FAA AC 150/5320-5D states that the fundamental objective of storm water management is to maintain the peak runoff rate from a developing area at or below the pre-development rate to control

flooding. FAA recommends that a 5-year storm event not encroach the pavement of a taxiway or runway and that the center 50 percent of the runway or taxiway should be free from ponding that results from a 10-year storm. Drainage infrastructure should be designed to pass a storm event within 48 hours.

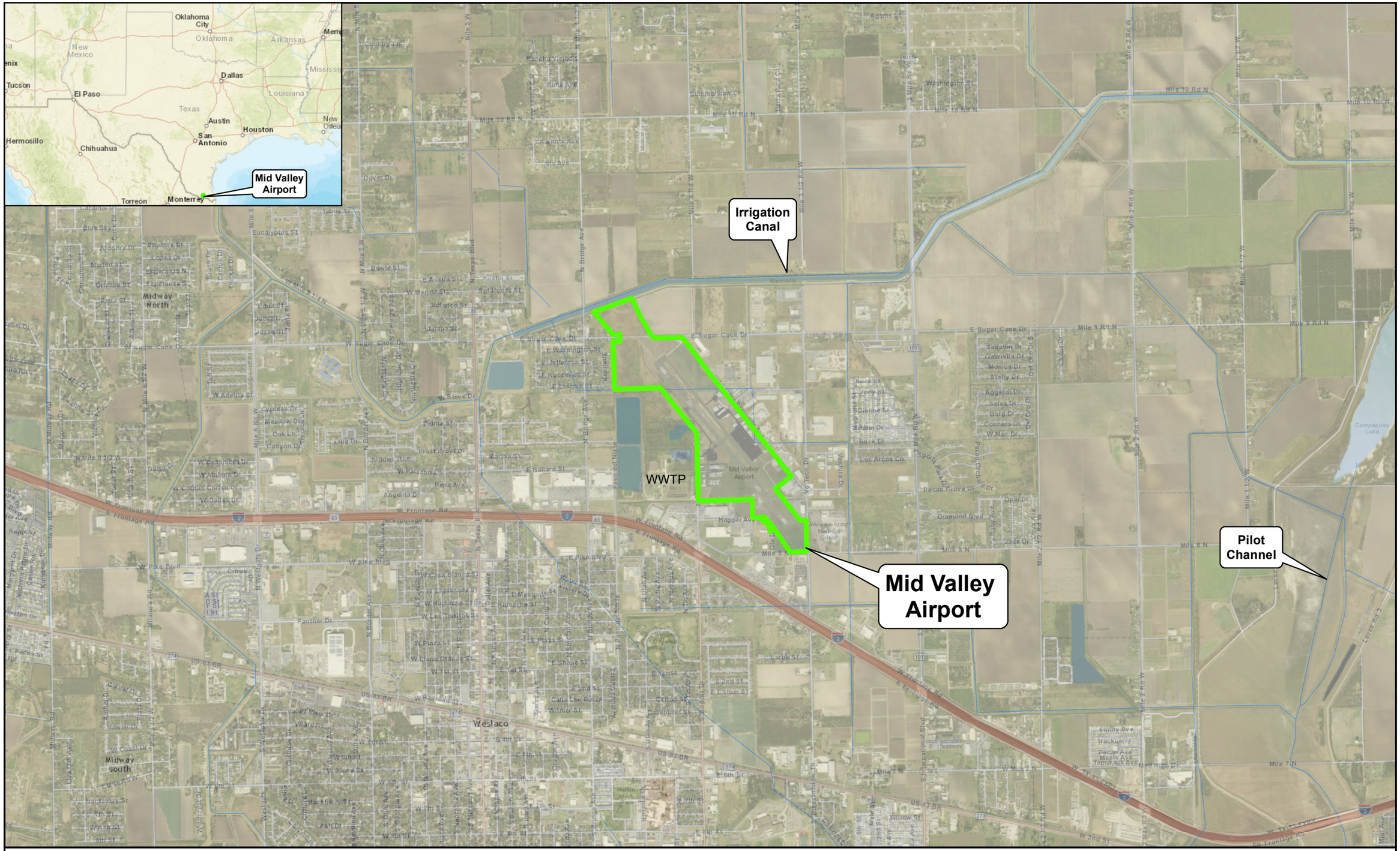
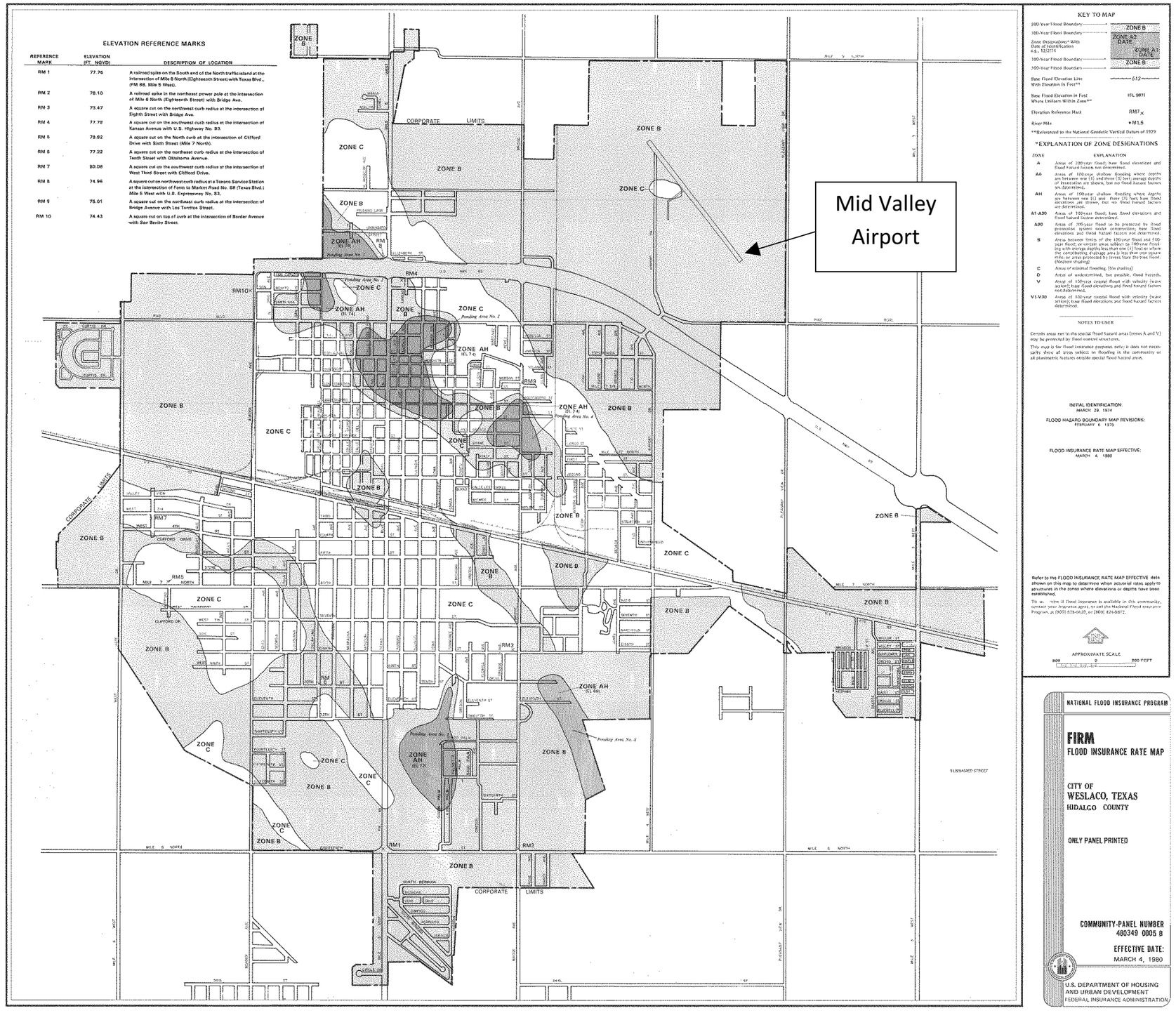


Exhibit 1	KSA	Location	Mid Valley Airport Weslaco, Texas	0 0.325 0.65 Miles	N W E S

EXHIBIT 2. FEMA FLOODPLAIN



3.0 EXISTING CONDITIONS

Section 3 provides an explanation of the methodologies used for the hydrologic analysis of the existing land use.

3.1 Drainage Area Delineation

Sub-basins were delineated using 1-foot contours that were generated from a 1/3 arc-second digital elevation model (DEM) that was downloaded from the United States Geological Survey (USGS). Drainage patterns in questionable areas were determined by field investigations. The runoff ultimately travels in an easterly direction into drainage channels on the east side of Joe Stephens Avenue. The largest of these channels is concrete lined (18b) and conveys runoff from a commercial area through the south side of the Airport under Runway 13-31 and Taxiway Alpha. The drainage channels flow north to an irrigation canal that drains into Pilot Channel. Pilot Channel is labeled on the Exhibit 1 and conveys the flow into the Gulf of Mexico. The existing sub-basins are provided on Exhibit 3.

Table 1. Existing Drainage Areas

Name	Area (sq mi)	Area (ac)
DA01	0.0162	10.39
DA02	0.0143	9.14
DA03	0.0499	31.91
DA04	0.0091	5.82
DA05	0.0262	16.75
DA06	0.0110	7.05
DA07	0.0067	4.32
DA08	0.0095	6.08
DA09	0.0078	4.97
DA10	0.0042	2.69
DA11	0.0373	23.90
DA12	0.0102	6.50
DA13	0.0563	36.04
DA14	0.0067	4.31
DA15	0.0972	62.23
DA16	0.0161	10.28
DA17	0.0219	14.04

3.2 Time of Concentration

The longest flow paths were determined for each drainage area and are comprised of sheet, shallow concentrated and channel flows. The latest version of TR-55 is WINTR-55 Small Watershed Hydrology Computer Program. The user guide states that sheet flow becomes concentrated flow beyond 100 feet, therefore sheet flow was limited to 100. Manning's Kinematic Equation was used to calculate

the time of concentration (Tc) for sheet flow. Manning's Kinematic Equation is provided below and Table 3-1 from TR-55 that contains the sheet flow roughness coefficients for Manning's n can be found in Appendix A.

Equation 1. Manning's Kinematic Equation

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5}s^{0.4}}$$

Concentrated flow was calculated based on paved or unpaved conditions. The equations below present the equations used to calculate velocity for shallow concentrated flow.

Equation 2. Unpaved Concentrated Velocity

$$V = 16.1345(s^{0.5})$$

Equation 3. Paved Concentrated Velocity

$$V = 20.3282(s^{0.5})$$

Channel flow velocities were calculated based on Manning's Equation. The velocities for shallow concentrated flow and channel flow were converted to travel time using Equation 5. Travel time was calculated by dividing the length by the velocity. Appendix B contains Manning's roughness coefficients (n) for channel flow used in Equation 4.

Equation 4. Manning's Velocity

$$V = \frac{1.49}{n}R^{2/3}S^{1/2}$$

Equation 5. Travel Time

$$t_t = \frac{L}{3600V}$$

The slope was calculated using the 2-foot contours outside the runway and a CAD surface was developed from survey data within the runway/taxiway area. The travel times for sheet, shallow concentrated and channel flow were added to determine the time of concentration for each drainage basin. The flow paths are shown on Exhibit 3 Existing Drainage Areas. A concrete lined Channel 18b on the south side of the airport conveys runoff from the southern drainage areas, WWTP and a commercial area west of the WWTP. An earthen channel conveys flows from the northern drainage areas and directs it east. Tc's were also calculated for routing flow through a sub-basin and the routings were modeled using the Lag Method. Appendix C contains the backup data taken from GIS and the Tc calculation of each flow path. The lag time used in the hydrologic model was calculated as 60% of the Tc, as provided below.

Table 2. Existing Time of Concentration

Name	Tc (min)	T_{lag} (min)
DA01	40.80	24.47
DA02	12.16	7.30
DA03	72.20	43.31
DA04	29.90	17.93
DA05	57.84	34.70
DA06	20.22	12.13
DA07	26.64	15.98
DA08	14.83	8.90
DA09	33.29	19.97
DA10	7.91	4.74
DA11	74.86	44.91
DA12	34.37	20.62
DA13	71.77	43.06
DA14	13.88	8.33
DA15	68.22	40.93
DA16	42.68	25.61
DA17	32.91	19.75

Table 3. Existing Routings

Reach	Tc (min)	T_{Lag} (min)
R11	4.94	2.96
R12	41.42	24.85
R13	8.46	5.08
R14	1.59	0.96
R15	27.46	16.47
R17	4.53	2.72
R2	11.84	7.10
R3	30.74	18.44
R5	1.65	0.99
R6	0.97	0.58
R7	35.63	21.37

Exhibit 3

KSA

Existing Drainage Areas

Mid Valley Airport
Weslaco, Texas

0 412.5 825
Feet

3.3 Curve Numbers

The SCS method was used to calculate composite curve numbers based on soil type and land use. The soils data was downloaded from the NRCS Web Soil Survey and KSA developed the land use based on aerial imagery. Antecedent Runoff Condition (ARC, former AMC) II curve numbers for each corresponding soils and land use was taken from Table 2-2a of TR-55 as presented in Appendix D. ARC II curve numbers represent average soil moisture conditions before a storm event. Appendix E contains the backup data and a pivot table of the area for soils versus land use. The curve numbers for each soil type and land use are below in Table 4. The hydrologic soil groups are shown in Exhibit 4 and existing land use on Exhibit 5.

Table 4. Curve Number Key

		Curve numbers for hydrologic soil group			
	Cover type and hydrologic condition	A	B	C	D
Open space (lawns, 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	98	98	98	98
	Paved; curbs and storm sewers	98	98	98	98
	Paved; open ditches	83	89	92	93
	Gravel	76	85	89	91
	Dirt	72	82	87	89
Western desert urban areas	Natural desert landscaping (pervious areas only)	63	77	85	88
	Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)	96	96	96	96
Urban districts	Commercial business	89	92	94	95
	Industrial	81	88	91	93
Residential districts by average lot size	1/8 acre or less (town house)	77	85	90	92
	1/4 acre	61	75	83	87
	1/3 acre	57	72	81	86
	1/2 acre	54	70	80	85
	1 acre	51	68	79	84
	2 acres	46	65	77	82
Developing urban areas	Newly graded areas (pervious areas only, no vegetation)	77	86	91	94

The composite curve number was calculated using the weighted average method as per Equation 6.

Equation 6. Curve Number

$$CN = \frac{\sum(CN * A)}{\sum A}$$

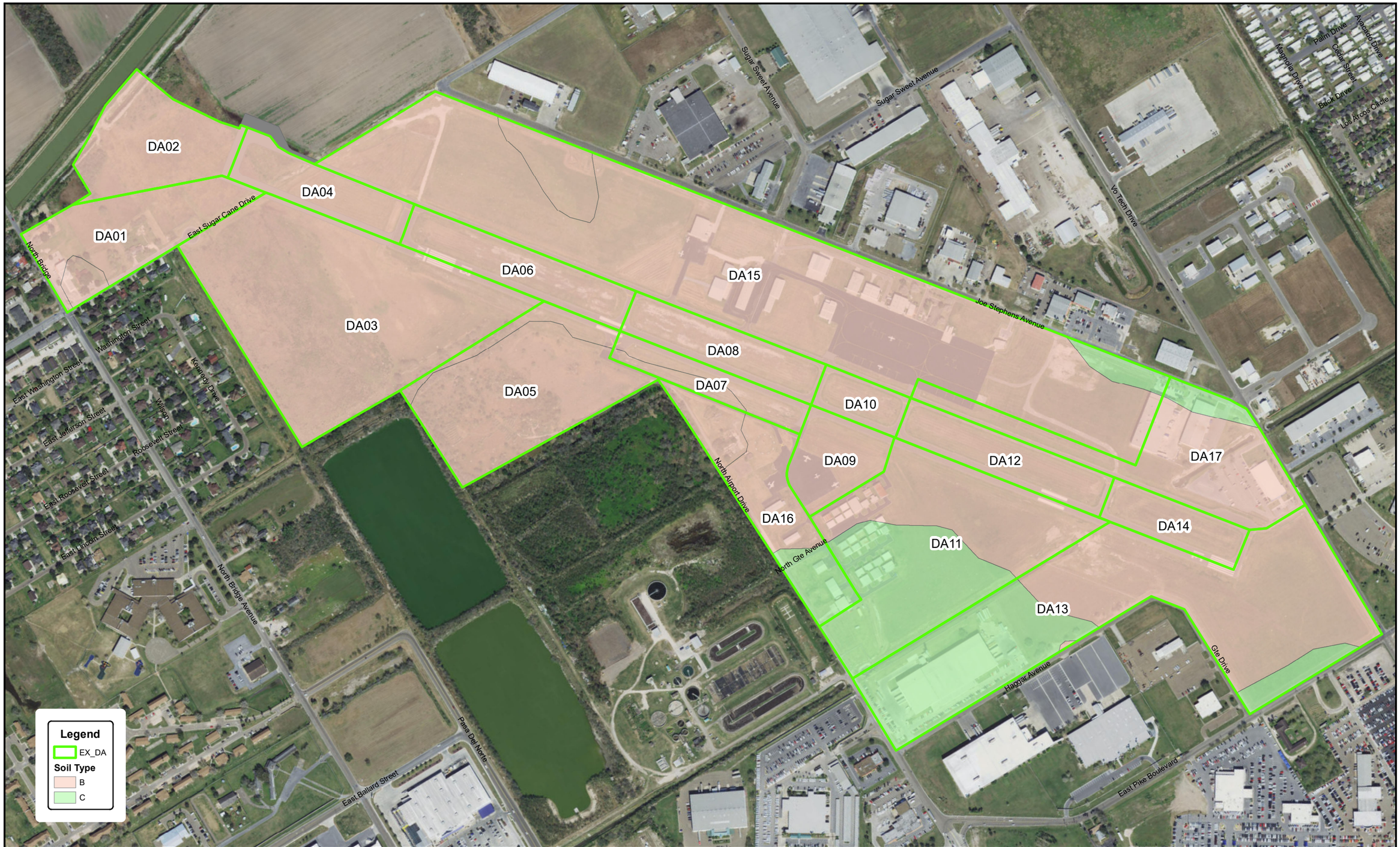


Exhibit 4

KSA

Hydrologic Soils

Mid Valley Airport
Weslaco, Texas

0 412.5 825
Feet

N E S W

Exhibit 5

KSA

Existing Land Use

Mid Valley Airport
Weslaco, Texas

0 412.5 825
Feet

N E S W

3.3.1 Initial Abstraction

The SCS Runoff Curve Number method was used to calculate runoff for the Airport in HMS.

Equation 7. SCS Runoff

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

One parameter in the SCS method is initial abstraction (I_a), which accounts for all losses before runoff begins. It is dependent on soil and cover parameters. Soil and cover parameters are represented by the potential maximum retention after runoff begins (S). The equation to calculate maximum retention is below.

Equation 8. Maximum Retention

$$\boldsymbol{S = \frac{1000}{CN} - 10}$$

Initial abstraction is calculated after maximum retention is determined.

Equation 9. Initial Abstraction

$$I_a = 0.2S$$

A summary of the composite curve numbers and initial abstraction values are presented in Table 5.

Table 5. Existing Curve Numbers

Name	Composite CN	Initial Abstraction (I_a)
DA01	67.78	0.95
DA02	65.40	1.06
DA03	62.28	1.21
DA04	73.32	0.73
DA05	62.27	1.21
DA06	70.91	0.82
DA07	74.56	0.68
DA08	70.62	0.83
DA09	75.87	0.64
DA10	72.72	0.75
DA11	72.95	0.74
DA12	71.18	0.81
DA13	73.66	0.74
DA14	71.24	0.81
DA15	71.19	0.81
DA16	75.26	0.66
DA17	86.86	0.30

4.0 FUTURE CONDITIONS

Section 4 provides an explanation of the methodologies used for the hydrologic analysis of the future land use. Future development will potentially include buildings, apron, roads, parking, taxiways and office space. The hydrologic parameters were recalculated to account for future development.

4.1 Drainage Area Delineation

The existing drainage areas were updated as necessary based on the location of the ponds and new drainage areas created by future development. New drainage areas were created for the future parallel taxiway on the west side of the runway. DA11 and 16 were merged to account for the future hangar and apron. The new parallel taxiway will divide DA09, so it was merged into DA11_B and DA11_A. Table 6 presents a summary of the areas.

Table 6. Future Drainage Areas

Name	Area (sq mi)	Area (ac)
DA01	0.0162	10.39
DA02	0.0143	9.14
DA03_A	0.0440	28.17
DA03_B	0.0099	6.34
DA04	0.0091	5.82
DA05	0.0216	13.83
DA06	0.0110	7.05
DA07	0.0090	5.79
DA08	0.0095	6.08
DA10	0.0042	2.69
DA11_A	0.0456	29.16
DA11_B	0.0108	6.92
DA12	0.0102	6.50
DA13_A	0.0258	16.51
DA13_B	0.0103	6.59
DA13_C	0.0234	15.01
DA14	0.0067	4.31
DA15_A	0.0387	24.79
DA15_B	0.0401	25.64
DA15_C	0.0176	11.28
DA17	0.0228	14.59

4.2 Time of Concentration

The Tc paths were updated as per future drainage areas. Tc's that flow into a pond terminate at an elevation equal to the pond being full. A minimum slope of 0.001 ft/ft was used outside of the surveyed area. The routings and Tc's were recalculated to account for the future development. Table

7 presents a summary of the Tc's and Table 8 the routings. Exhibit 6 shows the flow paths of the Tc's. Appendix F contains the back data and calculations.

Table 7. Future Time of Concentration

Name	Tc (min)	T_{lag} (min)
DA01	40.80	24.43
DA02	12.16	7.28
DA03_A	71.23	42.65
DA03_B	19.21	11.50
DA04	29.90	17.90
DA05	57.84	34.64
DA06	20.22	12.11
DA07	26.64	15.95
DA08	14.83	8.88
DA10	7.91	4.74
DA11_A	67.62	40.49
DA11_B	28.71	17.19
DA12	34.37	20.58
DA13_A	36.93	22.11
DA13_B	17.77	10.64
DA13_C	59.03	35.35
DA14	13.95	8.35
DA15_A	39.48	23.64
DA15_B	68.22	40.85
DA15_C	46.10	27.60
DA17	35.35	21.17

Table 8. Future Routings

Reach	Tc (min)	T_{lag} (min)
R11_A	4.94	2.96
R12	41.42	24.85
R13_A	8.46	5.08
R13_B	18.71	11.23
R14	1.59	0.96
R15	27.46	16.47
R17	4.53	2.72
R2	11.84	7.10
R3_A	29.18	17.50
R3_B	1.57	0.94
R5	1.65	0.99
R6	0.97	0.58
R7	35.63	21.37

4.3 Curve Numbers

The current land use was updated per the business development plan created as part of KSA's WSL.008. The future development plan will include apron, buildings, office space, roads, parking lots and a parallel taxiway. The development will take place on the east and west sides of the airport. ARC II curve numbers were used to represent average conditions. Exhibit 7 depicts the future land use and a summary of the composite curve numbers is presented on Table 9. Appendix G contains the backup data and a summary pivot table.

Table 9. Future Curve Numbers

Name	Composite CN	Initial Abstraction (I_a)
DA01	67.78	0.95
DA02	65.40	1.06
DA03_A	62.67	1.19
DA03_B	71.26	0.81
DA04	73.32	0.73
DA05	62.57	1.20
DA06	70.91	0.82
DA07	76.91	0.60
DA08	70.62	0.83
DA10	72.72	0.75
DA11_A	79.83	0.51
DA11_B	70.69	0.83
DA12	71.18	0.81
DA13_A	84.11	0.38
DA13_B	72.36	0.76
DA13_C	65.84	1.04
DA14	71.24	0.81
DA17	87.63	0.28
DA15_C	76.14	0.63
DA15_B	62.81	1.18
DA15_A	87.90	0.28

Exhibit 6

KSA

Future Drainage Areas

Mid Valley Airport
Weslaco, Texas

0 412.5 825
Feet

N E S W

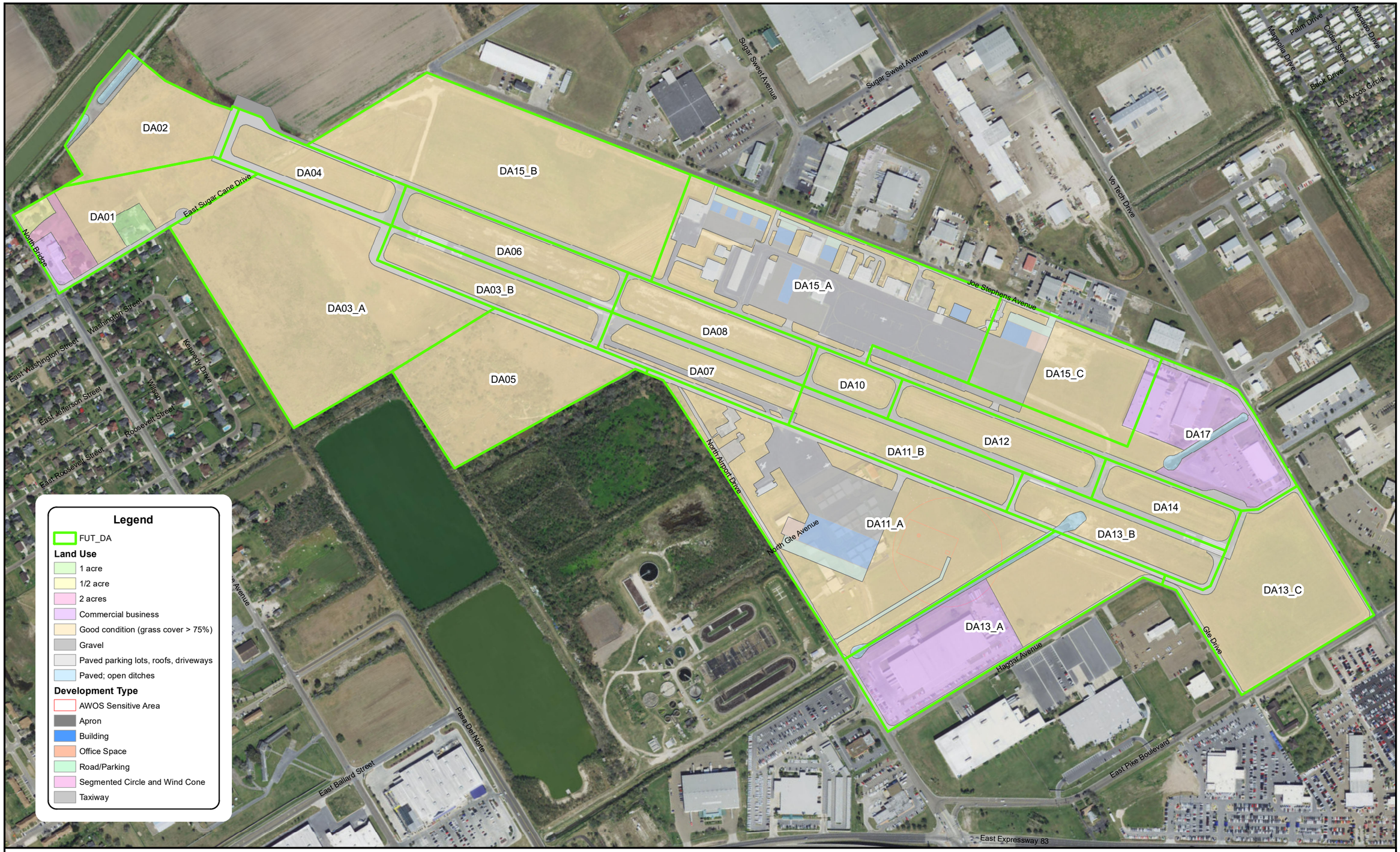


Exhibit 7

KSA

Future Land Use

Mid Valley Airport
Weslaco, Texas

0 412.5 825
Feet

N E S W

5.0 RAINFALL DATA

Precipitation depths for each storm event were taken from the City of Weslaco's Master Drainage Plan dated 4/15/15. The 25-year, 24-hour storm depth of 7 inches was taken from USGS *Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas* dated 2004. The SCS 24-hour Type III rainfall distribution was used to analyze the 2-, 5-, 10-, 25-, 50- and 100-year (50%, 20%, 10%, 4%, 2% and 1% respectively) storm events. Table 10 presents the bold depths used in the HMS model and Appendix H contains the maps from the Atlas.

Table 10. 24-Hour Depth-Frequency

Minutes	Rainfall Event						
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR
5	0.56	0.70	0.81	-	1.07	1.18	1.48
15	1.00	1.35	1.50	-	2.00	2.20	2.80
30	1.50	1.90	2.20	-	2.90	3.20	4.00
60	1.85	2.45	2.90	-	4.00	4.50	6.00
120	2.20	3.00	3.60	-	5.10	5.80	8.00
180	2.35	3.20	3.80	-	5.40	6.25	8.50
360	2.60	3.60	4.40	-	6.50	7.50	10.00
720	2.90	4.10	5.00	-	7.25	8.50	12.00
1440	**3.30**	**4.50**	**5.50**	**7.00**	**8.00**	**9.50**	13.00

6.0 HYDROLOGIC MODEL

HEC-HMS Version 4.1 was used to compute the discharge for existing and future conditions. The hydrologic parameters discussed above were input into HMS. An existing, future and 3 alternative basin models were developed to quantify existing and future conditions. Appendix I contains schematics of the HMS basin models. Once the hydrology was determined the ponds could be sized to mitigate hydraulic impacts to the construction of conceptual improvements. Appendix J contains the results from the HMS model.

6.1 Detention Analysis

The development will add impervious area (roads, buildings, parking lots, taxiway, apron and other paved areas) to the airport site and increase storm water runoff. This increase in storm water runoff could potentially create a flood hazard to the airport and its adjacent areas, if adequate drainage infrastructure is not in place. Storm water detention ponds temporarily impound or detain excess storm water. Detention must be provided to reduce the future development peak discharge rate to the existing development discharge rate, per the City of Weslaco. Weslaco requires detention if the future runoff of a 25-year event exceeds existing runoff. Any excess runoff must be detained on-site

and released at an existing 10-year rate. The detention ponds also mitigate the 100-year peak discharge rate to less than the pre-development peak discharge rate and drain within 48-hours.

The detention ponds constructed in the alternatives below will consist of four components: a berm, a low flow pilot channel, an emergency spillway and an outlet structure. The side slopes shall be constructed no steeper than 4:1 to allow maintenance equipment to traverse the slopes. The ponds are to be excavated to provide positive drainage through the pond and a low flow pilot channel is recommended to be installed at a minimum of 0.3 percent to convey low flows through the pond. The emergency spillway shall be set at the 100-year pool level and shall pass larger events. One foot of freeboard above the 100-year pool level shall be included in the elevation of the berm. Erosion control should be installed downstream of the emergency spillway to stabilize the channel from erosive velocities. The ponds have been designed with an outlet structure that includes a low flow port that is less than 18 inches and are susceptible to clogging. Paneling shall be installed around the low flow port to lessen the likelihood of clogging. The image below provides an example of an outlet structure that consists of low and high ports that are protected from clogging by wire mesh. The outlet structure can be connected to an 18-inch or larger outlet pipe. The outlet structure provides a means to restrict discharge less than 18 inches and release larger quantities during high flows to protect surrounding infrastructure. The design phase will fine tune the components of the pond to maximize the efficiency of the pond.

Runoff from Mid Valley Airport outfalls in three general locations: two to the east and one to the north. Three detention alternatives were analyzed to mitigate the additional flows from the future development. The future development plan locates the Automated Weather Observation System (AWOS) in Pond 11A. The AWOS will either have to be relocated or constructed to account for the temporary detainment of water.

6.1.1 Alternative 1

Detention Alternative 1 consists of three ponds, two along Joe Stephens Avenue and one on the south side as can be seen in Exhibit 8. The ponds are located where flow converges. Pond 11A will mitigate flows from the new development on the west side of the airport and Pond 15C on the east. Ponds 11A and 15C will outfall into the concrete lined Channel 18b. The flows from the majority of the large apron and new development on the east side are not detainable without the addition of major infrastructure as they are diverted by existing storm drain and flow east to Joe Stephens Avenue (Out2). Pond 15B counters mitigating the area to be developed by detaining undeveloped flows conveyed by a 30 inch storm drain under the runway/taxiway. Pond 15B will rely on storm drain to transfer the water under Joe Stephens Avenue to the drainage channels.

The results from HEC-HMS indicate the 3 proposed detention facilities attenuate the post-development peak discharge rates to at or below pre-development.

6 acres
3 feet deep
(3) 2 foot RCPs
50 foot Spillway

3 acres
3 feet deep
(1) 6 inch Low Flow Port
10 foot Spillway

8 acres
3 feet deep
(1) 6 inch Low Flow Port
50 foot Spillway

Out1
Out2
Out3

DA01
DA02
DA03_A
DA03_B
DA04
DA05
DA06
DA07
DA08
DA10
DA11_A
DA11_B
DA12
DA13_A
DA13_B
DA13_C
DA14
DA15_A
DA15_B
DA15_C
DA17
P11A
P15B
P15C

East Sugar Cane Drive
Sugar Sweet Avenue
Joe Stephens Avenue
North Bridge
Washington Street
East Washington Street
Kennedy Drive
Wilson
East Jefferson Street
Roosevelt Street
East Roosevelt Street
East Lincoln Street
North Bridge Avenue
Paseo Del Norte
East Ballard Street
North Airport Drive
North Gie Avenue
Haggar Avenue
Gie Drive
East Pike Boulevard
East Expressway 83
Vo Teen Drive
Palm Drive
Magnolia Drive
Cedar Street
Avocado Drive
Birch Drive
Los Arcos Circle

Legend

- Flow Direction
- Ponds
- FUT_DA
- Storm Pipe
- Contours_1ft

Development Type

- AWOS Sensitive Area
- Apron
- Building
- Office Space
- Road/Parking
- Segmented Circle and Wind Cone
- Taxiway

Exhibit 8

KSA

Alternative 1

Mid Valley Airport
Weslaco, Texas

0 412.5 825
Feet

N E S W

Table 11. Alternative 1 Summary of Results

2-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P11A	15.98	20.84	0.62	64.13	3
DA15	24.45	-	47.12	-	-
P15C	6.79	9.27	0.24	63.94	0.9
P15B	30.51	25.21	9.3	64.97	1.9
Out1	48.73	-	46.49	-	-
Out2	41.06	-	33.61	-	-
Out3	6.97	-	6.97	-	-

5-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P11A	29.99	35.21	0.85	64.93	5.2
DA15	48.22	-	80.63	-	-
P15C	13.35	16.57	0.34	64.70	1.7
P15B	63.37	54.94	26.34	65.74	3.5
Out1	88.2	-	81.32	-	-
Out2	83.99	-	58.36	-	-
Out3	14.22	-	14.22	-	-

10-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P11A	42.75	47.75	1.02	65.66	7.1
DA15	70.29	-	110.8	-	-
P15C	19.42	23.09	0.4	65.41	2.4
P15B	94.71	84.04	44.69	66.44	4.9
Out1	123.79	-	112.92	-	-
Out2	124.66	-	85.28	-	-
Out3	21.74	-	21.74	-	-

25-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P11A	62.91	67.04	9.39	65.95	7.9
DA15	105.61	-	158.17	-	-
P15C	29.14	33.25	2.34	65.96	3
P15B	145.62	131.97	107.82	66.99	6
Out1	179.71	-	162.68	-	-
Out2	190.42	-	164.24	-	-
Out3	34.12	-	34.11	-	-

50-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P11A	76.75	80.01	18.23	5.61	8.3
DA15	130.04	-	190.68	-	-
P15C	35.84	40.17	4.11	66.05	3.1
P15B	181.23	165.83	134.07	67.13	6.8
Out1	218	-	196.81	-	-
Out2	236.31	-	209.43	-	-
Out3	42.8	-	42.79	-	-

100-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P11A	97.83	99.52	33.7	66.16	9.3
DA15	167.51	-	240.19	-	-
P15C	46.11	50.63	8.19	66.2	3.6
P15B	236.17	218.48	180.41	67.35	8.1
Out1	276.23	-	248.9	-	-
Out2	306.96	-	272.36	-	-
Out3	56.28	-	56.27	-	-

The proposed Pond “P11A” will have a surface area of 8 acres and provide a peak storage volume of 9.3 acre-feet. P11A will have 4:1 side slopes, be 3 feet deep and have one 6-inch low flow port and a 50-foot wide emergency spillway. The outlet structure can discharge through a 18-inch RCP to reduce the clogging factor. The pond will outfall into the concrete lined Channel 18b. P11A

The proposed Pond “P15C” will have a surface area of 3 acres and provide a peak storage volume of 3.6 acre-feet. P15C will have 4:1 side slopes, be 3 feet deep and have one 6-inch low flow port

and a 10-foot wide emergency spillway. The outlet structure can discharge through a 18-inch RCP to reduce the clogging factor. The pond will outfall into the concrete lined Channel 18b.

The proposed Pond "P15B" will have a surface area of 6 acres and provide a peak storage volume of 8.1 acre-feet. P15B will have 4:1 side slopes, be 3 feet deep and have three 24-inch RCP outlet pipes and a 50-foot wide emergency spillway. The outlet pipes will tie in to the existing storm drain and outfall to earthen drainage channels on the east side of Joe Stephens Avenue.

These three proposed detention ponds will provide sufficient mitigation for any adverse downstream impacts. A total of 17 acres of land is required to construct these ponds. The large surface area is a result of the airports flat topography.

6.1.2 Alternative 2

Detention Alternative 2 preserves the area adjacent to Joe Stephens Avenue for future development. Alternative 2 accounts for 2.5 feet of storage in the existing and future islands between the taxiways and runway. Four existing and four future islands could be used to attenuate runoff from the airport. The islands that flow south did not fully mitigate the 25-year event so Pond 11A was included to mitigate flows to "Out1". This can be seen on Exhibit 9.

The FAA AC 150/5320-5D recommends that a 5-year storm event not encroach the pavement of a taxiway or runway and that the center 50 percent of the runway or taxiway should be free from ponding that results from a 10-year storm. 2-2.4.2 of the Advisory Circular 5320-5D states storage of water between runways, taxiways and aprons should be considered a safety factor for temporary accommodation of runoff from storm return periods longer than 5 years. Therefore, the culverts could be restricted to temporarily store runoff less than 48 hours.

An outfall structure could be constructed on the upstream side of the culverts to convey low and high flows. The low flow port would be used to detain water in the island and the high flow port would utilize the full capacity of the culvert to convey larger events. The high flow port would also minimize the likelihood of water on the runway and taxiway. The taxiways and runway are at elevation 67.5 ft-msl, which is not reached until the 50-year event. The ponds were restricted to a 6-inch low flow port. Table 12 presents the stage-storage rating curves for the ponds.

Table 13 presents the results from HEC-HMS that indicate the 3 proposed detention facilities attenuate the post-development peak discharge rates to at or below pre-development.

Table 12. Alternative 2 Stage-Storage

DA14	
Elevation (ft)	**Volume (ac-ft)**
65.5	0.02
66.0	0.14
66.5	0.40
67.0	0.90
67.5	1.84

DA12	
Elevation (ft)	**Volume (ac-ft)**
65.5	0.01
66.0	0.15
66.5	0.89
67.0	2.34
67.5	4.29

DA10	
Elevation (ft)	**Volume (ac-ft)**
66.5	0.00
67.0	0.13
67.5	0.46
68.0	1.04

DA08	
Elevation (ft)	**Volume (ac-ft)**
65.5	0.01
66.0	0.15
66.5	0.88
67.0	2.17
67.5	3.97

DA06	
Elevation (ft)	**Volume (ac-ft)**
64.5	0.08
65.0	0.26
65.5	0.66
66.0	1.39
66.5	2.57
67.0	4.27
67.5	6.67

DA04	
Elevation (ft)	**Volume (ac-ft)**
65.5	0.01
66.0	0.27
66.5	1.09
67.0	2.31
67.5	3.87

(4) Existing Island Ponds
(4) Future Island Ponds
2.5 foot deep
(1) 6 inch Low Flow Port
(1) 2x2 foot High Flow Port

5 acres
3 feet deep
(1) 24 inch RCP
50 foot Spillway

Out1
Out2
Out3

DA01
DA02
DA03_A
DA03_B
DA04
DA05
DA06
DA07
DA08
DA10
DA11_A
DA11_B
DA12
DA13_A
DA13_B
DA13_C
DA14
DA15_A
DA15_B
DA15_C
DA17

P3_B
P4
P6
P7
P8
P11_B
P11A
P12
P13_B

East Sugar Cane Drive
Sugar Sweet Avenue
Vo Tech Drive
Joe Stephens Avenue
Palm Drive
Cedar Street
Avocado Drive
Magnolia Drive
Birch Drive
Los Arcos Circle
North Bridge
Washington Street
East Washington Street
Kennedy Drive
Wilson
East Jefferson Street
Roosevelt Street
East Roosevelt Street
East Lincoln Street
North Bridge Avenue
North Airport Drive
Pasea Del Norte
East Ballard Street
Haggar Avenue
Gte Drive
East Pike Boulevard
East Expressway 83

Legend

- Flow Direction
- FUT_DA
- Ponds
- Storm Pipe
- Contours_1ft

Development Type

- AWOS Sensitive Area
- Apron
- Building
- Office Space
- Road/Parking
- Segmented Circle and Wind Cone
- Taxiway

Exhibit 9

KSA

Alternative 2

Mid Valley Airport
Weslaco, Texas

0 412.5 825
Feet

N E W S

Table 13. Alternative 2 Summary of Results

2-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P4	4.04	5.87	0.31	66.03	0.3
P6	4.87	6.08	1	64.79	0.2
P3B	2.5	5.6	0.99	0.2	64.74
P8	4.6	5.13	0.52	66.03	0.2
P7	3.39	9.1	0.55	66.17	0.4
P12	3.68	8.4	0.69	66.38	0.3
P11B	2.89	5.87	0.59	66.16	0.2
P13B	6.78	6.25	0.59	66.19	0.2
P11A	15.98	20.84	4.02	64.12	1.9
Out1	48.73	-	49.81	-	-
Out2	41.06	-	37.45	-	-
Out3	6.97	-	4.81	-	-

5-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P4	7.6	10.98	0.34	66.23	0.7
P6	9.66	11.93	1.04	65.25	0.5
P3B	6.60	10.91	1.03	65.18	0.4
P8	9.14	10.14	0.55	66.22	0.5
P7	6.24	14.4	0.58	66.4	0.7
P12	7.23	16.25	0.74	66.9	0.8
P11B	5.49	11.59	0.64	66.64	0.5
P13B	12.62	11.92	0.64	66.66	0.6
P11A	29.99	35.21	8.96	64.76	2.9
Out1	88.2	-	81.63	-	-
Out2	83.99	-	63.01	-	-
Out3	14.22	-	11.18	-	-

10-year					
Pond	Existing Flow	Inflow	Outflow	Peak Stage	Peak Storage
	(cfs)	(cfs)	(cfs)	(ft)	(ac-ft)
P4	10.85	15.63	0.37	66.44	1
P6	14.08	17.37	65.57	65.57	0.8
P3B	10.67	15.82	1.06	65.51	0.7
P8	13.37	14.8	0.58	66.42	0.8
P7	8.81	19.06	0.6	66.57	1.1
P12	10.52	23.44	0.77	67.19	1.3
P11B	7.88	16.91	0.68	66.97	0.9
P13B	17.90	17.1	0.68	66.98	0.9
P11A	42.75	47.75	13.81	65.31	3.9
Out1	123.79	-	110.04	-	-
Out2	124.66	-	87.65	-	-
Out3	21.74	-	17.38	-	-

25-year					
Pond	Existing Flow	Inflow	Outflow	Peak Stage	Peak Storage
	(cfs)	(cfs)	(cfs)	(ft)	(ac-ft)
P4	15.97	22.93	0.4	66.68	1.5
P6	21.19	26.02	1.1	65.94	1.3
P3B	17.53	23.62	1.09	65.83	1.1
P8	20.12	22.24	0.61	66.65	1.3
P7	12.85	26.29	0.63	66.78	1.6
P12	15.78	34.86	2.37	67.52	1.8
P11B	11.67	25.38	0.71	67.29	1.4
P13B	26.18	25.3	0.71	67.28	1.4
P11A	62.91	67.04	34.61	65.92	4.9
Out1	179.71	-	154.72	-	-
Out2	190.42	-	128.22	-	-
Out3	34.12	-	27.36	-	-

50-year					
Pond	Existing Flow	Inflow	Outflow	Peak Stage	Peak Storage
	(cfs)	(cfs)	(cfs)	(ft)	(ac-ft)
P4	19.49	27.92	0.42	66.84	1.9
P6	26.1	31.98	1.12	66.13	1.7
P3B	22.45	28.99	1.11	66.04	1.5
P8	24.78	27.36	0.63	66.79	1.6
P7	15.61	31.19	0.65	66.92	2
P12	19.41	42.76	7.57	67.55	1.8
P11B	14.27	31.22	1.26	67.51	1.8
P13B	31.84	30.92	0.73	67.5	1.8
P11A	76.75	80	49.9	66.05	5.2
Out1	218	-	185.32	-	-
Out2	236.31	-	157.7	-	-
Out3	42.8	-	34.43	-	-

100-year					
Pond	Existing Flow	Inflow	Outflow	Peak Stage	Peak Storage
	(cfs)	(cfs)	(cfs)	(ft)	(ac-ft)
P4	24.84	35.49	0.44	67.07	2.5
P6	33.6	41.08	1.14	66.4	2.3
P3B	30.13	37.18	1.13	66.28	2.1
P8	31.9	35.19	0.66	67.01	2.2
P7	19.79	38.64	0.67	67.11	2.6
P12	24.97	54.8	34.58	67.65	1.8
P11B	18.25	40.13	6.02	67.54	1.8
P13B	40.42	39.46	6.79	67.55	1.8
P11A	97.83	99.52	69.15	66.18	5.9
Out1	276.23	-	253.96	-	-
Out2	306.96	-	203.59	-	-
Out3	56.28	-	45.39	-	-

The proposed Pond “P11A” will have a surface area of 5 acres and provide a peak storage volume of 5.9 acre-feet. P11A will have 4:1 side slopes, be 3 feet deep and have one 24-inch outlet pipe and a 50-foot wide emergency spillway. The pond will outfall into the concrete lined Channel 18b.

The island ponds between the runway and parallel taxiway will only need an outlet structure constructed on the upstream side of the culverts. The outlet structure will consist of a 6-inch low flow port and a 2’x2’ high flow port. The island ponds provide 17 acre-feet of storage.

These proposed detention ponds will provide sufficient mitigation for adverse downstream impacts. 5 acres of land is required to construct these ponds after the parallel taxiway is constructed.

6.1.3 Alternative 3

Alternative 3 preserves adjacent lots in DA15B on Joe Stephens Avenue for future development as seen in Exhibit 10. Runoff on the north half of the airport is re-routed to the west, then travels south towards the WWTP. This will be made possible by re-grading the earthen channel in DA15_B and reinstalling the storm drain at a negative slope. Pond "P5" is not located on airport property nor is DA05. If this alternative is chosen the land will have to be purchased. P5 will have to be moved north to DA05, if the WW basin is needed by the WWTP.

The proposed Pond "P5" will have a surface area of 15 acres and provide a peak storage volume of 18.9 acre-feet. P5 will have 4:1 side slopes, be 3 feet deep and have one 24-inch outlet pipe and a 100-foot wide emergency spillway. Pond P5 outfalls into an earthen channel along Airport Drive. The channel will convey the flows south to concrete Channel 18b. Ponds P11A and 15C are needed to detain the storm events first flows and mitigate the flows for Out1.

The proposed Pond "P11A" will have a surface area of 8 acres and provide a peak storage volume of 9.3 acre-feet. P11A will have 4:1 side slopes, be 3 feet deep and have one 6-inch low flow port and a 50-foot wide emergency spillway. The pond will outfall into the concrete lined Channel 18b.

The proposed Pond "P15C" will have a surface area of 3 acres and provide a peak storage volume of 3.4 acre-feet. P15C will have 4:1 side slopes, be 3 feet deep and have one 6-inch low flow port and a 20-foot wide emergency spillway. The pond will outfall into the concrete lined Channel 18b.

The results for this alternative can be seen in Table 14. The results from HEC-HMS indicate the 3 proposed detention facilities attenuate the post-development peak discharge rates to at or below pre-development.

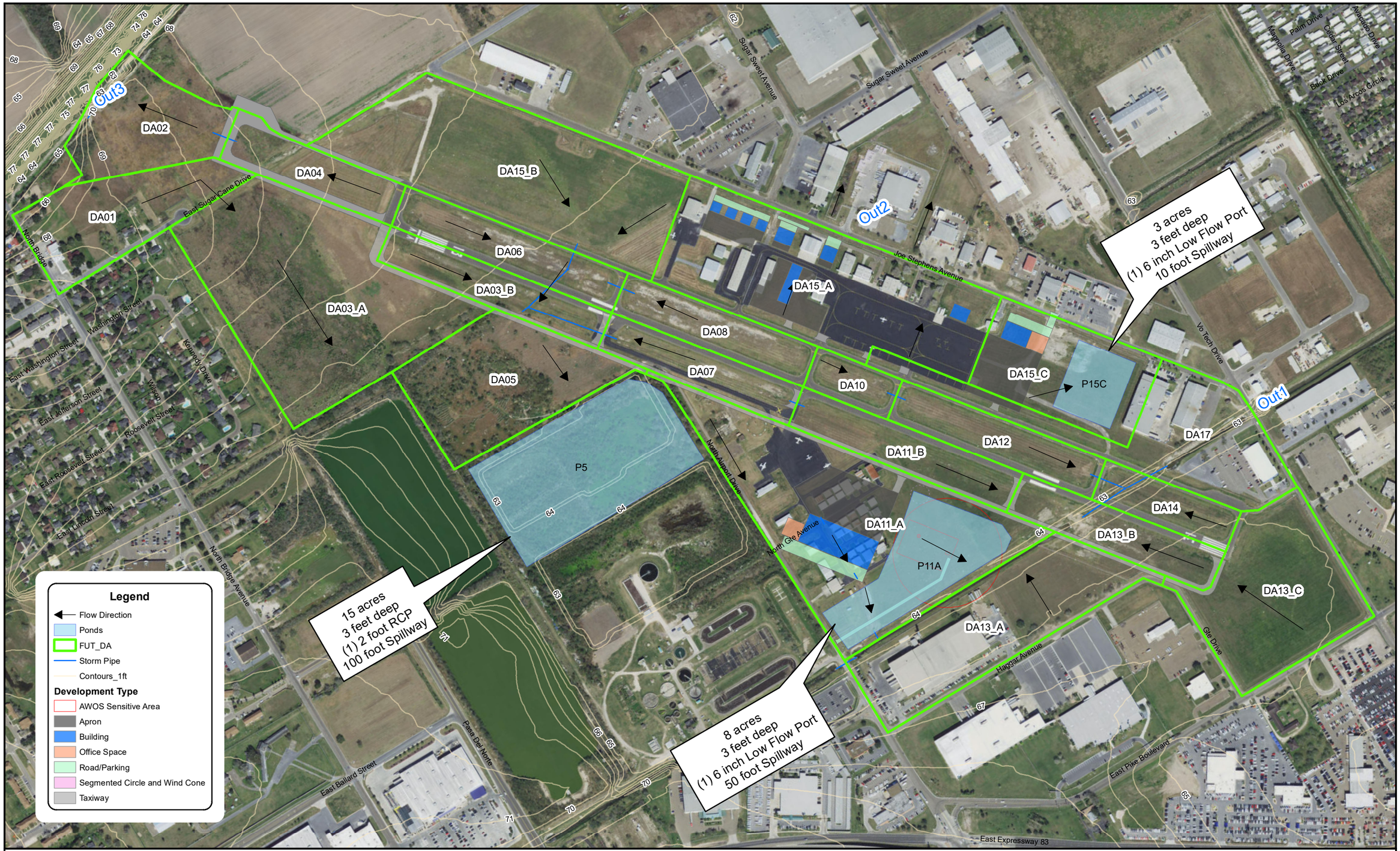


Exhibit 10

KSA

Alternative 3

Mid Valley Airport
Weslaco, Texas

0 412.5 825
Feet

N E S W

Table 14. Alternative 3 Summary of Results

2-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P5	17.86	22.5	2.2	63.85	4.3
P11A	15.98	20.84	0.6	64.18	3.1
P15C	6.79	7.58	0.25	63.98	1
Out1	48.73	-	54.04	-	-
Out2	41.06	-	31.33	-	-
Out3	6.97	-	6.97	-	-

5-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P5	40.41	51.11	6.52	64.5	7.5
P11A	29.99	35.21	0.84	64.98	5.3
P15C	13.35	13.53	0.34	64.74	1.7
Out1	88.2	-	91.73	-	-
Out2	83.99	-	47.54	-	-
Out3	14.22	-	14.22	-	-

10-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P5	63.14	81.18	11.77	65.11	10.6
P11A	42.75	47.75	1.01	65.71	7.2
P15C	19.42	18.86	0.41	65.44	2.4
Out1	123.79	-	125.33	-	-
Out2	124.66	-	61.12	-	-
Out3	21.74	-	21.74	-	-

25-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P5	100.85	131.95	33.87	65.94	14.7
P11A	62.91	67.04	9.89	65.95	7.9
P15C	29.14	27.17	2.76	65.91	2.9
Out1	179.71	-	177.84	-	-
Out2	190.42	-	81.41	-	-
Out3	34.12	-	34.11	-	-

50-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P5	127.6	168.17	63.8	66.08	16.2
P11A	76.75	80.01	18.75	66.04	8.3
P15C	35.84	32.83	6.12	66.01	3
Out1	218	-	213.91	-	-
Out2	236.31	-	94.87	-	-
Out3	42.8	-	42.79	-	-

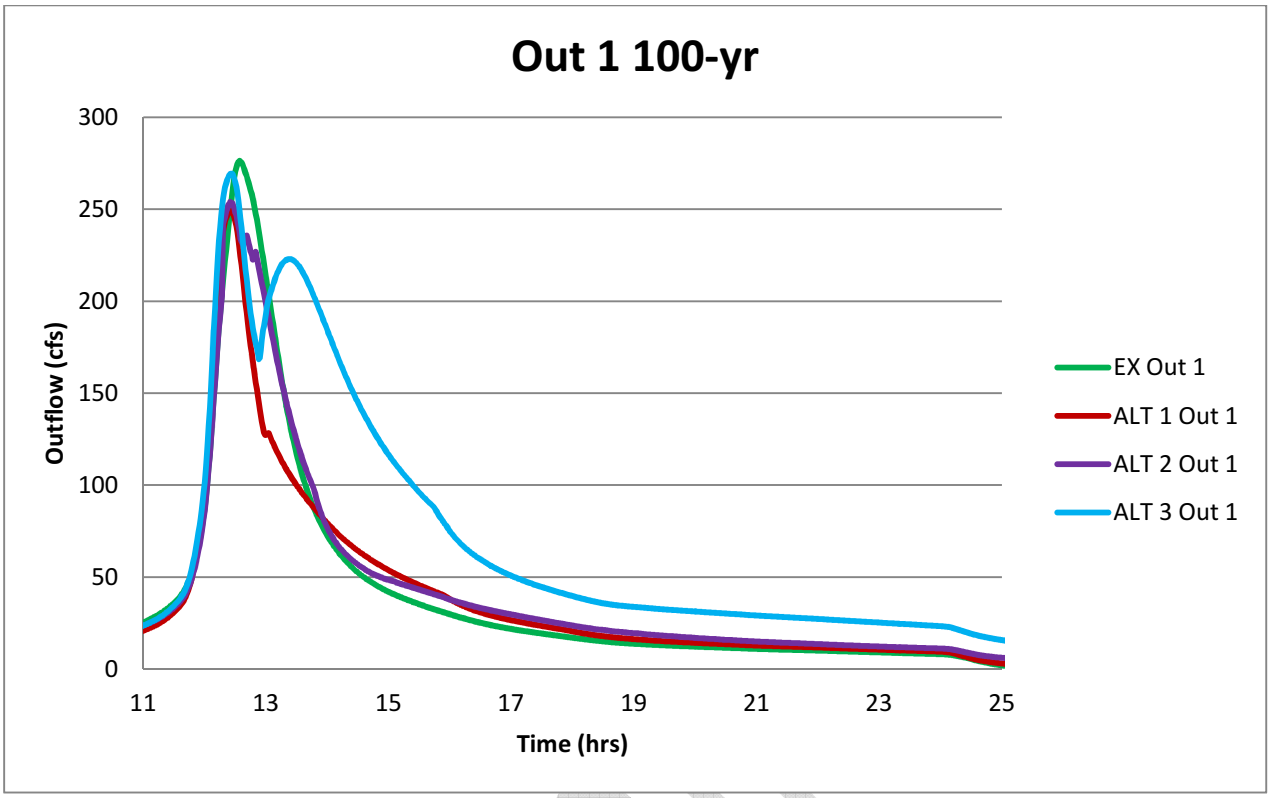
100-year					
Pond	Existing Flow (cfs)	Inflow (cfs)	Outflow (cfs)	Peak Stage (ft)	Peak Storage (ac-ft)
P5	169.32	224.69	114.81	66.26	18.9
P11A	97.83	99.52	34.41	66.17	9.3
P15C	46.11	41.38	12	66.13	3.4
Out1	276.23	-	269.36	-	-
Out2	306.96	-	114.94	-	-
Out3	56.28	-	56.27	-	-

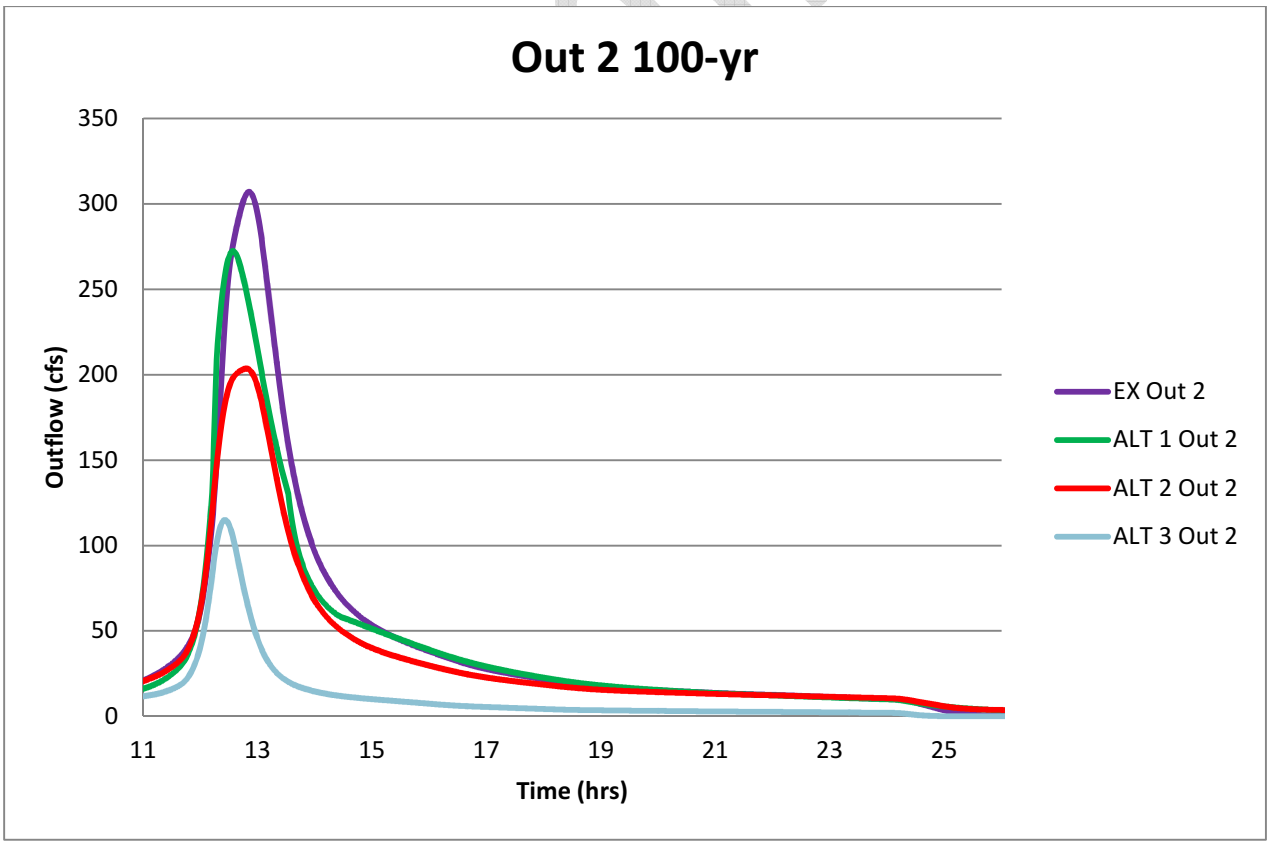
7.0 SUMMARY AND CONCLUSIONS

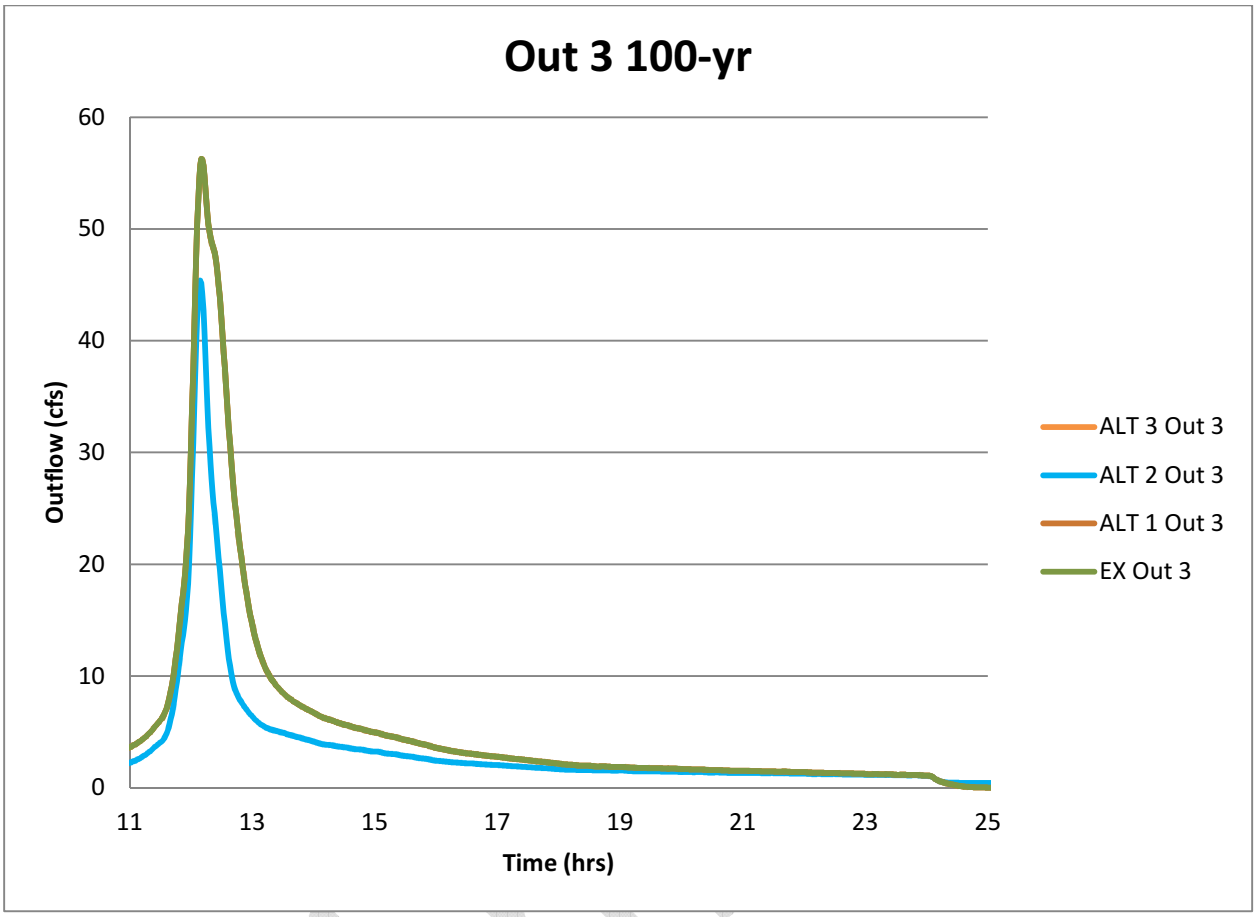
3 Alternatives were designed that detain excess runoff created by future development and release flows into downstream channels at a rate equal to or less than pre-development rates. The flows are release at three outlets for the Airport: Out1, Out2 and Out3. The hydrographs at these outlet locations are provided in the graphs below.

KSA recommends Alternative 2 to mitigate Mid Valley Airport's additional flows created by the future development. The conceptual development plan and conceptual drainage improvements are depicted in Exhibit 9. Alternative 2 will utilize current infrastructure and be the most cost effective way to store the excess runoff after the parallel taxiway is constructed on west Runway 13/31. This alternative will install multi-port outlet structures on the upstream side of culverts to utilize storage created between the runway and taxiways. Valuable property adjacent to Joe Stephens Avenue will be preserved for future development.

This study was to explore different detention options that will serve future development of Mid Valley Airport. The final drainage plan will need to be adjusted, refined and designed to support actual airport development.


Out 1 100-yr
Outflow (cfs)
300
250
200
150
100
50
0
11
13
15
17
19
21
23
25
Time (hrs)
EX Out 1
ALT 1 Out 1
ALT 2 Out 1
ALT 3 Out 1


Out 2 100-yr
Outflow (cfs)
350
300
250
200
150
100
50
0
11
13
15
17
19
21
23
25
Time (hrs)
EX Out 2
ALT 1 Out 2
ALT 2 Out 2
ALT 3 Out 2



MID VALLEY AIRPORT

WESLACO, TX

DRAINAGE STUDY

KSA Job No: WSL.007

APPENDIX A

(Table 3-1 Manning's N Values - Sheet Flow)

Sheet flow

Sheet flow is flow over plane surfaces. It usually occurs in the headwater of streams. With sheet flow, the friction value (Manning's n) is an effective roughness coefficient that includes the effect of raindrop impact; drag over the plane surface; obstacles such as litter, crop ridges, and rocks; and erosion and transportation of sediment. These n values are for very shallow flow depths of about 0.1 foot or so. Table 3-1 gives Manning's n values for sheet flow for various surface conditions.

Table 3-1 Roughness coefficients (Manning's n) for sheet flow

Surface description	n [1/]
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses [2/]	0.24
Bermudagrass .	0.41
Range (natural)	0.13
Woods:[3/]	
Light underbrush	0.40
Dense underbrush	0.80

1 The n values are a composite of information compiled by Engman (1986).

2 Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.

3 When selecting n , consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

For sheet flow of less than 300 feet, use Manning's kinematic solution (Overtop and Meadows 1976) to compute T_t:

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}} \qquad \text{[eq. 3-3]}$$

where:

T_t = travel time (hr),
n = Manning's roughness coefficient (table 3-1)
L = flow length (ft)
P_2 = 2-year, 24-hour rainfall (in)
s = slope of hydraulic grade line (land slope, ft/ft)

This simplified form of the Manning's kinematic solution is based on the following: (1) shallow steady uniform flow, (2) constant intensity of rainfall excess (that part of a rain available for runoff), (3) rainfall duration of 24 hours, and (4) minor effect of infiltration on travel time. Rainfall depth can be obtained from appendix B.

Shallow concentrated flow

After a maximum of 300 feet, sheet flow usually becomes shallow concentrated flow. The average velocity for this flow can be determined from figure 3-1, in which average velocity is a function of watercourse slope and type of channel. For slopes less than 0.005 ft/ft, use equations given in appendix F for figure 3-1. Tillage can affect the direction of shallow concentrated flow. Flow may not always be directly down the watershed slope if tillage runs across the slope.

After determining average velocity in figure 3-1, use equation 3-1 to estimate travel time for the shallow concentrated flow segment.

Open channels

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle sheets. Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for bankfull elevation.

MID VALLEY AIRPORT

WESLACO, TX

DRAINAGE STUDY

KSA Job No: WSL.007

APPENDIX B

(Manning's N Values - Channel Flow)

Show

Manning's n Values

Reference tables for Manning's n values for Channels, Closed Conduits Flowing Partially Full, and Corrugated Metal Pipes.

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070
3. Floodplains			
a. Pasture, no brush			
1.short grass	0.025	0.030	0.035
2. high grass	0.030	0.035	0.050
b. Cultivated areas			
1. no crop	0.020	0.030	0.040
2. mature row crops	0.025	0.035	0.045
3. mature field crops	0.030	0.040	0.050
c. Brush			
1. scattered brush, heavy weeds	0.035	0.050	0.070
2. light brush and trees, in winter	0.035	0.050	0.060
3. light brush and trees, in summer	0.040	0.060	0.080
4. medium to dense brush, in winter	0.045	0.070	0.110
5. medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. dense willows, summer, straight	0.110	0.150	0.200

2. cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. same as 4. with flood stage reaching branches	0.100	0.120	0.160
4. Excavated or Dredged Channels			
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	0.040
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, brush on sides	0.040	0.050	0.080
3. same as above, highest stage of flow	0.045	0.070	0.110
4. dense brush, high stage	0.080	0.100	0.140
5. Lined or Constructed Channels			
a. Cement			
1. neat surface	0.010	0.011	0.013
2. mortar	0.011	0.013	0.015
b. Wood			
1. planed, untreated	0.010	0.012	0.014
2. planed, creosoted	0.011	0.012	0.015
3. unplaned	0.011	0.013	0.015
4. plank with battens	0.012	0.015	0.018
5. lined with roofing paper	0.010	0.014	0.017
c. Concrete			

1. trowel finish	0.011	0.013	0.015
2. float finish	0.013	0.015	0.016
3. finished, with gravel on bottom	0.015	0.017	0.020
4. unfinished	0.014	0.017	0.020
5. gunite, good section	0.016	0.019	0.023
6. gunite, wavy section	0.018	0.022	0.025
7. on good excavated rock	0.017	0.020	
8. on irregular excavated rock	0.022	0.027	
d. Concrete bottom float finish with sides of:			
1. dressed stone in mortar	0.015	0.017	0.020
2. random stone in mortar	0.017	0.020	0.024
3. cement rubble masonry, plastered	0.016	0.020	0.024
4. cement rubble masonry	0.020	0.025	0.030
5. dry rubble or riprap	0.020	0.030	0.035
e. Gravel bottom with sides of:			
1. formed concrete	0.017	0.020	0.025
2. random stone mortar	0.020	0.023	0.026
3. dry rubble or riprap	0.023	0.033	0.036
f. Brick			
1. glazed	0.011	0.013	0.015
2. in cement mortar	0.012	0.015	0.018
g. Masonry			
1. cemented rubble	0.017	0.025	0.030
2. dry rubble	0.023	0.032	0.035
h. Dressed ashlar/stone paving	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

Manning's n for Closed Conduits Flowing Partly Full (Chow, 1959).

Type of Conduit and Description	Minimum	Normal	Maximum
1. Brass, smooth:	0.009	0.010	0.013
2. Steel:			
Lockbar and welded	0.010	0.012	0.014
Riveted and spiral	0.013	0.016	0.017
3. Cast Iron:			
Coated	0.010	0.013	0.014
Uncoated	0.011	0.014	0.016
4. Wrought Iron:			
Black	0.012	0.014	0.015
Galvanized	0.013	0.016	0.017
5. Corrugated Metal:			

Subdrain	0.017	0.019	0.021
Stormdrain	0.021	0.024	0.030
6. Cement:			
Neat Surface	0.010	0.011	0.013
Mortar	0.011	0.013	0.015
7. Concrete:			
Culvert, straight and free of debris	0.010	0.011	0.013
Culvert with bends, connections, and some debris	0.011	0.013	0.014
Finished	0.011	0.012	0.014
Sewer with manholes, inlet, etc., straight	0.013	0.015	0.017
Unfinished, steel form	0.012	0.013	0.014
Unfinished, smooth wood form	0.012	0.014	0.016
Unfinished, rough wood form	0.015	0.017	0.020
8. Wood:			
Stave	0.010	0.012	0.014
Laminated, treated	0.015	0.017	0.020
9. Clay:			
Common drainage tile	0.011	0.013	0.017
Vitrified sewer	0.011	0.014	0.017
Vitrified sewer with manholes, inlet, etc.	0.013	0.015	0.017
Vitrified Subdrain with open joint	0.014	0.016	0.018
10. Brickwork:			
Glazed	0.011	0.013	0.015
Lined with cement mortar	0.012	0.015	0.017
Sanitary sewers coated with sewage slime with bends and connections	0.012	0.013	0.016
Paved invert, sewer, smooth bottom	0.016	0.019	0.020
Rubble masonry, cemented	0.018	0.025	0.030

Manning's n for Corrugated Metal Pipe (AISI, 1980).

Type of Pipe, Diameter and Corrugation Dimension	n
1. Annular 2.67 x 1/2 inch (all diameters)	0.024
2. Helical 1.50 x 1/4 inch	
8" diameter	0.012
10" diameter	0.014
3. Helical 2.67 x 1/2 inch	
12" diameter	0.011
18" diameter	0.014
24" diameter	0.016
36" diameter	0.019
48" diameter	0.020
60" diameter	0.021
4. Annular 3x1 inch (all diameters)	0.027
5. Helical 3x1 inch	
48" diameter	0.023
54" diameter	0.023
60" diameter	0.024
66" diameter	0.025

72" diameter	0.026
78" diameter and larger	0.027
6. Corrugations 6x2 inches	
60" diameter	0.033
72" diameter	0.032
120" diameter	0.030
180" diameter	0.028

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KSA Job No: WSL.007

APPENDIX C

(Existing Tc Calculation Backup Data)

APPENDIX C

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Existing Conditions Time of Concentration

DA	Flow Type	Surface Description	Manning's Roughness n	Flow Length L (ft)	Slope s (ft/ft)	Hydraulic Radius r (SF)	Velocity V (fps)	Travel Time (hr)	Travel Time (min)
DA14	SHEET	Smooth surfaces	0.011	100	0.02			0.02	1.47
DA01	SHEET	Smooth surfaces	0.011	100	0.002			0.06	3.70
DA02	SHEET	Smooth surfaces	0.011	100	0.004			0.05	2.80
DA03	SHEET	Short grass prairie	0.15	100	0.001			0.66	39.44
DA04	SHEET	Smooth surfaces	0.011	100	0.008			0.04	2.12
DA06	SHEET	Smooth surfaces	0.011	100	0.013			0.03	1.75
DA07	SHEET	Smooth surfaces	0.011	100	0.016			0.03	1.61
DA08	SHEET	Smooth surfaces	0.011	100	0.013			0.03	1.75
DA09	SHEET	Smooth surfaces	0.011	100	0.001			0.08	4.88
DA10	SHEET	Smooth surfaces	0.011	100	0.01			0.03	1.94
DA11	SHEET	Short grass prairie	0.15	100	0.001			0.66	39.44
DA12	SHEET	Smooth surfaces	0.011	100	0.025			0.02	1.35
DA13	SHEET	Short grass prairie	0.15	100	0.001			0.66	39.44
DA17	SHEET	Short grass prairie	0.15	100	0.02			0.20	11.90
DA16	SHEET	Smooth surfaces	0.011	100	0.001			0.08	4.88
DA15	SHEET	Short grass prairie	0.15	100	0.001			0.66	39.44
DA05	SHEET	Short grass prairie	0.15	100	0.001			0.66	39.44
DA04	SHALLOW	Unpaved		850.205	0.001		0.51	0.46	27.77
DA06	SHALLOW	Unpaved		979.336	0.003		0.88	0.31	18.47
DA08	SHALLOW	Unpaved		980.936	0.006		1.25	0.22	13.08
DA10	SHALLOW	Unpaved		365.313	0.004		1.02	0.10	5.97
DA12	SHALLOW	Unpaved		1011.12	0.001		0.51	0.55	33.03
DA14	SHALLOW	Unpaved		537.28	0.002		0.72	0.21	12.41
DA07	SHALLOW	Unpaved		938.616	0.0015		0.62	0.42	25.03
DA09	SHALLOW	Unpaved		869.947	0.001		0.51	0.47	28.42
DA11	SHALLOW	Unpaved		1084.36	0.001		0.51	0.59	35.42
DA02	SHALLOW	Unpaved		640.775	0.005		1.14	0.16	9.36
DA01	SHALLOW	Unpaved		1135.86	0.001		0.51	0.62	37.10
DA03	SHALLOW	Unpaved		1549.51	0.003		0.88	0.49	29.22
DA13	SHALLOW	Unpaved		1400.02	0.002		0.72	0.54	32.34
DA17	SHALLOW	Unpaved		1438.64	0.005		1.14	0.35	21.02
DA16	SHALLOW	Paved		1458	0.001		0.64	0.63	37.80
DA15	SHALLOW	Unpaved		771.926	0.001		0.51	0.42	25.22
DA05	SHALLOW	Unpaved		563.46	0.001		0.51	0.31	18.41
DA03	CHANNEL			636.618	0.005		3.00	0.06	3.54
DA15	CHANNEL			641.951	0.001		3.00	0.06	3.57
Minutes	1440	Rainfall	2-YR	P (in)	2.17				

APPENDIX C

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Existing Conditions Routing Time of Concentration

FID	Id	FLOW	LENGTH	DA	SURFACE	SLOPE	REACH	Velocity V (fps)	Travel Time (hr)	Travel Time (min)
0	0	SHALLOW	338.257	DA16		0.005	R11	1.14	0.08	4.94
1	0	SHALLOW	86.4003	DA10		0.02	R12	2.28	0.01	0.63
3	0	SHALLOW	1241.21	DA10		0.001	R12	0.51	0.68	40.55
4	0	SHALLOW	810.523	DA04		0.005	R2	1.14	0.20	11.84
5	0	SHALLOW	1442.66	DA01		0.003	R3	0.88	0.45	27.21
9	0	SHALLOW	1090.69	DA09		0.001	R7	0.51	0.59	35.63
12	0	SHALLOW	840.652	DA06		0.001	R15	0.51	0.46	27.46
2	0	PIPE	87.0555	DA10		0.01	R12	6.00	0.00	0.24
7	0	PIPE	592.467	DA07		0	R5	6.00	0.03	1.65
8	0	PIPE	347.447	DA03		0	R6	6.00	0.02	0.97
6	0	CHANNEL	636.618	DA01		0.005	R3	3.00	0.06	3.54
10	0	CHANNEL	1523.47	DA16		0.002	R13	3.00	0.14	8.46
11	0	CHANNEL	286.938	DA16		0.002	R14	3.00	0.03	1.59
13	0	CHANNEL	815.567	DA16		0.002	R17	3.00	0.08	4.53

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APPENDIX D

(Table 2-2a Curve Number Values)

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
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
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
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) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: 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. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

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DRAINAGE STUDY

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APPENDIX E

(Existing Curve Number Backup Data)

APPENDIX D

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Existing Conditions Composite Curve Numbers

DA	DA Area	Land Use Area	Land Use	Soil	CN	CN Percentage
DA06	7.0510	5.1630	Good condition (grass cover > 75%)	B	61	44.6670
DA04	5.8178	3.8809	Good condition (grass cover > 75%)	B	61	40.6916
DA02	9.1353	7.6773	Good condition (grass cover > 75%)	B	61	51.2645
DA01	10.3939	0.0291	Good condition (grass cover > 75%)	B	61	0.1705
DA01	10.3939	6.0502	Good condition (grass cover > 75%)	B	61	35.5078
DA03	31.9109	30.8094	Good condition (grass cover > 75%)	B	61	58.8944
DA05	16.7470	14.4790	Good condition (grass cover > 75%)	B	61	52.7389
DA05	16.7470	1.6918	Good condition (grass cover > 75%)	B	61	6.1623
DA07	4.3164	0.9082	Good condition (grass cover > 75%)	B	61	12.8352
DA07	4.3164	1.8266	Good condition (grass cover > 75%)	B	61	25.8140
DA08	6.0758	4.4963	Good condition (grass cover > 75%)	B	61	45.1427
DA10	2.6881	1.8365	Good condition (grass cover > 75%)	B	61	41.6750
DA09	4.9679	2.9715	Good condition (grass cover > 75%)	B	61	36.4863
DA12	6.4988	4.7107	Good condition (grass cover > 75%)	B	61	44.2158
DA14	4.3058	3.1141	Good condition (grass cover > 75%)	B	61	44.1169
DA13	36.0395	4.3927	Good condition (grass cover > 75%)	C	74	9.0195
DA13	36.0395	19.7752	Good condition (grass cover > 75%)	B	61	33.4713
DA01	10.3939	0.5417	1/2 acre	B	70	3.6484
DA01	10.3939	0.6402	2 acres	B	65	4.0033
DA01	10.3939	0.7926	2 acres	B	65	4.9567
DA01	10.3939	0.7519	1 acre	B	68	4.9191
DA01	10.3939	0.1453	Paved parking lots, roofs, driveways	B	98	1.3704
DA01	10.3939	0.6199	Paved parking lots, roofs, driveways	B	98	5.8448
DA03	31.9109	0.0513	Paved parking lots, roofs, driveways	B	98	0.1576
DA04	5.8178	0.2498	Paved parking lots, roofs, driveways	B	98	4.2080
DA02	9.1353	0.1424	Paved; open ditches	B	89	1.3873
DA02	9.1353	0.3082	Paved; open ditches	B	89	3.0028
DA02	9.1353	0.7504	Gravel	B	85	6.9824
DA03	31.9109	0.5827	Paved parking lots, roofs, driveways	B	98	1.7895
DA06	7.0510	1.8879	Paved parking lots, roofs, driveways	B	98	26.2399
DA05	16.7470	0.1893	Paved parking lots, roofs, driveways	B	98	1.1075
DA05	16.7470	0.3867	Paved parking lots, roofs, driveways	B	98	2.2629
DA07	4.3164	0.3917	Paved parking lots, roofs, driveways	B	98	8.8934
DA07	4.3164	1.1898	Paved parking lots, roofs, driveways	B	98	27.0145
DA08	6.0758	1.5794	Paved parking lots, roofs, driveways	B	98	25.4756
DA09	4.9679	1.9964	Paved parking lots, roofs, driveways	B	98	39.3826
DA10	2.6881	0.8516	Paved parking lots, roofs, driveways	B	98	31.0469
DA11	23.9001	0.2580	Good condition (grass cover > 75%)	B	61	0.6585
DA11	23.9001	0.0221	Good condition (grass cover > 75%)	B	61	0.0565
DA11	23.9001	0.1965	Good condition (grass cover > 75%)	B	61	0.5016
DA11	23.9001	0.0432	Good condition (grass cover > 75%)	B	61	0.1103
DA11	23.9001	9.7786	Good condition (grass cover > 75%)	C	74	30.2767
DA11	23.9001	9.2085	Good condition (grass cover > 75%)	B	61	23.5028
DA11	23.9001	1.4954	Paved parking lots, roofs, driveways	C	98	6.1317
DA11	23.9001	1.2777	Paved parking lots, roofs, driveways	B	98	5.2390
DA11	23.9001	0.0104	Paved parking lots, roofs, driveways	C	98	0.0426
DA11	23.9001	0.0282	Paved parking lots, roofs, driveways	B	98	0.1157
DA11	23.9001	0.9039	Paved parking lots, roofs, driveways	B	98	3.7065
DA11	23.9001	0.3433	Paved; open ditches	C	92	1.3213
DA11	23.9001	0.2305	Paved; open ditches	B	89	0.8582
DA12	6.4988	1.7861	Paved parking lots, roofs, driveways	B	98	26.9333
DA14	4.3058	1.1916	Paved parking lots, roofs, driveways	B	98	27.1211
DA13	36.0395	0.7999	Paved parking lots, roofs, driveways	B	98	2.1750
DA13	36.0395	0.4372	Paved parking lots, roofs, driveways	B	98	1.1890
DA13	36.0395	0.6787	Paved parking lots, roofs, driveways	C	98	1.8455
DA13	36.0395	0.5697	Paved parking lots, roofs, driveways	B	98	1.5491
DA11	23.9001	0.1016	Paved parking lots, roofs, driveways	C	98	0.4166
DA13	36.0395	0.4500	Paved; open ditches	C	92	1.1488
DA13	36.0395	0.3456	Paved; open ditches	B	89	0.8533
DA13	36.0395	8.5906	Commercial business	C	94	22.4063
DA03	31.9109	0.4675	Paved parking lots, roofs, driveways	B	98	1.4359
DA04	5.8178	1.6870	Paved parking lots, roofs, driveways	B	98	28.4181
DA02	9.1353	0.2567	Paved parking lots, roofs, driveways	B	98	2.7534
DA01	10.3939	0.1320	Paved parking lots, roofs, driveways	B	98	1.2445
DA15	62.2293	0.9721	Good condition (grass cover > 75%)	C	74	1.1560
DA15	62.2293	10.0324	Good condition (grass cover > 75%)	B	61	9.8342
DA16	10.2785	1.6924	Good condition (grass cover > 75%)	C	74	12.1845
DA16	10.2785	1.8607	Good condition (grass cover > 75%)	B	61	11.0426
DA16	10.2785	3.4237	Good condition (grass cover > 75%)	B	61	20.3185
DA15	62.2293	3.5048	Good condition (grass cover > 75%)	B	61	3.4356
DA15	62.2293	21.6622	Good condition (grass cover > 75%)	B	61	21.2343
DA15	62.2293	0.8454	Good condition (grass cover > 75%)	B	61	0.8287
DA15	62.2293	2.7507	Good condition (grass cover > 75%)	B	61	2.6963
DA15	62.2293	2.7230	Good condition (grass cover > 75%)	B	61	2.6692
DA15	62.2293	0.4994	Good condition (grass cover > 75%)	B	61	0.4896
DA15	62.2293	0.4791	Good condition (grass cover > 75%)	B	61	0.4696
DA15	62.2293	0.1309	Good condition (grass cover > 75%)	B	61	0.1283
DA15	62.2293	0.0414	Good condition (grass cover > 75%)	B	61	0.0406
DA15	62.2293	0.0429	Good condition (grass cover > 75%)	B	61	0.0420
DA15	62.2293	1.0798	Good condition (grass cover > 75%)	B	61	1.0585
DA15	62.2293	0.3443	Good condition (grass cover > 75%)	B	61	0.3375
DA17	14.0353	4.1471	Commercial business	B	92	27.1838
DA15	62.2293	0.3224	Paved parking lots, roofs, driveways	C	98	0.5078
DA15	62.2293	14.9180	Paved parking lots, roofs, driveways	B	98	23.4932
DA17	14.0353	0.5207	Paved; open ditches	B	89	3.3019
DA17	14.0353	0.9810	Commercial business	C	94	6.5701
DA17	14.0353	2.9512	Commercial business	B	92	19.3448
DA17	14.0353	0.3435	Paved parking lots, roofs, driveways	C	98	2.3982
DA17	14.0353	2.2258	Paved parking lots, roofs, driveways	B	98	15.5413
DA15	62.2293	0.0518	Paved parking lots, roofs, driveways	B	98	0.0815
DA15	62.2293	0.0362	Paved parking lots, roofs, driveways	B	98	0.0570
DA15	62.2293	0.1929	Paved parking lots, roofs, driveways	B	98	0.3038
DA15	62.2293	0.0130	Good condition (grass cover > 75%)	B	61	0.0127
DA15	62.2293	0.1328	Commercial business	C	94	0.2006
DA15	62.2293	0.4834	Commercial business	B	92	0.7147
DA15	62.2293	0.6373	Gravel	B	85	0.8705
DA17	14.0353	0.0352	Gravel	B	85	0.2132
DA16	10.2785	0.0003	Paved parking lots, roofs, driveways	C	98	0.0029
DA16	10.2785	0.0053	Paved parking lots, roofs, driveways	C	98	0.0507
DA16	10.2785	0.0003	Paved parking lots, roofs, driveways	B	98	0.0025
DA16	10.2785	0.0072	Paved parking lots, roofs, driveways	B	98	0.0683
DA16	10.2785	0.1945	Paved parking lots, roofs, driveways	C	98	1.8543
DA16	10.2785	0.2354	Paved parking lots, roofs, driveways	B	98	2.2445
DA16	10.2785	0.2560	Paved parking lots, roofs, driveways	B	98	2.4408
DA16	10.2785	0.7951	Paved parking lots, roofs, driveways	C	98	7.5811
DA16	10.2785	0.1449	Paved parking lots, roofs, driveways	B	98	1.3813
DA16	10.2785	1.1088	Paved parking lots, roofs, driveways	B	98	10.5719
DA16	10.2785	0.0005	Paved parking lots, roofs, driveways	B	98	0.0044
DA16	10.2785	0.2784	Paved parking lots, roofs, driveways	B	98	2.6542
DA16	10.2785	0.2610	Paved parking lots, roofs, driveways	B	98	2.4887
DA16	10.2785	0.0270	Paved parking lots, roofs, driveways	B	98	0.2570
DA16	10.2785	0.0055	Paved parking lots, roofs, driveways	C	98	0.0520
DA15	62.2293	0.0009	Gravel	B	85	0.0013
DA16	10.2785	0.0007	Paved parking lots, roofs, driveways	B	98	0.0069
DA16	10.2785	0.0001	Paved parking lots, roofs, driveways	B	98	0.0014
DA16	10.2785	0.0051	Paved parking lots, roofs, driveways	B	98	0.0488
DA01	10.3939	0.2737	Commercial business	B	92	2.4223
DA01	10.3939	0.4173	Commercial business	B	92	3.6935
DA15	62.2293	0.3285	Paved parking lots, roofs, driveways	B	98	0.5174
DA17	14.0353	1.0872	Good condition (grass cover > 75%)	B	61	4.7250
DA17	14.0353	1.7445	Good condition (grass cover > 75%)	B	61	7.5821
DA04	5.8178	0.0000	Good condition (grass cover > 75%)	B	61	0.0001
DA04	5.8178	0.0000	Paved parking lots, roofs, driveways	B	98	0.0001
DA02	9.1353	0.0005	Good condition (grass cover > 75%)	B	61	0.0031
DA02	9.1353	0.0005	Paved parking lots, roofs, driveways	B	98	0.0050
DA02	9.1353	0.0000	Paved parking lots, roofs, driveways	B	98	0.0004
DA01	10.3939	0.0000	Paved parking lots, roofs, driveways	B	98	0.0004
DA06	7.0510	0.0000	Paved parking lots, roofs, driveways	B	98	0.0001
DA05	16.7470	0.0000	Paved parking lots, roofs, driveways	B	98	0.0001
DA05	16.7470	0.0003	Paved parking lots, roofs, driveways	B	98	0.0015
DA16	10.2785	0.0003	Good condition (grass cover > 75%)	B	61	0.0016
DA11	23.9001	0.0021	Paved parking lots, roofs, driveways	B	98	0.0086
DA12	6.4988	0.0021	Paved parking lots, roofs, driveways	B	98	0.0315
DA11	23.9001	0.0001	Paved parking lots, roofs, driveways	B	98	0.0004
DA14	4.3058	0.0001	Paved parking lots, roofs, driveways	B	98	0.0025
DA15	62.2293	0.0001	Good condition (grass cover > 75%)	B	61	0.0001
DA17	14.0353	0.0001	Good condition (grass cover > 75%)	B	61	0.0003
DA15	62.2293	0.0026	Good condition (grass cover > 75%)	B	61	0.0025
DA15	62.2293	0.0026	Gravel	B	85	0.0035
DA17	14.0353	0.0001	Good condition (grass cover > 75%)	B	61	0.0005
DA15	62.2293	0.0001	Paved parking lots, roofs, driveways	B	98	0.0002

MID VALLEY AIRPORT

WESLACO, TX

DRAINAGE STUDY

KSA Job No: WSL.007

APPENDIX F

(Future Tc Backup Data)

APPENDIX F

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Future Conditions Time of Concentration

DA	Flow Type	Surface Description	Manning's Roughness n	Flow Length L (ft)	Slope s (ft/ft)	Hydraulic Radius r (SF)	Velocity V (fps)	Travel Time (hr)	Travel Time (min)
DA14	SHEET	Smooth surfaces	0.011	100.00	0.02000			0.02	1.47
DA01	SHEET	Smooth surfaces	0.011	100.00	0.00200			0.06	3.70
DA02	SHEET	Smooth surfaces	0.011	100.00	0.00400			0.05	2.80
DA03_A	SHEET	Short grass prairie	0.15	100.00	0.00100			0.66	39.44
DA04	SHEET	Smooth surfaces	0.011	100.00	0.00800			0.04	2.12
DA06	SHEET	Smooth surfaces	0.011	100.00	0.01300			0.03	1.75
DA07	SHEET	Smooth surfaces	0.011	100.00	0.01600			0.03	1.61
DA08	SHEET	Smooth surfaces	0.011	100.00	0.01300			0.03	1.75
DA10	SHEET	Smooth surfaces	0.011	100.00	0.01000			0.03	1.94
DA11_B	SHEET	Short grass prairie	0.15	100.00	0.02000			0.20	11.90
DA12	SHEET	Smooth surfaces	0.011	100.00	0.02500			0.02	1.35
DA13_C	SHEET	Short grass prairie	0.15	100.00	0.00100			0.66	39.44
DA17	SHEET	Short grass prairie	0.15	100.00	0.02000			0.20	11.90
DA11_A	SHEET	Smooth surfaces	0.011	100.00	0.00100			0.08	4.88
DA05	SHEET	Short grass prairie	0.15	100.00	0.00100			0.66	39.44
DA15_B	SHEET	Short grass prairie	0.15	100.00	0.00100			0.66	39.44
DA03_B	SHEET	Smooth surfaces	0.011	100.00	0.02000			0.02	1.47
DA13_B	SHEET	Smooth surfaces	0.011	100.00	0.02000			0.02	1.47
DA13_A	SHEET	Short grass prairie	0.15	100.00	0.00200			0.50	29.89
DA15_C	SHEET	Short grass prairie	0.15	100.00	0.00200			0.50	29.89
DA15_A	SHEET	Short grass prairie	0.15	100.00	0.00200			0.50	29.89
DA04	SHALLOW	Unpaved		850.21	0.00100		0.51	0.46	27.77
DA06	SHALLOW	Unpaved		979.34	0.00300		0.88	0.31	18.47
DA08	SHALLOW	Unpaved		980.94	0.00600		1.25	0.22	13.08
DA10	SHALLOW	Unpaved		365.31	0.00400		1.02	0.10	5.97
DA12	SHALLOW	Unpaved		1011.12	0.00100		0.51	0.55	33.03
DA14	SHALLOW	Unpaved		540.25	0.00200		0.72	0.21	12.48
DA07	SHALLOW	Unpaved		938.62	0.00150		0.62	0.42	25.03
DA11_B	SHALLOW	Unpaved		1150.56	0.00500		1.14	0.28	16.81
DA02	SHALLOW	Unpaved		640.78	0.00500		1.14	0.16	9.36
DA01	SHALLOW	Unpaved		1135.86	0.00100		0.51	0.62	37.10
DA03_A	SHALLOW	Unpaved		1549.51	0.00300		0.88	0.49	29.22
DA13_B	SHALLOW	Unpaved		705.84	0.00200		0.72	0.27	16.30
DA17	SHALLOW	Unpaved		1396.04	0.00500		1.14	0.34	20.39
DA11_A	SHALLOW	Unpaved		1646.87	0.00100		0.51	0.90	53.80
DA05	SHALLOW	Unpaved		563.46	0.00100		0.51	0.31	18.41
DA15_B	SHALLOW	Unpaved		771.93	0.00100		0.51	0.42	25.22
DA03_B	SHALLOW	Unpaved		767.97	0.00200		0.72	0.30	17.74
DA13_C	SHALLOW	Unpaved		599.98	0.00100		0.51	0.33	19.60
DA13_A	SHALLOW	Unpaved		366.11	0.00500		1.14	0.09	5.35
DA15_C	SHALLOW	Unpaved		496.34	0.00100		0.51	0.27	16.21
DA15_A	SHALLOW	Unpaved		293.67	0.00100		0.51	0.16	9.59
DA03_A	CHANNEL			462.94	0.00500		3.00	0.04	2.57
DA11_A	CHANNEL			305.30	0.00200		3.00	0.03	1.70
DA13_A	CHANNEL			305.30	0.00200		3.00	0.03	1.70
DA15_B	CHANNEL			641.95	0.00100		3.00	0.06	3.57
DA17	CHANNEL			550.10	0.00500		3.00	0.05	3.06
DA11_A	CHANNEL			1305.56	0.00200		3.00	0.12	7.25
DA15_A	CHANNEL			236.27	0.00100		3.00	0.02	1.31
Minutes	1440	Rainfall	2-YR	P (in)	2.17				

APPENDIX F

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Future Conditions Routing Time of Concentration

FID	Id	FLOW	LENGTH	DA	SURFACE	SLOPE	REACH	Velocity V (fps)	Travel Time (hr)	Travel Time (min)
0	0	SHALLOW	338.257	DA16		0.005	R11_A	1.14	0.08	4.94
1	0	SHALLOW	86.4003	DA10		0.02	R12	2.28	0.01	0.63
3	0	SHALLOW	1241.21	DA10		0.001	R12	0.51	0.68	40.55
4	0	SHALLOW	810.523	DA04		0.005	R2	1.14	0.20	11.84
5	0	SHALLOW	1442.66	DA01		0.003	R3_A	0.88	0.45	27.21
9	0	SHALLOW	1090.69	DA09		0.001	R7	0.51	0.59	35.63
12	0	SHALLOW	840.652	DA06		0.001	R15	0.51	0.46	27.46
14	0	SHALLOW	810.159	DA13		0.002	R13_B	0.72	0.31	18.71
2	0	PIPE	87.0555	DA10		0.01	R12	6.00	0.00	0.24
7	0	PIPE	592.467	DA07		0	R5	6.00	0.03	1.65
8	0	PIPE	347.447	DA03		0	R6	6.00	0.02	0.97
6	0	CHANNEL	354.302	DA01		0.005	R3_A	3.00	0.03	1.97
10	0	CHANNEL	1523.47	DA16		0.002	R13_A	3.00	0.14	8.46
11	0	CHANNEL	286.938	DA16		0.002	R14	3.00	0.03	1.59
13	0	CHANNEL	815.567	DA16		0.002	R17	3.00	0.08	4.53
15	0	CHANNEL	282.316	DA01		0.005	R3_B	3.00	0.03	1.57

MID VALLEY AIRPORT

WESLACO, TX

DRAINAGE STUDY

KSA Job No: WSL.007

APPENDIX G

(Future CN Backup Data)

APPENDIX G

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Future Conditions Composite Curve Number

DA	DA Area	Land Use Area	Land Use	Soil	CN	CN Percentage
DA06	7.0510	5.1630	Good condition (grass cover > 75%)	B	61	44.6670
DA04	5.8172	3.8623	Good condition (grass cover > 75%)	B	61	40.5014
DA05	13.8312	12.5652	Good condition (grass cover > 75%)	B	61	55.4165
DA01	10.3939	0.0291	Good condition (grass cover > 75%)	B	61	0.1705
DA02	9.1356	7.6758	Good condition (grass cover > 75%)	B	61	51.2524
DA01	10.3939	6.0499	Good condition (grass cover > 75%)	B	61	35.5061
DA03_A	28.1688	26.8946	Good condition (grass cover > 75%)	B	61	58.2407
DA05	13.8312	0.6807	Good condition (grass cover > 75%)	B	61	3.0021
DA08	6.0758	4.4963	Good condition (grass cover > 75%)	B	61	45.1427
DA10	2.6881	1.8365	Good condition (grass cover > 75%)	B	61	41.6750
DA12	6.4988	4.7107	Good condition (grass cover > 75%)	B	61	44.2158
DA14	4.3058	3.1141	Good condition (grass cover > 75%)	B	61	44.1169
DA13_C	15.0063	1.7862	Good condition (grass cover > 75%)	C	74	8.8083
DA13_C	15.0063	11.8832	Good condition (grass cover > 75%)	B	61	48.3047
DA01	10.3939	0.5417	1/2 acre	B	70	3.6484
DA01	10.3939	0.6402	2 acres	B	65	4.0033
DA01	10.3939	0.7926	2 acres	B	65	4.9567
DA01	10.3939	0.7519	1 acre	B	68	4.9191
DA01	10.3939	0.1453	Paved parking lots, roofs, driveways	B	98	1.3704
DA01	10.3939	0.6199	Paved parking lots, roofs, driveways	B	98	5.8448
DA03_A	28.1688	0.0513	Paved parking lots, roofs, driveways	B	98	0.1785
DA02	9.1356	0.1424	Paved; open ditches	B	89	1.3872
DA02	9.1356	0.3082	Paved; open ditches	B	89	3.0027
DA02	9.1356	0.7504	Gravel	B	85	6.9822
DA11_A	29.1600	0.3433	Paved; open ditches	C	92	1.0830
DA13_A	16.5092	0.4500	Paved; open ditches	C	92	2.5079
DA11_A	29.1600	0.1130	Paved; open ditches	B	89	0.3450
DA13_A	16.5092	0.1935	Paved; open ditches	B	89	1.0432
DA13_B	6.5852	0.2695	Paved; open ditches	B	89	3.6420
DA11_A	29.1600	0.3046	Paved parking lots, roofs, driveways	C	98	1.0236
DA13_A	16.5092	0.6172	Paved parking lots, roofs, driveways	C	98	3.6640
DA13_C	15.0063	0.0614	Paved parking lots, roofs, driveways	C	98	0.4013
DA11_A	29.1600	0.1860	Paved parking lots, roofs, driveways	B	98	0.6252
DA11_A	29.1600	0.2307	Paved parking lots, roofs, driveways	B	98	0.7752
DA13_A	16.5092	0.2349	Paved parking lots, roofs, driveways	B	98	1.3944
DA13_C	15.0063	0.3348	Paved parking lots, roofs, driveways	B	98	2.1864
DA13_A	16.5092	8.5906	Commercial business	C	94	48.9128
DA15_C	11.2783	0.9721	Good condition (grass cover > 75%)	C	74	6.3784
DA17	14.5940	2.1230	Good condition (grass cover > 75%)	B	61	8.8736
DA15_C	11.2783	5.5047	Good condition (grass cover > 75%)	B	61	29.7725
DA15_B	25.6408	3.5048	Good condition (grass cover > 75%)	B	61	8.3380
DA15_A	24.7921	0.8311	Good condition (grass cover > 75%)	B	61	2.0449
DA15_B	25.6408	20.8365	Good condition (grass cover > 75%)	B	61	49.5705
DA15_A	24.7921	0.8454	Good condition (grass cover > 75%)	B	61	2.0801
DA11_A	29.1600	3.4483	Paved parking lots, roofs, driveways	C	98	11.5891
DA05	13.8312	0.5435	Paved parking lots, roofs, driveways	B	98	3.8510
DA07	5.7853	1.0575	Paved parking lots, roofs, driveways	B	98	17.9128
DA11_A	29.1600	0.3048	Paved parking lots, roofs, driveways	B	98	1.0244
DA03_B	6.3373	0.3781	Paved parking lots, roofs, driveways	B	98	5.8470
DA17	14.5940	0.3423	Paved parking lots, roofs, driveways	C	98	2.2986
DA15_C	11.2783	0.3224	Paved parking lots, roofs, driveways	C	98	2.8016
DA06	7.0510	1.8879	Paved parking lots, roofs, driveways	B	98	26.2400
DA04	5.8172	1.9545	Paved parking lots, roofs, driveways	B	98	32.9276
DA02	9.1356	0.2588	Paved parking lots, roofs, driveways	B	98	2.7758
DA01	10.3939	0.1323	Paved parking lots, roofs, driveways	B	98	1.2472
DA03_A	28.1688	1.2229	Paved parking lots, roofs, driveways	B	98	4.2544
DA05	13.8312	0.0418	Paved parking lots, roofs, driveways	B	98	0.2962
DA07	5.7853	1.4299	Paved parking lots, roofs, driveways	B	98	24.2219
DA08	6.0758	1.5794	Paved parking lots, roofs, driveways	B	98	25.4756
DA10	2.6881	0.8516	Paved parking lots, roofs, driveways	B	98	31.0469
DA12	6.4988	1.7861	Paved parking lots, roofs, driveways	B	98	26.9333
DA14	4.3058	1.1916	Paved parking lots, roofs, driveways	B	98	27.1211
DA11_A	29.1600	5.5420	Paved parking lots, roofs, driveways	B	98	18.6253
DA15_A	24.7921	17.7821	Paved parking lots, roofs, driveways	B	98	70.2904
DA17	14.5940	2.9344	Paved parking lots, roofs, driveways	B	98	19.7048
DA03_B	6.3373	1.3796	Paved parking lots, roofs, driveways	B	98	21.3345
DA11_B	6.9153	1.8112	Paved parking lots, roofs, driveways	B	98	25.6677
DA13_B	6.5852	1.1762	Paved parking lots, roofs, driveways	B	98	17.5046
DA13_C	15.0063	0.6643	Paved parking lots, roofs, driveways	B	98	4.3384
DA15_B	25.6408	1.2823	Paved parking lots, roofs, driveways	B	98	4.9011
DA15_C	11.2783	3.3013	Paved parking lots, roofs, driveways	B	98	28.6855
DA15_A	24.7921	0.2072	Good condition (grass cover > 75%)	B	61	0.5098
DA15_A	24.7921	0.1309	Good condition (grass cover > 75%)	B	61	0.3220
DA15_A	24.7921	0.0414	Good condition (grass cover > 75%)	B	61	0.1019
DA15_A	24.7921	0.0429	Good condition (grass cover > 75%)	B	61	0.1055
DA15_A	24.7921	0.9501	Good condition (grass cover > 75%)	B	61	2.3378
DA15_A	24.7921	0.3877	Good condition (grass cover > 75%)	B	61	0.9540
DA15_A	24.7921	1.4557	Good condition (grass cover > 75%)	B	61	3.5817
DA15_C	11.2783	0.0234	Good condition (grass cover > 75%)	B	61	0.1263
DA17	14.5940	4.1410	Commercial business	B	92	26.1046
DA17	14.5940	0.5207	Paved; open ditches	B	89	3.1755
DA15_A	24.7921	1.2687	Good condition (grass cover > 75%)	B	61	3.1216
DA15_A	24.7921	0.0139	Good condition (grass cover > 75%)	B	61	0.0342
DA15_A	24.7921	0.1702	Good condition (grass cover > 75%)	B	61	0.4188
DA15_A	24.7921	0.1837	Paved parking lots, roofs, driveways	B	98	0.7260
DA17	14.5940	0.5844	Good condition (grass cover > 75%)	B	61	2.4427
DA15_A	24.7921	0.0281	Good condition (grass cover > 75%)	B	61	0.0691
DA15_A	24.7921	0.2771	Good condition (grass cover > 75%)	B	61	0.6817
DA15_A	24.7921	0.0360	Good condition (grass cover > 75%)	B	61	0.0885
DA03_B	6.3373	0.8611	Good condition (grass cover > 75%)	B	61	8.2885
DA03_B	6.3373	3.7184	Good condition (grass cover > 75%)	B	61	35.7915
DA07	5.7853	0.3790	Good condition (grass cover > 75%)	B	61	3.9960
DA07	5.7853	0.0760	Good condition (grass cover > 75%)	B	61	0.8010
DA07	5.7853	0.9082	Good condition (grass cover > 75%)	B	61	9.5763
DA07	5.7853	1.9030	Good condition (grass cover > 75%)	B	61	20.0656
DA11_B	6.9153	5.1034	Good condition (grass cover > 75%)	B	61	45.0170
DA11_A	29.1600	9.8798	Good condition (grass cover > 75%)	C	74	25.0721
DA11_A	29.1600	0.1499	Good condition (grass cover > 75%)	B	61	0.3135
DA11_A	29.1600	5.4919	Good condition (grass cover > 75%)	B	61	11.4886
DA11_A	29.1600	0.3700	Paved parking lots, roofs, driveways	C	98	1.2436
DA13_B	6.5852	4.4983	Good condition (grass cover > 75%)	B	61	41.6688
DA13_A	16.5092	0.3600	Paved parking lots, roofs, driveways	B	98	2.1370
DA13_B	6.5852	0.6397	Paved parking lots, roofs, driveways	B	98	9.5196
DA13_C	15.0063	0.2763	Paved parking lots, roofs, driveways	B	98	1.8041
DA17	14.5940	0.9801	Commercial business	C	94	6.3129
DA15_C	11.2783	0.1328	Commercial business	C	94	1.1070
DA17	14.5940	2.9545	Commercial business	B	92	18.6250
DA15_C	11.2783	0.4850	Commercial business	B	92	3.9559
DA13_A	16.5092	2.6065	Good condition (grass cover > 75%)	C	74	11.6832
DA13_A	16.5092	3.4565	Good condition (grass cover > 75%)	B	61	12.7715
DA01	10.3939	0.2737	Commercial business	B	92	2.4223
DA01	10.3939	0.4173	Commercial business	B	92	3.6935
DA07	5.7853	0.0317	Good condition (grass cover > 75%)	B	61	0.3344
DA11_A	29.1600	0.0000	Paved parking lots, roofs, driveways	B	98	0.0000
DA15_A	24.7921	0.0000	Good condition (grass cover > 75%)	B	61	0.0000
DA15_C	11.2783	0.4062	Good condition (grass cover > 75%)	B	61	2.1971
DA15_A	24.7921	0.0130	Good condition (grass cover > 75%)	B	61	0.0319
DA15_A	24.7921	0.0362	Paved parking lots, roofs, driveways	B	98	0.1432
DA15_A	24.7921	0.0645	Paved parking lots, roofs, driveways	B	98	0.2550
DA15_C	11.2783	0.1284	Paved parking lots, roofs, driveways	B	98	1.1154
DA11_A	29.1600	0.0651	Good condition (grass cover > 75%)	C	74	0.1653
DA11_A	29.1600	0.3916	Good condition (grass cover > 75%)	B	61	0.8192
DA11_A	29.1600	0.2349	Good condition (grass cover > 75%)	B	61	0.4914
DA11_A	29.1600	0.6428	Good condition (grass cover > 75%)	B	61	1.3446
DA11_A	29.1600	0.2303	Paved parking lots, roofs, driveways	B	98	0.7740
DA11_A	29.1600	0.0268	Paved parking lots, roofs, driveways	B	98	0.0900
DA11_A	29.1600	0.0005	Paved parking lots, roofs, driveways	B	98	0.0015
DA11_A	29.1600	0.2803	Paved parking lots, roofs, driveways	B	98	0.9422
DA11_A	29.1600	0.9058	Good condition (grass cover > 75%)	B	61	1.8950
DA02	9.1356	0.0000	Paved parking lots, roofs, driveways	B	98	0.0004
DA01	10.3939	0.0000	Paved parking lots, roofs, driveways	B	98	0.0004
DA12	6.4988	0.0007	Paved parking lots, roofs, driveways	B	98	0.0104
DA11_B	6.9153	0.0007	Paved parking lots, roofs, driveways	B	98	0.0098
DA12	6.4988	0.0014	Paved parking lots, roofs, driveways	B	98	0.0211
DA13_B	6.5852	0.0014	Paved parking lots, roofs, driveways	B	98	0.0208
DA14	4.3058	0.0001	Paved parking lots, roofs, driveways	B	98	0.0025
DA13_B	6.5852	0.0001	Paved parking lots, roofs, driveways	B	98	0.0016
DA04	5.8172	0.0002	Good condition (grass cover > 75%)	B	61	0.0019
DA04	5.8172	0.0002	Paved parking lots, roofs, driveways	B	98	0.0030
DA11_A	29.1600	0.0040	Paved parking lots, roofs, driveways	C	98	0.0136
DA11_A	29.1600	0.0040	Good condition (grass cover > 75%)	C	74	0.0103
DA11_A	29.1600	0.0010	Paved parking lots, roofs, driveways	B	98	0.0034
DA11_A	29.1600	0.0010	Good condition (grass cover > 75%)	B	61	0.0021
DA11_A	29.1600	0.0117	Paved parking lots, roofs, driveways	B	98	0.0392
DA11_A	29.1600	0.0117	Good condition (grass cover > 75%)	B	61	0.0244
DA11_A	29.1600	0.0007	Paved parking lots, roofs, driveways	B	98	0.0025
DA11_A	29.1600	0.0007	Good condition (grass cover > 75%)	B	61	0.0015
DA15_A	24.7921	0.0005	Paved parking lots, roofs, driveways	B	98	0.0019
DA15_A	24.7921	0.0005	Good condition (grass cover > 75%)	B	61	0.0012
DA17	14.5940	0.0061	Paved parking lots, roofs, driveways	B	98	0.0410
DA17	14.5940	0.0061	Commercial business	B	92	0.0385
DA17	14.5940	0.0002	Paved parking lots, roofs, driveways	B	98	0.0012
DA17	14.5940	0.0002	Good condition (grass cover > 75%)	B	61	0.0008
DA17	14.5940	0.0009	Paved parking lots, roofs, driveways	C	98	0.0059
DA17	14.5940	0.0009	Commercial business	C	94	0.0057
DA15_C	11.2783	0.0000	Paved parking lots, roofs, driveways	C	98	0.0000
DA15_C	11.2783	0.0000	Commercial business	C	94	0.0000
DA17	14.5940	0.0003	Paved parking lots, roofs, driveways	B	98	0.0021
DA17	14.5940	0.0003	Commercial business	B	92	0.0019
DA03_B	6.3373	0.0001	Paved parking lots, roofs, driveways	B	98	0.0014
DA03_B	6.3373	0.0001	Paved parking lots, roofs, driveways	B	98	0.0014
DA11_A	29.1600	0.0001	Paved parking lots, roofs, driveways	B	98	0.0003
DA11_A	29.1600	0.0001	Good condition (grass cover > 75%)	B	61	0.0002

MID VALLEY AIRPORT

WESLACO, TX

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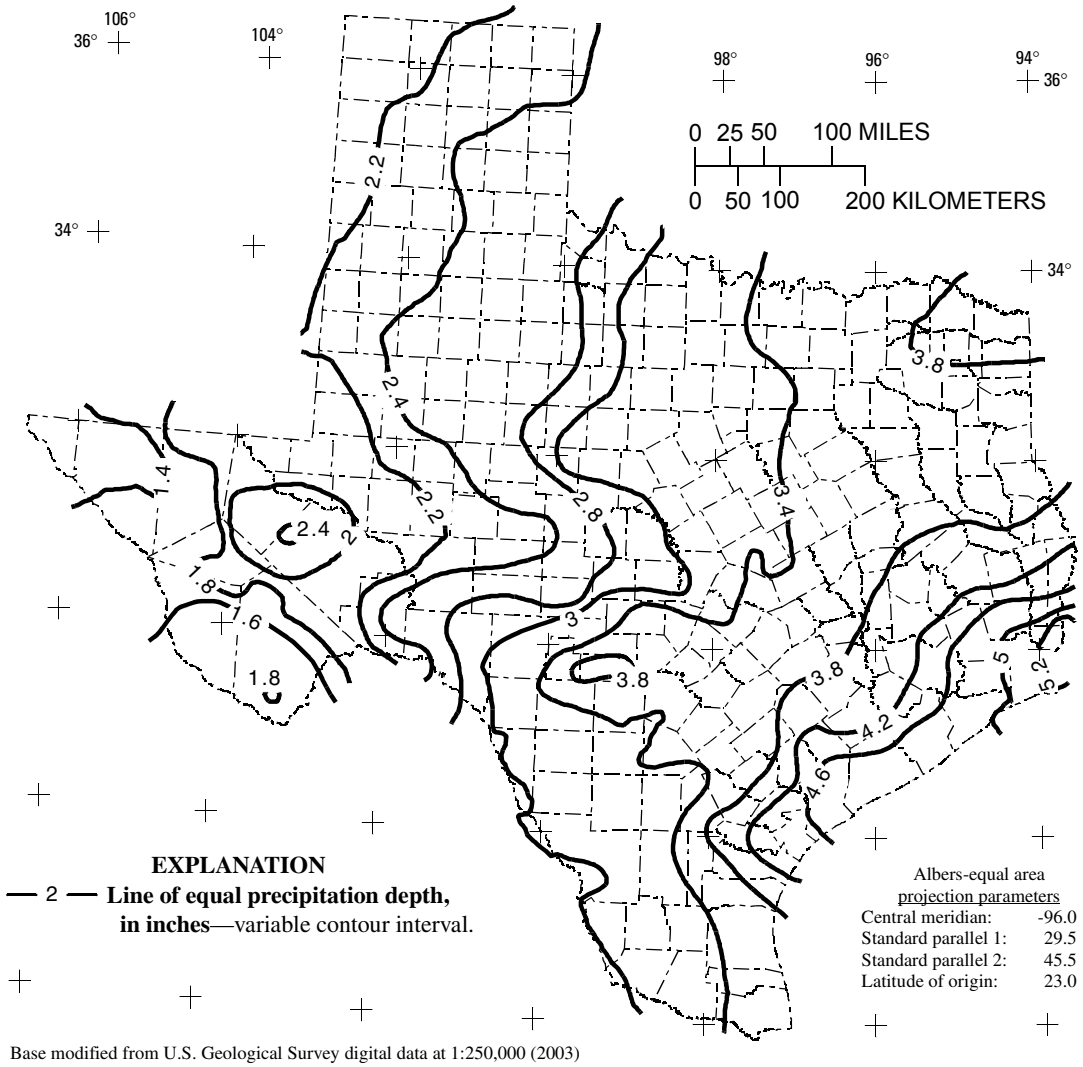
KSA Job No: WSL.007

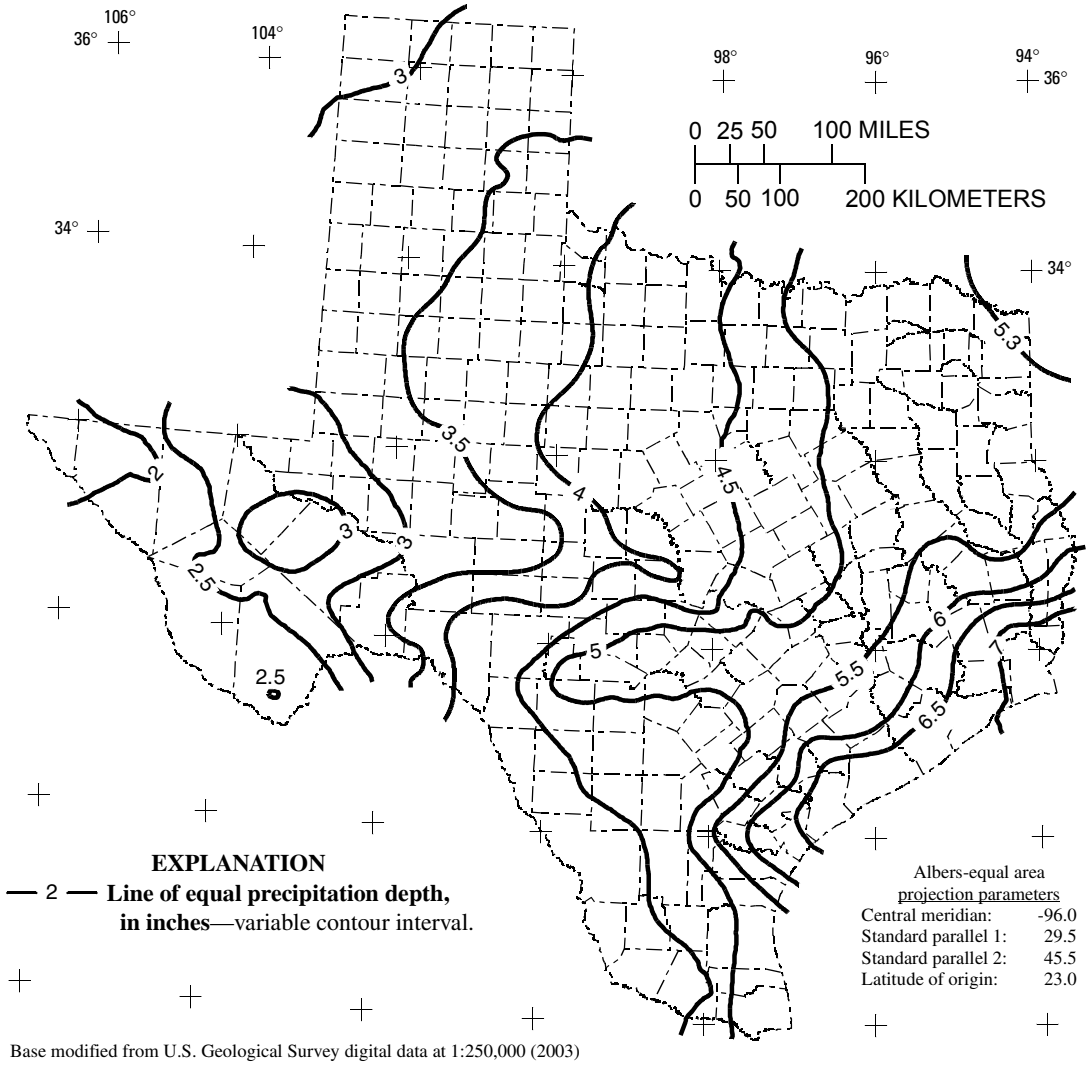
APPENDIX H

(Maps from USGS Atlas)



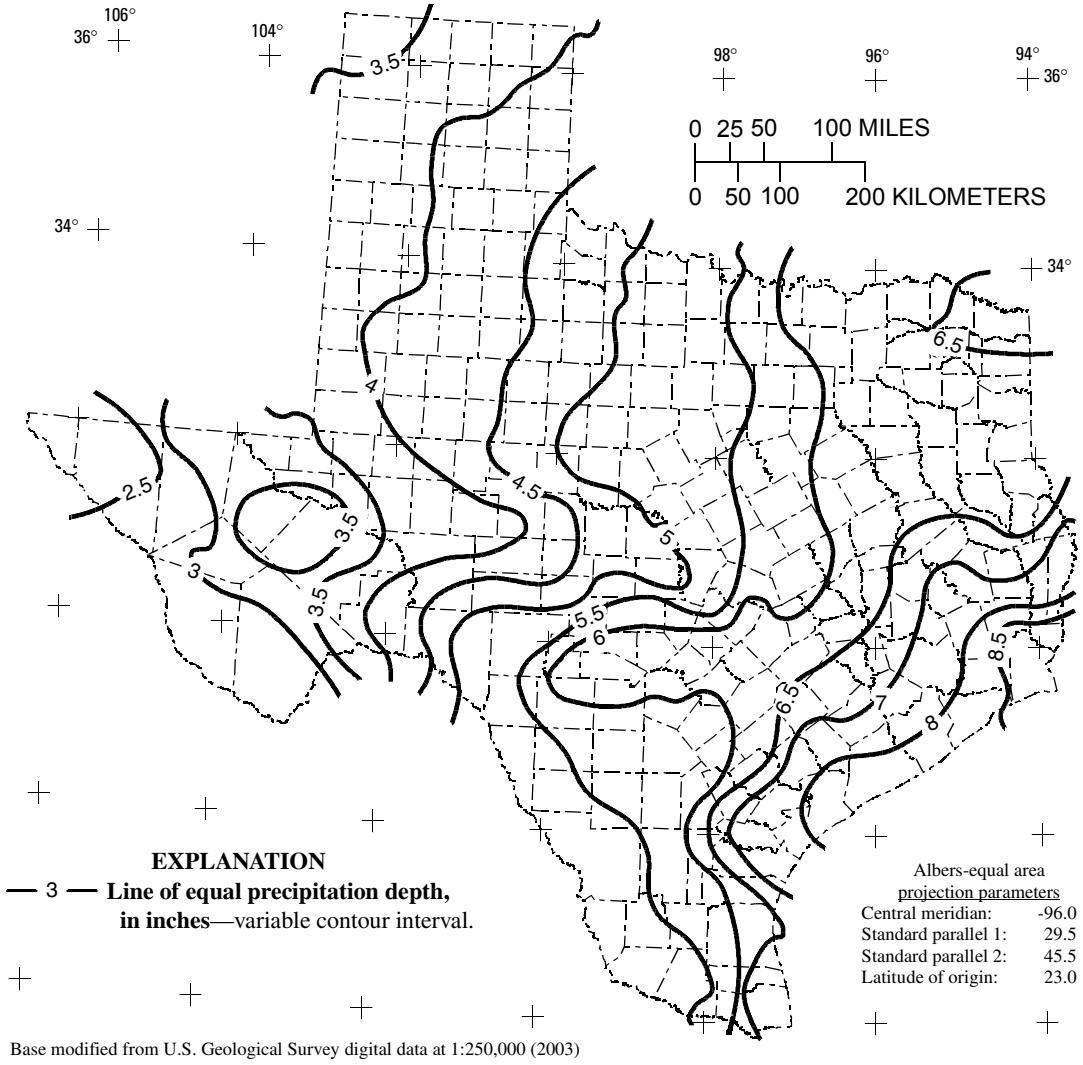
Base modified from U.S. Geological Survey digital data at 1:250,000 (2003)

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



Base modified from U.S. Geological Survey digital data at 1:250,000 (2003)

Figure 23. Depth of precipitation for 5-year storm for 1-day duration in Texas.



Base modified from U.S. Geological Survey digital data at 1:250,000 (2003)

Figure 35. Depth of precipitation for 10-year storm for 1-day duration in Texas.

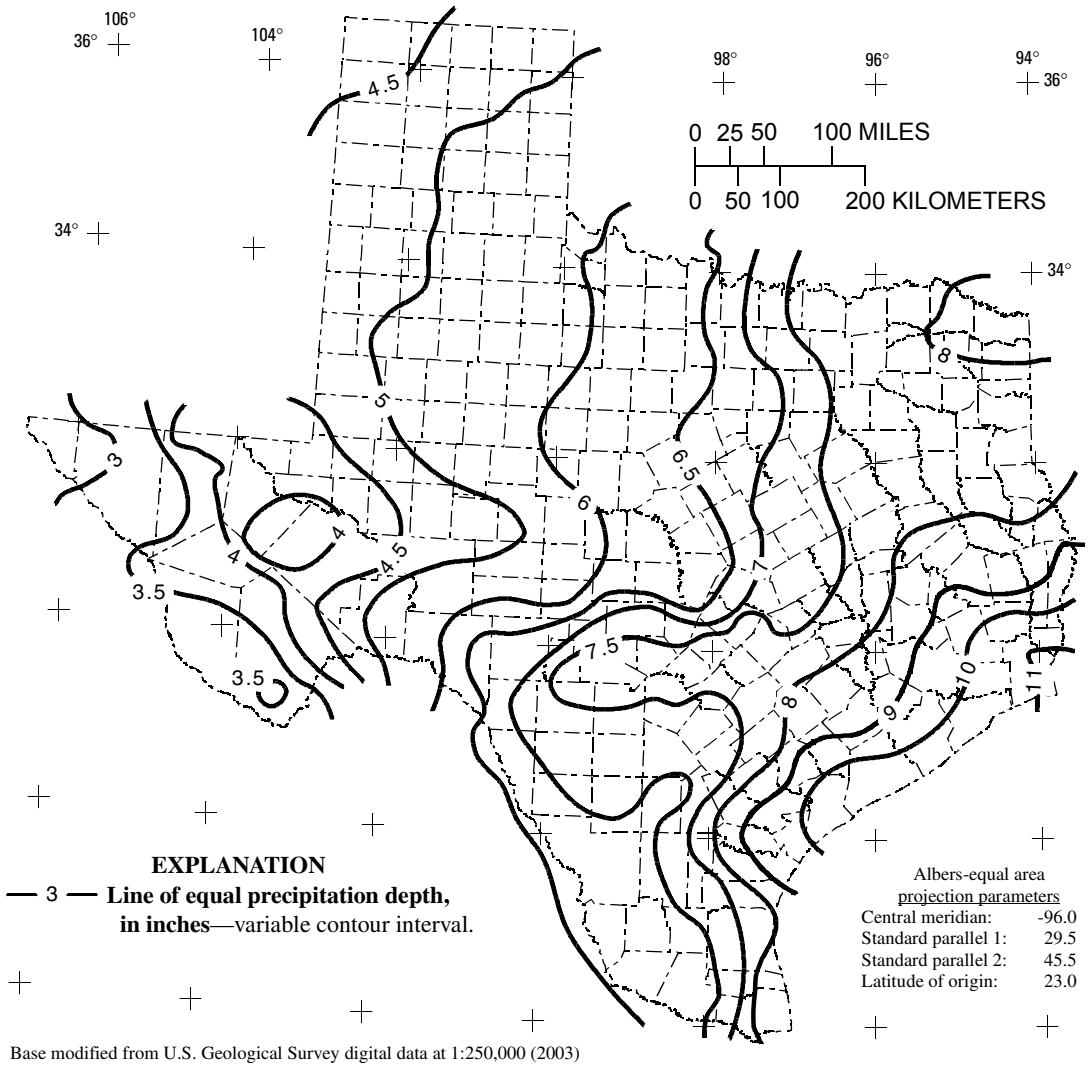
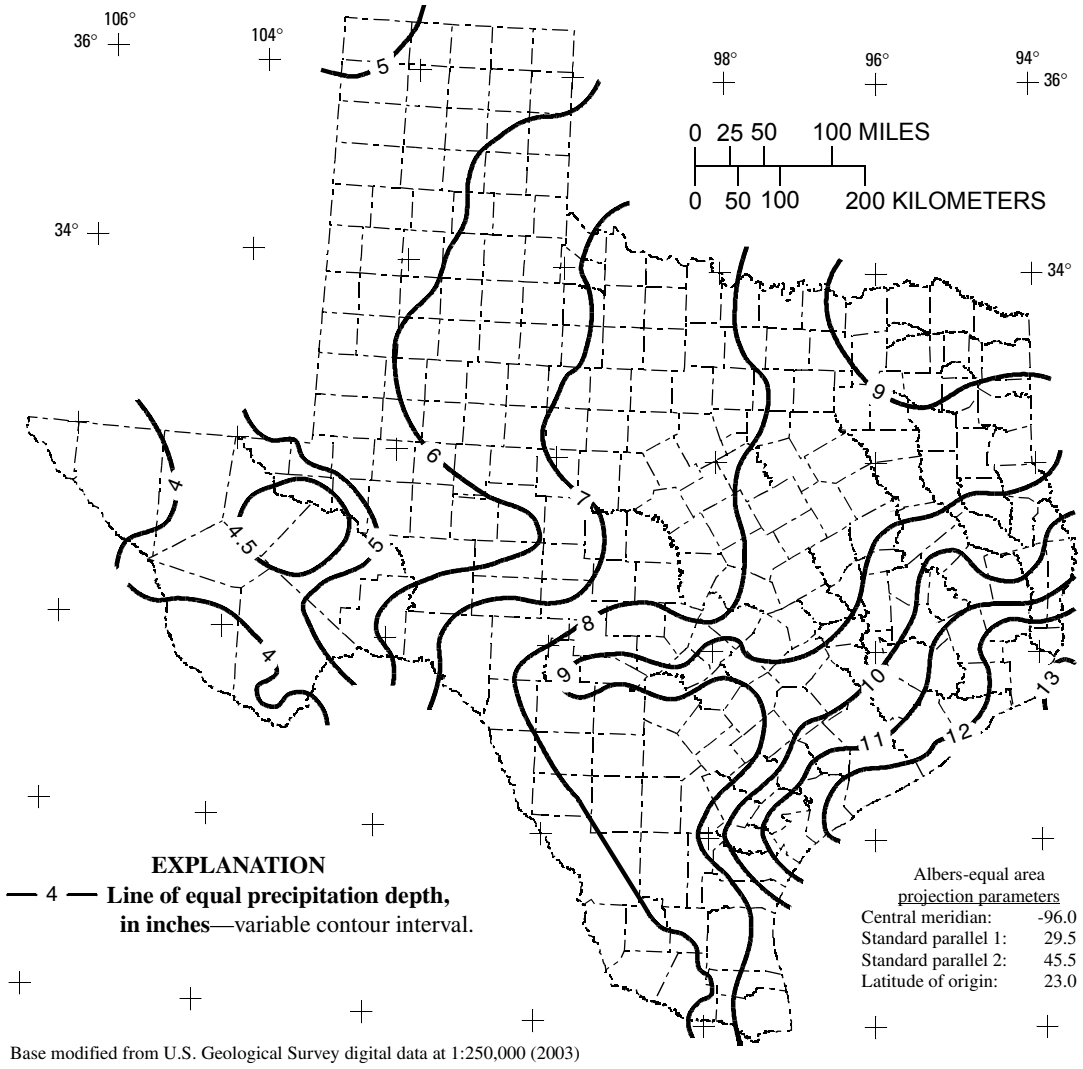
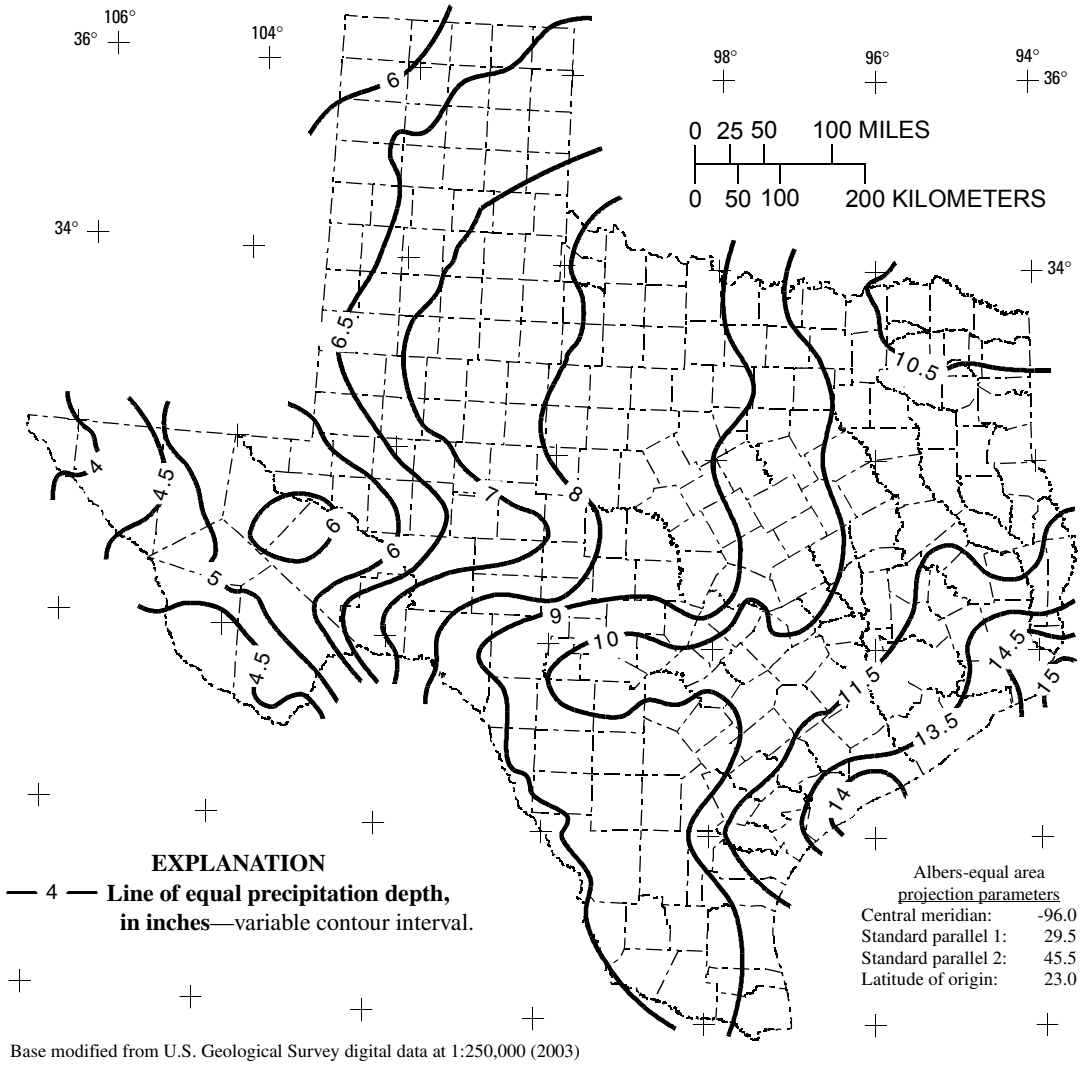


Figure 47. Depth of precipitation for 25-year storm for 1-day duration in Texas.



Base modified from U.S. Geological Survey digital data at 1:250,000 (2003)

Figure 59. Depth of precipitation for 50-year storm for 1-day duration in Texas.



Base modified from U.S. Geological Survey digital data at 1:250,000 (2003)

Figure 71. Depth of precipitation for 100-year storm for 1-day duration in Texas.

MID VALLEY AIRPORT

WESLACO, TX

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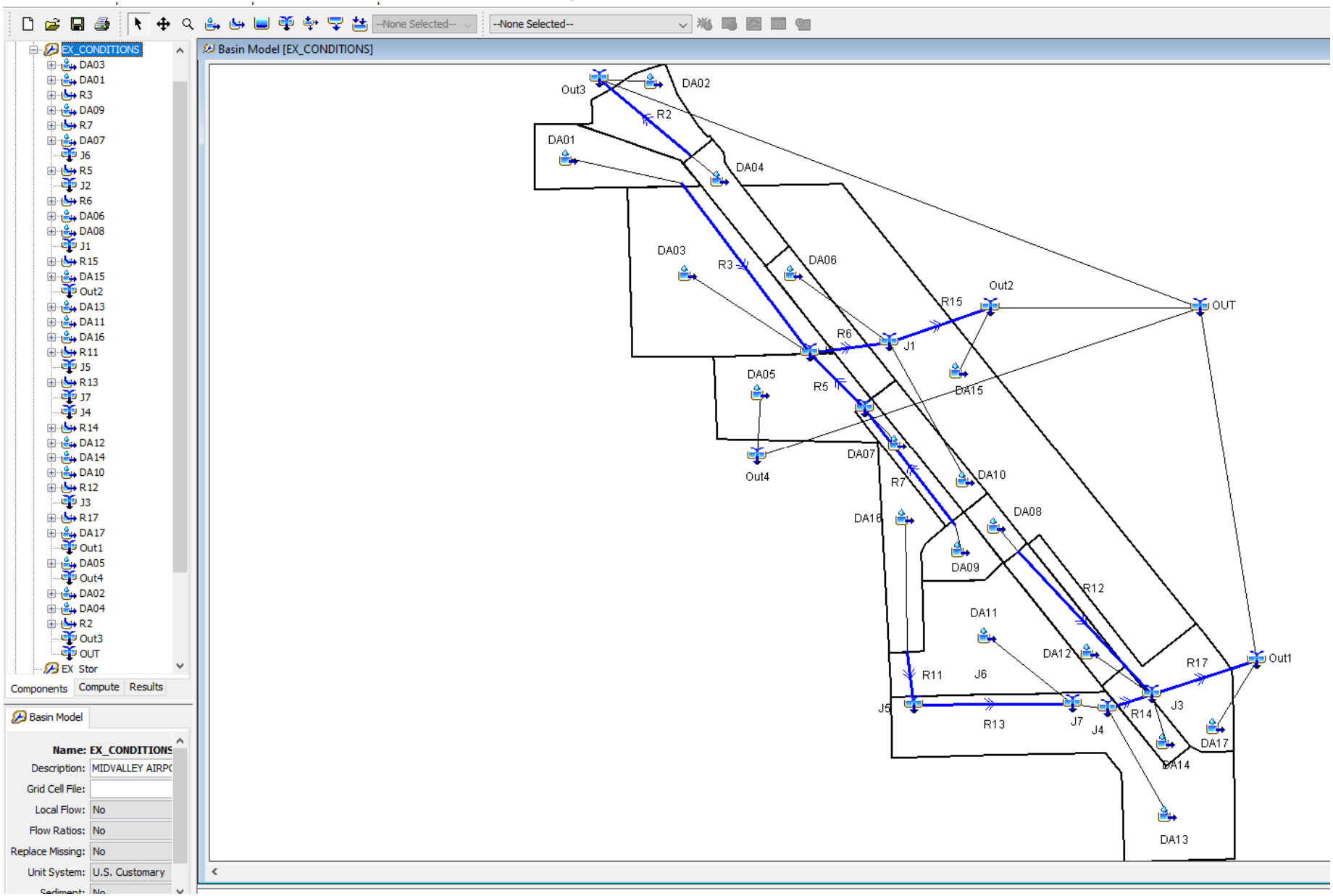
APPENDIX I

(HMS Model Schematics)

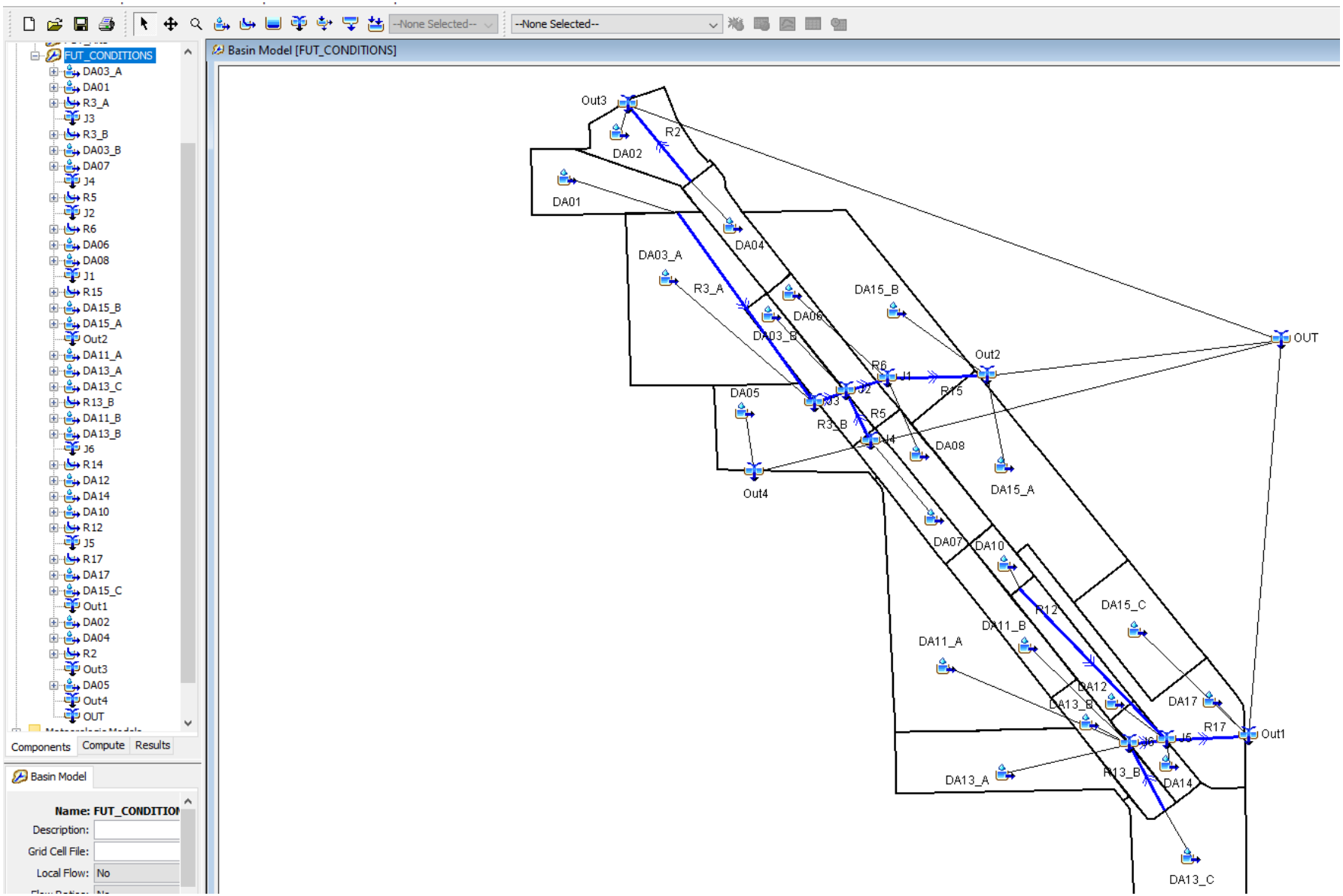
APPENDIX I

City of Weslaco – Mid Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Existing Conditions HMS Schematic



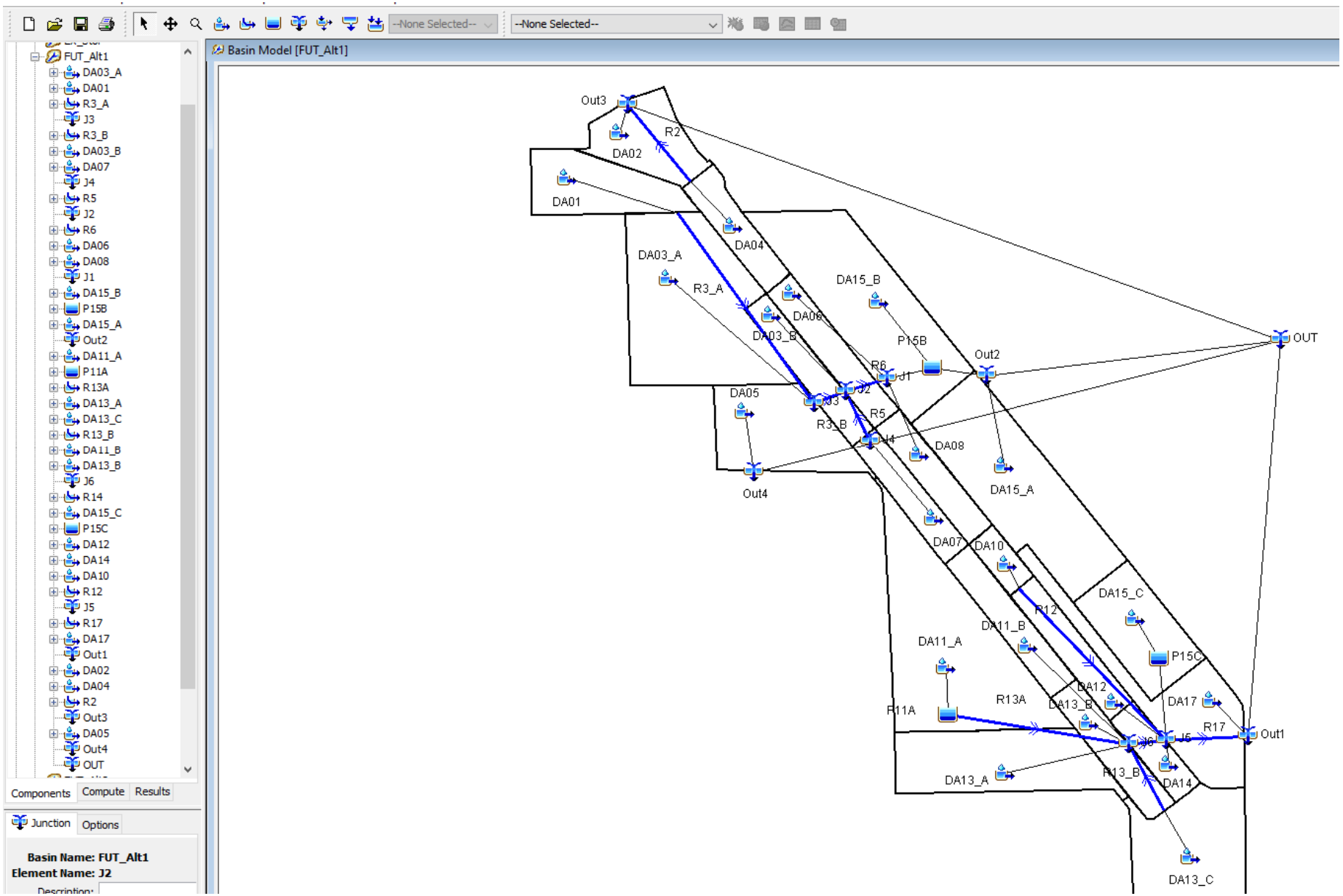
APPENDIX I

City of Weslaco – Mid Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Future Conditions HMS Schematic



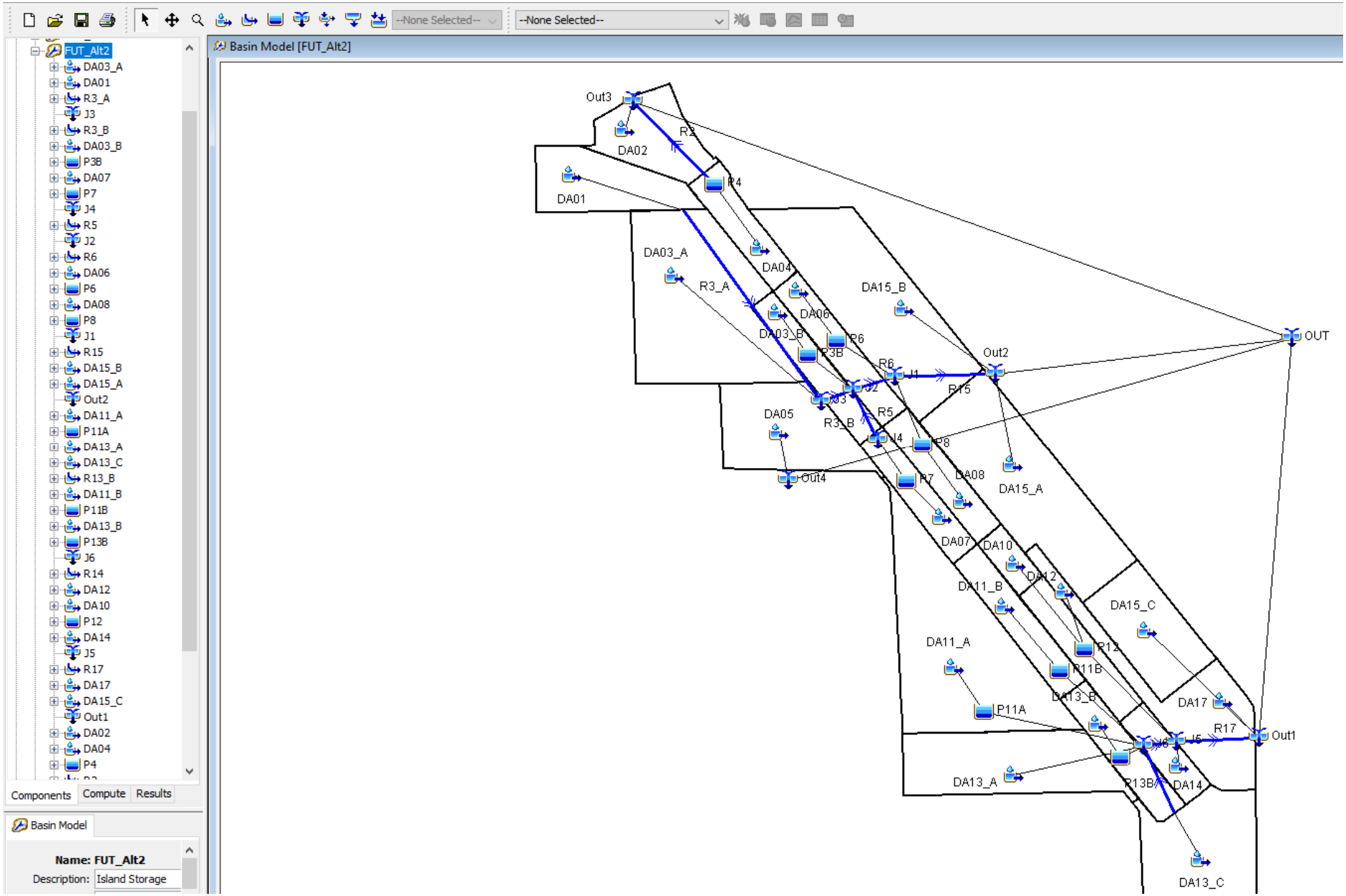
APPENDIX I

City of Weslaco – Mid Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 1 HMS Schematic



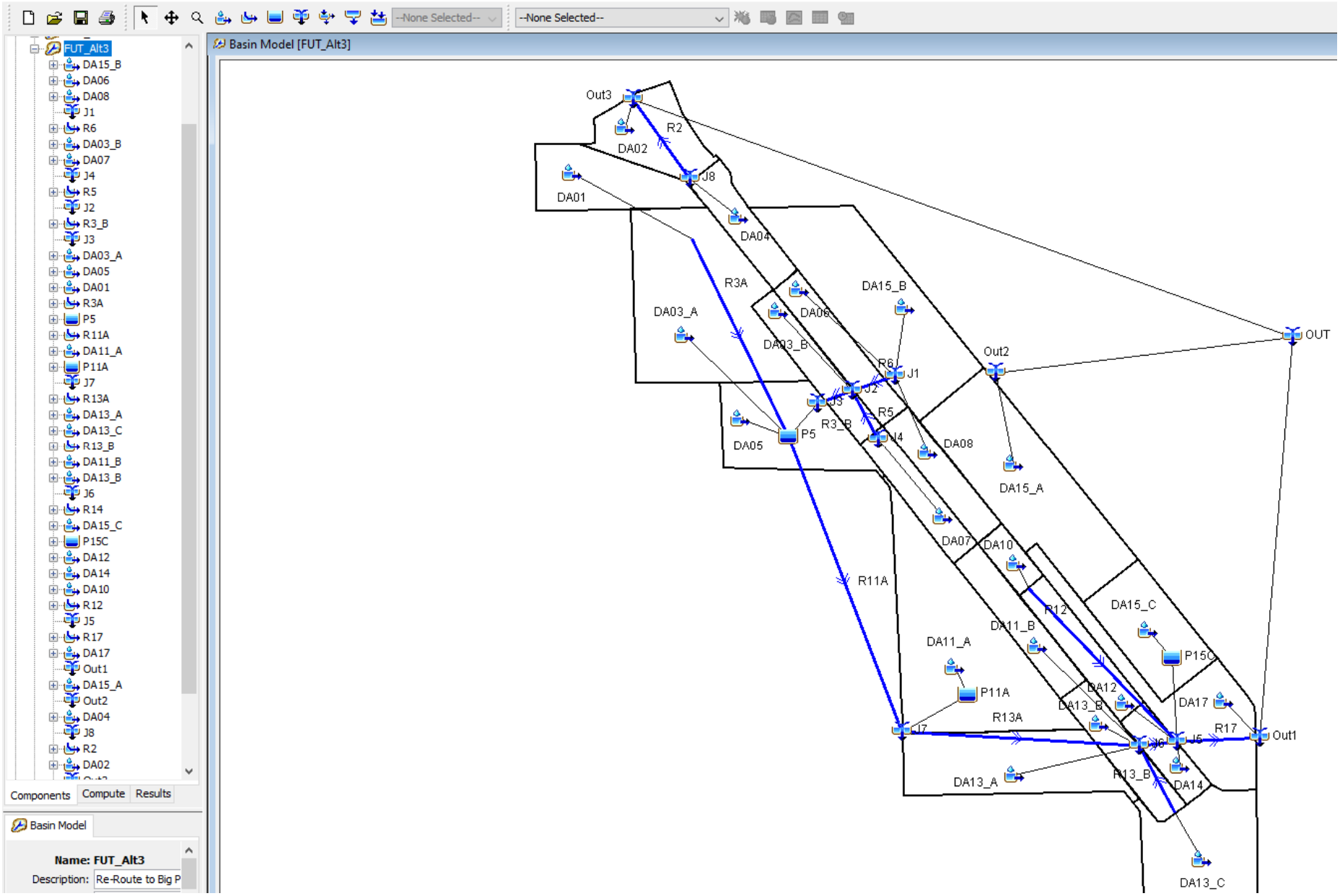
APPENDIX I

City of Weslaco – Mid Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 3 HMS Schematic



APPENDIX I

City of Weslaco – Mid Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 3 HMS Schematic



MID VALLEY AIRPORT

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APPENDIX J

(HMS Model Results)

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Existing Conditions 2-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03	0.04986	5.55	20Sep2016, 12:59	1.4
DA01	0.01624	4.21	20Sep2016, 12:33	0.7
R3	0.01624	4.21	20Sep2016, 12:51	0.7
DA09	0.00776	3.83	20Sep2016, 12:25	0.5
R7	0.00776	3.83	20Sep2016, 12:46	0.5
DA07	0.00674	3.39	20Sep2016, 12:20	0.4
J6	0.01451	5.6	20Sep2016, 12:40	0.9
R5	0.01451	5.6	20Sep2016, 12:40	0.9
J2	0.08061	14.54	20Sep2016, 12:49	3
R6	0.08061	14.54	20Sep2016, 12:49	3
DA06	0.01102	4.87	20Sep2016, 12:16	0.5
DA08	0.00949	4.6	20Sep2016, 12:12	0.5
J1	0.10112	17.29	20Sep2016, 12:45	4
R15	0.10112	17.29	20Sep2016, 13:01	4
DA15	0.09723	24.45	20Sep2016, 12:50	4.9
Out2	0.19835	41.06	20Sep2016, 12:54	8.9
DA13	0.05631	16.17	20Sep2016, 12:51	3.3
DA11	0.03734	9.98	20Sep2016, 12:54	2.1
DA16	0.01606	6.82	20Sep2016, 12:32	1
R11	0.01606	6.82	20Sep2016, 12:34	1
J5	0.01606	6.82	20Sep2016, 12:34	1
R13	0.01606	6.82	20Sep2016, 12:39	1
J7	0.05340	15.98	20Sep2016, 12:45	3.1
J4	0.10972	31.95	20Sep2016, 12:48	6.3
R14	0.10972	31.95	20Sep2016, 12:48	6.3
DA12	0.01015	3.68	20Sep2016, 12:27	0.5
DA14	0.00673	3.47	20Sep2016, 12:11	0.3
DA10	0.00420	2.73	20Sep2016, 12:07	0.2
R12	0.00420	2.73	20Sep2016, 12:31	0.2
J3	0.13080	36.51	20Sep2016, 12:45	7.4
R17	0.13080	36.51	20Sep2016, 12:47	7.4
DA17	0.02193	18.5	20Sep2016, 12:23	2.3
Out1	0.15273	48.73	20Sep2016, 12:35	9.8
DA05	0.02617	3.32	20Sep2016, 12:48	0.7
Out4	0.02617	3.32	20Sep2016, 12:48	0.7
DA02	0.01427	4.78	20Sep2016, 12:11	0.5
DA04	0.00910	4.04	20Sep2016, 12:23	0.5
R2	0.00910	4.04	20Sep2016, 12:30	0.5
Out3	0.02337	6.97	20Sep2016, 12:25	1
OUT	0.40062	93.38	20Sep2016, 12:44	20.5

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Existing Conditions 5-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03	0.04986	14.31	20Sep2016, 12:54	3.1
DA01	0.01624	8.99	20Sep2016, 12:31	1.3
R3	0.01624	8.99	20Sep2016, 12:49	1.3
DA09	0.00776	6.88	20Sep2016, 12:24	0.9
R7	0.00776	6.88	20Sep2016, 12:45	0.9
DA07	0.00674	6.24	20Sep2016, 12:19	0.7
J6	0.01451	10.05	20Sep2016, 12:39	1.6
R5	0.01451	10.05	20Sep2016, 12:39	1.6
J2	0.08061	32.22	20Sep2016, 12:47	6
R6	0.08061	32.22	20Sep2016, 12:47	6
DA06	0.01102	9.66	20Sep2016, 12:15	1
DA08	0.00949	9.14	20Sep2016, 12:11	0.9
J1	0.10112	37.4	20Sep2016, 12:43	7.9
R15	0.10112	37.4	20Sep2016, 12:59	7.9
DA15	0.09723	48.22	20Sep2016, 12:48	9.1
Out2	0.19835	83.99	20Sep2016, 12:53	17
DA13	0.05631	30.32	20Sep2016, 12:50	5.8
DA11	0.03734	18.98	20Sep2016, 12:52	3.8
DA16	0.01606	12.36	20Sep2016, 12:30	1.8
R11	0.01606	12.36	20Sep2016, 12:32	1.8
J5	0.01606	12.36	20Sep2016, 12:32	1.8
R13	0.01606	12.36	20Sep2016, 12:37	1.8
J7	0.05340	29.99	20Sep2016, 12:44	5.5
J4	0.10972	59.97	20Sep2016, 12:47	11.4
R14	0.10972	59.97	20Sep2016, 12:47	11.4
DA12	0.01015	7.23	20Sep2016, 12:25	1
DA14	0.00673	6.81	20Sep2016, 12:11	0.6
DA10	0.00420	5.17	20Sep2016, 12:07	0.4
R12	0.00420	5.17	20Sep2016, 12:31	0.4
J3	0.13080	68.63	20Sep2016, 12:43	13.4
R17	0.13080	68.63	20Sep2016, 12:45	13.4
DA17	0.02193	28.43	20Sep2016, 12:22	3.6
Out1	0.15273	88.2	20Sep2016, 12:35	17
DA05	0.02617	8.59	20Sep2016, 12:44	1.6
Out4	0.02617	8.59	20Sep2016, 12:44	1.6
DA02	0.01427	11.04	20Sep2016, 12:10	1
DA04	0.00910	7.6	20Sep2016, 12:22	0.9
R2	0.00910	7.6	20Sep2016, 12:29	0.9
Out3	0.02337	14.22	20Sep2016, 12:12	2
OUT	0.40062	181.84	20Sep2016, 12:42	37.6

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Existing Conditions 10-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03	0.04986	14.31	20Sep2016, 12:54	3.1
DA01	0.01624	8.99	20Sep2016, 12:31	1.3
R3	0.01624	8.99	20Sep2016, 12:49	1.3
DA09	0.00776	6.88	20Sep2016, 12:24	0.9
R7	0.00776	6.88	20Sep2016, 12:45	0.9
DA07	0.00674	6.24	20Sep2016, 12:19	0.7
J6	0.01451	10.05	20Sep2016, 12:39	1.6
R5	0.01451	10.05	20Sep2016, 12:39	1.6
J2	0.08061	32.22	20Sep2016, 12:47	6
R6	0.08061	32.22	20Sep2016, 12:47	6
DA06	0.01102	9.66	20Sep2016, 12:15	1
DA08	0.00949	9.14	20Sep2016, 12:11	0.9
J1	0.10112	37.4	20Sep2016, 12:43	7.9
R15	0.10112	37.4	20Sep2016, 12:59	7.9
DA15	0.09723	48.22	20Sep2016, 12:48	9.1
Out2	0.19835	83.99	20Sep2016, 12:53	17
DA13	0.05631	30.32	20Sep2016, 12:50	5.8
DA11	0.03734	18.98	20Sep2016, 12:52	3.8
DA16	0.01606	12.36	20Sep2016, 12:30	1.8
R11	0.01606	12.36	20Sep2016, 12:32	1.8
J5	0.01606	12.36	20Sep2016, 12:32	1.8
R13	0.01606	12.36	20Sep2016, 12:37	1.8
J7	0.05340	29.99	20Sep2016, 12:44	5.5
J4	0.10972	59.97	20Sep2016, 12:47	11.4
R14	0.10972	59.97	20Sep2016, 12:47	11.4
DA12	0.01015	7.23	20Sep2016, 12:25	1
DA14	0.00673	6.81	20Sep2016, 12:11	0.6
DA10	0.00420	5.17	20Sep2016, 12:07	0.4
R12	0.00420	5.17	20Sep2016, 12:31	0.4
J3	0.13080	68.63	20Sep2016, 12:43	13.4
R17	0.13080	68.63	20Sep2016, 12:45	13.4
DA17	0.02193	28.43	20Sep2016, 12:22	3.6
Out1	0.15273	88.2	20Sep2016, 12:35	17
DA05	0.02617	8.59	20Sep2016, 12:44	1.6
Out4	0.02617	8.59	20Sep2016, 12:44	1.6
DA02	0.01427	11.04	20Sep2016, 12:10	1
DA04	0.00910	7.6	20Sep2016, 12:22	0.9
R2	0.00910	7.6	20Sep2016, 12:29	0.9
Out3	0.02337	14.22	20Sep2016, 12:12	2
OUT	0.40062	181.84	20Sep2016, 12:42	37.6

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Existing Conditions 25-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03	0.04986	38.55	20Sep2016, 12:50	7.5
DA01	0.01624	20.98	20Sep2016, 12:29	2.9
R3	0.01624	20.98	20Sep2016, 12:47	2.9
DA09	0.00776	13.88	20Sep2016, 12:23	1.8
R7	0.00776	13.88	20Sep2016, 12:44	1.8
DA07	0.00674	12.85	20Sep2016, 12:18	1.5
J6	0.01451	20.24	20Sep2016, 12:39	3.2
R5	0.01451	20.24	20Sep2016, 12:39	3.2
J2	0.08061	77.94	20Sep2016, 12:45	13.7
R6	0.08061	77.94	20Sep2016, 12:45	13.7
DA06	0.01102	21.19	20Sep2016, 12:14	2.2
DA08	0.00949	20.12	20Sep2016, 12:11	1.9
J1	0.10112	88.93	20Sep2016, 12:42	17.7
R15	0.10112	88.93	20Sep2016, 12:58	17.7
DA15	0.09723	105.61	20Sep2016, 12:46	19.4
Out2	0.19835	190.42	20Sep2016, 12:51	37.1
DA13	0.05631	63.59	20Sep2016, 12:48	12
DA11	0.03734	40.31	20Sep2016, 12:50	7.8
DA16	0.01606	25.16	20Sep2016, 12:29	3.6
R11	0.01606	25.16	20Sep2016, 12:31	3.6
J5	0.01606	25.16	20Sep2016, 12:31	3.6
R13	0.01606	25.16	20Sep2016, 12:36	3.6
J7	0.05340	62.91	20Sep2016, 12:43	11.4
J4	0.10972	125.9	20Sep2016, 12:45	23.4
R14	0.10972	125.9	20Sep2016, 12:45	23.4
DA12	0.01015	15.78	20Sep2016, 12:24	2
DA14	0.00673	14.8	20Sep2016, 12:10	1.3
DA10	0.00420	10.85	20Sep2016, 12:07	0.9
R12	0.00420	10.85	20Sep2016, 12:31	0.9
J3	0.13080	144.41	20Sep2016, 12:40	27.7
R17	0.13080	144.41	20Sep2016, 12:42	27.7
DA17	0.02193	49.27	20Sep2016, 12:22	6.4
Out1	0.15273	179.71	20Sep2016, 12:35	34.1
DA05	0.02617	23.08	20Sep2016, 12:41	3.9
Out4	0.02617	23.08	20Sep2016, 12:41	3.9
DA02	0.01427	27.03	20Sep2016, 12:09	2.4
DA04	0.00910	15.97	20Sep2016, 12:21	1.9
R2	0.00910	15.97	20Sep2016, 12:28	1.9
Out3	0.02337	34.12	20Sep2016, 12:11	4.3
OUT	0.40062	397	20Sep2016, 12:39	79.5

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Existing Conditions 50-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03	0.04986	49.51	20Sep2016, 12:50	9.5
DA01	0.01624	26.18	20Sep2016, 12:28	3.6
R3	0.01624	26.18	20Sep2016, 12:46	3.6
DA09	0.00776	16.77	20Sep2016, 12:23	2.1
R7	0.00776	16.77	20Sep2016, 12:44	2.1
DA07	0.00674	15.61	20Sep2016, 12:18	1.8
J6	0.01451	24.47	20Sep2016, 12:38	3.9
R5	0.01451	24.47	20Sep2016, 12:38	3.9
J2	0.08061	98.05	20Sep2016, 12:45	17.1
R6	0.08061	98.05	20Sep2016, 12:45	17.1
DA06	0.01102	26.1	20Sep2016, 12:14	2.7
DA08	0.00949	24.78	20Sep2016, 12:11	2.3
J1	0.10112	111.47	20Sep2016, 12:41	22.1
R15	0.10112	111.47	20Sep2016, 12:57	22.1
DA15	0.09723	130.04	20Sep2016, 12:46	23.9
Out2	0.19835	236.31	20Sep2016, 12:51	46
DA13	0.05631	77.57	20Sep2016, 12:48	14.7
DA11	0.03734	49.31	20Sep2016, 12:50	9.6
DA16	0.01606	30.48	20Sep2016, 12:29	4.3
R11	0.01606	30.48	20Sep2016, 12:31	4.3
J5	0.01606	30.48	20Sep2016, 12:31	4.3
R13	0.01606	30.48	20Sep2016, 12:36	4.3
J7	0.05340	76.75	20Sep2016, 12:42	13.9
J4	0.10972	153.61	20Sep2016, 12:45	28.6
R14	0.10972	153.61	20Sep2016, 12:45	28.6
DA12	0.01015	19.41	20Sep2016, 12:24	2.5
DA14	0.00673	18.19	20Sep2016, 12:10	1.7
DA10	0.00420	13.24	20Sep2016, 12:06	1.1
R12	0.00420	13.24	20Sep2016, 12:30	1.1
J3	0.13080	176.41	20Sep2016, 12:39	33.8
R17	0.13080	176.41	20Sep2016, 12:41	33.8
DA17	0.02193	57.56	20Sep2016, 12:22	7.5
Out1	0.15273	218	20Sep2016, 12:34	41.3
DA05	0.02617	29.61	20Sep2016, 12:40	5
Out4	0.02617	29.61	20Sep2016, 12:40	5
DA02	0.01427	34.09	20Sep2016, 12:09	3
DA04	0.00910	19.49	20Sep2016, 12:20	2.4
R2	0.00910	19.49	20Sep2016, 12:27	2.4
Out3	0.02337	42.8	20Sep2016, 12:11	5.4
OUT	0.40062	489.02	20Sep2016, 12:38	97.6

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Existing Conditions 100-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03	0.04986	66.74	20Sep2016, 12:49	12.7
DA01	0.01624	34.22	20Sep2016, 12:28	4.8
R3	0.01624	34.22	20Sep2016, 12:46	4.8
DA09	0.00776	21.16	20Sep2016, 12:22	2.7
R7	0.00776	21.16	20Sep2016, 12:43	2.7
DA07	0.00674	19.79	20Sep2016, 12:18	2.3
J6	0.01451	30.87	20Sep2016, 12:38	5
R5	0.01451	30.87	20Sep2016, 12:38	5
J2	0.08061	129.28	20Sep2016, 12:45	22.5
R6	0.08061	129.28	20Sep2016, 12:45	22.5
DA06	0.01102	33.6	20Sep2016, 12:14	3.5
DA08	0.00949	31.9	20Sep2016, 12:11	3
J1	0.10112	146.42	20Sep2016, 12:41	28.9
R15	0.10112	146.42	20Sep2016, 12:57	28.9
DA15	0.09723	167.51	20Sep2016, 12:45	30.7
Out2	0.19835	306.96	20Sep2016, 12:51	59.7
DA13	0.05631	98.88	20Sep2016, 12:47	18.7
DA11	0.03734	63.05	20Sep2016, 12:49	12.3
DA16	0.01606	38.55	20Sep2016, 12:29	5.5
R11	0.01606	38.55	20Sep2016, 12:31	5.5
J5	0.01606	38.55	20Sep2016, 12:31	5.5
R13	0.01606	38.55	20Sep2016, 12:36	5.5
J7	0.05340	97.83	20Sep2016, 12:42	17.8
J4	0.10972	195.81	20Sep2016, 12:44	36.5
R14	0.10972	195.81	20Sep2016, 12:44	36.5
DA12	0.01015	24.97	20Sep2016, 12:23	3.2
DA14	0.00673	23.37	20Sep2016, 12:10	2.1
DA10	0.00420	16.89	20Sep2016, 12:06	1.4
R12	0.00420	16.89	20Sep2016, 12:30	1.4
J3	0.13080	225.31	20Sep2016, 12:37	43.2
R17	0.13080	225.31	20Sep2016, 12:39	43.2
DA17	0.02193	69.93	20Sep2016, 12:21	9.2
Out1	0.15273	276.23	20Sep2016, 12:34	52.5
DA05	0.02617	39.89	20Sep2016, 12:40	6.7
Out4	0.02617	39.89	20Sep2016, 12:40	6.7
DA02	0.01427	45.04	20Sep2016, 12:09	3.9
DA04	0.00910	24.84	20Sep2016, 12:20	3
R2	0.00910	24.84	20Sep2016, 12:27	3
Out3	0.02337	56.28	20Sep2016, 12:10	7
OUT	0.40062	630.26	20Sep2016, 12:38	125.8

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Alternative 1 2-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	5.16	20Sep2016, 12:58	1.3
DA01	0.01624	4.21	20Sep2016, 12:33	0.7
R3_A	0.01624	4.21	20Sep2016, 12:50	0.7
J3	0.06025	9.23	20Sep2016, 12:53	2
R3_B	0.06025	9.23	20Sep2016, 12:53	2
DA03_B	0.00990	4.58	20Sep2016, 12:15	0.5
DA07	0.00904	6.67	20Sep2016, 12:18	0.8
J4	0.00904	6.67	20Sep2016, 12:18	0.8
R5	0.00904	6.67	20Sep2016, 12:18	0.8
J2	0.07920	13.17	20Sep2016, 12:39	3.3
R6	0.07920	13.17	20Sep2016, 12:39	3.3
DA06	0.01102	4.87	20Sep2016, 12:16	0.5
DA08	0.00949	4.6	20Sep2016, 12:12	0.5
J1	0.09971	21.3	20Sep2016, 12:16	4.3
DA15_B	0.04010	6.52	20Sep2016, 12:35	1.2
P15B	0.13981	9.3	20Sep2016, 13:45	5.4
DA15_A	0.03874	31.33	20Sep2016, 12:27	4.3
Out2	0.17855	33.61	20Sep2016, 12:29	9.7
DA11_A	0.04556	20.84	20Sep2016, 12:41	3.6
P11A	0.04556	0.62	20Sep2016, 22:33	2.1
R13A	0.04556	0.62	20Sep2016, 22:38	2.1
DA13_A	0.02580	10.88	20Sep2016, 12:27	1.5
DA13_C	0.02345	4.21	20Sep2016, 12:47	0.9
R13_B	0.02345	4.21	20Sep2016, 12:58	0.9
DA11_B	0.01081	4.09	20Sep2016, 12:22	0.5
DA13_B	0.01029	5.28	20Sep2016, 12:14	0.6
J6	0.11590	19.79	20Sep2016, 12:25	5.5
R14	0.11590	19.79	20Sep2016, 12:25	5.5
DA15_C	0.01762	9.27	20Sep2016, 12:22	1.2
P15C	0.01762	0.24	20Sep2016, 23:47	0.8
DA12	0.01015	3.68	20Sep2016, 12:27	0.5
DA14	0.00673	3.47	20Sep2016, 12:11	0.3
DA10	0.00420	2.73	20Sep2016, 12:07	0.2
R12	0.00420	2.73	20Sep2016, 12:31	0.2
J5	0.15460	27.77	20Sep2016, 12:28	7.4
R17	0.15460	27.77	20Sep2016, 12:30	7.4
DA17	0.02280	19.22	20Sep2016, 12:24	2.5
Out1	0.17740	46.49	20Sep2016, 12:27	9.9
DA02	0.01427	4.78	20Sep2016, 12:11	0.5
DA04	0.00909	4.03	20Sep2016, 12:23	0.5
R2	0.00909	4.03	20Sep2016, 12:30	0.5
Out3	0.02336	6.97	20Sep2016, 12:25	1
DA05	0.02161	0.54	20Sep2016, 13:18	0.3
Out4	0.02161	0.54	20Sep2016, 13:18	0.3
OUT	0.4009215	86.94	20Sep2016, 12:27	20.9

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Alternative 1 5-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	13.11	20Sep2016, 12:53	2.8
DA01	0.01624	8.99	20Sep2016, 12:31	1.3
R3_A	0.01624	8.99	20Sep2016, 12:48	1.3
J3	0.06025	21.96	20Sep2016, 12:50	4.1
R3_B	0.06025	21.96	20Sep2016, 12:50	4.1
DA03_B	0.00990	9.01	20Sep2016, 12:14	0.9
DA07	0.00904	10.58	20Sep2016, 12:18	1.3
J4	0.00904	10.58	20Sep2016, 12:18	1.3
R5	0.00904	10.58	20Sep2016, 12:18	1.3
J2	0.07920	28.81	20Sep2016, 12:40	6.3
R6	0.07920	28.81	20Sep2016, 12:40	6.3
DA06	0.01102	9.66	20Sep2016, 12:15	1
DA08	0.00949	9.14	20Sep2016, 12:11	0.9
J1	0.09971	42.11	20Sep2016, 12:16	8.2
DA15_B	0.04010	16.52	20Sep2016, 12:32	2.5
P15B	0.13981	26.34	20Sep2016, 13:17	10.6
DA15_A	0.03874	47.54	20Sep2016, 12:26	6.6
Out2	0.17855	58.36	20Sep2016, 12:31	17.2
DA11_A	0.04556	35.21	20Sep2016, 12:40	5.9
P11A	0.04556	0.85	21Sep2016, 00:24	2.9
R13A	0.04556	0.85	21Sep2016, 00:29	2.9
DA13_A	0.02580	19.03	20Sep2016, 12:26	2.6
DA13_C	0.02345	9.56	20Sep2016, 12:43	1.7
R13_B	0.02345	9.56	20Sep2016, 12:54	1.7
DA11_B	0.01081	8.14	20Sep2016, 12:21	1
DA13_B	0.01029	10.13	20Sep2016, 12:13	1
J6	0.11590	37.52	20Sep2016, 12:24	9.3
R14	0.11590	37.52	20Sep2016, 12:24	9.3
DA15_C	0.01762	16.57	20Sep2016, 12:21	2
P15C	0.01762	0.34	21Sep2016, 00:08	1.2
DA12	0.01015	7.23	20Sep2016, 12:25	1
DA14	0.00673	6.81	20Sep2016, 12:11	0.6
DA10	0.00420	5.17	20Sep2016, 12:07	0.4
R12	0.00420	5.17	20Sep2016, 12:31	0.4
J5	0.15460	52.81	20Sep2016, 12:27	12.5
R17	0.15460	52.81	20Sep2016, 12:29	12.5
DA17	0.02280	29.25	20Sep2016, 12:24	3.8
Out1	0.17740	81.32	20Sep2016, 12:27	16.3
DA02	0.01427	11.04	20Sep2016, 12:10	1
DA04	0.00909	7.59	20Sep2016, 12:22	0.9
R2	0.00909	7.59	20Sep2016, 12:29	0.9
Out3	0.02336	14.22	20Sep2016, 12:12	2
DA05	0.02161	3.37	20Sep2016, 12:52	0.9
Out4	0.02161	3.37	20Sep2016, 12:52	0.9
OUT	0.4009215	153.79	20Sep2016, 12:28	36.4

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Alternative 1 10-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	21.21	20Sep2016, 12:51	1.81
DA01	0.01624	13.55	20Sep2016, 12:30	2.22
R3_A	0.01624	13.55	20Sep2016, 12:47	2.22
J3	0.06025	34.61	20Sep2016, 12:49	1.92
R3_B	0.06025	34.61	20Sep2016, 12:49	1.92
DA03_B	0.00990	13.1	20Sep2016, 12:14	2.52
DA07	0.00904	14.03	20Sep2016, 12:18	3.51
J4	0.00904	14.03	20Sep2016, 12:18	3.51
R5	0.00904	14.03	20Sep2016, 12:18	3.51
J2	0.07920	44.13	20Sep2016, 12:40	2.18
R6	0.07920	44.13	20Sep2016, 12:40	2.18
DA06	0.01102	14.08	20Sep2016, 12:14	2.49
DA08	0.00949	13.37	20Sep2016, 12:11	2.47
J1	0.09971	62.24	20Sep2016, 12:16	2.24
DA15_B	0.04010	26.59	20Sep2016, 12:31	1.82
P15B	0.13981	44.69	20Sep2016, 13:10	2.1
DA15_A	0.03874	61.12	20Sep2016, 12:26	4.14
Out2	0.17855	85.28	20Sep2016, 12:33	2.54
DA11_A	0.04556	47.75	20Sep2016, 12:40	3.32
P11A	0.04556	1.02	21Sep2016, 00:27	1.48
R13A	0.04556	1.02	21Sep2016, 00:32	1.48
DA13_A	0.02580	26.59	20Sep2016, 12:26	2.66
DA13_C	0.02345	14.78	20Sep2016, 12:42	2.06
R13_B	0.02345	14.78	20Sep2016, 12:53	2.06
DA11_B	0.01081	11.91	20Sep2016, 12:20	2.47
DA13_B	0.01029	14.57	20Sep2016, 12:13	2.62
J6	0.11590	54.26	20Sep2016, 12:24	2.05
R14	0.11590	54.26	20Sep2016, 12:24	2.05
DA15_C	0.01762	23.09	20Sep2016, 12:21	2.97
P15C	0.01762	0.4	21Sep2016, 00:11	1.52
DA12	0.01015	10.52	20Sep2016, 12:25	2.52
DA14	0.00673	9.88	20Sep2016, 12:10	2.52
DA10	0.00420	7.38	20Sep2016, 12:07	2.65
R12	0.00420	7.38	20Sep2016, 12:31	2.65
J5	0.15460	76.14	20Sep2016, 12:26	2.06
R17	0.15460	76.14	20Sep2016, 12:28	2.06
DA17	0.02280	37.65	20Sep2016, 12:23	4.11
Out1	0.17740	112.92	20Sep2016, 12:26	2.32
DA02	0.01427	17.09	20Sep2016, 12:10	2.03
DA04	0.00909	10.83	20Sep2016, 12:21	2.71
R2	0.00909	10.83	20Sep2016, 12:28	2.71
Out3	0.02336	21.74	20Sep2016, 12:11	2.29
DA05	0.02161	7.27	20Sep2016, 12:47	1.31
Out4	0.02161	7.27	20Sep2016, 12:47	1.31
OUT	0.4009215	219.91	20Sep2016, 12:28	2.37

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Alternative 1 25-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	34.9	20Sep2016, 12:49	6.7
DA01	0.01624	20.98	20Sep2016, 12:29	2.9
R3_A	0.01624	20.98	20Sep2016, 12:46	2.9
J3	0.06025	55.71	20Sep2016, 12:47	9.7
R3_B	0.06025	55.71	20Sep2016, 12:47	9.7
DA03_B	0.00990	19.61	20Sep2016, 12:13	2
DA07	0.00904	19.39	20Sep2016, 12:18	2.3
J4	0.00904	19.39	20Sep2016, 12:18	2.3
R5	0.00904	19.39	20Sep2016, 12:18	2.3
J2	0.07920	69.37	20Sep2016, 12:40	14
R6	0.07920	69.37	20Sep2016, 12:40	14
DA06	0.01102	21.19	20Sep2016, 12:14	2.2
DA08	0.00949	20.12	20Sep2016, 12:11	1.9
J1	0.09971	95.05	20Sep2016, 12:15	18
DA15_B	0.04010	43.51	20Sep2016, 12:29	6.2
P15B	0.13981	107.82	20Sep2016, 12:47	24.1
DA15_A	0.03874	81.41	20Sep2016, 12:26	11.5
Out2	0.17855	164.24	20Sep2016, 12:41	35.6
DA11_A	0.04556	67.04	20Sep2016, 12:39	11.4
P11A	0.04556	9.39	20Sep2016, 14:50	6.6
R13A	0.04556	9.39	20Sep2016, 14:55	6.6
DA13_A	0.02580	38.76	20Sep2016, 12:25	5.3
DA13_C	0.02345	23.38	20Sep2016, 12:41	4
R13_B	0.02345	23.38	20Sep2016, 12:52	4
DA11_B	0.01081	17.95	20Sep2016, 12:20	2.1
DA13_B	0.01029	21.6	20Sep2016, 12:13	2.1
J6	0.11590	81.24	20Sep2016, 12:23	20.1
R14	0.11590	81.24	20Sep2016, 12:23	20.1
DA15_C	0.01762	33.25	20Sep2016, 12:20	4
P15C	0.01762	2.34	20Sep2016, 15:42	2.3
DA12	0.01015	15.78	20Sep2016, 12:24	2
DA14	0.00673	14.8	20Sep2016, 12:10	1.3
DA10	0.00420	10.85	20Sep2016, 12:07	0.9
R12	0.00420	10.85	20Sep2016, 12:31	0.9
J5	0.15460	113.51	20Sep2016, 12:26	26.7
R17	0.15460	113.51	20Sep2016, 12:28	26.7
DA17	0.02280	50.24	20Sep2016, 12:23	6.8
Out1	0.17740	162.68	20Sep2016, 12:26	33.4
DA02	0.01427	27.03	20Sep2016, 12:09	2.4
DA04	0.00909	15.95	20Sep2016, 12:21	1.9
R2	0.00909	15.95	20Sep2016, 12:28	1.9
Out3	0.02336	34.11	20Sep2016, 12:11	4.3
DA05	0.02161	14.66	20Sep2016, 12:44	2.7
Out4	0.02161	14.66	20Sep2016, 12:44	2.7
OUT	0.4009215	339.67	20Sep2016, 12:34	76

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Alternative 1 50-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	44.72	20Sep2016, 12:49	8.5
DA01	0.01624	26.18	20Sep2016, 12:28	3.6
R3_A	0.01624	26.18	20Sep2016, 12:45	3.6
J3	0.06025	70.73	20Sep2016, 12:47	12.2
R3_B	0.06025	70.73	20Sep2016, 12:47	12.2
DA03_B	0.00990	24.12	20Sep2016, 12:13	2.4
DA07	0.00904	23.02	20Sep2016, 12:18	2.8
J4	0.00904	23.02	20Sep2016, 12:18	2.8
R5	0.00904	23.02	20Sep2016, 12:18	2.8
J2	0.07920	87.2	20Sep2016, 12:40	17.4
R6	0.07920	87.2	20Sep2016, 12:40	17.4
DA06	0.01102	26.1	20Sep2016, 12:14	2.7
DA08	0.00949	24.78	20Sep2016, 12:11	2.3
J1	0.09971	118.06	20Sep2016, 12:15	22.4
DA15_B	0.04010	55.64	20Sep2016, 12:29	7.8
P15B	0.13981	134.07	20Sep2016, 12:48	30
DA15_A	0.03874	94.87	20Sep2016, 12:26	13.5
Out2	0.17855	209.43	20Sep2016, 12:34	43.6
DA11_A	0.04556	80.01	20Sep2016, 12:39	13.6
P11A	0.04556	18.23	20Sep2016, 13:57	8.8
R13A	0.04556	18.23	20Sep2016, 14:02	8.8
DA13_A	0.02580	47.27	20Sep2016, 12:25	6.5
DA13_C	0.02345	29.45	20Sep2016, 12:41	5
R13_B	0.02345	29.45	20Sep2016, 12:52	5
DA11_B	0.01081	22.12	20Sep2016, 12:20	2.6
DA13_B	0.01029	26.45	20Sep2016, 12:12	2.6
J6	0.11590	100.03	20Sep2016, 12:23	25.5
R14	0.11590	100.03	20Sep2016, 12:23	25.5
DA15_C	0.01762	40.17	20Sep2016, 12:20	4.9
P15C	0.01762	4.11	20Sep2016, 14:18	3.2
DA12	0.01015	19.41	20Sep2016, 12:24	2.5
DA14	0.00673	18.19	20Sep2016, 12:10	1.7
DA10	0.00420	13.24	20Sep2016, 12:06	1.1
R12	0.00420	13.24	20Sep2016, 12:30	1.1
J5	0.15460	139.42	20Sep2016, 12:26	33.9
R17	0.15460	139.42	20Sep2016, 12:28	33.9
DA17	0.02280	58.58	20Sep2016, 12:23	7.9
Out1	0.17740	196.81	20Sep2016, 12:26	41.8
DA02	0.01427	34.09	20Sep2016, 12:09	3
DA04	0.00909	19.46	20Sep2016, 12:20	2.3
R2	0.00909	19.46	20Sep2016, 12:27	2.3
Out3	0.02336	42.79	20Sep2016, 12:11	5.3
DA05	0.02161	20.19	20Sep2016, 12:42	3.5
Out4	0.02161	20.19	20Sep2016, 12:42	3.5
OUT	0.4009215	451.77	20Sep2016, 12:28	94.2

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Alternative 1 100-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	60.14	20Sep2016, 12:48	11.4
DA01	0.01624	34.22	20Sep2016, 12:28	4.8
R3_A	0.01624	34.22	20Sep2016, 12:45	4.8
J3	0.06025	94.14	20Sep2016, 12:46	16.1
R3_B	0.06025	94.14	20Sep2016, 12:46	16.1
DA03_B	0.00990	31.02	20Sep2016, 12:13	3.1
DA07	0.00904	28.53	20Sep2016, 12:18	3.5
J4	0.00904	28.53	20Sep2016, 12:18	3.5
R5	0.00904	28.53	20Sep2016, 12:18	3.5
J2	0.07920	114.93	20Sep2016, 12:40	22.7
R6	0.07920	114.93	20Sep2016, 12:40	22.7
DA06	0.01102	33.6	20Sep2016, 12:14	3.5
DA08	0.00949	31.9	20Sep2016, 12:11	3
J1	0.09971	153.64	20Sep2016, 12:15	29.1
DA15_B	0.04010	74.62	20Sep2016, 12:28	10.4
P15B	0.13981	180.41	20Sep2016, 12:46	39.4
DA15_A	0.03874	114.94	20Sep2016, 12:26	16.6
Out2	0.17855	272.36	20Sep2016, 12:34	56
DA11_A	0.04556	99.52	20Sep2016, 12:39	17.1
P11A	0.04556	33.7	20Sep2016, 13:32	12.3
R13A	0.04556	33.7	20Sep2016, 13:37	12.3
DA13_A	0.02580	60.39	20Sep2016, 12:25	8.3
DA13_C	0.02345	38.9	20Sep2016, 12:40	6.6
R13_B	0.02345	38.9	20Sep2016, 12:51	6.6
DA11_B	0.01081	28.51	20Sep2016, 12:19	3.4
DA13_B	0.01029	33.84	20Sep2016, 12:12	3.3
J6	0.11590	129.01	20Sep2016, 12:23	33.8
R14	0.11590	129.01	20Sep2016, 12:23	33.8
DA15_C	0.01762	50.63	20Sep2016, 12:20	6.2
P15C	0.01762	8.19	20Sep2016, 13:21	4.5
DA12	0.01015	24.97	20Sep2016, 12:23	3.2
DA14	0.00673	23.37	20Sep2016, 12:10	2.1
DA10	0.00420	16.89	20Sep2016, 12:06	1.4
R12	0.00420	16.89	20Sep2016, 12:30	1.4
J5	0.15460	179.24	20Sep2016, 12:25	45
R17	0.15460	179.24	20Sep2016, 12:27	45
DA17	0.02280	71.03	20Sep2016, 12:23	9.7
Out1	0.17740	248.9	20Sep2016, 12:26	54.7
DA02	0.01427	45.04	20Sep2016, 12:09	3.9
DA04	0.00909	24.82	20Sep2016, 12:20	3
R2	0.00909	24.82	20Sep2016, 12:27	3
Out3	0.02336	56.27	20Sep2016, 12:10	7
DA05	0.02161	28.96	20Sep2016, 12:41	4.8
Out4	0.02161	28.96	20Sep2016, 12:41	4.8
OUT	0.4009215	581.24	20Sep2016, 12:29	122.5

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 2 2-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	5.16	20Sep2016, 12:58	1.3
DA01	0.01624	4.21	20Sep2016, 12:33	0.7
R3_A	0.01624	4.21	20Sep2016, 12:50	0.7
J3	0.06025	9.23	20Sep2016, 12:53	2
R3_B	0.06025	9.23	20Sep2016, 12:53	2
DA03_B	0.00990	5.6	20Sep2016, 12:09	0.5
P3B	0.00990	0.99	20Sep2016, 12:52	0.5
DA07	0.00904	9.1	20Sep2016, 12:08	0.8
P7	0.00904	0.55	20Sep2016, 15:01	0.8
J4	0.00904	0.55	20Sep2016, 15:01	0.8
R5	0.00904	0.55	20Sep2016, 15:01	0.8
J2	0.07920	10.77	20Sep2016, 12:53	3.3
R6	0.07920	10.77	20Sep2016, 12:53	3.3
DA06	0.01102	6.08	20Sep2016, 12:09	0.5
P6	0.01102	1	20Sep2016, 12:58	0.5
DA08	0.00949	5.13	20Sep2016, 12:09	0.5
P8	0.00949	0.52	20Sep2016, 14:04	0.5
J1	0.09971	12.28	20Sep2016, 12:53	4.3
R15	0.09971	12.28	20Sep2016, 13:09	4.3
DA15_B	0.04010	4.9	20Sep2016, 12:56	1.2
DA15_A	0.03874	31.33	20Sep2016, 12:27	4.3
Out2	0.17855	37.45	20Sep2016, 12:30	9.8
DA11_A	0.04556	20.84	20Sep2016, 12:41	3.6
P11A	0.04556	4.02	20Sep2016, 14:30	3.4
DA13_A	0.02580	18.41	20Sep2016, 12:26	2.4
DA13_C	0.02345	4.21	20Sep2016, 12:47	0.9
R13_B	0.02345	4.21	20Sep2016, 12:58	0.9
DA11_B	0.01081	5.87	20Sep2016, 12:09	0.5
P11B	0.01081	0.59	20Sep2016, 14:08	0.5
DA13_B	0.01029	6.25	20Sep2016, 12:09	0.6
P13B	0.01029	0.59	20Sep2016, 14:11	0.6
J6	0.11590	21.14	20Sep2016, 12:29	7.7
R14	0.11590	21.14	20Sep2016, 12:29	7.7
DA12	0.01015	5.71	20Sep2016, 12:09	0.5
DA10	0.00420	2.73	20Sep2016, 12:07	0.2
P12	0.01435	0.69	20Sep2016, 14:49	0.7
DA14	0.00673	3.47	20Sep2016, 12:11	0.3
J5	0.13698	23.78	20Sep2016, 12:27	8.8
R17	0.13698	23.78	20Sep2016, 12:29	8.8
DA17	0.02280	19.22	20Sep2016, 12:24	2.5
DA15_C	0.01762	7.58	20Sep2016, 12:34	1.2
Out1	0.1774047	49.81	20Sep2016, 12:27	12.5
DA02	0.01427	4.78	20Sep2016, 12:11	0.5
DA04	0.00909	5.87	20Sep2016, 12:09	0.5
P4	0.00909	0.31	20Sep2016, 15:59	0.5
R2	0.00909	0.31	20Sep2016, 16:06	0.5
Out3	0.02336	4.81	20Sep2016, 12:11	1
DA05	0.02161	0.54	20Sep2016, 13:18	0.3
Out4	0.02161	0.54	20Sep2016, 13:18	0.3
OUT	0.4009215	90.09	20Sep2016, 12:28	23.5

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 2 5-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	13.11	20Sep2016, 12:53	2.8
DA01	0.01624	8.99	20Sep2016, 12:31	1.3
R3_A	0.01624	8.99	20Sep2016, 12:48	1.3
J3	0.06025	21.96	20Sep2016, 12:50	4.1
R3_B	0.06025	21.96	20Sep2016, 12:50	4.1
DA03_B	0.00990	10.91	20Sep2016, 12:08	0.9
P3B	0.00990	1.03	20Sep2016, 13:51	0.9
DA07	0.00904	14.4	20Sep2016, 12:08	1.3
P7	0.00904	0.58	20Sep2016, 16:01	1.3
J4	0.00904	0.58	20Sep2016, 16:01	1.3
R5	0.00904	0.58	20Sep2016, 16:01	1.3
J2	0.07920	23.56	20Sep2016, 12:50	6.3
R6	0.07920	23.56	20Sep2016, 12:50	6.3
DA06	0.01102	11.93	20Sep2016, 12:08	1
P6	0.01102	1.04	20Sep2016, 14:04	1
DA08	0.00949	10.14	20Sep2016, 12:08	0.9
P8	0.00949	0.55	20Sep2016, 15:49	0.9
J1	0.09971	25.14	20Sep2016, 12:50	8.2
R15	0.09971	25.14	20Sep2016, 13:06	8.2
DA15_B	0.04010	12.38	20Sep2016, 12:51	2.5
DA15_A	0.03874	47.54	20Sep2016, 12:26	6.6
Out2	0.17855	63.01	20Sep2016, 12:33	17.3
DA11_A	0.04556	35.21	20Sep2016, 12:40	5.9
P11A	0.04556	8.96	20Sep2016, 13:55	5.7
DA13_A	0.02580	29.29	20Sep2016, 12:25	3.9
DA13_C	0.02345	9.56	20Sep2016, 12:43	1.7
R13_B	0.02345	9.56	20Sep2016, 12:54	1.7
DA11_B	0.01081	11.59	20Sep2016, 12:08	1
P11B	0.01081	0.64	20Sep2016, 15:45	1
DA13_B	0.01029	11.92	20Sep2016, 12:08	1
P13B	0.01029	0.64	20Sep2016, 15:41	1
J6	0.11590	36.09	20Sep2016, 12:30	13.4
R14	0.11590	36.09	20Sep2016, 12:30	13.4
DA12	0.01015	11.14	20Sep2016, 12:08	1
DA10	0.00420	5.17	20Sep2016, 12:07	0.4
P12	0.01435	0.74	20Sep2016, 16:12	1.4
DA14	0.00673	6.81	20Sep2016, 12:11	0.6
J5	0.13698	40.14	20Sep2016, 12:28	15.4
R17	0.13698	40.14	20Sep2016, 12:30	15.4
DA17	0.02280	29.25	20Sep2016, 12:24	3.8
DA15_C	0.01762	13.53	20Sep2016, 12:32	2
Out1	0.1774047	81.63	20Sep2016, 12:27	21.2
DA02	0.01427	11.04	20Sep2016, 12:10	1
DA04	0.00909	10.98	20Sep2016, 12:08	0.9
P4	0.00909	0.34	20Sep2016, 17:48	0.9
R2	0.00909	0.34	20Sep2016, 17:55	0.9
Out3	0.02336	11.18	20Sep2016, 12:10	1.9
DA05	0.02161	3.37	20Sep2016, 12:52	0.9
Out4	0.02161	3.37	20Sep2016, 12:52	0.9
OUT	0.4009215	151.18	20Sep2016, 12:29	41.3

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 2 10-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	21.21	20Sep2016, 12:51	4.2
DA01	0.01624	13.55	20Sep2016, 12:30	1.9
R3_A	0.01624	13.55	20Sep2016, 12:47	1.9
J3	0.06025	34.61	20Sep2016, 12:49	6.2
R3_B	0.06025	34.61	20Sep2016, 12:49	6.2
DA03_B	0.00990	15.82	20Sep2016, 12:08	1.3
P3B	0.00990	1.06	20Sep2016, 14:49	1.3
DA07	0.00904	19.06	20Sep2016, 12:08	1.7
P7	0.00904	0.6	20Sep2016, 16:55	1.7
J4	0.00904	0.6	20Sep2016, 16:55	1.7
R5	0.00904	0.6	20Sep2016, 16:55	1.7
J2	0.07920	36.26	20Sep2016, 12:49	9.2
R6	0.07920	36.26	20Sep2016, 12:49	9.2
DA06	0.01102	17.37	20Sep2016, 12:08	1.5
P6	0.01102	1.07	20Sep2016, 15:07	1.5
DA08	0.00949	14.8	20Sep2016, 12:08	1.2
P8	0.00949	0.58	20Sep2016, 16:43	1.2
J1	0.09971	37.89	20Sep2016, 12:49	11.9
R15	0.09971	37.89	20Sep2016, 13:05	11.9
DA15_B	0.04010	19.99	20Sep2016, 12:49	3.9
DA15_A	0.03874	61.12	20Sep2016, 12:26	8.5
Out2	0.17855	87.65	20Sep2016, 12:35	24.3
DA11_A	0.04556	47.75	20Sep2016, 12:40	8.1
P11A	0.04556	13.81	20Sep2016, 13:44	7.8
DA13_A	0.02580	38.55	20Sep2016, 12:25	5.1
DA13_C	0.02345	14.78	20Sep2016, 12:42	2.6
R13_B	0.02345	14.78	20Sep2016, 12:53	2.6
DA11_B	0.01081	16.91	20Sep2016, 12:08	1.4
P11B	0.01081	0.68	20Sep2016, 16:36	1.4
DA13_B	0.01029	17.1	20Sep2016, 12:08	1.4
P13B	0.01029	0.68	20Sep2016, 16:31	1.4
J6	0.11590	50.23	20Sep2016, 12:32	18.4
R14	0.11590	50.23	20Sep2016, 12:32	18.4
DA12	0.01015	16.17	20Sep2016, 12:08	1.4
DA10	0.00420	7.38	20Sep2016, 12:07	0.6
P12	0.01435	0.77	20Sep2016, 17:21	2
DA14	0.00673	9.88	20Sep2016, 12:10	0.9
J5	0.13698	55.37	20Sep2016, 12:29	21.3
R17	0.13698	55.37	20Sep2016, 12:31	21.3
DA17	0.02280	37.65	20Sep2016, 12:23	5
DA15_C	0.01762	18.86	20Sep2016, 12:32	2.8
Out1	0.1774047	110.04	20Sep2016, 12:27	29.1
DA02	0.01427	17.09	20Sep2016, 12:10	1.5
DA04	0.00909	15.63	20Sep2016, 12:08	1.3
P4	0.00909	0.37	20Sep2016, 19:08	1.2
R2	0.00909	0.37	20Sep2016, 19:15	1.2
Out3	0.02336	17.38	20Sep2016, 12:10	2.7
DA05	0.02161	7.27	20Sep2016, 12:47	1.5
Out4	0.02161	7.27	20Sep2016, 12:47	1.5
OUT	0.4009215	208.78	20Sep2016, 12:29	57.7

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 2 25-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	34.9	20Sep2016, 12:49	6.7
DA01	0.01624	20.98	20Sep2016, 12:29	2.9
R3_A	0.01624	20.98	20Sep2016, 12:46	2.9
J3	0.06025	55.71	20Sep2016, 12:47	9.7
R3_B	0.06025	55.71	20Sep2016, 12:47	9.7
DA03_B	0.00990	23.62	20Sep2016, 12:08	2
P3B	0.00990	1.09	20Sep2016, 15:48	2
DA07	0.00904	26.29	20Sep2016, 12:08	2.3
P7	0.00904	0.63	20Sep2016, 17:52	2.3
J4	0.00904	0.63	20Sep2016, 17:52	2.3
R5	0.00904	0.63	20Sep2016, 17:52	2.3
J2	0.07920	57.4	20Sep2016, 12:47	14
R6	0.07920	57.4	20Sep2016, 12:47	14
DA06	0.01102	26.02	20Sep2016, 12:08	2.2
P6	0.01102	1.1	20Sep2016, 16:01	2.2
DA08	0.00949	22.24	20Sep2016, 12:08	1.9
P8	0.00949	0.61	20Sep2016, 17:48	1.9
J1	0.09971	59.09	20Sep2016, 12:47	18
R15	0.09971	59.09	20Sep2016, 13:03	18
DA15_B	0.04010	32.82	20Sep2016, 12:48	6.2
DA15_A	0.03874	81.41	20Sep2016, 12:26	11.5
Out2	0.17855	128.22	20Sep2016, 12:43	35.7
DA11_A	0.04556	67.04	20Sep2016, 12:39	11.4
P11A	0.04556	34.61	20Sep2016, 13:15	11.1
DA13_A	0.02580	52.51	20Sep2016, 12:24	7.1
DA13_C	0.02345	23.38	20Sep2016, 12:41	4
R13_B	0.02345	23.38	20Sep2016, 12:52	4
DA11_B	0.01081	25.38	20Sep2016, 12:08	2.1
P11B	0.01081	0.71	20Sep2016, 17:48	2.1
DA13_B	0.01029	25.3	20Sep2016, 12:08	2.1
P13B	0.01029	0.71	20Sep2016, 17:39	2.1
J6	0.11590	73.45	20Sep2016, 12:33	26.5
R14	0.11590	73.45	20Sep2016, 12:33	26.5
DA12	0.01015	24.17	20Sep2016, 12:08	2
DA10	0.00420	10.85	20Sep2016, 12:07	0.9
P12	0.01435	2.37	20Sep2016, 14:26	2.9
DA14	0.00673	14.8	20Sep2016, 12:10	1.3
J5	0.13698	80.14	20Sep2016, 12:29	30.7
R17	0.13698	80.14	20Sep2016, 12:31	30.7
DA17	0.02280	50.24	20Sep2016, 12:23	6.8
DA15_C	0.01762	27.17	20Sep2016, 12:31	4
Out1	0.1774047	154.72	20Sep2016, 12:28	41.5
DA02	0.01427	27.03	20Sep2016, 12:09	2.4
DA04	0.00909	22.93	20Sep2016, 12:08	1.9
P4	0.00909	0.4	20Sep2016, 17:37	1.5
R2	0.00909	0.4	20Sep2016, 17:44	1.5
Out3	0.02336	27.36	20Sep2016, 12:09	3.9
DA05	0.02161	14.66	20Sep2016, 12:44	2.7
Out4	0.02161	14.66	20Sep2016, 12:44	2.7
OUT	0.4009215	302.14	20Sep2016, 12:30	83.7

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 2 50-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	44.72	20Sep2016, 12:49	8.5
DA01	0.01624	26.18	20Sep2016, 12:28	3.6
R3_A	0.01624	26.18	20Sep2016, 12:45	3.6
J3	0.06025	70.73	20Sep2016, 12:47	12.2
R3_B	0.06025	70.73	20Sep2016, 12:47	12.2
DA03_B	0.00990	28.99	20Sep2016, 12:08	2.4
P3B	0.00990	1.11	20Sep2016, 16:13	2.4
DA07	0.00904	31.19	20Sep2016, 12:07	2.8
P7	0.00904	0.65	20Sep2016, 18:33	2.6
J4	0.00904	0.65	20Sep2016, 18:33	2.6
R5	0.00904	0.65	20Sep2016, 18:33	2.6
J2	0.07920	72.45	20Sep2016, 12:47	17.2
R6	0.07920	72.45	20Sep2016, 12:47	17.2
DA06	0.01102	31.98	20Sep2016, 12:08	2.7
P6	0.01102	1.12	20Sep2016, 16:40	2.7
DA08	0.00949	27.36	20Sep2016, 12:08	2.3
P8	0.00949	0.63	20Sep2016, 18:33	2.3
J1	0.09971	74.16	20Sep2016, 12:47	22.2
R15	0.09971	74.16	20Sep2016, 13:03	22.2
DA15_B	0.04010	42.02	20Sep2016, 12:47	7.8
DA15_A	0.03874	94.87	20Sep2016, 12:26	13.5
Out2	0.17855	157.7	20Sep2016, 12:47	43.6
DA11_A	0.04556	80.01	20Sep2016, 12:39	13.6
P11A	0.04556	49.9	20Sep2016, 13:07	13.4
DA13_A	0.02580	61.84	20Sep2016, 12:24	8.4
DA13_C	0.02345	29.45	20Sep2016, 12:41	5
R13_B	0.02345	29.45	20Sep2016, 12:52	5
DA11_B	0.01081	31.22	20Sep2016, 12:08	2.6
P11B	0.01081	1.26	20Sep2016, 17:05	2.6
DA13_B	0.01029	30.92	20Sep2016, 12:08	2.6
P13B	0.01029	0.73	20Sep2016, 18:15	2.6
J6	0.11590	103.37	20Sep2016, 12:53	32
R14	0.11590	103.37	20Sep2016, 12:53	32
DA12	0.01015	29.67	20Sep2016, 12:08	2.5
DA10	0.00420	13.24	20Sep2016, 12:06	1.1
P12	0.01435	7.57	20Sep2016, 12:40	3.6
DA14	0.00673	18.19	20Sep2016, 12:10	1.7
J5	0.13698	111.76	20Sep2016, 12:53	37.2
R17	0.13698	111.76	20Sep2016, 12:55	37.2
DA17	0.02280	58.58	20Sep2016, 12:23	7.9
DA15_C	0.01762	32.83	20Sep2016, 12:31	4.9
Out1	0.1774047	185.32	20Sep2016, 12:28	50
DA02	0.01427	34.09	20Sep2016, 12:09	3
DA04	0.00909	27.92	20Sep2016, 12:08	2.3
P4	0.00909	0.42	20Sep2016, 22:41	1.6
R2	0.00909	0.42	20Sep2016, 22:48	1.6
Out3	0.02336	34.43	20Sep2016, 12:09	4.6
DA05	0.02161	20.19	20Sep2016, 12:42	3.5
Out4	0.02161	20.19	20Sep2016, 12:42	3.5
OUT	0.4009215	367.13	20Sep2016, 12:30	101.6

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 2 100-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA03_A	0.04401	60.14	20Sep2016, 12:48	11.4
DA01	0.01624	34.22	20Sep2016, 12:28	4.8
R3_A	0.01624	34.22	20Sep2016, 12:45	4.8
J3	0.06025	94.14	20Sep2016, 12:46	16.1
R3_B	0.06025	94.14	20Sep2016, 12:46	16.1
DA03_B	0.00990	37.18	20Sep2016, 12:08	3.1
P3B	0.00990	1.13	20Sep2016, 17:08	3.1
DA07	0.00904	38.64	20Sep2016, 12:07	3.5
P7	0.00904	0.67	20Sep2016, 20:21	2.8
J4	0.00904	0.67	20Sep2016, 20:21	2.8
R5	0.00904	0.67	20Sep2016, 20:21	2.8
J2	0.07920	95.9	20Sep2016, 12:47	22.1
R6	0.07920	95.9	20Sep2016, 12:47	22.1
DA06	0.01102	41.08	20Sep2016, 12:08	3.5
P6	0.01102	1.14	20Sep2016, 17:31	3.5
DA08	0.00949	35.19	20Sep2016, 12:08	3
P8	0.00949	0.66	20Sep2016, 20:21	2.6
J1	0.09971	97.66	20Sep2016, 12:47	28.1
R15	0.09971	97.66	20Sep2016, 13:03	28.1
DA15_B	0.04010	56.45	20Sep2016, 12:46	10.4
DA15_A	0.03874	114.94	20Sep2016, 12:26	16.6
Out2	0.17855	203.59	20Sep2016, 12:48	55.1
DA11_A	0.04556	99.52	20Sep2016, 12:39	17.1
P11A	0.04556	69.15	20Sep2016, 13:02	16.8
DA13_A	0.02580	75.78	20Sep2016, 12:24	10.4
DA13_C	0.02345	38.9	20Sep2016, 12:40	6.6
R13_B	0.02345	38.9	20Sep2016, 12:51	6.6
DA11_B	0.01081	40.13	20Sep2016, 12:08	3.4
P11B	0.01081	6.02	20Sep2016, 12:47	3.4
DA13_B	0.01029	39.46	20Sep2016, 12:08	3.3
P13B	0.01029	6.79	20Sep2016, 12:48	3.3
J6	0.11590	152.45	20Sep2016, 12:48	40.5
R14	0.11590	152.45	20Sep2016, 12:48	40.5
DA12	0.01015	38.07	20Sep2016, 12:08	3.2
DA10	0.00420	16.89	20Sep2016, 12:06	1.4
P12	0.01435	34.58	20Sep2016, 12:16	4.6
DA14	0.00673	23.37	20Sep2016, 12:10	2.1
J5	0.13698	164.35	20Sep2016, 12:48	47.2
R17	0.13698	164.35	20Sep2016, 12:50	47.2
DA17	0.02280	71.03	20Sep2016, 12:23	9.7
DA15_C	0.01762	41.38	20Sep2016, 12:31	6.2
Out1	0.1774047	253.96	20Sep2016, 12:25	63.1
DA02	0.01427	45.04	20Sep2016, 12:09	3.9
DA04	0.00909	35.49	20Sep2016, 12:08	3
P4	0.00909	0.44	20Sep2016, 23:52	1.7
R2	0.00909	0.44	20Sep2016, 23:59	1.7
Out3	0.02336	45.39	20Sep2016, 12:09	5.6
DA05	0.02161	28.96	20Sep2016, 12:41	4.8
Out4	0.02161	28.96	20Sep2016, 12:41	4.8
OUT	0.4009215	485.53	20Sep2016, 12:29	128.7

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 3 2-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA15_B	0.04010	5.17	20Sep2016, 12:51	1.2
DA06	0.01102	4.87	20Sep2016, 12:16	0.5
DA08	0.00949	4.6	20Sep2016, 12:12	0.5
J1	0.06061	10.15	20Sep2016, 12:15	2.2
R6	0.06061	10.15	20Sep2016, 12:15	2.2
DA03_B	0.00990	4.58	20Sep2016, 12:15	0.5
DA07	0.00904	6.67	20Sep2016, 12:18	0.8
J4	0.00904	6.67	20Sep2016, 12:18	0.8
R5	0.00904	6.67	20Sep2016, 12:18	0.8
J2	0.07955	21.25	20Sep2016, 12:16	3.5
R3_B	0.07955	21.25	20Sep2016, 12:16	3.5
J3	0.07955	21.25	20Sep2016, 12:16	3.5
DA03_A	0.04401	5.16	20Sep2016, 12:58	1.3
DA05	0.02161	0.54	20Sep2016, 13:18	0.3
DA01	0.01624	4.21	20Sep2016, 12:33	0.7
R3A	0.01624	4.21	20Sep2016, 12:50	0.7
P5	0.16142	2.2	20Sep2016, 20:21	4.3
R11A	0.16142	2.2	20Sep2016, 20:28	4.3
DA11_A	0.04556	20.84	20Sep2016, 12:41	3.6
P11A	0.04556	0.6	21Sep2016, 00:21	2
J7	0.20698	2.8	20Sep2016, 20:45	6.3
R13A	0.20698	2.8	20Sep2016, 20:50	6.3
DA13_A	0.02580	18.41	20Sep2016, 12:26	2.4
DA13_C	0.02345	4.21	20Sep2016, 12:47	0.9
R13_B	0.02345	4.21	20Sep2016, 12:58	0.9
DA11_B	0.01081	4.09	20Sep2016, 12:22	0.5
DA13_B	0.01029	5.28	20Sep2016, 12:14	0.6
J6	0.27732	27.39	20Sep2016, 12:25	10.7
R14	0.27732	27.39	20Sep2016, 12:25	10.7
DA15_C	0.01762	7.58	20Sep2016, 12:34	1.2
P15C	0.01762	0.25	20Sep2016, 23:50	0.8
DA12	0.01015	3.68	20Sep2016, 12:27	0.5
DA14	0.00673	3.47	20Sep2016, 12:11	0.3
DA10	0.00420	2.73	20Sep2016, 12:07	0.2
R12	0.00420	2.73	20Sep2016, 12:31	0.2
J5	0.31602	35.24	20Sep2016, 12:27	12.5
R17	0.31602	35.24	20Sep2016, 12:29	12.5
DA17	0.02280	19.22	20Sep2016, 12:24	2.5
Out1	0.33882	54.04	20Sep2016, 12:27	15
DA15_A	0.03874	31.33	20Sep2016, 12:27	4.3
Out2	0.03874	31.33	20Sep2016, 12:27	4.3
DA04	0.00909	4.03	20Sep2016, 12:23	0.5
J8	0.00909	4.03	20Sep2016, 12:23	0.5
R2	0.00909	4.03	20Sep2016, 12:30	0.5
DA02	0.01427	4.78	20Sep2016, 12:11	0.5
Out3	0.02336	6.97	20Sep2016, 12:25	1
OUT	0.4009215	92.25	20Sep2016, 12:27	20.3

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan

TxDOT: 1421WESLA KSA: WSL.007

Alternative 3 5-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA15_B	0.04010	13.09	20Sep2016, 12:47	2.5
DA06	0.01102	9.66	20Sep2016, 12:15	1
DA08	0.00949	9.14	20Sep2016, 12:11	0.9
J1	0.06061	22.24	20Sep2016, 12:15	4.4
R6	0.06061	22.24	20Sep2016, 12:15	4.4
DA03_B	0.00990	9.01	20Sep2016, 12:14	0.9
DA07	0.00904	10.58	20Sep2016, 12:18	1.3
J4	0.00904	10.58	20Sep2016, 12:18	1.3
R5	0.00904	10.58	20Sep2016, 12:18	1.3
J2	0.07955	41.51	20Sep2016, 12:16	6.6
R3_B	0.07955	41.51	20Sep2016, 12:16	6.6
J3	0.07955	41.51	20Sep2016, 12:16	6.6
DA03_A	0.04401	13.11	20Sep2016, 12:53	2.8
DA05	0.02161	3.37	20Sep2016, 12:52	0.9
DA01	0.01624	8.99	20Sep2016, 12:31	1.3
R3A	0.01624	8.99	20Sep2016, 12:48	1.3
P5	0.16142	6.52	20Sep2016, 17:07	9.9
R11A	0.16142	6.52	20Sep2016, 17:14	9.9
DA11_A	0.04556	35.21	20Sep2016, 12:40	5.9
P11A	0.04556	0.84	21Sep2016, 00:24	2.9
J7	0.20698	7.32	20Sep2016, 17:20	12.7
R13A	0.20698	7.32	20Sep2016, 17:25	12.7
DA13_A	0.02580	29.29	20Sep2016, 12:25	3.9
DA13_C	0.02345	9.56	20Sep2016, 12:43	1.7
R13_B	0.02345	9.56	20Sep2016, 12:54	1.7
DA11_B	0.01081	8.14	20Sep2016, 12:21	1
DA13_B	0.01029	10.13	20Sep2016, 12:13	1
J6	0.27732	48	20Sep2016, 12:24	20.4
R14	0.27732	48	20Sep2016, 12:24	20.4
DA15_C	0.01762	13.53	20Sep2016, 12:32	2
P15C	0.01762	0.34	21Sep2016, 00:14	1.2
DA12	0.01015	7.23	20Sep2016, 12:25	1
DA14	0.00673	6.81	20Sep2016, 12:11	0.6
DA10	0.00420	5.17	20Sep2016, 12:07	0.4
R12	0.00420	5.17	20Sep2016, 12:31	0.4
J5	0.31602	63.11	20Sep2016, 12:26	23.5
R17	0.31602	63.11	20Sep2016, 12:28	23.5
DA17	0.02280	29.25	20Sep2016, 12:24	3.8
Out1	0.33882	91.73	20Sep2016, 12:26	27.4
DA15_A	0.03874	47.54	20Sep2016, 12:26	6.6
Out2	0.03874	47.54	20Sep2016, 12:26	6.6
DA04	0.00909	7.59	20Sep2016, 12:22	0.9
J8	0.00909	7.59	20Sep2016, 12:22	0.9
R2	0.00909	7.59	20Sep2016, 12:29	0.9
DA02	0.01427	11.04	20Sep2016, 12:10	1
Out3	0.02336	14.22	20Sep2016, 12:12	2
OUT	0.4009215	152.81	20Sep2016, 12:26	35.9

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 3 10-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA15_B	0.04010	21.13	20Sep2016, 12:45	3.9
DA06	0.01102	14.08	20Sep2016, 12:14	1.5
DA08	0.00949	13.37	20Sep2016, 12:11	1.2
J1	0.06061	34.31	20Sep2016, 12:15	6.6
R6	0.06061	34.31	20Sep2016, 12:15	6.6
DA03_B	0.00990	13.1	20Sep2016, 12:14	1.3
DA07	0.00904	14.03	20Sep2016, 12:18	1.7
J4	0.00904	14.03	20Sep2016, 12:18	1.7
R5	0.00904	14.03	20Sep2016, 12:18	1.7
J2	0.07955	60.97	20Sep2016, 12:15	9.6
R3_B	0.07955	60.97	20Sep2016, 12:15	9.6
J3	0.07955	60.97	20Sep2016, 12:15	9.6
DA03_A	0.04401	21.21	20Sep2016, 12:51	4.2
DA05	0.02161	7.27	20Sep2016, 12:47	1.5
DA01	0.01624	13.55	20Sep2016, 12:30	1.9
R3A	0.01624	13.55	20Sep2016, 12:47	1.9
P5	0.16142	11.77	20Sep2016, 16:10	15.4
R11A	0.16142	11.77	20Sep2016, 16:17	15.4
DA11_A	0.04556	47.75	20Sep2016, 12:40	8.1
P11A	0.04556	1.01	21Sep2016, 00:27	3.6
J7	0.20698	12.71	20Sep2016, 16:20	19
R13A	0.20698	12.71	20Sep2016, 16:25	19
DA13_A	0.02580	38.55	20Sep2016, 12:25	5.1
DA13_C	0.02345	14.78	20Sep2016, 12:42	2.6
R13_B	0.02345	14.78	20Sep2016, 12:53	2.6
DA11_B	0.01081	11.91	20Sep2016, 12:20	1.4
DA13_B	0.01029	14.57	20Sep2016, 12:13	1.4
J6	0.27732	66.72	20Sep2016, 12:24	29.6
R14	0.27732	66.72	20Sep2016, 12:24	29.6
DA15_C	0.01762	18.86	20Sep2016, 12:32	2.8
P15C	0.01762	0.41	21Sep2016, 00:17	1.4
DA12	0.01015	10.52	20Sep2016, 12:25	1.4
DA14	0.00673	9.88	20Sep2016, 12:10	0.9
DA10	0.00420	7.38	20Sep2016, 12:07	0.6
R12	0.00420	7.38	20Sep2016, 12:31	0.6
J5	0.31602	88.47	20Sep2016, 12:26	33.9
R17	0.31602	88.47	20Sep2016, 12:28	33.9
DA17	0.02280	37.65	20Sep2016, 12:23	5
Out1	0.33882	125.33	20Sep2016, 12:26	38.9
DA15_A	0.03874	61.12	20Sep2016, 12:26	8.5
Out2	0.03874	61.12	20Sep2016, 12:26	8.5
DA04	0.00909	10.83	20Sep2016, 12:21	1.3
J8	0.00909	10.83	20Sep2016, 12:21	1.3
R2	0.00909	10.83	20Sep2016, 12:28	1.3
DA02	0.01427	17.09	20Sep2016, 12:10	1.5
Out3	0.02336	21.74	20Sep2016, 12:11	2.9
OUT	0.4009215	206.06	20Sep2016, 12:26	50.3

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 3 25-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA15_B	0.04010	34.66	20Sep2016, 12:44	6.2
DA06	0.01102	21.19	20Sep2016, 12:14	2.2
DA08	0.00949	20.12	20Sep2016, 12:11	1.9
J1	0.06061	54.23	20Sep2016, 12:15	10.2
R6	0.06061	54.23	20Sep2016, 12:15	10.2
DA03_B	0.00990	19.61	20Sep2016, 12:13	2
DA07	0.00904	19.39	20Sep2016, 12:18	2.3
J4	0.00904	19.39	20Sep2016, 12:18	2.3
R5	0.00904	19.39	20Sep2016, 12:18	2.3
J2	0.07955	92.56	20Sep2016, 12:15	14.5
R3_B	0.07955	92.56	20Sep2016, 12:15	14.5
J3	0.07955	92.56	20Sep2016, 12:15	14.5
DA03_A	0.04401	34.9	20Sep2016, 12:49	6.7
DA05	0.02161	14.66	20Sep2016, 12:44	2.7
DA01	0.01624	20.98	20Sep2016, 12:29	2.9
R3A	0.01624	20.98	20Sep2016, 12:46	2.9
P5	0.16142	33.87	20Sep2016, 14:12	24.8
R11A	0.16142	33.87	20Sep2016, 14:19	24.8
DA11_A	0.04556	67.04	20Sep2016, 12:39	11.4
P11A	0.04556	9.89	20Sep2016, 14:42	6.6
J7	0.20698	42.88	20Sep2016, 14:27	31.5
R13A	0.20698	42.88	20Sep2016, 14:32	31.5
DA13_A	0.02580	52.51	20Sep2016, 12:24	7.1
DA13_C	0.02345	23.38	20Sep2016, 12:41	4
R13_B	0.02345	23.38	20Sep2016, 12:52	4
DA11_B	0.01081	17.95	20Sep2016, 12:20	2.1
DA13_B	0.01029	21.6	20Sep2016, 12:13	2.1
J6	0.27732	96.42	20Sep2016, 12:24	46.8
R14	0.27732	96.42	20Sep2016, 12:24	46.8
DA15_C	0.01762	27.17	20Sep2016, 12:31	4
P15C	0.01762	2.76	20Sep2016, 15:22	2.4
DA12	0.01015	15.78	20Sep2016, 12:24	2
DA14	0.00673	14.8	20Sep2016, 12:10	1.3
DA10	0.00420	10.85	20Sep2016, 12:07	0.9
R12	0.00420	10.85	20Sep2016, 12:31	0.9
J5	0.31602	128.67	20Sep2016, 12:26	53.4
R17	0.31602	128.67	20Sep2016, 12:28	53.4
DA17	0.02280	50.24	20Sep2016, 12:23	6.8
Out1	0.33882	177.84	20Sep2016, 12:26	60.2
DA15_A	0.03874	81.41	20Sep2016, 12:26	11.5
Out2	0.03874	81.41	20Sep2016, 12:26	11.5
DA04	0.00909	15.95	20Sep2016, 12:21	1.9
J8	0.00909	15.95	20Sep2016, 12:21	1.9
R2	0.00909	15.95	20Sep2016, 12:28	1.9
DA02	0.01427	27.03	20Sep2016, 12:09	2.4
Out3	0.02336	34.11	20Sep2016, 12:11	4.3
OUT	0.4009215	288.65	20Sep2016, 12:25	76

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 3 50-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA15_B	0.04010	44.36	20Sep2016, 12:43	7.8
DA06	0.01102	26.1	20Sep2016, 12:14	2.7
DA08	0.00949	24.78	20Sep2016, 12:11	2.3
J1	0.06061	68.29	20Sep2016, 12:15	12.8
R6	0.06061	68.29	20Sep2016, 12:15	12.8
DA03_B	0.00990	24.12	20Sep2016, 12:13	2.4
DA07	0.00904	23.02	20Sep2016, 12:18	2.8
J4	0.00904	23.02	20Sep2016, 12:18	2.8
R5	0.00904	23.02	20Sep2016, 12:18	2.8
J2	0.07955	114.61	20Sep2016, 12:15	18
R3_B	0.07955	114.61	20Sep2016, 12:15	18
J3	0.07955	114.61	20Sep2016, 12:15	18
DA03_A	0.04401	44.72	20Sep2016, 12:49	8.5
DA05	0.02161	20.19	20Sep2016, 12:42	3.5
DA01	0.01624	26.18	20Sep2016, 12:28	3.6
R3A	0.01624	26.18	20Sep2016, 12:45	3.6
P5	0.16142	63.8	20Sep2016, 13:37	31.6
R11A	0.16142	63.8	20Sep2016, 13:44	31.6
DA11_A	0.04556	80.01	20Sep2016, 12:39	13.6
P11A	0.04556	18.75	20Sep2016, 13:55	8.9
J7	0.20698	82.3	20Sep2016, 13:46	40.5
R13A	0.20698	82.3	20Sep2016, 13:51	40.5
DA13_A	0.02580	61.84	20Sep2016, 12:24	8.4
DA13_C	0.02345	29.45	20Sep2016, 12:41	5
R13_B	0.02345	29.45	20Sep2016, 12:52	5
DA11_B	0.01081	22.12	20Sep2016, 12:20	2.6
DA13_B	0.01029	26.45	20Sep2016, 12:12	2.6
J6	0.27732	117.12	20Sep2016, 12:24	59.1
R14	0.27732	117.12	20Sep2016, 12:24	59.1
DA15_C	0.01762	32.83	20Sep2016, 12:31	4.9
P15C	0.01762	6.12	20Sep2016, 13:48	3.2
DA12	0.01015	19.41	20Sep2016, 12:24	2.5
DA14	0.00673	18.19	20Sep2016, 12:10	1.7
DA10	0.00420	13.24	20Sep2016, 12:06	1.1
R12	0.00420	13.24	20Sep2016, 12:30	1.1
J5	0.31602	156.63	20Sep2016, 12:26	67.5
R17	0.31602	156.63	20Sep2016, 12:28	67.5
DA17	0.02280	58.58	20Sep2016, 12:23	7.9
Out1	0.33882	213.91	20Sep2016, 12:26	75.5
DA15_A	0.03874	94.87	20Sep2016, 12:26	13.5
Out2	0.03874	94.87	20Sep2016, 12:26	13.5
DA04	0.00909	19.46	20Sep2016, 12:20	2.3
J8	0.00909	19.46	20Sep2016, 12:20	2.3
R2	0.00909	19.46	20Sep2016, 12:27	2.3
DA02	0.01427	34.09	20Sep2016, 12:09	3
Out3	0.02336	42.79	20Sep2016, 12:11	5.3
OUT	0.4009215	344.93	20Sep2016, 12:25	94.4

APPENDIX J

City of Weslaco - Mid-Valley Airport Master Drainage Plan
TxDOT: 1421WESLA KSA: WSL.007
Alternative 3 100-yr HMS Results

Hydrologic Element	Drainage Area (sq mi)	Peak Discharge (cfs)	Time to Peak	Volume (ac-ft)
DA15_B	0.04010	59.56	20Sep2016, 12:42	10.4
DA06	0.01102	33.6	20Sep2016, 12:14	3.5
DA08	0.00949	31.9	20Sep2016, 12:11	3
J1	0.06061	90.14	20Sep2016, 12:15	16.8
R6	0.06061	90.14	20Sep2016, 12:15	16.8
DA03_B	0.00990	31.02	20Sep2016, 12:13	3.1
DA07	0.00904	28.53	20Sep2016, 12:18	3.5
J4	0.00904	28.53	20Sep2016, 12:18	3.5
R5	0.00904	28.53	20Sep2016, 12:18	3.5
J2	0.07955	148.63	20Sep2016, 12:15	23.4
R3_B	0.07955	148.63	20Sep2016, 12:15	23.4
J3	0.07955	148.63	20Sep2016, 12:15	23.4
DA03_A	0.04401	60.14	20Sep2016, 12:48	11.4
DA05	0.02161	28.96	20Sep2016, 12:41	4.8
DA01	0.01624	34.22	20Sep2016, 12:28	4.8
R3A	0.01624	34.22	20Sep2016, 12:45	4.8
P5	0.16142	114.81	20Sep2016, 13:19	42.3
R11A	0.16142	114.81	20Sep2016, 13:26	42.3
DA11_A	0.04556	99.52	20Sep2016, 12:39	17.1
P11A	0.04556	34.41	20Sep2016, 13:31	12.3
J7	0.20698	149.05	20Sep2016, 13:28	54.6
R13A	0.20698	149.05	20Sep2016, 13:33	54.6
DA13_A	0.02580	75.78	20Sep2016, 12:24	10.4
DA13_C	0.02345	38.9	20Sep2016, 12:40	6.6
R13_B	0.02345	38.9	20Sep2016, 12:51	6.6
DA11_B	0.01081	28.51	20Sep2016, 12:19	3.4
DA13_B	0.01029	33.84	20Sep2016, 12:12	3.3
J6	0.27732	189.57	20Sep2016, 13:25	78.3
R14	0.27732	189.57	20Sep2016, 13:25	78.3
DA15_C	0.01762	41.38	20Sep2016, 12:31	6.2
P15C	0.01762	12	20Sep2016, 13:21	4.5
DA12	0.01015	24.97	20Sep2016, 12:23	3.2
DA14	0.00673	23.37	20Sep2016, 12:10	2.1
DA10	0.00420	16.89	20Sep2016, 12:06	1.4
R12	0.00420	16.89	20Sep2016, 12:30	1.4
J5	0.31602	210.48	20Sep2016, 13:23	89.5
R17	0.31602	210.48	20Sep2016, 13:25	89.5
DA17	0.02280	71.03	20Sep2016, 12:23	9.7
Out1	0.33882	269.36	20Sep2016, 12:26	99.2
DA15_A	0.03874	114.94	20Sep2016, 12:26	16.6
Out2	0.03874	114.94	20Sep2016, 12:26	16.6
DA04	0.00909	24.82	20Sep2016, 12:20	3
J8	0.00909	24.82	20Sep2016, 12:20	3
R2	0.00909	24.82	20Sep2016, 12:27	3
DA02	0.01427	45.04	20Sep2016, 12:09	3.9
Out3	0.02336	56.27	20Sep2016, 12:10	7
OUT	0.4009215	430.72	20Sep2016, 12:25	122.7