

HYDROLOGIC AND HYDRAULIC ANALYSES

INTRODUCTION

Hydrologic and hydraulic analyses were conducted as part of the feasibility study to develop existing condition models for the Leon Creek Watershed. The model analyses will be used as the baseline for comparison with the future without-project conditions for alternative analysis and plan selection.

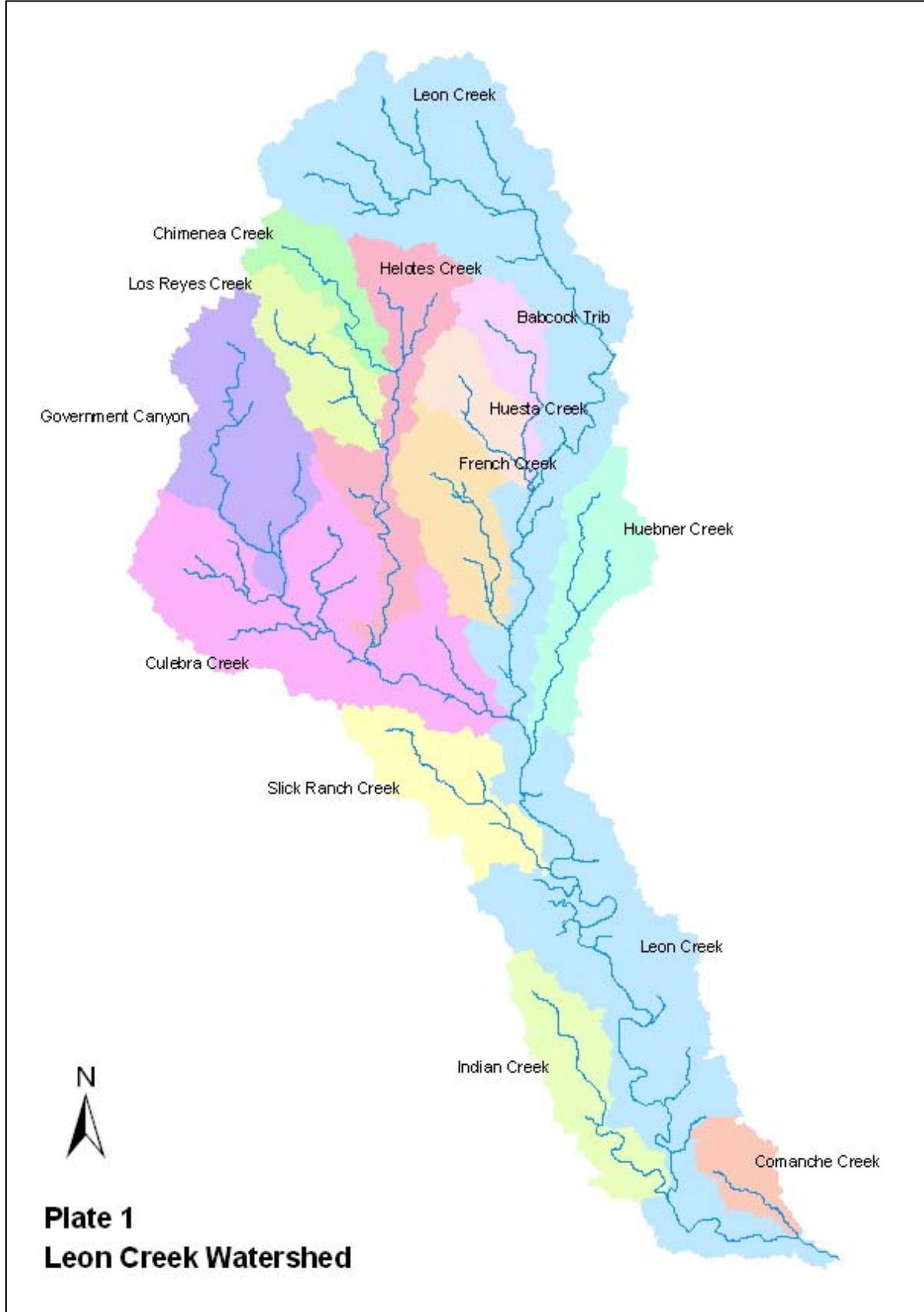
Study Area

The Leon Creek Watershed is located in the northwestern portion of Bexar County, stretching from the northwest limits of the County to the confluence of Leon Creek with the Medina River southwest of the city of San Antonio. The total drainage area of this watershed is approximately 238 square miles. Elevations within this watershed range from 1,600 to 456 feet National Geodetic Vertical Datum (NGVD).

This watershed includes several major tributaries to Leon Creek, including Culebra Creek (82.3 square miles), Huebner Creek (12 square miles), French Creek (11.6 square miles), Slick Ranch Creek (11.5 square miles), Indian Creek (11 square miles), and numerous smaller tributaries. Plate 1 on the next page provides a general watershed map.

The shape of the Leon Creek Watershed is unique in that the portion upstream of Huebner Creek is relatively wide and the portion downstream of Huebner Creek is relatively narrow. The upper portion has an average width of approximately 10 miles and a length of about 32 miles. The portion of the watershed downstream of Huebner Creek has an average width of approximately four miles and a length of about 25 miles.

A variety of types and intensity of development exist within the Leon Creek Watershed. The portion of the watershed upstream of the upper Interstate Highway 10 crossing is relatively undeveloped with scattered residential and agricultural structures. Downstream of the upper I-10 crossing, the watershed is composed of extensive residential and commercial development. Lackland Air Force Base is situated within the watershed. Government Canyon, a tributary of Culebra Creek, is designated a State Natural Area, which permanently protects its land, water, and wildlife from suburban development.



HYDROLOGIC ANALYSIS

To develop discharge-frequency relationships for Leon Creek and tributaries for both existing and future without-project conditions, the study team performed a detailed hydrologic analysis of the Leon Creek Watershed.

Drainage Basin Area Delineation

Leon Creek and tributaries were delineated based on an upper limit of study of one square mile. The San Antonio River Authority (SARA) provided a 2003 Digital Elevation Model (DEM). Based on five-foot contours generated from the DEM, the USACE Hydrologic Engineering Center - Geospatial Hydrologic Modeling System (HEC-GeoHMS Version 1.1 running on ArcView 3.3) was used to generate the subbasin parameters of drainage area, stream length, stream length from the subbasin outflow point to the subbasin centroid, and stream slope.

Boundary Modification

After the subbasins were delineated in HEC-GeoHMS, the outside boundary was checked for accuracy using the DEM data and aerial photography. Because of errors in DEM, the boundary conflicted with the actual topography. For a few areas of the Leon Creek Watershed, delineations were hand-drawn to replace the computer-generated delineations, particularly the outer boundary on the northwest portion of the watershed. The updated outside boundary was used for the development of the hydrologic model.

Precipitation Data

Theoretical point rainfall data for the area was updated for the Bexar County Digital Flood Insurance Rate Map (DFIRM) effort described in the technical report, “Development of Design Rainfall Information,” dated 3 March 2005. The update was based on the United States Geological Survey (USGS) report, “Atlas of Depth-Duration Frequency of Precipitation Annual Maxima for Texas” (Scientific Investigations Report 2004-5041). The City of San Antonio also replaced the updated values in their Unified Development Code (UDC).

For consistency in the San Antonio area DFIRM studies, the updated values were used in this feasibility study. Table G.1-1 presents the hypothetical precipitation array for the study area. The standard annual chance exceedance (ACE) frequency-related events are more commonly known as those having recurrence intervals of 2, 5, 10, 25, 50, 100, 250, and 500 years, respectively.

Table G.1-1. Point Rainfall Depths (inches)

Annual Chance Exceedance	Recurrence Interval (years)	Storm Duration							
		5 min	15 min	1 hr	2 hrs	3 hrs	6 hrs	12 hrs	24 hrs
50%	2	0.53	1.07	1.84	2.20	2.41	2.80	3.2	3.6
20%	5	0.68	1.40	2.35	2.92	3.28	3.83	4.4	5.0
10%	10	0.78	1.60	2.76	3.55	3.95	4.60	5.4	6.0
4%	25	0.93	1.80	3.32	4.35	4.90	5.70	6.4	7.5
2%	50	1.04	2.10	3.85	5.10	5.70	6.50	7.5	9.0
1%	100	1.13	2.50	4.35	5.80	6.60	7.50	8.8	10.0
0.4%	250	1.33	2.90	5.19	7.00	8.00	9.00	10.4	11.8
0.2%	500	1.52	3.30	5.80	8.10	9.40	10.60	12.4	13.7

EXISTING CONDITIONS

Existing conditions discharge-frequency relationships were developed based on topography, current land use values, current precipitation data, and existing conditions urbanization and impervious percentages.

Model Development

Using the USACE HEC-HMS version 3.0 software, a watershed runoff model was developed. The Leon Creek Watershed was subdivided into 363 subbasins, which required the designation of 443 junctions and the development of routing data for 191 reaches. Points of interest in the watershed included the confluence of Leon Creek with all tributaries whose total drainage area exceeded one square mile, major road crossings, and USGS gage locations. The subbasins and junctions were defined to obtain detailed flow information (flood hydrographs) at all points of interest. A six-minute computation interval was used in the model to provide detail (shaping) of the unit hydrograph applied at the smaller subbasins in the analysis.

Areal Reduction Factors

Values from the National Weather Service (NWS) Technical Paper 40 (TP40), Figure 15 “Depth-Area-Duration” curves, were used to adjust the point rainfall to representative average values over the contributing watershed size at each point of interest.

Initial Abstractions and Infiltration Rates

Based on storm reproductions and frequency analysis, minimum losses were found to best calibrate the rare flood events. The values used are reasonable and are similar to those used in other models developed for the San Antonio area. Loss rates vary by frequency to reflect antecedent soil moisture conditions for rarer flood events. This variation reflects the availability of watershed surface storage

and the degree of surface soil saturation expected to exist at the onset of the flood-producing storm event.

- For frequent runoff events, the assumption is that there is a low probability of an antecedent storm, thus higher initial loss and infiltration rates.
- For the rarer flood events, there is a higher probability of an antecedent storm capable of at least partially occupying the available watershed surface storage areas and saturating the surface soils.

Table G.1-2 shows the loss rates used in the hydrologic study for the Leon Creek Watershed.

Table G.1-2. Loss Rates

Annual Chance Exceedance	Recurrence Interval (years)	Initial Loss (inches)	Infiltration (inches/hour)
50%	2	2.00	0.20
20%	5	1.80	0.18
10%	10	1.60	0.16
4%	25	1.40	0.14
2%	50	1.20	0.12
1%	100	1.00	0.10
0.4%	250	0.80	0.08
0.2%	500	0.60	0.06

Land Use

A land use raster dataset was provided by SARA for this study. A technical memorandum, “General Hydrologic and Hydraulic Modeling Tasks: Development of Land Use Information for Hydraulic Modeling,” dated 15 April 2005, describes in detail the development of the land use dataset. The digital dataset was based on information obtained from City of San Antonio 2005 zoning coverage, Bexar County 2004 parcel coverage, 1992 USGS National Land Cover Dataset (NLCD), and the USGS National Hydrographic Dataset (NHD). The resulting dataset provides an existing condition San Antonio River Basin (SARB) composite land classification data layer, appropriate for the derivation of hydrologic modeling parameters.

Table G.1-3 shows land use types and associated impervious cover percentages. The major land use categories include classification codes for Undeveloped, Residential, Commercial, Industrial, Transportation, Extraction, Open Space, Services, and Water. Each land use type is associated with a value for the percent of impervious cover.

Table G.1-3. Composite Land Use Classification

Class	Classification	SARB Land Use	UDC Zoning	Governor Code	NLCD Code (1992)	Impervious Cover %	Urban. % %
1	Undeveloped						
11	Meadow	UM	FR, ED, NP, MR, PUD	D1, D3, D5, A2, M3, E1	81	0	0
12	Brush	UB	ED, NP, MR, PUD, RE, R-20, C3 ERZD	D4, G, A2, M3, E1, J7	51, 61	0	0
13	Woods	UW	ED, MR, NP, MPCD, GC-1, NCD-3	D2, A2	41, 42, 43, 71	0	0
2	Residential						
21	Dispersed	RD	RP, RE, MR, NP, R-20	A1, A2		10	20
22	Low Density	RL	R-15, R-20, RE, MH, ED, NP, MR, PUD	A1, A2		25	30
23	Medium Density	RM	R-6, RM-6, UD, ED, MH, NP, MR, PUD, UD	A1, O1, A2	21	38	80
24	High Density	RH	R-4, R-5, RM-4, RM-5, MH, NP, MR, PUD	A1, A2	22	65	90
25	Multi-Family	RMF	MF (MF-25, MF-33, MF-40, MF-50)	B1		75	95
26	Edwards Aquifer Regulated Zone	EARZ				15	0
3	Commercial						
31	Commercial	C	NC, O (O-1, O-2), C (C-1, C-2, C-2P, C-2NA, C-3, C-3R, C-3NA), D, ED, NP, PUD, UD, RE	F1, A2		90	90
4	Industrial						
41	Industrial	I	L, I-1, I-2, MI-I, DZ, MR, PUD, RE, R-20	F2, J4	23	72	95
5	Transportation						
51	Transportation	T	MR			90	90
6	Extraction						
61	Mining	M	QD		32	0	0
7	Open Space						
71	Urban	OU	ED, MH, NP, MR, PUD	C1, E1	31, 33, 85	0	0
72	Cultivated	OC	MR, NP, RD	D6, FR, E1	82, 83, 84	0	0
73	Easements	EA		Z0		10	10
8	Services						
81	Utilities	U	PUD	J1, J2, J7		80	70
82	Mixed-Use	MX	PUD	Z0		40	50
9	Water						
91	Lakes, Ponds, Streams, Wetlands	W			11, 91, 92	100	100
10	Mixed-Use						
101	Residential/Commercial Developments	MRC				51	90

Urbanization and Imperviousness

For each subbasin, the values of percent urbanization and percent imperviousness were developed.

- Urbanization is the percentage of a subbasin that has been developed and improved with channelization and/or a storm collection network. This value affects the Snyder's unit hydrograph lag time (t_p).
- Imperviousness is the percentage of a subbasin hydraulically connected to the drainage network that is covered with impervious material. This value affects the volume of rainfall lost through interception and infiltration.

The urbanization and imperviousness values for each subbasin are based on the land use dataset described under "Land Use." Each land use type was assigned a value for urbanization and one for imperviousness. Using Environmental Systems Research Institute (ESRI) ArcGIS, the subbasin layer developed in the HEC-GeoHMS process (see "Drainage Basin Area Delineation," page G.1-3) was overlaid on the land use dataset. Net values for each subbasin were derived by weighting the land uses within each subbasin.

Development of Unit Hydrographs

For consistency with previous studies in the region, Snyder's unit hydrograph method was used. The Snyder's unit hydrograph peaking coefficient, "CP640" of 400 ($cp = 0.625$), was derived from the Snyder Unit Hydrograph Parameter Guidelines provided by SARA, dated 27 May 2005. Snyder's unit hydrographs were developed for each subbasin, based on the specific physical measurements produced by GeoHMS.

Lag Time Parameters

Snyder's lag time (t_p) for each subbasin was calculated using the measurements produced by GeoHMS, which include the following:

- Length (L) of the major stream
- Distance from the subbasin outflow point to the location of the subbasin centroid (L_{ca})
- Weighted slope (S_{st}) of the major stream that shows the best representation of the valley slope
- Percent urbanization

The following reports describe the methodology used to calculate the Snyder's unit hydrograph lag time for each subbasin:

- *Synthetic Hydrograph Relationships, Trinity River Tributaries, Fort Worth-Dallas Urban Area*, T.L. Nelson, 1970.
- *Effects of Urbanization on Various Frequency Peak Discharges*, Paul K. Rodman, October 1977.

The Snyder's lag time is computed using the following equation:

$$\log(t_p) = .3833 \log(L * L_{ca} / (S_{st}^{.5})) + \log(0.92) - (.266 * \text{Urban.} / 100)$$

where:

- t_p = Snyder's lag time
- L = Longest stream length within subbasin (miles)
- L_{ca} = Distance along stream from subbasin centroid to outlet (miles)
- S_{st} = Stream slope over reach between 10% and 85% of L (ft/mile)
- Urban. = Urbanization factor (percent)

Snyder's lag time values ranged from a minimum of 0.04 hours to a maximum of 1.28 hours for subbasins in the Leon Creek Watershed. The mean value was 0.40 hours. Table G.1-4 contains the unit hydrograph data for each subbasin.

Table G.1-4. Snyder's Lag Time Computation

Subbasin	Area (sq. mi.)	L (miles)	L_{ca} (miles)	S_{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t_p (hours)	Computed t_p (hours)	
BT-1 headwaters	1.024	1.556	0.537	105.60	2.8242	0.346	0.35	2.7324
BT-2 ab BT-UNT1	0.377	1.302	0.723	137.28	6.1466	0.337	0.34	5.8663
BT-3 ab BT-UNT2	2.193	3.765	1.742	47.52	12.4578	0.836	0.84	10.0741
BT-4 ab LC	0.676	2.908	1.454	31.68	62.9656	0.561	0.56	38.0487
BT-UNT1	0.995	2.018	0.827	95.04	3.9129	0.457	0.46	3.5159
BT-UNT2	0.940	2.946	1.518	79.20	26.8783	0.599	0.60	18.8787
CC-1 headwaters	1.057	2.388	1.201	116.16	0.0281	0.554	0.55	0.0281
CC-10 ab CC-UNT2	0.679	2.282	1.110	47.52	80.6023	0.383	0.38	56.4269
CC-11 ab CC-A	1.008	2.419	1.107	52.80	63.2940	0.426	0.43	45.2057
CC-12 ab LC	0.532	2.125	0.798	36.96	53.0195	0.408	0.41	36.2657
CC-2 ab CC-F	0.482	1.540	0.829	42.24	2.7605	0.485	0.48	2.7605
CC-3 ab CC-E	1.463	4.068	0.719	31.68	6.8614	0.686	0.69	6.1240
CC-4 ab GC	0.849	2.832	1.310	31.68	9.3888	0.740	0.74	8.5616
CC-5 ab CC-D	0.827	2.347	1.385	26.40	2.0926	0.762	0.76	2.0926
CC-6 ab CC-C	0.077	0.627	0.270	36.96	0.0037	0.233	0.23	0.0018
CC-7 ab CC-B	0.748	2.165	1.317	36.96	35.1758	0.555	0.55	32.6827
CC-8 ab HE	0.321	1.967	1.058	79.20	46.6675	0.396	0.40	45.1978
CC-9 ab CC-UNT1	1.894	3.079	1.577	47.52	57.0178	0.567	0.57	40.7761
CC-A-1 headwaters	1.079	2.022	0.949	58.08	81.6123	0.329	0.33	53.6713
CC-A-2 at Tezel Rd	0.972	1.864	1.045	63.36	76.7690	0.335	0.34	52.9999
CC-A-3 ab CC	1.194	2.376	1.119	42.24	77.6721	0.406	0.41	48.6018
CC-B-1 headwaters	1.017	2.318	1.339	63.36	10.1059	0.603	0.60	8.4020
CC-B-2 ab CC-B-UNT1	0.008	0.135	0.076	132.00	2.4085	0.062	0.06	2.4085
CC-B-3 ab CC	0.015	0.308	0.104	89.76	80.4389	0.063	0.06	80.4389
CC-B-UNT1	0.682	2.557	1.382	63.36	11.6672	0.627	0.63	9.0894

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
CC-C-1 headwaters	1.000	2.373	1.153	105.60	13.8882	0.509	0.51	9.9788
CC-C-2 ab CC-C-UNT1	1.015	2.379	0.909	42.24	13.2889	0.556	0.56	10.9218
CC-C-3 ab CC-C1	0.517	2.352	1.253	26.40	12.1650	0.690	0.69	11.6928
CC-C-4 ab CC	0.989	2.790	1.311	26.40	8.3060	0.768	0.77	7.8051
CC-C-UNT1	0.875	2.233	1.148	58.08	1.7095	0.600	0.60	1.6090
CC-C1-1 headwaters	1.005	2.449	1.007	52.80	9.0661	0.575	0.58	7.3233
CC-C1-2 ab CC-C	0.478	1.456	0.676	36.96	14.7393	0.418	0.42	13.4149
CC-D-1 headwaters	0.726	2.905	1.445	26.40	5.1948	0.825	0.82	5.1896
CC-D-2 ab CC-D-UNT2	0.013	0.213	0.075	100.32	0.0000	0.078	0.08	0.0000
CC-D-3 ab CC-D-UNT3	0.337	1.530	0.721	79.20	1.0982	0.410	0.41	0.7991
CC-D-4 at Culebra Rd	1.156	1.797	1.353	63.36	32.9709	0.477	0.48	32.6554
CC-D-5 ab UNT4	0.623	2.107	0.621	36.96	4.7476	0.496	0.50	4.6381
CC-D-6 ab CC	0.076	0.621	0.280	58.08	18.4331	0.193	0.19	12.3584
CC-D-UNT1	0.604	2.087	1.050	36.96	1.8504	0.615	0.62	1.7044
CC-D-UNT2	0.448	1.200	0.621	84.48	1.0067	0.349	0.35	0.7479
CC-D-UNT3	0.895	2.599	1.401	31.68	4.6017	0.757	0.76	4.5416
CC-D-UNT4	0.617	1.679	0.860	105.60	2.2922	0.428	0.43	1.7689
CC-E-1 headwaters	1.024	2.038	0.943	121.44	1.4857	0.467	0.47	0.9841
CC-E-2 ab CC	0.656	2.431	1.281	31.68	9.4406	0.692	0.69	7.1015
CC-F-1 headwaters	0.997	2.629	1.616	73.92	10.2369	0.660	0.66	7.5084
CC-F-2 at dam	0.386	1.416	0.545	36.96	0.2645	0.416	0.42	0.2645
CC-F-3 ab CC	0.078	0.618	0.210	58.08	0.0050	0.193	0.19	0.0050
CC-F-UNT1	0.394	1.342	0.744	52.80	0.6417	0.428	0.43	0.6417
CC-UNT1	0.923	2.861	1.306	26.40	83.5313	0.488	0.49	57.1851
CC-UNT2	1.214	2.925	1.191	26.40	48.8630	0.588	0.59	33.5162
CHI-1 headwaters	0.736	1.550	0.698	126.72	0.0000	0.375	0.37	0.0000
CHI-2 ab CHI-UNT2	0.090	0.520	0.180	374.88	0.0000	0.119	0.12	0.0000
CHI-3 ab CHI-UNT3	1.245	2.475	1.091	89.76	1.3598	0.564	0.56	1.1609
CHI-4 at dam	0.586	1.387	0.374	174.24	7.1747	0.255	0.25	6.0091
CHI-5 ab CHI-UNT4	1.148	3.084	1.332	52.80	0.8313	0.736	0.74	0.6569
CHI-6 ab HE	0.423	1.393	0.640	116.16	1.6504	0.350	0.35	1.1801
CHI-UNT1	0.462	1.300	0.671	168.96	0.9536	0.325	0.32	0.9536
CHI-UNT2	0.360	1.119	0.535	190.08	0.0000	0.276	0.28	0.0000
CHI-UNT3	0.981	1.973	0.858	126.72	0.3699	0.444	0.44	0.3699
CHI-UNT4	0.512	1.242	0.588	242.88	0.0007	0.285	0.28	0.0007
COM-1 headwaters	1.140	2.618	1.085	36.96	39.7109	0.539	0.54	29.7569
COM-2 ab COM-UNT2	0.355	1.339	0.590	36.96	12.1357	0.391	0.39	9.4266
COM-3 ab COM-UNT3	0.140	0.739	0.047	36.96	1.5402	0.126	0.13	1.4723
COM-4 ab COM-UNT4	0.603	1.633	0.860	47.52	2.4112	0.493	0.49	2.4043
COM-5 ab LC	0.461	1.743	0.740	42.24	32.7179	0.405	0.41	25.4111
COM-UNT1	0.614	1.978	0.912	42.24	30.4276	0.467	0.47	23.1527

Existing Conditions

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
COM-UNT2	0.355	1.970	0.985	36.96	19.4295	0.527	0.53	13.1628
COM-UNT3	0.618	1.904	1.029	36.96	0.1264	0.596	0.60	0.0850
COM-UNT4	0.388	2.087	0.933	21.12	7.2402	0.633	0.63	4.9706
FR-1 headwaters	0.741	2.186	1.169	89.76	54.1517	0.400	0.40	40.6179
FR-2 ab FR-UNT2	0.019	0.294	0.118	79.20	25.6854	0.094	0.09	21.2906
FR-3 ab FR-C	0.227	1.405	0.662	47.52	29.8939	0.355	0.36	24.5539
FR-4 ab FR-B	0.063	0.617	0.408	31.68	8.2381	0.266	0.27	7.1038
FR-5 be Prue Rd	0.768	1.884	0.876	47.52	49.0768	0.394	0.39	31.5207
FR-6 at Bandera Rd	1.037	2.230	0.745	47.52	52.9510	0.386	0.39	33.5656
FR-7 ab FR-A	0.729	3.324	1.393	58.08	66.8859	0.505	0.50	48.2437
FR-8 ab LC	0.550	1.588	0.623	26.40	58.3285	0.342	0.34	38.9731
FR-A-1 headwaters	1.047	1.782	0.772	63.36	80.5528	0.287	0.29	61.0903
FR-A-2 at Braun Rd	0.311	1.179	0.551	79.20	72.2587	0.217	0.22	49.8300
FR-A-3 ab FR-A1	0.223	1.446	0.557	58.08	78.4058	0.240	0.24	45.9801
FR-A-4 ab FR	0.005	0.229	0.121	36.96	53.1654	0.084	0.08	37.4368
FR-A1	1.021	1.910	0.670	73.92	72.3675	0.285	0.28	45.6246
FR-B-1 headwaters	1.142	2.155	1.082	79.20	15.4703	0.501	0.50	14.6349
FR-B-2	0.115	1.358	0.674	47.52	58.6859	0.296	0.30	55.3909
FR-B-3 ab FR-B-UNT1	0.079	0.640	0.198	47.52	27.1019	0.169	0.17	17.6801
FR-B-UNT1	0.680	1.779	0.846	42.24	37.5630	0.417	0.42	26.4598
FR-C-1 headwaters	0.902	2.243	1.031	31.68	46.6957	0.491	0.49	40.4248
FR-C-2 ab FR	0.594	2.082	1.820	52.80	63.8979	0.485	0.48	59.7263
FR-UNT1	0.521	1.623	0.844	126.72	21.7510	0.359	0.36	16.6204
FR-UNT2	0.858	2.567	1.185	95.04	23.9821	0.508	0.51	17.0699
GC-1 headwaters	1.074	1.589	0.633	121.44	8.5221	0.349	0.35	8.3086
GC-10 ab GC-B	0.380	1.721	0.843	73.92	0.2436	0.465	0.46	0.2436
GC-11 ab GC-A	0.032	0.479	0.185	52.80	0.0000	0.170	0.17	0.0000
GC-12 ab CC	0.821	1.834	0.906	31.68	0.7718	0.574	0.57	0.7718
GC-2 ab GC-UNT1	0.217	0.966	0.507	63.36	8.8675	0.299	0.30	8.0207
GC-3 ab GC-UNT2	0.705	1.688	0.773	105.60	5.3163	0.404	0.40	4.2581
GC-4 ab GC-E	0.188	0.768	0.361	195.36	0.0000	0.205	0.20	0.0000
GC-5 ab GC-D	0.254	0.984	0.523	89.76	0.0000	0.301	0.30	0.0000
GC-6 ab GC-UNT3	0.955	2.030	1.108	68.64	0.0036	0.558	0.56	0.0018
GC-7 ab WC	0.592	1.748	0.762	95.04	0.0000	0.429	0.43	0.0000
GC-8 ab GC-C	0.356	1.359	0.473	121.44	0.0000	0.310	0.31	0.0000
GC-9 ab GC-UNT4	0.343	1.896	1.067	31.68	0.1358	0.621	0.62	0.1358
GC-A-1 headwaters	1.118	1.604	0.706	168.96	0.0008	0.361	0.36	0.0008
GC-A-2 ab GC-A-UNT1	0.079	0.582	0.310	549.12	0.0000	0.142	0.14	0.0000
GC-A-3 ab GC-A-UNT2	0.474	1.718	0.872	84.48	0.0007	0.459	0.46	0.0007
GC-A-4 ab GC	0.349	2.097	1.138	47.52	0.6534	0.610	0.61	0.6534
GC-A-UNT1	0.241	0.902	0.442	242.88	0.0450	0.226	0.23	0.0450

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
GC-A-UNT2	0.273	1.046	0.454	237.60	1.4289	0.240	0.24	1.1923
GC-B-1 headwaters	0.971	2.451	1.289	100.32	0.0002	0.591	0.59	0.0002
GC-B-2 ab GC-B-UNT2	0.192	1.420	0.756	95.04	0.0000	0.395	0.39	0.0000
GC-B-3 ab GC	0.032	0.348	0.164	58.08	0.0000	0.141	0.14	0.0000
GC-B-UNT1	0.430	1.926	0.943	142.56	0.0000	0.447	0.45	0.0000
GC-B-UNT2	0.389	1.805	0.961	95.04	0.0000	0.475	0.47	0.0000
GC-C-1 headwaters	0.989	1.888	1.073	142.56	0.0000	0.466	0.47	0.0000
GC-D-1 headwaters	1.000	1.787	0.698	126.72	0.1325	0.396	0.40	0.1259
GC-D-2 ab GC-D-UNT1	0.066	0.466	0.151	316.80	0.0000	0.110	0.11	0.0000
GC-D-3 ab GC	0.165	0.863	0.386	285.12	0.0000	0.204	0.20	0.0000
GC-D-UNT1	0.437	1.235	0.647	211.20	0.0020	0.303	0.30	0.0020
GC-E-1 headwaters	0.710	2.353	1.133	116.16	8.5619	0.511	0.51	7.5590
GC-E-2 ab GC	0.032	0.402	0.170	126.72	0.0000	0.130	0.13	0.0000
GC-E-UNT1	0.601	2.140	1.061	126.72	11.5180	0.464	0.46	11.0617
GC-UNT1	0.972	2.628	1.370	100.32	1.6461	0.615	0.62	1.4393
GC-UNT2	0.504	1.857	0.986	121.44	8.4950	0.439	0.44	7.0297
GC-UNT3	0.761	1.397	0.685	195.36	3.0314	0.323	0.32	2.4286
GC-UNT4	0.445	2.091	1.184	84.48	0.0000	0.556	0.56	0.0000
HB-1 headwaters	1.009	1.890	0.777	26.40	83.8525	0.341	0.34	73.4228
HB-2 ab HB-UNT1	0.122	0.830	0.282	142.56	93.0588	0.115	0.12	72.7994
HB-3 ab HB-UNT2	0.214	0.850	0.364	63.36	73.8089	0.169	0.17	54.4021
HB-4 ab HB-UNT3	0.020	0.320	0.150	100.32	33.9761	0.096	0.10	22.5149
HB-5 ab Babcock Rd	0.728	1.864	0.695	42.24	56.5806	0.351	0.35	38.2439
HB-6 ab HB-A	1.278	2.559	1.250	42.24	63.7831	0.474	0.47	45.9419
HB-7 at Bandera Rd	1.697	2.633	1.018	31.68	72.8043	0.443	0.44	59.7927
HB-8 ab LC	2.329	4.129	1.964	31.68	49.4160	0.782	0.78	41.5953
HB-A-1 headwaters	0.617	2.061	1.188	68.64	70.8969	0.373	0.37	63.8518
HB-A-2 ab HB-A-UNT2	0.317	1.024	0.477	84.48	31.6682	0.246	0.25	23.2651
HB-A-3 ab HB-A-UNT3	0.114	0.726	0.294	105.60	66.0490	0.139	0.14	59.8732
HB-A-4 ab HB	0.857	1.892	0.935	52.80	72.4873	0.343	0.34	62.5507
HB-A-UNT1	0.490	1.092	0.836	95.04	45.0370	0.282	0.28	30.8573
HB-A-UNT2	0.687	1.828	0.785	79.20	73.6856	0.291	0.29	64.6670
HB-A-UNT3	0.740	2.082	0.975	89.76	76.2228	0.320	0.32	65.4918
HB-UNT1	0.280	1.169	0.523	79.20	81.9090	0.200	0.20	59.9392
HB-UNT2	0.195	1.100	0.514	79.20	85.0364	0.190	0.19	56.1847
HB-UNT3	0.258	1.001	0.439	63.36	84.6405	0.180	0.18	56.5465
HE-1 headwaters	1.001	2.205	0.882	121.44	0.2979	0.472	0.47	0.2914
HE-2 ab HE-UNT1	0.134	0.628	0.261	295.68	0.8701	0.154	0.15	0.4747
HE-3 ab HE-UNT2	0.544	1.456	0.842	121.44	1.6317	0.393	0.39	1.0615
HE-4 ab HE-B	0.670	1.828	0.826	121.44	17.4907	0.386	0.39	12.9941
HE-5 ab CHI	0.343	1.002	0.351	200.64	19.7699	0.198	0.20	14.2286

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
HE-6 ab LR	1.688	3.281	1.407	42.24	14.3414	0.739	0.74	12.5856
HE-7 ab HE-A	1.704	2.821	1.520	68.64	34.9208	0.577	0.58	32.3061
HE-8 ab HE-UNT3	3.332	5.470	2.310	31.68	44.6777	0.954	0.95	33.9842
HE-9 ab CC	0.069	0.705	0.369	68.64	10.3945	0.229	0.23	8.9005
HE-A-1 headwaters	1.010	2.083	1.105	121.44	0.9535	0.502	0.50	0.7331
HE-A-2 ab HE	0.561	2.283	1.327	63.36	20.5298	0.560	0.56	16.2158
HE-B-1 headwaters	0.741	1.769	0.833	79.20	8.5014	0.438	0.44	6.8240
HE-B-2 ab HE-B-UNT2	0.821	2.435	1.102	73.92	6.4331	0.566	0.57	4.7204
HE-B-3 ab HE	0.101	0.713	0.337	195.36	23.2356	0.168	0.17	16.2884
HE-B-UNT1	0.586	1.380	1.163	132.00	8.6454	0.410	0.41	7.2664
HE-B-UNT2	0.678	2.049	0.854	126.72	2.3831	0.444	0.44	2.3139
HE-UNT1	0.339	1.148	0.538	195.36	0.6515	0.277	0.28	0.4347
HE-UNT2	0.821	2.487	1.291	100.32	3.7635	0.581	0.58	3.1042
HE-UNT3-1	1.011	2.875	1.465	21.12	35.0582	0.718	0.72	30.5423
HE-UNT3-2	0.307	1.633	0.911	36.96	36.8026	0.428	0.43	33.3710
HUE-1 headwaters	1.029	1.717	0.912	110.88	1.1983	0.440	0.44	1.1983
HUE-2 ab HUE-UNT1	0.014	0.242	0.120	649.44	2.7955	0.067	0.07	2.7955
HUE-3 ab HUE-B	0.423	1.346	0.558	68.64	3.0616	0.360	0.36	2.9790
HUE-4 ab HUE-A	0.561	1.915	0.987	63.36	21.2476	0.466	0.47	18.0880
HUE-5 ab HUE-UNT2	0.200	1.021	0.573	36.96	48.3846	0.279	0.28	38.5611
HUE-6 ab LC	0.451	2.117	1.307	31.68	64.6770	0.472	0.47	50.0093
HUE-A	0.972	2.625	1.300	79.20	22.7751	0.554	0.55	15.2270
HUE-B	1.102	2.086	1.070	110.88	0.4102	0.506	0.51	0.4102
HUE-UNT1	0.556	1.495	0.780	121.44	10.5317	0.365	0.36	10.0376
HUE-UNT2	0.756	2.539	1.343	63.36	59.2621	0.462	0.46	40.6215
IN-1 headwaters	0.553	1.456	0.472	52.80	59.9700	0.258	0.26	39.9977
IN-10 at dam	0.647	1.320	0.455	63.36	14.5626	0.312	0.31	14.5539
IN-11 ab IN-UNT9	0.922	2.003	1.133	26.40	0.5531	0.670	0.67	0.4443
IN-12 ab LC	0.091	0.794	0.422	105.60	0.0000	0.248	0.25	0.0000
IN-2 ab IN-UNT2	0.173	0.955	0.386	63.36	42.3696	0.219	0.22	28.6712
IN-3 ab IN-UNT3	0.020	0.425	0.208	89.76	70.9266	0.099	0.10	44.4948
IN-4 ab IN-UNT4&5	1.006	2.631	0.899	42.24	64.9543	0.419	0.42	45.4189
IN-5 ab IN-UNT6	0.508	1.718	1.005	52.80	67.4483	0.351	0.35	42.4217
IN-6 ab IN-UNT7	0.353	1.258	0.249	68.64	64.1801	0.177	0.18	39.2280
IN-7 ab IN-A	0.904	2.410	1.125	31.68	57.9899	0.487	0.49	42.6604
IN-8 at Somerset Rd	0.467	1.485	0.645	36.96	15.2452	0.413	0.41	15.1893
IN-9 ab IN-UNT8	0.379	1.299	0.594	15.84	6.1319	0.473	0.47	6.1052
IN-A-1 headwaters	0.724	2.521	1.347	42.24	35.6369	0.577	0.58	32.1308
IN-A-2 ab IN	0.154	1.130	0.639	47.52	36.5621	0.310	0.31	30.1737
IN-A-UNT1	0.434	1.918	1.054	42.24	35.7604	0.472	0.47	24.2095
IN-UNT1	0.406	1.586	0.650	42.24	32.2628	0.373	0.37	26.3690

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
IN-UNT2	0.206	0.986	0.474	79.20	51.9619	0.216	0.22	36.0260
IN-UNT3	0.284	1.118	0.694	95.04	65.8781	0.233	0.23	41.8764
IN-UNT4	0.391	1.376	0.701	68.64	40.4975	0.315	0.31	29.3201
IN-UNT5	0.356	1.848	1.072	47.52	72.7583	0.365	0.37	45.2233
IN-UNT6	0.688	2.593	1.740	58.08	60.3001	0.520	0.52	45.2065
IN-UNT7	0.344	1.501	0.789	68.64	36.5354	0.349	0.35	19.4955
IN-UNT8	0.261	1.122	0.451	52.80	4.3510	0.323	0.32	4.3296
IN-UNT9	0.700	2.482	1.065	36.96	1.4132	0.663	0.66	1.1317
LC -1 headwater	0.746	1.752	0.773	153.12	0.0974	0.394	0.39	0.0974
LC-10 at Camp Bullis	3.909	3.166	1.036	47.52	30.5097	0.574	0.57	21.9679
LC-11 ab Loop1604	3.971	5.332	3.156	31.68	14.1864	1.283	1.28	12.5139
LC-12 ab LT-I	1.384	2.800	1.385	31.68	32.9039	0.652	0.65	29.7256
LC-13 ab BT	0.851	2.828	1.286	36.96	46.2242	0.569	0.57	27.4311
LC-14 ab HUE	0.002	0.122	0.079	110.88	80.8979	0.038	0.04	42.6692
LC-15 ab LT-H	1.120	2.421	0.763	47.52	74.2685	0.352	0.35	49.9170
LC-16 ab FR	2.889	4.901	1.836	26.40	56.2222	0.808	0.81	40.4112
LC-17 ab LFR	1.309	2.950	1.642	42.24	61.4282	0.564	0.56	46.0083
LC-18 ab CC	0.856	2.403	1.282	31.68	56.7985	0.516	0.52	38.5995
LC-19 ab HB	0.794	2.013	1.023	26.40	58.7009	0.452	0.45	40.0200
LC-2 ab UNT2	0.125	0.674	0.284	364.32	3.0634	0.155	0.15	3.0634
LC-20 ab LT-G	0.926	2.516	1.186	47.52	58.1577	0.467	0.47	48.1133
LC-21 ab LT-F	1.785	4.045	1.805	21.12	42.7164	0.846	0.85	32.4696
LC-22 ab SR	0.471	1.976	0.393	26.40	34.7932	0.360	0.36	25.2573
LC-23 ab WV	0.448	1.816	0.395	21.12	21.8602	0.395	0.39	15.5478
LC-24 ab LT-E	2.324	4.179	1.832	21.12	43.5448	0.857	0.86	34.7190
LC-25 ab LT-D	0.382	1.364	0.583	42.24	17.1802	0.370	0.37	14.6129
LC-26 at Military Dr	3.818	3.780	2.225	47.52	63.6577	0.672	0.67	48.1179
LC-27 ab LT-C	0.266	1.365	0.617	31.68	56.3265	0.315	0.31	43.6289
LC-28 at New Laredo	2.001	3.562	1.149	15.84	36.8646	0.742	0.74	29.1509
LC-28A	0.694	2.050	0.919	84.48	36.8646	0.400	0.40	29.1509
LC-29 ab LT-B	1.709	3.157	1.477	26.40	27.1540	0.751	0.75	22.8097
LC-3 ab UNT3	0.542	1.755	0.646	190.08	0.0000	0.353	0.35	0.0000
LC-30 ab LT-A	1.902	3.197	1.729	21.12	18.7280	0.880	0.88	15.5809
LC-31 ab IN	0.483	1.929	0.798	31.68	38.5850	0.442	0.44	29.4476
LC-32 at Applewhite	2.176	3.219	1.807	21.12	13.6941	0.926	0.93	11.3403
LC-33 ab COM	2.879	4.830	2.397	26.40	14.9606	1.146	1.15	11.3748
LC-34 ab Medina Riv	0.952	3.020	1.370	21.12	0.0014	0.884	0.88	0.0010
LC-4 ab LT-N	0.504	1.522	0.864	58.08	0.1180	0.469	0.47	0.1151
LC-5 ab PC	1.204	2.031	1.122	121.44	1.7377	0.497	0.50	1.3074
LC-6 ab LT-M	1.495	2.387	1.018	84.48	14.2281	0.506	0.51	11.1023
LC-7 ab LT-L	1.778	2.848	1.319	36.96	14.9838	0.698	0.70	11.2082

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LC-8 ab LT-K	0.600	1.434	0.544	63.36	32.0191	0.310	0.31	27.8079
LC-9 ab LT-J	1.318	2.178	1.030	31.68	29.9321	0.538	0.54	22.8692
LC-N-1 headwater	1.002	2.410	1.255	126.72	0.1507	0.556	0.56	0.1507
LC-UNT1	0.646	1.746	0.873	132.00	0.9095	0.422	0.42	0.8922
LC-UNT2	0.482	1.498	0.744	142.56	0.6636	0.369	0.37	0.5270
LC-UNT3	0.348	1.293	0.632	105.60	0.0989	0.348	0.35	0.0989
LFR-1 headwaters	0.681	1.962	0.985	52.80	66.6925	0.368	0.37	47.9809
LFR-2 ab LC	0.156	0.698	0.247	36.96	39.1349	0.185	0.18	29.9029
LFR-UNT1	0.347	1.029	0.454	105.60	61.5831	0.193	0.19	40.4862
LR-1 headwaters	1.081	1.687	0.683	137.28	0.0000	0.378	0.38	0.0000
LR-2 at Bandera Rd	0.895	1.435	0.545	168.96	10.6026	0.294	0.29	10.0578
LR-3 ab LR-A	0.679	1.658	0.768	110.88	9.7296	0.386	0.39	8.9220
LR-4 at Bandera Rd	0.923	1.526	0.589	126.72	5.7073	0.337	0.34	5.4521
LR-5 ab RC	0.519	1.417	0.660	68.64	15.5950	0.362	0.36	14.0867
LR-6 ab LR-UNT1	0.360	1.319	0.729	121.44	14.6400	0.330	0.33	11.1337
LR-7 ab UNT2	0.116	0.960	0.459	153.12	31.6668	0.211	0.21	29.1040
LR-8 ab HE	0.157	0.694	0.476	137.28	28.0120	0.197	0.20	22.8240
LR-A-1 headwaters	0.594	1.493	0.711	163.68	4.0627	0.346	0.35	3.4243
LR-A-2 ab LR	0.208	1.211	0.589	168.96	23.7292	0.262	0.26	21.7063
LR-A-UNT1	0.448	1.217	0.575	132.00	6.8593	0.302	0.30	5.7073
LR-UNT1	0.671	1.802	0.933	89.76	14.9807	0.433	0.43	12.9363
LR-UNT2	0.642	1.790	0.916	116.16	5.8403	0.431	0.43	4.4469
LT-A-1 headwaters	1.004	2.246	1.006	26.40	75.1710	0.424	0.42	58.6734
LT-A-2 ab LT-A-UNT1	0.078	0.762	0.364	52.80	61.0285	0.181	0.18	45.6337
LT-A-3 at Durette Dr	0.163	0.842	0.286	31.68	4.1597	0.268	0.27	2.7181
LT-A-4 ab LC	0.269	1.188	0.597	52.80	38.2294	0.298	0.30	24.3357
LT-A-UNT1	0.479	2.457	1.369	26.40	80.1725	0.479	0.48	66.4489
LT-B-1 headwaters	0.976	2.540	1.297	10.56	88.1603	0.539	0.54	67.2171
LT-B-2 ab LT-B-UNT2	0.035	0.428	0.224	42.24	79.9139	0.112	0.11	62.6199
LT-B-3 ab IH35	0.300	0.951	0.274	31.68	51.5508	0.207	0.21	42.7784
LT-B-4 ab LT-B-UNT3	0.467	1.551	0.611	36.96	71.5847	0.291	0.29	54.1041
LT-B-5 ab LC	0.134	1.153	0.486	42.24	38.4619	0.284	0.28	30.3804
LT-B-UNT1	0.214	0.852	0.414	42.24	89.0849	0.175	0.17	71.4166
LT-B-UNT2	0.243	1.022	0.505	15.84	35.4773	0.338	0.34	27.6426
LT-B-UNT3	0.254	1.251	0.768	31.68	88.0455	0.272	0.27	66.7291
LT-C-1 headwaters	1.145	3.491	1.728	15.84	94.9999	0.603	0.60	72.0003
LT-C-2 ab LC	0.125	1.001	0.471	21.12	92.9493	0.217	0.22	73.2729
LT-C-UNT1	1.088	3.006	1.310	15.84	93.6945	0.516	0.52	72.4916
LT-D-1 headwaters	0.970	2.309	1.250	21.12	82.6922	0.464	0.46	63.0545
LT-D-2 ab LC	0.195	1.208	0.642	26.40	55.3064	0.318	0.32	42.0888
LT-E-1 headwaters	1.122	2.147	1.070	42.24	56.1468	0.438	0.44	45.8686

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
LT-E-2 (da 1.3)	0.196	1.228	0.718	73.92	38.8551	0.303	0.30	31.8061
LT-E-3 ab LT-E-1	0.251	1.509	0.369	84.48	6.8843	0.301	0.30	5.8496
LT-E-4 ab LC	0.179	0.862	0.233	36.96	1.1115	0.247	0.25	0.9263
LT-E1-1 headwaters	0.630	2.021	0.850	26.40	35.2677	0.487	0.49	27.7618
LT-E1-2 at Kenley Av	0.053	0.540	0.246	52.80	30.0000	0.165	0.17	25.0000
LT-E1-3 (da 1.13)	0.113	0.521	0.204	89.76	30.0000	0.137	0.14	25.0000
LT-E1-4 ab LT-E	0.180	1.025	0.548	126.72	28.0362	0.246	0.25	23.4131
LT-E1-UNT1	0.338	1.372	0.537	21.12	31.8773	0.375	0.38	27.0338
LT-F-1 headwaters	0.985	2.632	0.949	36.96	39.4803	0.514	0.51	31.0005
LT-F-2 ab UNT2	0.011	0.413	0.199	10.56	59.4733	0.156	0.16	30.8461
LT-F-3 ab LC	0.018	0.356	0.178	31.68	34.7919	0.133	0.13	18.5766
LT-F-UNT1	0.181	1.028	0.527	15.84	31.3333	0.354	0.35	27.0663
LT-F-UNT2	0.495	1.890	0.891	26.40	16.8483	0.541	0.54	13.0880
LT-G-1 headwaters	1.011	2.426	1.183	73.92	66.7768	0.401	0.40	47.4825
LT-G-2 ab LC	0.324	1.462	0.768	42.24	32.0472	0.386	0.39	19.7798
LT-H-1 headwaters	1.008	2.440	1.198	31.68	45.4075	0.542	0.54	32.7846
LT-H-2	0.464	1.176	0.594	63.36	76.4135	0.227	0.23	56.6642
LT-H-3 ab LC	0.332	1.512	0.857	42.24	67.4344	0.328	0.33	47.5212
LT-I-1 headwaters	1.005	2.469	1.239	84.48	22.8853	0.525	0.52	17.0417
LT-I-2 ab LC	0.318	1.094	0.390	84.48	22.3891	0.247	0.25	15.0650
LT-J-1 headwaters	0.762	1.827	0.912	116.16	4.9048	0.436	0.44	4.2532
LT-J-2 ab LT-UNT2&3	0.315	1.223	0.469	121.44	7.2371	0.284	0.28	5.4275
LT-J-3 ab LC	0.182	1.024	0.384	163.68	15.6497	0.220	0.22	13.4692
LT-J-UNT1	0.384	1.139	0.586	174.24	3.6640	0.287	0.29	2.8196
LT-J-UNT2	0.264	1.167	0.675	174.24	0.1028	0.312	0.31	0.0827
LT-J-UNT3	0.228	1.140	0.587	179.52	21.7793	0.255	0.26	14.5766
LT-J-UNT4	0.394	1.515	0.998	137.28	65.9745	0.280	0.28	46.7694
LT-K-1 headwaters	1.047	2.133	1.074	79.20	20.6231	0.482	0.48	18.1836
LT-K-2 ab LT-K-UNT1	0.103	0.683	0.356	174.24	20.2684	0.176	0.18	18.0490
LT-K-3 ab LT-K-UNT2	0.280	1.828	0.929	52.80	29.2869	0.440	0.44	24.4121
LT-K-4 ab LT-K2	0.498	1.661	0.897	73.92	20.8375	0.414	0.41	15.4133
LT-K-5 ab LT-K1	0.452	1.559	0.700	105.60	31.3020	0.322	0.32	29.6967
LT-K-6 ab LC	0.021	0.287	0.152	68.64	90.0000	0.071	0.07	90.0000
LT-K-UNT1	0.939	2.509	1.129	63.36	20.9909	0.544	0.54	14.6445
LT-K-UNT2	0.825	2.274	1.153	73.92	33.4335	0.476	0.48	22.3866
LT-K1	1.019	1.943	1.140	84.48	20.0274	0.472	0.47	13.8380
LT-K2-1 headwaters	1.143	3.182	1.580	63.36	10.0996	0.725	0.73	8.6997
LT-K2-2 ab LT-K	0.030	1.134	0.576	63.36	74.7444	0.223	0.22	74.7444
LT-K2-UNT1	0.431	1.765	0.841	95.04	8.3644	0.425	0.42	7.2922
LT-L-1 headwater	0.796	2.306	0.853	116.16	10.8229	0.449	0.45	8.3165
LT-L-2 ab LC	0.137	0.799	0.454	258.72	19.7448	0.191	0.19	18.8473

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
LT-L-UNT1	0.379	1.362	0.624	137.28	10.4523	0.316	0.32	8.8637
LT-M-1headwaters	0.910	2.155	0.695	47.52	16.7960	0.462	0.46	15.1390
LT-M-2 ab UNT2	0.345	1.200	0.504	121.44	5.1444	0.293	0.29	4.1473
LT-M-3 ab LT-M1	0.966	2.043	0.841	95.04	17.1947	0.426	0.43	12.8960
LT-M-4 ab LC	0.599	1.532	1.072	79.20	11.5558	0.449	0.45	9.9905
LT-M-UNT1	0.434	1.460	0.729	137.28	0.1126	0.367	0.37	0.0939
LT-M-UNT2	0.709	2.097	0.990	132.00	0.6820	0.476	0.48	0.4483
LT-M1-1 headwater	0.908	1.812	0.791	73.92	26.9000	0.393	0.39	20.8765
LT-M1-2 ab UNT2	0.130	0.748	0.283	200.64	14.4452	0.168	0.17	10.1476
LT-M1-3 ab UNT3	0.140	0.645	0.178	195.36	29.2671	0.122	0.12	21.8309
LT-M1-4 ab LT-M	0.195	0.720	0.135	279.84	7.0991	0.122	0.12	5.9022
LT-M1-UNT1	0.397	1.361	0.678	116.16	30.2585	0.298	0.30	22.8291
LT-M1-UNT2	0.288	1.128	0.573	132.00	35.6802	0.245	0.25	25.9865
LT-M1-UNT3	0.371	1.139	0.468	147.84	9.3918	0.262	0.26	7.8121
LT-N-2 ab LC	0.155	0.819	0.534	264.00	0.8510	0.229	0.23	0.8510
LT-N-UNT1	0.315	1.122	0.518	232.32	0.0000	0.263	0.26	0.0000
PC-1 headwater	1.078	1.636	0.856	137.28	1.0447	0.405	0.41	0.8351
PC-2 ab UNT1	0.724	1.741	0.750	100.32	2.2588	0.415	0.42	2.2445
PC-3 ab LC	0.893	2.243	1.268	79.20	3.7243	0.581	0.58	2.8364
PC-UNT1	0.489	1.455	0.482	95.04	0.5027	0.335	0.33	0.4942
RC-1 headwaters	0.843	1.577	0.480	147.84	0.1794	0.317	0.32	0.1755
RC-2 ab LR	0.353	1.174	0.513	258.72	19.7751	0.231	0.23	17.6824
RC-UNT1	0.693	1.665	0.833	121.44	8.0153	0.396	0.40	7.1953
SR-1 headwaters	1.002	1.771	0.658	52.80	40.0506	0.357	0.36	35.9398
SR-10 ab LC	0.523	1.685	0.757	31.68	81.6961	0.316	0.32	56.3962
SR-2 ab SR-UNT1	0.190	0.860	0.394	110.88	21.0808	0.216	0.22	17.5537
SR-3 ab SR-unt2	0.818	1.646	0.807	58.08	38.7723	0.371	0.37	26.3757
SR-4 ab SR-UNT3	0.325	1.390	0.586	47.52	17.7234	0.364	0.36	13.7800
SR-5 ab SR-UNT4	0.131	0.988	0.527	47.52	7.5254	0.327	0.33	6.5173
SR-6 ab SR-B	0.416	1.964	1.136	36.96	37.1912	0.499	0.50	31.1310
SR-7 ab SR-UNT5	0.307	1.391	0.645	21.12	67.8386	0.325	0.32	54.6407
SR-8 ab SR-A	0.433	1.530	0.781	42.24	72.8546	0.308	0.31	46.4914
SR-9 ab SR-UNT6	0.072	0.635	0.314	68.64	83.2691	0.132	0.13	51.5124
SR-A	0.808	2.367	1.531	31.68	78.4614	0.481	0.48	59.4817
SR-B-1 headwaters	0.948	2.272	0.927	58.08	75.8229	0.353	0.35	55.5526
SR-B-2 ab SR-B-UNT2	0.027	0.475	0.215	47.52	27.3031	0.155	0.15	23.7537
SR-B-3 ab SR	0.372	1.664	0.698	52.80	33.6459	0.371	0.37	26.2505
SR-B-UNT1	0.318	1.413	0.794	52.80	21.0297	0.395	0.40	13.9356
SR-B-UNT2	0.616	2.387	1.110	47.52	68.2166	0.420	0.42	48.3225
SR-B-UNT3	0.107	0.740	0.378	73.92	64.9150	0.166	0.17	52.6953
SR-UNT1	0.307	1.214	0.581	84.48	41.1650	0.267	0.27	34.0048

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	0.366	
SR-UNT2	0.883	1.873	0.809	84.48	37.7140	0.366	0.37	35.0697
SR-UNT3	0.472	1.722	1.186	79.20	19.2955	0.465	0.47	15.5528
SR-UNT4	0.253	1.524	0.683	84.48	40.0285	0.312	0.31	36.8811
SR-UNT5	1.820	3.184	1.330	42.24	40.2164	0.610	0.61	32.5354
SR-UNT6	0.381	2.207	1.029	10.56	71.5504	0.517	0.52	52.8265
WC-1 headwaters	1.026	2.047	0.945	137.28	0.0000	0.461	0.46	0.0000
WV-1 headwaters	0.990	2.643	1.120	15.84	83.0762	0.494	0.49	53.4905
WV-2 at Old Hwy 90	0.296	1.172	0.558	31.68	80.3530	0.246	0.25	51.8850
WV-3 ab LC	0.205	1.143	0.633	58.08	42.3773	0.288	0.29	37.1413
WV-UNT1	0.348	1.531	0.705	47.52	82.9702	0.272	0.27	52.0781

Channel Routing Procedures

The Modified Puls routing method was used for all routing reaches. The valley storage versus discharge relationships were derived from backwater analyses using USACE Hydrologic Engineering Center – River Analysis System (HEC-RAS), version 3.1.2. For a more detailed description of the hydraulic modeling process, see “Hydraulic Analysis” beginning on page G.1-63.

Development of Discharge-Frequency Relationships

The precipitation runoff process for the watershed was modeled using the HEC-HMS 3.0 watershed model. The Snyder’s unit hydrograph at each subbasin was applied to each block of excess rainfall to develop the hypothetical flood hydrographs. These hydrographs were combined and then routed downstream. On the next page, table G.1-5 presents the discharges for the 50, 20, 10, 4, 2, 1, 0.4, and 0.2% ACE storms or storms that have recurrence intervals of 2, 5, 10, 25, 50, 100, 250, and 500 years, respectively.

Table G.1-5. Peak Discharges (cfs) – Existing Conditions

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Creek headwaters	JLC001	1.392	390	1,880	2,710	3,360	3,950	4,550	5,430	6,160
Leon Creek above LC-UNT2	JLC002	1.517	400	1,970	2,870	3,570	4,190	4,820	5,760	6,530
Leon Creek below LC-UNT2	JLC003	1.999	540	2,340	3,800	4,730	5,550	6,390	7,630	8,650
Leon Creek above LC-UNT3	JLC005	2.541	570	3,070	4,600	5,780	6,810	7,860	9,370	10,600
Leon Creek below LC-UNT3	JLC006	2.889	630	3,410	5,180	6,500	7,650	8,830	10,500	11,900
Leon Creek above Leon Trib N	JLC007	3.393	500	3,460	5,450	6,990	8,160	9,380	11,200	12,700
Leon Creek below Leon Trib N	JLC008	4.865	600	4,520	7,190	9,350	11,000	12,500	15,000	17,000
Leon Creek above Pecan Creek	JLC009	6.069	570	4,880	7,990	10,700	12,700	14,500	17,100	19,300
Leon Creek below Pecan Creek	JLC010	9.253	880	7,010	11,500	15,600	18,600	21,600	25,800	29,400
Leon Creek above Leon Trib M	JLC011	10.748	860	7,250	12,200	16,800	20,100	23,300	28,000	32,000
Leon Creek below Leon Trib M	JLC012	17.140	1,710	11,400	19,100	26,300	31,500	36,500	44,100	50,300
Leon Creek above Leon Trib L	JLC013	18.918	1,590	9,710	17,300	25,700	31,000	36,500	44,700	51,300
Leon Creek below Leon Trib L	JLC014	20.230	1,580	9,710	17,500	26,100	31,500	37,200	45,700	52,700
Leon Creek above Leon Trib K	JLC016	20.830	1,560	9,570	16,000	24,900	30,600	35,900	44,500	51,700
Leon Creek below Leon Trib K	JLC017	27.618	1,810	10,700	18,500	30,200	37,200	43,900	54,400	63,700
Leon Creek above Leon Trib J	JLC018	28.936	1,800	10,700	17,900	29,500	36,700	43,600	54,300	64,100
Leon Creek below Leon Trib J	JLC019	31.465	2,050	10,700	18,000	29,900	37,300	44,600	55,700	65,800
Leon Creek at Camp Bullis	JLC020	35.374	2,120	10,700	17,300	28,700	36,200	44,000	55,700	67,000
Leon Creek at Loop 1604	JLC021	39.345	2,070	10,500	16,800	26,400	34,000	41,300	54,200	66,300
Leon Creek above Leon Trib I	JLC022	40.729	2,040	10,500	16,600	25,900	33,500	40,900	52,700	65,100
Leon Creek below Leon Trib I	JLC023	42.052	2,030	10,500	16,600	25,800	33,500	40,900	52,700	65,200
Leon Creek above Babcock Trib	JLC025	42.903	1,980	10,400	16,400	25,500	33,000	40,300	52,000	64,500
Leon Creek below Babcock Trib	JLC026	49.108	2,090	10,500	16,500	25,600	33,300	40,800	53,000	65,900
Leon Creek above Huesta Creek	JLC027	49.110	2,090	10,500	16,500	25,600	33,300	40,800	52,800	65,900
Leon Creek below Huesta Creek	JLC028	55.174	2,100	10,500	16,500	25,600	33,400	41,100	53,100	66,600
Leon Creek above Leon Trib H	JLC029	56.294	2,070	10,500	16,400	25,400	33,000	40,700	52,400	65,800
Leon Creek below Leon Trib H	JLC030	58.098	2,080	10,500	16,500	25,400	33,000	40,800	52,500	65,900

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Creek above French Creek	JLC032	60.987	2,110	10,400	16,400	25,100	32,600	40,500	52,000	65,400
Leon Creek below French Creek	JLC033	72.619	3,300	12,500	20,500	30,300	38,200	45,900	58,200	70,100
Leon Creek above Lower French Creek	JLC035	73.928	3,310	12,500	20,400	30,400	38,300	46,200	58,900	71,100
Leon Creek below Lower French Creek	JLC036	75.112	3,330	12,600	20,500	30,500	38,400	46,400	59,200	71,500
Leon Creek above Culebra Creek	JLC037	75.968	3,300	12,500	20,300	30,100	38,000	45,800	58,600	71,100
Leon Creek below Culebra Creek	JLC038	158.277	4,630	26,700	48,500	73,000	91,100	109,600	139,700	167,100
Leon Creek above Huebner Creek	JLC040	159.071	4,580	26,400	48,100	72,500	90,900	109,400	139,100	166,800
Leon Creek below Huebner Creek	JLC041	171.023	5,890	27,400	50,400	75,800	95,100	113,800	145,200	176,700
Leon Creek above Leon Trib G	JLC043	171.949	5,870	27,200	50,000	75,500	94,800	113,600	144,800	176,200
Leon Creek below Leon Trib G	JLC044	173.284	5,890	27,200	50,100	75,500	94,900	113,700	145,000	176,500
Leon Creek above Leon Trib F	JLC046	175.069	5,870	26,900	49,600	75,100	94,800	113,600	144,700	176,100
Leon Creek below Leon Trib F	JLC047	176.759	5,880	26,900	49,600	75,200	94,900	113,800	144,900	176,400
Leon Creek above Slick Ranch Creek	JLC048	177.230	5,870	26,800	49,500	75,100	94,800	113,800	144,800	176,400
Leon Creek below Slick Ranch Creek	JLC049	188.759	6,190	27,000	50,000	75,900	96,000	115,400	146,800	179,300
Leon Creek above Westwood Village	JLC050	189.207	6,190	26,900	49,600	75,400	96,000	115,300	146,600	179,100
Leon Creek below Westwood Village	JLC051	191.046	6,240	27,000	49,600	75,500	96,100	115,500	146,800	179,500
Leon Creek above Leon Trib E	JLC053	193.370	6,260	26,700	49,200	75,200	95,900	115,500	146,600	179,100
Leon Creek below Leon Trib E	JLC054	196.432	6,300	26,700	49,300	75,200	96,100	115,700	146,900	179,700
Leon Creek above Leon Trib D	JLC056	196.814	6,290	26,600	49,100	75,200	96,000	115,700	146,800	179,500
Leon Creek below Leon Trib D	JLC057	197.979	6,310	26,600	49,200	75,200	96,100	115,800	146,900	179,700
Leon Creek at Military Drive	JLC058	201.797	6,350	26,600	48,900	75,000	96,000	116,000	147,000	179,900
Leon Creek above Leon Trib C	JLC059	202.063	6,350	26,500	48,900	74,900	85,900	115,900	146,900	179,700
Leon Creek below Leon Trib C	JLC060	204.421	6,390	26,500	48,900	75,000	96,100	116,100	147,200	180,100
Leon Creek below Test Cell Facility	JLC061	205.115	6,380	26,500	48,900	74,900	96,000	116,100	147,100	180,100
Leon Creek at New Laredo	JLC062	207.810	6,370	26,300	48,200	74,500	95,500	116,200	147,200	180,200
Leon Creek above Leon Trib B	JLC063	209.519	6,350	26,100	47,900	74,200	95,200	116,100	147,000	180,100
Leon Creek below Leon Trib B	JLC064	212.142	6,390	26,100	48,000	74,300	95,300	116,300	147,300	180,500
Leon Creek above Leon Trib A	JLC066	214.044	6,360	26,000	47,200	73,700	94,600	116,200	146,900	180,100
Leon Creek below Leon Trib A	JLC067	216.037	6,380	26,000	47,200	73,700	94,700	116,300	147,000	180,000

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Creek above Indian Creek	JLC069	216.520	6,370	26,000	46,800	73,500	94,400	116,100	146,800	180,000
Leon Creek below Indian Creek	JLC070	227.491	6,580	26,200	47,100	74,000	95,200	117,600	148,800	183,100
Leon Creek at Applewhite	JLC072	229.667	6,550	26,100	46,600	73,300	94,600	117,500	148,500	182,900
Leon Creek above Comanche Creek	JLC074	232.546	6,520	25,900	46,300	72,300	93,800	116,300	147,500	181,500
Leon Creek below Comanche Creek	JLC075	237.220	6,540	26,000	46,300	72,300	93,900	116,500	147,800	182,000
Leon Creek above Medina River	JLC076	238.172	6,510	25,600	46,100	71,700	93,400	114,900	146,600	180,900
Leon Trib N headwaters	JLTN01	1.317	290	1,380	2,070	2,640	3,120	3,590	4,310	4,900
Leon Trib N above Leon Creek	JLTN02	1.472	330	1,580	2,370	3,020	3,560	4,120	4,930	5,620
Pecan Creek headwaters	JPE01	1.078	300	1,450	2,090	2,600	3,050	3,520	4,200	4,760
Pecan Creek above PC-UNT1	JPE02	1.802	340	1,770	2,770	3,630	4,320	5,020	6,120	7,040
Pecan Creek below PC-UNT1	JPE03	2.291	410	2,210	3,470	4,580	5,470	6,360	7,760	8,890
Pecan Creek above Leon Creek	JPE04	3.184	390	2,400	3,920	5,360	6,480	7,560	9,250	10,700
Leon Trib M headwaters	JLTM01	1.344	450	1,750	2,490	3,110	3,640	4,200	5,020	5,690
Leon Trib M above LT-M-UNT2	JLTM02	1.689	400	1,780	2,700	3,430	4,050	4,690	5,650	6,450
Leon Trib M below LT-M-UNT2	JLTM03	2.398	540	2,520	3,790	4,910	5,810	6,720	8,080	9,200
Leon Trib M above Leon Trib M1	JLTM04	3.364	540	2,790	4,530	5,990	7,150	8,320	10,100	11,600
Leon Trib M below Leon Trib M1	JLTM05	5.793	1,120	4,780	7,700	10,330	12,300	14,270	17,300	19,800
Leon Trib M above Leon Creek	JLTM06	6.392	1,150	4,920	7,930	10,810	13,000	15,110	18,400	21,200
Leon Trib M1 headwaters	JLTM101	1.305	600	2,000	2,800	3,410	4,000	4,620	5,490	6,220
Leon Trib M1 above LT-M1-UNT2	JLTM102	1.435	570	1,910	2,770	3,440	4,050	4,660	5,580	6,330
Leon Trib M1 below LT-M1-UNT2	JLTM103	1.723	680	2,320	3,300	4,110	4,840	5,610	6,700	7,620
Leon Trib M1 above LT-M1-UNT3	JLTM104	1.863	630	2,460	3,180	4,020	4,740	5,480	6,610	7,560
Leon Trib M1 below LT-M1-UNT3	JLTM105	2.234	730	2,570	3,790	4,840	5,720	6,620	7,980	9,100
Leon Trib M1 above Leon Trib M	JLTM106	2.429	700	2,470	3,680	4,810	5,710	6,600	7,990	9,140
Leon Trib L headwaters	JLTL01	1.175	380	1,570	2,230	2,770	3,250	3,760	4,480	5,090
Leon Trib L above Leon Creek	JLTL02	1.312	440	1,740	2,530	3,140	3,690	4,260	5,080	5,770
Leon Trib K headwaters	JLTK001	1.047	390	1,300	1,850	2,310	2,710	3,130	3,740	4,240
Leon Trib K above LT-K-UNT1	JLTK002	1.150	400	1,330	1,910	2,390	2,810	3,240	3,900	4,420
Leon Trib K below LT-K-UNT1	JLTK003	2.089	690	2,380	3,420	4,290	5,050	5,820	6,980	7,930

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Trib K above LT-K-UNT2	JLTK005	2.369	660	2,390	3,530	4,470	5,290	6,170	7,450	8,380
Leon Trib K below LT-K-UNT2	JLTK006	3.194	800	3,000	4,440	5,640	6,730	7,860	9,510	10,700
Leon Trib K above Leon Trib K2	JLTK007	3.692	810	3,000	4,590	6,000	7,120	7,310	10,200	11,600
Leon Trib K below Leon Trib K2	JLTK008	5.296	1,040	3,930	6,100	8,180	9,710	11,300	13,900	15,900
Leon Trib K above Leon Trib K1	JLTK010	5.748	1,080	3,950	6,070	8,390	10,100	11,800	14,500	16,700
Leon Trib K below Leon Trib K1	JLTK011	6.767	1,190	4,310	6,620	9,310	11,300	13,300	16,300	19,000
Leon Trib K above Leon Creek	JLTK012	6.788	1,190	4,300	6,600	9,300	11,300	13,200	16,300	19,000
Leon Trib K2 headwaters	JLTK201	1.574	370	1,440	2,130	2,750	3,250	3,750	4,510	5,150
Leon Trib K2 above Leon Creek	JLTK203	1.604	380	1,470	2,160	2,800	3,310	3,820	4,590	5,240
Leon Trib K1 headwaters	LT-K1	1.047	350	1,260	1,810	2,270	2,660	3,070	3,670	4,170
Leon Trib J headwaters	JLTJ01	1.146	340	1,550	2,260	2,800	3,290	3,800	4,530	5,150
Leon Trib J above LT-J-UNT2&3	JLTJ02	1.461	350	1,750	2,630	3,320	3,910	4,500	5,360	6,110
Leon Trib J below LT-J-UNT2&3	JLTJ03	1.953	470	2,330	3,590	4,510	5,300	6,130	7,300	8,280
Leon Trib J above Leon Creek	JLTJ05	2.529	600	2,560	4,090	5,390	6,400	7,380	8,860	10,100
Leon Trib I headwaters	JLTI01	1.005	350	1,190	1,690	2,120	2,490	2,870	3,430	3,900
Leon Trib I above Leon Creek	JLTI02	1.323	460	1,560	2,230	2,800	3,290	3,790	4,540	5,150
Babcock Trib headwaters	GBT01	1.024	320	1,520	2,190	2,690	3,150	3,640	4,330	4,920
Babcock Trib above BT-UNT1	GBT02	1.401	360	1,760	2,600	3,300	3,910	4,560	5,490	6,220
Babcock Trib below BT-UNT1	GBT03	2.396	610	2,940	4,340	5,490	6,490	7,530	9,050	10,300
Babcock Trib above BT-UNT2	GBT05	4.589	780	3,650	5,570	7,270	8,620	10,000	12,000	13,800
Babcock Trib below BT-UNT2	GBT06	5.529	860	4,130	6,330	8,290	9,880	11,500	13,900	15,900
Babcock Trib above Leon Creek	GBT07	6.205	770	3,890	6,120	8,200	9,670	11,200	13,700	15,800
Huesta Creek headwaters	JHU001	1.029	270	1,290	1,890	2,370	2,780	3,220	3,840	4,360
Huesta Creek above HUE-UNT1	JHU002	1.043	270	1,290	1,900	2,380	2,800	3,230	3,860	4,380
Huesta Creek below HUE-UNT1	JHU003	1.599	460	2,080	3,000	3,730	4,380	5,050	6,030	6,840
Huesta Creek above Huesta Trib B	JHU004	2.022	440	2,180	3,350	4,250	5,000	5,770	6,890	7,820
Huesta Creek below Huesta Trib B	JHU005	3.124	660	3,340	5,070	6,510	7,680	8,870	10,600	12,000
Huesta Creek above Huesta Trib A	JHU006	3.685	590	3,360	5,340	6,900	8,140	9,230	11,000	12,600
Huesta Creek below Huesta Trib A	JHU007	4.657	710	4,100	6,530	8,430	9,950	11,300	13,500	15,500

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Huesta Creek above HUE-UNT2	JHU008	4.857	670	3,990	6,390	8,370	9,870	11,200	13,400	15,400
Huesta Creek below HUE-UNT2	JHU009	5.613	760	4,410	7,120	9,360	11,000	12,500	15,000	17,300
Huesta Creek above Leon Creek	JHU011	6.064	960	4,450	7,220	9,710	11,500	13,100	15,600	18,000
Huesta Trib B above Huesta Creek	HUE-B	1.102	260	1,260	1,850	2,340	2,750	3,170	3,800	4,310
Huesta Trib A above Huesta Creek	HUE-A	0.972	310	1,080	1,560	1,970	2,320	2,680	3,200	3,640
Leon Trib H headwaters	JLTH01	1.008	470	1,210	1,670	2,090	2,450	2,820	3,370	3,820
Leon Trib H Area 2	JLTH02	1.472	600	1,500	2,120	2,720	3,210	3,690	4,460	5,050
Leon Trib H above Leon Creek	JLTH03	1.804	720	1,750	2,530	3,340	3,960	4,590	5,550	6,350
French Creek headwaters	JFR001	1.262	680	1,900	2,600	3,180	3,720	4,300	5,110	5,790
French Creek above FR-UNT2	JFR002	1.281	660	1,840	2,580	3,180	3,720	4,280	5,060	5,730
French Creek below FR-UNT2	JFR003	2.139	950	2,830	3,990	4,960	5,810	6,690	7,950	9,010
French Creek above French Trib C	JFR004	2.366	890	2,660	3,880	4,870	5,730	6,610	7,950	9,040
French Creek below French Trib C	JFR005	3.862	1,560	4,250	6,150	7,780	9,160	10,500	12,600	14,400
French Creek above French Trib B	JFR006	3.925	1,470	4,200	6,010	7,580	8,610	9,880	12,200	14,000
French Creek below French Trib B	JFR007	5.941	1,820	5,510	7,930	10,000	11,400	13,000	16,000	18,300
French Creek at Prue Road	JFR008	6.709	1,920	6,080	9,010	11,700	13,500	15,000	18,600	21,500
French Creek at Bandera Road	JFR010	7.746	1,790	5,740	8,780	11,800	14,000	15,700	19,200	22,400
French Creek above French Trib A	JFR012	8.475	1,710	5,590	8,760	12,200	14,500	16,400	19,800	23,000
French Creek below French Trib A	JFR013	11.082	1,960	5,920	9,330	13,300	15,900	18,100	21,900	25,400
French Creek above Leon Creek	JFR015	11.632	2,230	5,810	9,180	13,300	16,500	19,100	23,400	27,100
French Trib C headwaters	JFTC01	0.902	500	1,190	1,610	2,000	2,340	2,690	3,210	3,650
French Trib C above French Creek	JFTC03	1.496	940	2,010	2,700	3,320	3,880	4,470	5,330	6,040
French Trib B headwaters	JFTB01	1.142	390	1,400	1,970	2,470	2,900	3,350	4,000	4,550
French Trib B Area 2	JFTB03	1.257	450	1,520	2,110	2,570	2,940	3,410	4,300	4,920
French Trib B above French Creek	JFTB04	1.336	450	1,540	2,150	2,630	3,010	3,500	4,410	5,090
French Trib A headwaters	JFTA01	1.047	1,070	2,080	2,640	3,140	3,660	4,240	5,010	5,670
French Trib A at Braun Road	JFTA03	1.358	1,210	2,440	3,210	3,850	4,510	5,220	6,180	6,970
French Trib A	JFTA05	1.581	1,370	2,840	3,730	4,470	5,240	6,070	7,190	8,110

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
French Trib A above French Creek	JFTA06	2.602	1,220	2,460	3,250	3,960	4,650	5,380	6,470	7,330
French Trib A1	FR-A1	1.021	830	1,950	2,570	3,080	3,590	4,160	4,910	5,570
Lower French Creek headwaters	JLFR01	1.028	760	1,790	2,370	2,850	3,330	3,850	4,560	5,170
Lower French Creek above Leon Creek	JLFR02	1.184	870	2,170	2,840	3,410	3,980	4,600	5,450	6,170
Culebra Creek headwaters	JCC001	1.057	230	1,110	1,670	2,130	2,510	2,900	3,470	3,950
Culebra Creek above Culebra Trib F	JCC003	1.539	250	1,490	2,300	2,970	3,500	4,110	4,940	5,630
Culebra Creek below Culebra Trib F	JCC004	3.394	440	2,900	4,480	5,930	7,040	8,060	9,090	10,400
Culebra Creek above Culebra Trib E	JCC006	4.857	530	3,650	5,840	7,870	9,420	10,900	12,700	14,500
Culebra Creek below Culebra Trib E	JCC007	6.537	660	4,590	7,460	10,100	12,100	14,100	16,600	19,000
Culebra Creek above Government Canyon	JCC009	7.386	650	4,640	7,700	10,800	13,000	15,100	17,900	20,700
Culebra Creek below Government Canyon	JCC010	25.559	1,300	11,600	20,000	29,400	36,000	42,600	52,400	61,000
Culebra Creek above Culebra Trib D	JCC011	26.386	1,220	11,100	19,200	28,700	35,700	42,100	52,200	60,900
Culebra Creek below Culebra Trib D	JCC012	31.881	1,230	12,500	21,600	32,900	40,900	48,400	59,900	70,200
Culebra Creek above Culebra Trib C	JCC013	31.958	1,210	12,400	21,500	32,500	40,700	48,200	59,700	70,000
Culebra Creek below Culebra Trib C	JCC014	37.837	1,240	13,600	23,700	36,700	46,300	55,200	68,600	80,600
Culebra Creek above Culebra Trib B	JCC015	38.585	1,220	13,300	23,400	36,100	44,300	54,200	67,700	80,100
Culebra Creek below Culebra Trib B	JCC016	40.307	1,200	13,300	23,500	36,400	44,600	54,800	68,600	81,100
Culebra Creek above Helotes Creek	JCC017	40.628	1,190	13,000	23,300	35,800	44,000	54,000	67,800	80,300
Culebra Creek below Helotes Creek	JCC018	72.814	1,520	21,100	37,000	55,100	69,200	83,300	104,300	118,800
Culebra Creek above CC-UNT1	JCC020	74.708	1,720	20,700	36,000	53,800	67,200	82,100	103,300	118,100
Culebra Creek below CC-UNT1	JCC021	75.631	1,770	20,700	36,000	53,800	67,200	82,100	103,300	118,200
Culebra Creek above CC-UNT2	JCC022	76.310	1,750	20,500	35,800	53,500	66,700	80,600	101,900	117,000
Culebra Creek below CC-UNT2	JCC023	77.524	1,780	20,400	35,800	53,500	66,700	80,600	101,900	117,200
Culebra Creek above Culebra Trib A	JCC024	78.532	1,760	20,200	35,600	53,100	66,100	79,900	101,000	116,300
Culebra Creek below Culebra Trib A	JCC025	81.777	1,940	20,200	35,700	53,200	66,200	80,100	101,300	116,900
Culebra Creek above Leon Creek	JCC027	82.309	1,910	19,900	35,600	52,900	65,900	79,400	99,900	115,500
Culebra Trib F headwaters	JCTF01	1.391	330	1,370	2,030	2,600	3,080	3,550	4,260	4,850
Culebra Trib F at dam	JCTF02	1.777	330	1,520	2,300	3,040	3,610	4,190	5,080	5,830
Culebra Trib F above Culebra Creek	JCTF03	1.855	220	1,490	2,290	3,040	3,610	4,110	4,690	5,310

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Culebra Trib E headwaters	JCTE01	1.024	260	1,210	1,800	2,260	2,660	3,080	3,680	4,180
Culebra Trib E above Culebra Creek	JCTE02	1.680	160	1,080	1,800	2,470	2,960	3,430	4,190	4,960
Government Canyon headwaters	JGC001	1.074	390	1,620	2,300	2,820	3,310	3,830	4,550	5,160
Government Canyon above GC-UNT1	JGC002	1.291	380	1,620	2,390	3,030	3,560	4,100	4,960	5,660
Government Canyon below GC-UNT1	JGC003	2.263	580	2,560	3,760	4,800	5,650	6,530	7,860	8,980
Government Canyon above GC-UNT2	JGC005	2.968	670	3,000	4,580	5,930	7,080	8,190	9,870	11,300
Government Canyon below GC-UNT2	JGC006	3.472	740	3,390	5,200	6,770	8,070	9,320	11,200	13,000
Government Canyon above GC Trib E	JGC007	3.660	720	3,340	5,160	6,740	8,080	9,410	11,400	13,100
Government Canyon below GC Trib E	JGC008	5.003	920	4,310	6,710	8,910	10,600	12,400	15,100	17,400
Government Canyon above GC Trib D	JGC009	5.257	890	4,270	6,700	8,960	10,700	12,500	15,100	17,400
Government Canyon below GC Trib D	JGC010	6.925	1,070	5,300	8,420	11,400	13,600	15,800	19,200	22,200
Government Canyon above GC-UNT3	JGC012	7.880	1,110	5,780	9,210	12,600	15,100	17,400	21,300	24,500
Government Canyon below GC-UNT3	JGC013	8.641	1,110	6,000	9,600	13,200	15,800	18,400	22,500	26,000
Government Canyon above Wildcat Canyon	JGC014	9.233	1,050	6,020	9,690	13,400	16,100	18,800	23,100	26,800
Government Canyon below Wildcat Canyon	JGC015	10.259	1,060	6,320	10,300	14,300	17,300	20,200	24,800	28,800
Government Canyon above GC Trib C	JGC017	10.615	1,020	6,310	10,300	14,400	17,400	20,400	25,100	29,200
Government Canyon below GC Trib C	JGC018	11.604	1,010	6,560	10,800	15,100	18,400	21,500	26,500	31,000
Government Canyon above GC-UNT4	JGC019	11.947	940	6,400	10,600	15,000	18,300	21,500	26,400	30,900
Government Canyon below GC-UNT4	JGC020	12.392	940	6,470	10,700	15,200	18,600	21,900	26,900	31,500
Government Canyon above GC Trib B	JGC021	12.772	930	6,450	10,800	15,400	18,800	22,100	27,300	32,000
Government Canyon below GC Trib B	JGC022	14.786	960	7,010	11,800	17,000	20,900	24,600	30,500	35,700
Government Canyon above GC Trib A	JGC023	14.818	950	6,970	11,800	17,000	20,900	24,600	30,400	35,600
Government Canyon below GC Trib A	JGC024	17.352	1,070	8,160	13,900	20,200	24,900	29,200	36,200	42,100
Government Canyon above Culebra Creek	JGC025	18.173	1,010	8,020	13,800	20,300	25,100	29,700	36,800	43,000
GC Trib E headwaters	JGCTE01	1.311	390	1,570	2,250	2,830	3,330	3,850	4,600	5,240
GC Trib E above Government Canyon	JGCTE02	1.343	380	1,520	2,240	2,830	3,330	3,840	4,610	5,250
GC Trib D headwaters	JGCTD01	1.000	280	1,390	1,990	2,460	2,890	3,330	3,970	4,500
GC Trib D above GC-D-UNT1	JGCTD02	1.066	280	1,350	1,970	2,500	2,940	3,410	4,070	4,630
GC Trib D below GC-D-UNT1	JGCTD03	1.503	400	1,970	2,870	3,600	4,220	4,880	5,870	6,670

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
GC Trib D above Government Canyon	JGCTD04	1.668	370	1,920	2,920	3,710	4,390	5,070	6,110	7,000
Wildcat Canyon above Government Canyon	WC-1	1.026	250	1,230	1,830	2,300	2,700	3,120	3,730	4,240
GC Trib C above Government Canyon	GC-C-1	0.989	240	1,170	1,730	2,190	2,570	2,970	3,550	4,040
GC Trib B headwaters	JGCTB01	1.401	300	1,470	2,200	2,800	3,300	3,810	4,570	5,200
GC Trib B above GC-B-UNT2	JGCTB03	1.593	290	1,550	2,370	3,070	3,630	4,210	5,070	5,780
GC Trib B below GC-B-UNT2	JGCTB04	1.982	350	1,870	2,890	3,740	4,420	5,140	6,280	7,160
GC Trib B above Government Canyon	JGCTB05	2.014	310	1,780	2,800	3,670	4,350	5,050	6,160	7,060
GC Trib A headwaters	JGCTA01	1.118	320	1,600	2,330	2,880	3,370	3,910	4,650	5,280
GC Trib A above GC-A-UNT1	JGCTA02	1.197	290	1,530	2,300	2,870	3,390	3,910	4,670	5,300
GC Trib A below GC-A-UNT1	JGCTA03	1.438	340	1,850	2,730	3,450	4,060	4,750	5,690	6,460
GC Trib A above GC-A-UNT2	JGCTA04	1.912	290	1,860	2,960	3,870	4,640	5,410	6,540	7,540
GC Trib A below GC-A-UNT2	JGCTA05	2.185	300	1,990	3,190	4,230	5,090	5,910	7,160	8,240
GC Trib A above Government Canyon	JGCTA06	2.534	250	1,820	3,050	4,220	5,060	5,980	7,330	8,500
Culebra Trib D headwaters	JCTD01	1.330	260	1,140	1,710	2,230	2,640	3,040	3,660	4,190
Culebra Trib D above CC-D-UNT2	JCTD02	1.343	260	1,140	1,710	2,240	2,650	3,060	3,690	4,220
Culebra Trib D below CC-D-UNT2	JCTD03	1.791	350	1,530	2,300	3,010	3,570	4,110	4,980	5,670
Culebra Trib D above CC-D-UNT3	JCTD05	2.128	410	1,840	2,800	3,690	4,380	5,060	6,110	6,980
Culebra Trib D below CC-D-UNT3	JCTD06	3.023	570	2,570	3,900	5,090	6,050	6,980	8,430	9,630
Culebra Trib D at Culebra Road	JCTD07	4.179	670	2,870	4,570	6,190	7,530	8,740	10,700	12,400
Culebra Trib D above CC-D-UNT4	JCTD08	4.802	630	2,830	4,480	6,330	7,720	9,110	11,300	13,200
Culebra Trib D below CC-D-UNT4	JCTD09	5.419	630	2,930	4,700	6,700	8,240	9,770	12,200	14,400
Culebra Trib D above Culebra Creek	JCTD10	5.495	630	2,880	4,600	6,610	8,130	9,640	12,100	14,300
Culebra Trib C headwaters	JCTC01	1.000	300	1,180	1,690	2,130	2,510	2,880	3,450	3,920
Culebra Trib C above CC-C-UNT1	JCTC02	2.015	300	1,220	2,040	2,850	3,510	4,220	5,240	6,060
Culebra Trib C below CC-C-UNT1	JCTC03	2.890	480	1,980	2,900	3,970	4,910	5,800	7,320	8,560
Culebra Trib C above Culebra Trib C1	JCTC05	3.407	520	2,200	3,340	4,730	5,840	6,860	8,540	9,970
Culebra Trib C below Culebra Trib C1	JCTC06	4.890	780	3,410	5,190	7,050	8,600	10,000	12,300	14,300
Culebra Trib C above Culebra Creek	JCTC08	5.879	860	3,800	5,960	8,160	9,920	11,600	14,400	16,700
Culebra Trib C1 headwaters	JCTC101	1.005	260	1,050	1,540	1,970	2,320	2,680	3,210	3,650

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Culebra Trib C1 above Culebra Trib C	JCTC102	1.483	280	1,260	1,940	2,520	2,980	3,430	4,130	4,700
Culebra Trib B headwaters	JCTB01	1.017	270	1,060	1,540	1,960	2,320	2,670	3,210	3,650
Culebra Trib B above CC-B-UNT1	JCTB02	1.025	270	1,060	1,550	1,970	2,330	2,680	3,220	3,660
Culebra Trib B below CC-B-UNT1	JCTB03	1.707	440	1,730	2,530	3,240	3,820	4,390	5,280	6,010
Culebra Trib B above Culebra Creek	JCTB04	1.722	440	1,720	2,530	3,240	3,820	4,410	5,300	6,040
Helotes Creek headwaters	JHE001	1.001	250	1,180	1,760	2,210	2,300	3,010	3,600	4,090
Helotes Creek above HE-UNT1	JHE002	1.135	250	1,220	1,830	2,310	2,740	3,170	3,800	4,310
Helotes Creek below HE-UNT1	JHE003	1.474	340	1,610	2,450	3,110	3,680	4,260	5,130	5,840
Helotes Creek above HE-UNT2	JHE005	2.018	440	2,100	3,200	4,150	4,920	5,700	6,850	7,840
Helotes Creek below HE-UNT2	JHE006	2.839	610	2,880	4,400	5,690	6,740	7,790	9,370	10,700
Helotes Creek above Helotes Trib B	JHE007	3.509	570	2,920	4,550	5,990	7,150	8,250	9,960	11,500
Helotes Creek below Helotes Trib B	JHE008	6.436	1,020	5,410	8,430	11,100	13,200	15,300	18,500	21,200
Helotes Creek above Chimenea Creek	JHE009	6.779	1,010	5,430	8,520	11,300	13,500	15,600	18,900	21,700
Helotes Creek below Chimenea Creek	JHE010	13.322	1,150	8,120	14,000	19,700	23,700	27,500	33,300	38,600
Helotes Creek above Los Reyes Creek	JHE011	15.010	1,000	7,660	13,100	19,600	23,900	28,100	34,300	39,800
Helotes Creek below Los Reyes Creek	JHE012	24.192	1,590	11,900	19,400	28,200	34,500	40,800	50,800	59,800
Helotes Creek above Helotes Trib A	JHE014	25.896	1,380	11,700	19,100	28,200	34,900	40,900	42,800	47,600
Helotes Creek below Helotes Trib A	JHE015	27.467	1,380	11,900	19,400	28,800	35,700	42,200	43,400	47,900
Helotes Creek above HE-UNT3	JHE016	30.779	1,110	11,200	18,600	27,300	34,400	41,200	44,100	46,900
Helotes Creek below HE-UNT3	JHE017	32.117	1,240	11,200	18,700	27,300	34,500	41,400	44,500	47,100
Helotes Creek above Culebra Creek	JHE018	32.186	1,190	11,100	18,600	27,200	34,400	41,300	44,500	47,100
Helotes Trib B headwaters	JHETB01	1.327	420	1,750	2,510	3,120	3,660	4,230	5,040	5,720
Helotes Trib B above HE-B-UNT2	JHETB02	2.148	430	2,180	3,360	4,310	5,130	5,940	7,130	8,140
Helotes Trib B below HE-B-UNT2	JHETB03	2.826	530	2,790	4,280	5,610	6,650	7,680	9,230	10,500
Helotes Trib B above Helotes Creek	JHETB04	2.927	510	2,740	4,270	5,590	6,620	7,680	9,270	10,600
Chimenea Creek headwaters	JCH01	1.198	360	1,760	2,560	3,140	3,690	4,270	5,080	5,760
Chimenea Creek above CHI-UNT2	JCH02	1.288	360	1,790	2,560	3,160	3,730	4,320	5,150	5,870
Chimenea Creek below CHI-UNT2	JCH03	1.648	460	2,310	3,400	4,190	4,930	5,710	6,790	7,730
Chimenea Creek above CHI-UNT3	JCH04	2.893	530	3,090	4,750	5,990	7,040	8,130	9,940	11,300

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Chimenea Creek below CHI-UNT3	JCH05	3.874	670	4,010	6,520	7,850	9,220	10,600	13,000	14,900
Chimenea Creek at dam	JCH06	4.460	610	4,180	6,590	8,450	9,950	11,400	13,900	16,000
Chimenea Creek above CHI-UNT4	JCH07	5.608	510	4,280	7,130	9,570	11,300	13,000	15,800	18,200
Chimenea Creek below CHI-UNT4	JCH08	6.120	500	4,400	7,340	9,930	11,800	13,600	16,600	19,100
Chimenea Creek above Helotes Creek	JCH09	6.543	460	4,190	7,160	9,940	11,900	13,800	16,800	19,400
Los Reyes Creek headwaters	JLR01	1.081	310	1,510	2,190	2,720	3,190	3,690	4,400	4,990
Los Reyes Creek at Bandera Road	JLR02	1.976	490	2,550	3,760	4,700	5,540	6,400	7,590	8,590
Los Reyes Creek above Los Reyes Trib A	JLR03	2.655	610	3,030	4,630	5,880	6,940	7,990	9,540	10,800
Los Reyes Creek below Los Reyes Trib A	JLR04	3.905	960	4,620	6,970	8,780	10,300	11,900	14,200	16,000
Los Reyes Creek at Bandera Road	JLR05	4.828	920	4,430	6,350	8,260	10,400	12,400	15,400	18,000
Los Reyes Creek above Ranch Creek	JLR06	5.347	870	4,150	6,010	7,830	9,550	11,500	14,500	17,300
Los Reyes Creek below Ranch Creek	JLR07	7.236	1,010	4,780	6,830	9,000	11,200	13,600	17,600	21,100
Los Reyes Creek above LR-UNT1	JLR09	7.596	1,000	4,810	6,960	9,640	11,200	13,600	17,500	21,000
Los Reyes Creek below LR-UNT1	JLR10	8.267	1,030	4,980	7,370	10,200	12,000	14,200	18,400	22,000
Los Reyes Creek above LR-UNT2	JLR12	8.383	1,030	4,990	7,420	10,300	12,100	14,100	18,300	22,100
Los Reyes Creek below LR-UNT2	JLR13	9.025	1,050	5,160	7,960	11,100	13,100	15,000	19,100	23,100
Los Reyes Creek above Helotes Creek	JLR14	9.182	1,050	5,170	7,970	11,000	13,100	15,000	19,000	22,900
Los Reyes Trib A headwaters	JLRTA01	1.042	360	1,650	2,340	2,850	3,340	3,860	4,590	5,200
Los Reyes Trib A above Los Reyes Creek	JLRTA02	1.250	390	1,720	2,520	3,140	3,660	4,160	4,920	5,570
Ranch Creek headwaters	JRC01	1.536	490	2,260	3,270	4,020	4,710	5,450	5,480	7,350
Ranch Creek above Los Reyes Creek	JRC03	1.889	540	2,480	3,650	4,540	5,340	6,170	7,380	8,410
Helotes Trib A headwaters	JHETA01	1.010	250	1,180	1,720	2,170	2,560	2,950	3,530	4,020
Helotes Trib A above Helotes Creek	JHETA02	1.571	190	1,280	2,010	2,670	3,230	3,790	4,640	5,330
Culebra Trib A headwaters	JCTA01	1.079	900	1,910	2,470	2,980	3,470	4,000	4,740	5,360
Culebra Trib A at Tezel Road	JCTA02	2.051	1,390	2,840	3,760	4,540	5,210	5,900	6,930	7,760
Culebra Trib A above Culebra Creek	JCTA03	3.245	1,360	2,990	4,160	5,270	6,180	7,040	8,400	9,530
Huebner Creek headwaters	JHB01	1.009	1,060	1,840	2,300	2,760	3,210	3,700	4,380	4,960
Huebner Creek above HB-UNT1	JHB02	1.131	1,110	1,920	2,420	2,910	3,430	3,890	4,530	5,110
Huebner Creek below HB-UNT1	JHB03	1.411	1,390	2,450	3,080	3,710	4,360	5,020	5,890	6,560

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Huebner Creek above HB-UNT2	JHB04	1.625	1,340	2,410	3,130	3,830	4,490	5,140	6,100	6,870
Huebner Creek below HB-UNT2	JHB05	1.820	1,450	2,650	3,430	4,210	4,960	5,720	6,800	7,690
Huebner Creek above HB-UNT3	JHB06	1.840	1,450	2,640	3,450	4,240	4,990	5,710	6,780	7,660
Huebner Creek below HB-UNT4	JHB07	2.098	1,590	2,970	3,920	4,850	5,710	6,580	7,830	8,860
Huebner Creek above Babcock Road	JHB08	2.826	1,680	3,330	4,510	5,710	6,740	7,760	9,360	10,700
Huebner Creek above Huebner Trib A	JHB09	4.104	1,360	2,790	3,900	5,200	6,190	7,370	9,230	10,900
Huebner Creek below Huebner Trib A	JHB10	7.926	2,960	6,410	8,660	10,900	13,000	15,100	18,300	21,100
Huebner Creek at Bandera Road	JHB11	9.623	2,740	6,010	8,760	11,500	13,600	15,600	19,000	22,600
Huebner Creek above Leon Creek	JHB13	11.952	3,140	6,920	9,940	13,100	15,700	18,200	22,000	26,000
Huebner Trib A headwaters	JHBT01	1.107	850	1,930	2,510	3,030	3,530	4,070	4,820	5,460
Huebner Trib A above HB-A-UNT2	JHBT02	1.424	790	1,830	2,490	3,110	3,660	4,210	5,060	5,780
Huebner Trib A below HB-A-UNT2	JHBT03	2.111	1,220	2,720	3,770	4,710	5,530	6,390	7,660	8,720
Huebner Trib A above HB-A-UNT3	JHBT05	2.225	1,230	2,740	3,800	4,780	5,630	6,500	7,810	8,890
Huebner Trib A below HB-A-UNT3	JHBT06	2.965	1,840	3,890	5,310	6,650	7,800	8,980	10,800	12,200
Huebner Trib A above Huebner Creek	JHBT08	3.822	2,350	4,880	6,620	8,270	9,690	11,200	13,400	15,300
Leon Trib G headwaters	JLTG01	1.011	710	1,590	2,080	2,530	2,960	3,400	4,040	4,570
Leon Trib G above Leon Creek	JLTG03	1.335	850	2,060	2,730	3,330	3,890	4,470	5,320	6,020
Leon Trib F headwaters	JLTF01	1.166	540	1,470	2,040	2,530	2,970	3,430	4,090	4,640
Leon Trib F above LT-F-UNT2	JLTF02	1.177	520	1,380	1,900	2,360	2,820	3,260	3,850	4,300
Leon Trib F below LT-F-UNT2	JLTF03	1.672	670	1,920	2,670	3,330	3,950	4,620	5,460	6,090
Leon Trib F above Leon Creek	JLTF04	1.690	660	1,920	2,680	3,350	3,980	4,620	5,480	6,130
Slick Ranch Creek headwaters	JSR01	1.002	610	1,590	2,150	2,310	3,050	3,230	4,190	4,750
Slick Ranch Creek above SR-UNT1	JSR02	1.192	570	1,530	2,160	2,690	3,160	3,660	4,390	5,030
Slick Ranch Creek below SR-UNT1	JSR03	1.499	680	1,850	2,630	3,300	3,890	4,500	5,430	6,240
Slick Ranch Creek above SR-UNT2	JSR05	2.317	920	2,630	3,830	4,860	5,720	6,600	7,970	9,240
Slick Ranch Creek below SR-UNT2	JSR06	3.200	1,190	3,420	5,010	6,430	7,590	8,740	10,600	12,200
Slick Ranch Creek above SR-UNT3	JSR08	3.525	1,220	3,530	5,180	6,720	7,950	9,160	11,100	12,800
Slick Ranch Creek below SR-UNT3	JSR09	3.997	1,300	3,870	5,730	7,430	8,780	10,100	12,300	14,300
Slick Ranch Creek above SR-UNT4	JSR11	4.128	1,270	3,830	5,720	7,460	8,820	10,200	12,200	14,100

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Slick Ranch Creek below SR-UNT4	JSR12	4.381	1,300	3,940	5,900	7,710	9,110	10,500	12,700	14,600
Slick Ranch Creek above Slick Ranch Trib B	JSR13	4.797	1,270	3,950	6,010	7,990	9,410	10,900	13,200	15,000
Slick Ranch Creek below Slick Ranch Trib B	JSR14	7.185	1,710	5,240	8,170	11,200	13,400	15,300	18,900	21,700
Slick Ranch Creek above SR-UNT5	JSR15	7.492	1,690	5,190	7,910	10,700	13,000	15,200	18,800	21,800
Slick Ranch Creek below SR-UNT5	JSR16	9.312	2,150	6,070	9,150	12,400	15,100	18,100	22,500	26,100
Slick Ranch Creek above Slick Ranch Trib A	JSR17	9.745	2,120	6,080	9,170	12,500	15,000	17,700	22,000	25,400
Slick Ranch Creek below Slick Ranch Trib A	JSR18	10.553	2,310	6,400	9,600	13,100	15,600	18,500	23,100	26,700
Slick Ranch Creek above SR-UNT6	JSR20	10.625	2,320	6,410	9,610	13,100	15,600	18,500	23,100	26,400
Slick Ranch Creek below SR-UNT6	JSR21	11.006	2,410	6,570	9,840	13,500	16,000	19,000	23,700	27,000
Slick Ranch Creek above Leon Creek	JSR23	11.529	2,460	6,670	9,970	13,600	16,200	19,000	23,400	26,000
Slick Ranch Trib B headwaters	JSRTB01	1.266	880	2,050	2,730	3,310	3,860	4,460	5,290	5,990
Slick Ranch Trib B above UNT2 & UNT3	JSRTB02	1.293	830	1,860	2,480	3,040	3,560	4,100	4,870	5,510
Slick Ranch Trib B below UNT2 & UNT3	JSRTB03	2.016	1,280	2,890	3,830	4,700	5,500	6,310	7,520	8,500
Slick Ranch Trib B above Slick Ranch Creek	JSRTB05	2.388	1,400	3,250	4,390	5,420	6,300	7,210	8,480	9,550
Slick Ranch Trib A above Slick Ranch Creek	SR-A	0.808	590	1,130	1,480	1,810	2,120	2,440	2,900	3,290
Westwood Village headwaters	JWV01	1.338	930	1,890	2,480	3,040	3,550	4,090	4,860	5,520
Westwood Village at Old Hwy 90	JWV02	1.634	980	1,980	2,490	2,980	3,450	3,930	4,680	5,340
Westwood Village above Leon Creek	JWV03	1.839	940	1,800	2,280	2,830	3,440	4,010	4,820	5,530
Leon Trib E headwaters	JLTE01	1.122	710	1,610	2,140	2,630	3,070	3,540	4,210	4,770
Leon Trib E Area 2	JLTE02	1.318	710	1,640	2,230	2,790	3,280	3,770	4,520	5,140
Leon Trib E above Leon Trib E1	JLTE03	1.569	690	1,680	2,380	3,030	3,570	4,110	4,940	5,640
Leon Trib E below Leon Trib E1	JLTE04	2.883	1,070	2,850	4,150	5,410	6,410	7,410	8,960	10,200
Leon Trib E above Leon Creek	JLTE06	3.062	1,090	3,000	4,360	5,680	6,750	7,770	9,240	10,300
Leon Trib E1 headwaters	JLTE101	0.968	450	1,300	1,800	2,220	2,600	3,000	3,580	4,060
Leon Trib E1 at Kenley Avenue	JLTE102	1.021	470	1,350	1,870	2,320	2,710	3,120	3,720	4,220
Leon Trib E1 Area 3	JLTE103	1.134	510	1,450	2,020	2,510	2,950	3,400	4,060	4,600
Leon Trib E1 above Leon Trib E	JLTE105	1.314	610	1,760	2,440	3,030	3,550	4,090	4,870	5,520
Leon Trib D headwaters	JLTD01	0.970	760	1,420	1,830	2,230	2,600	2,990	3,560	4,030

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Trib D above Leon Creek	JLTD03	1.165	890	1,730	2,240	2,730	3,180	3,660	4,350	4,920
Leon Trib C headwaters	JLTC01	2.233	1,730	2,950	3,760	4,600	5,370	6,160	7,340	8,320
Leon Trib C above Leon Creek	JLTC03	2.358	1,470	2,410	3,140	3,960	4,670	5,440	6,810	7,810
Leon Trib B headwaters	JLTB01	1.190	850	1,490	1,920	2,370	2,760	3,160	3,780	4,270
Leon Trib B above LT-B-UNT2	JLTB02	1.225	870	1,510	1,950	2,410	2,810	3,210	3,840	4,340
Leon Trib B below LT-B-UNT2	JLTB03	1.468	1,000	1,880	2,450	3,020	3,540	4,060	4,840	5,490
Leon Trib B at IH35	JLTB05	1.768	1,180	2,180	2,590	2,900	3,140	3,420	3,780	4,460
Leon Trib B above LT-B-UNT3	JLTB07	2.235	1,460	2,800	3,400	3,910	4,360	4,780	5,380	5,840
Leon Trib B below LT-B-UNT3	JLTB08	2.489	1,670	3,190	4,000	4,640	5,210	5,760	6,530	7,140
Leon Trib B above Leon Creek	JLTB10	2.623	1,730	3,410	4,240	4,930	5,510	6,090	6,920	7,540
Leon Trib A headwaters	JLTA01	1.004	790	1,550	2,010	2,440	2,850	3,270	3,890	4,400
Leon Trib A above LT-A-UNT1	JLTA02	1.082	840	1,640	2,120	2,580	3,010	3,460	4,110	4,650
Leon Trib A below LT-A-UNT1	JLTA03	1.561	1,210	2,320	3,000	3,650	4,260	4,890	5,820	6,580
Leon Trib A at Durette Drive	JLTA04	1.724	1,270	2,550	3,300	4,030	4,700	5,400	6,430	7,280
Leon Trib A above Leon Creek	JLTA05	1.993	1,270	2,690	3,570	4,420	5,170	5,960	7,180	8,130
Indian Creek headwaters	JIN01	0.959	600	1,640	2,200	2,660	3,100	3,600	4,260	4,830
Indian Creek above IN-UNT2	JIN02	1.132	600	1,640	2,310	2,840	3,330	3,840	4,580	5,190
Indian Creek below IN-UNT2	JIN03	1.338	710	1,930	2,680	3,330	3,920	4,530	5,420	6,160
Indian Creek above IN-UNT3	JIN04	1.358	710	1,940	2,710	3,350	3,930	4,520	5,410	6,140
Indian Creek below IN-UNT3	JIN05	1.642	870	2,350	3,300	4,110	4,840	5,610	6,700	7,600
Indian Creek above IN-UNT4 & IN-UNT5	JIN07	2.648	1,210	3,080	4,420	5,460	6,310	7,150	8,470	9,520
Indian Creek below IN-UNT4 & IN-UNT5	JIN08	3.395	1,540	3,820	5,590	7,000	8,100	9,210	10,900	12,200
Indian Creek above IN-UNT6	JIN10	3.903	1,620	4,000	5,750	7,410	8,700	9,840	11,700	13,000
Indian Creek below IN-UNT6	JIN11	4.591	1,920	4,650	6,670	8,630	10,100	11,500	13,700	15,300
Indian Creek above IN-UNT7	JIN13	4.944	1,870	4,670	6,670	8,510	10,000	11,500	13,800	15,600
Indian Creek below IN-UNT7	JIN14	5.288	1,940	4,900	7,000	8,940	10,500	12,100	14,500	16,500
Indian Creek above Indian Trib A	JIN16	6.192	1,820	4,350	5,860	7,470	8,660	10,200	13,400	16,400
Indian Creek below Indian Trib A	JIN17	7.504	1,970	4,640	6,140	7,810	9,010	10,900	14,600	18,200
Indian Creek at Somerset Road	JIN19	7.971	1,930	4,600	6,110	7,790	9,000	10,800	14,400	18,100

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Indian Creek above IN-UNT8	JIN21	8.350	1,830	4,500	6,020	7,710	8,920	10,600	13,900	17,600
Indian Creek below IN-UNT8	JIN22	8.611	1,830	4,500	6,030	7,720	8,930	10,600	13,900	17,600
Indian Creek at dam	JIN23	9.258	1,750	4,410	5,960	7,690	8,910	10,600	13,900	17,600
Indian Creek above IN-UNT9	JIN25	10.180	1,660	4,230	5,810	7,470	8,740	10,300	13,200	16,400
Indian Creek below IN-UNT9	JIN26	10.880	1,650	4,230	5,810	7,480	8,770	10,400	13,300	16,600
Indian Creek above Leon Creek	JIN27	10.971	1,640	4,210	5,800	7,450	8,750	10,400	13,300	16,500
Indian Trib A headwaters	JITA01	1.158	500	1,370	1,900	2,370	2,790	3,200	3,830	4,350
Indian Trib A above Indian Creek	JITA03	1.312	490	1,380	1,960	2,500	2,960	3,420	4,120	4,700
Comanche Creek headwaters	JCO01	1.754	750	2,120	2,940	3,670	4,310	4,950	5,920	6,720
Comanche Creek above COM-UNT2	JCO02	2.109	670	2,020	2,950	3,810	4,510	5,200	6,270	7,160
Comanche Creek below COM-UNT2	JCO03	2.464	740	2,300	3,390	4,380	5,180	5,980	7,240	8,270
Comanche Creek above COM-UNT3	JCO05	2.604	730	2,280	3,390	4,410	5,240	6,070	7,360	8,430
Comanche Creek below COM-UNT3	JCO06	3.222	810	2,740	4,100	5,410	6,420	7,420	9,000	10,300
Comanche Creek above COM-UNT4	JCO08	3.825	860	3,080	4,720	6,290	7,500	8,660	10,500	12,100
Comanche Creek below COM-UNT4	JCO09	4.213	910	3,330	5,120	6,870	8,190	9,480	11,600	13,300
Comanche Creek above Leon Creek	JCO10	4.674	820	3,290	5,130	6,990	8,380	9,750	11,900	13,700

USGS Stream Gage Sites

The United States Geological Survey maintains two stream flow gages in the Leon Creek watershed: Leon Creek at I-35 and Helotes Creek at Helotes. Information on each stream gage is published annually in the USGS *Water Resources Data* report for the State of Texas. Data from these gages was used to compute a statistical peak discharge-frequency analysis and flood hydrograph reproductions for hydrologic model verification.

Leon Creek at Interstate Highway 35

The following gage description and data were published by USGS in *Water Resources Data – Texas*, 2002, Volume 5, page 166.

The Leon Creek at I-35 at San Antonio, TX gage (station number 08181480) is located on the left bank between bridges on I-35 in San Antonio, 1.7 miles northeast of the intersection of I-35 and Loop 410, and 11.8 miles upstream from the mouth.

Drainage area of Leon Creek at the gage is 219 square miles. Discharge data is available for the period October 1984 to present. Maximum discharge observed at this gage was 93,300 cfs on October 17, 1998 (an indirect measurement from a floodmark of 29.31 feet).

The USGS produced a paper, “Summary of Estimated Discharge,” to discuss the October 1998 storm. The paper discussed the process used to estimate the peak flow rate during this event, including identifying an acceptable cross-section location and high-water mark to estimate the flow rate. The cross-section location was approximately two miles upstream of the I-35 crossing. The paper rated this discharge estimate as fair (10–15 percent error).

Helotes Creek at Helotes

Information for the Helotes Creek at Helotes gage was published in the *Water Resources Data – Texas*, 2002, Volume 5, page 162.

The Helotes Creek at Helotes, TX gage (station number 08181400) is located 42 feet to the left and 44 feet downstream from the centerline of the bridge on State Highway 16, 0.1 miles northwest of Helotes, and 8.6 miles upstream from the mouth.

The drainage area at the gage is 15.0 square miles. Discharge data is available from June 1968 to present. The maximum discharge at this gage of 12,600 cfs (from a rating curve extended above the discharge measurement of 4,960 cfs) occurred on October 18, 1998. Peak stage was 15.21 feet (from floodmark).

Statistical Peak Discharge-Frequency Analysis

To verify hydrologic modeling parameters and loss rates, a statistical peak discharge frequency analysis was performed. The USACE Flood Frequency Analysis (HEC-FFA) software was used in the statistical evaluation of peak discharges at the two USGS gages in the Leon Creek Watershed. These analyses followed guidance provided in the U.S. Water Resources Council Bulletin Number 17B, “Guidelines for Determining Flood Flow Frequency,” dated September 1981. When a station’s systematic record exhibited a standard deviation in excess of 0.5, its generalized skew coefficient was reduced in accordance with Southwestern Division USACE guidance dated December 1985. The generalized skew coefficient is reduced to prevent exaggeration of the projected peak discharges for the rarer flood events, when the standard deviation of the log-transformed annual peak discharge series exceeds 0.5. The statistical effect is to reduce the upward curvature at the rare end of the projected discharge-frequency curve.

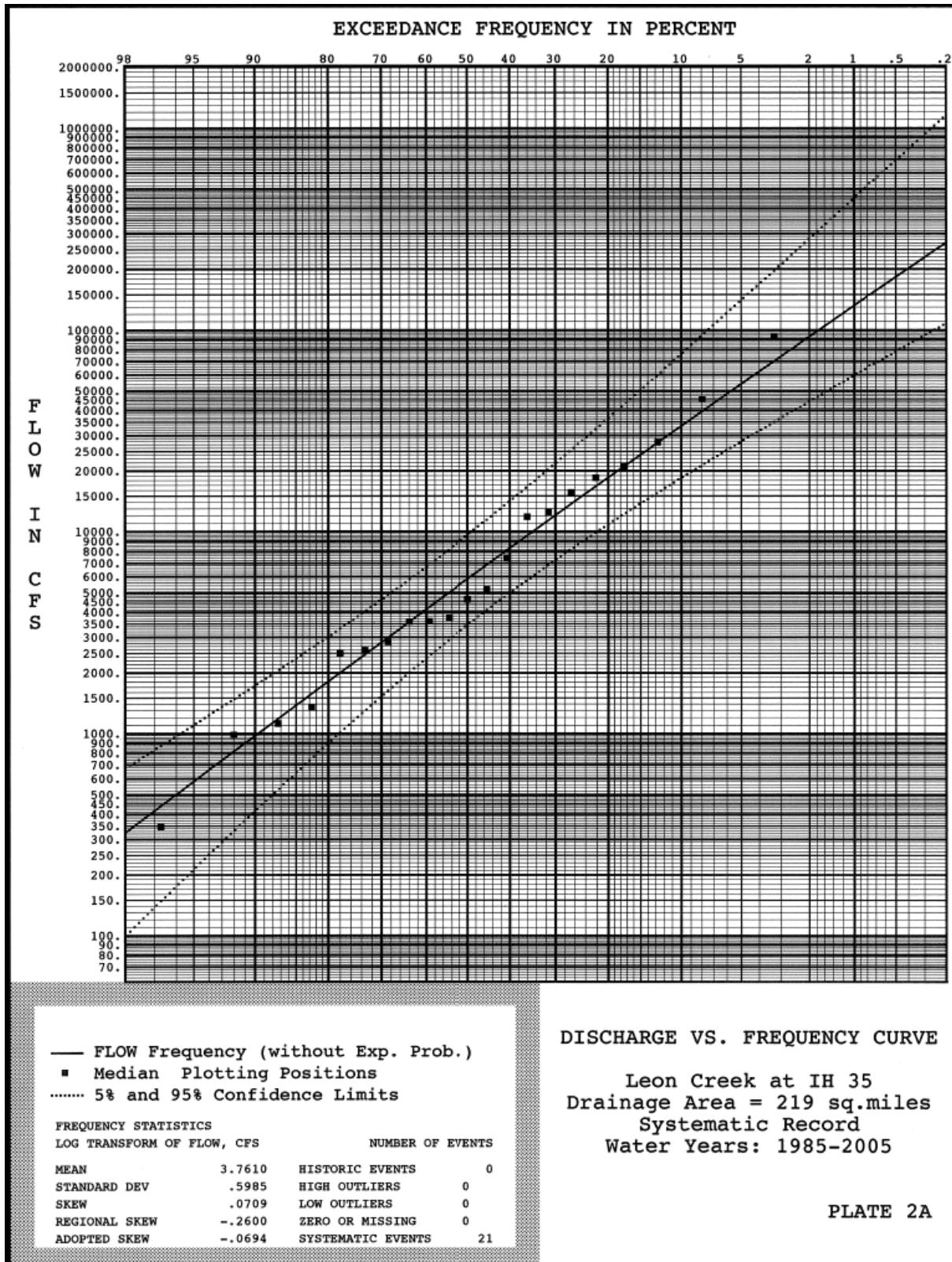
Leon Creek at I-35 Gage

The annual peak series available at the Leon Creek gage extends from 1985 to present. For the purpose of establishing an estimate of the 100-year peak discharge, this 21-year period-of-record is short but does provide a meaningful indication for the more frequent events. The extreme annual peaks in this record include readings of 93,300 cfs (17 October 1998), 45,600 cfs (02 July 2002), and 27,900 cfs (22 June 1997). Frequency analyses based upon the systematic 21-year record produced a 100-year peak discharge estimate of 133,000 cfs.

Helotes Creek at Helotes Gage

The annual peak series available at the Helotes Creek gage extends from 1969 to present. For the purpose of establishing an estimate of the 100-year peak discharge, this 37-year period-of-record is sufficient. The more extreme annual peaks in this record include 12,600 cfs (18 October 1998), 10,900 cfs (02 July 2002), 7,680 cfs (16 July 1973), and 7,140 cfs (11 June 1987). Frequency analyses based upon the systematic 37-year record produced a 100-year peak discharge estimate of 33,400 cfs. Extending the record to consider the longest known period over which the October 1998 discharge level has not been exceeded (since 1923 in this case) lowers this projection to 30,200 cfs.

On the following pages, Plates 2A and 2B show graphical results of the frequency analyses for the Leon Creek at I-35 gage and the Helotes Creek at Helotes gage, respectively.



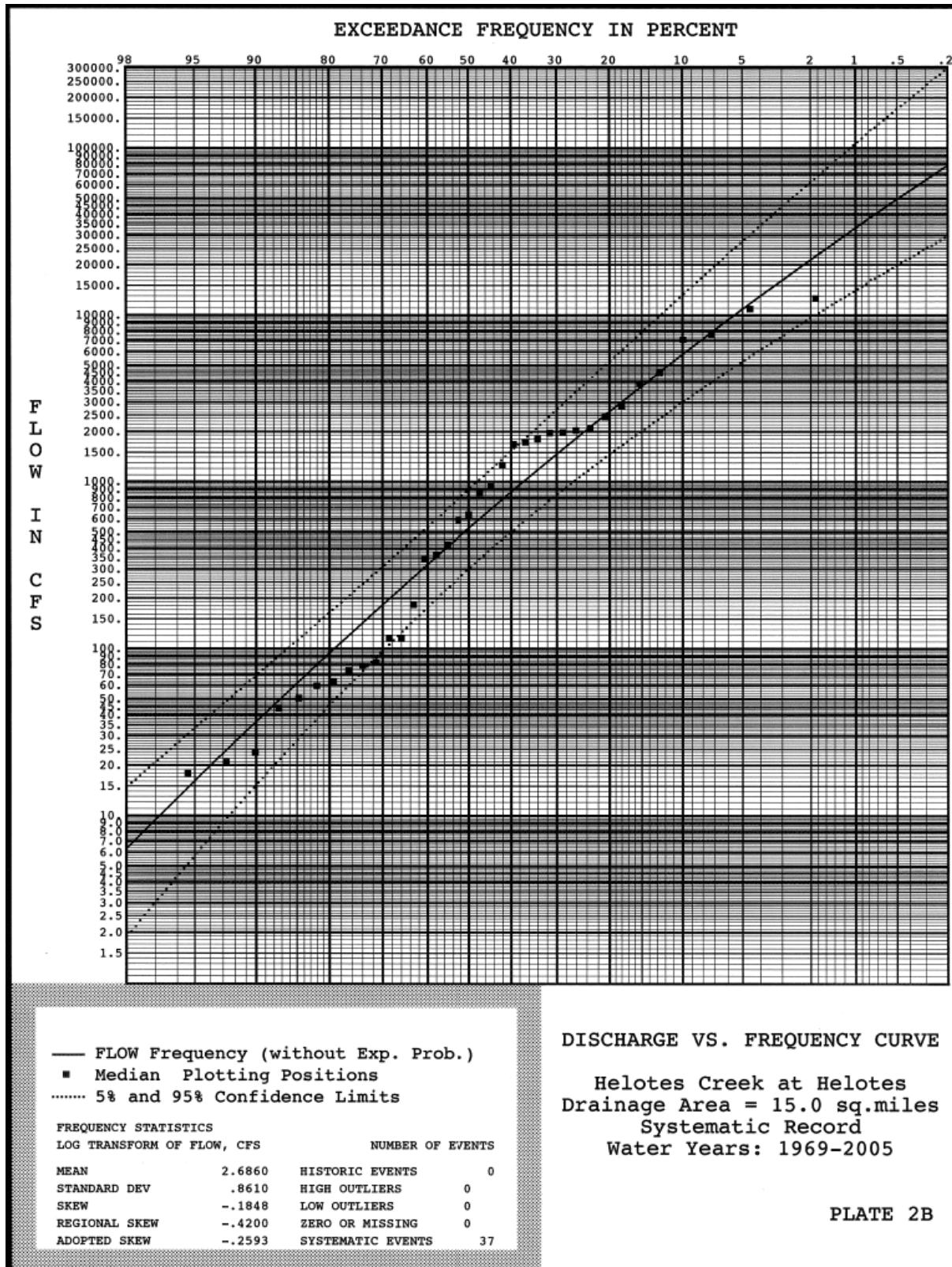


Table G.1-6 presents a comparison of the computed (simulated) 1% ACE discharge and the statistical analysis.

Table G.1-6. Comparison of Simulated and Frequency Analysis

Gage Site	1% ACE Simulated	1% ACE Frequency Analysis
Leon Creek at I-35	116,000 cfs	133,000 cfs
Helotes Creek at Helotes	28,100 cfs	30,200 cfs

Flood Hydrograph Reproduction

The USGS published gage readings for several significant flood events for both the Leon Creek at I-35 gage and the Helotes Creek at Helotes gage. Of particular note were the storms of June 1997, October 1998, and July 2002. However, according to the USGS, the recorded data from these events is of questionable reliability.

SARA obtained rainfall data for these major storms from OneRain, Inc. This 15-minute interval rainfall data was input to the HEC-HMS watershed model, and a storm reproduction was performed for all three significant events. Table G.1-7 shows a comparison between the observed flood peaks at the Leon Creek at I-35 and Helotes Creek at Helotes gages and the simulated flood peaks produced by HEC-HMS.

Table G.1-7. Comparison of Observed and Simulated Flows (cfs)

Gage Site	June 1997		October 1998		July 2002	
	Observed	Simulated	Observed	Simulated	Observed	Simulated
Leon Creek at I-35	27,900	51,448	93,300	82,416	45,600	38,783
Helotes Creek at Helotes	4,560	11,754	12,600	7,887	10,900	5,402

Model Verification

Because the data for the significant floods of record was of questionable reliability according to the USGS, more emphasis was placed on the frequency analysis to verify the watershed modeling parameters of initial loss and infiltration rates, Snyder's lag time (t_p), and Snyder's peaking coefficient (c_p).

Conclusion

The recent high flows that have occurred, the results of the frequency analyses, along with the increased urbanization in the Leon Creek Watershed, justify the higher discharges computed for the feasibility study. The without-project discharges will be used as the baseline for comparison with the future without-project condition discharges.

FUTURE CONDITIONS HYDROLOGIC ANALYSIS

Future without-project conditions discharge-frequency relationships were developed, based on anticipated changes in land use, urbanization, and impervious percentage values.

Future Land Use

A future land use raster dataset was provided by the San Antonio River Authority (SARA). Major categories include land use codes for undeveloped, residential, commercial, industrial, transportation, extraction, open space, services, water, and mixed use. Each land use type is associated with an impervious cover percent and a percent urbanization. Land use types, associated impervious cover, and percent urbanization are shown in table G.1-3 on page G.1-6.

Upon inspection of the future land use dataset, SARA and USACE determined that portions of the land use dataset were incorrectly classified. SARA, USACE, and Halff Associates agreed to modify the future land use data file to correctly reflect the future conditions. The major modifications consisted of changing parks classified as Commercial to Undeveloped. Other minor modifications were made in smaller subbasins to show the correct hydrologic results.

Lag Time Parameters

Snyder's lag time (t_p) was calculated using future conditions urbanization in the same manner as lag time was calculated for existing conditions (see "Lag Time Parameters" on page G.1-7). Table G.1-8 contains the unit hydrograph data for future conditions. Snyder's lag time values ranged from a minimum of 0.04 hours to a maximum of 0.96 hours for subbasins in the Leon Creek Watershed. The mean value was 0.32 hours.

Table G.1-8. Unit Hydrograph Data – Future Modified

Subbasin	Area (sq. mi.)	L (miles)	L_{ca} (miles)	S_{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t_p (hours)	Hours	
BT-1 headwaters	1.024	1.556	0.537	105.60	77.76	0.218	0.22	46.37
BT-2 ab BT-UNT1	0.377	1.302	0.723	137.28	54.46	0.251	0.25	34.16
BT-3 ab BT-UNT2	2.193	3.765	1.742	47.52	65.75	0.603	0.60	48.22
BT-4 ab LC	0.676	2.908	1.454	31.68	79.89	0.505	0.51	49.32
BT-UNT1	0.995	2.018	0.827	95.04	41.49	0.363	0.36	22.62
BT-UNT2	0.940	2.946	1.518	79.20	65.40	0.473	0.47	38.96
CC-1 headwaters	1.057	2.388	1.201	116.16	10.12	0.521	0.52	6.20
CC-10 ab CC-UNT2	0.679	2.282	1.110	47.52	86.15	0.370	0.37	63.73
CC-11 ab CC-A	1.008	2.419	1.107	52.80	84.21	0.375	0.37	57.30
CC-12 ab LC	0.532	2.125	0.798	36.96	83.09	0.339	0.34	51.72
CC-2 ab CC-F	0.482	1.540	0.829	42.24	58.16	0.345	0.35	30.00
CC-3 ab CC-E	1.463	4.068	0.719	31.68	58.36	0.501	0.50	34.55
CC-4 ab GC	0.849	2.832	1.310	31.68	54.09	0.563	0.56	31.12

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)		
CC-5 ab CC-D	0.827	2.347	1.385	26.40	38.42	0.610	0.61	23.74
CC-6 ab CC-C	0.077	0.627	0.270	36.96	55.60	0.166	0.17	26.41
CC-7 ab CC-B	0.748	2.165	1.317	36.96	75.36	0.434	0.43	55.27
CC-8 ab HE	0.321	1.967	1.058	79.20	89.59	0.304	0.30	87.83
CC-9 ab CC-UNT1	1.894	3.079	1.577	47.52	86.40	0.474	0.47	65.95
CC-A-1 headwaters	1.079	2.022	0.949	58.08	83.83	0.325	0.32	54.35
CC-A-2 at Tezel Rd	0.972	1.864	1.045	63.36	84.77	0.319	0.32	57.52
CC-A-3 ab CC	1.194	2.376	1.119	42.24	82.30	0.394	0.39	51.62
CC-B-1 headwaters	1.017	2.318	1.339	63.36	88.77	0.372	0.37	55.14
CC-B-2 ab CC-B-UNT1	0.008	0.135	0.076	132.00	90.00	0.036	0.04	89.24
CC-B-3 ab CC	0.015	0.308	0.104	89.76	90.00	0.060	0.06	90.00
CC-B-UNT1	0.682	2.557	1.382	63.36	88.95	0.391	0.39	52.84
CC-C-1 headwaters	1.000	2.373	1.153	105.60	68.92	0.399	0.40	37.42
CC-C-2 ab CC-C-UNT1	1.015	2.379	0.909	42.24	57.27	0.425	0.42	33.54
CC-C-3 ab CC-C1	0.517	2.352	1.253	26.40	57.27	0.524	0.52	35.82
CC-C-4 ab CC	0.989	2.790	1.311	26.40	59.43	0.561	0.56	35.08
CC-C-UNT1	0.875	2.233	1.148	58.08	73.03	0.387	0.39	36.45
CC-C1-1 headwaters	1.005	2.449	1.007	52.80	28.35	0.466	0.47	17.67
CC-C1-2 ab CC-C	0.478	1.456	0.676	36.96	70.97	0.296	0.30	42.55
CC-D-1 headwaters	0.726	2.905	1.445	26.40	70.53	0.553	0.55	41.03
CC-D-2 ab CC-D-UNT2	0.013	0.213	0.075	100.32	45.65	0.059	0.06	21.68
CC-D-3 ab CC-D-UNT3	0.337	1.530	0.721	79.20	71.43	0.267	0.27	34.98
CC-D-4 at Culebra Rd	1.156	1.797	1.353	63.36	75.79	0.367	0.37	55.93
CC-D-5 ab UNT4	0.623	2.107	0.621	36.96	63.91	0.345	0.35	37.21
CC-D-6 ab CC	0.076	0.621	0.280	58.08	56.17	0.153	0.15	31.35
CC-D-UNT1	0.604	2.087	1.050	36.96	76.89	0.388	0.39	41.10
CC-D-UNT2	0.448	1.200	0.621	84.48	78.67	0.217	0.22	46.65
CC-D-UNT3	0.895	2.599	1.401	31.68	68.62	0.511	0.51	42.05
CC-D-UNT4	0.617	1.679	0.860	105.60	88.99	0.251	0.25	51.45
CC-E-1 headwaters	1.024	2.038	0.943	121.44	2.93	0.463	0.46	1.64
CC-E-2 ab CC	0.656	2.431	1.281	31.68	54.09	0.526	0.53	30.21
CC-F-1 headwaters	0.997	2.629	1.616	73.92	18.01	0.629	0.63	15.50
CC-F-2 at dam	0.386	1.416	0.545	36.96	61.79	0.286	0.29	31.30
CC-F-3 ab CC	0.078	0.618	0.210	58.08	55.29	0.138	0.14	26.29
CC-F-UNT1	0.394	1.342	0.744	52.80	7.26	0.411	0.41	16.57
CC-UNT1	0.923	2.861	1.306	26.40	85.32	0.483	0.48	58.35
CC-UNT2	1.214	2.925	1.191	26.40	84.80	0.472	0.47	57.06
CHI-1 headwaters	0.736	1.550	0.698	126.72	79.85	0.230	0.23	37.96
CHI-2 ab CHI-UNT2	0.090	0.520	0.180	374.88	80.00	0.073	0.07	38.00
CHI-3 ab CHI-UNT3	1.245	2.475	1.091	89.76	69.91	0.371	0.37	33.73
CHI-4 at dam	0.586	1.387	0.374	174.24	66.47	0.177	0.18	34.30
CHI-5 ab CHI-UNT4	1.148	3.084	1.332	52.80	67.88	0.488	0.49	32.52

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
CHI-6 ab HE	0.423	1.393	0.640	116.16	66.72	0.235	0.24	32.08
CHI-UNT1	0.462	1.300	0.671	168.96	80.02	0.200	0.20	38.53
CHI-UNT2	0.360	1.119	0.535	190.08	80.00	0.169	0.17	38.00
CHI-UNT3	0.981	1.973	0.858	126.72	78.99	0.274	0.27	37.72
CHI-UNT4	0.512	1.242	0.588	242.88	74.74	0.180	0.18	35.50
COM-1 headwaters	1.140	2.618	1.085	36.96	89.32	0.398	0.40	79.18
COM-2 ab COM-UNT2	0.355	1.339	0.590	36.96	94.60	0.236	0.24	72.68
COM-3 ab COM-UNT3	0.140	0.739	0.047	36.96	94.83	0.071	0.07	72.18
COM-4 ab COM-UNT4	0.603	1.633	0.860	47.52	94.86	0.280	0.28	72.10
COM-5 ab LC	0.461	1.743	0.740	42.24	94.91	0.277	0.28	72.33
COM-UNT1	0.614	1.978	0.912	42.24	92.59	0.319	0.32	76.43
COM-UNT2	0.355	1.970	0.985	36.96	94.46	0.333	0.33	73.93
COM-UNT3	0.618	1.904	1.029	36.96	94.96	0.333	0.33	72.14
COM-UNT4	0.388	2.087	0.933	21.12	94.97	0.370	0.37	72.11
FR-1 headwaters	0.741	2.186	1.169	89.76	55.14	0.397	0.40	42.04
FR-2 ab FR-UNT2	0.019	0.294	0.118	79.20	25.16	0.094	0.09	20.67
FR-3 ab FR-C	0.227	1.405	0.662	47.52	56.36	0.302	0.30	42.43
FR-4 ab FR-B	0.063	0.617	0.408	31.68	86.13	0.165	0.16	60.06
FR-5 be Prue Rd	0.768	1.884	0.876	47.52	82.73	0.320	0.32	49.95
FR-6 at Bandera Rd	1.037	2.230	0.745	47.52	82.58	0.322	0.32	50.40
FR-7 ab FR-A	0.729	3.324	1.393	58.08	85.93	0.449	0.45	66.75
FR-8 ab LC	0.550	1.588	0.623	26.40	81.16	0.298	0.30	48.35
FR-A-1 headwaters	1.047	1.782	0.772	63.36	86.17	0.277	0.28	61.32
FR-A-2 at Braun Rd	0.311	1.179	0.551	79.20	86.19	0.199	0.20	60.57
FR-A-3 ab FR-A1	0.223	1.446	0.557	58.08	82.04	0.235	0.24	48.61
FR-A-4 ab FR	0.005	0.229	0.121	36.96	80.67	0.071	0.07	41.49
FR-A1	1.021	1.910	0.670	73.92	82.86	0.267	0.27	51.54
FR-B-1 headwaters	1.142	2.155	1.082	79.20	67.39	0.364	0.36	49.39
FR-B-2	0.115	1.358	0.674	47.52	89.69	0.245	0.24	87.36
FR-B-3 ab FR-B-UNT1	0.079	0.640	0.198	47.52	85.99	0.118	0.12	70.32
FR-B-UNT1	0.680	1.779	0.846	42.24	84.20	0.314	0.31	54.80
FR-C-1 headwaters	0.902	2.243	1.031	31.68	68.24	0.431	0.43	55.82
FR-C-2 ab FR	0.594	2.082	1.820	52.80	84.36	0.428	0.43	75.49
FR-UNT1	0.521	1.623	0.844	126.72	22.12	0.358	0.36	19.17
FR-UNT2	0.858	2.567	1.185	95.04	39.32	0.463	0.46	27.66
GC-1 headwaters	1.074	1.589	0.633	121.44	65.78	0.246	0.25	36.69
GC-10 ab GC-B	0.380	1.721	0.843	73.92	10.47	0.436	0.44	6.65
GC-11 ab GC-A	0.032	0.479	0.185	52.80	35.30	0.137	0.14	17.49
GC-12 ab CC	0.821	1.834	0.906	31.68	59.05	0.402	0.40	29.87
GC-2 ab GC-UNT1	0.217	0.966	0.507	63.36	31.96	0.260	0.26	22.15
GC-3 ab GC-UNT2	0.705	1.688	0.773	105.60	15.60	0.379	0.38	9.16
GC-4 ab GC-E	0.188	0.768	0.361	195.36	0.00	0.205	0.20	0.00

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)		
GC-5 ab GC-D	0.254	0.984	0.523	89.76	0.00	0.301	0.30	0.00
GC-6 ab GC-UNT3	0.955	2.030	1.108	68.64	0.00	0.558	0.56	0.02
GC-7 ab WC	0.592	1.748	0.762	95.04	0.00	0.429	0.43	0.00
GC-8 ab GC-C	0.356	1.359	0.473	121.44	0.00	0.310	0.31	0.00
GC-9 ab GC-UNT4	0.343	1.896	1.067	31.68	0.09	0.621	0.62	0.31
GC-A-1 headwaters	1.118	1.604	0.706	168.96	0.00	0.361	0.36	0.00
GC-A-2 ab GC-A-UNT1	0.079	0.582	0.310	549.12	0.00	0.142	0.14	0.00
GC-A-3 ab GC-A-UNT2	0.474	1.718	0.872	84.48	0.29	0.458	0.46	0.23
GC-A-4 ab GC	0.349	2.097	1.138	47.52	47.80	0.457	0.46	25.07
GC-A-UNT1	0.241	0.902	0.442	242.88	0.12	0.225	0.23	0.12
GC-A-UNT2	0.273	1.046	0.454	237.60	21.86	0.212	0.21	11.49
GC-B-1 headwaters	0.971	2.451	1.289	100.32	0.00	0.591	0.59	0.00
GC-B-2 ab GC-B-UNT2	0.192	1.420	0.756	95.04	34.55	0.320	0.32	19.79
GC-B-3 ab GC	0.032	0.348	0.164	58.08	39.48	0.111	0.11	18.75
GC-B-UNT1	0.430	1.926	0.943	142.56	0.07	0.447	0.45	0.28
GC-B-UNT2	0.389	1.805	0.961	95.04	47.79	0.354	0.35	24.80
GC-C-1 headwaters	0.989	1.888	1.073	142.56	0.00	0.466	0.47	0.00
GC-D-1 headwaters	1.000	1.787	0.698	126.72	0.16	0.395	0.40	0.88
GC-D-2 ab GC-D-UNT1	0.066	0.466	0.151	316.80	0.00	0.110	0.11	0.00
GC-D-3 ab GC	0.165	0.863	0.386	285.12	0.00	0.204	0.20	0.00
GC-D-UNT1	0.437	1.235	0.647	211.20	0.00	0.303	0.30	0.00
GC-E-1 headwaters	0.710	2.353	1.133	116.16	27.51	0.455	0.46	20.61
GC-E-2 ab GC	0.032	0.402	0.170	126.72	0.00	0.130	0.13	0.00
GC-E-UNT1	0.601	2.140	1.061	126.72	14.94	0.455	0.45	18.40
GC-UNT1	0.972	2.628	1.370	100.32	68.05	0.410	0.41	33.52
GC-UNT2	0.504	1.857	0.986	121.44	30.35	0.384	0.38	17.43
GC-UNT3	0.761	1.397	0.685	195.36	2.82	0.323	0.32	6.30
GC-UNT4	0.445	2.091	1.184	84.48	0.00	0.556	0.56	0.06
HB-1 headwaters	1.009	1.890	0.777	26.40	91.26	0.325	0.33	80.48
HB-2 ab HB-UNT1	0.122	0.830	0.282	142.56	93.77	0.115	0.11	73.97
HB-3 ab HB-UNT2	0.214	0.850	0.364	63.36	89.91	0.153	0.15	66.93
HB-4 ab HB-UNT3	0.020	0.320	0.150	100.32	80.89	0.072	0.07	42.65
HB-5 ab Babcock Rd	0.728	1.864	0.695	42.24	63.13	0.337	0.34	39.51
HB-6 ab HB-A	1.278	2.559	1.250	42.24	69.37	0.458	0.46	47.78
HB-7 at Bandera Rd	1.697	2.633	1.018	31.68	75.30	0.436	0.44	61.58
HB-8 ab LC	2.329	4.129	1.964	31.68	75.59	0.666	0.67	59.44
HB-A-1 headwaters	0.617	2.061	1.188	68.64	86.01	0.340	0.34	78.81
HB-A-2 ab HB-A-UNT2	0.317	1.024	0.477	84.48	36.78	0.238	0.24	27.89
HB-A-3 ab HB-A-UNT3	0.114	0.726	0.294	105.60	88.33	0.121	0.12	81.39
HB-A-4 ab HB	0.857	1.892	0.935	52.80	87.22	0.314	0.31	78.81
HB-A-UNT1	0.490	1.092	0.836	95.04	53.78	0.267	0.27	36.19
HB-A-UNT2	0.687	1.828	0.785	79.20	89.83	0.264	0.26	81.39

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
HB-A-UNT3	0.740	2.082	0.975	89.76	89.76	0.294	0.29	75.80
HB-UNT1	0.280	1.169	0.523	79.20	90.01	0.190	0.19	64.68
HB-UNT2	0.195	1.100	0.514	79.20	84.95	0.190	0.19	55.68
HB-UNT3	0.258	1.001	0.439	63.36	85.48	0.180	0.18	56.76
HE-1 headwaters	1.001	2.205	0.882	121.44	79.12	0.291	0.29	37.74
HE-2 ab HE-UNT1	0.134	0.628	0.261	295.68	79.40	0.095	0.10	37.78
HE-3 ab HE-UNT2	0.544	1.456	0.842	121.44	68.90	0.260	0.26	33.02
HE-4 ab HE-B	0.670	1.828	0.826	121.44	58.10	0.301	0.30	32.58
HE-5 ab CHI	0.343	1.002	0.351	200.64	50.97	0.163	0.16	28.99
HE-6 ab LR	1.688	3.281	1.407	42.24	41.45	0.626	0.63	26.18
HE-7 ab HE-A	1.704	2.821	1.520	68.64	42.37	0.551	0.55	36.82
HE-8 ab HE-UNT3	3.332	5.470	2.310	31.68	82.43	0.757	0.76	61.93
HE-9 ab CC	0.069	0.705	0.369	68.64	89.68	0.141	0.14	83.10
HE-A-1 headwaters	1.010	2.083	1.105	121.44	1.19	0.501	0.50	0.83
HE-A-2 ab HE	0.561	2.283	1.327	63.36	41.85	0.492	0.49	27.90
HE-B-1 headwaters	0.741	1.769	0.833	79.20	56.54	0.327	0.33	31.76
HE-B-2 ab HE-B-UNT2	0.821	2.435	1.102	73.92	59.75	0.408	0.41	30.15
HE-B-3 ab HE	0.101	0.713	0.337	195.36	40.79	0.151	0.15	24.67
HE-B-UNT1	0.586	1.380	1.163	132.00	49.16	0.320	0.32	27.57
HE-B-UNT2	0.678	2.049	0.854	126.72	63.71	0.305	0.31	31.91
HE-UNT1	0.339	1.148	0.538	195.36	78.40	0.172	0.17	37.36
HE-UNT2	0.821	2.487	1.291	100.32	67.92	0.392	0.39	33.79
HE-UNT3-1	1.011	2.875	1.465	21.12	82.32	0.537	0.54	61.04
HE-UNT3-2	0.307	1.633	0.911	36.96	85.78	0.317	0.32	69.33
HUE-1 headwaters	1.029	1.717	0.912	110.88	10.91	0.415	0.41	5.94
HUE-2 ab HUE-UNT1	0.014	0.242	0.120	649.44	67.35	0.045	0.05	31.99
HUE-3 ab HUE-B	0.423	1.346	0.558	68.64	64.78	0.247	0.25	38.54
HUE-4 ab HUE-A	0.561	1.915	0.987	63.36	86.21	0.313	0.31	57.77
HUE-5 ab HUE-UNT2	0.200	1.021	0.573	36.96	82.68	0.226	0.23	51.25
HUE-6 ab LC	0.451	2.117	1.307	31.68	89.33	0.405	0.41	70.39
HUE-A	0.972	2.625	1.300	79.20	70.91	0.413	0.41	45.51
HUE-B	1.102	2.086	1.070	110.88	17.59	0.456	0.46	10.02
HUE-UNT1	0.556	1.495	0.780	121.44	61.60	0.267	0.27	34.89
HUE-UNT2	0.756	2.539	1.343	63.36	83.77	0.398	0.40	56.76
IN-1 headwaters	0.553	1.456	0.472	52.80	82.88	0.224	0.22	57.60
IN-10 at dam	0.647	1.320	0.455	63.36	90.00	0.197	0.20	90.00
IN-11 ab IN-UNT9	0.922	2.003	1.133	26.40	90.00	0.387	0.39	90.00
IN-12 ab LC	0.091	0.794	0.422	105.60	88.72	0.144	0.14	83.50
IN-2 ab IN-UNT2	0.173	0.955	0.386	63.36	70.02	0.184	0.18	48.25
IN-3 ab IN-UNT3	0.020	0.425	0.208	89.76	82.50	0.092	0.09	49.63
IN-4 ab IN-UNT4&5	1.006	2.631	0.899	42.24	83.65	0.374	0.37	53.55
IN-5 ab IN-UNT6	0.508	1.718	1.005	52.80	82.59	0.320	0.32	51.04

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
IN-6 ab IN-UNT7	0.353	1.258	0.249	68.64	81.79	0.159	0.16	46.85
IN-7 ab IN-A	0.904	2.410	1.125	31.68	81.61	0.422	0.42	61.16
IN-8 at Somerset Rd	0.467	1.485	0.645	36.96	90.07	0.261	0.26	89.74
IN-9 ab IN-UNT8	0.379	1.299	0.594	15.84	90.00	0.283	0.28	90.00
IN-A-1 headwaters	0.724	2.521	1.347	42.24	66.31	0.478	0.48	60.45
IN-A-2 ab IN	0.154	1.130	0.639	47.52	82.13	0.234	0.23	71.59
IN-A-UNT1	0.434	1.918	1.054	42.24	56.88	0.415	0.42	39.44
IN-UNT1	0.406	1.586	0.650	42.24	32.26	0.373	0.37	26.82
IN-UNT2	0.206	0.986	0.474	79.20	54.99	0.212	0.21	37.92
IN-UNT3	0.284	1.118	0.694	95.04	83.09	0.210	0.21	51.64
IN-UNT4	0.391	1.376	0.701	68.64	85.60	0.239	0.24	58.06
IN-UNT5	0.356	1.848	1.072	47.52	83.05	0.343	0.34	52.66
IN-UNT6	0.688	2.593	1.740	58.08	85.18	0.447	0.45	63.90
IN-UNT7	0.344	1.501	0.789	68.64	81.21	0.265	0.27	42.33
IN-UNT8	0.261	1.122	0.451	52.80	90.00	0.191	0.19	90.00
IN-UNT9	0.700	2.482	1.065	36.96	87.16	0.392	0.39	76.07
LC -1 headwater	0.746	1.752	0.773	153.12	79.42	0.242	0.24	37.78
LC-10 at Camp Bullis	3.909	3.166	1.036	47.52	63.31	0.470	0.47	37.88
LC-11 ab Loop1604	3.971	5.332	3.156	31.68	62.13	0.957	0.96	54.27
LC-12 ab LT-I	1.384	2.800	1.385	31.68	88.44	0.464	0.46	81.06
LC-13 ab BT	0.851	2.828	1.286	36.96	80.96	0.460	0.46	47.63
LC-14 ab HUE	0.002	0.122	0.079	110.88	80.80	0.038	0.04	42.17
LC-15 ab LT-H	1.120	2.421	0.763	47.52	85.17	0.330	0.33	56.09
LC-16 ab FR	2.889	4.901	1.836	26.40	72.87	0.730	0.73	50.18
LC-17 ab LFR	1.309	2.950	1.642	42.24	74.01	0.522	0.52	56.25
LC-18 ab CC	0.856	2.403	1.282	31.68	81.01	0.445	0.44	57.75
LC-19 ab HB	0.794	2.013	1.023	26.40	83.54	0.388	0.39	53.45
LC-2 ab UNT2	0.125	0.674	0.284	364.32	69.16	0.103	0.10	34.45
LC-20 ab LT-G	0.926	2.516	1.186	47.52	88.67	0.388	0.39	79.98
LC-21 ab LT-F	1.785	4.045	1.805	21.12	90.79	0.630	0.63	69.28
LC-22 ab SR	0.471	1.976	0.393	26.40	82.06	0.270	0.27	46.29
LC-23 ab WV	0.448	1.816	0.395	21.12	82.46	0.272	0.27	49.00
LC-24 ab LT-E	2.324	4.179	1.832	21.12	77.77	0.695	0.69	60.40
LC-25 ab LT-D	0.382	1.364	0.583	42.24	17.37	0.370	0.37	14.79
LC-26 at Military Dr	3.818	3.780	2.225	47.52	64.95	0.667	0.67	49.28
LC-27 ab LT-C	0.266	1.365	0.617	31.68	65.76	0.297	0.30	51.83
LC-28 at New Laredo	2.001	3.562	1.149	15.84	80.54	0.568	0.57	60.58
LC-28A	0.694	2.050	0.919	84.48	59.37	0.348	0.35	43.33
LC-29 ab LT-B	1.709	3.157	1.477	26.40	67.20	0.587	0.59	54.78
LC-3 ab UNT3	0.542	1.755	0.646	190.08	61.81	0.242	0.24	31.55
LC-30 ab LT-A	1.902	3.197	1.729	21.12	91.07	0.565	0.57	79.84
LC-31 ab IN	0.483	1.929	0.798	31.68	91.15	0.320	0.32	84.69

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
LC-32 at Applewhite	2.176	3.219	1.807	21.12	91.81	0.574	0.57	67.73
LC-33 ab COM	2.879	4.830	2.397	26.40	94.93	0.702	0.70	72.24
LC-34 ab Medina Riv	0.952	3.020	1.370	21.12	95.00	0.494	0.49	72.00
LC-4 ab LT-N	0.504	1.522	0.864	58.08	70.11	0.305	0.31	33.37
LC-5 ab PC	1.204	2.031	1.122	121.44	67.74	0.332	0.33	32.78
LC-6 ab LT-M	1.495	2.387	1.018	84.48	45.12	0.419	0.42	27.17
LC-7 ab LT-L	1.778	2.848	1.319	36.96	47.73	0.571	0.57	28.61
LC-8 ab LT-K	0.600	1.434	0.544	63.36	66.53	0.251	0.25	61.41
LC-9 ab LT-J	1.318	2.178	1.030	31.68	80.86	0.394	0.39	43.26
LC-N-1 headwater	1.002	2.410	1.255	126.72	80.00	0.341	0.34	38.08
LC-UNT1	0.646	1.746	0.873	132.00	78.00	0.263	0.26	37.54
LC-UNT2	0.482	1.498	0.744	142.56	77.39	0.231	0.23	37.01
LC-UNT3	0.348	1.293	0.632	105.60	51.28	0.255	0.25	29.30
LFR-1 headwaters	0.681	1.962	0.985	52.80	80.60	0.338	0.34	58.64
LFR-2 ab LC	0.156	0.698	0.247	36.96	64.73	0.158	0.16	59.04
LFR-UNT1	0.347	1.029	0.454	105.60	66.43	0.187	0.19	43.75
LR-1 headwaters	1.081	1.687	0.683	137.28	79.99	0.232	0.23	38.00
LR-2 at Bandera Rd	0.895	1.435	0.545	168.96	68.97	0.205	0.21	39.28
LR-3 ab LR-A	0.679	1.658	0.768	110.88	19.54	0.363	0.36	20.24
LR-4 at Bandera Rd	0.923	1.526	0.589	126.72	50.81	0.256	0.26	28.49
LR-5 ab RC	0.519	1.417	0.660	68.64	49.47	0.294	0.29	31.66
LR-6 ab LR-UNT1	0.360	1.319	0.729	121.44	19.37	0.321	0.32	13.62
LR-7 ab UNT2	0.116	0.960	0.459	153.12	34.52	0.207	0.21	30.66
LR-8 ab HE	0.157	0.694	0.476	137.28	35.81	0.188	0.19	26.76
LR-A-1 headwaters	0.594	1.493	0.711	163.68	75.69	0.223	0.22	37.43
LR-A-2 ab LR	0.208	1.211	0.589	168.96	55.59	0.215	0.22	39.38
LR-A-UNT1	0.448	1.217	0.575	132.00	66.45	0.210	0.21	34.00
LR-UNT1	0.671	1.802	0.933	89.76	54.38	0.340	0.34	34.32
LR-UNT2	0.642	1.790	0.916	116.16	13.24	0.412	0.41	7.94
LT-A-1 headwaters	1.004	2.246	1.006	26.40	89.65	0.388	0.39	69.30
LT-A-2 ab LT-A-UNT1	0.078	0.762	0.364	52.80	90.00	0.152	0.15	90.00
LT-A-3 at Durette Dr	0.163	0.842	0.286	31.68	90.00	0.158	0.16	90.00
LT-A-4 ab LC	0.269	1.188	0.597	52.80	85.78	0.223	0.22	66.81
LT-A-UNT1	0.479	2.457	1.369	26.40	88.67	0.454	0.45	73.91
LT-B-1 headwaters	0.976	2.540	1.297	10.56	89.22	0.536	0.54	70.77
LT-B-2 ab LT-B-UNT2	0.035	0.428	0.224	42.24	89.16	0.106	0.11	72.24
LT-B-3 ab IH35	0.300	0.951	0.274	31.68	92.33	0.161	0.16	76.40
LT-B-4 ab LT-B-UNT3	0.467	1.551	0.611	36.96	89.10	0.261	0.26	68.62
LT-B-5 ab LC	0.134	1.153	0.486	42.24	74.34	0.228	0.23	57.48
LT-B-UNT1	0.214	0.852	0.414	42.24	90.07	0.173	0.17	72.75
LT-B-UNT2	0.243	1.022	0.505	15.84	93.30	0.237	0.24	72.20
LT-B-UNT3	0.254	1.251	0.768	31.68	88.46	0.272	0.27	66.44

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)		
LT-C-1 headwaters	1.145	3.491	1.728	15.84	95.00	0.603	0.60	72.00
LT-C-2 ab LC	0.125	1.001	0.471	21.12	93.45	0.217	0.22	73.59
LT-C-UNT1	1.088	3.006	1.310	15.84	93.70	0.516	0.52	72.87
LT-D-1 headwaters	0.970	2.309	1.250	21.12	92.03	0.438	0.44	70.71
LT-D-2 ab LC	0.195	1.208	0.642	26.40	66.56	0.296	0.30	51.36
LT-E-1 headwaters	1.122	2.147	1.070	42.24	68.92	0.405	0.40	61.98
LT-E-2 (da 1.3)	0.196	1.228	0.718	73.92	39.13	0.302	0.30	32.01
LT-E-3 ab LT-E-1	0.251	1.509	0.369	84.48	7.16	0.301	0.30	6.08
LT-E-4 ab LC	0.179	0.862	0.233	36.96	1.30	0.247	0.25	1.02
LT-E1-1 headwaters	0.630	2.021	0.850	26.40	35.19	0.487	0.49	27.79
LT-E1-2 at Kenley Av	0.053	0.540	0.246	52.80	30.00	0.165	0.17	25.00
LT-E1-3 (da 1.13)	0.113	0.521	0.204	89.76	30.00	0.137	0.14	25.00
LT-E1-4 ab LT-E	0.180	1.025	0.548	126.72	27.97	0.246	0.25	23.35
LT-E1-UNT1	0.338	1.372	0.537	21.12	31.87	0.375	0.38	27.03
LT-F-1 headwaters	0.985	2.632	0.949	36.96	84.00	0.391	0.39	69.05
LT-F-2 ab UNT2	0.011	0.413	0.199	10.56	81.09	0.137	0.14	43.96
LT-F-3 ab LC	0.018	0.356	0.178	31.68	69.17	0.108	0.11	35.19
LT-F-UNT1	0.181	1.028	0.527	15.84	93.99	0.241	0.24	75.62
LT-F-UNT2	0.495	1.890	0.891	26.40	50.76	0.440	0.44	40.69
LT-G-1 headwaters	1.011	2.426	1.183	73.92	88.11	0.352	0.35	67.20
LT-G-2 ab LC	0.324	1.462	0.768	42.24	91.06	0.269	0.27	64.41
LT-H-1 headwaters	1.008	2.440	1.198	31.68	86.74	0.421	0.42	60.63
LT-H-2	0.464	1.176	0.594	63.36	86.72	0.213	0.21	64.47
LT-H-3 ab LC	0.332	1.512	0.857	42.24	85.21	0.294	0.29	57.56
LT-I-1 headwaters	1.005	2.469	1.239	84.48	88.40	0.351	0.35	81.22
LT-I-2 ab LC	0.318	1.094	0.390	84.48	81.28	0.172	0.17	44.68
LT-J-1 headwaters	0.762	1.827	0.912	116.16	58.88	0.314	0.31	31.41
LT-J-2 ab LT-UNT2&3	0.315	1.223	0.469	121.44	48.39	0.220	0.22	34.26
LT-J-3 ab LC	0.182	1.024	0.384	163.68	75.97	0.152	0.15	45.22
LT-J-UNT1	0.384	1.139	0.586	174.24	71.97	0.189	0.19	35.23
LT-J-UNT2	0.264	1.167	0.675	174.24	47.44	0.234	0.23	31.74
LT-J-UNT3	0.228	1.140	0.587	179.52	38.80	0.230	0.23	24.13
LT-J-UNT4	0.394	1.515	0.998	137.28	73.05	0.268	0.27	54.54
LT-K-1 headwaters	1.047	2.133	1.074	79.20	41.48	0.424	0.42	41.86
LT-K-2 ab LT-K-UNT1	0.103	0.683	0.356	174.24	57.09	0.140	0.14	57.41
LT-K-3 ab LT-K-UNT2	0.280	1.828	0.929	52.80	56.61	0.373	0.37	55.09
LT-K-4 ab LT-K2	0.498	1.661	0.897	73.92	31.44	0.388	0.39	30.45
LT-K-5 ab LT-K1	0.452	1.559	0.700	105.60	65.33	0.261	0.26	66.39
LT-K-6 ab LC	0.021	0.287	0.152	68.64	90.00	0.071	0.07	90.00
LT-K-UNT1	0.939	2.509	1.129	63.36	26.95	0.525	0.52	23.79
LT-K-UNT2	0.825	2.274	1.153	73.92	35.77	0.469	0.47	24.44
LT-K1	1.019	1.943	1.140	84.48	45.05	0.405	0.40	27.19

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	t _p (hours)	
LT-K2-1 headwaters	1.143	3.182	1.580	63.36	44.14	0.589	0.59	35.01
LT-K2-2 ab LT-K	0.030	1.134	0.576	63.36	81.32	0.214	0.21	82.62
LT-K2-UNT1	0.431	1.765	0.841	95.04	19.65	0.397	0.40	23.80
LT-L-1 headwater	0.796	2.306	0.853	116.16	57.27	0.338	0.34	32.06
LT-L-2 ab LC	0.137	0.799	0.454	258.72	60.04	0.149	0.15	40.03
LT-L-UNT1	0.379	1.362	0.624	137.28	36.20	0.371	0.37	31.83
LT-M-1headwaters	0.910	2.155	0.695	47.52	45.56	0.388	0.39	31.42
LT-M-2 ab UNT2	0.345	1.200	0.504	121.44	55.10	0.216	0.22	30.16
LT-M-3 ab LT-M1	0.966	2.043	0.841	95.04	56.06	0.336	0.34	32.25
LT-M-4 ab LC	0.599	1.532	1.072	79.20	43.74	0.368	0.37	28.14
LT-M-UNT1	0.434	1.460	0.729	137.28	79.23	0.226	0.23	37.79
LT-M-UNT2	0.709	2.097	0.990	132.00	70.56	0.310	0.31	34.25
LT-M1-1 headwater	0.908	1.812	0.791	73.92	36.20	0.371	0.37	31.83
LT-M1-2 ab UNT2	0.130	0.748	0.283	200.64	33.39	0.150	0.15	25.92
LT-M1-3 ab UNT3	0.140	0.645	0.178	195.36	40.31	0.114	0.11	31.05
LT-M1-4 ab LT-M	0.195	0.720	0.135	279.84	33.88	0.104	0.10	24.89
LT-M1-UNT1	0.397	1.361	0.678	116.16	33.58	0.292	0.29	25.31
LT-M1-UNT2	0.288	1.128	0.573	132.00	56.21	0.216	0.22	36.00
LT-M1-UNT3	0.371	1.139	0.468	147.84	28.16	0.234	0.23	22.73
LT-N-2 ab LC	0.155	0.819	0.534	264.00	72.91	0.147	0.15	35.07
LT-N-UNT1	0.315	1.122	0.518	232.32	80.00	0.161	0.16	38.00
PC-1 headwater	1.078	1.636	0.856	137.28	72.12	0.262	0.26	35.58
PC-2 ab UNT1	0.724	1.741	0.750	100.32	48.79	0.312	0.31	28.87
PC-3 ab LC	0.893	2.243	1.268	79.20	59.16	0.414	0.41	30.52
PC-UNT1	0.489	1.455	0.482	95.04	75.18	0.212	0.21	36.41
RC-1 headwaters	0.843	1.577	0.480	147.84	8.33	0.302	0.30	4.08
RC-2 ab LR	0.353	1.174	0.513	258.72	26.12	0.223	0.22	20.80
RC-UNT1	0.693	1.665	0.833	121.44	13.38	0.383	0.38	11.26
SR-1 headwaters	1.002	1.771	0.658	52.80	90.03	0.263	0.26	89.42
SR-10 ab LC	0.523	1.685	0.757	31.68	85.63	0.308	0.31	63.09
SR-2 ab SR-UNT1	0.190	0.860	0.394	110.88	89.23	0.143	0.14	86.24
SR-3 ab SR-unt2	0.818	1.646	0.807	58.08	88.08	0.275	0.27	75.65
SR-4 ab SR-UNT3	0.325	1.390	0.586	47.52	86.41	0.239	0.24	71.29
SR-5 ab SR-UNT4	0.131	0.988	0.527	47.52	82.80	0.206	0.21	52.27
SR-6 ab SR-B	0.416	1.964	1.136	36.96	90.21	0.361	0.36	82.50
SR-7 ab SR-UNT5	0.307	1.391	0.645	21.12	92.63	0.279	0.28	80.54
SR-8 ab SR-A	0.433	1.530	0.781	42.24	83.71	0.288	0.29	51.11
SR-9 ab SR-UNT6	0.072	0.635	0.314	68.64	82.97	0.133	0.13	50.04
SR-A	0.808	2.367	1.531	31.68	86.48	0.458	0.46	71.07
SR-B-1 headwaters	0.948	2.272	0.927	58.08	84.82	0.334	0.33	55.92
SR-B-2 ab SR-B-UNT2	0.027	0.475	0.215	47.52	85.81	0.108	0.11	60.97
SR-B-3 ab SR	0.372	1.664	0.698	52.80	89.36	0.264	0.26	74.27

Subbasin	Area (sq. mi.)	L (miles)	L _{ca} (miles)	S _{st} (fpm)	Urban. (%)	Rounded		Imperv. Cover (%)
						Computed t _p (hours)	Rounded t _p (hours)	
SR-B-UNT1	0.318	1.413	0.794	52.80	80.61	0.274	0.27	40.86
SR-B-UNT2	0.616	2.387	1.110	47.52	83.65	0.382	0.38	55.47
SR-B-UNT3	0.107	0.740	0.378	73.92	91.59	0.141	0.14	75.33
SR-UNT1	0.307	1.214	0.581	84.48	89.40	0.199	0.20	84.76
SR-UNT2	0.883	1.873	0.809	84.48	89.55	0.266	0.27	86.44
SR-UNT3	0.472	1.722	1.186	79.20	87.69	0.306	0.31	74.55
SR-UNT4	0.253	1.524	0.683	84.48	86.49	0.235	0.24	68.94
SR-UNT5	1.820	3.184	1.330	42.24	88.96	0.453	0.45	74.35
SR-UNT6	0.381	2.207	1.029	10.56	89.00	0.465	0.46	64.01
WC-1 headwaters	1.026	2.047	0.945	137.28	0.00	0.461	0.46	0.00
WV-1 headwaters	0.990	2.643	1.120	15.84	83.52	0.492	0.49	55.49
WV-2 at Old Hwy 90	0.296	1.172	0.558	31.68	83.35	0.242	0.24	54.36
WV-3 ab LC	0.205	1.143	0.633	58.08	90.25	0.215	0.21	81.80
WV-UNT1	0.348	1.531	0.705	47.52	83.04	0.272	0.27	52.08

Channel Routing Procedures

The modified Puls routing method was used for all routing reaches. The valley storage versus discharge relationships were derived from backwater analyses using HEC-RAS, version 3.1.2. For a more detailed description of the hydraulic modeling process, see “Hydraulic Analysis” beginning on page G.1-62. The future conditions discharges exceeded the limits on the existing routing. Modifications were made to the existing channel routing in 14 reaches due to the increased discharges in the future conditions. These modifications consisted of linearly extrapolating the tables so the future discharges fall within the limits of the tables.

Future Condition Discharge-Frequency Relationships

On the next page, Table G.1-9 presents the discharges for the 50, 20, 10, 4, 2, 1, 0.4, and 0.2% ACE storms for future conditions.

Table G.1-9. Peak Discharges (cfs) – Future Without-Project

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Creek headwaters	JLC001	1.392	1,030	2,820	3,700	4,420	5,150	5,960	7,040	7,970
Leon Creek above LC-UNT2	JLC002	1.517	1,100	2,920	3,890	4,650	5,390	6,240	7,360	8,320
Leon Creek below LC-UNT2	JLC003	1.999	1,450	3,930	5,210	6,220	7,220	8,360	9,870	11,200
Leon Creek above LC-UNT3	JLC005	2.541	1,590	4,370	5,870	7,090	8,280	9,540	11,300	12,800
Leon Creek below LC-UNT3	JLC006	2.889	1,760	4,870	6,510	7,890	9,250	10,700	12,700	14,300
Leon Creek above Leon Trib N	JLC007	3.393	1,690	4,790	6,650	8,090	9,430	10,800	12,900	14,500
Leon Creek below Leon Trib N	JLC008	4.865	2,170	6,080	8,690	10,700	12,400	14,200	16,800	18,900
Leon Creek above Pecan Creek	JLC009	6.069	2,310	6,640	9,610	12,200	14,300	16,100	18,700	21,000
Leon Creek below Pecan Creek	JLC010	9.253	3,270	9,340	13,800	17,600	20,800	23,800	28,500	32,300
Leon Creek above Leon Trib M	JLC011	10.748	3,310	9,830	14,600	19,000	22,500	25,800	30,800	34,900
Leon Creek below Leon Trib M	JLC012	17.140	4,960	15,100	22,500	29,500	35,000	40,300	48,200	54,800
Leon Creek above Leon Trib L	JLC013	18.918	4,600	12,200	21,000	28,400	34,000	39,900	48,300	55,400
Leon Creek below Leon Trib L	JLC014	20.230	4,600	12,300	21,200	28,800	34,400	40,600	49,300	56,700
Leon Creek above Leon Trib K	JLC016	20.830	4,550	12,000	19,400	27,500	33,100	38,900	47,700	56,700
Leon Creek below Leon Trib K	JLC017	27.618	5,360	13,200	23,500	33,100	40,300	47,400	58,200	69,400
Leon Creek above Leon Trib J	JLC018	28.936	5,240	13,100	22,300	32,400	39,600	46,800	57,900	68,100
Leon Creek below Leon Trib J	JLC019	31.465	5,270	13,100	22,400	32,800	40,100	47,700	59,300	69,700
Leon Creek at Camp Bullis	JLC020	35.374	5,070	13,000	20,900	31,400	38,900	46,700	59,000	70,100
Leon Creek at Loop 1604	JLC021	39.345	4,900	12,800	19,500	28,800	35,900	43,200	56,400	68,400
Leon Creek above Leon Trib I	JLC022	40.729	4,860	12,800	19,300	28,300	35,400	42,600	54,900	67,100
Leon Creek below Leon Trib I	JLC023	42.052	4,870	12,800	19,400	28,300	35,400	42,700	54,900	67,200
Leon Creek above Babcock Trib	JLC025	42.903	4,800	12,700	19,200	27,800	34,900	42,100	54,100	66,300
Leon Creek below Babcock Trib	JLC026	49.108	4,900	12,900	19,300	28,000	35,200	42,500	54,700	67,400
Leon Creek above Huesta Creek	JLC027	49.110	4,900	12,900	19,300	28,000	35,200	42,500	54,700	67,400
Leon Creek below Huesta Creek	JLC028	55.174	4,920	12,900	19,400	27,900	35,300	42,800	55,000	68,100
Leon Creek above Leon Trib H	JLC029	56.294	4,900	12,900	19,300	27,700	34,900	42,300	54,200	67,300
Leon Creek below Leon Trib H	JLC030	58.098	5,030	13,000	19,300	27,700	34,900	42,400	54,300	67,400

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Creek above French Creek	JLC032	60.987	5,250	13,500	19,700	27,400	34,600	42,100	53,700	66,900
Leon Creek below French Creek	JLC033	72.619	6,910	17,500	25,900	34,900	42,900	51,000	62,700	74,700
Leon Creek above Lower French Creek	JLC035	73.928	6,900	17,400	25,700	35,100	42,900	51,200	63,400	75,600
Leon Creek below Lower French Creek	JLC036	75.112	6,930	17,500	25,800	35,200	43,100	51,400	63,800	76,000
Leon Creek above Culebra Creek	JLC037	75.968	6,880	17,300	25,300	34,700	42,400	50,600	63,200	75,400
Leon Creek below Culebra Creek	JLC038	158.277	10,500	35,700	55,300	78,400	94,700	113,000	142,100	168,600
Leon Creek above Huebner Creek	JLC040	159.071	10,400	35,300	55,100	78,100	94,600	112,800	141,500	168,200
Leon Creek below Huebner Creek	JLC041	171.023	11,900	36,800	57,800	81,900	99,200	117,500	148,200	179,500
Leon Creek above Leon Trib G	JLC043	171.949	11,800	36,500	57,700	81,600	99,000	117,300	147,900	178,900
Leon Creek below Leon Trib G	JLC044	173.284	11,900	36,600	57,800	81,700	99,100	117,400	148,100	179,200
Leon Creek above Leon Trib F	JLC046	175.069	11,700	36,200	57,600	81,400	99,100	117,400	147,700	178,700
Leon Creek below Leon Trib F	JLC047	176.759	11,800	36,300	57,700	81,500	99,200	117,600	147,900	179,100
Leon Creek above Slick Ranch Creek	JLC048	177.230	11,700	36,200	57,700	81,500	99,200	117,600	147,900	179,100
Leon Creek below Slick Ranch Creek	JLC049	188.759	12,200	36,700	58,600	82,500	100,700	119,300	150,000	182,100
Leon Creek above Westwood Village	JLC050	189.207	12,200	36,400	58,300	82,200	100,700	119,300	149,900	181,900
Leon Creek below Westwood Village	JLC051	191.046	12,300	36,400	58,400	82,300	100,800	119,500	150,200	182,300
Leon Creek above Leon Trib E	JLC053	193.370	12,200	36,100	58,100	82,000	100,800	119,500	149,900	181,900
Leon Creek below Leon Trib E	JLC054	196.432	12,200	36,200	58,200	82,100	101,000	119,800	150,300	182,400
Leon Creek above Leon Trib D	JLC056	196.814	12,200	36,100	58,100	82,000	100,900	119,800	150,100	182,300
Leon Creek below Leon Trib D	JLC057	197.979	12,200	36,100	58,200	82,100	101,000	119,900	150,300	182,500
Leon Creek at Military Drive	JLC058	201.797	12,200	36,000	57,900	81,900	101,100	120,100	150,400	182,800
Leon Creek above Leon Trib C	JLC059	202.063	12,200	35,900	57,900	81,800	101,000	120,100	150,300	182,500
Leon Creek below Leon Trib C	JLC060	204.421	12,200	36,000	57,900	81,900	101,200	120,300	150,600	182,900
Leon Creek below Test Cell Facility	JLC061	205.115	12,200	35,900	57,900	81,800	101,100	120,300	150,600	182,900
Leon Creek at New Laredo	JLC062	207.810	12,200	35,500	57,100	81,600	101,200	120,500	150,700	183,100
Leon Creek above Leon Trib B	JLC063	209.519	12,100	35,300	56,800	81,300	100,900	120,500	150,600	183,100
Leon Creek below Leon Trib B	JLC064	212.142	12,200	35,400	56,900	81,400	101,100	120,700	150,900	183,500
Leon Creek above Leon Trib A	JLC066	214.044	12,200	35,000	56,200	81,000	100,400	120,600	150,700	183,100
Leon Creek below Leon Trib A	JLC067	216.037	12,200	35,100	56,200	81,100	100,600	120,800	150,900	183,400

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Creek above Indian Creek	JLC069	216.520	12,200	35,000	55,800	80,900	100,300	120,700	150,700	183,100
Leon Creek below Indian Creek	JLC070	227.491	12,500	35,300	56,300	81,700	101,600	122,400	152,900	186,500
Leon Creek at Applewhite	JLC072	229.667	12,500	35,300	55,900	81,200	101,300	122,400	152,800	186,400
Leon Creek above Comanche Creek	JLC074	232.546	12,500	35,100	55,600	80,600	100,300	121,900	151,900	185,100
Leon Creek below Comanche Creek	JLC075	237.220	12,500	35,200	55,700	80,800	100,600	122,200	152,400	185,700
Leon Creek above Medina River	JLC076	238.172	12,500	35,200	55,500	80,300	100,200	121,100	151,500	184,700
Leon Trib N headwaters	JLTN01	1.317	870	2,210	2,980	3,600	4,200	4,860	5,760	6,530
Leon Trib N above Leon Creek	JLTN02	1.472	980	2,560	3,410	4,120	4,800	5,560	6,580	7,460
Pecan Creek headwaters	JPE01	1.078	760	2,110	2,800	3,350	3,910	4,520	5,340	6,060
Pecan Creek above PC-UNT1	JPE02	1.802	910	2,440	3,470	4,390	5,230	6,120	7,420	8,490
Pecan Creek below PC-UNT1	JPE03	2.291	1,140	3,050	4,340	5,480	6,510	7,610	9,240	10,700
Pecan Creek above Leon Creek	JPE04	3.184	1,120	3,140	4,660	6,080	7,330	8,560	10,600	12,100
Leon Trib M headwaters	JLTM01	1.344	790	2,160	2,910	3,540	4,140	4,770	5,660	6,410
Leon Trib M above LT-M-UNT2	JLTM02	1.689	770	2,160	3,080	3,830	4,500	5,200	6,250	7,130
Leon Trib M below LT-M-UNT2	JLTM03	2.398	1,100	3,100	4,460	5,580	6,580	7,580	9,080	10,400
Leon Trib M above Leon Trib M1	JLTM04	3.364	1,200	3,480	5,190	6,700	7,990	9,240	11,200	12,800
Leon Trib M below Leon Trib M1	JLTM05	5.793	1,990	5,880	8,760	11,300	13,400	15,500	18,800	21,500
Leon Trib M above Leon Creek	JLTM06	6.392	2,010	5,930	8,910	11,700	14,100	16,400	19,900	22,700
Leon Trib M1 headwaters	JLTM101	1.305	730	2,130	2,890	3,510	4,100	4,730	5,610	6,360
Leon Trib M1 above LT-M1-UNT2	JLTM102	1.435	690	2,020	2,830	3,500	4,100	4,720	5,640	6,390
Leon Trib M1 below LT-M1-UNT2	JLTM103	1.723	840	2,430	3,400	4,230	4,980	5,760	6,870	7,820
Leon Trib M1 above LT-M1-UNT3	JLTM104	1.863	780	2,290	3,240	4,090	4,840	5,600	6,740	7,700
Leon Trib M1 below LT-M1-UNT3	JLTM105	2.234	910	2,680	3,890	4,920	5,810	6,720	8,110	9,270
Leon Trib M1 above Leon Trib M	JLTM106	2.429	890	2,600	3,810	4,890	5,790	6,670	8,080	9,270
Leon Trib L headwaters	JLTL01	1.175	700	2,000	2,670	3,240	3,780	4,360	5,170	5,850
Leon Trib L above Leon Creek	JLTL02	1.312	790	2,210	3,000	3,630	4,240	4,910	5,820	6,600
Leon Trib K headwaters	JLTK001	1.047	650	1,550	2,070	2,530	2,960	3,400	4,050	4,580
Leon Trib K above LT-K-UNT1	JLTK002	1.150	670	1,550	2,090	2,560	3,010	3,500	4,190	4,740
Leon Trib K below LT-K-UNT1	JLTK003	2.089	1,030	2,670	3,650	4,510	5,290	6,090	7,290	8,280

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Trib K above LT-K-UNT2	JLTK005	2.369	940	2,720	3,750	4,670	5,550	6,410	7,700	8,760
Leon Trib K below LT-K-UNT2	JLTK006	3.194	1,080	3,410	4,710	5,900	7,020	8,090	9,760	11,200
Leon Trib K above Leon Trib K2	JLTK007	3.692	1,100	3,400	4,880	6,240	7,390	8,560	10,500	12,000
Leon Trib K below Leon Trib K2	JLTK008	5.296	1,480	4,420	6,430	8,480	10,100	11,600	14,200	16,400
Leon Trib K above Leon Trib K1	JLTK010	5.748	1,610	4,300	6,520	8,690	10,500	12,100	14,800	17,100
Leon Trib K below Leon Trib K1	JLTK011	6.767	1,600	4,280	6,480	8,650	10,400	12,000	14,700	17,000
Leon Trib K above Leon Creek	JLTK012	6.788	1,600	4,280	6,480	8,650	10,400	12,000	14,700	17,000
Leon Trib K2 headwaters	JLTK201	1.574	720	1,870	2,570	3,220	3,770	4,330	5,180	5,880
Leon Trib K2 above Leon Creek	JLTK203	1.604	10	230	360	460	540	620	760	870
Leon Trib K1 headwaters	LT-K1	1.047	520	1,520	2,070	2,540	2,970	3,420	4,070	4,600
Leon Trib J headwaters	JLTJ01	1.146	750	2,170	2,910	3,490	4,070	4,710	5,570	6,310
Leon Trib J above LT-J-UNT2&3	JLTJ02	1.461	820	2,370	3,290	3,990	4,650	5,350	6,390	7,220
Leon Trib J below LT-J-UNT2&3	JLTJ03	1.953	1,090	3,210	4,450	5,400	6,290	7,230	8,620	9,740
Leon Trib J above Leon Creek	JLTJ05	2.529	1,260	3,420	4,900	6,230	7,330	8,470	10,200	11,600
Leon Trib I headwaters	JLTI01	1.005	1,130	1,830	2,270	2,710	3,160	3,630	4,300	4,860
Leon Trib I above Leon Creek	JLTI02	1.323	1,390	2,420	3,020	3,610	4,210	4,860	5,750	6,510
Babcock Trib headwaters	GBT01	1.024	940	2,300	2,950	3,490	4,060	4,700	5,540	6,270
Babcock Trib above BT-UNT1	GBT02	1.401	1,010	2,460	3,370	4,100	4,840	5,630	6,640	7,440
Babcock Trib below BT-UNT1	GBT03	2.396	1,460	3,950	5,440	6,630	7,800	9,060	10,800	12,100
Babcock Trib above BT-UNT2	GBT05	4.589	2,120	5,010	6,850	8,630	10,300	11,800	14,000	15,900
Babcock Trib below BT-UNT2	GBT06	5.529	2,320	5,580	7,700	9,720	11,600	13,300	15,800	18,000
Babcock Trib above Leon Creek	GBT07	6.205	2,130	5,240	7,310	9,290	11,000	12,600	15,300	17,500
Huesta Creek headwaters	JHU001	1.029	330	1,410	2,010	2,490	2,920	3,370	4,010	4,550
Huesta Creek above HUE-UNT1	JHU002	1.043	330	1,410	2,030	2,510	2,940	3,390	4,050	4,590
Huesta Creek below HUE-UNT1	JHU003	1.599	620	2,290	3,260	4,000	4,690	5,430	6,460	7,320
Huesta Creek above Huesta Trib B	JHU004	2.022	650	2,390	3,540	4,450	5,230	6,000	7,160	8,090
Huesta Creek below Huesta Trib B	JHU005	3.124	980	3,650	5,400	6,780	7,970	9,200	11,000	12,500
Huesta Creek above Huesta Trib A	JHU006	3.685	960	3,640	5,530	7,060	8,270	9,370	11,300	12,800
Huesta Creek below Huesta Trib A	JHU007	4.657	1,230	4,460	6,810	8,690	10,200	11,600	13,800	15,700

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Huesta Creek above HUE-UNT2	JHU008	4.857	1,230	4,350	6,670	8,640	10,200	11,500	13,700	15,800
Huesta Creek below HUE-UNT2	JHU009	5.613	1,640	4,860	7,500	9,700	11,400	12,900	15,400	17,700
Huesta Creek above Leon Creek	JHU011	6.064	1,860	5,020	7,680	10,200	12,000	13,700	16,300	18,700
Huesta Trib B above Huesta Creek	HUE-B	1.102	360	1,370	1,980	2,480	2,910	3,360	4,020	4,560
Huesta Trib A above Huesta Creek	HUE-A	0.972	650	1,480	1,960	2,390	2,790	3,200	3,810	4,310
Leon Trib H headwaters	JLTH01	1.008	820	1,570	2,020	2,460	2,860	3,290	3,910	4,420
Leon Trib H Area 2	JLTH02	1.472	1,010	1,940	2,590	3,220	3,790	4,330	5,180	5,870
Leon Trib H above Leon Creek	JLTH03	1.804	1,120	2,230	3,030	3,830	4,530	5,240	6,280	7,130
French Creek headwaters	JFR001	1.262	710	1,910	2,610	3,180	3,720	4,300	5,110	5,800
French Creek above FR-UNT2	JFR002	1.281	680	1,860	2,590	3,190	3,730	4,280	5,070	5,730
French Creek below FR-UNT2	JFR003	2.139	1,070	2,960	4,130	5,100	5,970	6,870	8,160	9,230
French Creek above French Trib C	JFR004	2.366	1,000	2,780	3,940	4,950	5,840	6,740	8,100	9,190
French Creek below French Trib C	JFR005	3.862	1,850	4,450	6,280	7,930	9,340	10,800	13,000	14,700
French Creek above French Trib B	JFR006	3.925	1,780	4,380	6,130	7,690	8,700	10,100	12,400	14,200
French Creek below French Trib B	JFR007	5.941	2,400	5,890	8,290	10,500	11,700	13,200	16,200	18,500
French Creek at Prue Road	JFR008	6.709	2,690	6,530	9,290	12,100	13,800	15,400	18,700	21,600
French Creek at Bandera Road	JFR010	7.746	2,580	6,260	9,110	12,100	14,200	16,000	19,500	22,600
French Creek above French Trib A	JFR012	8.475	2,490	6,170	9,180	12,500	14,700	16,700	20,200	23,300
French Creek below French Trib A	JFR013	11.082	2,650	6,620	9,960	13,800	16,500	18,800	22,600	26,100
French Creek above Leon Creek	JFR015	11.632	2,710	6,590	9,890	14,000	17,100	19,900	24,400	28,200
French Trib C headwaters	JFTC01	0.902	680	1,360	1,780	2,170	2,530	2,900	3,450	3,910
French Trib C above French Creek	JFTC03	1.496								
French Trib B headwaters	JFTB01	1.142	850	1,880	2,470	2,990	3,490	4,030	4,780	5,420
French Trib B Area 2	JFTB03	1.257	950	1,950	2,480	2,900	3,420	4,090	5,060	5,830
French Trib B above French Creek	JFTB04	1.336	980	2,000	2,520	2,960	3,440	4,170	5,120	5,820
French Trib A headwaters	JFTA01	1.047	1,060	2,080	2,670	3,170	3,700	4,280	5,050	5,720
French Trib A at Braun Road	JFTA03	1.358	1,250	2,510	3,260	3,900	4,570	5,280	6,250	7,050
French Trib A	JFTA05	1.581	1,420	2,920	3,790	4,540	5,310	6,150	7,270	8,200

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
French Trib A above French Creek	JFTA06	2.602	1,270	2,480	3,280	4,000	4,690	5,420	6,500	7,370
French Trib A1	FR-A1	1.021	910	2,030	2,630	3,140	3,660	4,240	5,000	5,660
Lower French Creek headwaters	JLFR01	1.028	900	1,940	2,500	3,000	3,490	4,040	4,770	5,410
Lower French Creek above Leon Creek	JLFR02	1.184	1,050	2,310	2,960	3,530	4,110	4,750	5,620	6,360
Culebra Creek headwaters	JCC001	1.057	290	1,210	1,760	2,220	2,610	3,010	3,610	4,100
Culebra Creek above Culebra Trib F	JCC003	1.539	420	1,650	2,480	3,160	3,730	4,310	5,180	5,890
Culebra Creek below Culebra Trib F	JCC004	3.394	780	3,100	4,620	6,020	7,150	8,260	9,410	10,600
Culebra Creek above Culebra Trib E	JCC006	4.857	1,030	4,120	6,230	8,270	9,850	11,400	13,600	15,300
Culebra Creek below Culebra Trib E	JCC007	6.537	1,120	4,840	7,580	10,400	12,400	14,400	17,100	19,400
Culebra Creek above Government Canyon	JCC009	7.386	1,210	5,000	7,940	11,000	13,300	15,400	18,600	21,200
Culebra Creek below Government Canyon	JCC010	25.559	2,260	12,400	20,700	29,700	36,200	42,700	52,600	61,300
Culebra Creek above Culebra Trib D	JCC011	26.386	2,110	12,100	20,100	29,100	35,900	42,300	52,300	61,100
Culebra Creek below Culebra Trib D	JCC012	31.881	2,210	13,500	22,400	33,000	40,800	48,100	59,500	69,600
Culebra Creek above Culebra Trib C	JCC013	31.958	2,190	13,400	22,200	32,800	40,600	47,900	59,300	69,500
Culebra Creek below Culebra Trib C	JCC014	37.837	3,220	14,600	24,200	36,500	45,500	54,300	67,600	79,400
Culebra Creek above Culebra Trib B	JCC015	38.585	3,210	14,400	23,900	35,900	43,900	53,400	66,800	78,800
Culebra Creek below Culebra Trib B	JCC016	40.307	3,320	14,400	24,000	36,100	44,000	53,700	67,200	79,500
Culebra Creek above Helotes Creek	JCC017	40.628	3,310	14,200	23,800	35,600	43,500	53,100	66,600	78,600
Culebra Creek below Helotes Creek	JCC018	72.814	5,760	26,100	41,400	58,300	73,000	86,600	103,400	117,700
Culebra Creek above CC-UNT1	JCC020	74.708	5,520	25,600	40,600	56,900	70,100	85,500	102,200	116,900
Culebra Creek below CC-UNT1	JCC021	75.631	5,520	25,600	40,600	56,900	70,100	85,500	102,300	117,100
Culebra Creek above CC-UNT2	JCC022	76.310	5,490	25,500	39,900	56,600	69,500	83,700	100,800	116,000
Culebra Creek below CC-UNT2	JCC023	77.524	5,490	25,500	39,900	56,600	69,500	83,700	100,900	116,200
Culebra Creek above Culebra Trib A	JCC024	78.532	5,440	25,300	39,700	56,100	68,800	82,500	100,000	115,500
Culebra Creek below Culebra Trib A	JCC025	81.777	5,470	25,400	39,800	56,300	68,900	82,700	100,400	116,100
Culebra Creek above Leon Creek	JCC027	82.309	5,420	25,200	39,700	56,000	68,500	81,900	99,100	114,800
Culebra Trib F headwaters	JCTF01	1.391	440	1,480	2,140	2,710	3,190	3,670	4,400	5,010
Culebra Trib F at dam	JCTF02	1.777	460	1,570	2,290	3,010	3,570	4,130	5,000	5,730
Culebra Trib F above Culebra Creek	JCTF03	1.855	410	1,540	2,290	3,000	3,570	4,090	4,670	5,290

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Culebra Trib E headwaters	JCTE01	1.024	270	1,240	1,830	2,300	2,700	3,120	3,730	4,240
Culebra Trib E above Culebra Creek	JCTE02	1.680	300	1,060	1,740	2,400	2,870	3,340	4,100	4,840
Government Canyon headwaters	JGC001	1.074	780	2,170	2,850	3,410	3,970	4,600	5,430	6,150
Government Canyon above GC-UNT1	JGC002	1.291	770	2,050	2,880	3,500	4,100	4,760	5,770	6,530
Government Canyon below GC-UNT1	JGC003	2.263	1,280	3,460	4,780	5,840	6,830	7,890	9,510	10,800
Government Canyon above GC-UNT2	JGC005	2.968	1,310	3,820	5,450	6,920	8,160	9,440	11,400	13,000
Government Canyon below GC-UNT2	JGC006	3.472	1,450	4,270	6,180	7,830	9,240	10,700	12,900	14,800
Government Canyon above GC Trib E	JGC007	3.660	1,410	4,160	6,080	7,730	9,240	10,700	13,000	14,900
Government Canyon below GC Trib E	JGC008	5.003	1,750	5,340	7,840	10,200	12,100	13,900	16,900	19,500
Government Canyon above GC Trib D	JGC009	5.257	1,710	5,240	7,790	10,100	12,100	14,000	17,000	19,400
Government Canyon below GC Trib D	JGC010	6.925	1,990	6,500	9,790	12,800	15,200	17,600	21,400	24,700
Government Canyon above GC-UNT3	JGC012	7.880	1,930	6,940	10,600	13,900	16,500	19,100	23,300	26,600
Government Canyon below GC-UNT3	JGC013	8.641	1,950	7,190	11,000	14,500	17,400	20,100	24,500	28,100
Government Canyon above Wildcat Canyon	JGC014	9.233	1,860	7,130	11,000	14,600	17,600	20,400	24,900	28,700
Government Canyon below Wildcat Canyon	JGC015	10.259	1,870	7,490	11,600	15,600	18,700	21,700	26,600	30,900
Government Canyon above GC Trib C	JGC017	10.615	1,810	7,430	11,600	15,600	18,800	21,900	26,900	31,200
Government Canyon below GC Trib C	JGC018	11.604	1,810	7,680	12,100	16,400	19,800	23,000	28,300	33,000
Government Canyon above GC-UNT4	JGC019	11.947	1,680	7,420	11,700	16,100	19,500	22,800	28,000	32,800
Government Canyon below GC-UNT4	JGC020	12.392	1,680	7,500	11,900	16,400	19,900	23,200	28,500	33,500
Government Canyon above GC Trib B	JGC021	12.772	1,650	7,490	11,900	16,500	20,000	23,400	28,800	33,900
Government Canyon below GC Trib B	JGC022	14.786	1,710	8,050	12,900	18,100	22,000	25,700	31,600	37,400
Government Canyon above GC Trib A	JGC023	14.818	1,690	7,980	12,900	18,100	21,900	25,700	31,600	37,300
Government Canyon below GC Trib A	JGC024	17.352	1,840	9,190	15,000	21,100	25,700	30,200	37,000	43,300
Government Canyon above Culebra Creek	JGC025	18.173	1,730	8,950	14,800	21,000	25,700	30,300	37,300	43,700
GC Trib E headwaters	JGCTE01	1.311	520	1,690	2,390	2,980	3,490	4,030	4,800	5,450
GC Trib E above Government Canyon	JGCTE02	1.343	500	1,670	2,350	2,940	3,450	3,970	4,750	5,390
GC Trib D headwaters	JGCTD01	1.000	290	1,390	1,990	2,470	2,890	3,340	3,980	4,510
GC Trib D above GC-D-UNT1	JGCTD02	1.066	290	1,360	1,980	2,500	2,940	3,410	4,070	4,630
GC Trib D below GC-D-UNT1	JGCTD03	1.503	410	1,980	2,870	3,600	4,230	4,880	5,870	6,680

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
GC Trib D above Government Canyon	JGCTD04	1.668	380	1,930	2,930	3,720	4,390	5,080	6,120	7,010
Wildcat Canyon above Government Canyon	WC-1	1.026	260	1,230	1,830	2,300	2,710	3,130	3,740	4,250
GC Trib C above Government Canyon	GC-C-1	0.989	250	1,170	1,740	2,190	2,580	2,980	3,560	4,050
GC Trib B headwaters	JGCTB01	1.401	310	1,480	2,200	2,810	3,310	3,820	4,570	5,200
GC Trib B above GC-B-UNT2	JGCTB03	1.593	320	1,560	2,390	3,080	3,630	4,200	5,080	5,800
GC Trib B below GC-B-UNT2	JGCTB04	1.982	390	1,860	2,850	3,710	4,390	5,100	6,210	7,070
GC Trib B above Government Canyon	JGCTB05	2.014	370	1,780	2,780	3,650	4,330	5,020	6,110	6,980
GC Trib A headwaters	JGCTA01	1.118	330	1,600	2,340	2,880	3,380	3,910	4,650	5,280
GC Trib A above GC-A-UNT1	JGCTA02	1.197	290	1,530	2,300	2,870	3,390	3,920	4,680	5,310
GC Trib A below GC-A-UNT1	JGCTA03	1.438	340	1,860	2,730	3,450	4,070	4,760	5,690	6,460
GC Trib A above GC-A-UNT2	JGCTA04	1.912	300	1,870	2,970	3,870	4,650	5,410	6,560	7,540
GC Trib A below GC-A-UNT2	JGCTA05	2.185	300	1,980	3,160	4,180	5,040	5,850	7,100	8,160
GC Trib A above Government Canyon	JGCTA06	2.534	260	1,790	2,990	4,130	4,970	5,870	7,210	8,360
Culebra Trib D headwaters	JCTD01	1.330	750	1,760	2,380	2,940	3,440	3,960	4,720	5,360
Culebra Trib D above CC-D-UNT2	JCTD02	1.343	750	1,750	2,370	2,920	3,440	3,950	4,710	5,360
Culebra Trib D below CC-D-UNT2	JCTD03	1.791	1,020	2,350	3,200	3,990	4,670	5,400	6,430	7,290
Culebra Trib D above CC-D-UNT3	JCTD05	2.128	1,170	2,790	3,830	4,760	5,640	6,510	7,800	8,840
Culebra Trib D below CC-D-UNT3	JCTD06	3.023	1,650	3,930	5,320	6,610	7,810	9,020	10,800	12,300
Culebra Trib D at Culebra Road	JCTD07	4.179	1,770	4,130	5,920	7,710	9,190	10,700	13,000	14,900
Culebra Trib D above CC-D-UNT4	JCTD08	4.802	1,690	3,910	5,680	7,590	9,190	10,800	13,400	15,500
Culebra Trib D below CC-D-UNT4	JCTD09	5.419	1,730	4,030	5,860	7,890	9,640	11,300	14,100	16,500
Culebra Trib D above Culebra Creek	JCTD10	5.495	1,700	3,930	5,730	7,750	9,430	11,100	14,000	16,300
Culebra Trib C headwaters	JCTC01	1.000	380	1,250	1,790	2,230	2,620	3,020	3,610	4,100
Culebra Trib C above CC-C-UNT1	JCTC02	2.015	560	1,480	2,010	2,760	3,420	4,130	5,140	5,970
Culebra Trib C below CC-C-UNT1	JCTC03	2.890	1,060	2,800	3,770	4,750	5,770	6,730	8,160	9,460
Culebra Trib C above Culebra Trib C1	JCTC05	3.407	1,120	2,980	4,120	5,350	6,500	7,570	9,230	10,800
Culebra Trib C below Culebra Trib C1	JCTC06	4.890	1,760	4,630	6,390	8,170	9,800	11,400	13,800	15,900
Culebra Trib C above Culebra Creek	JCTC08	5.879	1,930	4,970	7,160	9,260	11,200	13,100	16,000	18,400

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Culebra Trib C1 headwaters	JCTC101	1.005	610	1,540	2,060	2,510	2,940	3,380	4,020	4,540
Culebra Trib C1 above Culebra Trib C	JCTC102	1.483	680	1,720	2,400	3,000	3,510	4,020	4,780	5,410
Culebra Trib B headwaters	JCTB01	1.017	810	1,670	2,180	2,640	3,080	3,550	4,210	4,770
Culebra Trib B above CC-B-UNT1	JCTB02	1.025	820	1,660	2,140	2,600	3,030	3,480	4,130	4,670
Culebra Trib B below CC-B-UNT1	JCTB03	1.707	1,330	2,730	3,540	4,300	5,010	5,780	6,840	7,720
Culebra Trib B above Culebra Creek	JCTB04	1.722	1,330	2,760	3,580	4,360	5,060	5,820	6,920	7,780
Helotes Creek headwaters	JHE001	1.001	730	1,910	2,500	2,980	3,490	4,040	4,780	5,410
Helotes Creek above HE-UNT1	JHE002	1.135	740	1,920	2,300	3,170	3,700	4,260	5,040	5,660
Helotes Creek below HE-UNT1	JHE003	1.474	960	2,470	3,400	4,150	4,910	5,690	6,720	7,580
Helotes Creek above HE-UNT2	JHE005	2.018	1,140	3,000	4,180	5,140	6,040	6,950	8,420	9,650
Helotes Creek below HE-UNT2	JHE006	2.839	1,550	4,100	5,640	7,020	8,280	9,590	11,700	13,300
Helotes Creek above Helotes Trib B	JHE007	3.509	1,540	3,970	5,580	7,120	8,390	9,630	11,800	13,400
Helotes Creek below Helotes Trib B	JHE008	6.436	2,570	7,100	10,100	13,000	15,300	17,600	21,300	24,400
Helotes Creek above Chimenea Creek	JHE009	6.779	2,580	7,130	10,300	13,100	15,500	17,900	21,500	24,500
Helotes Creek below Chimenea Creek	JHE010	13.322	3,840	11,500	17,200	22,700	26,900	30,900	37,500	43,200
Helotes Creek above Los Reyes Creek	JHE011	15.010	3,560	10,600	16,400	22,400	27,000	31,400	38,200	44,100
Helotes Creek below Los Reyes Creek	JHE012	24.192	5,160	15,400	23,400	31,700	38,300	45,000	55,500	65,400
Helotes Creek above Helotes Trib A	JHE014	25.896	4,970	15,200	23,200	31,800	38,800	41,500	46,300	52,600
Helotes Creek below Helotes Trib A	JHE015	27.467	5,020	15,500	23,600	32,600	39,900	42,900	46,800	53,000
Helotes Creek above HE-UNT3	JHE016	30.779	4,570	14,800	22,100	30,400	37,800	42,700	45,600	52,200
Helotes Creek below HE-UNT3	JHE017	32.117	730	1,910	2,500	2,980	3,490	4,040	4,780	5,410
Helotes Creek above Culebra Creek	JHE018	32.186	4,510	14,700	22,100	30,400	37,700	42,900	45,700	52,000
Helotes Trib B headwaters	JHETB01	1.327	770	2,250	3,030	3,670	4,280	4,940	5,860	6,640
Helotes Trib B above HE-B-UNT2	JHETB02	2.148	910	2,730	3,910	4,950	5,850	6,750	8,090	9,220
Helotes Trib B below HE-B-UNT2	JHETB03	2.826	1,150	3,460	5,050	6,360	7,490	8,670	10,500	11,900
Helotes Trib B above Helotes Creek	JHETB04	2.927	1,140	3,430	4,980	6,370	7,550	8,730	10,500	12,000
Chimenea Creek headwaters	JCH01	1.198	950	2,670	3,450	4,090	4,760	5,500	6,490	7,350
Chimenea Creek above CHI-UNT2	JCH02	1.288	980	2,630	3,500	4,170	4,870	5,660	6,710	7,590
Chimenea Creek below CHI-UNT2	JCH03	1.648	1,250	3,470	4,550	5,420	6,320	7,330	8,680	9,830

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Chimenea Creek above CHI-UNT3	JCH04	2.893	1,590	4,270	5,760	7,020	8,250	9,660	11,800	13,400
Chimenea Creek below CHI-UNT3	JCH05	3.874	2,060	5,490	7,600	9,270	10,900	12,700	15,400	17,500
Chimenea Creek at dam	JCH06	4.460	2,060	5,660	7,970	9,820	11,500	13,300	16,100	18,400
Chimenea Creek above CHI-UNT4	JCH07	5.608	2,030	5,870	8,600	11,000	12,900	14,900	18,000	20,500
Chimenea Creek below CHI-UNT4	JCH08	6.120	2,060	6,000	8,840	11,300	13,300	15,300	18,600	21,300
Chimenea Creek above Helotes Creek	JCH09	6.543	1,950	5,810	8,650	11,300	13,300	15,300	18,700	21,500
Los Reyes Creek headwaters	JLR01	1.081	830	2,320	3,020	3,590	4,180	4,830	5,700	6,460
Los Reyes Creek at Bandera Road	JLR02	1.976	1,350	3,590	4,780	5,750	6,700	7,720	9,090	10,300
Los Reyes Creek above Los Reyes Trib A	JLR03	2.655	1,490	4,010	5,630	6,890	8,060	9,280	11,000	12,400
Los Reyes Creek below Los Reyes Trib A	JLR04	3.905	2,260	6,200	8,460	10,400	12,100	13,900	16,400	18,400
Los Reyes Creek at Bandera Road	JLR05	4.828	2,120	5,440	7,100	9,510	11,600	14,100	17,300	20,400
Los Reyes Creek above Ranch Creek	JLR06	5.347	1,990	5,010	6,570	8,580	10,500	12,600	15,800	18,700
Los Reyes Creek below Ranch Creek	JLR07	7.236	2,240	5,720	7,440	9,980	12,300	15,100	19,200	23,000
Los Reyes Creek above LR-UNT1	JLR09	7.596	2,220	5,730	7,680	9,990	12,300	14,900	19,100	22,700
Los Reyes Creek below LR-UNT1	JLR10	8.267	2,270	5,900	8,240	10,900	12,700	15,500	19,900	23,800
Los Reyes Creek above LR-UNT2	JLR12	8.383	2,260	5,900	8,280	10,900	12,700	15,500	19,800	23,800
Los Reyes Creek below LR-UNT2	JLR13	9.025	2,290	6,170	8,880	11,800	13,700	16,100	20,600	24,900
Los Reyes Creek above Helotes Creek	JLR14	9.182	2,270	6,170	8,880	11,800	13,700	16,000	20,500	24,600
Los Reyes Trib A headwaters	JLRTA01	1.042	800	2,340	3,020	3,580	4,160	4,820	5,680	6,440
Los Reyes Trib A above Los Reyes Creek	JLRTA02	1.250	880	2,350	3,190	3,780	4,340	4,990	5,890	6,850
Ranch Creek headwaters	JRC01	1.536	570	2,430	3,420	4,170	4,880	5,640	6,700	7,600
Ranch Creek above Los Reyes Creek	JRC03	1.889	620	2,620	3,750	4,640	5,490	6,390	7,670	8,720
Helotes Trib A headwaters	JHETA01	1.010	250	1,190	1,730	2,180	2,560	2,960	3,540	4,020
Helotes Trib A above Helotes Creek	JHETA02	1.571	260	1,270	1,990	2,630	3,190	3,750	4,590	5,270
Culebra Trib A headwaters	JCTA01	1.079	930	1,970	2,540	3,050	3,550	4,090	4,850	5,480
Culebra Trib A at Tezel Road	JCTA02	2.051	1,460	2,930	3,850	4,630	5,310	6,020	7,060	7,900
Culebra Trib A above Culebra Creek	JCTA03	3.245	1,430	3,030	4,200	5,300	6,220	7,090	8,440	9,570
Huebner Creek headwaters	JHB01	1.009	1,170	1,900	2,350	2,810	3,270	3,760	4,450	5,030
Huebner Creek above HB-UNT1	JHB02	1.131	1,210	1,970	2,450	2,960	3,460	3,920	4,580	5,160

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Huebner Creek below HB-UNT1	JHB03	1.411	1,500	2,510	3,160	3,770	4,400	5,100	5,970	6,650
Huebner Creek above HB-UNT2	JHB04	1.625	1,450	2,470	3,160	3,850	4,510	5,150	6,100	6,870
Huebner Creek below HB-UNT2	JHB05	1.820	1,570	2,720	3,480	4,270	5,020	5,780	6,860	7,750
Huebner Creek above HB-UNT3	JHB06	1.840	1,570	2,720	3,490	4,280	5,020	5,760	6,840	7,740
Huebner Creek below HB-UNT4	JHB07	2.098	1,720	3,070	4,000	4,920	5,780	6,650	7,910	8,940
Huebner Creek above Babcock Road	JHB08	2.826	1,800	3,420	4,590	5,770	6,800	7,830	9,480	10,900
Huebner Creek above Huebner Trib A	JHB09	4.104	1,460	2,870	3,960	5,250	6,230	7,420	9,310	11,000
Huebner Creek below Huebner Trib A	JHB10	7.926	3,560	6,810	9,020	11,300	13,400	15,600	18,900	21,800
Huebner Creek at Bandera Road	JHB11	9.623	3,200	6,490	9,130	11,800	13,900	16,000	19,400	23,000
Huebner Creek above Leon Creek	JHB13	11.952	3,730	7,380	10,400	13,500	16,000	18,500	22,400	26,400
Huebner Trib A headwaters	JHBT01	1.107	1,040	2,040	2,590	3,110	3,620	4,170	4,930	5,580
Huebner Trib A above HB-A-UNT2	JHBT02	1.424	930	1,930	2,590	3,200	3,760	4,320	5,190	5,910
Huebner Trib A below HB-A-UNT2	JHBT03	2.111	1,440	2,830	3,820	4,770	5,610	6,460	7,740	8,800
Huebner Trib A above HB-A-UNT3	JHBT05	2.225	1,460	2,870	3,860	4,840	5,690	6,550	7,870	8,940
Huebner Trib A below HB-A-UNT3	JHBT06	2.965	2,200	4,150	5,510	6,850	8,030	9,270	11,100	12,700
Huebner Trib A above Huebner Creek	JHBT08	3.822	2,870	5,260	6,870	8,490	9,930	11,500	13,800	15,700
Leon Trib G headwaters	JLTG01	1.011	970	1,780	2,260	2,720	3,160	3,650	4,320	4,890
Leon Trib G above Leon Creek	JLTG03	1.335	1,310	2,400	3,040	3,660	4,250	4,900	5,800	6,560
Leon Trib F headwaters	JLTF01	1.166	1,120	1,990	2,520	3,040	3,540	4,070	4,830	5,460
Leon Trib F above LT-F-UNT2	JLTF02	1.177	1,040	1,780	2,240	2,750	3,290	3,750	4,310	4,700
Leon Trib F below LT-F-UNT2	JLTF03	1.672	1,320	2,460	3,160	3,870	4,630	5,290	6,120	6,730
Leon Trib F above Leon Creek	JLTF04	1.690	1,320	2,480	3,160	3,890	4,600	5,290	6,120	6,740
Slick Ranch Creek headwaters	JSR01	1.002	1,440	2,200	2,680	3,160	3,670	4,240	5,000	5,650
Slick Ranch Creek above SR-UNT1	JSR02	1.192	1,300	2,040	2,530	3,060	3,590	4,130	5,010	5,670
Slick Ranch Creek below SR-UNT1	JSR03	1.499	1,580	2,460	3,070	3,750	4,400	5,090	6,170	7,090
Slick Ranch Creek above SR-UNT2	JSR05	2.317	2,170	3,570	4,500	5,490	6,420	7,430	9,090	10,400
Slick Ranch Creek below SR-UNT2	JSR06	3.200	2,790	4,600	5,850	7,180	8,400	9,650	11,800	13,600
Slick Ranch Creek above SR-UNT3	JSR08	3.525	2,850	4,740	6,060	7,470	8,750	10,100	12,300	14,200
Slick Ranch Creek below SR-UNT3	JSR09	3.997	3,090	5,150	6,590	8,140	9,550	11,000	13,600	15,600

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Slick Ranch Creek above SR-UNT4	JSR11	4.128	1,580	5,090	6,560	8,150	9,540	11,000	13,300	15,300
Slick Ranch Creek below SR-UNT4	JSR12	4.381	3,100	5,230	6,780	8,440	9,880	11,400	13,700	15,900
Slick Ranch Creek above Slick Ranch Trib B	JSR13	4.797	3,090	5,270	6,910	8,680	10,100	11,800	14,200	15,900
Slick Ranch Creek below Slick Ranch Trib B	JSR14	7.185	3,890	7,180	9,670	12,400	14,600	16,700	20,400	23,200
Slick Ranch Creek above SR-UNT5	JSR15	7.492	3,830	7,000	9,540	11,800	14,200	16,600	20,400	23,200
Slick Ranch Creek below SR-UNT5	JSR16	9.312	4,330	8,050	11,000	13,400	16,400	19,400	24,000	27,500
Slick Ranch Creek above Slick Ranch Trib A	JSR17	9.745	4,300	8,030	10,900	13,400	16,100	18,900	23,400	26,600
Slick Ranch Creek below Slick Ranch Trib A	JSR18	10.553	4,490	8,440	11,400	14,000	16,900	19,900	24,600	28,100
Slick Ranch Creek above SR-UNT6	JSR20	10.625	4,480	8,450	11,400	14,100	16,900	19,800	24,400	27,900
Slick Ranch Creek below SR-UNT6	JSR21	11.006	4,570	8,650	11,700	14,400	17,200	20,300	24,900	28,500
Slick Ranch Creek above Leon Creek	JSR23	11.529	4,610	8,760	11,800	14,700	17,400	20,300	24,400	27,400
Slick Ranch Trib B headwaters	JSRTB01	1.266	1,060	2,280	2,940	3,540	4,120	4,750	5,620	6,360
Slick Ranch Trib B above UNT2 & UNT3	JSRTB02	1.293	980	2,050	2,670	3,250	3,790	4,360	5,170	5,830
Slick Ranch Trib B below UNT2 & UNT3	JSRTB03	2.016	1,530	3,120	4,050	4,930	5,750	6,590	7,840	8,830
Slick Ranch Trib B above Slick Ranch Creek	JSRTB05	2.388	1,800	3,570	4,720	5,760	6,680	7,590	8,870	9,960
Slick Ranch Trib A above Slick Ranch Creek	SR-A	0.808	700	1,210	1,540	1,870	2,180	2,500	2,980	3,370
Westwood Village headwaters	JWV01	1.338	950	1,900	2,490	3,040	3,550	4,090	4,870	5,520
Westwood Village at Old Hwy 90	JWV02	1.634	1,000	1,990	2,490	2,970	3,450	3,920	4,670	5,330
Westwood Village above Leon Creek	JWV03	1.839	970	1,810	2,280	2,820	3,410	3,970	4,760	5,470
Leon Trib E headwaters	JLTE01	1.122	970	1,830	2,340	2,830	3,300	3,780	4,490	5,080
Leon Trib E Area 2	JLTE02	1.318	950	1,850	2,450	3,030	3,540	4,070	4,870	5,490
Leon Trib E above Leon Trib E1	JLTE03	1.569	920	1,920	2,590	3,250	3,830	4,410	5,290	6,000
Leon Trib E below Leon Trib E1	JLTE04	2.883	1,340	3,150	4,450	5,680	6,700	7,710	9,280	10,600
Leon Trib E above Leon Creek	JLTE06	3.062	1,360	3,280	4,620	5,920	7,000	8,030	9,550	10,600
Leon Trib E1 headwaters	JLTE101	0.968	460	1,300	1,800	2,230	2,610	3,010	3,580	4,060
Leon Trib E1 at Kenley Avenue	JLTE102	1.021	480	1,360	1,870	2,320	2,720	3,130	3,730	4,230
Leon Trib E1 Area 3	JLTE103	1.134	520	1,460	2,020	2,520	2,950	3,400	4,060	4,610
Leon Trib E1 above Leon Trib E	JLTE105	1.314	610	1,760	2,450	3,030	3,550	4,090	4,880	5,530

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Leon Trib D headwaters	JLTD01	0.970	860	1,500	1,900	2,300	2,680	3,080	3,660	4,140
Leon Trib D above Leon Creek	JLTD03	1.165	1,020	1,820	2,310	2,800	3,270	3,750	4,450	5,030
Leon Trib C headwaters	JLTC01	2.233	860	1,460	1,860	2,290	2,670	3,060	3,650	4,140
Leon Trib C above Leon Creek	JLTC03	2.358	1,480	2,420	3,150	3,970	4,670	5,440	6,810	7,810
Leon Trib B headwaters	JLTB01	1.190	890	1,510	1,930	2,370	2,770	3,170	3,780	4,280
Leon Trib B above LT-B-UNT2	JLTB02	1.225	900	1,530	1,960	2,410	2,820	3,220	3,840	4,350
Leon Trib B below LT-B-UNT2	JLTB03	1.468	1,160	1,990	2,560	3,120	3,640	4,190	4,980	5,660
Leon Trib B at IH35	JLTB05	1.768	1,460	2,240	2,620	2,920	3,180	3,470	3,880	4,500
Leon Trib B above LT-B-UNT3	JLTB07	2.235	1,810	2,920	3,490	4,010	4,430	4,860	5,440	5,920
Leon Trib B below LT-B-UNT3	JLTB08	2.489	2,040	3,400	4,100	4,740	5,280	5,830	6,620	7,310
Leon Trib B above Leon Creek	JLTB10	2.623	2,160	3,570	4,380	5,080	5,680	6,300	7,160	7,720
Leon Trib A headwaters	JLTA01	1.004	950	1,670	2,120	2,560	2,980	3,440	4,070	4,610
Leon Trib A above LT-A-UNT1	JLTA02	1.082	1,010	1,790	2,270	2,740	3,190	3,680	4,360	4,930
Leon Trib A below LT-A-UNT1	JLTA03	1.561	1,430	2,470	3,140	3,790	4,420	5,090	6,040	6,840
Leon Trib A at Durette Drive	JLTA04	1.724	1,590	2,730	3,460	4,190	4,880	5,610	6,660	7,530
Leon Trib A above Leon Creek	JLTA05	1.993	1,660	2,900	3,720	4,540	5,300	6,100	7,290	8,230
Indian Creek headwaters	JIN01	0.959	750	1,780	2,360	2,830	3,300	3,820	4,510	5,120
Indian Creek above IN-UNT2	JIN02	1.132	760	1,740	2,350	2,880	3,380	3,910	4,680	5,310
Indian Creek below IN-UNT2	JIN03	1.338	890	2,040	2,810	3,470	4,070	4,700	5,620	6,370
Indian Creek above IN-UNT3	JIN04	1.358	890	2,050	2,800	3,470	4,090	4,730	5,650	6,400
Indian Creek below IN-UNT3	JIN05	1.642	1,100	2,570	3,480	4,290	5,040	5,820	6,940	7,860
Indian Creek above IN-UNT4 & IN-UNT5	JIN07	2.648	1,450	3,290	4,510	5,560	6,400	7,230	8,540	9,590
Indian Creek below IN-UNT4 & IN-UNT5	JIN08	3.395	1,890	4,030	5,680	7,170	8,310	9,420	11,100	12,500
Indian Creek above IN-UNT6	JIN10	3.903	1,990	4,240	5,950	7,550	8,890	10,100	11,900	13,200
Indian Creek below IN-UNT6	JIN11	4.591	2,410	4,970	6,890	8,880	10,500	11,900	14,100	15,700
Indian Creek above IN-UNT7	JIN13	4.944	2,380	5,010	6,900	8,710	10,300	11,800	14,200	15,900
Indian Creek below IN-UNT7	JIN14	5.288	2,480	5,250	7,220	9,130	10,800	12,400	14,900	16,800
Indian Creek above Indian Trib A	JIN16	6.192	2,290	4,570	6,040	7,590	8,790	10,400	13,500	16,700
Indian Creek below Indian Trib A	JIN17	7.504	2,480	4,860	6,320	7,910	9,110	11,000	14,700	18,400

Discharge Location	HMS Hydrologic Element	Drainage Area (sq miles)	Recurrence Interval (years)							
			2	5	10	25	50	100	250	500
Indian Creek at Somerset Road	JIN19	7.971	2,460	4,870	6,310	7,910	9,120	11,000	14,400	18,200
Indian Creek above IN-UNT8	JIN21	8.350	2,390	4,810	6,240	7,850	9,070	10,800	14,000	17,600
Indian Creek below IN-UNT8	JIN22	8.611	2,410	4,830	6,260	7,880	9,100	10,800	14,000	17,600
Indian Creek at dam	JIN23	9.258	2,370	4,800	6,240	7,870	9,110	10,800	14,000	17,600
Indian Creek above IN-UNT9	JIN25	10.180	2,320	4,690	6,140	7,700	8,940	10,500	13,200	16,200
Indian Creek below IN-UNT9	JIN26	10.880	2,340	4,720	6,180	7,740	9,000	10,600	13,200	16,300
Indian Creek above Leon Creek	JIN27	10.971	2,330	4,710	6,170	7,720	8,980	10,600	13,200	16,200
Indian Trib A headwaters	JITA01	1.158	800	1,660	2,190	2,670	3,120	3,590	4,280	4,850
Indian Trib A above Indian Creek	JITA03	1.312	780	1,640	2,200	2,730	3,210	3,700	4,460	5,060
Comanche Creek headwaters	JCO01	1.754	1,850	3,060	3,830	4,590	5,340	6,150	7,280	8,240
Comanche Creek above COM-UNT2	JCO02	2.109	1,640	2,810	3,600	4,420	5,170	5,950	7,120	8,110
Comanche Creek below COM-UNT2	JCO03	2.464	1,840	3,140	4,050	5,020	5,910	6,780	8,130	9,240
Comanche Creek above COM-UNT3	JCO05	2.604	1,830	3,120	4,070	5,060	5,950	6,830	8,200	9,330
Comanche Creek below COM-UNT3	JCO06	3.222	2,140	3,700	4,840	6,080	7,150	8,210	9,910	11,300
Comanche Creek above COM-UNT4	JCO08	3.825	2,480	4,370	5,750	7,260	8,550	9,840	11,900	13,600
Comanche Creek below COM-UNT4	JCO09	4.213	2,710	4,830	6,330	8,030	9,480	11,000	13,300	15,100
Comanche Creek above Leon Creek	JCO10	4.674	2,640	4,720	6,290	8,060	9,540	11,000	13,300	15,200

Comparison with Existing Conditions

Computed hypothetical frequency discharges were compared with the existing discharges provided by the USACE.

The future conditions of Leon Creek Watershed are more urbanized than the existing conditions, thus most discharges are higher than the existing conditions discharges. However, some discharges decreased due to timing issues. The Feasibility Study discharges exceeded those in existing conditions by an average of nine percent (median of five percent). Extreme changes range from a 71-percent increase at a node on Huesta Tributary A to a three-percent decrease at a node on Culebra Tributary E. On the next page, Table G.1–10 presents a comparison of 100-year existing and future flows at selected locations in the watershed.

The increased urbanization in the Leon Creek Watershed justifies the higher discharges computed for the future without-project conditions, while timing issues reduced discharges at a few nodes. The future without-project discharges will be used as the baseline for comparison with the future with-project condition discharges.

Table G.1–10. Comparison of 100-year Future Without-Project and Existing Flows

Discharge Location	HMS Hydrologic Element	Q Break Station	Drainage Area (sq miles)	100-year Discharge (cfs)			
				Future	Existing	Future – Existing	Change
Leon Creek at Loop 1604	JLC021	221468	39.345	43,200	41,300	1,900	4.60%
Leon Creek below Leon Trib I	JLC023	202660	42.052	42,700	40,900	1,800	4.40%
Leon Creek below Huesta Creek	JLC029	188437	56.294	42,300	40,700	1,600	3.93%
Leon Creek below French Creek	JLC033	168201	72.619	51,000	45,900	5,100	11.11%
Leon Creek below Culebra Creek	JLC038	151954	158.277	113,000	109,600	3,400	3.10%
Leon Creek below Huebner Creek	JLC041	147620	171.023	117,500	113,800	3,700	3.25%
Leon Creek below Slick Ranch Creek	JLC049	123319	188.759	119,300	115,400	3,900	3.38%
Leon Creek at Military Drive	JLC058	91521	201.797	120,100	116,000	4,100	3.53%
Leon Creek below Test Cell Facility	JLC061	76884	205.115	120,300	116,100	4,200	3.62%
Leon Creek below Indian Creek	JLC070	35989	227.491	122,400	117,600	4,800	4.08%
Leon Creek above Medina River	JLC076	4643	238.172	121,100	114,900	6,200	5.40%
Babcock Trib above Leon Creek	GBT07	4854	6.205	12,600	11,200	1,400	12.50%
Huesta Creek above Leon Creek	JHU011	2441	6.064	13,700	13,100	600	4.58%
French Creek above Leon Creek	JFR015	2619	11.632	19,900	19,100	800	4.19%
Culebra Creek below Government Canyon	JCC010	43882	25.559	42,700	42,600	100	0.23%
Culebra Creek below Helotes Creek	JCC018	25268	72.814	86,600	83,300	3,300	3.96%
Culebra Creek above Leon Creek	JCC027	2637	82.309	81,900	79,400	2,500	3.15%
Government Canyon above Culebra Creek	JGC025	2380	18.173	30,300	29,700	600	2.02%
Helotes Creek above Culebra Creek	JHE017	3062	32.117	42,900	41,400	1,500	3.62%
Huebner Creek above Leon Creek	JHB13	5714	11.952	18,500	18,200	300	1.65%
Slick Ranch Creek above Leon Creek	JSR23	1436	11.529	20,300	19,000	1,300	6.84%
Indian Creek above Leon Creek	JIN27	776	10.971	10,600	10,400	200	1.92%
Comanche Creek above Leon Creek	JCO10	2152	4.674	11,000	9,750	1,250	12.82%

HYDRAULIC ANALYSIS

The goal of this phase of the Leon Creek Feasibility Study was to provide an assessment of without-project conditions for the mainstem of Leon Creek and all tributaries with at least one square mile of contributing drainage area. Discharges were computed for the 50, 20, 10, 4, 2, 1, 0.4, and 0.2% ACE probability events. These discharges were used to perform backwater modeling to obtain water surface profiles for Leon Creek and its tributaries.

Industry standard tools, methodology, and best engineering judgment were used to evaluate all data collected, perform analyses, and develop the required discharges and computed water surface elevation profiles. The analyses will be used as the baseline for comparison with the future without-project conditions for alternative analysis and plan selection.

Mapping Data

The San Antonio River Authority (SARA) provided mapping data for hydraulic modeling. During the Bexar County Digital Flood Insurance Rate Map (DFIRM) effort, SARA's contractor performed aerial photography and aerial triangulation, which was used to produce two-foot interval contour maps, three-dimensional mass points and breaklines, and planimetric features. The same contractor performed detailed field survey to obtain bridge, culvert, and road crossing data.

Backwater Model Development

Standard USACE Hydrologic Engineering Center – River Analysis System (HEC-RAS) version 3.1.2, backwater models were developed for Leon Creek and all tributaries with a contributing drainage area of at least one square mile. Due to the large size of the watershed and the number of tributaries, each stream was modeled independently.

Cross-sections

Stream and valley cross-section data were developed from the detailed topographic mapping discussed in "Hydrologic Analysis" on page G.1-3. Environmental Systems Research Institute (ESRI) ArcMap, Version 9.1, software was used to develop the three-dimensional terrain modeling. Triangulated Irregular Network (TIN) representations were developed with ArcMap, using the available mass points and the terrain surface break lines.

USACE HEC-GeoRAS software was used to accomplish the following steps:

- Develop stream stationing along the Leon Creek channel and all tributary channels.
- Develop preliminary measurements for channel and overbank reach lengths between cross-sections.
- Identify preliminary channel bank stations at each cross-section.
- Extract the cross-section data points (elevation versus section station).

- Populate each of the associated input data fields within the preliminary HEC-RAS models.

Locations and Layout Considerations

The locations for cross-sections were identified to capture the critical hydraulic features within the study reach. Because these models are also used in the DFIRM effort, the cross-sections were located as recommended by SARA to achieve spacing of not more than 1,000 feet between the cross-sections in rural areas and not more than 500 feet of spacing in urban areas.

- The spacing of cross-sections was reduced as necessary to model significant hydraulic features such as bridges, low water crossings, dams, or to capture expected flow change locations.
- Cross-sections were extended to capture the 0.2% ACE (500-year) floodplain.
- Locations of tributaries that contribute to the study streams were also considered for choosing the appropriate cross-section locations.

Structures

Railroad and roadway bridges were incorporated within the HEC-RAS models for each stream in the study. All bridge data was field surveyed and provided by SARA through their surveying contractor.

Manning's Roughness Coefficients

Manning's *n* values were developed based on the land use data set discussed in “Hydrologic Analysis,” page G.1-3. Each land use was assigned a value for Manning’s *n* and values for each cross-section were extracted using ArcMap. Table G.1-11 shows the *n* value for each land use code.

Table G.1-11. Correlation of Land Use to Manning’s *n* Value

Land Use Code	<i>n</i> Value
Commercial	0.070
Industrial	0.060
Lightly Wooded	0.070
Moderately Wooded	0.085
Heavily Wooded	0.100
Low Density Residential	0.080
High Density Residential	0.100
Multi-Family Residential	0.060
Golf Course	0.045
Meadow	0.045
Pasture	0.055
Quarry	1.000
Rock Quarry	1.000
Transportation	0.015
Water Body	0.026

Manning's n values varied horizontally for each cross-section, thus capturing the variation in land use along the cross-section. Values ranged from 0.015 to 0.1 in the overbanks and 0.015 to 0.085 for the channel.

Modeling Considerations

Using existing condition cross-sections, structure data, and Manning's n values, the team developed hydraulic models for each stream in the study area.

Water Surface Elevations

Hydraulic models developed for each stream studied used the flow data obtained from the hydrologic study. The normal depth method was used as the downstream boundary condition to determine the starting water surface elevations for the hydraulic models, based upon estimated downstream friction slopes.

Structure/Road Crossings

The existing bridges and culverts were included in the hydraulic models to determine their effect on water surface profiles and the resulting floodplain. All required bridge and culvert parameters and dimensions were obtained from the detailed field surveys that SARA provided. The values recommended in HEC-RAS for entrance/exit loss coefficients and Manning's n values for the top and bottom of pipes were used. The upstream and downstream inverts for all culverts were also obtained from the detailed field surveys.

Ineffective Flow Areas

To define the appropriate limits for the areas of effective flow, ineffective flow areas were designated around structures according to the HEC-RAS modeling standards. Ineffective flow was also designated for that portion of cross-sections where flow was not effectively conveyed downstream.

Model Calibration

Hydraulic models can be calibrated using observed high-water marks, measured profiles, and stage information at stream gages during high-flow events. However, there is insufficient data of this type to use for calibration of the model. As discussed in "Introduction," there are only two USGS stream gages in the Leon Creek Watershed. According to the USGS, data for the October 1998 and July 2002 storms are of questionable reliability for these two gages. Therefore, they were not used to calibrate the hydraulic models. No other high-water marks or calibration data were available.

Water Surface Profiles

Water surface profiles were developed for the 50, 20, 10, 4, 2, 1, 0.4, and 0.2% ACE probability flood events for each stream studied. Beginning on page G.1-69, Plates 3A–3W show the water surface profiles for streams with an AOI or streams with a potential project.

Floodplain Delineation

Water surface elevations were exported from each HEC-RAS model to ArcMap. HEC-GeoRAS tools were used to delineate the floodplains.

FUTURE CONDITIONS HYDRAULIC ANALYSIS

Future conditions hydraulic models were developed by changing the flows to convert the existing HEC-RAS models to future conditions. A new flow file containing the 50, 20, 10, 4, 2, 1, 0.4, and 0.2% ACE probability was created for the RAS model. The flow values in the new flow file are from the USACE future conditions HEC-HMS model, which was developed by adjusting for projected future land uses. All parameters were kept the same in the RAS models, except for the changes made for the future condition flows. As shown in **Error! Reference source not found.** on the next page, an expected increase in water surface elevations is seen throughout the watershed.

Conclusion

Discharge-frequency relationships were developed for Leon Creek and tributaries for both existing and future without-project conditions. Due to anticipated development in the watershed, discharges for future without-project conditions increased by an average of nine percent over existing conditions discharges. Discharge-stage relationships were developed based on the existing conditions and future without-project conditions hydraulic modeling. As expected, an increase in water surface elevations for future without-project conditions is seen throughout the watershed.

Table G.1-12. Comparison of 100-year Future Without-Project and Existing Water Surface Elevations (WSEL)

Discharge Location	HMS Hydrologic Element	Q Break Station	Drainage Area (sq miles)	100-year WSEL (ft)			
				Future	Existing	Future - Existing	Change
Leon Creek at Loop 1604	JLC021	221468	39.345	1,024.35	1,024.15	0.20	0.02%
Leon Creek below Leon Trib I	JLC023	202660	42.052	953.33	953.06	0.27	0.03%
Leon Creek below Huesta Creek	JLC029	188437	56.294	898.02	897.67	0.35	0.04%
Leon Creek below French Creek	JLC033	168201	72.619	824.27	823.70	0.57	0.07%
Leon Creek below Culebra Creek	JLC038	151954	158.277	778.92	778.54	0.38	0.05%
Leon Creek below Huebner Creek	JLC041	147620	171.023	768.15	767.86	0.29	0.04%
Leon Creek below Slick Ranch Creek	JLC049	123319	188.759	705.99	705.32	0.67	0.09%
Leon Creek at Military Drive	JLC058	91521	201.797	654.11	653.68	0.43	0.07%
Leon Creek below Test Cell Facility	JLC061	76884	205.115	635.12	634.75	0.37	0.06%
Leon Creek below Indian Creek	JLC070	35989	227.491	572.37	572.19	0.18	0.03%
Leon Creek above Medina River	JLC076	4643	238.172	514.02	512.87	1.15	0.22%
Babcock Trib above Leon Creek	JBT07	4854	6.205	939.69	938.97	0.72	0.08%
Huesta Creek above Leon Creek	JHU011	2441	6.064	931.53	931.29	0.24	0.03%
French Creek above Leon Creek	JFR015	2619	11.632	840.65	840.49	0.16	0.02%
Culebra Creek below Government Canyon	JCC010	43882	25.559	923.49	923.48	0.01	0.00%
Culebra Creek below Helotes Creek	JCC018	25268	72.814	855.54	855.13	0.41	0.05%
Culebra Creek above Leon Creek	JCC027	2637	82.309	781.88	781.57	0.31	0.04%
Government Canyon above Culebra Creek	JGC025	2380	18.173	933.09	933.00	0.09	0.01%
Helotes Creek above Culebra Creek	JHE017	3062	32.117	865.05	864.82	0.23	0.03%
Huebner Creek above Leon Creek	JHB13	5714	11.952	790.50	790.38	0.12	0.02%
Slick Ranch Creek above Leon Creek	JSR23	1436	11.529	714.53	711.72	2.81	0.39%
Indian Creek above Leon Creek	JIN27	776	10.971	551.91	551.78	0.13	0.02%
Comanche Creek above Leon Creek	JCO10	2152	4.674	508.10	507.27	0.83	0.16%

WITH PROJECT CONDIDTIONS

Project Alternatives Considered

Once the first phase of the study, describing the without project conditions for hydrology and hydraulics, was completed, the Leon Creek Feasibility Study moved into the phase of evaluating potential project alternatives. Initially, 37 Economic Reaches were identified for analysis as potential project areas. Once existing conditions economics were analyzed, twelve Areas of Interest (AOI) were identified in the Leon Creek watershed. A map showing the twelve AOIs is shown in Plate 4. Identified AOIs and their corresponding Economic Reach are described in Table G.1-13. Alternatives were identified and analyzed to reduce or mitigate flooding in each of the AOIs. For each AOI several alternatives were investigated until a feasible and viable alternative was developed. Alternatives included detention ponds, channelization, levees, bypass channels, increased overbank storage, removal of obstructions, and weir structures.

Table G.1-13. Identified Areas of Interest

Area of Interest	Stream	Original Reach	AOI Location and Bounds
AOI-1	Leon Creek	LC R2	On Leon Creek between Quintana Road and New Laredo Highway
AOI-2	Leon Creek	LC R3	On Leon Creek, just south of its crossing of SW Military Dr
AOI-3	Leon Creek Trib F	LC Trib F	On tributary F of Leon Creek, bounded on the east by S. Callaghan Road, on the south by Old US Highway 90 W, on the west by Gena Road, and on the north by the northern boundary of the tributary's 500-year flood delineation
AOI-4	Slick Ranch Creek	Slick Ranch	On Slick Ranch Creek, upstream of its confluence with Leon Creek. Bounded on the north by State Highway 151, Pinn Road to the east, Marbach Road to the south, and the stream's 500-year floodplain delineation to the west
AOI-5	Culebra Creek Leon Creek	Culebra LC R5	On Culebra Creek, from its confluence with Leon Creek in Reach 5, and continuing along Culebra Creek, upstream to its confluence with Helotes Creek
AOI-6	Huebner Creek	Huebner	Along Huebner Creek, bounded on the north at its crossing with Bandera Road, and on the south near Brierbrook, on the east and west by the 500-year floodplain delineation of the stream
AOI-7	Leon Creek	LC R5	Along Leon Creek, from Barryhill Road to the north, Grissom Road to the south, and the stream's 500-year floodplain delineation on the east and west
AOI-8	Huebner Creek	Huebner	Along Huebner Creek, bounded on the north by Parkland Oaks Drive, to the south by Bandera Road, and on the east and west by the 500-year floodplain delineation of the stream
AOI-9	Huebner Creek	Huebner	Along Huebner Creek from just above Babcock Road on the north, to the crossing at Whitby Road to the south, and on the east and west by the 500-year floodplain delineation
AOI-10	Leon Creek	LC 6	Along Leon Creek, beginning at Mission Cemetery on the north, along the stream parallel to I-10 W, to just south of Old Camp Bullis Road.
AOI-11	Leon Creek Leon Creek Leon Creek Trib L	LC 6 LC 7	Along tributary L of Leon Creek, just southeast of the intersection of Broad Oak Trail and Boerne Stage Road to the northwest, following the stream to its confluence with Leon Creek at I-10 W
AOI-12	Helotes Creek	Helotes	On Helotes Creek, roughly bounded on the north by Pond Road, to the east by Ink Wells and Pine Branch, the south by Village Basin, and to the west by W Loop 1605 N

AOI Descriptions and Initial Alternatives Investigated

Initial alternatives analyzed are shown on Plate 5.

AOI-1(Leon Creek Reach 2) is located on Leon Creek between Quintana Road on the north extending south past New Laredo Highway. Damages in this area can be caused by the 20% Annual

Exceedance Probability (AEP) storm event. Damages consist of Commercial, Mobile Homes, Privately Owned Vehicles, and Single Family Residential.

A detention pond was considered in one of the upstream oxbows in order to reduce and possibly mitigate flood damages in some of the low frequency storm event flows. However, due to significantly high flow volumes in the lower frequency storm events, the proposed pond was determined to be insufficient to contain the 20% AEP storm without overtopping the weir, which resulted in minimal flow reductions. A levee structure was considered on the eastern side of this area. However, due to the width of the floodplain, the levee would need a significant enclosure along the upstream side of this area to keep flood waters from getting behind the levee.

Channel overbank storage was the selected alternative due to the ability to significantly reduce water surface elevations (WSEL) in this AOI and surrounding areas. This portion of Leon Creek may also benefit from storm water reduction in the upper reaches.

AOI-2(Leon Creek Reach 3) is located on Leon Creek just downstream of Southwest Military Drive. The San Antonio Port Authority Jet Engine Test Cell facility is located in this AOI, and damages have occurred during low frequency storm events such as the 20% AEP storm event. Damaged properties in this area are primarily Commercial. Contents (jet engines) contribute significantly to the damages. There is an existing levee located between the facility and Leon Creek, but the levee is not of sufficient height and overtopped by low frequency storm events.

Just like AOI-1, detention in this area is not feasible due to the fact that discharges are so large. Therefore, levees that provide 1% and 0.2% AEP levels of protection and a bypass channel were the selected alternatives to reduce damages in this AOI. This portion of Leon Creek may also benefit from storm water reduction in the upper reaches.

AOI-3(Leon Creek Trib F Reach) is located on Leon Trib F, which has damages located west of the Callaghan Road crossing. Damages in this area are caused by the 0.4 and 0.2% AEP storm events. The 0.2% AEP storm event on Leon Creek will back up into Leon Trib F and have negative impacts for a significant portion of the tributary. Damages consist of Public, Privately Owned Vehicles, and Single Family Residential.

A weir structure with flap gates was placed near the confluence of Leon Trib F and Leon Creek. While this would protect the area from Leon Creek backwater, this alternative made the localized flooding caused by Leon Trib F considerably worse. A detention pond upstream of Callaghan Road was also considered to reduce flooding in the area. Since flooding in this area is caused by the high frequency storm events, this pond would have to be very significant in size, making this alternative not cost effective.

The proposed levee structure along the south side of Leon Trib F was the selected alternative and will consist of simply raising an existing gravel road by 2 to 3 feet. In addition, other alternatives upstream that lower the water surface elevations of Leon Creek will possibly have an impact on AOI-3 by reducing the backwater situation observed.

AOI-4(Slick Ranch Creek Reach) is located along Slick Ranch Creek upstream of Marbach Road, downstream of Highway 151, and west of Pinn Road. Damages in this AOI are caused by the 10% AEP storm event. Damages consist of Commercial, Multi Family Residential, Privately Owned Vehicles, and Single Family Residential.

The selected alternative for this AOI consisted of recent channel improvements and a Letter Of Map Revision(LOMR) by the City of San Antonio(COSA), which were incorporated into the USACE hydraulic model. Using the USACE hydrology, these improvements did not result in significant reductions as previously modeled in the LOMR. This is due to the significantly lower discharges used in the LOMR model. Since this area is developed with recent channel improvements, there were no other alternatives considered at this time.

AOI-5(Culebra Creek Reach 1) is located along Culebra Creek from inside of Loop 1604 down to the confluence with Leon Creek. Culebra Creek has been channelized in this area and there is a regional detention pond, Culebra Creek Regional Stormwater Facility (RSWF), currently being constructed by the COSA. This detention pond was incorporated into the Future Conditions HMS model as an off line weir to reduce development discharges. This facility does not significantly reduce discharges and there are still potential damages downstream to consider. Potential damages occur at the 0.4% AEP storm event and consist of Public, Privately Owned Vehicles, and Single Family Residential.

The alternatives analyzed for this AOI include the Government Canyon Detention and Helotes Creek Detention sites. Both of these alternatives have a USACE plan and a plan submitted by San Antonio River Authority(SARA) as part of the Leon Creek Watershed Master Plan.

AOI – 5A(Leon Creek Reach 5) is located at the confluence of Leon and Culebra Creeks, just upstream of Ingram Road. This area was originally part of AOI-3, but was determined that the flooding source was not actually Culebra Creek, but in fact was due to backwater from Leon Creek.

A levee structure along Leon and Culebra Creeks was considered, but the cost was too great to warrant the project. Off-line detention was also considered in order to shave the peak of the major flooding events. However, the majority of the damages due to flooding are caused by lower event storms. Therefore, this was not a feasible option. Channel modification was chosen in this area to mitigate the effects of private structural damages which occur in this reach.

AOI-6(Huebner Creek Reach) is located along Huebner Creek from Bandera Road on the north downstream past Crystal Run. This segment of Huebner Creek was previously channelized. Potential damages occur in the 10% AEP storm event. Damages consist of Commercial, Mobile Homes, Privately Owned Vehicles, and Single Family Residential.

Additional channelization was investigated, but then removed from consideration, due to the extent of existing channelization and the lack of grade and right-of-way to develop drop structures or wider banks.

The Huebner Trib A pond alternative was analyzed for this AOI. In addition, the LC-15 Huebner RSWF as proposed by Bexar County is expected to have a large impact on this site as well.

AOI-7(Leon Creek Reach 5) is located along Leon Creek upstream of Grissom Road. This area was previously channelized into what was observed to be bedrock. Most of the potential damages occur on the east side of Leon Creek and primarily occur at the 2% AEP storm event and higher. Potential damages consist of Privately Owned Vehicles and Single Family Residential.

Channelization was investigated, but removed from consideration, due to the existing condition of Leon Creek in this area. A detention pond located upstream at the confluence of Babcock Creek and Leon Creek was also considered as an alternative for this AOI. While there is an ample amount of open space to fit a pond in this area, the amount of excavation required rendered this alternative unfeasible. Due to the significant flows in this area, a significantly sized pond structure would be required.

The selected alternatives for this area are two alternative levee structures, providing protection for the 1% and 0.2% AEP storm events. In addition, the Quarry Pond may have a large impact on this site as well.

AOI-8(Huebner Creek Reach) is located on Huebner Creek bounded by Apple Green Road on the north down to Bandera Road on the south. This area was previously channelized throughout most of the reach. Potential damages occur at the 4% AEP storm event. Potential damages consist of Public, Privately Owned Vehicles, and Single Family Residential.

Additional channelization was investigated, but then removed from consideration, due to the extent of existing channelization and lack of grade and right-of-way to develop drop structures or wider banks.

The Huebner Trib A pond was the selected alternative for this area. In addition, the LC-15 Huebner RSWF as proposed by Bexar County has a large impact on this site as well.

AOI-9(Huebner Creek Reach) is located on Huebner Creek bounded by Babcock Road on the north down to Whitby Road on the south. Potential damages occur at the 4% AEP storm event and consists of Privately Owned Vehicles and Single Family Residential properties.

Due to available ROW and flexible channel elevations, channelization was analyzed for this area. Channelization consists of channel widening and deepening through AOI-9. In addition, the LC-15 Huebner RSWF as proposed by Bexar County has a large impact on this site as well.

AOI-10(Leon Creek Reach 6) is located on Leon Creek east of IH-10 from just north of Raymond R Russell Park down past Old Camp Bullis Road on the south. Potential damages occur at the 4% AEP storm event and consist of Commercial, Mobile Homes, Public, Privately Owned Vehicles, and Single Family Residential properties.

Channelization, levees, and ponds were considered for this AOI, but due to the lack of right of way and existing development conditions in the area, all three were not considered feasible.

The Target AOI-11 Ponds which are located in the upper areas of this watershed were analyzed for this AOI.

AOI-11(Leon Creek Reaches 6 and 7) is located on Leon Creek and runs along Boerne Stage Road from IH-10 on the east and proceeds west on Boerne Stage Road. Potential damages occur at the 10% AEP storm event and consist of Commercial, Mobile Homes, Public, Privately Owned Vehicles, and Single Family Residential properties. This section of Leon Creek was previously channelized.

Additional channelization was considered but was ruled out due to limited right of way and the existing development conditions of Leon Creek in the area. There is also a large backwater issue from IH-10, which was determined to cause a large portion of the problems for this AOI. Any alternative that would alleviate this backwater issue would have to be mitigated immediately, due to the negative impacts it would have downstream of the structure.

Leon Trib M Pond and Leon XS 285313 Pond were considered and modeled separately with minimal results. However, when they were modeled in combination, the results reflected some reduction in damages.

The Target AOI-11 Ponds are the selected alternatives for this area, which consist of both Leon Trib M Pond and Leon XS 285313 Pond.

AOI-12(Helotes Creek Reach) is located on Helotes Creek south of Loop 1604. Potential damages occur at the 4% AEP storm event and consist of Public, Privately Owned Vehicles, and Single Family Residential properties. This section of Helotes Creek was observed to be heavily vegetated with significant blockages to the conveyance of flows.

The alternative analyzed for this AOI consists of maintenance of the channel and clearing trees and brush along this stretch of Helotes Creek, reducing the Manning's n-value which results in significantly lower WSEL. In addition, the Helotes Creek Pond also significantly impacts this area. Both of the aforementioned alternatives were chosen for this AOI.

SELECTED ALTERNATIVE DESCRIPTIONS

Selected alternatives were chosen for further analysis based upon preliminary costs and benefits to be gained. During the course of this analysis, additional alternatives were developed and analyzed and are described in this section.

Alternative 1 - Leon AOI-1 Overbank Modifications (Impacts AOI-1)

This alternative consists of adding channel storage in the overbanks from cross-sections 71115 to 66551. New Laredo Highway divides the upper section and the lower section, both of which have different modifications. For the upper section, from cross-section 71115 to 69321, modifications were made in the left overbank, on the east side of Leon Creek. The modifications consisted of having a 0.5% slope extend outward from the channel banks to intersect at 4:1 side slope coming down from the existing ground near Plumnear Street. For the lower section, from cross-section 68856 to 66551, the right overbank, west of Leon Creek, will be excavated. A slope of 0.5% will slope from the banks of an existing drainage channel towards Leon Creek. The high point in between the channel and Leon Creek will be removed in order to gain channel storage in the overbanks. This additional storage will enable Leon Creek to contain the 20% AEP storm event in AOI-1. Excavation will be required on this

alternative. Effects of this alternative impact only AOI-1 and surrounding areas. See Table G.1-14. This alternative did not reduce water surface elevations for the less frequent events and in some locations a rise in water surface elevation was seen. This alternative was eliminated from further consideration due to the hydraulic impacts and because it was shown to have negative net benefits.

Alternative 2 - Leon AOI-2 1% AEP Levee (Impacts AOI-2)

This alternative consists of adding a levee along Leon Creek from cross-section 85024 to 87627. The levee would run along the east side of Leon Creek in order to prevent damages from occurring for the 1% AEP storm event in AOI-2. The levee elevation would range from 640 on the downstream end to 649 on the upstream end. The greatest difference between the levee elevation and the existing ground elevation is approximately 16.87'. Effects of this alternative impact only Leon Creek around AOI-2. See Table G.1-15. While this alternative initially showed a small increase in water surface elevations upstream of the levee (greatest increase was 1.24 feet), the team felt that this alternative was worth pursuing if these inducements could be mitigated.

Alternative 3 - Leon AOI-2 0.2% AEP Levee (Impacts AOI-2)

This alternative consists of adding a levee along Leon Creek from cross-section 85024 to 87627. The levee would run along the east side of Leon Creek in order to prevent damages from occurring for the 0.2% AEP storm event in AOI-2. The levee elevation would range from 644 on the downstream end to 653 on the upstream end. The greatest difference between the levee elevation and the existing ground elevation is approximately 19.94'. Effects of this alternative impact only Leon Creek around AOI-2. See Table G.1-16. This alternative was also carried forward for optimization.

Alternative 4 - Leon AOI-2 Bypass Channel (Impacts AOI-2)

This alternative consists of adding a 2,738 foot bypass channel on Leon Creek to divert flows away from AOI-2. The bypass channel flows in a south-southwest direction and diverts some of the flow past the oxbow in Leon Creek before tying back into Leon Creek downstream of AOI-2. The bypass channel begins just downstream of the crossing of Leon Creek and Military Drive around Leon cross-section 87864 and ties back into Leon Creek between cross-sections 78641 and 77693. The bypass channel has a bottom width of 40' and a constant slope of 0.53%. Excavation will be required on this alternative. The by-pass channel will contain the 2% AEP storm and will reduce, but not eliminate, existing flooding for each event. Effects of the bypass channel impact only Leon Creek around AOI-2. See Table G.1-17. Due to the reduction in water surface elevations provided by this alternative, it was selected to be optimized during the next phase of the study.

Alternative 5 - Slick Ranch Improvements (Impacts AOI-4)

This alternative consists of adding channel improvements to the Slick Ranch Creek HEC-RAS models. Data for these improvements came from a HEC-RAS model received from SARA which reflects a project named Slick Ranch Regional Stormwater Detention Facility. Cross-sections 6632 to 2490 were copied from SARA's HEC-RAS model and incorporated into the USACE model. The cross-section stationing was also modified for those cross-sections brought into the HEC-RAS model in order for HEC-RAS to recognize them. The cross-sections in the Hydraulic Comparison Table do not

match up exactly, but represent cross-sections in close proximities to each other. Excavation will be required for this alternative. Effects of this alternative impact Slick Ranch around AOI-4. See Table G.1-18. The original thinking was that the sponsor might seek credit for this work as part of the Federal project. As the study progressed, the sponsor decided not to proceed with seeking credit and the analysis was truncated.

Alternative 6 - Leon Trib F AOI-3 0.2% AEP Levee (Impacts AOI-3)

This alternative consists of adding a levee along Leon Trib F from Callaghan Road continuing west about 2,611 feet. The levee would consist of raising an existing privately owned dirt road which runs parallel and along the south side of Leon Trib F to protect AOI-3 from both the Leon Creek 0.2% AEP WSEL (717.12) and Leon Trib F 0.2% AEP WSEL (717.83 at downstream face of Callaghan Road Bridge). This levee would be set at a minimum elevation of 717.5 for most of the channel and raised to 718 for the upstream segment (spanning about 186'). The dirt road would need to be raised 2.75 feet at its lowest elevation in order to keep AOI-3 from having any further flooding issues. Effects of this alternative impact only Leon Trib F, and the water surface elevations in this area are increased slightly (<0.02' for 0.2% AEP storm event). See Table G.1-19. While this alternative has positive net benefits, it was not investigated further due to lack of sponsor support.

Alternative 7 - Huebner Trib A Pond (Impacts AOI-8, AOI-6)

This alternative consists of placing an inline pond at the confluence of Huebner Trib A and Huebner Trib B, located upstream of the crossing of Huebner Trib A and Babcock Road. This pond consists of a 14 foot tall dam structure with a 200' weir, and storage of approximately 295 acre-feet. This pond was designed to contain the 4% AEP storm event without overtopping the weir. Excavation will be needed to obtain the storage for this alternative. Positive effects of this alternative continue downstream of this pond along Huebner Trib A and Huebner Creek until Huebner Creek confluences with Leon Creek. Leon Creek water surface elevations are raised slightly by this alternative (<0.05' for the 1% AEP storm event) from its confluence with Huebner Creek downstream to the confluence of Leon Creek with the Medina River. See Table G.1-20. This alternative was selected for optimization in order to determine if the inducements could be eliminated.

Alternative 8 - Huebner AOI-9 Channel Modifications (Impacts AOI-9)

This alternative consists of approximately 3,800 feet of channel modifications along Huebner Creek between Whitby Road and Hollyhock Road. Channel modifications consist of channel widening and deepening. The channel bottom width varies from 50 feet on the lower end to 30 feet on the upper end. The slopes vary for this alternative with three segments, 0.45%, 0.51%, and 0.68%. Excavation will be required for this alternative. The effects of this alternative are only in the location of the channel modifications. Negative impacts can be mitigated through channel storage near the confluence of Huebner and Leon Creeks. See Table G.1-21. Due to the inducements caused by this alternative, as well as the fact that it produced negative net benefits, this project was eliminated from consideration.

Alternative 9 – LC-15 Huebner @ Prue RSWF (Impacts AOI-9, 8, 6)

This alternative consists of adding the LC-15 Huebner at Prue RSWF, as proposed in the Leon Creek Watershed Master Plan developed by SARA, to the USACE Future Conditions HMS Model. The RSWF is located on Huebner Creek just upstream of Prue Road. This alternative consists of partially blocking one of the 9X6 box culverts. Effects of this alternative can be observed downstream on Huebner Creek to the confluence of Leon Creek, and from there down the rest of Leon Creek slight impacts (<0.01' for 0.2% AEP storm event) can be observed. See Table G.1-22. Since this project was already under construction and the sponsor would possibly seek credit for it, this alternative was carried forward for consideration as part of the Federal project.

Alternative 10 - Helotes Channel Improvements (Impacts AOI-12)

For this alternative (Helotes Creek Channel Improvements) the wooded area downstream of Loop 1604 (XS 13795 to 5108) is cleared to have more open space or grassland area in order to reduce the Manning's n-value. The n-value in this area was reduced to 0.045 which represents the area being cleared to have more open space. Effects of this alternative impact only AOI-12 and surrounding areas. See Table G.1-23. This alternative was eliminated from further analysis due to significant negative net benefits.

Alternative 11 – DC-12 Helotes Creek RSWF (Impacts AOI-12, 5, 2, 1)

This alternative consists of adding the DC-12 Helotes Creek RSWF, as proposed in the Leon Creek Watershed Master Plan provided by SARA, to the USACE Future Conditions HMS Model. The RSWF is located on Helotes Creek at an existing quarry site northwest of Loop 1604 and south of FM 1560. The dam is approximately 28.5' tall and the maximum storage of this RSWF is 2,608 acre-feet. Effects of this alternative continue down Helotes, Culebra, and Leon Creek. See Table G.1-24. This alternative provided significant reductions in water surface elevation as well as significant net benefits. However, it was not considered for further analysis when compared with Alternative 12 which took advantage of an existing quarry, thus reducing costs and producing greater net benefits.

Alternative 12 - Halff Helotes-Quarry Pond (Impacts AOI-12, 5, 2, 1)

This alternative consists of a pond being located at an existing quarry along Helotes Creek northwest of Loop 1604 and south of FM 1560. Currently there is a 50 acre quarry site that is excavated to 100 feet below natural grade. This alternative diverts flow via a lateral weir into the pond and takes advantage of the 5000 acre-feet of storage. The weir structure would be a 500 foot lateral weir. Some earthwork would be required on the site. Effects of this alternative are observed throughout Helotes, Culebra and Leon Creeks. See Table G.1-25. This alternative was carried forward in to the optimization phase due to its significant reductions in water surface elevations and positive net benefits.

Alternative 13 - Halff Government Canyon Pond (Impacts AOI-5, AOI-2, AOI-1)

This alternative consists of a pond being located in Government Canyon State Park. This pond would be located approximately 8,200 feet upstream (7,600 feet straight-line northwest) of the park entrance. This pond consists of a 60 foot tall dam with a 350 foot weir, and storage of approximately 5,583 acre-feet. This pond was designed to contain the 0.2% AEP storm event without overtopping the weir. The

weir serves the purpose of allowing the dam to function in the event of back to back major storms (i.e. one 0.2% AEP storm event followed by another 0.2% AEP storm event before the first can completely drain). With this configuration this pond will drain completely in approximately 36 hours for the 1% AEP event. Excavation will not be needed in order to obtain the desired storage for this alternative. Effects of this alternative continue downstream and can be observed as far as the confluence of Leon Creek with the Medina River.

The location of this pond was selected in order to optimize the storage. This pond also can be significantly modified in regards to height and outlet structure in order to increase or decrease size and efficiency due to the amount of elevation relief in this particular area. According to the contours in the area, the dam has the potential to increase in height upwards of 50+ feet by making it longer and shifting the alignment slightly. This could significantly increase storage and allow a smaller outlet structure, thus decreasing flows downstream as well. See Table G.1-26. This alternative produced negative net benefits and was eliminated from further analysis.

Alternative 14 – Government Canyon RSWF (Impacts AOI-5, AOI-2, AOI-1)

This alternative consists of adding the Government Canyon RSWF, as proposed in the Leon Creek Watershed Master Plan provided by SARA, to the USACE Future Conditions HMS Model. The RSWF is located within Government Canyon State Park. The RSWF consists of a 51 foot tall dam structure and a maximum storage of approximately 6,870 ac-ft. The maximum discharge from this outlet structure is 1,000 cfs. Effects of this alternative can be observed down the rest of Government Canyon, Culebra Creek, and Leon Creek. See Table G.1-27. This alternative was located in a state natural preserve area and presents significant cultural and environmental concerns, including endangered species implications.

Alternative 14b – Government Canyon U.S. Pond (Impacts AOI-5)

Because of the cultural and environmental significance of the Government Canyon area, a smaller version of Alternative 14 was considered. This alternative uses the same location as the pond described in Alternative 14, but new outlet structure and storages have been calculated for this area. The dam will remain at 51 feet tall and the maximum discharge will be approximately 25,000 cfs. The maximum storage of this pond is 1,845 ac-ft. See Table G.1-28. This alternative produced significant negative net benefits and because of this, along with the cultural and environmental concerns, it was eliminated from further consideration.

Alternative 15 - Leon AOI-7 1% AEP Levee (Impacts AOI-7)

This alternative consists of adding a levee along Leon Creek from cross-section 161047 to 164568. The levee is on the eastern side of Leon Creek to prevent damages from occurring for the 1% AEP storm event in AOI-7. The levee elevation would range from 801 on the downstream end to 814.5 on the upstream end. The greatest difference between levee elevation and existing ground elevation is approximately 5.1 feet. Effects of this alternative impact only Leon Creek in the vicinity of AOI-7. See Table G.1-29. This alternative was selected for further optimization to include interior drainage.

Alternative 16 - Leon AOI-7 0.2% AEP Levee (Impacts AOI-7)

This alternative consists of adding a levee along Leon Creek from cross-section 159661 to 164568. The levee is on the eastern side of Leon Creek to prevent damages from occurring for the 0.2% AEP storm event in AOI-7. The levee elevation would range from 801 on the downstream end to 820 on the upstream end. The greatest difference between levee elevation and existing ground elevation is approximately 10.6 feet. Effects of this alternative impact only Leon Creek in the vicinity of AOI-7. See Table G.1-30. This alternative was selected for further optimization to include interior drainage.

Alternative 17 – Quarry at the Rim RSWF (Impacts AOI-7, AOI 2, AOI-1)

This alternative consists of adding the Quarry at the RIM RSWF, as proposed in the Leon Creek Watershed Master Plan provided by SARA, to the USACE Future Conditions HMS Model. The location of this RSWF is at an existing quarry site located along Leon Creek. The site is located north of Loop 1604 and east of IH-10. A lateral weir will divert some of the flows to a diversion channel which will in turn drain into the Quarry at the Rim RSWF. Effects of this alternative can be observed downstream to the confluence of Leon Creek with the Medina River. See Table G.1-31. This alternative produced some net benefits and reduced water surface elevations downstream. However, the Quarry at the Rim is a working quarry with an estimated economic life of 25 or more additional years of operation. The owner is not currently interested in selling, and the real estate costs used in the initial screening most likely are not adequate to cover the condemnation value of the property's future income stream. The local sponsor has indicated that they are not willing to pursue condemnation of a working commercial establishment. Therefore, this alternative was eliminated from further consideration.

Alternative 18 - Target AOI-11 Ponds (Impacts AOI-11, AOI-10)

This alternative consists of two ponds located upstream of AOI-11. Leon Trib M Pond is an inline pond located along Leon Trib M approximately 4,030 feet upstream (northwest) of the northern-most crossing of Boerne Stage Road. Leon XS 285313 Pond is an inline pond located along Leon Creek approximately 1.3 miles upstream (west) of the crossing of Leon Creek and Huntress Lane. Leon Trib M Pond consists of a 42 foot tall dam with a 300 foot weir, with storage of approximately 348 acre-feet. Leon XS 285313 Pond consists of a 38 foot tall dam with a 350 foot weir, with storage of approximately 455 acre-feet. Both of these ponds were designed to contain the 4% AEP storm events without overtopping the weirs. No excavation will be needed to obtain the storage for either of these two ponds for this alternative. Effects of this alternative can be observed down Leon Creek to its confluence with French Creek.

These two ponds were run in conjunction as an alternative due to the greater impacts found downstream in both AOI-11 and AOI-10. In order to have any impact on these areas of interest, the project needs to be located upstream of these areas and the ponds reduce flow and upset the timing of the hydrographs in order to reduce water surface elevations downstream. See Table G.1-32. This alternative produced positive net benefits, albeit very small, with a benefit to cost ratio 1.0. The area also has historical significance which could lead to a politically charged environment. Therefore, the sponsor elected not to pursue this alternative any further.

Alternative 19 – Boerne Stage Road Improvements (Impacts AOI-11)

This alternative was requested by the Bexar County Flood Control District. This alternative consists of incorporating the Boerne Stage Road Improvements (developed by others) into the USACE HEC-RAS model. The road improvements consist of widening and raising Boerne Stage Road from Cross Mountain Road on the west to IH 10 frontage road on the east. This road would then act as a levee. Effects of this alternative can be observed only in AOI-11. See Table G.1-33. No significant effect on water surface profiles was observed with the road improvement in place and no additional analysis was conducted per sponsor request.

Alternative 20 – AOI-7 Channel Modifications – 300' Bottom Width (Impacts AOI-7)

This alternative was requested by the Bexar County Flood Control District. This alternative consists of approximately 6,125 feet of channel deepening and widening, using a bottom width of 300 feet, to contain the 0.2% AEP storm event. Effects of this alternative can be observed only in AOI-7. See Table G.1-34. This alternative had significant negative net benefits and was modified (see Alternative 21 description).

Alternative 21 – AOI-7 Channel Modifications – 200' Bottom Width (Impacts AOI-7)

This alternative was developed after investigating Alternative 20 and realizing the need to develop a smaller alternative to contain the 1% AEP storm event. This alternative consists of approximately 3,820 feet of channel deepening and widening, using a bottom width of 200 feet. Effects of this alternative can be observed only in AOI-7. See Table G.1-35. Further refinements were made to this alternative to determine if a smaller channel would produce positive net benefits. See Alternative 21b.

Alternative 21b – AOI-7 Channel Modifications – 100' Bottom Width (Impacts AOI-7)

This alternative was developed after running the economics on Alternative 21. Alternative 21 had a BCR of approximately 0.9, and Alternative 21 was optimized to produce a higher BCR. After investigating Alternative 21 further, the 100' bottom width channel alleviates the 1% AEP flooding within this area. This alternative consists of approximately 3,820 feet of channel deepening and widening, using a bottom width of 100 feet. Effects of this alternative can be observed only in AOI-7. See Table G.1-36. This alternative was selected for further analysis to determine the optimal size channel to reduce water surface elevations and gain the most net benefits.

Alternative 22 – LC-15 HB@Prue & Huebner Trib A Pond (Impacts AOI-9, 8, 6)

This alternative was requested by the Bexar County Flood Control District. This alternative consists of combining two previous alternatives, Alternative 7 & 9. The two ponds, LC-15 Huebner @ Prue RSWF and Huebner Trib A Pond, were run in unison in the HMS model to develop new flows. See Table G.1-37. This alternative was selected for further analysis and would use the optimized Alternative 7 & 9 features.

Alternative 23 – Leon Creek AOI-5A Channel Modifications (Impacts AOI-5A)

This alternative was requested by the Bexar County Flood Control District. This alternative consists of approximately 2,500 feet of channel modifications located upstream of Ingram Road, with varying depths and bottom widths. The channel bottom will be cut to the lowest elevation within the channel

bottom and no cut will occur to the existing side slopes. See Table G.1-38. Further refinements were made to this alternative to determine if a smaller channel would produce positive net benefits. See Alternative 23b.

Alternative 23b – Leon Creek AOI-5A Channel Modifications (Impacts AOI-5A)

This alternative was developed after running the economics on Alternative 23. Alternative 23 had a BCR of approximately 0.9, and an alternative was developed to achieve a higher BCR. This alternative consists of approximately 1,935 feet of channel modifications located upstream of Ingram Road, with varying depths and bottom widths. The channel bottom will be cut to the lowest elevation within the channel bottom and no cut will occur to the existing side slopes. See Table G.1-39. This alternative was selected for further analysis to determine the optimal size channel to reduce water surface elevations and gain the most net benefits.

Selected Alternatives’ Optimization

After more detailed economic analysis, the alternatives selected for further evaluation, by virtue of having a Benefit-Cost Ratio greater than 1, are the following: Alternative 2 and 3 – Test Cell Levees, Alternative 4 – Test Cell By Pass, Alternative 7 - Huebner Trib A Pond, Alternative 9 – Huebner Creek RSWF at Prue Road, Alternative 12 – Helotes Quarry Pond, Alternative 15 and 16 – Leon Creek Levees, Alternative 22- Alt 7 and 9 combo, Alternative 21b – Leon Creek Channel Improvements, Alternative 23b – Leon Creek at Culebra Creek Channel Improvements.

Alternatives 2 and 3 (Test Cell Levees) – The original alternatives consisted of 1% and 0.2% AEP flood protection levees, respectively. After examining the currently-effective FEMA Flood Insurance Study (FIS) Base Flood Elevation (BFE) it was determined that the FEMA 1% AEP water surface elevation, plus the three feet of required freeboard, was less than the applied 1% AEP levee height for Alternative 2, without any additional freeboard. This difference relates to differences in magnitude of FEMA’s and this Feasibility Study’s projected 1% AEP peak discharges along Leon Creek. The Local Sponsor requested that levee alternatives be limited to those with sufficient height to achieve National Flood Insurance Program (NFIP) compliance, unless there are demonstrative reductions in expected inundation damages when considering more-elevated levee options; therefore only the 1% AEP levee height was evaluated further.

With this alternative, an interior drainage plan was developed to mitigate for the otherwise captured storm runoff behind the levee. This plan consisted of storm drains and ditches which drain to a sump area. The outlet (sluice) culvert at the sump area was configured with a flap gate, to prevent surging Leon Creek channel flows from entering the sump.

While this levee alternative produced significant positive net benefits at the Test Cell, upstream hydraulic inducements were found to be a residual concern. Additional refinements would be needed to fully mitigate for these hydraulic inducements. See Alternative 2 and 4 Combo and Alternative 2 with Channel Improvements (Mitigation) for additional details in this regard.

Alternative 2 with Channel Improvements (Mitigation) – This alternative is the same as Alternative 2, but channel improvements were now introduced to mitigate for increases in water

surface elevations due to the constriction in the Leon Creek flow area along the Test Cell (levee) reach. Refer to Plate 6 for the location of this alternative. The improvements would consist of a 40-foot bottom width channel upstream of the Military Highway bridge and a transition to an 80-foot channel downstream of the bridge and adjacent to the levee reach. See Table G.1-40. This channel modification was found to be sufficient to eliminate the induced increases in water surface elevations upstream of the proposed (levee) project. Because this reconfigured alternative has significant net benefits and eliminates upstream inducements, it will be carried forward as part of the recommended plan.

Alternative 4 (Test Cell Bypass) – This alternative was altered slightly from the original version. After further investigation, it was noted that a large 48-inch sewer main would have to be relocated under the original alignment; therefore, the bypass channel alignment was modified slightly to obtain physical clearance. The dimensions of this alternative were subsequently economically optimized, considering 100-, 40-, and 25-foot bottom widths. See Tables G.1-41, G.1-42, and G.1-43 for the computed results for these three scenarios. All three sizes of this alternative produce positive net benefits with the 100-foot channel providing the greatest net benefit. However, since none of these channel improvement measures performed as well as the levee alternative, the stand-alone version of this alternative was eliminated from further consideration.

Alternative 2 and 4 Combo – This alternative simply combines Alternative 2 and Alternative 4 (with the 100-foot bottom width bypass channel). See Table G.1-44. It increases net benefits but does not eliminate the induced damages caused by the constriction in the Leon Creek flow area along the Test Cell (levee) reach; therefore, it was also eliminated from further consideration. See Plate 7 for the location of these alternatives.

Alternative 2 with Mitigation and 4 Combo – This alternative combines Alternative 2 with hydraulic mitigation and Alternative 4 (with the 100-foot bottom width bypass channel). The analysis indicates that the addition of the bypass channel to Alternative 2 with mitigation had only a very small effect upon flood damage reduction benefits, while adding substantially to implementation cost; therefore, this alternative was eliminated from further consideration.

Alternative 7 (Huebner Trib A Pond) – Alternative 7 is a detention pond that was optimized by changing the size, location and outfall configuration. It was determined that the outfall and size of the pond were already generally optimized, but the physical location could be modified slightly, in order to reasonably minimize real estate costs. Refer to Table G.1-20. Due to the significant negative net benefits, this alternative was eliminated from further consideration.

Alternative 9 (Huebner Creek RSWF at Prue Road) – This alternative is currently slated for construction as a Bexar County Flood Control Project. The hydrologic and hydraulic models, as well as the cost estimate, were provided by the local sponsor and were incorporated into this study. The project went through a PER and other alternatives were investigated by the sponsor, thus no optimization was performed on this site. This alternative produced significant negative net benefits, and was therefore eliminated from further consideration.

Alternative 22 – This alternative is a combination of an optimized Alternative 7 and Alternative 9. See Table G.1-45. The marginal increase in benefits by combining the alternatives was minor and insufficient to provide positive net benefits. Therefore, this alternative was eliminated from further consideration.

Alternative 12 (Helotes Quarry Pond) – The economic efficiency of Alternative 12 primarily relates to the fact that it could take advantage of an existing topographic feature adjacent to the Helotes Creek floodplain, as shown on Plate 8. This so-called pond is actually an excavated rock quarry pit that extends approximately 120 feet below the natural ground surface and has potential to provide approximately 5000 acre-feet of flood storage. In order to reasonably optimize this alternative, both smaller- and larger-scale projects were also evaluated. Development of a smaller-scale project at this site can be demonstrated qualitatively to be inferior in performance to the 5000 acre-foot scale. The readily-available storage is provided essentially for free with real estate acquisition of the site. Attempting to utilize only a fraction of the available storage would significantly reduce benefits without achieving any cost savings. Conversely, a larger-scale plan, which would store more flood water than Alternative 12 and thus be expected to provide a greater reduction in downstream flood damages, was also considered. The tested larger plan would divert and store an additional 2400 acre-feet of floodwaters. In order to provide this additional storage, excavation and limestone-blasting would be required, along with implementation of a larger diversion weir and floodwater evacuation pumping system. As a result, costs would increase significantly, rendering this larger-scale plan less economically feasible. The obviously optimum scale of storage is full utilization of the existing quarry (5000 acre-feet of storage) space. Due to the reductions in water surface elevations on Helotes Creek, Culebra Creek, and Leon Creek and the associated positive net benefits from this alternative, it is being carried forward as part of the recommended plan.

Alternative 15 and 16 (Leon Creek Levees) - The original alternatives consisted of 1% and 0.2% AEP flood protection levees, respectively. After examining the currently-effective FEMA Flood Insurance Study (FIS) Base Flood Elevation (BFE) it was determined that the FEMA 1% AEP water surface elevation, plus the three feet of required freeboard, was less than the applied 1% AEP levee height for Alternative 15, without any additional freeboard. This difference relates to differences in magnitude of FEMA's and this Feasibility Study's projected 1% AEP peak discharges along Leon Creek. The Local Sponsor requested that levee alternatives be limited to those with sufficient height to achieve National Flood Insurance Program (NFIP) compliance, unless there are demonstrative reductions in expected inundation damages when considering more-elevated levee options; therefore only the 1% AEP levee height was evaluated further.

With this alternative, an interior drainage plan was developed to mitigate for the otherwise captured storm runoff behind the levee. This plan consisted of storm drains and ditches which drain to a sump area. The outlet (sluice) culvert at the sump area was configured with a flap gate, to prevent surging Leon Creek channel flows from entering the sump.

These levee alternatives produced negative net benefits and were thus eliminated from further consideration.

Alternative 21b (Leon Creek Channel Improvements) – Alternative 21B was further evaluated, for purposes of economically optimizing its channel size. Channel plans with bottom widths of 85, 100, and 150 feet were assessed. The longitudinal scale (length) was also varied among these plans, but the slope of each plan was maintained as equal to that of the existing channel, in order to avoid utility conflicts. Cost of utility relocations was accounted for in this alternative. See Tables G.1-46 and G.1-47 for results for the 85- and 150- foot channel options. The 100-foot channel was previously presented in Table G.1-36.

The 85-foot channel was subsequently identified as likely representing the economically-optimized solution. Updated and refined cost estimates were then prepared. Preliminary real estate and construction costs, provided by the Local Sponsor, were updated by USACE real estate and cost estimating personnel. Total costs for this alternative were found to have increased substantially above the preliminary estimates, rendering this alternative infeasible; therefore, it was eliminated from consideration.

Alternative 23b (Leon Creek at Culebra Creek Channel Improvements) - Alternative 23B was further evaluated, for purposes of economically optimizing its channel size. The slope of the channel would have been modified slightly, but this plan is primarily comprised of the removal of large quantities of gravelly sedimentation that has occurred along this reach of Leon Creek. See Table G.1-39, presented previously, for results with this alternative. Since this alternative produces negative net benefits, it was eliminated from further consideration.

RECOMMENDED PLAN

Two structural alternatives are recommended for inclusion as parts of the NED plan for Leon Creek. These are Alternative 2 with Channel Modifications (for mitigation of upstream hydraulic impacts caused by the constriction at the Test Cell reach) and Alternative 12 – the Helotes Quarry Pond. Both of these alternatives reduce flood risks in the Leon Creek watershed and are economically justified as stand-alone projects. Combination of these measures into a complete NED plan entailed additional analysis and consideration as follows.

Next-Added Increment Analysis

While the two recommended structural alternatives are located in distinctly different parts of the watershed, the possibility exists that the hydrologic and/or hydraulic effects of one measure may interact with those of another, materially affecting the performance and potentially the very economic justification of one or more elements. To assess this situation, a so-called Next-Added Increment analysis was undertaken. In this instance, each of the two recommended alternatives (projects) was measured with regards to how they add or detract from the performance characteristics of the other.

Structural alternatives at the Test Cell reach along Leon Creek have a direct impact on frequency-based water surface profiles only in the vicinity of the Test Cell reach. This is true for both channelization and levee solutions in that area. With or even without hydraulic mitigation, impacts (of

those alternatives) upon water surface profiles diminish to zero a short distance upstream from the Test Cell area. There is absolutely zero potential impact upon hydrologic and/or hydraulic performance for any alternative on Helotes Creek, located several river miles further upstream.

Conversely, a floodwater detention project on Helotes Creek, such as the recommended Helotes Creek Quarry Plan (Alternative 12), significantly reduces frequency-based flood discharges all the way from the detention site, downstream along Helotes Creek, Culebra Creek, and Leon Creek. As such, the Helotes Creek Quarry Plan is capable of reducing flood damages in the Test Cell reach. Treated as a stand-alone alternative, this plan would get credit for producing a measurable expected annual flood damage reduction benefit in that Test Cell reach. However, when also treated as a stand-alone alternative, the Test Cell Levee Plan (with upstream hydraulic mitigation) even more substantially reduces expected annual flood damages in that same Test Cell reach. The issue is that both project elements “compete” for some of the same expected annual damage reduction benefits in that reach.

As was expected, the required “next-added” economic analyses clearly indicate that there is only a very minor overlap in flood damage reduction benefits afforded by the proposed simultaneous combination of the two elements of the recommended plan, when compared to treating the two elements in stand-alone fashion. The “shared” flood damage reduction benefits under the combined-plans scenario are sufficiently small so as to not impact the economic optimization of either element of the recommended plan.

Results of the associated hydraulic modeling performed for the combination of these two structural alternatives are shown in Table G.1-48.

Recommended Plan

The Helotes Creek Quarry Plan, which is capable of reducing frequency-based peak discharges in the Test Cell reach by 4 to 8 percent, provides for a slightly enhanced level-of-performance of the Test Cell Levee Plan. Nonetheless, both elements of this combined plan are economically optimized from a National Economic Development (NED) standpoint, when treated as either stand-alone projects or as a combined project.

Table G.1-14

Alternative 1: Leon AOI-1 Overbank Modifications

Stream	Location / AOI #	Cross-section	500 WSEL (ft) FC w/o Project	500 WSEL (ft) FC wth Project	Difference (w/o - w/Proj)	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC wth Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC wth Project	Difference (w/o - w/Proj)
Leon Creek		87864	648.96	648.96	0	646.92	646.92	0	644.13	644.13	0
	AOI 2	87627	648.51	648.51	0	646.6	646.6	0	643.8	643.8	0
	AOI 2	86710	644.28	644.28	0	640.87	640.88	-0.01	639.42	639.42	0
	AOI 2	85691	643.38	643.38	0	639.41	639.41	0	636.59	636.54	0.05
	AOI 2	84973	643.09	643.09	0	639.03	639.03	0	636.05	635.99	0.06
	u/s Leon Trib C	82969	642.68	642.68	0	638.47	638.47	0	635.07	634.97	0.1
	d/s Leon Trib C	82554	642.63	642.63	0	638.4	638.4	0	634.98	634.87	0.11
		79435	641.02	641.02	0	636.56	636.56	0	632.48	632.4	0.08
		75582	636.36	636.36	0	632.23	632.24	-0.01	628.69	628.54	0.15
		74009	629.09	629.1	-0.01	626.31	626.36	-0.05	624.27	623.91	0.36
		72887	626.83	626.86	-0.03	624.48	624.57	-0.09	622.85	622.26	0.59
	u/s Quintana Rd / AOI 1	71561	624.78	624.83	-0.05	622.93	623.07	-0.14	621.77	620.88	0.89
	d/s Quintaa Rd / AOI 1	71115	621.91	622.28	-0.37	619.74	620.45	-0.71	618.66	615.02	3.64
	u/s New Laredo Hwy / AOI 1	69321	619.99	618.58	1.41	618.16	616.93	1.23	617.06	615.39	1.67
	d/s New Laredo Hwy / AOI 1	68856	618	616.33	1.67	614.8	613	1.8	613.65	610.42	3.23
	AOI 1	67795	617.18	616.37	0.81	613.97	613.14	0.83	611.54	610.71	0.83
		66551	617.04	616.35	0.69	613.82	613.13	0.69	611.39	610.7	0.69
		64262	614.54	614.54	0	611.74	611.74	0	609.59	609.59	0
		63541	612.01	612.01	0	609.39	609.39	0	607.36	607.38	-0.02

Table G.1-15

Alternative 2: Leon AOI-2 100 Year Levee

Stream	Location / AOI #	Cross-section	500 WSEL (ft) FC w/o Project	500 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Leon Creek		95755	665.12	665.13	-0.01	660.33	660.16	0.17	656.53	656.55	-0.02
		95690	665.46	665.47	-0.01	660.71	660.61	0.1	657.02	657.04	-0.02
		94824	665.12	665.13	-0.01	660.35	660.24	0.11	656.63	656.65	-0.02
		94802	665.09	665.11	-0.02	660.32	660.21	0.11	656.61	656.63	-0.02
		94293	664.92	664.93	-0.01	660.15	660.04	0.11	656.42	656.45	-0.03
		94274	664.89	664.9	-0.01	660.12	660.01	0.11	656.4	656.43	-0.03
		93810	664.72	664.73	-0.01	659.95	659.84	0.11	656.21	656.23	-0.02
		93798	664.7	664.71	-0.01	659.94	659.83	0.11	656.18	656.21	-0.03
		93047	664.08	664.09	-0.01	659.32	659.19	0.13	655.5	655.53	-0.03
		93032	663.83	663.84	-0.01	659.07	658.93	0.14	655.25	655.28	-0.03
		92368	660.84	660.86	-0.02	656.66	656.64	0.02	653.38	653.43	-0.05
		92350	659.64	659.68	-0.04	655.87	655.91	-0.04	652.69	652.75	-0.06
		90894	656.97	657.03	-0.06	653.84	653.9	-0.06	650.98	651.07	-0.09
		90875	656.87	656.92	-0.05	653.83	653.89	-0.06	650.96	651.05	-0.09
		90266	656.43	656.49	-0.06	653.32	653.39	-0.07	650.65	650.75	-0.1
		90248	655.79	655.87	-0.08	652.82	652.9	-0.08	650.52	650.62	-0.1
		90179	655.72	655.79	-0.07	652.7	652.78	-0.08	650.3	650.41	-0.11
		90158	655.61	655.68	-0.07	652.64	652.72	-0.08	650.25	650.36	-0.11
		89670	654.41	654.53	-0.12	651.66	651.79	-0.13	649.2	649.38	-0.18
		89593	653.92	654.07	-0.15	651.29	651.36	-0.07	648.85	649.06	-0.21
		88636	652.7	652.94	-0.24	650.44	650.53	-0.09	648.32	648.55	-0.23
		87864	648.96	650.03	-1.07	646.92	647.38	-0.46	644.13	645.25	-1.12
		87627	648.51	649.64	-1.13	646.6	647.05	-0.45	643.8	644.93	-1.13
		87518	648.18	648.8	-0.62	646.37	646.27	0.1	643.52	644.26	-0.74
		87210	645.43	646.04	-0.61	642.05	642.95	-0.9	640.4	641.15	-0.75
		86710	644.28	644.75	-0.47	640.87	642.11	-1.24	639.42	640.75	-1.33
		86207	643.5	643.46	0.04	639.47	639.25	0.22	636.62	637.92	-1.3
		85866	643.41	643.44	-0.03	639.45	639.48	-0.03	636.64	636.69	-0.05
		85691	643.38	643.4	-0.02	639.41	639.43	-0.02	636.59	636.64	-0.05
		85024	643.16	643.15	0.01	639.12	639.11	0.01	636.19	636.17	0.02
		84973	643.09	643.09	0	639.03	639.03	0	636.05	636.05	0
		83663	642.8	642.8	0	638.63	638.63	0	635.33	635.33	0
		82554	642.63	642.63	0	638.4	638.4	0	634.98	634.98	0
		80352	642.08	642.08	0	637.81	637.81	0	634.21	634.21	0

Table G.1-16

Alternative 3: Leon AOI-2 500 Year Levee

Stream	Location / AOI #	Cross-section	500 WSEL (ft) FC w/o Project	500 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Leon Creek	u/s Leon Trib D	97465	668.37	668.37	0	663.85	663.85	0	660.53	660.62	-0.09
	d/s Leon Trib D	96588	666.23	666.24	-0.01	661.77	661.77	0	658.27	658.48	-0.21
	u/s Galaxy Rd	95755	665.12	665.12	0	660.3	660.31	-0.01	656.5	656.55	-0.05
	d/s Galaxy Rd	95690	665.46	665.46	0	660.71	660.72	-0.01	657.02	657.1	-0.08
		94949	665.16	665.16	0	660.39	660.41	-0.02	656.68	656.78	-0.1
		94274	664.89	664.89	0	660.12	660.14	-0.02	656.41	656.51	-0.1
		93543	664.48	664.48	0	659.75	659.77	-0.02	655.98	656.1	-0.12
		92368	660.84	660.84	0	656.66	656.7	-0.04	653.39	653.58	-0.19
		91051	657.96	657.98	-0.02	654.49	654.67	-0.18	651.5	651.53	-0.03
		90196	655.9	655.92	-0.02	652.89	653.16	-0.27	650.49	650.88	-0.39
		89769	654.38	654.41	-0.03	651.65	652.06	-0.41	649.2	649.84	-0.64
		89157	652.99	653.05	-0.06	650.56	651.14	-0.58	648.38	649.15	-0.77
	u/s Military Dr W	88636	652.7	652.76	-0.06	650.44	651	-0.56	648.32	649.1	-0.78
	d/s Military Dr W	87864	648.96	649.3	-0.34	646.92	648.99	-2.07	644.13	647.03	-2.9
	AOI 2	87518	648.18	648.29	-0.11	646.37	646.66	-0.29	643.52	645.33	-1.81
	AOI 2	86207	643.5	643.51	-0.01	639.47	639.65	-0.18	636.62	638.43	-1.81
	AOI 2	85024	643.16	643.16	0	639.12	639.11	0.01	636.19	636.18	0.01
	u/s Leon Trib C	82969	642.68	642.68	0	638.47	638.47	0	635.07	635.07	0
	d/s Leon Trib C	82554	642.63	642.63	0	638.4	638.4	0	634.98	634.98	0

Table G.1-17

Alternative 4: Leon AOI-2 Bypass Channel

Stream	Location / AOI #	Cross-section	500 WSEL (ft) FC w/o Project	500 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Leon Creek		99980	672.74	672.74	0	668.21	668.18	0.03	665.4	665.4	0
		96588	666.23	666.22	0.01	661.77	661.63	0.14	658.27	658.28	-0.01
		95319	665.22	665.21	0.01	660.46	660.34	0.12	656.78	656.8	-0.02
		94007	664.74	664.74	0	659.97	659.85	0.12	656.22	656.25	-0.03
d/s Kelly St		92579	662.38	662.37	0.01	658.11	657.94	0.17	654.55	654.59	-0.04
		91051	657.96	657.94	0.02	654.49	654.4	0.09	651.5	651.59	-0.09
		90196	655.9	655.86	0.04	652.89	652.75	0.14	650.49	650.61	-0.12
u/s Bypass Channel (inlet)		88636	652.7	652.58	0.12	650.44	650.07	0.37	648.32	648.59	-0.27
d/s Bypass Channel (inlet) / AOI 2		87864	648.96	646.55	2.41	646.92	643.36	3.56	644.13	640.2	3.93
AOI 2		87627	648.51	646.36	2.15	646.6	643.07	3.53	643.8	639.5	4.3
AOI 2		87210	645.43	643.35	2.08	642.05	639.79	2.26	640.4	637.86	2.54
AOI 2		86207	643.5	642.01	1.49	639.47	637.45	2.02	636.62	634.41	2.21
AOI 2		85691	643.38	642.07	1.31	639.41	637.67	1.74	636.59	634.04	2.55
AOI 2		84973	643.09	641.89	1.2	639.03	637.43	1.6	636.05	633.67	2.38
		84720	643.02	641.85	1.17	638.93	637.37	1.56	635.87	633.49	2.38
		82969	642.68	641.66	1.02	638.47	637.09	1.38	635.07	632.93	2.14
		80352	642.08	641.35	0.73	637.81	636.76	1.05	634.21	632.57	1.64
u/s Bypass Channel (outlet)		78641	640.17	640.29	-0.12	635.69	635.79	-0.1	631.59	631.66	-0.07
d/s Bypass Channel (outlet)		77693	639.57	639.57	0	635.21	635.21	0	631.17	631.17	0
		76046	637.63	637.63	0	633.47	633.47	0	629.7	629.7	0

Table G.1-18

Alternative 5: Slick Ranch Improvements

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Slick Ranch		8523	744.55	744.55	0	743.82	743.82	0	742.77	742.78	-0.01
		6878 - 6996	737.23	736.73	0.5	736.91	736.26	0.65	736.45	736.06	0.39
		5386 - 5406	731.04	729.81	1.23	730.37	728.63	1.74	729.69	727.65	2.04
		4124 - 4133	727.42	725.85	1.57	726.72	725.04	1.68	726.04	724.29	1.75
		3356 - 3631	726.14	723.80	2.34	725.43	722.77	2.66	724.75	721.93	2.82
	u/s of Marbach	2490 - 2492	720.21	720.30	-0.09	719.52	719.64	-0.12	719.21	719.17	0.04
	d/s of Pinn	1204	715.17	715.17	0	713.57	713.57	0	711.9	711.90	0

Table G.1-19

Alternative 6: Leon Trib F AOI-3 500 Year Levee

Stream	Location / AOI #	Cross-section	500 WSEL (ft) FC w/o Project	500 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Leon Trib F	u/s Callaghan Rd	4241	717.83	717.83	0	717.14	717.15	-0.01	716.38	716.38	0
	d/s Callaghan Rd	4097	717.55	717.55	0	716.31	716.32	-0.01	714.53	714.53	0
	AOI 3	3911	717.36	717.36	0	716.1	716.11	-0.01	714.45	714.45	0
	AOI 3	3742	717.18	717.18	0	715.92	715.92	0	714.23	714.23	0
	AOI 3	3482	716.92	716.92	0	715.58	715.58	0	713.84	713.84	0
	AOI 3	3209	716.38	716.38	0	715.27	715.27	0	713.53	713.53	0
	AOI 3	2925	716.45	716.45	0	714.98	714.98	0	713.22	713.22	0
	AOI 3	2713	716.47	716.47	0	714.83	714.83	0	713.07	713.07	0
	AOI 3	2491	716.45	716.45	0	714.64	714.64	0	712.88	712.88	0
		2286	716.05	716.05	0	714.52	714.52	0	712.77	712.77	0
		2090	715.31	715.31	0	713.88	713.88	0	712.23	712.23	0
		1876	714.9	714.9	0	713.51	713.51	0	711.91	711.91	0
		1655	714.58	714.58	0	713.2	713.2	0	711.62	711.62	0
		1486	714.37	714.37	0	713.01	713.01	0	711.44	711.44	0
		1223	712.81	712.81	0	711.51	711.51	0	710.04	710.04	0
	u/s confluence Leon Creek	1009	711.18	711.18	0	709.96	709.96	0	708.56	708.56	0

Table G.1-20

Alternative 7: Huebner Trib A Pond

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Column1 Column2 Column3 Column4 Column5 Column6 Column7 Column8 Column9 Column10 Column11											
Huebner Trib A	d/s Huebner Trib A Pond	5206	871.1	871.1	0	870.63	870.63	0	870.15	870.15	0
	u/s Babcock Rd	4629	866.75	866.75	0	866	866.00	0	865.35	865.35	0
	d/s Babcock Rd	4470	864.87	864.87	0	864.44	864.44	0	864.06	864.06	0
	u/s Eckhert Rd	2654	854.29	854.25	0.04	853.58	853.55	0.03	852.66	852.61	0.05
	d/s Eckhert Rd	2579	851.95	851.88	0.07	851.44	851.39	0.05	850.91	850.86	0.05
	u/s confluence w/Huebner Crk	326	838.75	837.51	1.24	838.26	837.13	1.13	837.75	836.82	0.93
Huebner Creek	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11
	d/s Huebner Trib A	23532	839.44	838.43	1.01	838.76	837.67	1.09	837.92	836.73	1.19
	u/s Apple Green Rd	22929	839.23	838.2	1.03	838.54	836.63	1.91	837.67	835.66	2.01
	d/s Apple Green Rd	22778	833.42	832.46	0.96	832.76	831.84	0.92	832.03	831.18	0.85
	AOI 8	21610	831.44	830.51	0.93	830.82	829.86	0.96	830.06	829.13	0.93
	u/s Evers Rd / AOI 8	18498	824.22	823.64	0.58	823.79	823.31	0.48	823.38	822.91	0.47
	d/s Evers Rd / AOI 8	18390	823.92	823.26	0.66	823.45	822.86	0.59	822.95	822.39	0.56
	AOI 8	15969	814.79	814.26	0.53	814.39	813.93	0.46	813.93	813.53	0.4
	u/s Bandera Rd / AOI 6	14267	811.45	810.87	0.58	811.02	810.4	0.62	810.4	809.62	0.78
	d/s Bandera Rd / AOI 6	14017	808.34	807.42	0.92	807.62	806.87	0.75	806.87	806.14	0.73
	AOI 6	12264	799.97	799.19	0.78	799.38	798.61	0.77	798.61	798.16	0.45
	AOI 6	10195	794.96	794.36	0.6	794.46	794.01	0.45	794	793.63	0.37
	AOI 6	7282	792.34	791.4	0.94	791.34	790.58	0.76	790.32	789.58	0.74
	u/s Timberhill Dr	5000	789.73	788.86	0.87	788.52	787.82	0.7	787.29	786.56	0.73
	d/s Timberhill Dr	4877	789.67	788.79	0.88	788.5	787.74	0.76	787.2	786.51	0.69
	u/s Ingram Rd	1724	766.3	765.57	0.73	765.33	764.68	0.65	765.19	764.7	0.49
	d/s Ingram Rd	1636	760.72	760.13	0.59	759.94	759.43	0.51	759.06	758.54	0.52
Leon Creek	u/s Huebner Creek	148048	768.76	768.77	-0.01	767.36	767.38	-0.02	765.69	765.69	0
	d/s Huebner Creek	147620	767.93	767.94	-0.01	766.57	766.58	-0.01	764.95	764.95	0
	u/s Culebra Rd	145073	761.08	761.1	-0.02	759.56	759.6	-0.04	757.94	757.94	0
	d/s Culebra Rd	144862	761.03	761.05	-0.02	759.47	759.5	-0.03	757.84	757.84	0
	u/s SW Loop 410	142963	758.76	758.78	-0.02	757.15	757.2	-0.05	755.65	755.65	0
	d/s SW Loop 410	142391	748.71	748.73	-0.02	747.01	747.03	-0.02	745.17	745.17	0
		141639	745.85	745.87	-0.02	743.88	743.89	-0.01	741.82	741.82	0
	u/s Leon Trib G	139942	743.79	743.82	-0.03	741.99	742	-0.01	739.95	739.95	0
	d/s Leon Trib G	139336	743.75	743.77	-0.02	741.95	741.95	0	739.91	739.91	0
	u/s TX Hwy 151	136389	736.91	736.94	-0.03	735.03	735.04	-0.01	732.95	732.95	0
	d/s TX Hwy 151	135790	733.28	733.3	-0.02	731.83	731.84	-0.01	730.28	730.28	0
	u/s Pinn Rd	134897	732.54	732.56	-0.02	731.01	731.02	-0.01	729.33	729.33	0
	d/s Pinn Rd	134762	732.26	732.28	-0.02	730.77	730.78	-0.01	729.14	729.14	0
	u/s Old Hwy 90 W	118873	703.14	703.18	-0.04	701.7	701.71	-0.01	700	700	0
	d/s Old Hwy 90 W	118757	702.39	702.44	-0.05	700.62	700.64	-0.02	698.65	698.65	0
	u/s US Hwy 90 W	117144	696.37	696.4	-0.03	695.28	695.29	-0.01	694.26	694.26	0

Table G.1-21

Alternative 8: Huebner AOI-9 Channel Modifications

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Huebner Creek	u/s Lockhill Rd.	36146	910.46	910.46	0	910.04	910.04	0	909.6	909.6	0
	d/s Lockhill Rd.	36089	910.33	910.33	0	909.9	909.9	0	909.47	909.47	0
	u/s White Bonned Rd	35768	909.41	909.41	0	908.84	908.84	0	908.24	908.24	0
	d/s White Bonned Rd	35696	909.43	909.43	0	908.89	908.89	0	908.28	908.28	0
		34939	906.33	906.33	0	905.85	905.85	0	905.21	905.21	0
		34290	903.03	903.03	0	902.54	902.54	0	902.02	902.02	0
	most u/s XS w/in Chan Mod	33578	899.49	899.49	0	898.96	898.96	0	898.41	898.41	0
	u/s Babcock Rd / AOI 9	32884	896.42	896.42	0	895.86	895.86	0	895.26	895.25	0.01
	d/s Babcock Rd / AOI 9	32782	895.67	895.66	0.01	895.22	895.21	0.01	894.72	894.71	0.01
	u/s Hollyhock Rd / AOI 9	32032	891.04	890.01	1.03	890.63	889.5	1.13	890.16	888.9	1.26
	d/s Hollyhock Rd / AOI 9	31954	890.92	890.01	0.91	890.52	889.52	1	890.06	888.93	1.13
	AOI 9	31068	885.79	882.21	3.58	885.28	881.7	3.58	884.71	881.15	3.56
	AOI 9	30096	879.96	876.83	3.13	879.51	876.33	3.18	879	875.79	3.21
	most d/s w/in Chan Mod / AOI 9	28870	872.47	871.18	1.29	872.08	870.73	1.35	871.64	870.19	1.45
		28627	870.77	869.93	0.84	870.39	869.43	0.96	869.98	868.94	1.04
		28369	869.14	867.8	1.34	868.69	867.43	1.26	868.26	867	1.26
	u/s Whitby Rd / d/s AOI 9	28230	868.23	868.2	0.03	867.82	867.79	0.03	867.32	867.3	0.02
	d/s Whitby Rd	28123	867.71	867.71	0	867.3	867.3	0	866.85	866.85	0
	u/s Eckhert Rd	26672	858.79	858.79	0	858.13	858.13	0	857.21	857.21	0
	d/s Eckhert Rd	26522	857.39	857.39	0	856.86	856.86	0	856.34	856.34	0
	u/s Huebner Rd	24548	842.45	842.45	0	842.03	842.03	0	839.77	839.77	0
	d/s Huebner Rd	24417	840.57	840.57	0	840	840	0	839.41	839.41	0
	u/s Huebner Trib A	23830	839.84	839.84	0	839.17	839.17	0	838.37	838.37	0
	d/s Huebner Trib A	23532	839.44	839.44	0	838.76	838.76	0	837.92	837.92	0
	u/s Apple Green Rd	22929	839.23	839.23	0	838.54	838.54	0	837.67	837.67	0

Table G.1-22

Alternative 9: AECOM LC-15 Huebner @ Prue RSWF

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Huebner Creek	u/s Prue Rd	37467	918.24	918.24	0	918.01	918.01	0	917.77	917.77	0
	d/s Prue Rd	37408	916.6	916.60	0	916.26	916.26	0	915.9	915.90	0
	u/s Lockhill Rd	36146	910.46	910.35	0.11	910.04	909.97	0.07	909.6	909.57	0.03
	d/s Lockhill Rd	36089	910.33	910.21	0.12	909.9	909.83	0.07	909.47	909.43	0.04
	u/s Babcock Rd / AOI 9	32884	896.42	895.53	0.89	895.86	895.12	0.74	895.26	894.68	0.58
	d/s Babcock Rd / AOI 9	32782	895.67	894.95	0.72	895.22	894.6	0.62	894.72	894.23	0.49
	u/s Hollyhock Rd	32032	891.04	890.38	0.66	890.63	890.05	0.58	890.16	889.7	0.46
	d/s Hollyhock Rd	31954	890.92	890.27	0.65	890.52	889.95	0.57	890.06	889.6	0.46
	AOI 9	31068	885.79	884.98	0.81	885.28	884.57	0.71	884.71	884.14	0.57
	AOI 9	30379	882.21	881.58	0.63	881.82	881.24	0.58	881.36	880.87	0.49
	AOI 9	29469	875.55	874.81	0.74	875.09	874.47	0.62	874.59	874.1	0.49
	AOI 9	28870	872.47	871.84	0.63	872.08	871.53	0.55	871.64	871.13	0.51
	u/s Whitby Rd	28230	868.23	867.56	0.67	867.82	867.21	0.61	867.32	866.8	0.52
	d/s Whitby Rd	28123	867.71	867.08	0.63	867.3	866.75	0.55	866.85	866.38	0.47
	u/s Eckhert Rd	26672	858.79	858.13	0.66	858.13	857.61	0.52	857.21	856.75	0.46
	d/s Eckhert Rd	26522	857.39	856.9	0.49	856.86	856.53	0.33	856.34	856.07	0.27
	u/s Huebner Rd	24548	842.45	842.06	0.39	842.03	840.19	1.84	839.77	839.57	0.2
	d/s Huebner Rd	24417	840.57	840.45	0.12	840	839.89	0.11	839.41	839.28	0.13
	u/s Huebner Trib A	23830	839.84	839.93	-0.09	839.17	839.23	-0.06	838.37	838.41	-0.04
	d/s Huebner Trib A	23532	839.44	839.44	0	838.76	838.76	0	837.92	837.91	0.01
	u/s Apple Green Rd	22929	839.23	839.23	0	838.54	838.54	0	837.67	837.67	0
	d/s Apple Green Rd	22778	833.42	833.42	0	832.76	832.76	0	832.03	832.03	0
Leon Creek	u/s Huebner Creek	148048	768.76	768.78	-0.02	767.36	767.37	-0.01	765.69	765.7	-0.01
	d/s Huebner Creek	147620	767.93	767.95	-0.02	766.57	766.58	-0.01	764.95	764.96	-0.01
	u/s Culebra Rd	145073	761.08	761.1	-0.02	759.56	759.57	-0.01	757.94	757.95	-0.01
	d/s Culebra Rd	144862	761.03	761.06	-0.03	759.47	759.47	0	757.84	757.85	-0.01
	u/s SW Loop 410	142963	758.76	758.78	-0.02	757.15	757.16	-0.01	755.65	755.66	-0.01
	d/s SW Loop 410	142391	748.71	748.72	-0.01	747.01	747.02	-0.01	745.17	745.19	-0.02
		141639	745.85	745.85	0	743.88	743.89	-0.01	741.82	741.83	-0.01
	u/s Leon Trib G	139942	743.79	743.79	0	741.99	742	-0.01	739.95	739.97	-0.02
	d/s Leon Trib G	139336	743.75	743.74	0.01	741.95	741.95	0	739.91	739.92	-0.01
	u/s TX Hwy 151	136389	736.91	736.93	-0.02	735.03	735.04	-0.01	732.95	732.97	-0.02
	d/s TX Hwy 151	135790	733.28	733.3	-0.02	731.83	731.84	-0.01	730.28	730.28	0
	u/s Pinn Rd	134897	732.54	732.57	-0.03	731.01	731.02	-0.01	729.33	729.34	-0.01
	d/s Pinn Rd	134762	732.26	732.27	-0.01	730.77	730.78	-0.01	729.14	729.15	-0.01
	u/s Old Hwy 90 W	118873	703.14	703.16	-0.02	701.7	701.7	0	700	700	0
	d/s Old Hwy 90 W	118757	702.39	702.41	-0.02	700.62	700.63	-0.01	698.65	698.65	0
	u/s US Hwy 90 W	117144	696.37	696.38	-0.01	695.28	695.29	-0.01	694.26	694.26	0
	d/s US Hwy 90 W	116690	690.11	690.11	0	689.06	689.06	0	687.82	687.82	0
	u/s Leon Trib E	102466	670.25	670.25	0	668.8	668.8	0	667.23	667.24	-0.01
	d/s Leon Trib E	102236	670.29	670.29	0	668.84	668.84	0	667.27	667.28	-0.01
	u/s Leon Trib D	97465	663.85	663.84	0.01	662.32	662.32	0	660.53	660.54	-0.01
	d/s Leon Trib D	96588	661.77	661.74	0.03	660.18	660.17	0.01	658.27	658.29	-0.02
	u/s SW Military Dr	88636	650.44	650.44	0	649.49	649.49	0	648.32	648.32	0
	d/s SW Military Dr	87864	646.92	646.92	0	645.66	645.66	0	644.13	644.13	0
	u/s Leon Trib C	82969	638.47	638.47	0	636.93	636.94	-0.01	635.07	635.08	-0.01
	d/s Leon Trib C	82554	638.4	638.41	-0.01	636.86	636.86	0	634.98	634.98	0

Table G.1-23

Alternative 10: Helotes Channel Improvements

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Helotes Creek		15905	919.66	919.66	0	919.32	919.32	0	918.49	918.49	0
		14316	918.94	918.94	0	918.68	918.68	0	917.97	917.97	0
	d/s SW Loop 1604	13795	909.72	907.33	2.39	909.28	907.07	2.21	908.14	906.35	1.79
		12631	907.1	904.65	2.45	906.45	904.11	2.34	904.76	902.76	2
		11477	903.76	901.31	2.45	903.17	900.75	2.42	901.49	899.3	2.19
		10305	901.56	899.32	2.24	900.98	898.74	2.24	899.34	897.3	2.04
	AOI 12	9407	898.47	896.2	2.27	897.82	895.37	2.45	896.2	893.48	2.72
	AOI 12	8499	895.71	893.23	2.48	894.67	892.16	2.51	892.83	890.44	2.39
	AOI 12	7731	890.51	887.79	2.72	889.66	886.46	3.2	887.84	885.01	2.83
	AOI 12	6606	887.83	884.84	2.99	886.99	883.13	3.86	885.12	881.21	3.91
		5108	879	879.24	-0.24	877.9	878.19	-0.29	876.22	876.61	-0.39
		4777	876.09	876.09	0	874.83	874.83	0	873.14	873.14	0
		4617	875.97	875.97	0	874.7	874.7	0	872.99	872.99	0

Table G.1-24

Alternative 11: AECOM DC-12 Helotes Creek RSWF

Stream	Location / AOI #	Cross-section	100 WSEL (ft)	100 WSEL (ft)	Difference	50 WSEL (ft)	50 WSEL (ft)	Difference	25 WSEL (ft)	25 WSEL (ft)	Difference
			FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj
Helotes Creek	d/s Helotes RSWF	26428	962.09	961.08	1.01	961.64	959.98	1.66	960.28	958.92	1.36
	u/s Braun Rd	21806	955.51	954.47	1.04	954.94	953.29	1.65	953.86	952.15	1.71
	d/s Braun Rd	21577	955.37	954.26	1.11	954.75	953.06	1.69	953.64	951.98	1.66
	u/s SW Loop 1604	14111	918.85	918.28	0.57	918.59	917.74	0.85	917.88	914.42	3.46
	d/s SW Loop 1604	13795	909.72	908.76	0.96	909.28	907.91	1.37	908.14	907	1.14
	AOI 12	9407	898.47	897.22	1.25	897.82	895.94	1.88	896.2	894.53	1.67
	AOI 12	7731	890.51	889.26	1.25	889.66	887.76	1.9	887.84	885.95	1.89
	AOI 12	6267	886.44	884.83	1.61	885.36	883.35	2.01	883.44	881.56	1.88
	u/s confluence Culebra Crk / AOI 5	702	849.22	848.43	0.79	848.65	847.8	0.85	847.84	847.18	0.66
Culebra Creek	d/s confluence Helotes Creek / AOI 5	24901	854.75	852.72	2.03	852.88	851.21	1.67	850.73	849.45	1.28
	u/s Culebra Rd / AOI 5	24033	853	850.91	2.09	851.09	849.23	1.86	848.71	847.31	1.4
	d/s Culebra Rd / AOI 5	23896	852.46	850.39	2.07	850.57	848.8	1.77	848.33	846.97	1.36
	AOI 5	15208	824.77	823.45	1.32	823.38	822.64	0.74	822.4	820.02	2.38
	AOI 5	9168	808.15	806.7	1.45	806.57	805.65	0.92	805.35	804.28	1.07
	u/s Culebra Trib A / AOI 5	5742	793.62	792.63	0.99	792.51	791.91	0.6	791.64	790.64	1
	d/s Culebra Trib A / AOI 5	5310	790.02	789.01	1.01	788.88	788.02	0.86	787.66	786.28	1.38
Leon Creek	u/s confluence Leon Creek / AOI 5	1927	775.77	774.34	1.43	774.16	773.31	0.85	772.94	771.79	1.15
	d/s confluence Culebra Creek	151954	778.44	777.39	1.05	776.5	775.74	0.76	774.5	773.34	1.16
	u/s SW Loop 410	142821	758.54	757.8	0.74	756.78	755.9	0.88	755.06	754.42	0.64
	d/s SW Loop 410	142600	758.5	757.79	0.71	756.79	755.8	0.99	754.7	753.87	0.83
	u/s Leon Trib G	139942	743.79	743.07	0.73	741.99	741.16	0.83	739.95	738.82	1.13
	d/s Leon Trib G	139336	743.75	743.02	0.74	741.95	741.12	0.83	739.91	738.78	1.13
	u/s TX Hwy 151/Stotzer Frwy	136282	735.82	735.12	0.7	734.07	733.31	0.77	732.15	731.1	1.05
	d/s TX Hwy 151/Stotzer Frwy	136045	735.47	734.79	0.68	733.77	733.03	0.75	731.9	730.88	1.02
	u/s Leon Trib F	127612	714.31	713.91	0.4	713.27	712.79	0.47	712.05	711.35	0.7
	d/s Leon Trib F	126859	714.06	713.67	0.39	713.04	712.58	0.46	711.85	711.16	0.69
	u/s US Hwy 90 W	116958	693.29	693.27	0.02	693.01	692.69	0.32	692.45	692.2	0.25
	d/s US Hwy 90 W	116825	688.52	688.34	0.18	688	687.75	0.25	687.28	686.76	0.52
		110862	680.72	680.17	0.55	679.22	678.56	0.66	677.2	676.22	0.98
	u/s Leon Trib E	102466	670.25	669.69	0.56	668.8	668.21	0.59	667.23	666.49	0.74
	d/s Leon Trib E	102236	670.29	669.75	0.54	668.84	668.25	0.59	667.27	666.54	0.73
	u/s Leon Trib D	97465	663.85	663.29	0.57	662.32	661.69	0.64	660.53	659.67	0.86
	d/s Leon Trib D	96588	661.77	661.18	0.61	660.18	659.54	0.66	658.27	657.37	0.9
	u/s Military Dr SW	88636	650.44	650.13	0.31	649.49	649.09	0.4	648.32	647.37	0.95
	d/s Military Dr SW / AOI 2	87864	646.92	646.5	0.42	645.66	645.13	0.53	644.13	643.43	0.7
	AOI 2	86207	639.47	638.97	0.5	638.04	637.46	0.58	636.62	636.3	0.32
	AOI 2	84973	639.03	638.53	0.49	637.63	637.09	0.54	636.05	635.19	0.86
	u/s New Laredo Hwy	69321	618.16	618.08	0.08	617.74	617.49	0.25	617.06	616.75	0.31
	d/s New Laredo Hwy	68856	614.8	614.38	0.42	614.08	613.93	0.15	613.65	613.48	0.17
	u/s IH 35 S	62942	608.67	608.38	0.29	607.8	607.44	0.36	606.77	606.34	0.43
	d/s IH 35 S	62806	608.11	607.82	0.28	607.23	606.87	0.36	606.23	605.81	0.42
	u/s Leon Trib B	57417	597.39	597.23	0.16	596.93	596.74	0.19	596.21	595.88	0.33
	d/s Leon Trib B	56444	596.97	596.83	0.14	596.57	596.42	0.15	595.92	595.61	0.31
	u/s SE Loop 410	55095	596.3	596.19	0.11	596.02	595.92	0.1	595.46	595.17	0.29
	d/s SE Loop 410	54631	594.64	594.38	0.26	593.78	592.1	1.68	591.87	591.66	0.21
	u/s Leon Trib A	51940	590.49	590.26	0.23	589.1	588.75	0.35	587.31	586.19	1.12
	d/s Leon Trib A	51046	587.1	586.81	0.29	586.16	585.81	0.35	585.04	584.5	0.54
	d/s Indian Creek	36743	572.86	572.49	0.37	571.64	571.22	0.42	570.37	570.03	0.34
	u/s Indian Creek	35989	572.56	572.19	0.37	571.35	570.94	0.4	570.1	569.79	0.31
	u/s Palo Alto Rd	32858	567.79	567.66	0.13	567.33	567.2	0.13	566.85	567.06	-0.21
	d/s Palo Alto Rd	32681	562.49	562.18	0.31	561.4	560.94	0.46	559.91	559.01	0.9
	u/s Comanche Creek	9432	522.15	520.84	1.31	517.92	516.58	1.34	513.41	511.85	1.56
	d/s Comanche Creek	8907	522.44	521.09	1.35	518.09	516.72	1.37	513.46	511.84	1.62
		1770	511.32	509.96	1.36	506.79	505.36	1.43	501.91	500.25	1.66
		426	511.55	510.21	1.34	507.07	505.64	1.43	502.18	500.51	1.67

Table G.1-25

Alternative 12: Half Helotes-Quarry Pond

Stream	Location / AOI #	Cross-section	100 WSEL (ft)	100 WSEL (ft)	Difference	50 WSEL (ft)	50 WSEL (ft)	Difference	25 WSEL (ft)	25 WSEL (ft)	Difference
			FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj
Helotes Creek	d/s Helotes RSWF	26428	962.09	957.72	4.37	961.64	957.39	4.25	960.28	956.75	3.53
	u/s Braun Rd	21806	955.51	949.11	6.4	954.94	948.08	6.86	953.86	946.38	7.48
	d/s Braun Rd	21577	955.37	948.92	6.45	954.75	947.88	6.87	953.64	946.18	7.46
	u/s SW Loop 1604	14111	918.85	911.68	7.17	918.59	910.91	7.68	917.88	909.51	8.37
	d/s SW Loop 1604	13795	909.72	905.95	3.77	909.28	905.64	3.64	908.14	905.06	3.08
	AOI 12	9407	898.47	892.88	5.59	897.82	892.26	5.56	896.2	891.27	4.93
	AOI 12	7731	890.51	884.72	5.79	889.66	884.06	5.6	887.84	883.26	4.58
	AOI 12	6267	886.44	880.1	6.34	885.36	879.28	6.08	883.44	878.27	5.17
	u/s confluence Culebra Crk / AOI 5	702	849.22	846.6	2.62	848.65	846.19	2.46	847.84	845.73	2.11
					0			0		0	0
Culebra Creek	d/s confluence Helotes Creek / AOI 5	24901	854.75	852.18	2.57	852.88	850.66	2.22	850.73	849.25	1.48
	u/s Culebra Rd / AOI 5	24033	853	850.35	2.65	851.09	848.64	2.45	848.71	847.1	1.61
	d/s Culebra Rd / AOI 5	23896	852.46	849.83	2.63	850.57	848.26	2.31	848.33	846.76	1.57
	AOI 5	15208	824.77	823.11	1.66	823.38	822.39	0.99	822.4	819.76	2.64
	AOI 5	9168	808.15	806.28	1.87	806.57	805.36	1.21	805.35	804.1	1.25
	u/s Culebra Trib A / AOI 5	5742	793.62	792.36	1.26	792.51	791.68	0.83	791.64	790.47	1.17
	d/s Culebra Trib A / AOI 5	5310	790.02	788.66	1.36	788.88	787.71	1.17	787.66	786.1	1.56
	u/s confluence Leon Creek / AOI 5	1927	775.77	773.97	1.8	774.16	772.99	1.17	772.94	771.58	1.36
Leon Creek					0			0		0	0
	d/s confluence Culebra Creek	151954	778.44	777.45	0.99	776.5	775.83	0.67	774.5	773.43	1.07
	u/s SW Loop 410	142821	758.54	757.99	0.55	756.78	756.03	0.75	755.06	754.56	0.5
	d/s SW Loop 410	142600	758.5	757.98	0.52	756.79	756	0.79	754.7	754.03	0.67
	u/s Leon Trib G	139942	743.79	743.25	0.54	741.99	741.36	0.63	739.95	739.08	0.87
	d/s Leon Trib G	139336	743.75	743.21	0.54	741.95	741.32	0.63	739.91	739.03	0.88
	u/s TX Hwy 151/Stotzer Frwy	136282	735.82	735.29	0.53	734.07	733.47	0.6	732.15	731.32	0.83
	d/s TX Hwy 151/Stotzer Frwy	136045	735.47	734.96	0.51	733.77	733.19	0.58	731.9	731.1	0.8
	u/s Leon Trib F	127612	714.31	714.01	0.3	713.27	712.89	0.38	712.05	711.5	0.55
	d/s Leon Trib F	126859	714.06	713.77	0.29	713.04	712.67	0.37	711.85	711.31	0.54
	u/s US Hwy 90 W	116958	693.29	693.28	0.01	693.01	692.71	0.3	692.45	692.26	0.19
	d/s US Hwy 90 W	116825	688.52	688.4	0.12	688	687.81	0.19	687.28	686.88	0.4
		110862	680.72	680.33	0.39	679.22	678.7	0.52	677.2	676.44	0.76
	u/s Leon Trib E	102466	670.25	669.86	0.39	668.8	668.34	0.46	667.23	666.67	0.56
	d/s Leon Trib E	102236	670.29	669.91	0.38	668.84	668.39	0.45	667.27	666.71	0.56
	u/s Leon Trib D	97465	663.85	663.44	0.41	662.32	661.83	0.49	660.53	659.85	0.68
	d/s Leon Trib D	96588	661.77	661.32	0.45	660.18	659.68	0.5	658.27	657.55	0.72
	u/s Military Dr SW	88636	650.44	650.21	0.23	649.49	649.18	0.31	648.32	647.55	0.77
	d/s Military Dr SW / AOI 2	87864	646.92	646.61	0.31	645.66	645.24	0.42	644.13	643.6	0.53
	AOI 2	86207	639.47	639.13	0.34	638.04	637.59	0.45	636.62	636.4	0.22
	AOI 2	84973	639.03	638.7	0.33	637.63	637.21	0.42	636.05	635.4	0.65
	u/s New Laredo Hwy	69321	618.16	618.09	0.07	617.74	617.52	0.22	617.06	616.8	0.26
	d/s New Laredo Hwy	68856	614.8	614.5	0.3	614.08	613.97	0.11	613.65	613.55	0.1
	u/s IH 35 S	62942	608.67	608.47	0.2	607.8	607.51	0.29	606.77	606.43	0.34
	d/s IH 35 S	62806	608.11	607.9	0.21	607.23	606.94	0.29	606.23	605.9	0.33
	u/s Leon Trib B	57417	597.39	597.27	0.12	596.93	596.73	0.2	596.21	595.95	0.26
	d/s Leon Trib B	56444	596.97	596.87	0.1	596.57	596.39	0.18	595.92	595.68	0.24
	u/s SE Loop 410	55095	596.3	596.23	0.07	596.02	595.87	0.15	595.46	595.23	0.23
	d/s SE Loop 410	54631	594.64	594.45	0.19	593.78	593.53	0.25	591.87	591.72	0.15
	u/s Leon Trib A	51940	590.49	590.32	0.17	589.1	588.79	0.31	587.31	586.78	0.53
	d/s Leon Trib A	51046	587.1	586.88	0.22	586.16	585.85	0.31	585.04	584.64	0.4
	d/s Indian Creek	36743	572.86	572.6	0.26	571.64	571.29	0.35	570.37	570.23	0.14
	u/s Indian Creek	35989	572.56	572.3	0.26	571.35	571.01	0.34	570.1	570	0.1
	u/s Palo Alto Rd	32858	567.79	567.71	0.08	567.33	567.23	0.1	566.85	567.36	-0.51
	d/s Palo Alto Rd	32681	562.49	562.26	0.23	561.4	561	0.4	559.91	559.19	0.72
	u/s Comanche Creek	9432	522.15	520.97	1.18	517.92	516.67	1.25	513.41	511.97	1.44
	d/s Comanche Creek	8907	522.44	521.22	1.22	518.09	516.8	1.29	513.46	511.97	1.49
		1770	511.32	510.05	1.27	506.79	505.43	1.36	501.91	500.36	1.55
		426	511.55	510.29	1.26	507.07	505.72	1.35	502.18	500.62	1.56

Table G.1-26
Alternative 13: Half Government Canyon Pond

Stream	Location / AOI #	Cross_section	100 WSEL (ft)	100 WSEL (ft)	Difference (Wd - WfPm)	50 WSEL (ft)	50 WSEL (ft)	Difference (Wd - WfPm)	25 WSEL (ft)	25 WSEL (ft)	Difference (Wd - WfPm)
Govt Canyon Creek	d/s Proposed Pond	17345	1023.83	1023.83	0	1022.27	1022.27	0	1021.06	1021.06	0
		14403	1002.79	1002.73	-0.06	1001.73	1001.67	-0.06	1000.51	1000.46	-0.05
		12367	990.94	981.17	-9.24	990.17	981.53	-8.64	989.2	981.33	-7.87
		10144	978.4	970.75	-7.65	977.79	970.67	-7.12	976.85	970.55	-6.3
	u/s Govt Canyon Trib B	7930	964.71	960.87	-3.84	964.17	960.57	-3.6	963.39	960.21	-3.18
	d/s Govt Canyon Trib B	7595	962.22	958.86	-3.36	961.62	958.48	-3.14	960.97	957.91	-3.06
	u/s Govt Canyon Trib A	6429	955.35	952.65	-2.7	954.68	952.21	-2.44	953.95	951.74	-2.21
	d/s Govt Canyon Trib A	6038	953.41	950.65	-2.76	952.65	950.2	-2.45	951.92	949.76	-2.16
		3685	941.93	939.45	-2.48	941.35	939.07	-2.29	940.64	938.56	-2.08
		2380	933.09	929.97	-3.12	932.31	929.22	-3.09	931.44	928.29	-3.15
	u/s confluence w/Leon Crk	94	925.69	923.61	-2.28	923.33	923.19	-2.14	924.69	922.63	-2.06
				0		0		0		0	
Culebra Creek	d/s Govt Canyon Creek	43882	923.99	921.91	-1.58	922.85	921.36	-1.49	922.09	920.65	-1.44
	u/s FM 1560	37375	900.72	889.46	-1.26	900.22	889.99	-1.23	889.58	889.29	-1.29
	d/s FM 1560	37200	889.63	886.89	-1.74	897.96	896.25	-1.71	897.07	895.4	-1.67
	u/s Culebra Trib C	33377	886.41	885.27	-1.14	885.61	884.59	-1.02	884.72	883.59	-1.13
	d/s Culebra Trib C	32968	885.78	884.64	-1.14	884.97	883.88	-1.09	884.08	882.96	-1.12
	u/s Culebra Trib B	28686	871.22	868.84	-2.38	869.31	867.45	-1.86	867.65	865.49	-2.16
	d/s Culebra Trib B	28422	870.03	868.27	-2.76	867.8	865.88	-1.92	866.07	864.04	-2.03
	u/s SW Loop 104	26041	864.54	862.54	-2.12	864.54	862.54	-1.54	861.46	859.83	-1.63
	d/s SW Loop 104	27827	863.89	861.86	-2.03	860.34	860.86	-1.48	860.62	859.15	-1.57
	u/s Helotes Creek / AOI 5	25489	856.59	855.1	-1.49	854.91	853.32	-1.59	852.99	851.85	-1.14
	d/s Helotes Creek / AOI 5	24901	854.75	853.06	-1.69	852.88	851.07	-1.81	850.73	849.49	-1.24
	u/s Culebra Rd / AOI 5	24033	853	851.27	-1.73	851.09	849.08	-2.01	848.71	847.36	-1.35
	d/s Culebra Rd / AOI 5	23896	852.46	850.75	-1.71	850.57	848.67	-1.9	848.33	847.01	-1.32
	AOI 5	19870	838.55	836.88	-1.67	836.69	835.45	-1.24	835.16	833.84	-1.32
	AOI 5	15582	825.03	823.8	-1.23	823.66	822.89	-0.77	822.69	820.61	-2.08
	d/s Tezel Rd / AOI 5	13259	821.2	820.34	-0.86	820.23	819.7	-0.53	819.57	815.77	-3.8
	d/s Tezel Rd / AOI 5	13109	818.34	816.71	-1.63	816.5	815.44	-1.06	815.15	813.91	-1.24
	u/s Timber Path / AOI 5	9773	810.19	809.39	-0.8	809.25	808.77	-0.48	808.63	808.05	-0.58
	d/s Timber Path / AOI 5	9663	810.99	809.79	-1.2	809.61	808.61	-1	808.33	807.21	-1.12
	AOI 5	5742	793.62	792.66	-0.96	792.51	791.87	-0.64	791.64	790.72	-0.92
	u/s confluence Leon Creek / AOI 5	1927	775.77	774.38	-1.39	774.16	773.27	-0.89	772.94	771.89	-1.05
Leon Creek	d/s confluence Culebra Creek	151954	778.44	777.78	-0.66	776.5	775.93	-0.57	774.5	773.67	-0.83
	d/s Ingram Rd	148983	769.61	769.26	-0.35	768.19	767.75	-0.44	766.55	765.9	-0.65
	d/s Ingram Rd	148848	769.15	768.82	-0.33	767.73	767.29	-0.44	766.03	765.36	-0.67
	u/s Huebner Creek	148048	768.76	768.46	-0.3	767.36	766.94	-0.42	765.69	765.02	-0.67
	d/s Huebner Creek	147620	767.93	767.63	-0.3	766.57	766.16	-0.41	764.95	764.31	-0.64
	d/s Culebra Rd	145073	761.08	760.72	-0.36	759.56	759.06	-0.5	757.94	757.41	-0.53
	d/s Culebra Rd	144862	761.03	760.67	-0.36	759.47	758.96	-0.51	757.84	757.31	-0.53
	u/s SW Loop 410	142963	758.76	758.37	-0.39	757.15	756.8	-0.55	755.65	755.24	-0.41
	d/s SW Loop 410	139842	743.79	743.38	-0.41	741.98	741.45	-0.54	739.95	739.28	-0.7
	d/s Leon Trib G	139336	743.75	743.33	-0.42	741.95	741.41	-0.54	739.31	739.2	-0.71
	d/s Leon Trib G	136389	736.91	736.48	-0.43	735.03	734.48	-0.55	732.95	732.22	-0.73
	d/s TX Hwy 151	135790	733.28	732.94	-0.34	731.83	731.42	-0.41	730.28	729.73	-0.55
	u/s Leon Trib F	127612	714.31	714.09	-0.22	712.27	712.95	-0.32	712.05	711.6	-0.45
	d/s Leon Trib F	126859	714.06	713.84	-0.22	712.04	712.73	-0.31	711.85	711.41	-0.44
	u/s Slick Ranch	124054	706.71	705.97	-0.13	705.53	705.37	-0.16	704.83	704.61	-0.22
	d/s Slick Ranch	123319	705.36	705.09	-0.21	703.99	703.61	-0.38	702.41	701.87	-0.54
	u/s Westwood Village Creek	117898	697.65	697.44	-0.21	696.75	696.6	-0.15	695.75	695.32	-0.43
	d/s J405	117405	692.7	686.43	-0.24	692.13	685.97	-0.16	684.94	684.55	-0.39
	d/s US Hwy 90 W	116620	690.11	689.9	-0.21	689.06	689.75	-0.31	687.82	687.61	-0.41
	d/s US Hwy 90 W	116620	690.11	689.9	-0.21	689.06	689.75	-0.31	687.82	687.61	-0.41
	d/s Leon Trib E	102466	670.25	669.97	-0.28	668.8	668.41	-0.39	667.23	667.77	-0.46
	d/s Leon Trib E	102236	670.29	670.02	-0.27	668.84	668.46	-0.38	667.27	666.81	-0.46
	d/s Leon Trib D	97465	663.85	663.52	-0.33	662.32	661.91	-0.41	660.53	659.98	-0.55
	d/s Leon Trib D	95658	661.77	661.4	-0.37	660.18	659.76	-0.42	658.27	657.7	-0.57
	u/s Elmore Hill Blvd	95755	660.3	659.87	-0.43	658.5	658.01	-0.49	656.5	655.82	-0.68
	d/s Elmore Hill Blvd	95690	660.71	660.33	-0.38	659.01	658.55	-0.46	657.02	656.33	-0.69
	u/s Military Dr SW	88636	650.44	650.26	-0.18	649.49	649.23	-0.26	648.32	647.66	-0.66
	d/s Military Dr SW	87844	646.92	646.69	-0.23	645.66	645.31	-0.35	644.13	643.7	-0.43
	AOI 2	87627	646.3	646.38	-0.22	646.29	645.02	-0.31	643.8	643.36	-0.44
	AOI 2	860	637	637	-0.01	636.94	637.65	-0.59	636.63	636.45	-0.1
	AOI 2	824973	639.03	638.78	-0.25	637.63	637.61	-0.38	636.05	636.03	-0.54
	d/s Leon Trib C	82989	638.47	638.2	-0.27	636.93	636.54	-0.39	635.07	634.32	-0.75
	d/s Leon Trib C	82554	638.4	638.13	-0.27	636.86	636.46	-0.4	634.38	634.23	-0.77
	u/s Quintana Rd	71561	622.93	622.82	-0.11	622.32	622.14	-0.18	617.77	617.42	-0.35
	d/s Quintana Rd	71115	619.74	619.64	-0.1	619.12	618.9	-0.22	618.66	618.4	-0.26
	u/s New Laredo Hwy / AOI 1	69321	618.16	618.11	-0.05	617.74	617.55	-0.19	617.06	616.85	-0.21
	d/s New Laredo Hwy / AOI 1	68856	618.4	614.57	-0.23	614.08	613.99	-0.09	613.65	613.57	-0.08
	u/s IH 35 S	63024	609.12	608.95	-0.17	608.19	607.97	-0.22	607.11	606.82	-0.29
	d/s IH 35 S	62672	607.67	607.51	-0.16	606.81	606.57	-0.24	605.81	605.54	-0.27
	u/s Leon Trib B	57413	597.39	597.13	-0.06	596.93	596.77	-0.16	596.21	596.16	-0.21
	d/s Leon Trib B	57414	598.03	598.03	-0.03	598.07	598.03	-0.04	598.32	598.72	-0.2
	d/s SE Loop 410	55005	596.3	596.24	-0.05	596.02	596.31	-0.11	595.46	595.2	-0.19
	d/s SE Loop 410	54631	594.64	594.49	-0.14	593.78	593.67	-0.21	591.87	591.76	-0.12
	u/s Leon Trib A	51940	590.49	590.36	-0.13	589.1	588.85	-0.25	587.31	586.89	-0.42
	d/s Leon Trib A	51046	587.1	586.93	-0.17	586.16	585.91	-0.25	585.04	584.72	-0.32
	u/s Indian Creek	36743	572.86	572.66	-0.2	571.64	571.35	-0.29	570.37	570.41	-0.04
	d/s Indian Creek	35989	572.56	572.35	-0.21	571.35	571.07	-0.28	570.1	570.18	-0.08
	u/s Palo Alto Rd	32858	567.79	567.73	-0.06	567.33	567.24	-0.09	566.85	567.63	-0.78
	d/s Palo Alto Rd	32681	562.49	562.31	-0.18	561.4	561.08	-0.32	559.91	559.47	-0.44
	u/s Applewhite Rd	25143	553.37	552.94	-0.43	553.51	551.94	-1.57	545.03	544.1	-0.93
	d/s Applewhite Rd	25092	550.86	550.91	-0.76	547.05	546.19	-0.86	543.29	542.35	-0.94
	u/s Applewhite Rd	25143	553.37	552.94	-0.43	553.51	551.94	-1.57	545.03	544.1	-0.93
	u/s Comanche Creek	9432	522.15	521.25	-0.9	517.97	516.91	-1.01	513.41	512.49	-1.12
	d/s Comanche Creek	8901	522.44	521.81	-0.63	518.05	517.06	-1.03	513.46	512.33	-1.14
	most d/s Leon Creek	426	511.65	510.6	-0.05	507.07	505.92	-1.08	502.18	500.97	-1.21

Table G.1-27

Alternative 14: AECOM Government Canyon RSWF

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference W/O - W/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Govt Canyon Creek	d/s Govt Canyon RSWF	19917	1044.71	1044.71	0	1043.67	1043.67	0	1042.51	1042.51	0
	u/s Govt Canyon Trib C	18525	1034.77	1034.77	0	1033.52	1033.52	0	1031.89	1031.89	0
	d/s Govt Canyon Trib C	18014	1029.09	1029.09	0	1027.83	1027.83	0	1026.35	1026.35	0
		16005	1012.58	1012.58	0	1011.69	1011.69	0	1010.71	1010.71	0
		14085	1000.77	1000.68	0.09	999.6	999.49	0.11	998.27	998.16	0.11
		11463	986	973.68	12.32	985.31	973.43	11.88	984.34	973.15	11.19
	u/s Govt Canyon Trib B	7930	964.71	960.2	4.51	964.17	959.97	4.2	963.39	959.82	3.57
	d/s Govt Canyon Trib B	7595	962.22	958.19	4.03	961.62	957.74	3.88	960.97	957.09	3.88
	u/s Govt Canyon Trib A	6429	955.35	952.14	3.21	954.65	951.76	2.89	953.95	951.31	2.64
	d/s Govt Canyon Trib A	6038	953.41	950.14	3.27	952.65	949.79	2.86	951.92	949.36	2.56
		3573	941.41	938.59	2.82	940.86	938.19	2.67	940.15	937.71	2.44
	u/s confluence Leon Crk	94	925.89	923.15	2.74	925.33	922.68	2.65	924.69	921.96	2.73
Culebra Creek	d/s confluence Govt Canyon Crk	43882	923.49	921.61	1.88	922.85	921.02	1.83	922.09	920.42	1.67
		41613	911.65	909.79	1.86	910.99	909.23	1.76	910.25	908.59	1.66
		39536	905.21	903.14	2.07	904.54	902.78	1.76	903.69	901.72	1.97
		39430	904.37	902.2	2.17	903.64	901.55	2.09	902.74	900.72	2.02
	u/s FM 1560	37375	900.72	899.2	1.52	900.22	898.69	1.53	899.58	897.91	1.67
	d/s FM 1560	37200	898.63	896.53	2.1	897.96	895.88	2.08	897.07	894.97	2.1
	u/s Culebra Trib D	36050	893.79	892.1	1.69	893.1	891.38	1.72	892.22	890.63	1.59
	d/s Culebra Trib D	35335	892.45	890.88	1.57	891.82	890.22	1.6	890.94	889.54	1.4
	u/s Culebra Trib C	33377	886.41	885.02	1.39	885.61	884.27	1.34	884.72	883.41	1.31
	d/s Culebra Trib C	32968	885.78	884.39	1.39	884.97	883.62	1.35	884.08	882.8	1.28
	u/s Westwood Loop	29583	874.69	872.62	2.07	873.42	871.45	1.97	872.03	870.28	1.75
	d/s Westwood Loop	29457	873.63	871.48	2.15	872.31	870.19	2.12	870.86	868.84	2.02
	u/s Culebra Trib B	28686	871.22	868.45	2.77	869.31	866.9	2.41	867.65	865.17	2.48
	d/s Culebra Trib B	28422	870.03	866.86	3.17	867.8	865.37	2.43	866.07	863.75	2.32
	u/s SW Loop 1604	28004	864.46	862	2.46	862.84	860.87	1.97	861.46	859.59	1.87
	d/s SW Loop 1604	27827	863.89	861.52	2.37	862.34	860.45	1.89	861.02	859.22	1.8
	u/s Helotes Creek / AOI 5	25268	855.54	853.64	1.9	853.8	851.9	1.9	851.85	850.44	1.41
	d/s Helotes Creek / AOI 5	24901	854.75	852.7	2.05	852.88	850.78	2.1	850.73	849.21	1.52
	u/s Culebra Rd	24033	853	850.9	2.1	851.09	848.76	2.33	848.71	847.05	1.66
	d/s Culebra Rd	23896	852.46	850.37	2.09	850.57	848.37	2.2	848.33	846.72	1.61
		19491	836.12	834.31	1.81	834.39	833.49	0.9	833.45	831.97	1.48
	u/s Tezel Rd / AOI 5	13259	821.2	820.18	1.02	820.23	819.6	0.63	819.57	815.29	4.28
	d/s Tezel Rd / AOI 5	13109	818.34	816.4	1.94	816.5	815.21	1.29	815.15	813.57	1.58
	u/s Timber Path / AOI 5	9773	810.19	809.22	0.97	809.25	808.66	0.59	808.63	807.87	0.76
	d/s Timber Path / AOI 5	9663	810.99	809.53	1.46	809.61	808.39	1.22	808.33	806.92	1.41
	u/s Old Grissom Rd / AOI 5	7743	800.97	799.72	1.25	799.76	798.82	0.94	798.72	797.45	1.27
	d/s Old Grissom rd / AOI 5	7587	800.86	799.71	1.15	799.75	798.87	0.88	798.79	797.59	1.2
	u/s Culebra Trib A / AOI 5	5742	793.62	792.48	1.14	792.51	791.72	0.79	791.64	790.49	1.15
	d/s Culebra Trib A / AOI 5	5310	790.02	788.84	1.18	788.88	787.76	1.12	787.66	786.09	1.57
	u/s confluence Leon Crk / AOI 5	1927	775.77	774.13	1.64	774.16	773.05	1.11	772.94	771.61	1.33

Alternative 14: AECOM Government Canyon RSWF

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference W/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference W/o - w/Proj
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Table G.1-27

Alternative 14: AECOM Government Canyon RSWF

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference W/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference W/o - w/Proj
Leon Creek	d/s confluence Culebra Creek	151954	778.44	777.46	0.98	776.5	775.75	0.75	774.5	773.39	1.11
	u/s Ingram Rd	148983	769.61	769.14	0.47	768.19	767.59	0.6	766.55	765.69	0.86
	d/s Ingram Rd	148848	769.15	768.69	0.46	767.73	767.13	0.6	766.03	765.15	0.88
	u/s Huebner Creek	148048	768.76	768.33	0.43	767.36	766.78	0.58	765.69	764.82	0.87
	d/s Huebner Creek	147620	767.93	767.51	0.42	766.57	766	0.57	764.95	764.11	0.84
	u/s Culebra Rd	145073	761.08	760.59	0.49	759.56	758.89	0.67	757.94	757.25	0.69
	d/s Culebra Rd	144862	761.03	760.53	0.5	759.47	758.79	0.68	757.84	757.15	0.69
	u/s NW Loop 410	142821	758.54	757.98	0.56	756.78	755.93	0.85	755.06	754.54	0.52
	d/s NW Loop 410	142600	758.5	757.96	0.54	756.79	755.88	0.91	754.7	753.99	0.71
	u/s Commerce St W	137060	740.12	739.55	0.57	738.23	737.44	0.79	736.07	735.06	1.01
	d/s Commerce St W	136902	740.01	739.4	0.61	738.1	737.31	0.79	735.93	734.93	1
	u/s TX hwy 151/Stotzer Frwy	136282	735.82	735.26	0.56	734.07	733.37	0.7	732.15	731.26	0.89
	d/s TX hwy 151/Stotzer Frwy	136045	735.47	734.92	0.55	733.77	733.09	0.68	731.9	731.04	0.86
	u/s Pinn Rd	134897	732.54	732.1	0.44	731.01	730.4	0.61	729.33	728.56	0.77
	d/s Pinn Rd	134762	732.26	731.8	0.46	730.77	730.17	0.6	729.14	728.38	0.76
	u/s Leon Trib F	127612	714.31	713.99	0.32	713.27	712.83	0.44	712.05	711.47	0.58
	d/s Leon Trib F	126859	714.06	713.75	0.31	713.04	712.61	0.43	711.85	711.29	0.56
	u/s Slick Ranch Creek	124054	706.1	705.91	0.19	705.53	705.29	0.24	704.83	704.51	0.32
	d/s Slick Ranch Creek	123319	705.36	704.97	0.39	703.99	703.45	0.54	702.41	701.72	0.69
	u/s Old Hwy 90 W	118873	703.14	702.73	0.41	701.7	701.12	0.58	700	699.22	0.78
	d/s Old Hwy 90 W	118757	702.39	701.88	0.51	700.62	699.95	0.67	698.65	697.84	0.81
	u/s US Hwy 90	116958	693.29	693.28	0.01	693.01	692.71	0.3	692.45	692.25	0.2
	d/s US Hwy 90	116825	688.52	688.4	0.12	688	687.78	0.22	687.28	686.87	0.41
	u/s Leon Trib E	102466	670.25	669.81	0.44	668.8	668.26	0.54	667.23	666.65	0.58
	d/s Leon Trib E	102236	670.29	669.86	0.43	668.84	668.3	0.54	667.27	666.69	0.58
	u/s Kelly St	100040	668.32	667.92	0.4	666.98	666.48	0.5	665.54	665.02	0.52
	d/s Kelly St	99980	668.21	667.81	0.4	666.86	666.35	0.51	665.4	664.87	0.53
	u/s Leon Trib D	97465	663.85	663.39	0.46	662.32	661.73	0.59	660.53	659.83	0.7
	d/s Leon Trib D	96588	661.77	661.27	0.5	660.18	659.58	0.6	658.27	657.54	0.73
	u/s Military Dr SW	88636	650.44	650.18	0.26	649.49	649.13	0.36	648.32	647.52	0.8
	d/s Military Dr SW	87864	646.92	646.58	0.34	645.66	645.17	0.49	644.13	643.57	0.56
	AOI 2	86207	639.47	639.09	0.38	638.04	637.51	0.53	636.62	636.39	0.23
	AOI 2	85024	639.12	638.75	0.37	637.73	637.25	0.48	636.19	635.5	0.69
	u/s Leon Trib C	82969	638.47	638.07	0.4	636.93	636.38	0.55	635.07	634.06	1.01
	d/s Leon Trib C	82554	638.4	638	0.4	636.86	636.3	0.56	634.98	633.95	1.03
	u/s Quintana Rd / AOI 1	71561	622.93	622.77	0.16	622.32	622.07	0.25	621.77	621.35	0.42
	d/s Quintana Rd / AOI 1	71115	619.74	619.6	0.14	619.12	618.83	0.29	618.66	618.32	0.34
	u/s New Laredo Hwy / AOI 1	69321	618.16	618.09	0.07	617.74	617.5	0.24	617.06	616.78	0.28
	d/s New Laredo Hwy / AOI 1	68856	614.8	614.46	0.34	614.08	613.95	0.13	613.65	613.56	0.09
	u/s IH 35 S	62942	608.67	608.41	0.26	607.8	607.47	0.33	606.77	606.41	0.36
	d/s IH 35 S	62806	608.11	607.85	0.26	607.23	606.91	0.32	606.23	605.88	0.35
	u/s Leon Trib B	57417	597.39	597.26	0.13	596.93	596.79	0.14	596.21	595.94	0.27
	d/s Leon Trib B	56444	596.97	596.85	0.12	596.57	596.46	0.11	595.92	595.66	0.26
	u/s SE Loop 410	55095	596.3	596.21	0.09	596.02	595.97	0.05	595.46	595.22	0.24
	d/s SE Loop 410	54631	594.64	594.43	0.21	593.78	592.1	1.68	591.87	591.72	0.15
	u/s Leon Trib A	51940	590.49	590.3	0.19	589.1	588.75	0.35	587.31	586.75	0.56
	d/s Leon Trib A	51046	587.1	586.85	0.25	586.16	585.81	0.35	585.04	584.62	0.42
	u/s Indian Creek	36743	572.86	572.55	0.31	571.64	571.25	0.39	570.37	570.2	0.17
	d/s Indian Creek	35989	572.56	572.25	0.31	571.35	570.97	0.38	570.1	569.96	0.14
	u/s St Hwy 16	32858	567.79	567.69	0.1	567.33	567.26	0.07	566.85	567.31	-0.46
	d/s St Hwy 16	32681	562.49	562.23	0.26	561.4	560.92	0.48	559.91	559.15	0.76
	u/s Applewhite Rd	25143	553.37	552.86	0.51	553.51	546.84	6.67	545.03	543.64	1.39
	d/s Applewhite Rd	25092	550.86	549.67	1.19	547.05	545.86	1.19	543.29	542.08	1.21
	u/s Comanche Creek	9432	522.15	520.89	1.26	517.92	516.54	1.38	513.41	511.96	1.45
	d/s Comanche Creek	8907	522.44	521.14	1.3	518.09	516.68	1.41	513.46	511.96	1.5
		1770	511.32	509.99	1.33	506.79	505.31	1.48	501.91	500.36	1.55
		850	511.83	510.5	1.33	507.31	505.82	1.49	502.39	500.81	1.58
		426	511.55	510.23	1.32	507.07	505.59	1.48	502.18	500.62	1.56

Table G.1-28

Alternative 14b: Government Canyon Pond

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Govt Canyon Creek	d/s Proposed Pond	17345	1023.83	1020.91	2.92	1022.27	1020.49	1.78	1021.06	1019.82	1.24
		14403	1002.79	1000.36	2.43	1001.73	999.93	1.8	1000.51	999.23	1.28
		12367	990.94	989.23	1.71	990.17	988.85	1.32	989.2	988.15	1.05
		10144	978.4	976.88	1.52	977.79	976.49	1.3	976.85	975.93	0.92
	u/s Govt Canyon Trib B	7930	964.71	963.48	1.23	964.17	963.13	1.04	963.39	962.55	0.84
	d/s Govt Canyon Trib B	7595	962.22	961.06	1.16	961.62	960.7	0.92	960.97	960.23	0.74
	u/s Govt Canyon Trib A	6429	955.35	954.35	1	954.65	953.92	0.73	953.95	953.38	0.57
	d/s Govt Canyon Trib A	6038	953.41	952.33	1.08	952.65	951.88	0.77	951.92	951.37	0.55
		3685	941.93	941.08	0.85	941.35	940.6	0.75	940.64	940.12	0.52
		2380	933.09	932.01	1.08	932.31	931.46	0.85	931.44	930.81	0.63
Culebra Creek	u/s confluence w/Leon Crk	94	925.89	925.11	0.78	925.33	924.71	0.62	924.69	924.24	0.45
	d/s Govt Canyon Creek	43882	923.49	922.99	0.5	922.85	922.49	0.36	922.09	921.75	0.34
	u/s FM 1560	37375	900.72	900.33	0.39	900.22	899.87	0.35	899.58	899.31	0.27
	d/s FM 1560	37200	898.63	898.11	0.52	897.96	897.46	0.5	897.07	896.71	0.36
	u/s Culebra Trib C	33377	886.41	886.08	0.33	885.61	885.29	0.32	884.72	884.44	0.28
	d/s Culebra Trib C	32968	885.78	885.45	0.33	884.97	884.66	0.31	884.08	883.78	0.3
	u/s Culebra Trib B	28686	871.22	870.27	0.95	869.31	868.84	0.47	867.65	867.15	0.5
	d/s Culebra Trib B	28422	870.03	868.82	1.21	867.8	867.27	0.53	866.07	865.6	0.47
	u/s SW Loop 1604	28004	864.46	863.76	0.7	862.84	862.37	0.47	861.46	861.07	0.39
	d/s SW Loop 1604	27827	863.89	863.22	0.67	862.34	861.89	0.45	861.02	860.64	0.38
Leon Creek	u/s Helotes Creek / AOI 5	25489	856.59	856.31	0.28	854.91	854.5	0.41	852.99	852.76	0.23
	d/s Helotes Creek / AOI 5	24901	854.75	854.42	0.33	852.88	852.4	0.48	850.73	850.48	0.25
	u/s Culebra Rd / AOI 5	24033	853	852.66	0.34	851.09	850.57	0.52	848.71	848.44	0.27
	d/s Culebra Rd / AOI 5	23896	852.46	852.12	0.34	850.57	850.09	0.48	848.33	848.07	0.26
	AOI 5	19870	838.55	838.18	0.37	836.69	836.36	0.33	835.16	834.97	0.19
	AOI 5	15582	825.03	824.67	0.36	823.66	823.45	0.21	822.69	822.55	0.14
	u/s Tezel Rd / AOI 5	13259	821.2	820.8	0.4	820.23	820.08	0.15	819.57	819.48	0.09
	d/s Tezel Rd / AOI 5	13109	818.34	817.97	0.37	816.5	816.23	0.27	815.15	814.96	0.19
	u/s Timber Path / AOI 5	9773	810.19	809.96	0.23	809.25	809.15	0.1	808.63	808.55	0.08
	d/s Timber Path / AOI 5	9663	810.99	810.74	0.25	809.61	809.37	0.24	808.33	808.17	0.16
Leon Creek	AOI 5	5742	793.62	793.4	0.22	792.51	792.37	0.14	791.64	791.53	0.11
	u/s confluence Leon Creek / AOI 5	1927	775.77	775.45	0.32	774.16	773.97	0.19	772.94	772.8	0.14
	d/s confluence Culebra Creek	151954	778.44	778.23	0.21	776.5	776.4	0.1	774.5	774.37	0.13
	u/s Ingram Rd	148983	769.61	769.5	0.11	768.19	768.12	0.07	766.55	766.45	0.1
	d/s Ingram Rd	148484	769.15	769.04	0.11	767.73	767.66	0.07	766.03	765.93	0.1
	u/s Huebner Creek	148048	768.76	768.66	0.1	767.36	767.3	0.06	765.69	765.58	0.11
	d/s Huebner Creek	147620	767.93	767.83	0.1	766.57	766.5	0.07	764.95	764.85	0.1
	u/s Culebra Rd	145073	761.08	760.97	0.11	759.56	759.49	0.07	757.94	757.84	0.1
	d/s Culebra Rd	144862	761.03	760.92	0.11	759.47	759.4	0.07	757.84	757.75	0.09
	u/s SW Loop 410	142963	758.76	758.64	0.12	757.15	757.08	0.07	755.65	755.56	0.09
Leon Creek	d/s SW Loop 410	142391	748.71	748.59	0.12	747.01	746.93	0.08	745.17	745.07	0.1
	u/s Leon Trib G	139942	743.79	743.65	0.14	741.99	741.89	0.1	739.95	739.83	0.12
	d/s Leon Trib G	139336	743.75	743.61	0.14	741.95	741.85	0.1	739.91	739.79	0.12
	u/s TX HWY 151	136389	736.91	736.75	0.16	735.03	734.93	0.1	732.95	732.84	0.11
	d/s TX HWY 151	135790	733.28	733.14	0.14	731.83	731.76	0.07	730.28	730.19	0.09
	u/s Leon Trib F	127612	714.31	714.25	0.06	713.27	713.22	0.05	712.05	711.98	0.07
	d/s Leon Trib F	126859	714.06	714	0.06	713.04	713	0.04	711.85	711.78	0.07
	u/s Slick Rach	124054	706.1	706.06	0.04	705.53	705.49	0.04	704.83	704.81	0.02
	d/s Slick Rach	123319	705.36	705.3	0.06	703.99	703.93	0.06	702.41	702.32	0.09
	u/s Westwood Village Creek	117896	697.65	697.61	0.04	696.75	696.72	0.03	695.75	695.67	0.08
Leon Creek	d/s Westwood Village Creek	117405	697.2	697.14	0.06	696.13	696.08	0.05	694.94	694.85	0.09
	u/s US Hwy 90 W	117144	696.37	696.32	0.05	695.28	695.24	0.04	694.26	694.17	0.09
	d/s US Hwy 90 W	116690	690.11	690.06	0.05	689.06	689.01	0.05	687.82	687.75	0.07
	u/s Leon Trib E	102466	670.25	670.18	0.07	668.8	668.74	0.06	667.23	667.16	0.07
	d/s Leon Trib E	102236	670.29	670.22	0.07	668.84	668.78	0.06	667.27	667.2	0.07
	u/s Leon Trib D	97465	663.85	663.73	0.12	662.32	662.27	0.05	660.53	660.45	0.08
	d/s Leon Trib D	96588	661.77	661.6	0.17	660.18	660.14	0.04	658.27	658.2	0.07
	u/s Elmore Hall Blvd	95755	660.3	660.08	0.22	658.5	658.46	0.04	656.5	656.42	0.08
	d/s Elmore Hall Blvd	95690	660.71	660.55	0.16	659.01	658.94	0.07	657.02	656.91	0.11
	u/s Military Dr SW	88636	650.44	650.4	0.04	649.49	649.45	0.04	648.32	648.1	0.22
Leon Creek	d/s Military Dr SW	87864	646.92	646.86	0.06	645.66	645.6	0.06	644.13	644.06	0.07
	AOI 2	87627	646.6	646.55	0.05	645.29	645.24	0.05	643.8	643.73	0.07
	AOI 2	86207	639.47	639.41	0.06	638.04	637.98	0.06	636.62	636.59	0.03
	AOI 2	84973	639.03	638.97	0.06	637.63	637.57	0.06	636.05	635.94	0.11
	u/s Leon Trib C	82969	638.47	638.41	0.06	636.93	636.87	0.06	635.07	634.92	0.15
	d/s Leon Trib C	82554	638.4	638.34	0.06	636.86	636.79	0.07	634.98	634.82	0.16
	u/s Quintana Rd	71561	622.93	622.9	0.03	622.32	622.29	0.03	621.77	621.68	0.09
	d/s Quintana Rd	71115	619.74	619.72	0.02	619.12	619.09	0.03	618.66	618.62	0.04
	u/s New Laredo Hwy / AOI 1	69321	618.16	618.15	0.01	617.74	617.72	0.02	617.06	617.01	0.05
	d/s New Laredo Hwy / AOI 1	68856	614.8	614.75	0.05	614.08	614.07	0.01	613.65	613.65	0
Leon Creek	u/s IH 35 S	63024	609.12	609.09	0.03	608.19	608.13	0.06	607.11	607.08	0.03
	d/s IH 35 S	62672	607.67	607.63	0.04	606.81	606.78	0.03	605.81	605.76	0.05
	u/s Leon Trib B	57417	597.39	597.37	0.02	596.93	596.91	0.02	596.21	596.18	0.03
	d/s Leon Trib B	56444	596.97	596.95	0.02	596.57	596.56	0.01	595.92	595.89	0.03
	u/s SE Loop 410	55095	596.3	596.28	0.02	596.02	596.02	0	595.46	595.43	0.03
	d/s SE Loop 410	54631	594.64	594.6	0.04	593.78	593.75	0.03	591.87	591.85	0.02
	u/s Leon Trib A	51940	590.49	590.46	0.03	589.1	589.06	0.04	587.31	587.25	0.06
	d/s Leon Trib A	51046	587.1	587.06	0.04	586.16	586.12	0.04	585.04	585	0.04
	u/s Indian Creek	36743	572.86	572.82	0.04	571.64	571.62	0.02	570.37	569.71	0.66
	d/s Indian Creek	35989	572.56	572.52	0.04	571.35	571.34	0.01	570.1	569.4	0.7
Leon Creek	u/s Palo Alto Rd	32858	567.79	567.78	0.01	567.33	567.39	-0.06	566.85	563.68	3.17
	d/s Palo Alto Rd	32681	562.49	562.45	0.04	561.4	561.31	0.09	559.91	559.84	0.07
	u/s Applewhite Rd	25143	553.37	553.3	0.07	553.51	548.38	5.13	545.03	545.54	-0.51
	d/s Applewhite Rd	25092	550.86	550.76	0.1	547.05	546.97	0.08	543.29	543.16	0.13
	u/s Comanche Creek	9432	522.15	521.96	0.19	517.92	517.78	0.14	513.41	513.27	0.14
	d/s Comanche Creek	8907									

Table G.1-29

Alternative 15: Leon AOI-7 100 Year Levee

Stream	Location / AOI #	Cross-section	500 WSEL (ft) FC w/o Project	500 WSEL (ft) FC with Project	Difference w/o - w/Proj	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Leon Creek	d/s French Creek	168201	826.86	826.94	-0.08	824.28	824.28	0	822.44	822.44	0
		167725	826.82	826.92	-0.1	823.67	823.67	0	821.22	821.21	0.01
		166687	821.75	822.53	-0.78	818.92	818.89	0.03	816.36	816.35	0.01
		166195	820.25	821.48	-1.23	817.03	816.93	0.1	813.34	813.28	0.06
	u/s Levee	165459	819.71	821.07	-1.36	816.44	816.32	0.12	812.42	812.33	0.09
	Within Levee / AOI 7	164568	817.45	818.46	-1.01	814.09	813.84	0.25	810.3	810.15	0.15
	Within Levee / AOI 7	163183	815.85	816.55	-0.7	812.23	811.58	0.65	807.97	807.64	0.33
	u/s Lower French Crk / AOI 7	161668	806.93	810.3	-3.37	803.28	804.57	-1.29	800.74	801.4	-0.66
	d/s Lower French Crk / AOI 7	161047	802.49	803.32	-0.83	800.52	800.45	0.07	796.32	796.19	0.13
	d/s Levee	159661	799.42	799.33	0.09	795.24	795.21	0.03	791.45	791.42	0.03
d/s Grissom Rd		158897	794.16	794.16	0	791.01	791.01	0	787.65	787.65	0
	u/s Grissom Rd	158683	794.04	794.04	0	790.69	790.69	0	787.3	787.3	0
	d/s Grissom Rd	158571	794.47	794.47	0	790.61	790.61	0	786.71	786.71	0

Table G.1-30

Alternative 16: Leon AOI-7 500 Year Levee

Stream	Location / AOI #	Cross-section	500 WSEL (ft) FC w/o Project	500 WSEL (ft) FC with Project	Difference w/o - w/Proj	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Leon Creek	d/s Bandera Rd	171219	842.47	842.47	0	840.91	840.91	0	838.63	838.63	0
		169928	833.02	833.04	-0.02	829.52	829.52	0	826.99	826.99	0
	u/s French Creek	168730	830.44	830.47	-0.03	827.38	827.38	0	824.97	824.97	0
	d/s French Creek	168201	826.86	826.97	-0.11	824.29	824.29	0	822.44	822.44	0
		167725	826.82	826.95	-0.13	823.67	823.68	-0.01	821.22	821.22	0
		166687	821.75	822.69	-0.94	818.92	818.97	-0.05	816.36	816.36	0
		166195	820.25	821.69	-1.44	817.03	817.16	-0.13	813.34	813.35	-0.01
	u/s Levee	165459	819.71	821.31	-1.6	816.44	816.60	-0.16	812.42	812.43	-0.01
	Within Levee / AOI 7	164568	817.45	818.81	-1.36	814.09	814.28	-0.19	810.3	810.32	-0.02
	Within Levee / AOI 7	163183	815.85	817.06	-1.21	812.23	812.33	-0.1	807.97	807.95	0.02
	u/s Lower French Crk / AOI 7	161668	806.93	806.39	0.54	803.28	803.21	0.07	800.74	800.74	0
	d/s Lower French Crk / AOI 7	161047	802.49	802.46	0.03	800.52	800.52	0	796.32	796.32	0
	d/s Levee	159661	799.42	799.35	0.07	795.24	795.24	0	791.45	791.45	0
		158897	794.16	794.16	0	791.01	791.01	0	787.65	787.65	0
	u/s Grissom Rd	158683	794.04	794.04	0	790.69	790.69	0	787.3	787.3	0
	d/s Grissom Rd	158571	794.47	794.47	0	790.61	790.61	0	786.71	786.71	0

Table G.1-31

Alternative 17: AECOM Quarry at the Rim RSWF

Stream	Location / AOI #	Cross-section	100 WSEL (ft)	100 WSEL (ft)	Difference	50 WSEL (ft)	50 WSEL (ft)	Difference	25 WSEL (ft)	25 WSEL (ft)	Difference
			FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj
d/s Quarry @ Rim RSWF	224100	1039.35	1039.35	0	1037.88	1037.88	0	1036.3	1036.3	0	
u/s IH 10 W/US Hwy 87	222596	1030.93	1030.93	0	1028.29	1028.28	0.01	1026.46	1026.47	-0.01	
d/s IH 10 W/US Hwy 87	222405	1030.69	1030.7	-0.01	1027.94	1027.94	0	1026.13	1026.14	-0.01	
u/s NW Loop 1604	214215	1003.24	996.59	6.65	1002.48	994.77	7.71	997.79	992	5.79	
d/s NW Loop 1604	213669	988.75	986.23	2.52	987.95	985.48	2.47	987.14	984.09	3.05	
u/s UTSA Blvd	208037	970.7	965.85	4.85	970.15	965.21	4.94	966.76	963.17	3.59	
d/s UTSA Blvd	207961	969.69	962.79	6.9	964.96	963.23	1.73	963.47	961.55	1.92	
u/s Hausman Rd	199411	945.66	942.22	3.44	944.71	941.13	3.58	942.84	939.52	3.32	
d/s Hausman Rd	199287	944.42	941.06	3.36	943.12	940.1	3.02	941.6	938.5	3.1	
u/s Huesta Creek	193432	919.8	917.53	2.27	918.9	916.58	2.32	917.65	914.95	2.7	
d/s Huesta Creek	193141	916.41	913.28	3.13	914.93	912.57	2.36	913.36	911.13	2.23	
u/s Prue Rd	185918	891.26	890.04	1.22	889.69	888.64	1.05	887.96	887.05	0.91	
d/s Prue Rd	185801	888.59	888.2	1.39	887.86	886.87	0.99	886.21	885.3	0.91	
u/s Bandera Rd	171483	847.24	846.95	0.29	846.56	846.37	0.19	845.82	845.64	0.18	
d/s Bandera Rd	171219	840.91	840.6	0.31	840.08	839.51	0.57	838.63	836.56	2.07	
u/s French Creek	168730	827.38	827.34	0.04	826.22	826.18	0.04	824.97	824.82	0.15	
d/s French Creek	168201	824.28	824.28	0	823.37	823.37	0	822.44	822.34	0.1	
AOI 7	164568	814.09	814.09	0	812.26	812.26	0	810.3	810.02	0.28	
u/s Lower French Creek / AOI 7	161668	803.28	803.28	0	801.88	801.87	0.01	800.74	800.71	0.03	
d/s Lower French Creek / AOI 7	161047	800.52	800.52	0	797.94	797.93	0.01	796.32	796.08	0.24	
u/s Grissom Rd	158683	790.69	790.68	0.01	789.11	789.09	0.02	787.3	786.59	0.71	
d/s Grissom Rd	158571	790.61	790.61	0	788.61	788.59	0.02	786.71	785.99	0.72	
u/s confluence Culebra Creek	152400	779.54	779.48	0.06	777.53	777.49	0.04	775.42	774.91	0.51	
d/s confluence Culebra Creek	151954	778.44	778.38	0.06	776.5	776.47	0.03	774.5	774.02	0.48	
u/s SW Loop 410	142821	758.54	758.5	0.04	756.78	756.76	0.02	755.06	754.82	0.24	
d/s SW Loop 410	142600	758.5	758.47	0.03	756.79	756.77	0.02	754.7	754.35	0.35	
u/s Leon Trib G	139942	743.79	743.75	0.04	741.99	741.96	0.03	739.95	739.52	0.43	
d/s Leon Trib G	139336	743.75	743.71	0.04	741.95	741.92	0.03	739.91	739.47	0.44	
u/s TX Hwy 151/Stotzer Frwy	136282	735.82	735.78	0.04	734.07	734.05	0.02	732.15	731.73	0.42	
d/s TX Hwy 151/Stotzer Frwy	136045	735.47	735.43	0.04	733.77	733.75	0.02	731.9	731.5	0.4	
u/s Leon Trib F	127612	714.31	714.29	0.02	713.27	713.25	0.02	712.05	711.78	0.27	
d/s Leon Trib F	126859	714.06	714.04	0.02	713.04	713.03	0.01	711.85	711.59	0.26	
u/s US Hwy 90 W	116958	693.29	693.29	0	693.01	693.01	0	692.45	692.35	0.1	
d/s US Hwy 90 W	116825	688.52	688.51	0.01	688	687.99	0.01	687.28	687.06	0.22	
110862	680.72	680.69	0.03	679.22	679.2	0.02	677.2	676.79	0.41		
u/s Leon Trib E	102466	670.25	670.23	0.02	668.8	668.78	0.02	667.23	666.94	0.29	
d/s Leon Trib E	102236	670.29	670.27	0.02	668.84	668.82	0.02	667.27	666.97	0.3	
u/s Leon Trib D	97465	663.85	663.78	0.07	662.32	662.29	0.03	660.53	660.15	0.38	
d/s Leon Trib D	96588	661.77	661.67	0.1	660.18	660.14	0.04	658.27	657.86	0.41	
u/s Military Dr SW	88636	650.44	650.43	0.01	649.49	649.48	0.01	648.32	647.81	0.51	
d/s Military Dr SW / AOI 2	87864	646.92	646.9	0.02	645.66	645.64	0.02	644.13	643.84	0.29	
AOI 2	86207	639.47	639.45	0.02	638.04	638.01	0.03	636.62	636.5	0.12	
AOI 2	84973	639.03	639.01	0.02	637.63	637.6	0.03	636.05	635.7	0.35	
u/s New Laredo Hwy	69321	618.16	618.16	0	617.74	617.73	0.01	617.06	616.91	0.15	
d/s New Laredo Hwy	68856	614.8	614.79	0.01	614.08	614.08	0	613.65	613.59	0.06	
u/s IH 35 S	62942	608.67	608.66	0.01	607.8	607.78	0.02	606.77	606.58	0.19	
d/s IH 35 S	62806	608.11	608.1	0.01	607.23	607.22	0.01	606.23	606.05	0.18	
u/s Leon Trib B	57417	597.39	597.38	0.01	596.93	596.92	0.01	596.21	596.07	0.14	
d/s Leon Trib B	56444	596.97	596.96	0.01	596.57	596.57	0	595.92	595.78	0.14	
u/s SE Loop 410	55095	596.3	596.29	0.01	596.02	596.03	-0.01	595.46	595.33	0.13	
d/s SE Loop 410	54631	594.64	594.62	0.02	593.78	593.77	0.01	591.87	591.78	0.09	
u/s Leon Trib A	51940	590.49	590.47	0.02	589.1	589.07	0.03	587.31	587	0.31	
d/s Leon Trib A	51046	587.1	587.09	0.01	586.16	586.14	0.02	585.04	584.81	0.23	
d/s Indian Creek	36743	572.86	572.85	0.01	571.64	571.62	0.02	570.37	570.09	0.28	
u/s Indian Creek	35989	572.56	572.55	0.01	571.35	571.34	0.01	570.1	569.83	0.27	
u/s Palo Alto Rd	32858	567.79	567.79	0	567.33	567.32	0.01	566.85	566.69	0.16	
d/s Palo Alto Rd	32681	562.49	562.48	0.01	561.4	561.38	0.02	559.91	559.58	0.33	
u/s Comanche Creek	9432	522.15	522.05	0.1	517.92	517.81	0.11	513.41	512.48	0.93	
d/s Comanche Creek	8907	522.44	522.33	0.11	518.09	517.98	0.11	513.46	512.5	0.96	
	1770	511.32	511.2	0.12	506.79	506.66	0.13	501.91	500.9	1.01	
	426	511.55	511.43	0.12	507.07	506.94	0.13	502.18	501.16	1.02	

Table G.1-32

Alternative 18: Target AOI-11 Ponds

Stream	Location / AOI #	Cross-section	100 WSEL (ft)	100 WSEL (ft)	Difference	50 WSEL (ft)	50 WSEL (ft)	Difference	25 WSEL (ft)	25 WSEL (ft)	Difference
			FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj
Leon Trib M	d/s of Proposed Pond	10630	1261.8	1261.8	0	1261.18	1261.18	0	1260.47	1260.47	0
	u/s Boerne Stage Rd	6614	1234.38	1233.50	0.88	1234.11	1233.23	0.88	1233.82	1233.07	0.75
	d/s Boerne Stage Rd	6558	1231.69	1230.51	1.18	1231.31	1230.07	1.24	1230.87	1229.21	1.66
	u/s Boerne Stage Rd	2488	1209.89	1208.96	0.93	1209.34	1208.63	0.71	1208.83	1208.27	0.56
	d/s Boerne Stage Rd	2438	1209.38	1208.66	0.72	1209.01	1208.34	0.67	1208.53	1207.99	0.54
		2130	1208.48	1207.81	0.67	1208.12	1207.47	0.65	1207.68	1207.12	0.56
	u/s confluence w/Leon Crk	653	1201.53	1200.69	0.84	1201.07	1200.22	0.85	1200.52	1199.73	0.79
Leon Creek											
	u/s confluence w/Leon Trib M	269552	1205.52	1204	1.52	1204.47	1203.35	1.12	1203.65	1202.59	1.06
	d/s confluence w/Leon Trib M	268942	1202.36	1201.48	0.88	1201.83	1201.01	0.82	1201.23	1200.47	0.76
	u/s Boerne Stage Rd	268623	1201.58	1200.79	0.79	1201.12	1200.32	0.8	1200.53	1199.72	0.81
	d/s Boerne Stage Rd	268551	1201.23	1200.42	0.81	1200.76	1199.93	0.83	1200.14	1199.32	0.82
	AOI 11	262508	1172.82	1171.59	1.23	1171.96	1170.88	1.08	1171.04	1170.23	0.81
	u/s confluence w/Leon Trib L / AOI 11	258191	1154.33	1153.05	1.28	1153.36	1152.35	1.01	1152.46	1151.57	0.89
	d/s confluence w/Leon Trib L / AOI 11	257761	1153.43	1152.13	1.3	1152.44	1151.44	1	1151.54	1150.67	0.87
	u/s IH 10 W/US Hwy 87 / AOI 11	255034	1143.61	1141.82	1.79	1142.16	1140.52	1.64	1140.63	1139.08	1.55
	d/s IH 10 W/US Hwy 87 / AOI 11	254878	1136.24	1134.8	1.44	1135.08	1133.74	1.34	1133.82	1132.56	1.26
	AOI 11	254011	1133.36	1132.67	0.69	1132.62	1132.02	0.6	1131.72	1131.05	0.67
	u/s confluence of Leon Trib J	246605	1109.91	1109.14	0.77	1108.97	1108.13	0.84	1107.83	1107.29	0.54
	d/s confluence of Leon Trib J & Dominion Dr	246348	1109.08	1108.32	0.76	1108.17	1107.24	0.93	1106.92	1106.45	0.47
	d/s Dominion Dr	246249	1106.49	1106.04	0.45	1105.96	1105.17	0.79	1104.3	1103.56	0.74
		244099	1098.5	1097.85	0.65	1097.72	1097.1	0.62	1096.84	1096.22	0.62
		241630	1089.17	1087.83	1.34	1087.7	1087.28	0.42	1087.02	1086.15	0.87
	AOI 10	239820	1085.74	1084.96	0.78	1084.8	1084.09	0.71	1083.62	1082.85	0.77
	u/s PVT Rd / AOI 10	239039	1082.86	1081.97	0.89	1081.81	1080.9	0.91	1080.52	1079.67	0.85
	d/s PVT Rd / AOI 10	239000	1082.32	1081.4	0.92	1081.24	1080.31	0.93	1079.92	1079.03	0.89
	u/s PVT St / AOI 10	237824	1076.27	1075.53	0.74	1075.06	1074.5	0.56	1074.2	1073.53	0.67
	d/s PVT St / AOI 10	237673	1076.61	1075.93	0.68	1075.65	1074.81	0.84	1074.44	1074.2	0.24
	u/s Camp Bullis Rd / AOI 10	235659	1070.69	1070.27	0.42	1069.91	1070.32	-0.41	1068.67	1064.4	4.27
	d/s Camp Bullis Rd / AOI 10	235598	1069.4	1068.91	0.49	1068.73	1065.62	3.11	1065.7	1064.75	0.95
	u/s Old Camp Bullis Rd / AOI 10	232257	1063.19	1062.21	0.98	1061.82	1060.8	1.02	1060.29	1059.48	0.81
	d/s Old Camp Bullis Rd / AOI 10	232168	1063.11	1062.12	0.99	1061.71	1060.67	1.04	1060.14	1059.28	0.86
	AOI 10	231730	1062.85	1061.82	1.03	1061.41	1060.31	1.1	1059.74	1058.81	0.93
	u/s HI 10/US Hwy 87	222596	1030.93	1030.83	0.1	1028.29	1026.97	1.32	1026.46	1025.72	0.74
	d/s HI 10/US Hwy 87	222405	1030.69	1030.67	0.02	1027.94	1026.61	1.33	1026.13	1025.44	0.69
	u/s HI 10/US Hwy 87	217004	1012.53	1012.18	0.35	1012.36	1011.35	1.01	1010.41	1008.32	2.09
	d/s HI 10/US Hwy 87	216540	1003.15	1002.58	0.57	1002.12	1000.18	1.94	999.12	998.14	0.98
	u/s NW Loop 1604	214215	1003.24	1003.11	0.13	1002.48	999.28	3.2	997.79	996.35	1.44
	d/s NW Loop 1604	213669	988.75	988.48	0.27	987.95	987.57	0.38	987.14	986.14	1
	u/s UTSA Blvd	208037	970.7	971.18	-0.48	970.15	967.32	2.83	966.76	965.67	1.09
	d/s UTSA Blvd	207961	969.69	965.71	3.98	964.96	964.24	0.72	963.47	962.66	0.81
	u/s Hausman Rd	199411	945.66	944.79	0.87	944.71	944.29	0.42	942.84	942.01	0.83
	d/s Hausman Rd	199287	944.42	943.75	0.67	943.12	942.47	0.65	941.6	940.88	0.72
	u/s Huesta Creek	193432	919.8	919.33	0.47	918.9	918.39	0.51	917.65	917.14	0.51
	d/s Huesta Creek	193141	916.41	915.65	0.76	914.93	914.21	0.72	913.36	912.97	0.39
	u/s Babcock Rd	192804	914.4	913.75	0.65	913.12	912.52	0.6	911.75	911.25	0.5
	d/s Babcock Rd	192681	912.89	912.25	0.64	911.62	911.04	0.58	910.3	909.82	0.48
	u/s Prue Rd	185918	891.26	890.59	0.67	889.69	889	0.69	887.96	887.41	0.55
	d/s Prue Rd	185801	889.59	888.83	0.76	887.86	887.22	0.64	886.21	885.67	0.54
		183725	880.91	880.42	0.49	879.82	879.34	0.48	878.52	878.05	0.47
		178929	863.47	862.7	0.77	861.74	861	0.74	859.82	859.17	0.65
		173346	849.73	849.29	0.44	848.67	848.37	0.3	847.5	847.36	0.14
	u/s Bandera Rd	171483	847.24	846.95	0.29	846.56	846.37	0.19	845.82	845.73	0.09
	d/s Bandera Rd	171219	840.91	840.6	0.31	840.08	839.51	0.57	838.63	836.76	1.87
	u/s BVT Rd at 7581 Bandera	169364	828.29	828.13	0.16	827.05	826.94	0.11	825.71	825.66	0.05
	d/s BVT Rd at 7581 Bandera	169047	827.96	827.84	0.12	826.74	826.65	0.09	825.42	825.38	0.04
	u/s French Creek	168730	827.38	827.34	0.04	826.22	826.18	0.04	824.97	824.95	0.02
	d/s French Creek	168201	824.28	824.28	0	823.37	823.37	0	822.44	822.44	0
		167417	822.51	822.51	0	821.37	821.37	0	820.2	820.2	0
		165459	816.44	816.44	0	814.44	814.44	0	812.42	812.42	0

Table G.1-33

Alternative 19 - Boerne Stage Rd. Improvements

261496 and 255196 along Boerne Stage Road in order to run a more thorough analysis in this area.

The only XS in this area which remain as in the May 2009 geometry file are 261496, 256824, 256760, & 255196.

All others within this extent are new or modified. A levee has been placed in this geometry file to represent the proposed improvements to Boerne Stage Road.

Stream		100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Leon Creek	278308	1249.87	1248.05	1.82	1248.74	1246.81	1.93	1247.33	1245.22	2.11
	277963	1248.33	1247.78	0.55	1247.02	1246.40	0.62	1245.23	1244.41	0.82
	277543	1247.58	1246.92	0.66	1246.18	1245.51	0.67	1244.07	1243.26	0.81
	276997	1245.85	1244.27	1.58	1244.34	1242.7	1.64	1242.11	1240.87	1.24
	276612	1244.25	1243.55	0.7	1242.54	1241.69	0.85	1240.5	1239.59	0.91
	276101	1240.92	1237.54	3.38	1239.36	1236.82	2.54	1237.61	1235.66	1.95
	275725	1237.13	1235.81	1.32	1236.22	1234.85	1.37	1234.99	1233.67	1.32
	275259	1235.49	1234.41	1.08	1234.5	1233.38	1.12	1233.22	1232.09	1.13
	274898	1233.45	1231.46	1.99	1232.43	1230.45	1.98	1231.14	1229.31	1.83
	274323	1229.72	1228.44	1.28	1228.76	1227.57	1.19	1227.65	1226.59	1.06
	273809	1228.43	1227.5	0.93	1227.54	1226.66	0.88	1226.46	1225.61	0.85
	273629	1227.88	1226.23	1.65	1226.98	1225.36	1.62	1225.9	1224.32	1.58
	273245	1225.19	1223.24	1.95	1224.2	1222.24	1.96	1223.05	1221.09	1.96
	272917	1221.95	1219.78	2.17	1220.9	1218.88	2.02	1219.66	1217.82	1.84
	272600	1219.95	1219.43	0.52	1218.81	1218.2	0.61	1217.64	1216.67	0.97
	272528	1218.95	1217.37	1.58	1218.02	1216.7	1.32	1217.06	1215.93	1.13
	272324	1217.39	1217.02	0.37	1216.64	1216.29	0.35	1215.8	1215.46	0.34
	271773	1215.72	1214.84	0.88	1214.91	1214	0.91	1213.89	1212.82	1.07
	271440	1214.78	1214.19	0.59	1213.93	1213.41	0.52	1212.71	1212.17	0.54
	270699	1213.05	1212.21	0.84	1212.19	1211.31	0.88	1210.97	1210.19	0.78
	270228	1211.75	1211.5	0.25	1210.79	1210.54	0.25	1209.55	1209.27	0.28
	269552	1208.2	1205.52	2.68	1207.12	1204.47	2.65	1205.9	1203.65	2.25
	268942	1203.15	1202.36	0.79	1202.55	1201.83	0.72	1201.92	1201.23	0.69
	268623	1201.8	1201.58	0.22	1201.33	1201.12	0.21	1200.73	1200.53	0.2
	268551	1201.46	1201.23	0.23	1200.98	1200.76	0.22	1200.36	1200.14	0.22
	267230	1198.85	1197.84	1.01	1198.32	1197.32	1	1197.66	1196.73	0.93
	266258	1195.17	1194.45	0.72	1194.45	1193.57	0.88	1193.65	1192.51	1.14
	265064	1189.75	1187.28	2.47	1188.62	1186.27	2.35	1187.37	1185.19	2.18
	263946	1183.06	1182.23	0.83	1182.03	1181.22	0.81	1180.96	1180.14	0.82
	262508	1174.03	1172.81	1.22	1173.11	1171.95	1.16	1172.12	1171.04	1.08
	261496	1170.22	1169.78	0.44	1169.51	1169.1	0.41	1168.49	1168.06	0.43
	260996	1168.7	1167.08	1.62	1167.81	1165.51	2.3	1166.84	1164.8	2.04
	260796	1167.46	1164.66	2.8	1166.57	1164.18	2.39	1165.82	1164.09	1.73
	260617	1166.26	1164.48	1.78	1165.54	1164.02	1.52	1165.11	1163.14	1.97
	260396	1165.16	1163.46	1.7	1164.61	1163.25	1.36	1164.5	1162.87	1.63
	260196	1164.08	1161.95	2.13	1164.73	1160.81	3.92	1163.3	1159.59	3.71
	259996	1162.65	1161.4	1.25	1161.98	1160.79	1.19	1161.6	1159.67	1.93
	259796	1161.7	1161.08	0.62	1161.1	1160.49	0.61	1160.29	1159.67	0.62
	259634	1161.27	1160.29	0.98	1160.7	1159.78	0.92	1159.83	1158.62	1.21
	259396	1160.65	1159.69	0.96	1159.96	1158.49	1.47	1159.1	1157.73	1.37
	259196	1160.15	1158.92	1.23	1159.35	1158.16	1.19	1158.54	1157.4	1.14
	258996	1159.37	1158.65	0.72	1158.58	1157.88	0.7	1157.81	1157.11	0.7
	258808	1158.66	1157.67	0.99	1157.85	1156.85	1	1157.01	1155.93	1.08
	258596	1157.23	1154.86	2.37	1156.5	1154.3	2.2	1155.73	1153.68	2.05
	258396	1155.2	1154.29	0.91	1154.26	1153.38	0.88	1153.33	1152.49	0.84
	258191	1154.44	1153.95	0.49	1153.51	1153.05	0.46	1152.6	1152.18	0.42
	257946	1153.66	1152.98	0.68	1152.71	1152.02	0.69	1151.82	1151.14	0.68
	257761	1152.79	1151.73	1.06	1151.85	1150.83	1.02	1150.98	1149.99	0.99
	257596	1152.1	1150.69	1.41	1151.15	1149.66	1.49	1150.31	1148.89	1.42
	257396	1151.33	1149.99	1.34	1150.34	1148.98	1.36	1149.54	1148.36	1.18
	257182	1150.54	1149.57	0.97	1149.53	1148.56	0.97	1148.83	1148	0.83
	256996	1149.92	1149.39	0.53	1148.9	1148.36	0.54	1148.29	1147.83	0.46
	256824	1149.46	1148.73	0.73	1148.42	1147.65	0.77	1147.88	1147.27	0.61
	256760	1148.78	1148.01	0.77	1147.7	1146.89	0.81	1146.41	1145.82	0.59
	256596	1147.76	1147.42	0.34	1146.58	1146.21	0.37	1145.47	1145.06	0.41
	256421	1147.46	1147.19	0.27	1146.22	1145.92	0.3	1145.04	1144.71	0.33
	256263	1147.13	1146.91	0.22	1145.82	1145.57	0.25	1144.57	1144.27	0.3
	256044	1146.9	1146.6	0.3	1145.53	1145.15	0.38	1144.22	1143.76	0.46
	255925	1146.75	1146.43	0.32	1145.34	1144.93	0.41	1143.98	1143.45	0.53
	255796	1146.51	1146.23	0.28	1145.03	1144.63	0.4	1143.57	1142.97	0.6
	255595	1146.33	1146.14	0.19	1144.79	1144.49	0.3	1143.24	1142.71	0.53
	255404	1146.18	1146.09	0.09	1144.58	1144.45	0.13	1142.88	1142.68	0.2
	255196	1146.15	1146.09	0.06	1144.53	1144.46	0.07	1142.82	1142.72	0.1
	255132	1146.13	1146.12	0.01	1144.5	1144.49	0.01	1142.77	1142.76	0.01
	255034	1145.55	1143.61	1.94	1143.96	1142.16	1.8	1142.28	1140.63	1.65
	254878	1140.96	1136.23	4.73	1139.48	1135.08	4.4	1137.91	1133.82	4.09
	254753	1136.26	1134.97	1.29	1135.82	1134.38	1.44	1135.32	1133.94	1.38
	254474	1134.76	1134	0.76	1134.32	1133.68	0.64	1133.84	1133.25	0.59
	254380	1134.41	1134.13	0.28	1133.71	1133.4	0.31	1132.96	1132.54	0.42
	254011	1133.83	1133.36	0.47	1133.1	1132.62	0.48	1132.26	1131.72	0.54
	253380	1131.71	1130.45	1.26	1130.89	1129.53	1.36	1129.9	1128.51	1.39

Table G.1-34

Alt 20- AOI7 Channel Modifications - 300' bottom width

Stream		100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj	10 WSEL (ft) FC w/o Project	10 WSEL (ft) FC with Project	Difference w/o - w/Proj
Leon Creek	179995	863.85	863.85	0	860.23	860.23	0	857.62	857.62	0
	175163	854.01	854.01	0	850.69	850.69	0	848.19	848.19	0
	171483	847.24	847.24	0	845.82	845.82	0	844.13	844.13	0
	171219	840.91	840.91	0	838.63	838.63	0	835.24	835.24	0
	169364	828.29	828.29	0	825.72	825.72	0	824.06	824.07	-0.01
	168201	824.31	824.3	0.01	822.45	822.46	-0.01	821.23	821.24	-0.01
	167417	822.57	822.55	0.02	820.21	820.28	-0.07	818.75	818.78	-0.03
	165801	817.39	811.79	5.6	814.16	809.81	4.35	811.67	808.48	3.19
	165279	816.65	808.78	7.87	813.36	806.49	6.87	810.61	805.11	5.5
	164568	813.44	803.12	10.32	810.91	800.45	10.46	808	798.72	9.28
	164045	812.13	801.12	11.01	810.02	798.3	11.72	807.02	796.47	10.55
	163492	810.73	799.1	11.63	808.94	796	12.94	805.86	793.96	11.9
	163052	810.07	797.78	12.29	808.16	794.43	13.73	805.14	792.08	13.06
	162450	809.58	796.44	13.14	807.72	792.78	14.94	804.46	789.8	14.66
	161878	806.43	795.52	10.91	803.1	791.72	11.38	800.54	788.16	12.38
	161249	801.58	794.84	6.74	799.32	791.01	8.31	797.73	787.05	10.68
	160629	798.63	794.43	4.2	795.2	790.62	4.58	791.31	786.49	4.82
	159661	795.38	794.06	1.32	791.6	790.28	1.32	787.63	786.07	1.56
	158683	790.69	790.69	0	787.3	787.3	0	783.63	783.63	0
	158571	790.61	790.61	0	786.71	786.71	0	783.2	783.2	0

Table G.1-35

Alt AOI7 - 21B - 200' channel imp

Stream		100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj	10 WSEL (ft) FC w/o Project	10 WSEL (ft) FC with Project	Difference w/o - w/Proj
Leon Creek	179995	863.85	863.85	0	860.23	860.23	0	857.62	857.62	0
	175163	854.01	854.01	0	850.69	850.69	0	848.19	848.19	0
	171483	847.24	847.24	0	845.82	845.82	0	844.13	844.13	0
	171219	840.91	840.91	0	838.63	838.63	0	835.24	835.24	0
	169364	828.29	828.29	0	825.72	825.71	0.01	824.06	824.06	0
	168201	824.31	824.28	0.03	822.45	822.44	0.01	821.23	821.23	0
	167417	822.57	822.51	0.06	820.21	820.21	0	818.75	818.75	0
	165801	817.39	816.73	0.66	814.16	813.46	0.7	811.67	811.39	0.28
	165279	816.65	815.88	0.77	813.36	812.43	0.93	810.61	810.16	0.45
	164568	813.44	811.78	1.66	810.91	808.81	2.1	808	806.74	1.26
	164045	812.13	809.74	2.39	810.02	807.02	3	807.02	805.1	1.92
	163492	810.73	804.79	5.94	808.94	801.64	7.3	805.86	799.68	6.18
	163052	810.07	801.8	8.27	808.16	798.72	9.44	805.14	796.7	8.44
	162450	809.58	798.69	10.89	807.72	795.21	12.51	804.46	792.69	11.77
	161878	806.43	797.14	9.29	803.1	793.41	9.69	800.54	790.28	10.26
	161249	801.58	795.62	5.96	799.32	791.88	7.44	797.73	788.24	9.49
	160629	798.63	794.77	3.86	795.2	790.98	4.22	791.31	787.02	4.29
	159661	795.38	794.21	1.17	791.6	790.45	1.15	787.63	786.29	1.34
	158683	790.69	790.69	0	787.3	787.3	0	783.63	783.63	0
	158571	790.61	790.61	0	786.71	786.71	0	783.2	783.2	0

Table G.1-36

Alt AOI 7 - 21B - 100' channel imp

Stream		100 WSEL (ft)	100 WSEL (ft)	Difference	25 WSEL (ft)	25 WSEL (ft)	Difference	10 WSEL (ft)	10 WSEL (ft)	Difference
		FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj	FC w/o Project	FC with Project	w/o - w/Proj
Leon Creek	179995	863.85	863.85	0	860.23	860.23	0	857.62	857.62	0
	175163	854.01	854.01	0	850.69	850.69	0	848.19	848.19	0
	171483	847.24	847.24	0	845.82	845.82	0	844.13	844.13	0
	171219	840.91	840.91	0	838.63	838.63	0	835.24	835.24	0
	169364	828.29	828.29	0	825.72	825.71	0.01	824.06	824.06	0
	168201	824.31	824.29	0.02	822.45	822.44	0.01	821.23	821.23	0
	167417	822.57	822.52	0.05	820.21	820.21	0	818.75	818.75	0
	165801	817.39	816.88	0.51	814.16	813.49	0.67	811.67	811.4	0.27
	165279	816.65	816.03	0.62	813.36	812.48	0.88	810.61	810.17	0.44
	164568	813.44	812.17	1.27	810.91	808.95	1.96	808	806.78	1.22
	164045	812.13	810.39	1.74	810.02	807.26	2.76	807.02	805.17	1.85
	163492	810.73	807.52	3.21	808.94	803.96	4.98	805.86	801.59	4.27
	163052	810.07	805.56	4.51	808.16	801.8	6.36	805.14	799.28	5.86
	162450	809.58	803.76	5.82	807.72	799.73	7.99	804.46	796.93	7.53
	161878	806.43	798.77	7.66	803.1	795.6	7.5	800.54	792.97	7.57
	161249	801.58	796.83	4.75	799.32	793.26	6.06	797.73	790.08	7.65
	160629	798.63	795.24	3.39	795.2	791.49	3.71	791.31	787.79	3.52
	159661	795.38	794.55	0.83	791.6	790.74	0.86	787.63	786.62	1.01
	158683	790.69	790.69	0	787.3	787.3	0	783.63	783.63	0
	158571	790.61	790.61	0	786.71	786.71	0	783.2	783.2	0

Table G.1-37

Alternative 22 - LC-15 HB@Prue & Huebner Trib A Pond

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Huebner Creek	u/s Prue Rd	37467	918.24	918.24	0	918.24	918.01	0.23	917.77	917.77	0
	d/s Prue Rd	37408	916.6	916.60	0	916.6	916.26	0.34	915.9	915.90	0
	u/s Lockhill Rd	36146	910.46	910.39	0.07	910.46	909.99	0.47	909.6	909.56	0.04
	d/s Lockhill Rd	36089	910.33	910.25	0.08	910.33	909.85	0.48	909.47	909.43	0.04
		35768	909.41	909.19	0.22	909.41	908.65	0.76	908.24	907.97	0.27
		35696	909.43	909.2	0.23	909.43	908.68	0.75	908.28	908.12	0.16
		34939	906.33	905.75	0.58	906.33	905.25	1.08	905.21	904.77	0.44
		34290	903.03	902.45	0.58	903.03	902.05	0.98	902.02	901.59	0.43
		33578	899.49	898.86	0.63	899.49	898.44	1.05	898.41	897.99	0.42
	u/s Babcock Rd / AOI 9	32884	896.42	895.75	0.67	896.42	895.29	1.13	895.26	894.77	0.49
	d/s Babcock Rd / AOI 9	32782	895.67	895.12	0.55	895.67	894.74	0.93	894.72	894.31	0.41
	u/s Hollyhock Rd	32032	891.04	889.39	1.65	891.04	888.94	2.1	890.16	888.4	1.76
	d/s Hollyhock Rd	31954	890.92	889.41	1.51	890.92	888.96	1.96	890.06	888.44	1.62
	AOI 9	31068	885.79	881.6	4.19	885.79	881.18	4.61	884.71	880.7	4.01
	AOI 9	30379	882.21	877.85	4.36	882.21	877.48	4.73	881.36	877.06	4.3
		30096	879.96	876.23	3.73	879.96	875.82	4.14	879	875.35	3.65
	AOI 9	29469	875.55	874.12	1.43	875.55	873.65	1.9	874.59	873.07	1.52
	AOI 9	28870	872.47	870.65	1.82	872.47	870.22	2.25	871.64	869.73	1.91
		28627	870.77	869.37	1.4	870.77	868.97	1.8	869.98	868.47	1.51
		28369	869.14	867.35	1.79	869.14	867.03	2.11	868.26	866.91	1.35
	u/s Whithby Rd	28230	868.23	867.72	0.51	868.23	867.34	0.89	867.32	866.88	0.44

Results below Cross-Section 28230 are Identical to the Results for the Huebner RSWF by itself.

Table G.1-38

Alternative 23 - Leon DC-3A Channel Modifications

CROSS SECTIONS MODIFIED INCLUDE: 151954, 151394, 150827, 149929, 149460. MODIFICATIONS INCLUDE BOTTOM WIDTHS WHICH VARY FROM 340 TO 485.

Stream		100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Leon Creek	164568	815.53	814.09	1.44	813.61	812.26	1.35	811.49	810.3	1.19
	164045	814.13	812.77	1.36	812.34	811.23	1.11	810.23	809.23	1
	163492	813.08	812.58	0.5	811.38	810.82	0.56	809.21	808.54	0.67
	163183	812.75	812.23	0.52	810.97	810.31	0.66	808.72	807.97	0.75
	162879	812.34	811.44	0.9	810.53	809.71	0.82	808.25	807.45	0.8
	162298	810.37	807.3	3.07	808.67	805.92	2.75	806.45	804.11	2.34
	161668	806.9	803.28	3.62	805.3	801.88	3.42	803.5	800.76	2.74
	161047	802.46	800.52	1.94	800.66	797.94	2.72	799.27	796.29	2.98
	160629	799.87	797.02	2.85	797.86	795.44	2.42	795.94	793.13	2.81
	159661	796.2	795.24	0.96	794.45	793.52	0.93	792.09	791.27	0.82
	158897	793.52	791.01	2.51	791.79	789.41	2.38	789.43	787.12	2.31
	158683	792.05	790.68	1.37	790.34	789.13	1.21	787.93	786.7	1.23
	158571	791.66	790.61	1.05	789.94	788.63	1.31	786.94	786.09	0.85
	158247	790.6	790.02	0.58	788.74	788.31	0.43	786.05	785.52	0.53
	157859	790.14	789.96	0.18	788.35	788.15	0.2	785.61	785.44	0.17
	157565	789.96	789.62	0.34	788.13	787.74	0.39	785.42	785.04	0.38
	157257	789.33	787.6	1.73	787.34	785.16	2.18	784.69	782.88	1.81
	156851	787.98	785.18	2.8	785.91	783.31	2.6	783.75	781.48	2.27
	156147	784.88	782.4	2.48	783.02	780.74	2.28	781.09	779.08	2.01
	155223	778.71	774.25	4.46	777.23	773.25	3.98	775.73	772.19	3.54
	154568	774.81	774.5	0.31	773.19	772.89	0.3	771.44	771.16	0.28
	153709	773.66	773.47	0.19	771.93	771.75	0.18	770.06	769.89	0.17
	152400	773.08	773.02	0.06	771.34	771.29	0.05	769.44	769.39	0.05
	151954	772.72	771.41	1.31	771.01	769.91	1.1	769.13	768.2	0.93
	151394	772.27	771.19	1.08	770.61	769.7	0.91	768.76	767.98	0.78
	150827	771.83	770.34	1.49	770.2	768.9	1.3	768.38	767.23	1.15
	149929	771.08	769.65	1.43	769.5	768.3	1.2	767.71	766.71	1
	149460	770.66	769.58	1.08	769.13	768.22	0.91	767.38	766.62	0.76
	148983	770.04	769.61	0.43	768.58	768.19	0.39	766.89	766.55	0.34
	148848	769.78	769.15	0.63	768.32	767.73	0.59	766.63	766.03	0.6
	148048	768.88	768.76	0.12	767.47	767.36	0.11	765.78	765.69	0.09

Table G.1-39

Alternative 23b - Leon DC-3A Channel Modifications

CROSS SECTIONS MODIFIED INCLUDE: 151394, 150827, 149929, 149460. MODIFICATIONS INCLUDE BOTTOM WIDTHS WHICH VARY FROM 340 TO 485.

Stream		100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj
Leon Creek	157565	789.96	789.62	0.34	788.13	787.74	0.39	785.42	785.04	0.38
	157257	789.33	787.6	1.73	787.34	785.16	2.18	784.69	782.88	1.81
	156851	787.98	785.18	2.8	785.91	783.31	2.6	783.75	781.48	2.27
	156147	784.88	782.4	2.48	783.02	780.74	2.28	781.09	779.08	2.01
	155223	778.71	774.25	4.46	777.23	773.25	3.98	775.73	772.19	3.54
	154568	775.27	774.99	0.28	773.6	773.33	0.27	771.78	771.52	0.26
	153709	774.27	774.11	0.16	772.5	772.34	0.16	770.58	770.43	0.15
	152400	773.77	773.71	0.06	771.98	771.93	0.05	770.06	770.01	0.05
	151954	773.19	771.53	1.66	771.44	770.02	1.42	769.52	768.28	1.24
	151394	772.4	771.27	1.13	770.72	769.76	0.96	768.84	768.03	0.81
	150827	771.88	770.06	1.82	770.24	768.62	1.62	768.39	766.96	1.43
	149929	770.98	769.45	1.53	769.39	768.11	1.28	767.58	766.53	1.05
	149460	770.55	769.46	1.09	769.01	768.1	0.91	767.25	766.5	0.75
	148983	769.96	769.57	0.39	768.49	768.15	0.34	766.8	766.5	0.3
	148848	769.72	769.16	0.56	768.26	767.74	0.52	766.56	766.05	0.51
	148048	768.88	768.76	0.12	767.47	767.36	0.11	765.78	765.69	0.09

Table G.1-40

Alternative 2: Leon AOI-2 100 Year Levee w CH MODS

Stream	Location / AOI #	Cross-section	500 WSEL (ft)		500 WSEL (ft)		100 WSEL (ft)		100 WSEL (ft)		25 WSEL (ft)		25 WSEL (ft)	
			FC w/o Project	FC with Project	w/o - w/Proj)	FC w/o Project	FC with Project	w/o - w/Proj)	FC w/o Project	FC with Project	w/o - w/Proj)	FC w/o Project	FC with Project	w/o - w/Proj)
Leon Creek	95755	665.12	665.09	0.03	660.33	660.13	0.2	656.53	656.3	0.23				
	95690	665.46	665.42	0.04	660.71	660.57	0.14	657.02	656.86	0.16				
	94824	665.12	665.09	0.03	660.35	660.19	0.16	656.63	656.45	0.18				
	94802	665.09	665.06	0.03	660.32	660.17	0.15	656.61	656.43	0.18				
	94293	664.92	664.88	0.04	660.15	659.99	0.16	656.42	656.24	0.18				
	94274	664.89	664.85	0.04	660.12	659.97	0.15	656.4	656.22	0.18				
	93810	664.72	664.69	0.03	659.95	659.79	0.16	656.21	656.01	0.2				
	93798	664.7	664.67	0.03	659.94	659.78	0.16	656.18	655.99	0.19				
	93047	664.08	664.04	0.04	659.32	659.13	0.19	655.5	655.27	0.23				
	93032	663.83	663.78	0.05	659.07	658.87	0.2	655.25	655.01	0.24				
	92368	660.84	660.77	0.07	656.66	656.54	0.12	653.38	653.02	0.36				
	92350	659.64	659.55	0.09	655.87	655.71	0.16	652.69	652.24	0.45				
	90894	656.97	656.81	0.16	653.84	653.57	0.27	650.98	650.19	0.79				
	90875	656.87	656.71	0.16	653.83	653.55	0.28	650.96	650.18	0.78				
	90266	656.43	656.26	0.17	653.32	652.97	0.35	650.65	649.82	0.83				
	90248	655.79	655.57	0.22	652.82	652.44	0.38	650.52	649.66	0.86				
	90179	655.72	655.49	0.23	652.7	652.29	0.41	650.3	649.44	0.86				
	90158	655.61	655.37	0.24	652.64	652.22	0.42	650.25	649.34	0.91				
	89670	654.41	654.01	0.4	651.66	651.01	0.65	649.2	648	1.2				
	89593	653.92	653.49	0.43	651.29	650.56	0.73	648.85	647.46	1.39				
	88636	652.7	652.24	0.46	650.44	649.83	0.61	648.32	647.02	1.3				
	87864	648.96	648.79	0.17	646.92	645.76	1.16	644.13	641.91	2.22				
	87627	648.51	648.48	0.03	646.6	645.06	1.54	643.8	641.84	1.96				
	87518	648.18	648.49	-0.31	646.37	640.93	5.44	643.52	640.23	3.29				
	87210	645.43	640.97	4.46	642.05	641.82	0.23	640.4	640.17	0.23				
	86710	644.28	643.39	0.89	640.87	641.13	-0.26	639.42	639.64	-0.22				
	86207	643.5	643.31	0.19	639.47	638.92	0.55	636.62	637.19	-0.57				
	85866	643.41	643.36	0.05	639.45	639.34	0.11	636.64	636.55	0.09				
	85691	643.38	643.36	0.02	639.41	639.37	0.04	636.59	636.58	0.01				
	85024	643.16	643.14	0.02	639.12	639.08	0.04	636.19	636.13	0.06				
	84973	643.09	643.09	0	639.03	639.03	0	636.05	636.05	0				
	83663	642.8	642.8	0	638.63	638.63	0	635.33	635.33	0				
	82554	642.63	642.63	0	638.4	638.4	0	634.98	634.98	0				
	80352	642.08	642.08	0	637.81	637.81	0	634.21	634.21	0				

Table G.1-41

Alternative 4: 100' BP Channel

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	10 WSEL (ft) FC w/o Project	10 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Leon Creek	95755	660.33		660.33	656.53		656.53	653.23		653.23	
	95690	660.71		660.71	657.02		657.02	653.85		653.85	
	94824	660.35		660.35	656.63		656.63	653.42		653.42	
	94802	660.32		660.32	656.61		656.61	653.39		653.39	
	94293	660.15		660.15	656.42		656.42	653.2		653.2	
	94274	660.12		660.12	656.4		656.4	653.18		653.18	
	93810	659.95		659.95	656.21		656.21	652.98		652.98	
	93798	659.94		659.94	656.18		656.18	652.95		652.95	
	93047	659.32		659.32	655.5		655.5	652.28		652.28	
	93032	659.07		659.07	655.25		655.25	652		652	
	92368	656.66		656.66	653.38		653.38	650.45		650.45	
	92350	655.87		655.87	652.69		652.69	649.8		649.8	
	90894	653.84		653.84	650.98		650.98	648.29		648.29	
	90875	653.83		653.83	650.96		650.96	648.27		648.27	
	90266	653.32		653.32	650.65		650.65	648.03		648.03	
	90248	652.82		652.82	650.52		650.52	647.93		647.93	
	90179	652.7		652.7	650.3		650.3	647.82		647.82	
	90158	652.64		652.64	650.25		650.25	647.72		647.72	
	89670	651.66		651.66	649.2		649.2	646.88		646.88	
	89593	651.29		651.29	648.85		648.85	646.65		646.65	
	88636	650.44		650.44	648.32		648.32	646.24		646.24	
	87864	646.92		646.92	644.13		644.13	641.71		641.71	
	87627	646.6		646.6	643.8		643.8	641.24		641.24	
	87518	646.37		646.37	643.52		643.52	641.05		641.05	
	87210	642.05		642.05	640.4		640.4	638.78		638.78	
	86710	640.87		640.87	639.42		639.42	638.15		638.15	
	86207	639.47		639.47	636.62		636.62	635.35		635.35	
	85866	639.45		639.45	636.64		636.64	633.99		633.99	
	85691	639.41		639.41	636.59		636.59	633.96		633.96	
	85024	639.12		639.12	636.19		636.19	633.53		633.53	
	84973	639.03		639.03	636.05		636.05	633.31		633.31	
	83663	638.63		638.63	635.33		635.33	631.95		631.95	
	82554	638.4		638.4	634.98		634.98	631.33		631.33	
	80352	637.81		637.81	634.21		634.21	630.49		630.49	
	78641	635.69		635.69	631.59		631.59	628.24		628.24	
	77693	635.21		635.21	631.17		631.17	627.87		627.87	
	76884	634.85		634.85	630.86		630.86	627.63		627.63	
	75186	631.35		631.35	627.98		627.98	625.11		625.11	

Table G.1-42

Alternative 4: 40' BP Channel

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	10 WSEL (ft) FC w/o Project	10 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Leon Creek		95755	660.33		660.33	656.53		656.53	653.23		653.23
		95690	660.71		660.71	657.02		657.02	653.85		653.85
		94824	660.35		660.35	656.63		656.63	653.42		653.42
		94802	660.32		660.32	656.61		656.61	653.39		653.39
		94293	660.15		660.15	656.42		656.42	653.2		653.2
		94274	660.12		660.12	656.4		656.4	653.18		653.18
		93810	659.95		659.95	656.21		656.21	652.98		652.98
		93798	659.94		659.94	656.18		656.18	652.95		652.95
		93047	659.32		659.32	655.5		655.5	652.28		652.28
		93032	659.07		659.07	655.25		655.25	652		652
		92368	656.66		656.66	653.38		653.38	650.45		650.45
		92350	655.87		655.87	652.69		652.69	649.8		649.8
		90894	653.84		653.84	650.98		650.98	648.29		648.29
		90875	653.83		653.83	650.96		650.96	648.27		648.27
		90266	653.32		653.32	650.65		650.65	648.03		648.03
		90248	652.82		652.82	650.52		650.52	647.93		647.93
		90179	652.7		652.7	650.3		650.3	647.82		647.82
		90158	652.64		652.64	650.25		650.25	647.72		647.72
		89670	651.66		651.66	649.2		649.2	646.88		646.88
		89593	651.29		651.29	648.85		648.85	646.65		646.65
		88636	650.44		650.44	648.32		648.32	646.24		646.24
		87864	646.92		646.92	644.13		644.13	641.71		641.71
		87627	646.6		646.6	643.8		643.8	641.24		641.24
		87518	646.37		646.37	643.52		643.52	641.05		641.05
		87210	642.05		642.05	640.4		640.4	638.78		638.78
		86710	640.87		640.87	639.42		639.42	638.15		638.15
		86207	639.47		639.47	636.62		636.62	635.35		635.35
		85866	639.45		639.45	636.64		636.64	633.99		633.99
		85691	639.41		639.41	636.59		636.59	633.96		633.96
		85024	639.12		639.12	636.19		636.19	633.53		633.53
		84973	639.03		639.03	636.05		636.05	633.31		633.31
		83663	638.63		638.63	635.33		635.33	631.95		631.95
		82554	638.4		638.4	634.98		634.98	631.33		631.33
		80352	637.81		637.81	634.21		634.21	630.49		630.49
		78641	635.69		635.69	631.59		631.59	628.24		628.24
		77693	635.21		635.21	631.17		631.17	627.87		627.87
		76884	634.85		634.85	630.86		630.86	627.63		627.63
		75186	631.35		631.35	627.98		627.98	625.11		625.11

Table G.1-43

Alternative 4: 25' BP Channel

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	10 WSEL (ft) FC w/o Project	10 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Leon Creek	95755		660.33	660.33	656.53		656.53	653.23			653.23
	95690		660.71	660.71	657.02		657.02	653.85			653.85
	94824		660.35	660.35	656.63		656.63	653.42			653.42
	94802		660.32	660.32	656.61		656.61	653.39			653.39
	94293		660.15	660.15	656.42		656.42	653.2			653.2
	94274		660.12	660.12	656.4		656.4	653.18			653.18
	93810		659.95	659.95	656.21		656.21	652.98			652.98
	93798		659.94	659.94	656.18		656.18	652.95			652.95
	93047		659.32	659.32	655.5		655.5	652.28			652.28
	93032		659.07	659.07	655.25		655.25	652			652
	92368		656.66	656.66	653.38		653.38	650.45			650.45
	92350		655.87	655.87	652.69		652.69	649.8			649.8
	90894		653.84	653.84	650.98		650.98	648.29			648.29
	90875		653.83	653.83	650.96		650.96	648.27			648.27
	90266		653.32	653.32	650.65		650.65	648.03			648.03
	90248		652.82	652.82	650.52		650.52	647.93			647.93
	90179		652.7	652.7	650.3		650.3	647.82			647.82
	90158		652.64	652.64	650.25		650.25	647.72			647.72
	89670		651.66	651.66	649.2		649.2	646.88			646.88
	89593		651.29	651.29	648.85		648.85	646.65			646.65
	88636		650.44	650.44	648.32		648.32	646.24			646.24
	87864		646.92	646.92	644.13		644.13	641.71			641.71
	87627		646.6	646.6	643.8		643.8	641.24			641.24
	87518		646.37	646.37	643.52		643.52	641.05			641.05
	87210		642.05	642.05	640.4		640.4	638.78			638.78
	86710		640.87	640.87	639.42		639.42	638.15			638.15
	86207		639.47	639.47	636.62		636.62	635.35			635.35
	85866		639.45	639.45	636.64		636.64	633.99			633.99
	85691		639.41	639.41	636.59		636.59	633.96			633.96
	85024		639.12	639.12	636.19		636.19	633.53			633.53
	84973		639.03	639.03	636.05		636.05	633.31			633.31
	83663		638.63	638.63	635.33		635.33	631.95			631.95
	82554		638.4	638.4	634.98		634.98	631.33			631.33
	80352		637.81	637.81	634.21		634.21	630.49			630.49
	78641		635.69	635.69	631.59		631.59	628.24			628.24
	77693		635.21	635.21	631.17		631.17	627.87			627.87
	76884		634.85	634.85	630.86		630.86	627.63			627.63
	75186		631.35	631.35	627.98		627.98	625.11			625.11

Table G.1-44

Alternative 2 and 4 Combo: Leon AOI-2 100 Year Levee w 100' BP Channel

Stream	Location / AOI #	Cross-section	500 WSEL (ft)	500 WSEL (ft)	Difference (w/o - w/Proj)	100 WSEL (ft)	100 WSEL (ft)	Difference (w/o - w/Proj)	25 WSEL (ft)	25 WSEL (ft)	Difference (w/o - w/Proj)
			FC w/o Project	FC with Project		FC w/o Project	FC with Project		FC w/o Project	FC with Project	
Leon Creek		95755	665.12	665.34	-0.22	660.33	660.44	-0.11	656.53	656.55	-0.02
		95690	665.46	665.61	-0.15	660.71	660.86	-0.15	657.02	657.19	-0.17
		94824	665.12	665.28	-0.16	660.35	660.51	-0.16	656.63	656.82	-0.19
		94802	665.09	665.25	-0.16	660.32	660.49	-0.17	656.61	656.8	-0.19
		94293	664.92	665.08	-0.16	660.15	660.32	-0.17	656.42	656.63	-0.21
		94274	664.89	665.05	-0.16	660.12	660.3	-0.18	656.4	656.61	-0.21
		93810	664.72	664.89	-0.17	659.95	660.13	-0.18	656.21	656.42	-0.21
		93798	664.7	664.87	-0.17	659.94	660.12	-0.18	656.18	656.4	-0.22
		93047	664.08	664.26	-0.18	659.32	659.53	-0.21	655.5	655.75	-0.25
		93032	663.83	664.02	-0.19	659.07	659.24	-0.17	655.25	655.51	-0.26
		92368	660.84	661.16	-0.32	656.66	656.98	-0.32	653.38	653.76	-0.38
		92350	659.64	660.08	-0.44	655.87	656.09	-0.22	652.69	653.16	-0.47
		90894	656.97	657.73	-0.76	653.84	654.27	-0.43	650.98	651.55	-0.57
		90875	656.87	657.61	-0.74	653.83	654.25	-0.42	650.96	651.54	-0.58
		90266	656.43	657.26	-0.83	653.32	653.84	-0.52	650.65	651.18	-0.53
		90248	655.79	656.78	-0.99	652.82	653.4	-0.58	650.52	651.08	-0.56
		90179	655.72	656.72	-1	652.7	653.32	-0.62	650.3	650.92	-0.62
		90158	655.61	656.63	-1.02	652.64	653.26	-0.62	650.25	650.87	-0.62
		89670	654.41	655.83	-1.42	651.66	652.51	-0.85	649.2	650.13	-0.93
		89593	653.92	655.47	-1.55	651.29	652.21	-0.92	648.85	649.84	-0.99
		88636	652.7	654.78	-2.08	650.44	651.59	-1.15	648.32	649.41	-1.09
		87864	648.96	653.67	-4.71	646.92	650.19	-3.27	644.13	647.74	-3.61
		87627	648.51	653.47	-4.96	646.6	649.65	-3.05	643.8	647.29	-3.49
		87518	648.18	652.07	-3.89	646.37	648.37	-2	643.52	646.05	-2.53
		87210	645.43	646.62	-1.19	642.05	643.96	-1.91	640.4	641.53	-1.13
		86710	644.28	644.13	0.15	640.87	640.76	0.11	639.42	641.47	-2.05
		86207	643.5	642.74	0.76	639.47	638.43	1.04	636.62	637.64	-1.02
		85866	643.41	642.85	0.56	639.45	638.76	0.69	636.64	635.08	1.56
		85691	643.38	642.83	0.55	639.41	638.74	0.67	636.59	635.06	1.53
		85024	643.16	642.63	0.53	639.12	638.47	0.65	636.19	634.72	1.47
		84973	643.09	642.59	0.5	639.03	638.42	0.61	636.05	634.6	1.45
		83663	642.8	642.34	0.46	638.63	638.05	0.58	635.33	633.89	1.44
		82554	642.63	642.17	0.46	638.4	637.83	0.57	634.98	633.58	1.4
		80352	642.08	641.66	0.42	637.81	637.29	0.52	634.21	633.1	1.11
		78641	640.36	640.04	0.32	635.69	635.6	0.09	631.59	631.69	-0.1
		77693	639.76	639.76	0	635.21	635.21	0	631.17	631.17	0
		76884	639.31	639.31	0	634.85	634.85	0	630.86	630.86	0
		75186	635.67	635.67	0	631.35	631.35	0	627.98	627.98	0

Table G.1-45

Alternative 22: Huebner RSWF & Trib A Pond(optimized)

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference (w/o - w/Proj)	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference (w/o - w/Proj)
Huebner Creek	d/s Huebner Trib A	23532	839.44	838.06	1.38	838.76	837.25	1.51	837.92	836.58	1.34
	u/s Apple Green Rd	22929	839.23	837.82	1.41	838.54	836.15	2.39	837.67	835.52	2.15
	d/s Apple Green Rd	22778	833.42	832.14	1.28	832.76	831.61	1.15	832.03	831.06	0.97
	AOI 8	21610	831.44	830.18	1.26	830.82	829.61	1.21	830.06	828.99	1.07
	u/s Evers Rd / AOI 8	18498	824.22	823.48	0.74	823.79	823.17	0.62	823.38	822.83	0.55
	d/s Evers Rd / AOI 8	18390	823.92	823.12	0.8	823.45	822.74	0.71	822.95	822.32	0.63
	AOI 8	15969	814.79	814.26	0.53	814.39	813.91	0.48	813.93	813.52	0.41
	u/s Bandera Rd / AOI 6	14267	811.45	810.87	0.58	811.02	810.35	0.67	810.4	809.6	0.8
	d/s Bandera Rd / AOI 6	14017	808.34	807.42	0.92	807.62	806.83	0.79	806.87	806.13	0.74
	AOI 6	12264	799.97	799.19	0.78	799.38	798.59	0.79	798.61	798.16	0.45
	AOI 6	10195	794.96	794.36	0.6	794.46	793.99	0.47	794	793.62	0.38
	AOI 6	7282	792.34	791.4	0.94	791.34	790.53	0.81	790.32	789.58	0.74
	u/s Timberhill Dr	5000	789.73	788.86	0.87	788.52	787.77	0.75	787.29	786.56	0.73
	d/s Timberhill Dr	4877	789.67	788.79	0.88	788.5	787.69	0.81	787.2	786.51	0.69
	u/s Ingram Rd	1724	766.3	765.57	0.73	765.33	764.63	0.7	765.19	764.7	0.49
	d/s Ingram Rd	1636	760.72	760.13	0.59	759.94	759.4	0.54	759.06	758.54	0.52
Leon Creek	u/s Huebner Creek	148048	768.76	768.79	-0.03	767.36	767.38	-0.02	765.69	765.7	-0.01
	d/s Huebner Creek	147620	767.93	767.96	-0.03	766.57	766.59	-0.02	764.95	764.96	-0.01
	u/s Culebra Rd	145073	761.08	761.12	-0.04	759.56	759.6	-0.04	757.94	757.95	-0.01
	d/s Culebra Rd	144862	761.03	761.08	-0.05	759.47	759.5	-0.03	757.84	757.85	-0.01
	u/s SW Loop 410	142963	758.76	758.81	-0.05	757.15	757.2	-0.05	755.65	755.66	-0.01
	d/s SW Loop 410	142391	748.71	748.75	-0.04	747.01	747.03	-0.02	745.17	745.19	-0.02
		141639	745.85	745.9	-0.05	743.88	743.9	-0.02	741.82	741.83	-0.01
	u/s Leon Trib G	139942	743.79	743.84	-0.05	741.99	742	-0.01	739.95	739.96	-0.01
	d/s Leon Trib G	139336	743.75	743.79	-0.04	741.95	741.96	-0.01	739.91	739.92	-0.01
	u/s TX Hwy 151	136389	736.91	736.95	-0.04	735.03	735.04	-0.01	732.95	732.97	-0.02
	d/s TX Hwy 151	135790	733.28	733.31	-0.03	731.83	731.84	-0.01	730.28	730.29	-0.01
	u/s Pinn Rd	134897	732.54	732.57	-0.03	731.01	731.03	-0.02	729.33	729.34	-0.01
	d/s Pinn Rd	134762	732.26	732.29	-0.03	730.77	730.78	-0.01	729.14	729.15	-0.01
	u/s Old Hwy 90 W	118873	703.14	703.18	-0.04	701.7	701.71	-0.01	700	700	0
	d/s Old Hwy 90 W	118757	702.39	702.44	-0.05	700.62	700.64	-0.02	698.65	698.66	-0.01
	u/s US Hwy 90 W	117144	696.37	696.41	-0.04	695.28	695.29	-0.01	694.26	694.26	0

Table G.1-46

Alt AOI 7 - 21B - 85' channel imp

Stream		100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj	10 WSEL (ft) FC w/o Project	10 WSEL (ft) FC with Project	Difference w/o - w/Proj
Leon Creek	179995	863.85	863.85	0	860.23	860.23	0	857.62	857.62	0
	175163	854.01	854.01	0	850.69	850.69	0	848.19	848.19	0
	171483	847.24	847.24	0	845.82	845.82	0	844.13	844.13	0
	171219	840.91	840.91	0	838.63	838.63	0	835.24	835.24	0
	169364	828.29	828.29	0	825.72	825.71	0.01	824.06	824.06	0
	168201	824.31	824.29	0.02	822.45	822.44	0.01	821.23	821.23	0
	167417	822.57	822.52	0.05	820.21	820.21	0	818.75	818.75	0
	165801	817.39	816.94	0.45	814.16	813.53	0.63	811.67	811.41	0.26
	165279	816.65	816.1	0.55	813.36	812.52	0.84	810.61	810.19	0.42
	164568	813.44	812.34	1.1	810.91	809.08	1.83	808	806.85	1.15
	164045	812.13	810.63	1.5	810.02	807.47	2.55	807.02	805.3	1.72
	163492	810.73	808.26	2.47	808.94	804.61	4.33	805.86	802.08	3.78
	163052	810.07	806.77	3.3	808.16	802.76	5.4	805.14	800.06	5.08
	162450	809.58	805.13	4.45	807.72	800.84	6.88	804.46	797.97	6.49
	161878	806.43	799.36	7.07	803.1	796.19	6.91	800.54	793.62	6.92
	161249	801.58	797.25	4.33	799.32	793.72	5.6	797.73	790.65	7.08
	160629	798.63	795.26	3.37	795.2	791.6	3.6	791.31	788.03	3.28
	159661	795.38	794.58	0.8	791.6	790.81	0.79	787.63	786.72	0.91
	158683	790.69	790.69	0	787.3	787.3	0	783.63	783.63	0
	158571	790.61	790.61	0	786.71	786.71	0	783.2	783.2	0

Table G.1-47

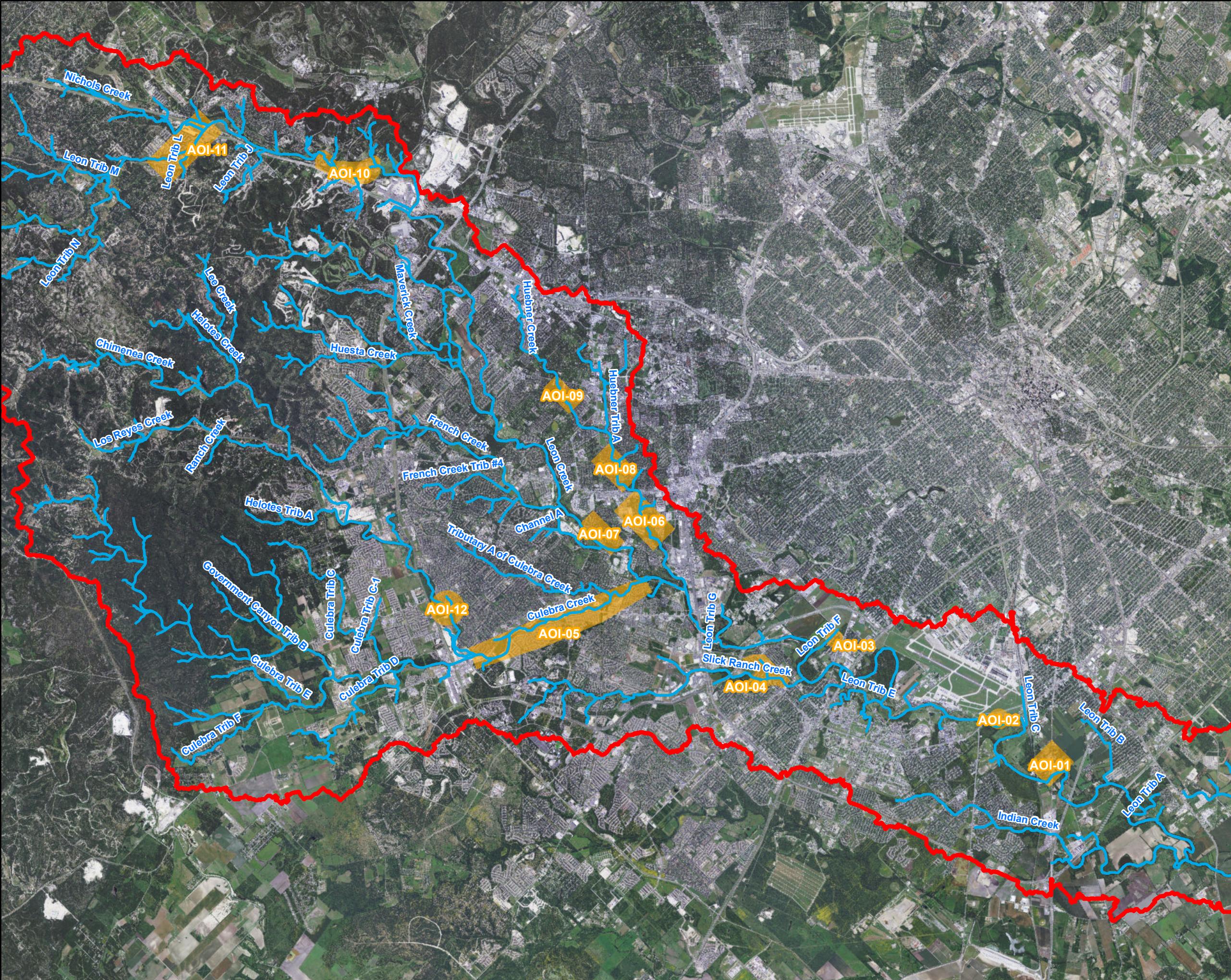
Alt AOI 7 - 21B - 150' channel imp

Stream		100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference w/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference w/o - w/Proj	10 WSEL (ft) FC w/o Project	10 WSEL (ft) FC with Project	Difference w/o - w/Proj
Leon Creek	179995	863.85	863.85	0	860.23	860.23	0	857.62	857.62	0
	175163	854.01	854.01	0	850.69	850.69	0	848.19	848.19	0
	171483	847.24	847.24	0	845.82	845.82	0	844.13	844.13	0
	171219	840.91	840.91	0	838.63	838.63	0	835.24	835.24	0
	169364	828.29	828.29	0	825.72	825.71	0.01	824.06	824.06	0
	168201	824.31	824.28	0.03	822.45	822.44	0.01	821.23	821.23	0
	167417	822.57	822.51	0.06	820.21	820.2	0.01	818.75	818.75	0
	165801	817.39	816.75	0.64	814.16	813.45	0.71	811.67	811.39	0.28
	165279	816.65	815.9	0.75	813.36	812.42	0.94	810.61	810.15	0.46
	164568	813.44	811.83	1.61	810.91	808.79	2.12	808	806.69	1.31
	164045	812.13	809.83	2.3	810.02	806.97	3.05	807.02	805.01	2.01
	163492	810.73	805.93	4.8	808.94	802.65	6.29	805.86	800.54	5.32
	163052	810.07	803.2	6.87	808.16	799.94	8.22	805.14	797.76	7.38
	162450	809.58	799.53	10.05	807.72	796.22	11.5	804.46	793.79	10.67
	161878	806.43	797.5	8.93	803.1	794.02	9.08	800.54	791.13	9.41
	161249	801.58	796.12	5.46	799.32	792.38	6.94	797.73	788.9	8.83
	160629	798.63	794.66	3.97	795.2	790.92	4.28	791.31	787.04	4.27
	159661	795.38	794.35	1.03	791.6	790.55	1.05	787.63	786.4	1.23
	158683	790.69	790.69	0	787.3	787.3	0	783.63	783.63	0
	158571	790.61	790.61	0	786.71	786.71	0	783.2	783.2	0

Table G.1-48
Helotes Quarry with Alternative 2 w/ Mitigation

Stream	Location / AOI #	Cross-section	100 WSEL (ft) FC w/o Project	100 WSEL (ft) FC with Project	Difference W/o - w/Proj	50 WSEL (ft) FC w/o Project	50 WSEL (ft) FC with Project	Difference W/o - w/Proj	25 WSEL (ft) FC w/o Project	25 WSEL (ft) FC with Project	Difference W/o - w/Proj
Helotes Creek	d/s Helotes RSWF	26428	962.09	957.72	4.37	961.64	957.39	4.25	960.28	956.75	3.53
	u/s Braun Rd	21806	955.51	949.11	6.4	954.94	948.08	6.86	953.86	946.38	7.48
	d/s Braun Rd	21577	955.37	948.92	6.45	954.75	947.88	6.87	953.64	946.18	7.46
	u/s SW Loop 1604	14111	918.85	911.68	7.17	918.59	910.91	7.68	917.88	909.51	8.37
	d/s SW Loop 1604	13795	909.72	905.95	3.77	909.28	905.64	3.64	908.14	905.06	3.08
	AOI 12	9407	898.47	892.88	5.59	897.82	892.26	5.56	896.2	891.27	4.93
	AOI 12	7731	890.51	884.72	5.79	889.66	884.06	5.6	887.84	883.26	4.58
	AOI 12	6267	886.44	880.1	6.34	885.36	879.28	6.08	883.44	878.27	5.17
	u/s confluence Culebra Crk / AOI 5	702	849.22	846.6	2.62	848.65	846.19	2.46	847.84	845.73	2.11
				0			0		0	0	
Culebra Creek	d/s confluence Helotes Creek / AOI 5	24901	854.75	852.18	2.57	852.88	850.66	2.22	850.73	849.25	1.48
	u/s Culebra Rd / AOI 5	24033	853	850.35	2.65	851.09	848.64	2.45	848.71	847.1	1.61
	d/s Culebra Rd / AOI 5	23896	852.46	849.83	2.63	850.57	848.26	2.31	848.33	846.76	1.57
	AOI 5	15208	824.77	823.11	1.66	823.38	822.39	0.99	822.4	819.76	2.64
	AOI 5	9168	808.15	806.28	1.87	806.57	805.36	1.21	805.35	804.1	1.25
	u/s Culebra Trib A / AOI 5	5742	793.62	792.36	1.26	792.51	791.68	0.83	791.64	790.47	1.17
	d/s Culebra Trib A / AOI 5	5310	790.02	788.66	1.36	788.88	787.71	1.17	787.66	786.1	1.56
	u/s confluence Leon Creek / AOI 5	1927	775.77	773.97	1.8	774.16	772.99	1.17	772.94	771.58	1.36
				0			0		0	0	
				0			0		0	0	
Leon Creek	d/s confluence Culebra Creek	151954	778.44	777.45	0.99	776.5	775.83	0.67	774.5	773.43	1.07
	u/s SW Loop 410	142821	758.54	757.99	0.55	756.78	756.03	0.75	755.06	754.56	0.5
	d/s SW Loop 410	142600	758.5	757.98	0.52	756.79	756	0.79	754.7	754.03	0.67
	u/s Leon Trib G	139942	743.79	743.25	0.54	741.99	741.36	0.63	739.95	739.08	0.87
	d/s Leon Trib G	139336	743.75	743.21	0.54	741.95	741.32	0.63	739.91	739.03	0.88
	u/s TX Hwy 151/Stotzer Frwy	136282	735.82	735.29	0.53	734.07	733.47	0.6	732.15	731.32	0.83
	d/s TX Hwy 151/Stotzer Frwy	136045	735.47	734.96	0.51	733.77	733.19	0.58	731.9	731.1	0.8
	u/s Leon Trib F	127612	714.31	714.01	0.3	713.27	712.89	0.38	712.05	711.5	0.55
	d/s Leon Trib F	126859	714.06	713.77	0.29	713.04	712.67	0.37	711.85	711.31	0.54
	u/s US Hwy 90 W	116958	693.29	693.28	0.01	693.01	692.71	0.3	692.45	692.26	0.19
	d/s US Hwy 90 W	116825	688.52	688.4	0.12	688	687.81	0.19	687.28	686.88	0.4
		110862	680.72	680.33	0.39	679.22	678.7	0.52	677.2	676.44	0.76
	u/s Leon Trib E	102466	670.25	669.85	0.4	668.8	668.34	0.46	667.23	666.67	0.56
	d/s Leon Trib E	102236	670.29	669.9	0.39	668.84	668.38	0.46	667.27	666.71	0.56
	u/s Leon Trib D	97465	663.85	663.41	0.44	662.32	661.78	0.54	660.53	659.81	0.72
	d/s Leon Trib D	96588	661.77	661.28	0.49	660.18	659.59	0.59	658.27	657.46	0.81
	u/s Military Dr SW	88636	650.44	649.63	0.81	649.49	647.74	1.75	648.32	645.99	2.33
	d/s Military Dr SW / AOI 2	87864	646.92	646.17	0.75	645.66	643.78	1.88	644.13	641.38	2.75
	AOI 2	86207	639.47	638.73	0.74	638.04	637.89	0.15	636.62	636.79	-0.17
	AOI 2	84973	639.03	638.7	0.33	637.63	637.21	0.42	636.05	635.4	0.65
	u/s New Laredo Hwy	69321	618.16	618.09	0.07	617.74	617.52	0.22	617.06	616.8	0.26
	d/s New Laredo Hwy	68856	614.8	614.5	0.3	614.08	613.97	0.11	613.65	613.55	0.1
	u/s IH 35 S	62942	608.67	608.47	0.2	607.8	607.51	0.29	606.77	606.43	0.34
	d/s IH 35 S	62806	608.11	607.9	0.21	607.23	606.94	0.29	606.23	605.9	0.33
	u/s Leon Trib B	57417	597.39	597.27	0.12	596.93	596.73	0.2	596.21	595.95	0.26
	d/s Leon Trib B	56444	596.97	596.87	0.1	596.57	596.39	0.18	595.92	595.68	0.24
	u/s SE Loop 410	55095	596.3	596.23	0.07	596.02	595.87	0.15	595.46	595.23	0.23
	d/s SE Loop 410	54631	594.64	594.45	0.19	593.78	593.53	0.25	591.87	591.72	0.15
	u/s Leon Trib A	51940	590.49	590.32	0.17	589.1	588.79	0.31	587.31	586.78	0.53
	d/s Leon Trib A	51046	587.1	586.88	0.22	586.16	585.85	0.31	585.04	584.64	0.4
	d/s Indian Creek	36743	572.86	572.6	0.26	571.64	571.29	0.35	570.37	570.23	0.14
	u/s Indian Creek	35989	572.56	572.3	0.26	571.35	571.01	0.34	570.1	570	0.1
	u/s Palo Alto Rd	32858	567.79	567.71	0.08	567.33	567.23	0.1	566.85	567.36	-0.51
	d/s Palo Alto Rd	32681	562.49	562.26	0.23	561.4	561	0.4	559.91	559.19	0.72
	u/s Comanche Creek	9432	522.15	520.97	1.18	517.92	516.67	1.25	513.41	511.97	1.44
	d/s Comanche Creek	8907	522.44	521.22	1.22	518.09	516.8	1.29	513.46	511.97	1.49
		1770	511.32	510.05	1.27	506.79	505.43	1.36	501.91	500.36	1.55
		426	511.55	510.29	1.26	507.07	505.72	1.35	502.18	500.62	1.56

Plate 4 Areas of Interest (Structural)



Legend

- Leon Creek Centerline
- Leon Creek Watershed
- Economic AOI

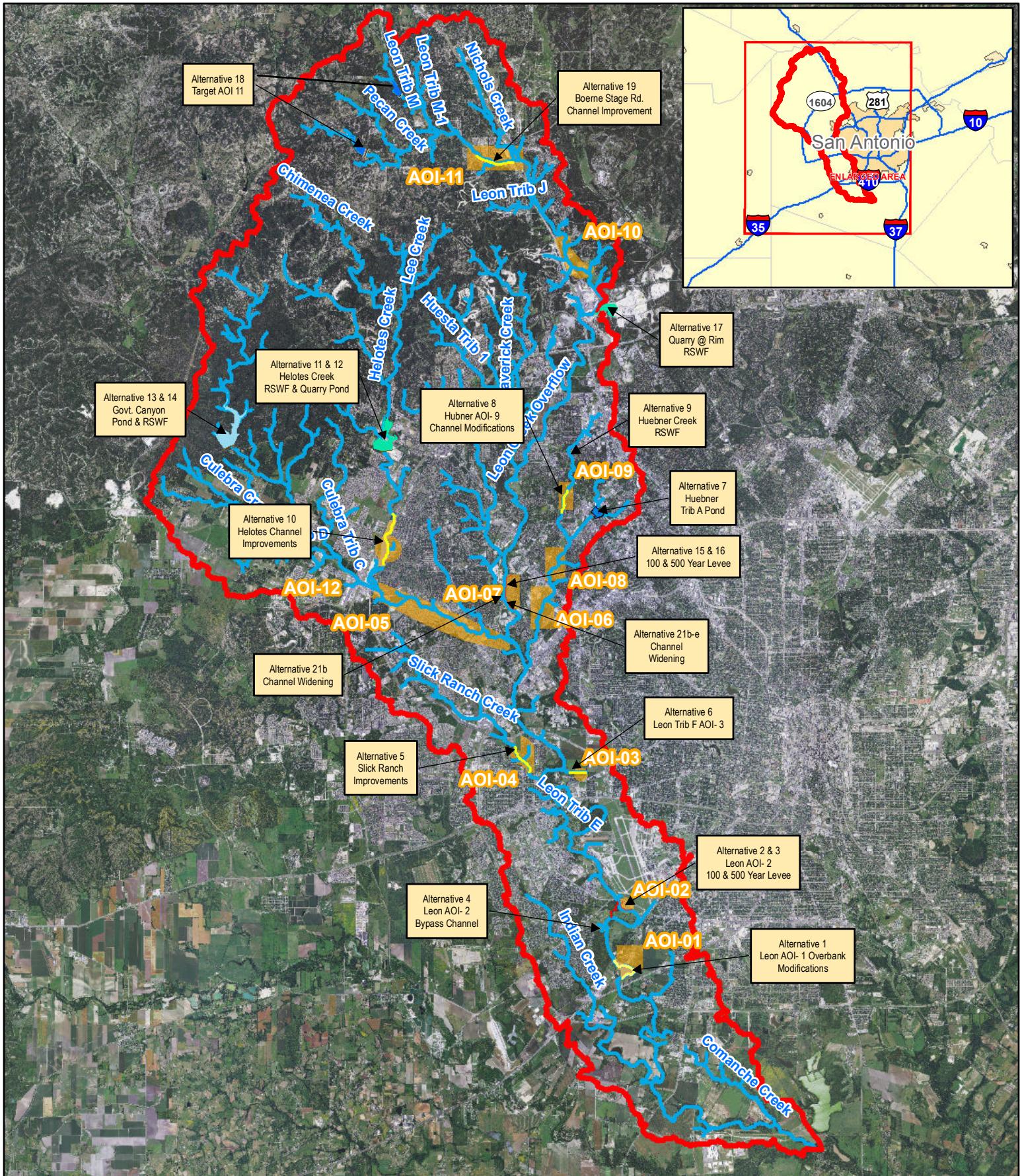
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Fort Worth District

Project: Leon Creek
Project Manager: Nova Robbins
Section: CESWF-PER-PT
Date: October 5, 2012
Author: Lucas Daniels
Location: \swf-netapp1\Civil\San_Antonio_Rvr_Bsn\Leon_Creek\GeospatialDocuments\mxd\20110408_AFB\LeonCreek_Alternative15.mxd

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Project: Leon Creek
Project Manager: Nova Robbin
Section: CESWF-PER-PT
Date: October 10, 2012
Author: Lucas Daniels
Location: (swf-11fbg/projects/objcts/LeonCreek/Documents)

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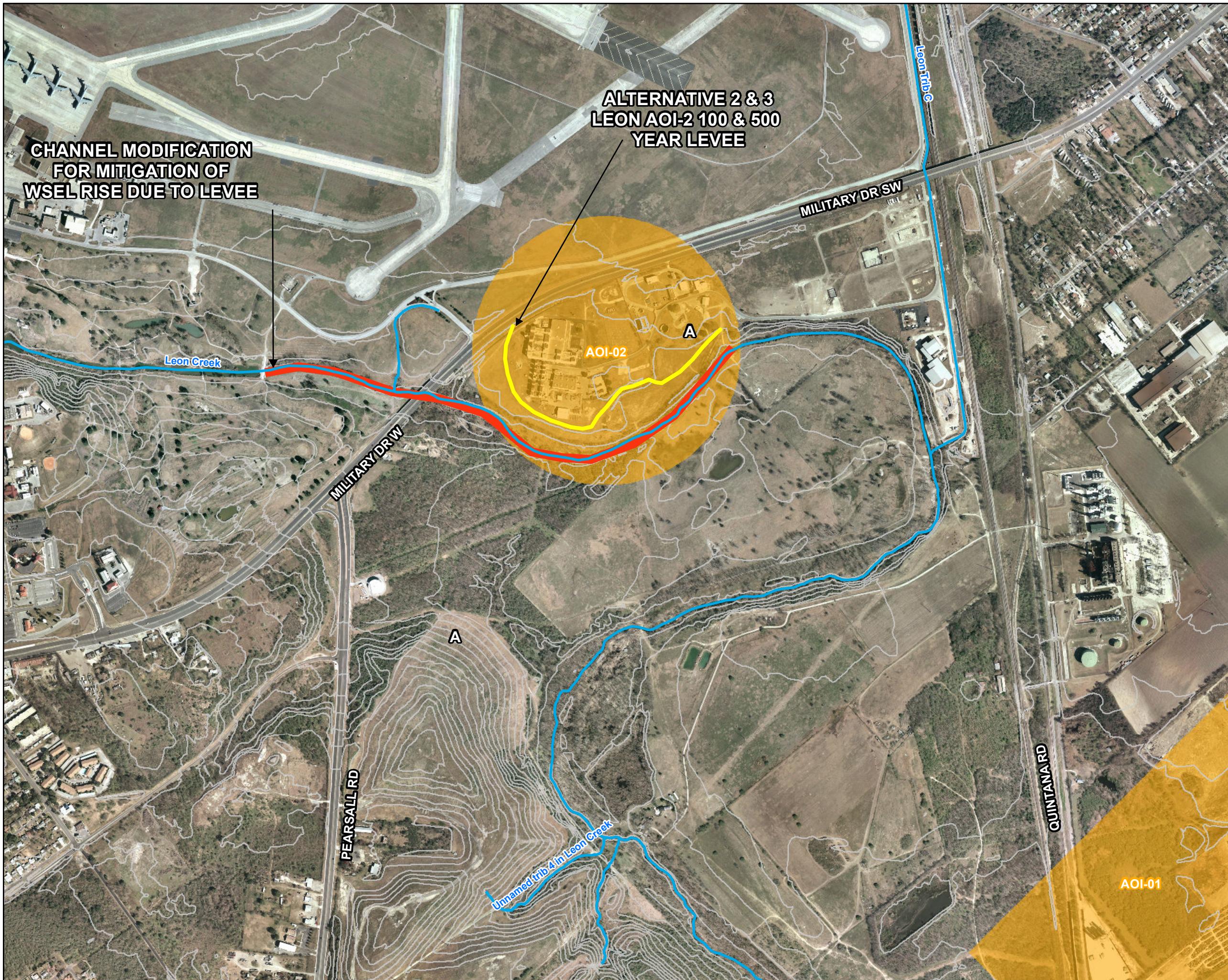
PLATE 5 INITIAL SUITE OF MEASURES



1 in = 4 miles

0 2 4 8 Miles
0 12,500 25,000 50,000 Feet

Plate 6 Alternative 2 with Channel Modification



Legend

- Leon Creek Centerline
- Channel Modification
- Contours
- Leon Creek Watershed
- Economic AOI
- Alternative 2- 100 YR Levee

Feet

0 500 1,000 1,500



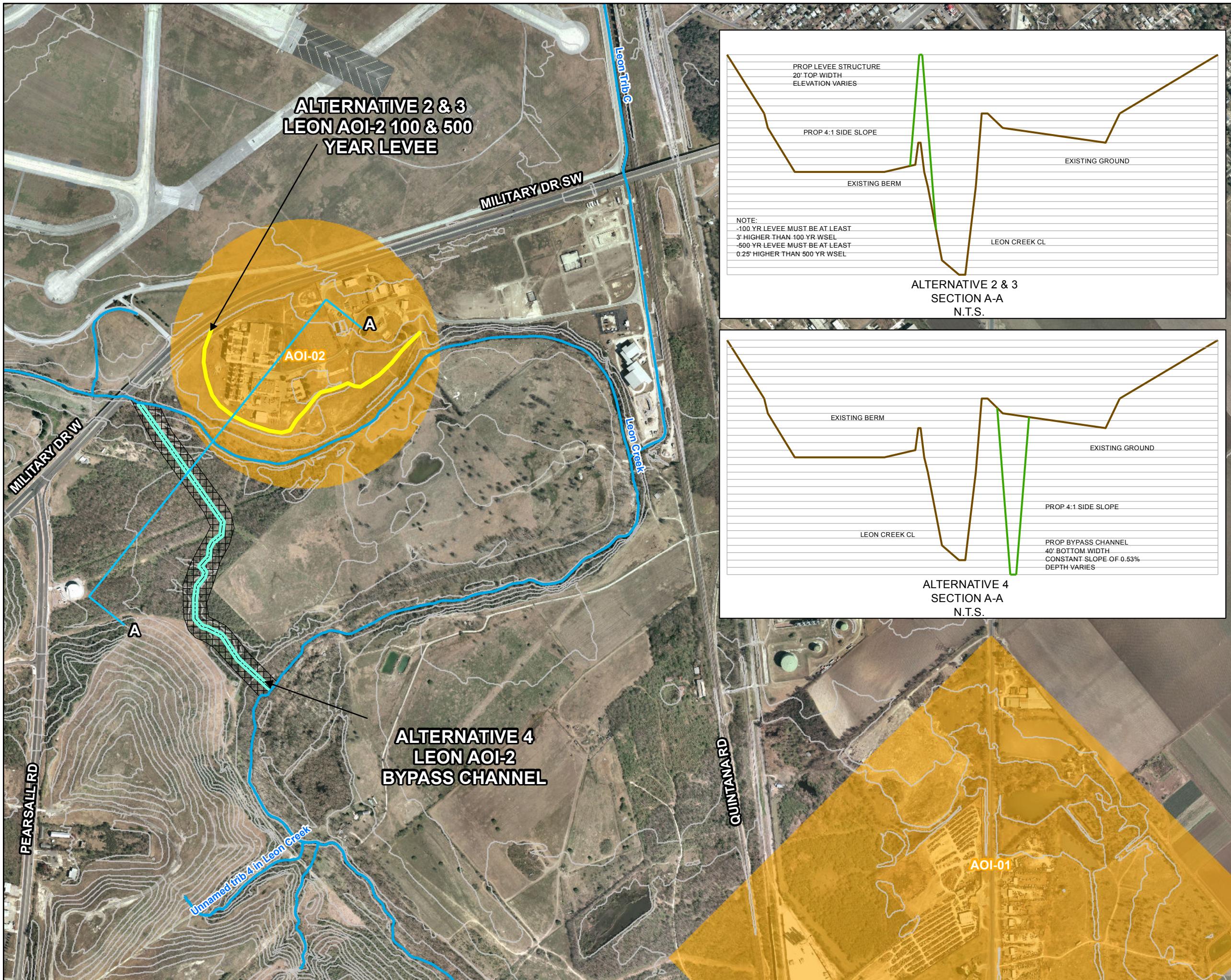
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Project: Leon Creek
Project Manager: Nova Robbins
Section: CESWF-PER-PT
Date: October 5, 2012
Author: Lucas Daniels
Location: \swf-netapp1\Civil\San_Antonio_Rvr_Bsn\Leon_Creek\GeospatialDocuments\mxd\20110408_AFB\LeonCreek_Alternative15.mxd

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Plate 7 Measures Evaluated- AOI- 2



Legend

- Leon Creek Centerline
- Contours
- Leon Creek Watershed
- Economic AOI
- Alternative 2- 100 YR Levee
- Alternative 4- Bypass Channel
- Alternative 4- Bypass Channel Excavation Area

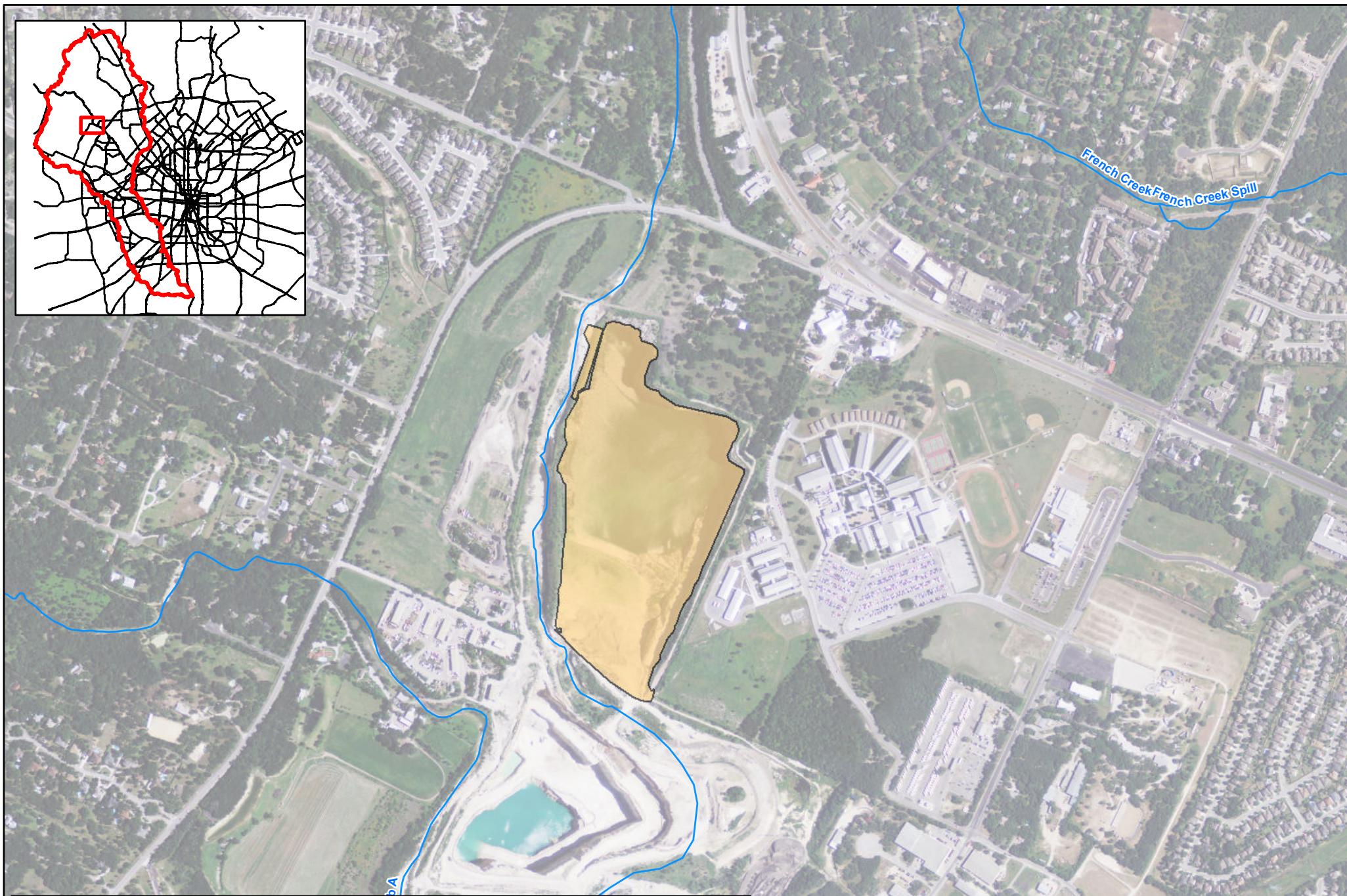
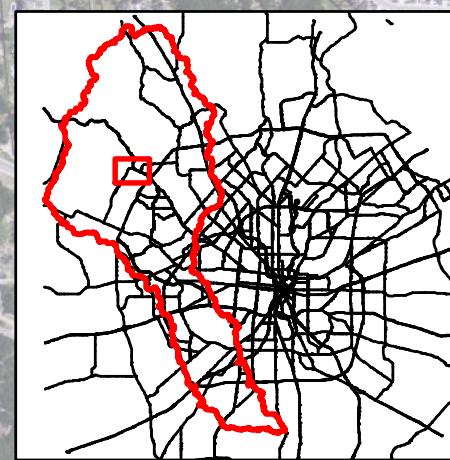
Feet

0 500 1,000 1,500



Project: Leon Creek
Project Manager: Nova Robbins
Section: CESWF-PER-PT
Date: October 5, 2012
Author: Lucas Daniels
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REFERENCE:
ESRI BASE DATASET
USGS NHD DATASET

Project: Leon Creek
Project Manager: Nova Robbins
Section: CES-TP-ER-PT
Date: 2012-05-12
Author: Lucas Daniels
Location: \w\mapstags\1C\WIL
San Antonio, Tx\Leon_Creek\Geospatial\Documents.mxd
20120206_AFB

LEON CREEK
SAN ANTONIO,
TEXAS

INTERIM
PLATE 8
QUARRY
ALTERNATIVE.

PROJECTION: NAD 1983
TEXAS SOUTH CENTRAL
STATE PLANE FIPS 4204

Legend

- Streams/Rivers
- Study Area

Helotes Creek Quarry Pond



0 0.05 0.1 0.2 0.3 0.4 Miles