CITY OF SAN ANTONIO

Regional Flood Mitigation Plan

December 2000

PAPE-DAWSON ENGINEERS, INC.

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I. INTRODUCTION

San Antonio is located in the south-central portion of Texas, approximately 150 miles from the Gulf of Mexico and 100 miles from the geographical center of Texas. Situated in Bexar County on the San Antonio River, the terrain to the northwest slopes upward to the Edwards Plateau and to the southeast it slopes downward to the Gulf Coastal Plains. These two distinct geological regions are divided by the Balcones Escarpment, a critical recharge zone for the Edwards Aquifer. The rolling hills of the area account for the range in elevation from 500 feet MSL (feet above mean seal level) in southern San Antonio to 1000 feet MSL just below the Balcones Escarpment to over 1600 feet MSL in the upper reaches of the San Antonio River in Bexar County. A location map of the project area is shown in Figure I-1

The City of San Antonio has a population of over 1.1 million people. Its city limits encompass approximately 417 square miles with an Extra Territorial Jurisdiction (ETJ) of approximately 789 square miles covering approximately 80% of Bexar County. Within the city's ETJ are several smaller municipalities including Alamo Heights, Terrell Hills, Olmos Park, Castle Hills, Converse, Helotes, Hollywood Park, Leon Valley, and Shavano Park just to name a few. Also within the city's ETJ are several military bases including Brooks AFB, Camp Bullis, Fort Sam Houston, Kelly AFB, Lackland AFB, and Randolph AFB.

At least five major watersheds; Cibolo Creek, Leon Creek, Olmos Creek, Salado Creek, and Medina River watersheds, and several smaller watersheds drain Bexar County from north to south converging in the San Antonio River in southern Bexar County and northern Wilson County. Development in these watersheds began over 200 years ago, but has been extensive in the past 50 years or so, especially in the northern half of Bexar County. The vast majority of the commercial and residential development outside of Loop 410 has occurred since the late 1950's. Aerial mapping flown in the early 1960's by the Natural Resource Conservation Service (NRCS) (formerly known as the Soil Conservation Service

[SCS]) Soil Survey for Bexar County, shows very little development outside of Loop 410 as compared to the present.

In 1926, the first of several flood detention dams in Bexar County, the Olmos Dam, was completed. The Olmos Dam is located just upstream of downtown San Antonio, with Olmos Creek upstream and the San Antonio River downstream of the dam. Since then, the NRCS in cooperation with the San Antonio River Authority has built 13 flood detention dams in the Salado Creek watershed. Six flood retention dams were built in the Martinez Creek watershed and seven flood retention structures were built in the Calaveras Creek watershed.

Since the early 1930's, several studies have been conducted on the San Antonio River, particularly in downtown San Antonio. Many projects ensued including straightening, widening, and deepening 31 miles of the San Antonio River and many of its tributaries. Most recently, two massive flood control tunnels, the San Pedro Creek Tunnel (SPCT) and the San Antonio River Tunnel (SART) were built to divert flood waters beneath downtown San Antonio.

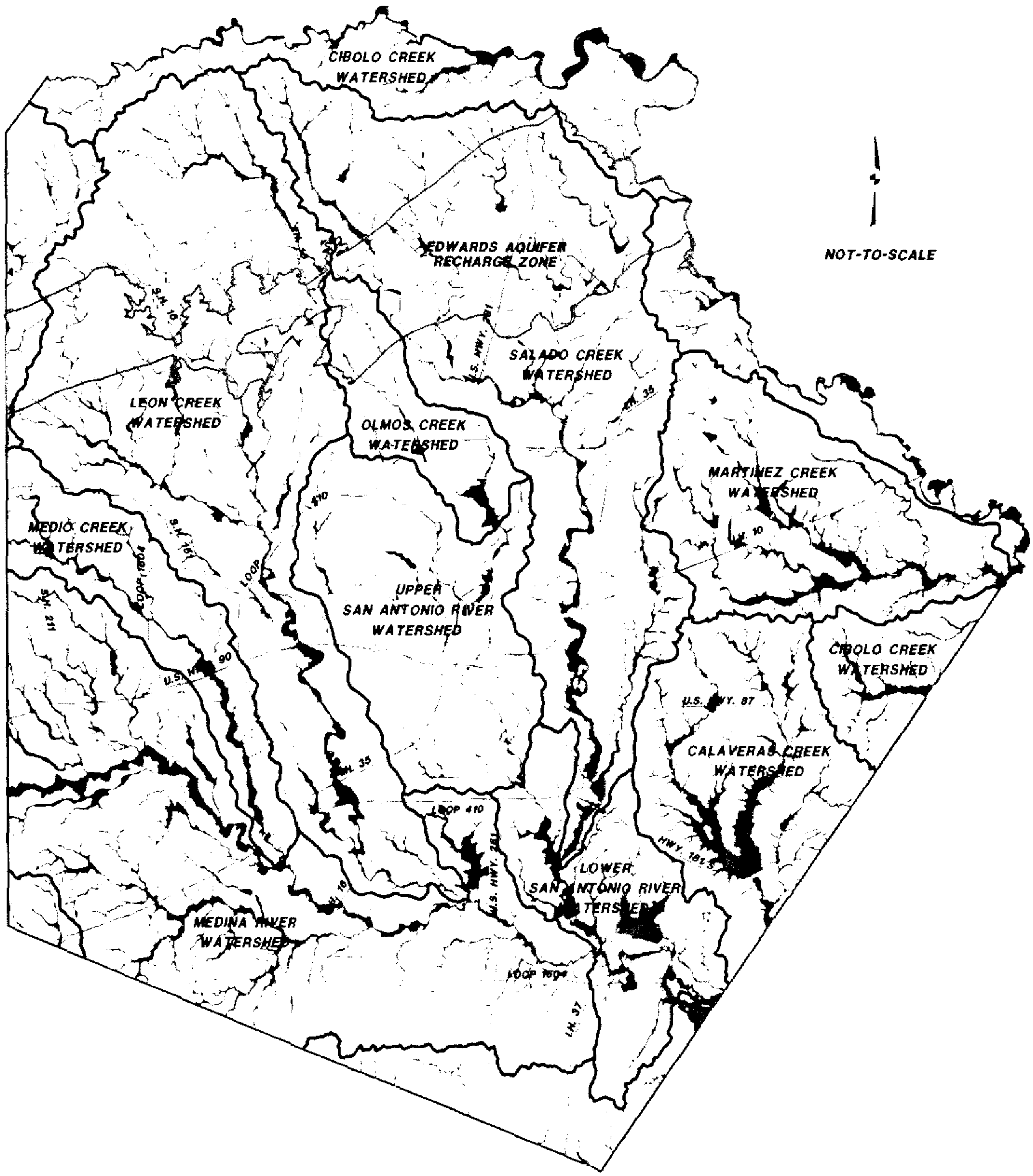

Figure I-1

WATERSHED LOCATION MAP

In 1996, the City of San Antonio contracted with three different engineering firms to develop complete Master Drainage Plans for three of the major watersheds in Bexar County; Leon Creek, Salado Creek , and Olmos Creek. Each study revised and updated the hydrological and hydraulic models for that particular watershed and sub-watersheds. Flooding problems were identified in several areas and over $100 million in potential flood mitigation projects were identified in these watersheds and are discussed in Sections III and IV of this Plan.

The City of San Antonio has participated in the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP) since 1983. The latest Flood Insurance Study (FIS) by FEMA is dated February 16, 1996. This study incorporated all studies and mapping revisions up to that date. FEMA is planning to update their maps to include all of the recent watershed studies and mapping revisions approved since 1996.

Even though the City of San Antonio, Bexar County and other agencies have recently studied some of the major watersheds, identified needed projects throughout the county, and implemented some of the more critical flood control projects, an overall flood mitigation plan for the study area has not been developed. The City of San Antonio is presenting this plan to the Texas Water Development Board (TWDB) as a tool to identify and codify all existing flood hazards and technically feasible flood mitigation activities within its jurisdiction and to provide a comprehensive strategy for implementing these activities.

The preparation process for this flood mitigation plan is discussed in Section II of this report. This section describes the City's efforts to attain input from the public and other organizations and municipalities affected by the plan and the incorporation of previous studies into this plan.

An Evaluation of Existing Hazards is presented in Section III. Descriptions of existing flood hazards as identified from several sources are given. Flood hazard areas are grouped by watershed and listed in Appendix A. Their locations are shown on the map in Appendix B.

The goals of this Flood Mitigation Plan are discussed in Section IV. Evaluations of the City's existing Flood Plain Management Program and potential mitigation alternatives are found in Sections V and VI, respectively. Potential mitigation projects are grouped by watershed and listed in Appendix C. Their locations are shown on the map in Appendix D.

An Action Plan to implement the recommended flood mitigation activities is included in Section VII of this report. Potential projects were assessed to determine their feasibility and funding options.

Section VIII discusses the action taken by the City of San Antonio to present this plan to interested residents, businesses, organizations, and communities affected by it. Feedback from these groups was then incorporated into the plan. The final plan was then reviewed and adopted by the City Council of San Antonio.

Finally, a formal process by which the progress of the Mitigation Plan is measured and how changes to the Plan can be made is outlined in Section IX.

PUBLIC WORKS – STORM WATER UTILITY

Program Information

The Storm Water Utility of Public Works, which is funded by the Storm Water Fee, consists of the following Divisions:

Storm Water Operations Division

- Vegetation Control - Mowing / Herbicide Applications / Tree Maintenance
- River Maintenance - Channel De-silting / Lake Dredging
- Street Cleaning - Street Sweeping / Graffiti Removal / Event Cleanups
- Tunnel Maintenance - Operating and Maintenance of Tunnels and Dams
- Storm Water Administration - Direction and Planning

Storm Water Engineering Division

- Design Engineering - Master Planning; Development Review; and CIP/MPO/special projects reviews.
- Engineering management of Regional Flood Control Facilities
- Floodplain management

The Storm Water Utility performs various tasks associated with the City's National Pollution Discharge Elimination System (NPDES) permit. Other divisions of Public Works and SAWS also help with NPDES permit compliance. Storm Water Engineering, in addition to design and review of public and private drainage facility plans leads master planning for drainage issues. This includes implementing regional flood control facilities, storm water detention systems and floodplain administration. Construction and maintenance of regional flood control facilities are activities associated with the Regional Storm Water Management Program.

Goals & Objectives

To perform the functions of planning & coordination, implementation, development, and management of the City's infrastructure system of lakes, streams, basins, dams and storm water systems in a responsive manner with a focus on quality, customer needs and the effective protection of public investment in the City's infrastructure.

Storm Water Utility:

- Consider finance strategies and affordability of options as addressed and recommended in the City of San Antonio Watershed Studies for improved performance of San Antonio's storm water infrastructure.
- Review the organization of the Storm Water Utility to maximize efficiency and customer service.
- Continue to execute tasks associated with compliance of the City's NPDES permit and the accounting methods for those activities.
- Educate the public on storm water issues as they relate to the total drainage system and individual watersheds.

Storm Water Operations:

- Continue the dredging program, which alleviates problems in the City of San Antonio's lakes and ponds by removing silt and debris.
- Provide for the protection of our environment by incorporating tree preservation/mitigation, reduced herbicide use, seeding of low maintenance ground cover and wildflowers.
- Take corrective course of action to ensure the reliability and functionality of the existing High Water Detection System and the Early Flood Warning System through system upgrades.
- Maintain City storm water facilities to ensure optimum capacity.
- Remove pollutants from City streets with an aggressive street cleaning program.

Storm Water Engineering:

- Review and evaluate the Regional Storm Water Management Program and associated fee structure.
- Implement the Storm Water Compliance for Construction Activity Ordinance.
- Continue implementation and enforcement of all drainage ordinances for the protection of the floodplain and the orderly development of the vegetation and natural facilities within it.

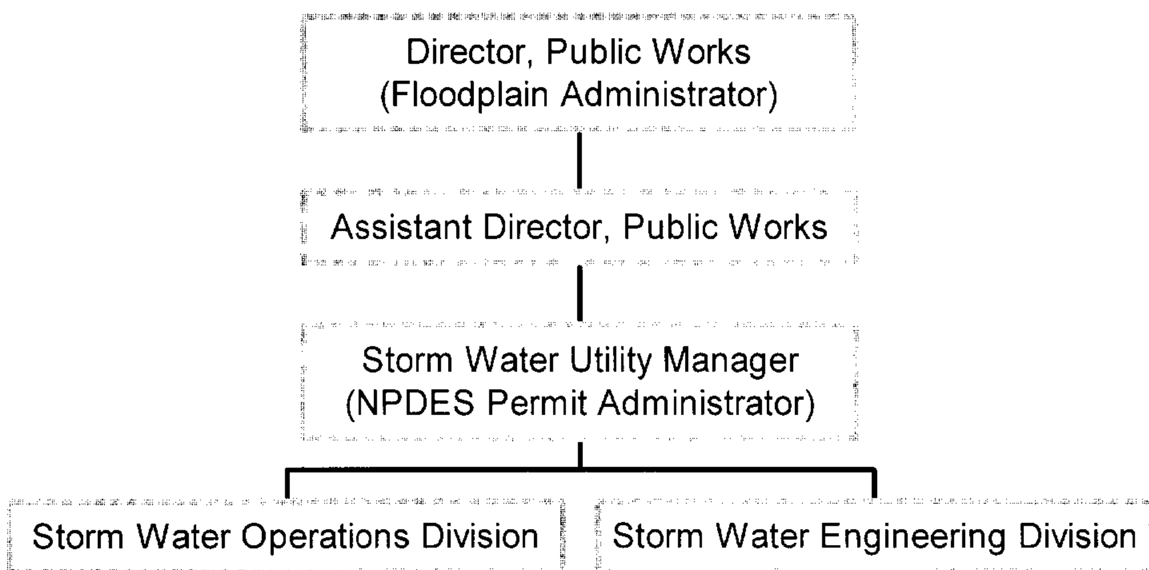

Figure I-2
STORM WATER UTILITY

II. PLAN PREPARATION PROCESS

In the wake of the devastating flood of October 1998, the City of San Antonio pushed forward to develop a comprehensive plan to implement technically feasible flood mitigation projects in order to minimize or avoid similar devastation in the future. Several divisions of the Public Works Department have been involved in the Plan Preparation process, including Capital Program, Drainage Engineering, Drainage Operations, Traffic Engineering, and the Streets Division. The Planning and Neighborhood Action Departments have also contributed. The Drainage Engineering, Drainage Operations, and Traffic Engineering Divisions have provided information on the City's needs for flood mitigation projects while the City of San Antonio Planning Department has provided information on the land use and development patterns in the various watershed.

The Drainage Regulation Review Committee made up of nine people representing neighborhood and environmental groups, developers and engineers, and elected city officials, was critical to the Watershed Planning process. They reviewed three major watershed studies on Leon Creek, Salado Creek, and Olmos Creek and recommended major revisions to the City's Drainage Regulations. These were adopted by the City Council between 1996 and 1997, and the revised 100-year flood plains were established as City policy. Each watershed plan identified several flood mitigation projects for the watersheds. The City held meetings with other municipalities and organizations and the public for their input. The Master Drainage Plan for each watershed was then presented to the City Council of San Antonio for their approval.

In addition to these Master Drainage Plans, the City of San Antonio decided to develop a comprehensive plan for the remainder of its jurisdiction. To do this, the City met with Bexar County Public Works to discuss the incorporation of their Bexar County Flood Analysis Report prepared by the San Antonio River Authority (SARA) into the Regional Flood Mitigation Plan. This report analyzed the effects of the October 1998 flood on Bexar County and many of its flood control structures. Requests for input from all municipalities within Bexar County were mailed out. Their responses were then incorporated into the report. The Bexar County Flood Analysis Report identified several flood problem areas and potential flood mitigation projects, which have been incorporated into this Plan. A copy of the Bexar County Flood Analysis Report can be found in Appendix E.

Several municipalities other than the City of San Antonio and Bexar County will be affected by this Plan. Implementation of the Plan will be a group effort by all municipalities with jurisdiction in the specific areas covered by the Plan. The City of San Antonio Public Works Department will, however, take the lead in planning and implementing the Plan.

In addition to the public notifications and meetings conducted as part of the Master Drainage Plans, several other meetings were held with other municipalities and the public and are discussed further in Section VIII of this report.

III. EVALUATION OF EXISTING HAZARDS

One of the first steps in mitigating flood hazards is to identify existing problem areas. Many hydrologic and hydraulic studies have been performed on creeks and rivers within the City of San Antonio, its extra-territorial jurisdiction and suburban cities. Also, Bexar County and the San Antonio River Authority have prepared numerous engineering studies, reports, and recommendations. From these studies, many potential flood problem areas were identified. Many of the problem areas are at street crossings including low water crossings and undersized bridges and culverts. However, the major concern is the over 600 structures which are located in the 100-year flood plain and were flooded during the October 1998 Flood. Areas of localized flooding due to inadequate drainage systems, eventhough not in a designated flood plain, have also been identified and included in this plan.

Flood hazard areas have been grouped by watershed and are listed in Appendix A with a brief description of each problem area. Each of the ten watersheds listed include several sub-watersheds. For example, the Leon Creek Watershed includes the Culebra Creek, French Creek, Huebner Creek, Helotes Creek, Huesta Creek, Maverick Creek, Slick Ranch Creek, Indian Creek and Comanche Creek sub-watersheds. Because of its complexity, the flood hazard areas of the Upper San Antonio River Watershed are listed by its larger sub-watersheds; Alazan Creek, Apache Creek, Martinez Creek, San Pedro Creek, Six Mile Creek, and Zarzamora Creek. The watershed boundaries and the location of each flood hazard area are shown on the map in Appendix B. The majority of the problem areas are within the more developed watersheds such as the Leon Creek, Salado Creek, Upper Olmos Creek, and the San Antonio River basins.

The City of San Antonio initiated a Flood Buyout Program in December 1998, designed to acquire almost 300 homes located in 100-year flood plains. Bexar County has recently done the same, including over 250 homes in their efforts. Over $20 million has been allocated for these programs.

IV. GOALS OF THE FLOOD MITIGATION PLAN

Due to its topography, dense development, rapid growth and semi-arid climate, the San Antonio area is subject to flash flooding, even from higher probability storms than the 100-year event. In the 1998 flood, the Salado Creek Watershed received 15-20 inches of rain in 24-hours resulting in a 250-year storm. Rains of three inches or more cause flash floods, which result in major property damage, and sometimes, loss of life. As a result, the goal of the Flood Mitigation Plan is to minimize loss of life and property damage and to promote the safety and protection of the public through effective flood plain management and aggressive implementation of identified mitigation projects.

V. EVALUATION OF THE EXISTING FLOOD PLAIN MANAGEMENT PROGRAM

Flood Plain Management has been a priority of the City of San Antonio since the early 1920's. Due to its diverse terrain and semi-arid climate, the City of San Antonio has always been subject to flash flooding which historically resulted in devastating loss of life and property. The City's existing flood plain management program is comprised of several components, which are managed by the Public Works Department and discussed below.

The City of San Antonio has participated in FEMA's National Flood Insurance Program (NIPF) since 1983. FEMA's most recent Flood Insurance Study (FIS) of the San Antonio area is dated February 16, 1996 and incorporates all studies and mapping revisions submitted to FEMA since 1983. All flood studies and mapping revisions submitted to FEMA have been reviewed by the City of San Antonio Public Works Department for compliance with the City's flood plain development regulations. The City's Director of Public Works has been designated by FEMA as the Flood Plain Administrator for the San Antonio area.

The City of San Antonio Unified Development Code (UDC) (Chapter 35 of the City Code) addresses the City's flood plain development regulations. Any development that occurs in its jurisdiction must comply with the City's UDC, and must be approved by the Public Works Department before it can be considered for platting or building permits. Ordinance No. 86711 (see Appendix J) amended the UDC effective October 20, 1997. This ordinance adopted the drainage regulations developed by the Drainage Regulation Review Committee. The Committee developed significant revisions to the UDC to provide for the safe and environmentally sensitive conveyance of stormwater, including the requirement that new development provide for onsite detention of stormwater or contribute to the funding of regional stormwater detention facilities. The regulations also protect natural flood plains, limit fill in flood plains, and establish a Regional Stormwater Management Program.

As previously mentioned, in 1994 the City of San Antonio commissioned drainage studies of three major watersheds; the Leon Creek, Salado Creek, and the Olmos Creek watersheds. From these three watershed studies, the City of San Antonio Public Works Department developed a Master Drainage Plan. This plan identified several flood problem areas throughout the three watersheds and evaluated potential mitigation projects for each problem area. Each of the watershed studies were submitted to FEMA for their review and incorporation onto their Flood Insurance Rate Maps (FIRM).

According to the Emergency Operations Plan for the City of San Antonio (see Appendix M), the City of San Antonio has the responsibility of providing for the health, welfare, and safety of its citizens in the event of a disaster or emergency crisis. For this reason, the San Antonio Emergency Management Office was established to address emergency situations requiring the coordination of several different agencies. The Emergency Management Plan deals with four phases of emergency management including mitigation, preparation, response, and recovery. The plan defines who, what, when, where, and how to mitigate, prepare for, respond to, and recover from the effects of natural disasters, technological accidents, national emergencies, acts of war, or other major incidents. The City's drainage program is part of the overall Emergency Operations Plan.

Other aspects of the existing Flood Plain Management Program for the City of San Antonio include project identification and implementation, drainage operations and maintenance, enforcement of flood plain regulations, and development of flood plains for parks and recreational use. The City's Public Works Department is responsible for identifying flood hazard areas through flood plain studies and citizen complaints, developing plans to mitigate these flood hazards, and then implementing these plans and constructing flood mitigation projects. A good example of the City's efforts to identify and implement flood mitigation plans was their response to the flood of October 1998. Almost

300 flood damaged properties totaling over $13 million were considered for purchase by the City for their 1998 Buyout Program.

The City of San Antonio's Drainage Operations Section is responsible for maintaining the existing storm drainage infrastructure within the City of San Antonio. These responsibilities include the control of vegetation in city drainage easements, the maintenance and cleaning of the City's underground storm sewer systems and open channels, street cleaning, and the operation and maintenance of the Olmos Dam and the San Antonio River and San Pedro Creek tunnels.

The City of San Antonio is responsible for the enforcement of its flood plain regulations and actively pursues violators of these regulations. Violators are usually identified through citizen complaints, city inspectors noticing the violation in progress, review of topographic maps and aerial photography, or from flood plain studies. Violators who do not comply with the flood plain regulations after notification from the City are subject to criminal and/or civil prosecution in the justice system.

The City of San Antonio Public Works Department is working in conjunction with the Parks and Recreation Department to obtain flood prone property for park and recreational development. A linear park plan along the flood plains of the Leon Creek, Salado Creek, and San Antonio River has been developed to safeguard the flood plains while providing flood control and recreational amenities.

VI. EVALUATION OF POTENTIAL MITIGATION ALTERNATIVES

Most of the existing flood hazards within the planning area have been identified, and the goals of the Flood Mitigation Plan have been defined. From the various studies conducted throughout the planning area, from the City of San Antonio Public Works Department and from several other sources, a potential flood mitigation project has been identified for each flood hazard area. These potential mitigation projects are listed in Appendix C. As with the list of flood hazard areas in Appendix "A", the list of potential mitigation projects is divided into the ten major watersheds within the planning area with the Upper San Antonio River Watershed further divided into its larger sub-watersheds. A brief description and estimated cost of each project is given and their locations are shown on the map in Appendix D.

VII. ACTION PLAN

A list of potential flood mitigation projects was developed in the previous section. It is now critical to evaluate all potential mitigation alternatives and find funding for the highest priority projects immediately. Projects from the City of San Antonio Master Plan Project List and Bond Projects List have already been evaluated by the Public Works Department for necessity and cost effectiveness and are, therefore, included in the recommended project list. In addition, projects recommended in the Leon Creek, Salado Creek and Upper Olmos Creek Watershed Master Drainage Plans have also been included in the Action Plan. Recommendation of other potential projects is based on their cost to implement and their ability to effectively mitigate flood hazards. Below is a list of recommended mitigation projects by watershed that will effectively meet the goals and objectives of this Flood Mitigation Plan.

Implementation of these recommended mitigation projects will be a joint effort between the City of San Antonio Public Works Department and the Bexar County Public Works Department. The County Wide Citizen's Watershed Master Plan Committee will represent the interests of the general public and local organizations when prioritizing and implementing the flood mitigation activities. Funding for these projects will come from many sources including local Capital Improvements Funds, TxDOT, the Texas Natural Resource Conservation Commission, FEMA, and other local, state, and federal sources.

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

Key Legend

#	- City of San Antonio Master Plan Projects
BB	- Bexar County and City of San Antonio Buy-Back Programs
BD	- City of San Antonio Projects - 1999 Bond Election and Others
C	- Leon Creek Watershed Master Drainage Plan Projects for Culebra Creek
CT	- Bexar County Proposed Construction Projects
D,P	- City of San Antonio Regional Detention and Channelization Facility Projects
F	- Leon Creek Watershed Master Drainage Plan Projects for French Creek
HB	- Leon Creek Watershed Master Drainage Plan Projects for Huebner Creek
HEL	- Leon Creek Watershed Master Drainage Plan Projects for Helotes Creek
HUE	- Leon Creek Watershed Master Drainage Projects for Huesta Creek
LC	- Leon Creek Watershed Master Drainage Plan for Projects for Leon Creek
M	- Leon Creek Watershed Master Drainage Plan for Projects for Maverick Creek
R	- Upper Olmos Creek Master Drainage Plan Projects
SA	- City of San Antonio / Bexar County / SARA Flood Control Projects - 1996
V	- Salado Creek Master Drainage Plan Projects

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LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
MEDINA RIVER WATERSHED			
BB-15		Shepherd - Atascosa (2 Properties, 2 w/improvements)	$68,880
CT-11		Town of Macdona, complete drainage improvements with and adjacent to town.	$830,000
CT-12		Applewhite Rd. - Replace narrow bridge	$840,500
CT-19		Pearsall Rd. - Increase capacity of drain culvert west of Lucky Rd.	$189,591
CT-21		Jungman Rd. - Replace lower water crossing north of Macdona - La Coste Rd.	$520,000
CT-33		O'Brien Rd. - Replace low water crossing	$548,400
CT-45		Pleasanton Rd. Bridge Widening	$400,000
SA-16		Median River at FM 1937 LWC replacement	$1,500,000
MEDIO CREEK WATERSHED			
BD-67		Hunt Lane: Demaya to U.S. 90	$2,349,534
CT-3		Geronimo Village Drainage	$100,000
CT-42		Ravenfield Road Bridge/Road Construction	$1,700,000
LEON CREEK WATERSHED			
#251	A	Callaghan East to Old Highway 90	$2,000,000
#251	B	S. Callaghan Rd Commerce to 90 MPO Project	$8,000,000
#252	A	Channel Parallel to Old Highway 90 & Acme	$8,900,000
#252	B	S. Callaghan Rd. Old Highway 90 to Castroville	
#1024		W. Villaret - Palo Alto College	$843,000
#1027		Castleridge - Shady Grove to Pinn	$1,100,000
#1033		Oxford Trace/Abe Lincoln	$950,000
#1060		Lomax	$122,000
#1061		Nickle and Dime Area Drainage (Buyouts)	$4,511,000
#1062		South Ridge Park Subdivision Outfall	$1,804,356
#1071		Parallel to 410	$283,000
#1079		Mountain View - Culebra/1604	$823,000
BB-17		Leon Creek Area (Plumnear Area - 33 properties)	$1,381,645
BB-20		Huebner Creek (Holly Hock - 3 properties)	$244,400
BB-22		Leon Creek (Somerset Rd. - 1 property)	$66,340
BD-9		Guilbeau Drainage at French Creek - Provides drainage improvements on Guilbeau Rd. at French Creek Rd.	$430,000

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
BD-18		Leon Creek Recreation Facilities and Detention Pond at Loop 410	$2,500,000
BD-26		Quintana Rd. Drainage #64 Extension	(Scheduled for Construction)
BD-28		Whitby at Huebner Creek	$444,952
BD-29		Babcock - DeZavala to Hausman	$5,751,691
BD-31		Holly Hock at Huebner Creek	$603,030
BD-34		Tezel: Timber Path to Ridge Path	$1,958,975
BD-35		36th Street; U.S. 90 to Gowdon Flood Mitigation	$3,800,000
BD-37		Abe Lincoln: Horn to Eckert	$1,700,000
BD-50		Dempsey: Farr to Gwanda Lee	$398,123
BD-77		Tezel: Ridge Path to Old Tezel	$2,938,463
BD-90		Hillside Acres Drainage Outfall	$753,747
C-3	A	Culebra Creek Levee East of Galm Road	$56,000
C-3	B	Culebra Creek Floodwall	$152,000
C-4	A	Steubing Rd. Bridge @ Culebra Creek	$442,000
C-4	B	Steubing Road Level	$26,000
C-5	B	Culebra Rd. reconstruction at Loop 1604	$365,000
C-6	A	New Culebra Road Bridge @ Culebra Creek	$1,310,000
C-6	B	Purchase 7 structures in floodplain	$1,155,000
C-7	A	Culebra Creek Channelization	$143,000
C-8	A	Culebra Rd. Bridge @ Culebra Creek	$2,039,000
C-8	B	Timber Path Bridge @ Culebra Creek	$6,000,000
C-8	C	Old Grissom Rd. Bridge @ Culebra Creek	$871,000
C-8	E	Purchase 1 structure in floodplain	$120,000
CT-5		Braun Rd. Bridge - replacement	$469,672
CT-13		Scenic Loop: replace LWC 0.4 m north of Grey Forest	$230,000
CT-26		Applewhite Rd. - Replace low water crossing	$310,000
CT-27		Zarzamora Rd. - Replace low water crossing @ Commanche Creek	$280,000
CT-43		Galm Rd. Bridge/Road Construction	$1,400,000
CT-47		Geronimo Forest Drainage	$400,000
D-1		Huesta Creek detention Pond and Park @ Leon Creek	$6,250,000
D-2		Spring Creek Detention Pond	
D-3		Leon Creek Detention Pond @ Whitby Street	
D-5		Leon Creek Detention Pond @ Culebra Creek	
D-6		Leon Creek Detention Pond @ Heath Lane	
D-7		Government Canyon Detention	

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
D-8		Leon Creek @ Heath Lane Channalization	
D-9		Huebner Creek @ Hollyhock Channelization	
D-10		Culebra Creek @ Loop 1604 Channelization	
D-11		Helotes Creek @ 1604 Channelization	
D-12		French Creek Channalization	$1,334,000
F-2	A	Hausman Bridge @ French Creek (LW-162)	$597,000
F-3		Prue Rd. Bridge @ French Creek (LW-163)	$512,000
F-4	A	North Verde Road Bridge @ French Creek	$655,000
F-4	B	South Verde Road Bridge @ French Creek	$751,000
F-4	C	Purchase 11 structures in floodplain at N. Verde	$1,200,000
F-5	A	Bandera Road Bridge Replacement @ French Creek	$254,000
F-8	A	Mainland Road Bridge @ French Creek	$254,000
F-9	A	Low Bid Lane Bridge at French Creek	$142,000
F-9	B	Heath Lane Improvements	$64,000
F-9	C	Clyde Dent Drive Bridge at French Creek	$139,000
GF-1		Scenic Loop Rd. @ Bluehill Pass	$1,000,000
GF-2		Hillside Dr. Bridge	$500,000
GF-3		Sherwood Trail Bridge	$500,000
GF-4		Hilltop Dr. Bridge	$500,000
HB-1		DeZavala Road Bridge @ Huebner Creek	$609,000
HB-2		Cimarron Street Floodwall along Huebner Creek	$100,000
HB-4		Prue Rd. Bridge @ Huebner Creek (LW-26)	$493,000
HB-5	A	Lockhill Road Bridge @ Huebner Creek (LW-26)	$288,000
HB-5	B	White Bonnet Bridge @ Huebner Creek (LW-27)	$288,000
HB-5	C	Lockhill Floodwall along Huebner Creek	$172,000
HB-5	D	Purchase 4 buildings in floodplain	$423,000
HB-8		Eckert Rd. Bridge @ Huebner Creek (New Culvert Constructed '95)	$457,000
HB-10		Timber Hill Road Bridge @ Huebner Creek (LW-57)	$928,000
HEL-1		Galm Rd. Bridge @ Helotes Creek	$513,000
HEL-3	A	Leslie Rd. Bridge @ Helotes Creek (LW106.1)	$352,000
HEL-3	B	Leslie Rd. Bridge @ Helotes Creek (LW106.1 LW 106.2)	$363,000
HEL-3	C	Leslie Rd. Bridge @ Helotes Creek	$363,000
HEL-3	D	Purchase 7 structures in floodplain	$1,260,000
HEL-6		Helotes Creek Channel Improvements	$1,400,000
HUE-3		Hausman Rd. Bridge @ Huesta Creek	$315,000
LC-1		Hausman Rd. Level (Prevents Split Flow)	$26,000
LC-2		Levee on Leon Creek, south of Hausman	$31,000

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
LC-4		Eckert Rd. Bridge @ Leon Creek	$590,000
LC-5		Timber Creek Estates, Leon Creek Channelization	$4,340,000
LC-6		Heath lane Reconstruction	$219,000
LC-7		Grissom Rd. Bridge @ Leon Creek	$1,273,000
LC-8		Levee on Leon Creek, south of Grissom Rd.	$26,000
LC-10		Ingram Road Bridge @ Leon Creek (LW-58)	$1,813,000
LC-12	A	Rebuild Culebra Road Bridge @ Leon Creek	$2,713,000
LC-14		West Commerce St. Bridge @ Leon Creek (LW-106)	$2,617,000
LC-15	A	Pinn Road Bridge @ Leon Creek (LW-107)	$989,000
LC-16	A	Brownleaf Floodwall along Leon Creek	$720,000
LC-17		Rodriguez park Signs and Flood Gates	$50,000
LV-1		Huebner Creek Channelization	$615,000
LV-2		Bandera Rd. Bridge Channelization @ Huebner Creek	$1,000,000
LV-3		Huebner Creek Channelization - Bandera Rd. to Evers Rd.	$6,780,000
LV-4		Evers Rd. @ Huebner Creek Replacement of Culvert	$766,000
M-1	A	Babcock Rd. Bridge @ Maverick Creek	$301,000
M-1	B	Babcock Rd. Bridge @ Maverick Creek	$301,000
M-1	C	Babcock Rd.. Bridge @ Maverick Creek	$301,000
M-1	D	Babcock Rd. Bridge @ Maverick Creek	$301,000
M-2		Babcock Rd. Level	$92,000
M-3		Babcock Rd. Level	$36,000
M-4		UTSA Blvd. Bridge @ Maverick Creek	$448,000
M-5		Hausman Road Bridge at Maverick Creek	$239,000
S-21		Leon Creek - Relocations	$3,247,000
S-25		Leon Creek - Keitha to Hwy. 90 west Channelization	$4,745,000
SA-13		Culebra Creek study - Helotes Creek to French	$50,000
TX-4		FM-471 - Leon Creek Area Drainage	$176,100
TX-12		FM-471 at Leon Creek Removal Gravel Washoff	$180,000

UPPER SAN ANTONIO RIVER WATERSHED

Alazan Creek Watershed

#71	N	Overbrook - Sunshine Dr. to Balcones	$8,910,000
#71	Z&K	Wilson - South of Woodlawn	$2,000,000
#98	A	Culebra Road - Goodrich to Hamilton	$450,000
#1019		Roberts St. NW 19 to Alazan Creek	$391,000
#1028		De Chantel Area	$1,800,000
#1040		St. Cloud	$354,000

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#16	ALT	W.Nueva /S. Alamo	$14,405,000
#24		Conrad St.	$12,742,375
#29		Camden - Jones to Newall	$200,000
#34		E. Mulberry	$1,200,000
#39	A	Zarzamora	$8,100,000
#39	U	El Jardin	$1,081,421
#39	V	36th Street @ Hwy. 90	$1,303,868
#52	B	Fair/Pine	
#54		Greer Storm Drain Project	$1,400,000
#55	Addit	Gever St. Drainage	$5,400,000
#56	B	Lennon Court - Clark Ave. to IH 37	$1,500,000
#56	X	S Presa to San Antonio River Outfall	$1,500,000
#63		W. Hart/S. Flores/Octavia (Octavia #63)	$6,000,000
#66	A	East Sayers - Pleasanton to S. Flores	$2,000,000
#69	A	Mayfield/Boswell/Dickson	$1,095,652
#88		Olmos Creek-Olmos Dam to Hildebrand	$3,000,000
#91		N. New Braunfels	$12,300,000
#149		Del Alamo - Jefferson / W. Martin / SA River	$15,755,900
#150		Brooklyn-Ave. B to Austin St.	$5,632,000
#150	A	Austin St. - Hackberry to Ave. B	$2,090,000
#150	B	Lamar - Hackberry to Austin St.	$2,625,000
#150	C	Brunet - Cherry to Live Oak	$2,400,000
#202		E.White - Mission to Roosevelt	$2,535,000
#1020		Adele - Drexel Rd. to Fair Ave	$365,000
#1035		E Magnolia - Main to Carleton	$2,000,000
#1039		Hawthorne - Flores	$217,000
#1041		Clay Street Drainage	$180,622
#1045		W. Kirk - Neimeyer to Carolyn	$1,130,500
#1046		Main Ave. / Old Guilbeau / San Antonio River	$403,000
#1049		Simms Area Drainage	$4,300,000
#1056		McCullough at N. St. Mary's	$602,500
#1058		Mission Road Area - Package 3	$1,400,000
AH-1		N. New Braunfels Street Drainage Channel	$12,000,000
AH-2		Channel Inlet @ N. New Braunfels and Redwood	$1,000,000
AH-3		Austin Hwy. street Drainage Channel (N. New Braunfels to Broadway)	$2,000,000
AH-4		Drainage Channel From Terrell Hills to Alamo Heights	$1,000,000
AH-5		Broadway Street Drainage thru Alamo Heights	$15,000,000

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#1048		Placid Dr. Drainage	$1,216,000
#1052		Proj #71-A & B Channel Restoration	$1,000,000
#1074		Ligustrum Drainage	$408,000
BD-52		Durango: San Marcos to Navidad	$1,556,841
BD-68		Las Moras - Street and Drainage	$71,376
BD-84		Waverly Phase II: Emroy to Glenmore	$445,000
BD-86		Wilson: Woodlawn to Waverly	$892,537
BD-87		Woodlawn Ave: San Antonio to Lake	$450,000
SA-1		Detention Facility near Spencer Lane and IH-10	$4,600,000

Apache Creek Watershed

#57	A	Woodlawn/Camino Santa Maria, Overhill	$1,500,000
#58	BZ	Quill	$3,600,000
#1054		Zarzamora - Guadalupe to Apache Creek	$687,000
BD-21		Dell Street Drainage (100 Block) (#58 BX)	$438,817
TX-1		24th Street - Commerce to Culebra	$2,440,000

Martinez Creek Watershed

#85	A	Buckeye/ Edgebrook	$2,900,000
#86		Vance Jackson/Freiling	$3,200,000
#303		Brazos and Arbor	$2,700,000
#1055		Craig, French, Ashby, Martinez Creek	$266,000
		Channel Modifications for Martinez Creek, Phase I	$2,652,300
		Channel Modifications for Martinez Creek, Phase II	$2,066,300
		Channel Modifications for Martinez Creek, Phase III	$3,163,800
BB-23		Martinez Creek Phase I	$4,302,154
BB-28		Martinez Creek Phase II	
BD-55		Elsmere: Michigan to Capitol	$125,441
BD-78		Thorain: Buckeye to S.P. Railroad	$327,750
BD-80		W. French: Zarzamora to Navidad	$325,772

San Antonio River Watershed

#1	A	Broadway - East Hildebrand to Burr Rd.	$639,000
#1	B	Burr Rd.	$2,700,000
#5	A	Cunningham	$2,302,660
#6	E	E Grayson	$1,300,000
#8		Brackenridge	$1,680,000
#16		E. Houston	$1,000,000

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#16	ALT	W.Nueva /S. Alamo	$14,405,000
#24		Conrad St.	$12,742,375
#29		Camden - Jones to Newall	$200,000
#34		E. Mulberry	$1,200,000
#39	A	Zarzamora	$8,100,000
#39	U	El Jardin	$1,081,421
#39	V	36th Street @ Hwy. 90	$1,303,868
#52	B	Fair/Pine	
#54		Greer Storm Drain Project	$1,400,000
#55	Addit	Gever St. Drainage	$5,400,000
#56	B	Lennon Court - Clark Ave. to IH 37	$1,500,000
#56	X	S Presa to San Antonio River Outfall	$1,500,000
#63		W. Hart/S. Flores/Octavia (Octavia #63)	$6,000,000
#66	A	East Sayers - Pleasanton to S. Flores	$2,000,000
#69	A	Mayfield/Boswell/Dickson	$1,095,652
#88		Olmos Creek-Olmos Dam to Hildebrand	$3,000,000
#91		N. New Braunfels	$12,300,000
#149		Del Alamo - Jefferson / W. Martin / SA River	$15,755,900
#150		Brooklyn-Ave. B to Austin St.	$5,632,000
#150	A	Austin St. - Hackberry to Ave. B	$2,090,000
#150	B	Lamar - Hackberry to Austin St.	$2,625,000
#150	C	Brunet - Cherry to Live Oak	$2,400,000
#202		E.White - Mission to Roosevelt	$2,535,000
#1020		Adele - Drexel Rd. to Fair Ave	$365,000
#1035		E Magnolia - Main to Carleton	$2,000,000
#1039		Hawthorne - Flores	$217,000
#1041		Clay Street Drainage	$180,622
#1045		W. Kirk - Neimeyer to Carolyn	$1,130,500
#1046		Main Ave. / Old Guilbeau / San Antonio River	$403,000
#1049		Simms Area Drainage	$4,300,000
#1056		McCullough at N. St. Mary's	$602,500
#1058		Mission Road Area - Package 3	$1,400,000
AH-1		N. New Braunfels Street Drainage Channel	$12,000,000
AH-2		Channel Inlet @ N. New Braunfels and Redwood	$1,000,000
AH-3		Austin Hwy. street Drainage Channel (N. New Braunfels to Broadway)	$2,000,000
AH-4		Drainage Channel From Terrell Hills to Alamo Heights	$1,000,000
AH-5		Broadway Street Drainage thru Alamo Heights	$15,000,000

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
BB-33		Sa River (Symphony Lane Area)	$1,271,940
BD-15		Octavia #63 Phase II	$6,896,000
BD-16		Rip-Rap #69 Phase II	$10,000,000
BD-48		Claremont/Eleanor/Natalen, Phase II	$687,975
BD-49		Claremont/Eleanor/Natalen, Phase III	$800,714
BD-57		Florida: IH-37 to St. Mary's	$1,450,300
BD-61		Gevers: IH-10 to Warding	$644,645
BD-70		Mancke Area Streets, Phase II	$957,918
BD-73		Mitchell Street - Probandt to Roosevelt	$1,463,764
COE-3		Six Mile Creek @ Sa River Drop Structure eroded	
COE-4		SA River @ Overflow to San Juan Ditch eroded	
COE-5		SA River @ San Juan Lift Station Dam tri-lock eroded	
COE-6		SA River tunnel inlet, trash rakes, splitter walls	
CT-48		Padre Boulevard Bridge widening	$400,000
SA-4		Major Drainage Improvements and Channel work along SA River	$3,250,000
SA-5		SARIP - Josephine to Lexington	$10,644,000
SA-6		SARIP - Hildebrand to Josephine	$1,992,000
SA-7		SARIP - Brooklyn Street Dam	$917,000
SA-8		SARIP - Guenther to Lone Star	$1,874,000
SA-9		SARIP - Lone Star to San Pedro Creek	$1,700,000
SA-10		SARIP - San Pedro Creek to Espada Dam	$6,905,000
SA-12		SARIP - Espada Dam	$11,675,000
TX-3		Mitchell Street - from Probandt to SP536 (Roosevelt Ave.)	$1,878,228

Six Mile Creek Watershed

KEY	EXT	DESCRIPTION	ESTIMATED COST
#39	J	Roselawn	$2,000,000
#65	D	Wabash	$3,825,000
#68	Riprap	Kendalia/Commercial	$13,000,000
#68	A	Clovis	
#68	D	Garnett	$1,000,000
#69	RPRAP2G	Southcross from Pleasanton to Commercial; Tupper, Nobb	$2,293,891
#69	RPRAP2D	Cannavan/Brunswick/Tupper	$5,750,000
#83	A	Branches of Six Mile Creek	$3,000,000
#83	B	Branches of Six Mile Creek	$3,000,000
#83	C	Branches of Six Mile Creek	$3,010,000
#83	X	Ashley / Espada, Phase II	$14,261,984
#83	XE	Oppenheimer	$4,759,389

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#1001		Baker St. Drainage	$1,195,000
#1006		Hutchins- Zarzamora to Commercial	$2,800,000
#1009		Wilma Jean- Rockwell	$1,500,000
#1015		Zarzamora / S. W. Military to IH 35	$340,000
#1023		Brabach - Roosevelt to Six Mile Creek	$5,505,000
#1031		Formosa - Cullin to Pleasanton	$5,200,000
#1053		Aaron @ Commercial & Cullin to Ascot	$214,000
#1066		Vestal Place - Commercial to Pleasanton	$229,000
#1077		Commercial - Petaluma to IH 410	$1,720,000
BD-2		Ansley Boulevard Drainage #1091	$2,589,491
BD-14		Military Ditch #65	$1,657,572
BD-22		Escalon Street Drainage #1008	$963,342
BD-25		S. Flores Drainage #70-70A Phase II, Part 3	$2,200,000
BD-32		Upper Six Mile Creek #83F	$4,662,459
BD-51		Drury Lane: Escalon to Dead End	$144,552
BD-64		Hilton: Clovis to W. Amber	$318,984

San Pedro Creek Watershed

KEY	EXT	DESCRIPTION	ESTIMATED COST
#35		Drainage Channel - Ripley / R.R.	$2,000,000
#35	X	San Pedro / Huisache/Mark Twain Middle School	$3,500,000
#35	Y	Hickman Extention to Fredericksburg	$2,000,000
#46	C	Baylor St.	$2,000,000
#254		Camp/S.Alamo	$962,145
#1029		Cumberland - Nogalitos to Garland	$1,675,600
BD-10		Harris Storm Drainage	$1,731,687
BD-40		Baylor Street - San Pedro Creek To Flores Street	$205,998
BD-58		Frio City Rd.: Brazos to Zarzamora	$2,086,272
BD-71		McKay (400 & 500 Blks)	$157,550
BD-74		Mockert Street Area: (Mockert, Forest, Lambert, Klein)	$1,300,000
TX-5		South Flores - from Alamo Street to San Pedro Creek Utility improvements	$2,831,372
TX-6		South Flores - from San Pedro Creek to Franciscan	$4,477,599

Zarzamora Creek Watershed

KEY	EXT	DESCRIPTION	ESTIMATED COST
#97	B	Trailwood, Hollyridge, Colebrook	$1,700,552
BB-26		Zarzamora Creek Area	$584,630
BD-1		39th Street #58M Phase II A Street Drainage	$739,108
BD-6		Culebra Drainage Project #58F (Zarzamora)	$4,394,000

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
BD-36		39th Street #58M, Phase II	$600,652
BD-45		Callaghan: Bandera to Horseshoe Bend	$2,900,000
BD-46		Callaghan: W. Horseshoe Bend to Ingram	$1,618,647

LOWER SAN ANTONIO RIVER WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#82	A	Brooks Field Outfall	$11,031,969
#1082		Brookside	$3,342,000
BB-13		SA River (Rabel Area)	
BB-25		SA River (Villamain Area)	$365,438
BD-19		San Antonio River Improvements	$5,259,997
COE-1		San Antonio River Pilot Channel South of 410 Erosion	
COE-2		SA River Channel Erosion Downstream of Ashley Rd.	
CT-4		City of Elmendorf - Complete Drainage Improvements	$450,000
SA-11		SARIP - Espada Dam to Espada Mission	$4,232,000

OLMOS CREEK WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#73	A	Barbara Dr. Drainage -McCullough	$10,811,000
#73	B	Barbara Dr. Drainage	$2,000,000
#73	C	Thames	$2,400,000
#74	A	Vidor	$4,059,000
#74	B	Belfast and Ridgecrest	$789,000
#74	C	Terra Alta Dr. Outfall	$1,000,000
#74	X	Lorene to Sahara	$2,002,000
#87	E	Rock Creek	$3,408,000
#88	E	Orsinger Rd. Sleepy Hollow	$3,780,000
#1014		Nacogdoches- Broadway to New Braunfels under construction	$679,500
#1068		Shook Ave.	$250,000
#1075		Lockhill Selma -West Ave. to Blanco	$8,934,500
#1080		Veda Mae - Shearer Hills	$4,300,000
BD-3		Ave Maria Drainage – Underground Drainage System	$2,200,000
BD-8		Flores/Breeden/Beacon Outfall Phase II	$1,051,700
BD-11		Howard Drainage (Wildwood to El Monte) – Reconstruct Drainage	$737,828
BD-23		Lockhill – Selma Rd. – George to Wurzbach Rd.	$3,500,000
BD-54		El Monte: Blanco to San Pedro	$400,000
BD-85		Western #74 Phase IIIA	$943,993
D-13		Vulcan Quarry Detention Pond	$1,997,125

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
D-14		Shavano Park Detention Pond	$5,711,478
D-15		Lockhill Selma – George Rd. Channelization	
D-16		West Branch Channelization	
D-17		West Ave. @ Loop 410	
D-24		Redland Detention Pond & Channelization	
OP-1		Shook Ave. Drainage Channel Improvements 1	$1,100,000
R-6		Dreamland Bridge at Olmos Creek	$1,750,000
SA-2		Detention Facility on East Branch of Olmos in Shavano Pk.	$2,800,000
TX-2		Lockhill Selma Rd. - George to Whisper Path	$4,680,000
TX-10		U.S. 281 at Jones Maltsberger Repair Rip-Rap	$30,000
SALADO CREEK WATERSHED			
#75	A	Vandiver	$2,536,000
#75	B	Cave Ln	$9,428,000
#75	C	Haskin	$3,773,500
#75	D	Kenilworth	$8,390,200
#75	E	Busby	$4,107,000
#76		Beitel Creek	$4,249,000
#76	C	Randolph Blvd. Tributary	$2,000,000
#77		Devonshire/Brookside	$10,963,300
#78		Harry Wurzbach to Corinne	$3,588,130
#89		Pershing Creek	$8,344,655
#114	B	E. Houston/Sapphire (Phase II)	$2,000,000
#114	C	Rice, W. W. White to Semlinger	$9,625,000
#114	C	W.W. White - Area Sts. (Phase II)	$5,864,000
#152		Rittiman Outfall	$2,000,000
#153		Nacogdoches	$15,394,250
#154	A	Center Park East	$138, 305
#154	B	Fratt Road	$3,343,260
#155		Schertz / Weidner (some private development)	$9,632,000
#203	EXT	Springfield Extention (TxDOT)	$10,540,000
#204		Rigsby	$2,304,200
#205		Holmgreen Rd. Outfall	$11,662,365
#206		Jo Marie / W. W. White	$5435,660
#1000		Belford St. - Dublin to Utopia	$9,980,486
#1004		Parhaven	$481,214
#1005		Moana St.	$226,474
#1012		Fertile Valley Farms Subdivision	$2,155,350

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#1016		Wenzel Rd. - Ridgemeadow to Topperwein	$1,251,250
#1017		Coker Lane Stout Ext.	$404,165
#1022		Braniff - Turbo to 281	$745, 290
#1025		Bel Meade	$2,088,128
#1026		Coca Cola Dr. - E. Houston to E. Commerce	$4,665,000
#1030		Emil Rd. - W.W. White to IH 10 (TxDOT)	$2,128,750
#1034		Lindenwood	$1,290,640
#1036		Kentwood Manor - Lorence Creek	$5,963,160
#1037		Paso Del Norte	$1,580,380
#1038		Stahl Road - Bell to Briarpoint	$1,500,000
#1065		Parliament at Blanco	$1,535,000
#1069		Earthen Channel - Patricia to Blanco	$670,400
#1072		Valley Forge	$268,860
#1076		Stringfellow - Southcross to Kashmuir	$396,850
#1078		Chandler - W.W. White to Dead End	$1,620,680
#1081		Peggy/Stutts	$2,888,760
#1083		Menger Creek - Cisco Blvd. and area streets	$6,200,000
#1084		Sams & Bernard	$1,789,375
BB-14		Southton (1 property with improvements)	$200,000
BB-18		Tributary to Salado Creek (Pipestone Dr.-Phase I	$408,600
BB-19		Beitel Creek Area (Briarglen Drive - 13 properties, Phase I)	$1,442,900
BB-21		Salado Creek (Wheatly Hts Area - Phase I)	$5,597,697
BB-24		Rosillo Creek Area (McNutt - Phase I)	
BB-27		Salado Creek (Wheatly Heights - Phase II)	$5,597,697
BB-29		Rosillo Creek Area (McNutt - Phase II)	
BB-31		Beitel Creek Area (Morga Area - Phase II)	
BB-32		Beitel Creek Area (Wurzbach - Phase II)	
BD-4		Blossom/Woodbury	$3,200,000
BD-5		Busby and Flamingo Drainage	$70,000
BD-12		IH-35/Gembler (Salado Creek)	$660,000
BD-13		Lanark Drainage (#92A)	$3,027,480
BD-17		James Park Development and Holbrook Road Impvtments	$910,657
BD-20		Wheatly Heights buyout and Salado Creek Greenway Dev.	$3,540,384
BD-24		Rittiman: Austin Hwy. to Harry Wurzbach	$1,018,893
BD-30		Higgins: Nacogdoches to Stahl	$2,407,407
BD-33		Pecan Valley: "J" Street to IH-10	$1,200,000
BD-39		Aurelia - M.L. King to Yucca	$210,242
BD-41		Bee Street - Walters to Frank	$411,000

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
BD-42		Belgium: Picarde to Coliseum	$1,702,566
BD-43		Bitters: Broadway to Nacogdoches	$1,953,326
BD-47		Cardiff: Aransas to Dead End	$666,392
BD-53		Duval/Seguin: Pierce to Walters	$880,000
BD-56		F Street: pecan Valley to IH-10	$186,419
BD-60		G Street: Pecan Valley to dead-end	$137,042
BD-63		Hi-Lions 80 Mod Phase III & V	$5,476,000
BD-66		Holbrook Rd. Area Improvements	$1,200,000
BD-69		Leonhardt: Encanta to Weidner	$809,391
BD-81		W.W. White Phase I: Rigsby to Lord	$3,030,546
BD-82		W.W. White Road Area Streets Phase II	$2,740,932
BD-88		Carson Street: Walters to Frank	$274,064
CT-24		Deer Cross Lane - Replace LWC	$186,325
CT-44		Old Corpus Christi Rd. Bridge Widening	$400,000
D-18		NRCS Retention pond site 15R @ McAllister Park	$4,375,000
D-19		Beitel Creek north of Loop 410 Channalization	$2,200,000
D-21		Perrin Beitel Channalization	$1,100,000
D-22		Holbrook Road Channalization	$961,225
S-13		Salado Creek - Rigsby to Roland (floodplain rectification)	$3,240,000
S-18		Salado Creek - Peltz to IH-10 Floodplain Rectification	$22,028,000
SA-14		Salado Creek Study – S. Loop 410 to E. Southcross	$75,000
SA-15		Salado Creek Study – E. Southcross to Rigsby Ave.	$75,000
TX-7		IH-35 West Frontage Rd: Holbrook to Walzem	$1,177,900
TX-11		Loop 410 at Beitel Creek	$78,171
TX-14		FM-2696 south of Cibolo Creek - Repair roadbed	
V-2		Remove 5,000' of Weidner and 2,500' of Old O'Conner Rd	$844,750
V-8		Remove 1,800' of Ira Lee from Austin Hwy. northward to limits of floodplain. Remove 600' roadway connection to Holbrook Rd. and reroute 600' of Holbrook Rd.	$345,900
V-10		Clear and Channelize 12,900' of Salado Creek between Wetmore & Jones Maltsberger Rd.	$20,189,400
V-11		New multiple pipe culverts @ Jones Maltsberger and Mud Creek	$250,000
V-12		New multiple pipe culverts @ Jones Maltsberger and Elm Creek	$400,000
V-13		New bridge structure at Binz-Engleman Rd. at IH 35	$3,240,000
V-14		New bridge structures for frontage roads at IH 35 and reroute Seguin Rd.	$3,000,000

LIST OF RECOMMENDED MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
V-15		New multiple box culverts and raise 2,700' of Bulverde Rd.	$500,000
V-16		New W. Avenue Bridge over Salado Creek	$2,682,000
V-17		New Vicar Road Bridge along Beitel Creek	$1,500,000
V-18		New Roland Bridge at Salado Creek	$2,400,000
V-19		New W. Avenue Bridge at Panther Springs	$250,000
CALAVERAS CREEK WATERSHED			
CT-1		Foster Road Structure Replacement - (3) U.S. 87 to Sulpher Springs Rd.	
CT-32		Real Rd. - replace low water crossing 0.1 mile west of FM 1516	$73,834
CIBOLO CREEK WATERSHED			
BB-1		Lyndon Drive	$968,813
BB-10		Lost Meadows	$165,022
BB-11		Aztec Lane	$402,390
BB-12		Bolton (11 properties, 11 w/improvements)	$530,236
CT-8		Blanco Rd. - replace LWC	$565,000
CT-10		Smithson Valley - replace LWC	$560,000
CT-14		Trainer Hale Rd. - replace LWC	$430,000
CT-16		Weir Rd. - Replace LWC	$425,000
CT-17		Schaeffer Rd. - replace LWC	$450,000
CT-29		Old Fredericksburg Road	$460,000
CT-46		Evans Road Bridges	$1,700,000
S-31		Cibolo Creek - 2.3 m down-stream of Schaeffer Rd. - relocation and flood proofing	$852,000
S-32		Cibolo Creek - 1.3 m upstream of Schaeffer Rd. - Relocation and floodproofing	$368,000
TX-14		FM 2696 south of Cibolo Creek	
MARTINEZ CREEK WATERSHED			
BB-9		Schaefer Road	$479,776
CT-31		Glen Fair - Increase capacity of drain	$127,645
TX-8		IH-10 S. Frontage Rd. @ Woman Hollering Creek - remove and regrade channel	$14,159
TX-9		IH-10 S. Frontage Rd. - repair rip-rap channel	$7,774
TX-13		FM 1516 @ West Saldtrillo Creek - repair erosion and clean culverts	$23,527

VIII. FORMAL ADOPTION OF THE FLOOD MITIGATION PLAN

In this section, the process by which this plan was reviewed by the public and other municipalities and formally adopted by the City of San Antonio is discussed. As previously mentioned, several meetings have been held with the public and other communities affected by the Leon Creek, Salado Creek, and Olmos Creek Watershed Studies and through deliberations of the Drainage Regulations Review Committee over four years. Further, the City Council held public hearings on each Watershed Master Drainage Plan prior to adoption.

More recently, a rough draft of the Flood Mitigation Plan was sent to all communities and organizations, affected by the plan and listed in Table VIII-1 below. Input from these communities and organizations was then incorporated into the Plan. The Plan was presented to the County-Wide Citizens Watershed Masterplan Committee on October 4, 2000 for their input. The Plan was then presented to the general public during a meeting at the City Council Chambers on November 20, 2000. With input from all meetings, the final Plan was drafted. The final Plan was then approved and formally adopted by the City Council of San Antonio. A list of all meetings and presentations held are listed in Table VIII-2 below.

TABLE VIII-1
List of Communities and Organizations Affected by the Plan

Community or Organization Name	Feedback Received
Bexar County	Yes
San Antonio River Authority	No
City of Alamo Heights	No
City of Balcones Heights	No
City of Castle Hills	No
City of China Grove	No
City of Converse	No
City of Elmendorf	No
City of Fair Oaks Ranch	No
City of Grey Forest	Yes
City of Helotes	No
City of Hill Country Village	No
City of Hollywood Park	No
City of Kirby	No
City of Leon Valley	No
City of Live Oak	No
City of Olmos Park	No
City of Saint Hedwig	No
City of Selma	No
City of Schertz	No
City of Shavano Park	No
City of Somerset	No
City of Terrell Hills	No
City of Universal City	No
City of Windcrest	No

Community or Organization Name	Feedback Received
Natural Resources Conservation Services, USDA	No
San Antonio Water System	No
Bexar Metropolitan Water District	No
Texas Department of Transportation	Yes
United States Geological Survey	No
Texas Natural Resource Conservation Commission	No
Brooks Air Force Base	No
Kelly Air Force Base	Yes
Lackland Air Force Base	No
Randolph Air Force Base	No
Fort Sam Houston	No

TABLE VIII-2
Meetings and Presentations held by the City of San Antonio

Date	Location	Entities/Organizations Represented	Description
Apr. 10, 1995	Colony House	City of San Antonio Rust Lichliter / Jameson Engineers Northside Neighborhoods for Organized Development General Public	Presentation of Preliminary Olmos Creek Master Drainage Plan to the Public
Nov. 15, 1995	Colony House	City of San Antonio Rust Lichliter / Jameson Engineers Northside Neighborhoods for Organized Development General Public	Presentation of Updated Olmos Creek Master Drainage Plan to the Public
Feb. 15, 1996	City of San Antonio Council Chambers	City Council Rust Lichliter / Jameson Engineers Public Works General Public	Presentation of Upper Olmos Creek Master Drainage Plan to City Council and the General Public
May 19, 1996	Colonies North Elementary School	City of San Antonio Rust Lichliter / Jameson Engineers Northside Neighborhoods for Organized Development General Public	Final Presentation of the Olmos Creek Master Drainage Plan to the Public.
Jul. 15, 1996	John Marshall High School	City of San Antonio Pape-Dawson Engineers, Inc. Northside Neighborhoods for Organized Development Northwest Neighborhood Alliance General Public	Presentation of the Leon Creek Master Drainage Plan to the Public

Date	Location	Entities/Organizations Represented	Description
Jul. 16, 1996	Leon Valley City Hall	City of Leon Valley Pape-Dawson Engineers, Inc. City of San Antonio	Meeting to discuss Leon Creek Master Drainage Plan
Feb. 27, 1997	City of San Antonio Council Chambers	City Council Pape-Dawson Engineers, Inc. Public Works General Public	Presentation of Leon Creek Master Drainage Plan to City Council and the General Public
Nov. 19, 1996	Carver Community Center	City of San Antonio Vickrey & Associates Salado Creek Open Space Corridor and Nature Trail Study Group General Public	Presentation of the Salado Creek Master Drainage Plan to the Public
Apr. 17, 1997	City of San Antonio Council Chambers	City Council Vickrey & Associates Public Works General Public	Presentation of Salado Creek Master Drainage Plan to City Council and the General Public
October 4, 2000	City Hall Media Briefing Room	County Wide Citizens Watershed Master Plan Committee City of San Antonio Public Works Bexar County Public Works	Presentation of rough draft of the Regional Flood Mitigation Plan
November 20, 2000	City of San Antonio Council Chambers	City of San Antonio Public Works Pape-Dawson Engineers, Inc. General Public	Presentation of Regional Flood Mitigation Plan for further input.
December 14, 2000	City of San Antonio Council Chambers	City Council City of San Antonio Public Works General Public	Final adoption of the Regional Flood Mitigation Plan by the City Council

TABLE III – 3

City of San Antonio's Ordinance Adopting the Regional Flood Mitigation Plan

This ordinance requested a resolution accepting the Regional Flood Mitigation Plan and authorized the submittal of the Regional Flood Mitigation Plan to the Federal Emergency Management Agency (FEMA) through the Texas Water Development Board (TWDB). The submittal of the plan will allow the City to apply for pre-disaster grant funds on an annual basis. The Regional Flood Mitigation Plan, in cooperation and coordination with Bexar County, the San Antonio River Authority and other local municipalities in Bexar County, establishes a comprehensive strategy for implementing technically feasible flood mitigation projects for the City of San Antonio and its extra territorial jurisdiction.

An unofficial copy of the Ordinance, prepared for signatures, is attached. After Council action on February 15, 2001, an official copy of the Ordinance will be submitted to FEMA through TWDB.

IX. PROCEDURES TO REVIEW AND REVISE THE PLAN

No matter how accurate and complete the Plan is when it is adopted, there will inevitably be a need to revise and update it in the future. Changes to the Plan may be required by development within the planning area, changes in population or land use, changes in the community's goals or priorities, or new advances in flood-mitigation knowledge, strategies, or technologies.

Below is a step-by-step outline of the formal process by which the progress of the Plan will be measured and how changes to the Plan will be implemented.

Step 1: The need for an update or revision to the Plan is identified by the City of San Antonio Public Works Department, Drainage Engineering Division. A revision also may be proposed by any suburban municipality or other organization that identifies the need for a revision.

Step 2: The Drainage Engineering Division will then review the proposed revision and recommend such action to the Director of Public Works for approval and needed funding.

Step 3: If a proposed revision is approved by the Director of Public Works and funds are secured, the Public Works Department will initiate the study, employ consultants, conduct the study, and make recommendations to the City Council for adoption. Once adopted, the new mitigation projects will be incorporated in to the Plan.

Step 4: If additional funding is required to implement revisions to the Plan, the revisions are presented to the City Council of San Antonio for their approval. The public will be invited to express their concerns and opinions on any proposed revisions to the Plan, prior to Council action.

Step 5: Funding will be sought to implement the revised plan.

APPENDIX A

List of Flood Hazard Areas by Watershed

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

Map Symbol	Key Legend	
◇	LW	- City of San Antonio Low Water Crossings
/////	CSA	- City of San Antonio High Water Areas
■	FL	- October 1998 Flood Problem Areas Identified by Various Sources
■	AH	- Alamo Heights Problem Areas
▬	BC	- Bexar County Emergency Management Department Records
▭	OR	- Bexar County Low Water Crossings - Water Over Road
▭	RC	- Bexar County Low Water Crossings - Road Closure
■	GF	- Grey Forest Problem Areas
▲	LV	- Leon Valley Problem Areas
●	OP	- Olmos Park Problem Areas
⬡	TxDOT	- Texas Department of Transportation Road Closures and High Water Areas
▬	UC	- Universal City Problem Areas
▬	WC	- Windcrest Problem Areas

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APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
MEDINA RIVER WATERSHED		
BC	4	10305 Moursand Ave.
BC	7	12515 Fisher Road flooding
BC	12	FM 1937 @ Medina River
BC	15	Applewhite Rd @ Medina River
BC	16	Cagnon Rd. @ Medina River
BC	17	Junman Rd. @ Medina River
BC	18	Grossenbacher Rd. @ Medina River
CSA	2	Hwy.90/West Grosenbacher (barricades for high water)
CSA	210	12000 Pleasanton Rd (high water)
CSA	211	Commercial/410 (high water)
OR	1-1	Shepherd Rd @ Tributary to Live Oak Creek
OR	1-2	Shepherd Rd. @ Live Oak Creek
OR	1-3	Keller Rd. @ Pole Cat Creek
OR	1-4	Wisdom Rd. @ Tributary at Medina Irr.
OR	1-5	Macdona Rd. @ Live Oak Slough
OR	1-6	Macdona Rd. @ Live Oak Slough
OR	1-7	Sherwood @ Tributary to Pole Cat Creek
OR	1-8	IH 35 @ Live Oak Slough
OR	1-9	Quintana Rd. @ Live Oak Creek
OR	1-10	Pleasanton Rd. @ Tributary to Gallinas St.
OR	1-11	Pleasanton Rd. @ Tributary to Gallinas St.
OR	1-14	Mathis Circle @ Tributary to Gallinas St.
OR	1-15	Mathis Circle @ Tributary to Galinas St.
OR	1-16	Neal Rd. @ Tributary to Medina River
OR	1-17	Jett Rd. @ Tributary to Galvan Creek
OR	1-18	Jett Rd. @ Tributary to Galvan Creek
OR	1-19	Jett Rd. @ Tributary to Galvan Creek
OR	1-20	Senior Rd. @ Tributary to Elm Creek
OR	1-21	Prairie @ Tributary to Elm Creek Rd.
OR	1-24	Jarratt @ Elm Creek
OR	1-25	Finley Lane @ Elm Creek
OR	1-26	Macdona @ Medina River
OR	1-29	Watson Rd. @ Tributary to Leon Creek
OR	1-35	Briggs Rd. @ Tributary to Elm Creek
OR	1-36	Shepherd Rd. @ Live Oak Creek
OR	1-37	Applewhite Rd. @ Tributary to Medina River
OR	1-38	McCoy Rd. @ Tributary to Elm Creek
OR	1-40	Trumbo Rd.@ Tributary 50 Gallinas St.

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
RC	1-42	Bradley Rd. @ Elm Creek
RC	1-43	Pearsal Rd. @ Elm Creek
RC	1-44	Evans Rd. @ Elm Creek
RC	1-45	Shepherd Rd. @ Elm Creek
RC	1-46	Kinney Rd. @ Elm Creek
RC	1-47	Beuton City Rd. @ Elm Creek
RC	1-48	O'Brien Rd. @ Pole Cat Creek
RC	1-49	Hollywood Rd. @ Pole Cat Creek
RC	1-53	Kinney Rd. @ Live Oak Slough
RC	1-54	Edwards Dr. @ Live Oak Slough
RC	1-55	Beauton City Rd. @ Post Oak Creek
RC	1-56	South Evans Rd. @ Post Oak Creek
RC	1-57	Applewhite Rd., @ Medina River
OR	2-1	Junman @ Sherer
OR	2-2	Gross & Bacher Rd. @ Medio Creek
RC	2-41	Gagnon Rd. @ Medina River
RC	2-42	Gagnon Rd. @ Pole Cat Creek
RC	2-43	Montgomery Rd. @ Medina River
RC	2-44	Gross @ Medina River
RC	2-45	Junman @ Medina River
TxDOT	16	IH-35 @ Elm Creek (road closed due to high water)
TxDOT	51	SH 16 @ medina River (both main lanes closed due to washing out)

MEDIO CREEK WATERSHED

BC	1	2575 Horal Rd. and Demya St. (flooding)
BC	19	Potranco Rd. @ Medina River
CSA	8	Hakaft/Victoria Crossing (barricades for high water)
CSA	19	610 Sawtooth (drainage ditch problem)
CSA	25	Ellison/Dugas (requested barricades)
CSA	46	Ray Ellison/Adams Hills (high water)
CSA	74	Covel/Ray Ellison (high water)
FL	14	Freeport Business Ctr. (local flooding)
LW	117	Ray Ellison @ Old Valley Hi (Medio Tributary)
LW	118	Ray Ellison @ 300' N of Medina Base (Medio Tributary)
LW	119	Ray Ellison @ Hidden Valley (Medio Tributary)
LW	120	Covel & Medio Creek (Medio)
LW	161	Horal Dr. @ Revlon (Medio Tributary)
OR	2-3	Horal Rd @ Tributary to Medio Creek

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
OR	2-28	Talley Rd @
OR	2-29	Cartwright Tr. @ Tributary to Medio Creek
OR	2-30	Talley Rd. @ Tributary to Medio Creek
OR	2-31	Talley Rd. @ Tributary to Medio Creek
OR	2-32	Talley Rd. @ Medio Creek
RC	2-39	Ranch Field @ Medio Creek
RC	2-40	Gagnon Rd @ Medina River

LEON CREEK WATERSHED

BC	2	12000 Somerset Rd (flooding)
BC	5	Hwy. 16 @ Applewhite Rd.
BC	6	Hwy. 16 @ So. Zarzamora Rd.
BC	8	Plummer Rd. Trailer Park
BC	13	Cassin Rd. @ IH 35
BC	14	Somerset Rd. @ Loop 410
BC	24	8355 Pearsall Rd.
BC	25	16251 Bandera Rd.
BC	27	19215, 19226, 19602 Scenic Loop Rd. in Grey Forest
BC	30	5896 Old Camp Bullis Rd.
BC	31	8617 Flintrock Rd.
CSA	1	Prue / Old Prue Road (barricades for high water)
CSA	3	Gilbeau/Brickwood (barricades for high water)
CSA	4	Marbach/Pinn Rd./Military (barricades for high water)
CSA	5	6646 Tezel (complete washout)
CSA	6	Hwy. 151/Potranco/Ritchland (barricades for high water)
CSA	7	Marbach/410 (barricades for high water)
CSA	11	Babcock/ Prue Road (barricades for high water)
CSA	12	Ingram / Micro (barricades for high water)
CSA	13	7411 Slipery Elementary (drainage ditch clogged)
CSA	14	Heath / Lowbid (barricades for high water)
CSA	15	Guilbeau / Wickershau (barricades for high water)
CSA	16	Hwy. 151/410 (barricades for high water)
CSA	17	1604/Chase Hill
CSA	18	70007 Forest Moss (drainage ditch problem)
CSA	21	6185 & 6100 Hollyhock (barricades for high water)
CSA	23	Culebra /Pipers Lane (high water)
CSA	24	Ridge Run/Texel (high water)
CSA	26	Timber Hill/Wurzbach (road closed)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
CSA	28	Grissom/Culebra/Old Grissom (high water)
CSA	31	Ingram / Leon Creek (high water)
CSA	33	Hausman / Babcock (high water)
CSA	35	Chasehill / Babcock (high water)
CSA	40	Hausman / Huntsman (high water)
CSA	43	2814 Village Pkwy (high water)
CSA	44	9031 Wellesley Manor (high water)
CSA	50	Westlawn / 2100 Pinn (high water)
CSA	53	Bandera / Old Prue Road (high water)
CSA	57	Babcock / Dezavala (high water)
CSA	68	Babcock/Glidden/Nickle/Dime (road closed, evacuated by FD)
CSA	81	Valleybrook/Timberhill (high water)
CSA	84	Ingram/Potranco (road closed)
CSA	85	Pinn/Brownleaf (road closed)
CSA	86	Old Grissom/Grissom/Grissom/Timberpath (road closed)
CSA	91	Braun/Lesley (water over road)
CSA	92	Rodriguez Park/Hwy. 90 (road closed)
CSA	93	Avril Ave./Elmer (road closed)
CSA	99	Health / Grissom (high water)
CSA	131	Somerset/Owasso (complete washout)
CSA	145	Prue Rd./Southwell (drainage clogged)
CSA	147	Mission/Military/Napier (road closed)
CSA	164	Springtime/Babcock (road closed)
CSA	179	Old Hwy. 90/Acme Rd. (road closed)
CSA	198	Culebra/Cliffbriar (high water)
CSA	200	Prue at Leon Creek (high water)
CSA	201	Babcock / Spring Rain (high water)
CSA	202	Quintana/Cassin (high water)
CSA	209	Old Hwy. 90/Gena/Rodriguez (road closed)
CSA	213	6600 Tezel (high water)
CSA	214	Westfield/Hwy. 90 (high water)
CSA	215	Somerset/Cassin (high water, FD called to rescue)
CSA	221	9000 Sumerset Rd. (high water)
CSA	225	11090 Alexander Hamilton Dr. (drain clogged up)
CSA	229	Southwell/Verbana (high water road closed)
CSA	231	Barron St. & Whitney Rd. (high water road closed)
FL	6	Lazy Acres Mobile Home Parl
GF	1	Requa Rd. (low water bridge damaged)
GF	2	Hillside Dr. (low water crossing)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
GF	3	Sherwood Trail (low water crossing)
GF	4	Hilltop Dr. (low water bridge)
GF	5	Scenic Loop Road at Blue Hill Pass (water over road)
LV	1	El Verde Rd (homes flooding)
LV	2	Jeff Loop Rd. (homes flooding)
LV	3	Bandera Rd. (businesses flooding)
LV	5	Cherry Leaf St. (homes flooding)
LW	1	Hausman Rd., 200' east of Babcock (Maverick)
LW	2	Hausman Rd @ Roadrunner (Maverick Tributary)
LW	3.1	Old Fredericksburg Rd., north of 1604 (Leon)
LW	4	Hausman Rd., 4800' West of IH-10 (Leon)
LW	5	Danvers Between Glidden & Dime (Huesta)\
LW	5.1	Hausman Rd, 4500' east of Loop 1604 (Huesta)
LW	6	Babcock Rd., 100' north of Nickle (Huesta)
LW	7	Babcock Rd., 500' south of Nickle (Huesta)
LW	8	Babcock Rd., 2300' south of Nickle (Maverick)\
LW	9	Babcock Rd., 2700' south of Nickle (Leon)
LW	25	Prue Rd., 1600' east of Babcock Road (Huebner Creek)
LW	26	Lockhill, 250' east of White Bonnett (Huebner Creek)
LW	27	White Bonnett, south of Lockhill (Huebner Creek)
LW	28	Hollyhock, 600' west of Babcock (Huebner Creek)
LW	29	Whitney Rd., 200' north of Wellesley Manor (Huebner Creek)
LW	30	Huebner Rd. 400' west of Floyd Curl (Huebner Creek)
LW	31	Babcock Rd, 1000' south of Huebner (Huebner Creek)
LW	55	Wurzbach, 750' south of Seveille (Huebner Tributary)
LW	56	Wurzbach, 2000' north of Timbermill (Huebner Tributary)
LW	57	Timbermill, north of Wurzbach (Huebner Creek)
LW	58	Ingram, 23500' east of Mabe (Leon Creek)
LW	59	Timberpath, 500' southeast of Grissom (Culebra Creek)
LW	59.1	Easterling, south of Culebra (Culebra Tributary)
LW	60	Old Grissom Rd.,500' south of Culebra (Culebra Creek)
LW	106	W. Commerce between Pinn & Military (Leon Creek)
LW	107	Pinn Rd, 2500' south of W. Commerce (Leon Creek)
LW	109	2000 Block Pinn Rd. (Leon Tributary)
LW	110	Arvil between Keitha & Elmer (Leon Creek)
LW	111	Rodriguez and Leon Creek (Leon Creek)
LW	112	Military and West Briar (Leon Tributary)
LW	112.1	Harness Ln, 300' north of Marbach Rd. (SW Research Tributary)
LW	112.2	Meadow Way, 300' north of Marbach Rd. (SW Research Tributary)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
LW	113	Martinique between (Barbados & Andros (Leon Tributary)
LW	114	Tallahassee between Barbados & Andros (Leon Tributary)
LW	115	Westfield between Barbados & Andros (Leon Tributary)
LW	116	Biscayne between Barbados & Andros (Leon Tributary)
LW	121	Whitewood, north of Medina Base (Leon Creek)
LW	122	Fedora between Dempsey & Clegg (Indian Tributary)
LW	123	Hill burm between Dempsey & Clegg (Indian Tributary)
LW	124	Gavllan between Dempsey & Clegg (Indian Tributary)
LW	125	Hayden between Dempsey & Clegg (Indian Tributary)
LW	125.1	War Cloud, 350' east of Running Horse (Indian Creek)
LW	138	Mauermann & Commanche Creek (Commanche Creek)
LW	160	Braun Rd., 1300' northeast of FM 1604 (Helotes Tributary)
LW	160.1	Leslie Rd., 1300' southeast of Braun Rd. (Helotes Creek)
LW	160.2	Leslie Rd., 1300' southeast of Braun Rd. (Helotes Creek)
LW	162	Hausman Rd., 4700' north of Bandera (French)
LW	162.1	Hausman Rd., 3900' north of Bandera (French)
LW	162.2	Hausman Rd., 5200' north of Bandera (French)
LW	163	Prue Rd., 1500' north of Bandera Rd. (French)
OR	2-4	Toutant Beauregard Road @ Pecan Creek
OR	2-5	Toutant Beauregard Road @ Tributary to Pecan Creek
OR	2-6	Toutant Beauregard Road @ Pecan Creek
OR	2-7	Old Fredericksburg Road @ Tributary to Cibolo Creek
OR	2-8	Boerne Stage Road @ Tributary to Leon Creek
OR	2-9	Scenic Loop Rd. @ Tributary to Leon Creek
OR	2-10	Scenic Loop Rd. @ Tributary to Helotes Creek
OR	2-11	Babcock Rd., @ Tributary to Lee Creek
OR	2-12	Old Fredericksburg Road @ Tributary to Leon Creek
OR	2-13	Old Fredericksburg Road /SPRR @ Tributary to Leon Creek
OR	2-14	Boerne Stage Road @ Leon Creek
OR	2-16	Wickwilde @ Tributary to Culebra Creek
OR	2-17	Beverly Hills @ Tributary to Culebra Creek
OR	2-18	Sunset Blvd. (@ Tributary to Culebra Creek
OR	2-19	Galm Rd. @ Tributary to Culebra Creek
OR	2-20	Galm Rd. @ Tributary to Culebra Creek
OR	2-21	Galm Rd. @ Tributary to Culebra Creek
OR	2-22	Shaenfield @ Tributary to Culebra Creek
OR	2-27	Talley Rd @
RC	1-41	Maurman Rd. @ Commanche Creek
RC	1-50	Applewhite Rd. @ Commanche Creek

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
RC	1-51	So. Zarzamora @ Commanche Creek
RC	1-52	Maurman Rd. @ Commanche Creek
RC	2-23	Leslie Rd. @ Helotes Creek
RC	2-24	Leslie Rd. @ Helotes Creek
RC	2-25	Leslie Rd. @ Helotes Creek
RC	2-26	Old Tezel Rd @ Tributary to Culebra Creek
RC	2-35	Scenic Loop Rd. @ Tributary to Helotes Creek
RC	2-36	Scenic Loop Rd. @ Tributary to Helotes Creek
RC	2-37	Babcock Road @ Tributary to Huesta Creek
RC	2-38	Babcoak Road @ Tributary to Huesta Creek
TxDOT	15	IH 35 @ Leon Creek (water over roadway)
TxDOT	22	IH-10 at Leon Creek (All lanes closed at 1:00 pm, approximately 4' of water over the mainlanes.)
TxDOT	23	US 90 @ Leon Creek (water over roadway)
TxDOT	47	SH 16 @ Huebner Creek (water over road)
TxDOT	48	SH-16 at Leon Creek - Outside lanes only closed as a precaution due to severe flooding a the bridge abutments.

UPPER SAN ANTONIO RIVER WATERSHED

Alazan Creek Watershed

CSA	39	Mc Neel / Overbrook (alarm, high water)
CSA	90	1414 Culebra (manhole cover off)
CSA	100	Wilson / Woodlawn (high water)
CSA	104	Huisach/Morning Glory/Woodlawn (high water, road closed)
CSA	107	Lombrano /Goodrich (high water)
CSA	113	St. Cloud / Morning Glory (road closed)
CSA	187	Buena Vista / Smith (open manhole)
CSA	225	1100 Alexander Hamilton Dr. (drainage clogged up)
FL	31	St. Cloud St.
FL	33	Woodlawn Lake Dam (repair damaged spillway)
FL	34	Laddle St. (reconstruct channel floors and walls @ Babcock)
LW	71	Danvile & Overbrook
LW	72	Spencer Ln. east of Balcones
LW	73	McNeel & Overbrook

Apache Creek Watershed

CSA	48	2000 Waverly / Bandera (high water)
CSA	116	36th / Freeman (high water
CSA	121	NW 24th / Martin (high water)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
LW	67.1	W. Quill Dr. @ Oakwood Dr.
LW	164	Dell Pl & Freeman

Martinez Creek Watershed

CSA	36	Culebra / IH 10
CSA	52	119 Ruiz (high water)
CSA	63	Storywood / Denecle (high water)
CSA	119	Fulten / Capitol (high water)
CSA	123	San Anglo /Capitol (high water)
CSA	136	Westwood / Breeden (high water)
FL	1	Martinez Creek Area - IH 10 to Alazon Creek

San Antonio River Watershed

AH	1	110 to 518 Austin Hwy. (businesses flooded)
AH	2	4600 to 5424 Broadway (businesses flooded)
AH	3	110 Chichester St. (businesses flooded)
AH	4	131 to 302 Patterson St. (homes flooded)
AH	6	306 to 325 Eaton St. (homes flooded)
AH	7	100 Grandview St. (home flooded)
AH	8	216 Arcadia Ave (apartments flooded)
AH	9	136 to 209 Grove St. (apartments flooded)
AH	12	353 to 376 Bluebonnet (homes flooded)
AH	13	353 to 355 Redwood (homes flooded)
AH	14	5701 to 715 New Braunfels/328 to 340 Montclair (homes flooded)
AH	15	210 to 220 Routt (homes flooded)
CSA	51	Underpass Rd. / St. Mary's/ Roosevelt (high water)
CSA	55	McCullough /Magnolia (high water)
CSA	64	N. Alamo / Grayson / - Josephine /Broadway (high water)
CSA	65	North Cherry / Sherman (high water)
CSA	70	Fair Ave. /Palmetto (high water)
CSA	78	S. Flores / Military (high water)
CSA	83	Mulberry /Brackenridge/River Rd. (clogged drain, high water)
CSA	87	Montana / IH-37 / Cherry (high water)
CSA	94	Geevers / Southcross (high water)
CSA	96	1600 Pyron (high water)
CSA	97	River Rd. / E. Woodlawn (road closed)
CSA	103	2600 Hackberry (high water)
CSA	120	36th /Thompson (high water)
CSA	124	300 Jennings / Marian (high water)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
CSA	128	Bellview / Queen Ann (high water)
CSA	130	Elm / Houston (high water)
CSA	132	Keats / Packard (high water)
CSA	134	Prado / Borday (high water)
CSA	137	St. Mary's / Josephine (high water)
CSA	138	Mission / Southcross (high water)
CSA	141	Alamo / Main (drainage clogged)
CSA	142	939 Steves (drainage clogged)
CSA	147	Mission / Military / Napier (road closed)
CSA	149	Old Corpus Christi Hwy. / Napier (road closed)
CSA	150	Stonewall / Pleasanton (road closed)
CSA	161	Probant / La Capella (road closed)
CSA	163	St. Mary's / Brooklyn / Baltimore (road closed)
CSA	177	Benita / Mission / Roosevelt (manhole overflowing)
CSA	191	Funston / New Braunfels (high water)
CSA	194	New Braunfels / Hot Wells (high water)
CSA	199	701 Austin Hwy. (missing manhole cover)
CSA	203	River Walk behind Hilton (high water)
CSA	204	White /Roosevelt (high water)
CSA	206	Pyron / White (high water)
CSA	224	Boyer / Presa to Hoefgen (washout)
CSA	226	Josephine / River (dam wall down)
CSA	230	Broadway / Funston (clogged drain inlet)
FL	28	Espada Park (repair washed out channel)
FL	50	Broadway 50-50 Restaurant
FL	56	St. Peter, the Prince of Apostles Catholic Church
FL	63	River Rd.
FL	83	Symphony LA.
LW	75	E. Mulberry @ San Antonio River
LW	126	Mission Parkway under Southcross
LW	127	Southcross & Box Elder
LW	128	Mission Parkway, south of Napier
LW	129	Mission Parkway @ San Antonio River
LW	146	Hiawatha , east of Nopal
LW	147	Nopal, north of Fair
LW	149	S. New Braunfels @ Koehler Ct.
TxDOT	9	IH 35 @ Pine St. (water over road)
TxDOT	10	IH 35 @ exit ramp to IH 37 S (roadway under water)
TxDOT	12	IH 35 @ exit ramps to U.S. 90 (roadway under water)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
TxDOT	13	IH 35 @ Theo Ave (southbound frontage road closed)
TxDOT	14	IH 35 @ Keats Ave. (northbound and southbound lanes closed)
TxDOT	20	IH 10 @ Probant Ave. (water over road covered entire intersection)
TxDOT	34	US 281 @ Josephine St. intersection (road closed)
TxDOT	46	Spur 371- Gen. Hudnel @ Frio City Rd. (road closed)
TxDOT	50	IH 37, 1000' south of Southcross (road closed)

Six Mile Creek Watershed

CSA	54	4700 Barlite (high water)
CSA	56	Wabash / Mayfield (high water)
CSA	69	Rockwell / Ansley (high water)
CSA	73	1034 Peabody (high water)
CSA	75	103 Dexter (high water)
CSA	109	Ashley / Stinson (high water)
CSA	127	300 W. Ansley (high water)
CSA	139	1406 Beverly Ann (drainage clogged)
CSA	140	Mayfield /Somerset (drainage clogged)
CSA	156	Hutchins / IH 35 (road closed, high water)
CSA	158	Cupples /Roselawn (car under water)
CSA	168	Ashley/Roosevelt (road closed for damaged bridge)
CSA	169	Zarzamora /IH 35 (road closed for high water)
CSA	181	Forsen /Rodrick (gravel washed out completely)
CSA	218	Gillette Blvd & Escalon Ave. (high water)
CSA	227	Schrader Rd / Rigsby (washout)
LW	132	Petaluma between Ludtke & Garnett
LW	133	Petaluma , 2900' west of Bascum
LW	134	Rockwell & Ansley
LW	135	Ansley between Ludtke and Garnett
LW	137	Gillette & Escalon
TxDOT	45	Spur 536 0Roosevelt Ave. @ Six-Mile Creek (road closed)

San Pedro Creek Watershed

CSA	58	San Pedro /West Kings Hwy (high water)
CSA	112	Ashley / Blanco / Flores (high water)
CSA	118	Santa Rosa / Nueva (high water)
CSA	125	Noglitos / S. Flores (high water)
CSA	146	139 Elsmer (drainage clogged)
CSA	165	3008 S. Flores (shoulder collapsed)
CSA	190	Hazel / Trinity (mud on street, street caving in)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
FL	2	IH 35 Lower Level - Brooklyn Ave to N. Flores
FL	7	Mulberry St. near Twain Middle School
FL	20	San Antonio River Tunnel Inlet (replace footing, headwall, washout near sidewalk)
FL	23	San Antonio River (repair damaged retaining wall near Pecan St.)
LW	108	Laurel & Harpe (San Pedro)
TxDOT	11	IH 35 @ lower level of S. Flores to St. Mary's St. (road closed)
TxDOT	21	IH 10 @ Cincinnati to Colorado (road closed)

Zarzamora Creek Watershed

CSA	30	El Centro/ Culebra (high water)
CSA	32	Laven / Culebra (high water, closed)
CSA	37	Bandera / Callaghan (high water)
CSA	38	3900 Callaghan / Farragott (high water)
CSA	66	Callaghan /Woodside / Timco (high water)
CSA	188	Callaghan Bet / Old Callaghan/Culebra (high water)
CSA	195	36th / Commerce / Hwy. 90 (high water)
CSA	197	Laven / Rubidoux (high water)
FL	32	Postwood Spillway (repair damaged concrete @ Callaghan)
Fl	62	5200 Roubidoux in Western Park Subd.
LV	4	NW Industrial (business flooded)
LW	33	Medical Dr., 200' west of Wurzbach
LW	61	Parkway, 500' east of Callaghan
LW	62	Callaghan Rd., 100' east of Woodside
LW	63	Silvercrest between Woodside & Horseshoe
LW	64	Silvercrest, 100' northwest of Majestic
LW	65	Oak Knoll, 500' east of E. Horseshoe Bend
LW	66	Oak Knoll between Horseshoe Bend & Majestic
LW	67	E. Horseshoe Bend & Oakwood
LW	68	Majestic between Oaknoll & Horseshoe Bend
LW	69	Callaghan Rd between Faragut & Sloan
LW	70	Callaghan Rd. & Hemphill
LW	70.1	Laven, South of Culebra
TxDOT	29	LP 410 @ Zarzamora Creek (water covered road, but passable)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
LOWER SAN ANTONIO RIVER WATERSHED		
CSA	144	Goliad / Military
CSA	228	Shane / Villamain (high water)
FL	29	Ashley Rd. @ Cemi Creek (extend headwall and repair washout)
LW	151	Mission Parkway between Military and Ansley (San Antonio River)
LW	152	Old Corpus Christi Hwy. South of Henderson (San Antonio River Tributary)
LW	158	Shane, east of Bobby Allen (San Antonio River Tributary)
LW	158.1	Nancy Carole Way, 500' west of Southton (San Antonio River Tributary)
LW	159	Southton Rd., 4700' west of IH 37 (San Antonio River Tributary)
OR	1-12	Goth Rd. @ Tributary to Blue Wing Lake
OR	1-13	Espanda Rd. @ Tributary to San Antonio River
OR	1-33	Lamm Rd @ Tributary to San Antonio River
OR	1-34	Preist Rd. @ Tributary to San Antonio River
OR	4-1	Heuze Rd. @ Tributary to San Antonio River
OR	4-2	Blue Wing Rd @ Tributary to San Antonio River
TxDOT	36	IH 37 @ San Antonio River (frontage road and turnaround)
OLMOS CREEK WATERSHED		
AH	5	214 Crescent St. (home flooded)
AH	10	50 to 102 Alamo Hts. Blvd, (homes flooded)
AH	11	141 W. Fairoaks (home flooded)
BC	20	Huebner Rd.@ NW Military Hwy
CSA	9	Lockhill Selma/Wurzbach (barricades for high water)
CSA	10	Lockhill Selma / Dreamland (barricades for high water)
CSA	20	4027 Sleepy Hollow (barricades for high water)
CSA	22	IH 10 / Wurzbach (requested barricades for high water)
CSA	27	4229 Flent Hill (drainage problems)
CSA	34	Vance Jackson / Meadows (high water)
CSA	47	Elm Creek / Wurzbach (high water)
CSA	77	Basin /McCullough/ Jackson-Keller (high water)
CSA	80	US 281 / Olmos (clogged drain, high water)
CSA	111	Basse /McCullough/ San Pedro (road closed)
CSA	114	Basse to railroad / U.S. 281 (road closed)
CSA	122	Basse / Blanco (high water)
CSA	126	Fresno / Blanco / San Pedro (high water)
CSA	129	Thorain/ McCullough (road closed)
CSA	183	Vance Jackson / Huebner (high water)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
CSA	184	Rock Creek Run / Callaghan (high water)
CSA	185	Lockhill Selma / George (high water)
CSA	186	Vance Jackson / Sinsonte (high water)
CSA	189	900 Contour (high water)
CSA	219	Jones Maltsberger / Oblate (high water)
CSA	220	241 E. Nottingham Pl (high water)
FL	3	US 281 N. and Basse Road
FL	21	Jackson-Keller @ Rock Creek (reconstruct concrete channel)
FL	35	Thames St and Warwick (reconstruct channel wall)
FL	36	Springwood & McCullough (reconstruct channel wall)
FL	38	Shadywood (reconstruct channel wall and floor)
FL	39	Thames & Langdon (reconstruct channel floor)
LW	10	George Rd., west of NW Military (E. Olmos)
LW	34	Sleepy Hollow @ Sunburst (W. Olmos)
LW	35	Orsinger Rd., 250' west of Sleepy Hollow (W. Olmos)
LW	36	Vance Jackson @ Orsinger Rd. (W. Olmos Tributary)
LW	37	Vance Jackson south of Treehill (W. Olmos Tributary)
LW	38	George Rd., east of Lockhill Selma (E. Olmos Tributary)
LW	39	Lockhill Selma 500' north of Wurzbach (E. Olmos)
LW	40	Lockhill Selma, 400' north of Whisper Path (E. Olmos Tributary)
LW	41	Vance Jackson, 200' south of Scenic (W. Olmos Tributary)
LW	42	Dreamland, south of railroad crossing (Olmos)
LW	42.1	Algerita Dr., 1000' northwest of Vance Jackson (Olmos Tributary)
LW	43	Lockhill Selma, south of Belair (Olmos Tributary)
LW	48	McCullough, north of Wolf Rd. (Olmos Tributary)
LW	49	Wolf @ Plymouth (Olmos Tributary)
LW	51	Halm, east of Jones Maltsberger (Olmos Tributary)
LW	52	Jackson Keller , south of South Sea (Olmos Tributary)
LW	53	McCullough @ Barbara (Olmos Tributary)
LW	54	McCullough, 600' south of Jackson Keller (Olmos)
LW	74	Devine, 400' north of Dick Frederick (Olmos)
OP	1	1045 Shook Ave. (condos flooded)
TxDOT	28	Lp 410 and West Ave @ Olmos Creek Intersection (intersection completely closed)
TxDOT	33	US 281, north of Basse Rd to 1 mile south of Basse Rd.(lanes closed)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
SALADO CREEK WATERSHED		
BC	9	Bulverde Rd. between Jones Maltsberger and Rittiman
BC	21	Loop 1604 N. at Judson Road
CSA	29	1323 Rainsong (drainage problems)
CSA	41	West Ave. / Bitters (high water)
CSA	42	Henderson Pass / Lorence Cr. (high water alarm)
CSA	45	West Ave. Nakoma (high water)
CSA	49	North East Entrance / Bitters (high water)
CSA	59	13003 Feather Ridge (high water)
CSA	60	Creekview / Currency (closed)
CSA	61	Director / Creekview (closed)
CSA	62	Old Seguin Rd. / Salado Creek (high water, closed)
CSA	71	Austin Hwy. : Harry Wurzbach (high water)
CSA	72	Stone Oak Parkway /Evans (wall down)
CSA	76	E. North Loop (road closed)
CSA	79	San Pedro / 281/ Brookhollow (clogged drain)
CSA	82	West Ave / Rhapsody (road closed)
CSA	88	Perin Beitel / Walzem (high water)
CSA	89	Starcrest / Budding (high water)
CSA	95	Jones Maltsberger / Saldo Creek (high water)
CSA	98	Higgins / Stahl (high water)
CSA	101	Pecan Valley /Southcross (high water)
CSA	102	Springhill (high water)
CSA	105	1300 Rittiman (high water)
CSA	106	Bright Sun / Sun Shadow (high water)
CSA	108	15415 Heimer (high water)
CSA	110	Jones Maltsberger / Burning Trail (high water)
CSA	115	Pop Gun / Houston (high water)
CSA	117	Blanco & Old Blanco (high water)
CSA	133	Holbrook / Houston (high water)
CSA	135	Rittiman / Allegro (high water)
CSA	143	3600 block Roland (drainage clogged)
CSA	148	Rio Grande / Hines (road closed)
CSA	151	East Salado Creek /Rigsby (road closed)
CSA	152	13131 Brook Garden (drainage overflowing)
CSA	153	Gembler / Coliseum / W W White (road closed)
CSA	154	Brookertee / F Street (road closed, high water)
CSA	155	Blanco / Bitters (exposed hole with gas line inside)
CSA	157	Houston & Commerce / Salado Creek (road closed)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
CSA	159	Pecan Valley / H Street (road closed, high water)
CSA	160	F Street / E Street / H Street / Lone Creek / Advance (road closed)
CSA	162	Hine / Martin Luther King (road closed)
CSA	166	Rigsby / Pecan Valley (road closed)
CSA	170	410 / Sulphur Spring (road closed for high water)
CSA	171	Coliseum / E. Houston (road closed for high water)
CSA	172	3635 Belgium (road closed for high water)
CSA	173	Houston / IH 410 (road closed for high water)
CSA	174	Military / WW White / 37 (road closed for high water)
CSA	175	834 Morning View (road closed for high water)
CSA	176	Wetmore / Wurzbach Parkway (road closed for high water)
CSA	178	Southcross / Pecan Valley / WW White (road closed for high water)
CSA	180	190 Grobe (road closed for high water)
CSA	182	Pecan Valley / PLaydale (road closed for high water)
CSA	192	Benz Engleman / Seguin (high water)
CSA	193	Holbrook /Ira Lee (high water)
CSA	205	Leonhardt / Encarta (high water
CSA	207	4000 Rittiman (high water)
CSA	208	Jones Maltsberger / Nakoma (high water)
CSA	212	Stone Oak Parkway / 281 to 1604 (high water)
CSA	216	Stahl / Wetmore (high water)
CSA	217	Overland Dr. & Ashland Dr. (high water)
CSA	222	Brooksdale Dr. & Ashland Dr. (high water)
CSA	223	Stahl Rd. & Jung Rd. (high water, cave in)
CSA	227	Schrader Rd / Rigsby (washout)
CSA	232	232 Blakeley Dr. (debris on road)
CSA	233	Rice Rd. / Salado Creek (debris on road)
FL	4	3900 Eisenhauer Road - Savannah Ridge Apartments
FL	5	4000 Briar Glen - Village North Subdivision
FL	8	Salado Creek - Willow Springs area
FL	9	Salado Creek - Wheatley Heights area
FL	10	Salado Creek - MacArthur park
FL	11	Salado Creek @ Beitel Creek - Perrin Beitel area
FL	12	Salado Creek - Holbrook area
FL	13	Salado Creek @ Rigsby
FL	22	Panther Springs Creek (reconstruct riprap, walls, footing)
FL	24	Sherman St and No. Walters (reconstructed concrete floor and walls)
FL	25	Larry St. and creek (reconstruct drainage bank on west side of bridge)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
FL	26	Sherman St. (reconstruct concrete wall, north of Walter)
FL	27	Crestway St and Randolph Blvd (reconstruct washed out culvert)
FL	30	Amanda Street (reconstruct damaged channel walls)
FL	37	Cherry Blossom and Orchid Blossom (reconstruct channel walls and floor)
FL	40	Stone Oak Parkway (reconstruct channel between Evan s Road and U.S. 281)
FL	41	Webbles and Walzem (repair channel Walls and floor)
FL	42	Cavewood (reconstruct retaining walls)
FL	43	E. Country Circle (reconstruct damaged channel floor and walls)
FL	44	Old O'Connor Rd. (reconstruct ditch at Lookout Road)
FL	45	Perrin Beitel (reconstruct concrete channel at Loop 410)
FL	46	Weidner Rd. (repair ditch line near Randolph)
FL	47	Bromley Place (reconstruct channel walls ad floor at Higgins)
FL	48	Ira Lee and Austin Highway (repair washed away railing)
FL	49	Perrin Beitel (repair channel walls and erosion from 410 to Salado Creek)
LW	11	Old Blanco Rd., north of Voelcker (Salado Creek)
LW	12.1	Paso Del Norte, 700' west of San Pedro (Lorence Tributary)
LW	12.2	Encino Grande, south of Paso Del Norte (Lorence Tributary)
LW	12.3	Rio Bravo @ Rio Seco (Lorence Tributary)
LW	13	West Ave., south of Interpark (Salado Tributary)
LW	14	Sugarcrest between Parkston & Happy Hollow (Lorence Tributary)
LW	15	Copperhill between Parkstone & Happy Hollow (Lorence Tributary)
LW	16	Ledgestone @ Mount Joy (Lorence Tributary)
LW	17	Springhill between Pipestone & Mt. Everest (Lorence)
LW	18	Jones Maltsberger, south of Redland (Mud Creek)
LW	19	Henderson Pass, south of Moss Briar (Lorence)
LW	20	Stahl Rd., 2100' east of Wetmore Rd. (Mud Tributary)
LW	21	Stahl Rd., north of Bell (Mud Tributary)
LW	22	Stahl Rd., south of Jung (Mud Tributary)
LW	22.1	Jung Rd., @ Stahl Rd. (Mud Tributary)
LW	23	Judson Rd., 400' east of Nacogdoches (Beitel Tributary)
LW	24	Judson Rd., @ Lookout Rd. (Beitel Tributary)
LW	24.1	Lookout Rd. 100' northeast of Judson Rd (Beitel Tributary)
LW	24.2	Lookout Rd., 200' southeast of Toperwein (Beitel Tributary)
LW	44	West Ave., north of Loop Rd. (Salado Tributary)
LW	45	West Ave., north of Loop Rd. (Salado Tributary)
LW	45.1	W. North Loop Rd., 1300' east of West Ave. (Salado Tributary)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
LW	46	North Loop, 150' southeast of North Loop Rd. (Salado)
LW	47	Maltsberger Lane, 925' east of San Pedro (Salado)
LW	76	Starcrest, 600' west of NE Entrance (Lorence)
LW	77	Starcrest , 580' east of NE entrance (Mud Creek)
LW	78	Bitters Rd., 2600' west of NE entrance (Salado Creek)
LW	79	NE Entrance Rd., 1000' south of Starcrest (Salado Creek)
LW	80	Bitters Rd., 75' west of NE Entrance Rd. (Salado Tributary)
LW	81	NE Entrance Rd., 500' north of Bitters (Salado Tributary)
LW	82	Cheever between Tesor & Tee Cee (Salado Tributary)
LW	83	Nacogdoches Rd. @ Bulverde (Salado Tributary)
LW	84	Nacogdoches Rd., 750' south of Old Perrin Beitel Rd (Salado Tributary)
LW	85	O'Connor Rd, north of Lookout Rd. (Beitel Tributary)
LW	86	Leonhardt, 500' south of Encante (Beitel Tributary)
LW	87	Leonhardt, 400' east of Encante (Beitel Tributary)
LW	88	Weidner Rd, south of Leonhardt (Beitel Tributary)
LW	89	Schertz, 1000' west of Martin Luther King Crossing (Beitel)
LW	90	Schertz, west of Weidner Rd. @ railroad crossing (Beitel Tributary)
LW	91	Weidner Rd., 500' north of Schertz (Bell Tributary)
LW	92	Weidner Rd., 50; east of Grand Park (Beitel Tributary)
LW	93	Eaglecrest, West of Weidner (Beitel Tributary)
LW	94	Cave Lane between Dundee & Kennilworth (Salado Tributary)
LW	95	Vandiver & Irvington (Salado Tributary)
LW	96	Vicar, 100' t of Pertin Beitel (Beitel Tributary)
LW	97	Austin Hwy. @ Ira Lee (Salado Creek)
LW	97.1	Ira Lee, north of Austin Hwy. (Salado Creek)
LW	98	Dell Oak @ Ashland (Walzem)
LW	99	Overland and Lakeshore (Walzem)
LW	100	Blakeley, 450' west of Vandiver (Salado Tributary)
LW	102	Rittiman, 3000' west of Castle Cross (Rosillo Creek)
LW	103	Gibbs Sprawl @ Rosillo Creek (Rosillo Creek)
LW	104	Old Seguin Rd. @ Salado Creek (Salado Creek)
LW	105	Creekview, west of Currency (Pershing)
LW	139	Kingkrest, east of Longleaf (Salado Tributary)
LW	141	Quinta @ Vista (Salado Tributary)
LW	144	Roland @ Arrid (Salado Creek)
LW	145	Roland, west of Therron (Salado Creek)
LW	148	Sinclair @ Rosillo Creek (Rosillo Creek)
LW	150	Pecan Valley Dr. @ Dollar Hide (Salado Creek)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
LW	153	WW White at Rosillo Creek (Rosillo Creek)
OR	3-5	Evans Rd. @ Tributary to Elm Waterhole Creek
OR	3-6	Evans Rd. @ Tributary to Elm Waterhole Creek
OR	3-7	Evans Rd. @ Tributary to Elm Waterhole Creek
OR	3-8	Judson Rd @ Elm Creek
OR	3-9	Classen Rd. @ Tributary to Elm Waterhole Creek
OR	3-10	Bulverde Rd. @ Elm Waterhole Creek
OR	3-11	Bulverde Rd. @ Tributary to Elm Waterhole Creek
OR	3-12	Jones Maltsberger @ Elm Creek
OR	3-13	Bulverde Rd. @ Tributary to Elm Waterhole Creek
OR	4-11	Goliad Rd @ Salado Creek
RC	3-22	Menger Dr @ Tributary to Elm Waterhole Creek
RC	3-23	Evans Rd. @ Elm Waterhole Creek
TxDOT	3	IH-35 at Ramps, north of Starlight Terrace (southbound lanes and frontage road had several inches of water; at its highest level the water was 12" deep and approx. 300' wide; road was never closed; traffic using the inside shoulder; flooding occurs occasionally, (inlets may be "slotted drain" type).
TxDOT	4	IH 35 at Fratt Interchange Connector to LP 410 West (SB to WB) (connector closed at 2:00 p.m. on Oct. 17, due to 4' of water over the road; reopened at 8:00 a.m. on Oct. 18; approximately 250' of roadway was under water, this is the first time this section of road had to be closed.
TxDOT	5	IH 35 from Walzem to Eisenhauer (mainlanes were covered with approx. 16" of water for a length of 400'; traffic using the inside shoulder; this is the first time where water covered these roads.
TxDOT	6	IH 35 south of Binz-Engleman (southbound mainlanes were covered with abut 12" of water, although still passable with traffic using the inside shoulder, first time occurrence.
TxDOT	7	IH 35 at Salado Creek (north and south frontage roads closed at 11:00 a.m. on Oct. 17, due to water over the roads; reopened Oct. 19, at 11:00 a.m., at its highest point water was 12'-15' deep; its usually takes a 8-10" rain to cause problems at this location.
TxDOT	8	IH 35 north of Coliseum Rd (northbound and southbound mainlanes and frontage roads were under 12" of water for a short period of time although still passable, first time occurrence.
TxDOT	31	US 281 North of Evans Rd. (mainlanes at this location under approximately 5 feet of water at various times on Oct 17 and 18; first time occurrence)

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
TxDOT	24	LP 410 at Fratt Interchange (both connectors at IH 35 South and IH 35 North closed at 1:00 p.m. on Oct. 17 due to water over road; open at 10:00 a.m. on Oct. 18; water was 10' deep and 800' across; this was the first time these lanes had to be closed.
TxDOT	25	LP 410 at Perrin Beitel (westbound frontage road closed for the first time; water was approximately 6' deep and 300' wide.
TxDOT	26	LP 410 at Salado Creek (all lanes closed at 6:00 p.m. on Oct 17 due to 3' of water over the roads; first time occurrence for the mainlanes at this location; width of water course was 1500'; mainlanes opened to traffic at 9:00 p.m. on the same day.)
TxDOT	27	LP 410 from Nacogdoches to Broadway (all lanes between Nacogdoches Rd. and Broadway Ave. were closed for several hours during the afternoon of Oct. 17 due to water over the roads; water was 3' deep and 300' wide at it peak; water has been over the roads before, but still passable.
TxDOT	30	LP 410 at Salado Creek (on Southeast LP 410, 1000' north of this location all lanes were closed for several hours at various times on Oct 17. and Oct. 18 ; mainlanes closed for the first time Oct. 17 for 3 hours (6:00 p.m. to 9:00 p.m.
TxDOT	32	US 281 at Salado Creek (all lanes closed from 2:00 to 3:00 p.m. on Oct. 17 due to water over the road; first time occurrence)
TxDOT	35	IH 37 at LP 410 (Westbound access road closed at 7:00 p.m. on Oct 17 due to water over the road; open at 6:00 p.m. on Oct. 18; first time occurrence
TxDOT	39	LP 1604 at Bulverde Road (water covered only the intersection; depth of water was 12" in all directions for 200' but passable; first time occurrence at this location)
TxDOT	44	SPUR 368 (Austin Hwy) at Salado Creek (all lanes had to be closed due to 3' of water over the road; width of water course was 1000'; first time this road had to be closed.
TxDOT	49	FM 2696 (Blanco Rd.) at Bitters Rd. (road closed at 7:00 a.m. on Oct. 17 due to 3'± of water over the road; width of water course 2000;' road opened at 10:00 p.m. on the same day; first time occurrence)
WC	1	Perrin Beitel Creek (drainage channel floods)
WC	2	Drainage channel that runs from the 700 block of Crestway Drive to the 4800 block of Walzem Road (water fills channel and then crosses the roads during heavy rains)'
WC	3	Drainage that runs underground and aboveground from the intersection of Crestway Drive and Eaglecrest Blvd to Montgomery Road (asphalt washed away and destroyed an underground drain pipe system).

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
CALAVERAS CREEK WATERSHED		
CSA	167	1300 Foster Rd. (road closed)
LW	154	Sulphur Springs , east of Lodi (Calaveras Tributary)
LW	155	Sulphur Springs, west of Lodi (Calaveras Tributary)
LW	156	Sulphur Springs between Foster & Gardner (Calaveras Tributary)
LW	157	Sulphur Springs , east of Beck (Hondo)
OR	4-3	Cassiano @ Tributary to Calaveras Lake
OR	4-4	So. Foster Rd. @ Tributary to Calaveras Lake
OR	4-5	Burshard Rd. @ Tributary to Calaveras Lake
OR	4-6	Burshard Rd. @ Tributary to Calaveras Lake
OR	4-7	So. Foster Rd. @ Calaveras Creek
OR	4-9	Zigmont Rd. @ Chupaderas Creek
OR	4-10	Real Rd. @ Chupaderas Creek
RC	4-13	Kierkner Rd @ Chupaderas Creek
RC	4-14	Kierkner Rd @ Chupaderas Creek
RC	4-15	Triple Free @ Tributary to Calaveras Creek
RC	4-16	Macaway @ Tributary to Dry Hole Creek
CIBOLO CREEK WATERSHED		
BC	26	Lakewood Acres (homes flooded)
BC	29	4357 Wind Valley
BC	32	6870 FM 1863
BC	33	Lakewood Acres (homes flooded)
OR	3-3	John Peterson Blvd. @ Cibolo Creek
OR	3-14	E. Borgfield Dr. @ Mud Creek
OR	3-15	S. Glenrose Rd. @ Tributary to Mud Creek
OR	3-16	Specht Rd. @ Tributary to Cibolo Creek
OR	4-8	Lavernia Rd. @ Dry Hollow Creek
RC	2-33	Boerne Stage Rd. @ Cibolo Creek
RC	2-34	Old Fredericksburg Rd @ Cibolo Creek
RC	3-17	Blanco Rd. @ Cibolo Creek
RC	3-18	Lower Seguin Rd. @ Cibolo Creek
RC	3-19	W. Schaeffer Rd @ Cibolo Creek
RC	3-21	Lookout Rd @ Selma Creek
RC	3-24	Smithson Valley @ Cibolo Creek
RC	3-25	E. Ramblewood Street @ Cibolo Creek Tributary
RC	3-26	Bulverde Rd. @ Cibolo Creek
RC	3-27	Obst Rd. @ Cibolo Creek

APPENDIX A
LIST OF FLOOD HAZARD AREAS BY WATERSHED

KEY	ID	DESCRIPTION
RC	4-21	Ullrich Rd. @ Tributary to Cibolo Creek
RC	4-23	Bexar Bowling @ Cibolo Creek
TxDOT	1	IH 35 @ Cibolo Creek (bridge closed)
TxDOT	2	IH 35 @ Retama Park (bridge closed)
TxDOT	17	IH 10 @ Cibolo Creek (main lanes closed and frontage road closed)
TxDOT	37	LP 1604, west of IH 35 (main lanes closed)
TxDOT	38	LP 1604, Lookout Rd (road closed)
TxDOT	40	FM 78 @ Cibolo Creek (water over bridge, road closed)
TxDOT	41	FM 2252 @ Cibolo Creek (road closed)
TxDOT	42	FM 2252, 1.5 miles north of LP 1604 (road closed)

MARTINEZ CREEK WATERSHED

BC	11	FM 78 and Foster Rd.
BC	22	LP 1604 S. @ IH 10 East
BC	23	FM 1518 @ St. Hedwig Rd.
CSA	196	Gibbs Sprawl / railroad tracks (high water)
LW	101	Gibbs Sprawl , 700' northeast of Castlecross (Rittiman Creek)
OR	3-1	Trainer Hale @ Woman Hollering Creek
OR	3-2	Lower Seguin @ Tributary to Salitrillo Creek
OR	3-4	Walzem Rd. near Martinez Creek
RC	3-20	Hwy 78 @ Salitrillo Creek
RC	4-12	Pfeil Rd @ Salitrillo Creek
RC	4-17	Abbott Rd @ Salitrillo Creek
RC	4-18	Abbott Rd @ Woman Hollering Creek
RC	4-19	Abbott Rd @ Woman Hollering Creek
RC	4-20	Miller Rd @ Woman Hollering Creek
RC	4-22	New Berline @ Woman Hollering Creek
TxDOT	18	IH 10 @ Woman Hollering Creek
TxDOT	19	IH 10 @ Graytown Rd.
TxDOT	43	FM 1976 @ Walzem Rd.
UC	1	Kitty Hawk Rd. @ Salitrillo Creek

APPENDIX B
Flood Hazard Areas Map

APPENDIX B
Flood Hazard Areas Map

APPENDIX C

List of Potential Mitigation Projects by Watersheds

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

Key Legend

#	- City of San Antonio Master Plan Projects
AH	- Alamo Heights Drainage Projects
BB	- Bexar County and City of San Antonio Buy-Back Programs
BD	- City of San Antonio Projects - 1999 Bond Election and Others
BM	- Bexar Metropolitan Water District Drainage Projects
C	- Leon Creek Watershed Master Drainage Plan Projects for Culebra Creek
CH	- 1989 Bexar County Watershed Study
COE	- Corps of Engineers Proposed Construction Projects
CT	- Bexar County Proposed Construction Projects
D,P	- City of San Antonio Regional Detention and Channelization Facility Projects
F	- Leon Creek Watershed Master Drainage Plan Projects for French Creek
GF	- Grey Forest Drainage Projects
HB	- Leon Creek Watershed Master Drainage Plan Projects for Huebner Creek
HEL	- Leon Creek Watershed Master Drainage Plan Projects for Helotes Creek
HUE	- Leon Creek Watershed Master Drainage Projects for Huesta Creek
LC	- Leon Creek Watershed Master Drainage Plan for Projects for Leon Creek
LV	- Leon Valley Drainage Projects
M	- Leon Creek Watershed Master Drainage Plan for Projects for Maverick Creek
OP	- Olmos Park Drainage Projects
R	- Upper Olmos Creek Master Drainage Plan Projects
S	- SARA / Bexar County Contract - Project List
SA	- City of San Antonio / Bexar County / SARA Flood Control Projects - 1996
TX	- Texas Department of Transportation Projects
UC	- Universal City Drainage Projects
V	- Salado Creek Master Drainage Plan Projects

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APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
MEDINA RIVER WATERSHED			
BB-15		Shepherd - Atascosa (2 Properties, 2 w/improvements)	$68,880
BM-2		Medina River Cleanup and Development	$5,366,234
CT-2		Keller Rd. @ Polecat Creek	$7,400,000
CT-6		Cagon Rd. - Replace low water crossing 10 m north of Macdona - La Coste Rd.	$4,350,000
CT-7		Cagon Rd. - Replace LWC 0.7 m north of Macdona - La Coste Rd.	$320,000
CT-11		Town of Macdona, complete drainage improvements with and adjacent to town.	$830,000
CT-12		Applewhite Rd. - Replace narrow bridge	$840,500
CT-15		Hollowell Rd. - Replace LWC 0.2 m south of Macdona - La Coste Rd.	$550,000
CT-19		Pearsall Rd. - Increase capacity of drain culvert west of Lucky Rd.	$189,591
CT-20		Kinney Rd. - Replace LWC 0.3 m north of Pearsall Rd.	$424,858
CT-21		Jungman Rd. - Replace lower water crossing north of Macdona - La Coste Rd.	$520,000
CT-23		Fisher Rd. - Increase capacity of drain culvert 0.4 m west of Somerset	$98,419
CT-25		Gross Lane - Replace LWC 0.3 m east of Mechlar Rd.	$550,000
CT-33		O'Brien Rd. - Replace low water crossing	$548,400
CT-40		Quintana Rd. - Replace LWC 0.1 m east of Trawailer	$424,858
CT-41		Jackal Rd. - Replace low water crossing 0.3 m south of Benton City Rd.	$525,000
CT-45		Pleasanton Rd. Bridge Widening	$400,000
SA-16		Median River at FM 1937 LWC replacement	$1,500,000
MEDIO CREEK WATERSHED			
BD-67		Hunt Lane: Demaya to U.S. 90	$2,349,534
BM-1		Medio Creek Channalization	$5,813,396
CT-3		Geronimo Village Drainage	$100,000
CT-42		Ravenfield Road Bridge/Road Construction	$1,700,000
LEON CREEK WATERSHED			
#251	A	Callaghan East to Old Highway 90	$2,000,000
#251	B	S. Callaghan Rd Commerce to 90 MPO Project	$8,000,000
#252	A	Channel Parallel to Old Highway 90 & Acme	$8,900,000
#252	B	S. Callaghan Rd. Old Highway 90 to Castroville	
#1024		W. Villaret - Palo Alto College	$843,000

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#1027		Castleridge - Shady Grove to Pinn	$1,100,000
#1033		Oxford Trace/Abe Lincoln	$950,000
#1060		Lomax	$122,000
#1061		Nickle and Dime Area Drainage (Buyouts)	$4,511,000
#1062		South Ridge Park Subdivision Outfall	$1,804,356
#1071		Parallel to 410	$283,000
#1079		Mountain View - Culebra/1604	$823,000
BB-17		Leon Creek Area (Plumnear Area - 33 properties)	$1,381,645
BB-20		Huebner Creek (Holly Hock - 3 properties)	$244,400
BB-22		Leon Creek (Somerset Rd. - 1 property)	$66,340
BB-30		Leon Creek (Edwards-Schlundt Rd.)	
BB-34		Valley View Trailer Park	
BD-9		Guilbeau Drainage at French Creek - Provides drainage improvements on Guilbeau Rd. at French Creek Rd.	$430,000
BD-18		Leon Creek Recreation Facilities and Detention Pond at Loop 410	$2,500,000
BD-26		Quintana Rd. Drainage #64 Extension	(Scheduled for Construction)
BD-28		Whitby at Huebner Creek	$444,952
BD-29		Babcock - DeZavala to Hausman	$5,751,691
BD-31		Holly Hock at Huebner Creek	$603,030
BD-34		Tezel: Timber Path to Ridge Path	$1,958,975
BD-35		36th Street; U.S. 90 to Gowdon Flood Mitigation	$3,800,000
BD-37		Abe Lincoln: Horn to Eckert	$1,700,000
BD-50		Dempsey: Farr to Gwanda Lee	$398,123
BD-77		Tezel: Ridge Path to Old Tezel	$2,938,463
BD-90		Hillside Acres Drainage Outfall	$753,747
C-3	A	Culebra Creek Levee East of Galm Road	$56,000
C-3	B	Culebra Creek Floodwall	$152,000
C-4	A	Steubing Rd. Bridge @ Culebra Creek	$442,000
C-4	B	Steubing Road Level	$26,000
C-5	B	Culebra Rd. reconstruction at Loop 1604	$365,000
C-6	A	New Culebra Road Bridge @ Culebra Creek	$1,310,000
C-6	B	Purchase 7 structures in floodplain	$1,155,000
C-7	A	Culebra Creek Channelization	$143,000
C-8	A	Culebra Rd. Bridge @ Culebra Creek	$2,039,000
C-8	B	Timber Path Bridge @ Culebra Creek	$6,000,000
C-8	C	Old Grissom Rd. Bridge @ Culebra Creek	$871,000
C-8	E	Purchase 1 structure in floodplain	$120,000
CT-5		Braun Rd. Bridge - replacement	$469,672
CT-13		Scenic Loop: replace LWC 0.4 m north of Grey Forest	$230,000
CT-18		Talley Rd. - Construct drain & Road	$1,650,000

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
CT-26		Applewhite Rd. - Replace low water crossing	$310,000
CT-27		Zarzamora Rd. - Replace low water crossing @ Commanche Creek	$280,000
CT-43		Galm Rd. Bridge/Road Construction	$1,400,000
CT-47		Geronimo Forest Drainage	$400,000
D-1		Huesta Creek detention Pond and Park @ Leon Creek	$6,250,000
D-2		Spring Creek Detention Pond	
D-3		Leon Creek Detention Pond @ Whitby Street	
D-5		Leon Creek Detention Pond @ Culebra Creek	
D-6		Leon Creek Detention Pond @ Heath Lane	
D-7		Government Canyon Detention	
D-8		Leon Creek @ Heath Lane Channalization	
D-9		Huebner Creek @ Hollyhock Channelization	
D-10		Culebra Creek @ Loop 1604 Channelization	
D-11		Helotes Creek @ 1604 Channelization	
D-12		French Creek Channalization	$1,334,000
F-2	A	Hausman Bridge @ French Creek (LW-162)	$597,000
F-3		Prue Rd. Bridge @ French Creek (LW-163)	$512,000
F-4	A	North Verde Road Bridge @ French Creek	$655,000
F-4	B	South Verde Road Bridge @ French Creek	$751,000
F-4	C	Purchase 11 structures in floodplain at N. Verde	$1,200,000
F-5	A	Bandera Road Bridge Replacement @ French Creek	$254,000
F-8	A	Mainland Road Bridge @ French Creek	$254,000
F-9	A	Low Bid Lane Bridge at French Creek	$142,000
F-9	B	Heath Lane Improvements	$64,000
F-9	C	Clyde Dent Drive Bridge at French Creek	$139,000
GF-1		Scenic Loop Rd. @ Bluehill Pass	$1,000,000
GF-2		Hillside Dr. Bridge	$500,000
GF-3		Sherwood Trail Bridge	$500,000
GF-4		Hilltop Dr. Bridge	$500,000
HB-1		DeZavala Road Bridge @ Huebner Creek	$609,000
HB-2		Cimarron Street Floodwall along Huebner Creek	$100,000
HB-4		Prue Rd. Bridge @ Huebner Creek (LW-26)	$493,000
HB-5	A	Lockhill Road Bridge @ Huebner Creek (LW-26)	$288,000
HB-5	B	White Bonnet Bridge @ Huebner Creek (LW-27)	$288,000
HB-5	C	Lockhill Floodwall along Huebner Creek	$172,000
HB-5	D	Purchase 4 buildings in floodplain	$423,000
HB-8		Eckert Rd. Bridge @ Huebner Creek (New Culvert Constructed '95)	$457,000
HB-10		Timber Hill Road Bridge @ Huebner Creek (LW-57)	$928,000
HEL-1		Galm Rd. Bridge @ Helotes Creek	$513,000
HEL-3	A	Leslie Rd. Bridge @ Helotes Creek (LW106.1)	$352,000

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
HEL-3	B	Leslie Rd. Bridge @ Helotes Creek (LW106.1 LW 106.2)	$363,000
HEL-3	C	Leslie Rd. Bridge @ Helotes Creek	$363,000
HEL-3	D	Purchase 7 structures in floodplain	$1,260,000
HEL-6		Helotes Creek Channel Improvements	$1,400,000
HUE-3		Hausman Rd. Bridge @ Huesta Creek	$315,000
LC-1		Hausman Rd. Level (Prevents Split Flow)	$26,000
LC-2		Levee on Leon Creek, south of Hausman	$31,000
LC-4		Eckert Rd. Bridge @ Leon Creek	$590,000
LC-5		Timber Creek Estates, Leon Creek Channelization	$4,340,000
LC-6		Heath lane Reconstruction	$219,000
LC-7		Grissom Rd. Bridge @ Leon Creek	$1,273,000
LC-8		Levee on Leon Creek, south of Grissom Rd.	$26,000
LC-10		Ingram Road Bridge @ Leon Creek (LW-58)	$1,813,000
LC-12	A	Rebuild Culebra Road Bridge @ Leon Creek	$2,713,000
LC-14		West Commerce St. Bridge @ Leon Creek (LW-106)	$2,617,000
LC-15	A	Pinn Road Bridge @ Leon Creek (LW-107)	$989,000
LC-16	A	Brownleaf Floodwall along Leon Creek	$720,000
LC-17		Rodriguez park Signs and Flood Gates	$50,000
LV-1		Huebner Creek Channelization	$615,000
LV-2		Bandera Rd. Bridge Channelization @ Huebner Creek	$1,000,000
LV-3		Huebner Creek Channelization - Bandera Rd. to Evers Rd.	$6,780,000
LV-4		Evers Rd. @ Huebner Creek Replacement of Culvert	$766,000
M-1	A	Babcock Rd. Bridge @ Maverick Creek	$301,000
M-1	B	Babcock Rd. Bridge @ Maverick Creek	$301,000
M-1	C	Babcock Rd.. Bridge @ Maverick Creek	$301,000
M-1	D	Babcock Rd. Bridge @ Maverick Creek	$301,000
M-2		Babcock Rd. Level	$92,000
M-3		Babcock Rd. Level	$36,000
M-4		UTSA Blvd. Bridge @ Maverick Creek	$448,000
M-5		Hausman Road Bridge at Maverick Creek	$239,000
S-21		Leon Creek - Relocations	$3,247,000
S-22		Leon Creek - SA Corporate Limits to 2000' DS New Laredo Hwy. Channel Rectification	$2,697,000
S-23		Leon Creek - Moray Rd. to SA Corporate Limits – Floodplain Rectification	$24,891,000
S-24		Leon Creek - IH-10 to Moray Rd. Floodplain Rectification	$17,944,000
S-25		Leon Creek - Keitha to Hwy. 90 west Channelization	$4,745,000
S-26		Leon Creek - Old Camp Bullis Rd. to SPRR - Relocation & floodproof	$1,020,000
S-27		Leon Creek - SPRR to IH-10 South Bend Frontage Rd.	$1,020,000

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
S-28		Leon Creek - Raymond Russel Park	$6,169,000
S-29		Leon Creek – IH 10 Southbound Frontage Road to Boerne Stage Road – Relocate & Floodproofing	$635,000
SA-13		Culebra Creek study - Helotes Creek to French	$50,000
TX-4		FM-471 - Leon Creek Area Drainage	$176,100
TX-12		FM-471 at Leon Creek Removal Gravel Washoff	$180,000

UPPER SAN ANTONIO RIVER WATERSHED

Alazan Creek Watershed

#71	N	Overbrook - Sunshine Dr. to Balcones	$8,910,000
#71	Z&K	Wilson - South of Woodlawn	$2,000,000
#98	A	Culebra Road - Goodrich to Hamilton	$450,000
#1019		Roberts St. NW 19 to Alazan Creek	$391,000
#1028		De Chantel Area	$1,800,000
#1040		St. Cloud	$354,000
#1048		Placid Dr. Drainage	$1,216,000
#1052		Proj #71-A & B Channel Restoration	$1,000,000
#1074		Ligustrum Drainage	$408,000
BD-52		Durango: San Marcos to Navidad	$1,556,841
BD-68		Las Moras - Street and Drainage	$71,376
BD-84		Waverly Phase II: Emroy to Glenmore	$445,000
BD-86		Wilson: Woodlawn to Waverly	$892,537
BD-87		Woodlawn Ave: San Antonio to Lake	$450,000
SA-1		Detention Facility near Spencer Lane and IH-10	$4,600,000

Apache Creek Watershed

#57	A	Woodlawn/Camino Santa Maria, Overhill	$1,500,000
#58	BZ	Quill	$3,600,000
#1054		Zarzamora - Guadalupe to Apache Creek	$687,000
BD-21		Dell Street Drainage (100 Block) (#58 BX)	$438,817
TX-1		24th Street - Commerce to Culebra	$2,440,000

Martinez Creek Watershed

#85	A	Buckeye/ Edgebrook	$2,900,000
#86		Vance Jackson/Freiling	$3,200,000
#303		Brazos and Arbor	$2,700,000
#1055		Craig, French, Ashby, Martinez Creek	$266,000
		Channel Modifications for Martinez Creek, Phase I	$2,652,300
		Channel Modifications for Martinez Creek, Phase II	$2,066,300
		Channel Modifications for Martinez Creek, Phase III	$3,163,800
BB-23		Martinez Creek Phase I	$4,302,154
BB-28		Martinez Creek Phase II	

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
BD-55		Elsmere: Michigan to Capitol	$125,441
BD-78		Thorain: Buckeye to S.P. Railroad	$327,750
BD-80		W. French: Zarzamora to Navidad	$325,772

San Antonio River Watershed

#1	A	Broadway - East Hildebrand to Burr Rd.	$639,000
#1	B	Burr Rd.	$2,700,000
#5	A	Cunningham	$2,302,660
#6	E	E Grayson	$1,300,000
#8		Brackenridge	$1,680,000
#16		E. Houston	$1,000,000
#16	ALT	W.Nueva /S. Alamo	$14,405,000
#24		Conrad St.	$12,742,375
#29		Camden - Jones to Newall	$200,000
#34		E. Mulberry	$1,200,000
#39	A	Zarzamora	$8,100,000
#39	U	El Jardin	$1,081,421
#39	V	36th Street @ Hwy. 90	$1,303,868
#52	B	Fair/Pine	
#54		Greer Storm Drain Project	$1,400,000
#55	Addit	Gever St. Drainage	$5,400,000
#56	B	Lennon Court - Clark Ave. to IH 37	$1,500,000
#56	X	S Presa to San Antonio River Outfall	$1,500,000
#63		W. Hart/S. Flores/Octavia (Octavia #63)	$6,000,000
#66	A	East Sayers - Pleasanton to S. Flores	$2,000,000
#69	A	Mayfield/Boswell/Dickson	$1,095,652
#88		Olmos Creek-Olmos Dam to Hildebrand	$3,000,000
#91		N. New Braunfels	$12,300,000
#149		Del Alamo - Jefferson / W. Martin / SA River	$15,755,900
#150		Brooklyn-Ave. B to Austin St.	$5,632,000
#150	A	Austin St. - Hackberry to Ave. B	$2,090,000
#150	B	Lamar - Hackberry to Austin St.	$2,625,000
#150	C	Brunet - Cherry to Live Oak	$2,400,000
#202		E.White - Mission to Roosevelt	$2,535,000
#1020		Adele - Drexel Rd. to Fair Ave	$365,000
#1035		E Magnolia - Main to Carleton	$2,000,000
#1039		Hawthorne - Flores	$217,000
#1041		Clay Street Drainage	$180,622
#1045		W. Kirk - Neimeyer to Carolyn	$1,130,500
#1046		Main Ave. / Old Guilbeau / San Antonio River	$403,000
#1049		Simms Area Drainage	$4,300,000
#1056		Mc Cullough at N. St. Mary's	$602,500

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#1058		Mission Road Area - Package 3	$1,400,000
AH-1		N. New Braunfels Street Drainage Channel	$12,000,000
AH-2		Channel Inlet @ N. New Braunfels and Redwood	$1,000,000
AH-3		Austin Hwy. street Drainage Channel (N. New Braunfels to Broadway)	$2,000,000
AH-4		Drainage Channel From Terrell Hills to Alamo Heights	$1,000,000
AH-5		Broadway Street Drainage thru Alamo Heights	$15,000,000
BB-33		Sa River (Symphony Lane Area)	$1,271,940
BD-15		Octavia #63 Phase II	$6,896,000
BD-16		Rip-Rap #69 Phase II	$10,000,000
BD-48		Claremont/Eleanor/Natalen, Phase II	$687,975
BD-49		Claremont/Eleanor/Natalen, Phase III	$800,714
BD-57		Florida: IH-37 to St. Mary's	$1,450,300
BD-61		Gevers: IH-10 to Warding	$644,645
BD-70		Mancke Area Streets, Phase II	$957,918
BD-73		Mitchell Street - Probandt to Roosevelt	$1,463,764
COE-3		Six Mile Creek @ Sa River Drop Structure eroded	
COE-4		SA River @ Overflow to San Juan Ditch eroded	
COE-5		SA River @ San Juan Lift Station Dam tri-lock eroded	
COE-6		SA River tunnel inlet, trash rakes, splitter walls	
CT-48		Padre Boulevard Bridge widening	$400,000
S-9		Gate #2 Brackenridge Park	$493,000
SA-4		Major Drainage Improvements and Channel work along SA River	$3,250,000
SA-5		SARIP - Josephine to Lexington	$10,644,000
SA-6		SARIP - Hildebrand to Josephine	$1,992,000
SA-7		SARIP - Brooklyn Street Dam	$917,000
SA-8		SARIP - Guenther to Lone Star	$1,874,000
SA-9		SARIP - Lone Star to San Pedro Creek	$1,700,000
SA-10		SARIP - San Pedro Creek to Espada Dam	$6,905,000
SA-12		SARIP - Espada Dam	$11,675,000
SA-17		Pyron Rd. @ Old SA River LWC replacement	
TX-3		Mitchell Street - from Probandt to SP536 (Roosevelt Ave.)	$1,878,228

Six Mile Creek Watershed

#39	J	Roselawn	$2,000,000
#65	D	Wabash	$3,825,000
#68	RipRap	Kendalia/Commercial	$13,000,000
#68	A	Clovis	
#68	D	Garnett	$1,000,000

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#69	RPRAP2G	Southcross from Pleasanton to Commercial; Tupper, Nobb	$2,293,891
#69	RPRAP2D	Cannavam/Brunswick/Tupper	$5,750,000
#83	A	Branches of Six Mile Creek	$3,000,000
#83	B	Branches of Six Mile Creek	$3,000,000
#83	C	Branches of Six Mile Creek	$3,010,000
#83	X	Ashley / Espada, Phase II	$14,261,984
#83	XE	Oppenheimer	$4,759,389
#1001		Baker St. Drainage	$1,195,000
#1006		Hutchins- Zarzamora to Commercial	$2,800,000
#1009		Wilma Jean- Rockwell	$1,500,000
#1015		Zarzamora / S. W. Military to IH 35	$340,000
#1023		Brabach - Roosevelt to Six Mile Creek	$5,505,000
#1031		Formosa - Cullin to Pleasanton	
#1053		Aaron @ Commerical & Cullin to Ascot	$214,000
#1066		Vestal Place - Commercial to Pleasanton	$229,000
#1077		Commercial - Petaluma to IH 410	$1,720,000
BD-2		Ansley Boulevard Drainage #1091	$2,589,491
BD-14		Military Ditch #65	$1,657,572
BD-22		Escalon Street Drainage #1008	$963,342
BD-25		S. Flores Drainage #70-70A Phase II, Part 3	$2,200,000
BD-32		Upper Six Mile Creek #83F	$4,662,459
BD-51		Drury Lane: Escalon to Dead End	
BD-64		Hilton: Clovis to W. Amber	$318,984

San Pedro Creek Watershed

KEY	EXT	DESCRIPTION	ESTIMATED COST
#35		Drainage Channel - Ripley / R.R.	$2,000,000
#35	X	San Pedro / Huisache/Mark Twain Middle School	$3,500,000
#35	Y	Hickman Extention to Fredericksburg	$2,000,000
#46	C	Baylor St.	$2,000,000
#254		Camp/S.Alamo	$962,145
#1029		Cumberland - Nogalitos to Garland	$1,675,600
BD-10		Harris Storm Drainage	$1,731,687
BD-40		Baylor Street - San Pedro Creek To Flores Street	$205,998
BD-58		Frio City Rd.: Brazos to Zarzamora	$2,086,272
BD-71		McKay (400 & 500 Blks)	$157,550
BD-74		Mockert Street Area: (Mockert, Forest, Lambert, Klein)	$1,300,000
TX-5		South Flores - from Alamo Street to San Pedro Creek Utility improvements	$2,831,372
TX-6		South Flores - from San Pedro Creek to Franciscan	$4,477,599

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
Zarzamora Creek Watershed			
#97	B	Trailwood, Hollyridge, Colebrook	$1,700,552
BB-26		Zarzamora Creek Area	$584,630
BD-1		39th Street #58M Phase II A Street Drainage	$739,108
BD-6		Culebra Drainage Project #58F (Zarzamora)	$4,394,000
BD-36		39th Street #58M, Phase II	$600,652
BD-45		Callaghan: Bandera to Horseshoe Bend	$2,900,000
BD-46		Callaghan: W. Horseshoe Bend to Ingram	$1,618,647
LOWER SAN ANTONIO RIVER WATERSHED			
#82	A	Brooks Field Outfall	$11,031,969
#1082		Brookside	$3,342,000
BB-13		SA River (Rabel Area)	
BB-25		SA River (Villamain Area)	$365,438
BD-19		San Antonio River Improvements	$5,259,997
COE-1		San Antonio River Pilot Channel South of 410 Erosion	
COE-2		SA River Channel Erosion Downstream of Ashley Rd.	
CT-4		City of Elmendorf - Complete Drainage Improvements	$450,000
CT-38		Blue Wing Road - Replace LWC	$203,559
SA-11		SARIP - Espada Dam to Espada Mission	$4,232,000
OLMOS CREEK WATERSHED			
#73	A	Barbara Dr. Drainage -McCullough	$10,811,000
#73	B	Barbara Dr. Drainage	$2,000,000
#73	C	Thames	$2,400,000
#74	A	Vidor	$4,059,000
#74	B	Belfast and Ridgecrest	$789,000
#74	C	Terra Alta Dr. Outfall	$1,000,000
#74	X	Lorene to Sahara	$2,002,000
#87	E	Rock Creek	$3,408,000
#88	E	Orsinger Rd. Sleepy Hollow	$3,780,000
#1014		Nacogdoches- Broadway to New Braunfels under construction	$679,500
#1068		Shook Ave.	$250,000
#1075		Lockhill Selma -West Ave. to Blanco	$8,934,500
#1080		Veda Mae - Shearer Hills	$4,300,000
BD-3		Ave Maria Drainage – Underground Drainage System	$2,200,000
BD-8		Flores/Breeden/Beacon Outfall Phase II	$1,051,700
BD-11		Howard Drainage (Wildwood to El Monte) – Reconstruct Drainage	$737,828

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
BD-23		Lockhill – Selma Rd. – George to Wurzbach Rd.	$3,500,000
BD-54		El Monte: Blanco to San Pedro	$400,000
BD-85		Western #74 Phase IIIA	$943,993
D-13		Vulcan Quarry Detention Pond	$1,997,125
D-14		Shavano Park Detention Pond	$5,711,478
D-15		Lockhill Selma – George Rd. Channelization	
D-16		West Branch Channelization	
D-17		West Ave. @ Loop 410	
D-24		Redland Detention Pond & Channelization	
OP-1		Shook Ave. Drainage Channel Improvements 1	$1,100,000
R-5		Channel Clearing – East Olmos north Loop 410	$221,778
R-6		Dreanland Bridge at Olmos Creek	$1,750,000
SA-2		Detention Facility on East Branch of Olmos in Shavano Park	$2,800,000
TX-2		Lockhill Selma Rd. - George to Whisper Path	$4,680,000
TX-10		U.S. 281 at Jones Maltsberger Repair Rip-Rap	$30,000

SALADO CREEK WATERSHED

#75	A	Vandiver	$2,536,000
#75	B	Cave Ln	$9,428,000
#75	C	Haskin	$3,773,500
#75	D	Kenilworth	$8,390,200
#75	E	Busby	$4,107,000
#76		Beitel Creek	$4,249,000
#76	C	Randolph Blvd. Tributary	$2,000,000
#77		Devonshir/Brookside	$10,963,300
#78		Harry Wurzbach to Corinne	$3,588,130
#89		Pershing Creek	$8,344,655
#114	B	E. Houston/Sapphire (Phase II)	$2,000,000
#114	C	Rice, W. W. White to Semlinger	$9,625,000
#114	C	W.W. White - Area Sts. (Phase II)	$5,864,000
#152		Rittiman Outfall	$2,000,000
#153		Nacogdoches	$15,394,250
#154	A	Center Park East	$138, 305
#154	B	Fratt Road	$3,343,260
#155		Schertz / Weidner (some private development)	$9,632,000
#203	EXT	Springfield Extention (TxDOT)	$10,540,000
#204		Rigsby	$2,304,200
#205		Holmgreen Rd. Outfall	$11,662,365
#206		Jo Marie / W. W. White	$5435,660
#1000		Belford St. - Dublin to Utopia	$9,980,486
#1004		Parhaven	$481,214

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
#1005		Moana St.	$226,474
#1012		Fertile Valley Farms Subdivision	$2,155,350
#1016		Wenzel Rd. - Ridgemeadow to Topperwein	$1,251,250
#1017		Coker Lane Stout Ext.	$404,165
#1022		Braniff - Turbo to 281	$745, 290
#1025		Bel Meade	$2,088,128
#1026		Coca Cola Dr. - E. Houston to E. Commerce	$4,665,000
#1030		Emil Rd. - W.W. White to IH 10 (TxDOT)	$2,128,750
#1034		Lindenwood	$1,290,640
#1036		Kentwood Manor - Lorence Creek	$5,963,160
#1037		Paso Del Norte	$1,580,380
#1038		Stahl Road - Bell to Briarpoint	$1,500,000
#1065		Parliament at Blanco	$1,535,000
#1069		Earthen Channel - Patricia to Blanco	$670,400
#1072		Valley Forge	$268,860
#1076		Stringfellow - Southcross to Kashmuir	$396,850
#1078		Chandler - W.W. White to Dead End	$1,620,680
#1081		Peggy/Stutts	$2,888,760
#1083		Menger Creek - Cisco Blvd & area streets	$6,200,000
#1084		Sams & Bernard	$1,789,375
BB-14		Southton(1 property with improvements)	$200,000
BB-18		Tributary to Salado Creek (Pipestone Dr.-Phase I	$408,600
BB-19		Beitel Creek Area (Briarglen Drive - 13 properties - Phase I)	$1,442,900
BB-21		Salado Creek (Wheatly Hts Area - Phase I)	$5,597,697
BB-24		Rosillo Creek Area (McNutt - Phase I)	
BB-27		Salado Creek (Wheatly Heights - Phase II)	$5,597,697
BB-29		Rosillo Creek Area (McNutt - Phase II)	
BB-31		Beitel Creek Area (Morga Area - Phase II)	
BB-32		Beitel Creek Area (Wurzbach - Phase II)	
BD-4		Blossom/Woodbury	$3,200,000
BD-5		Busby and Flamingo Drainage	$70,000
BD-12		IH-35/Gembler (Salado Creek)	$660,000
BD-13		Lanark Drainage (#92A)	$3,027,480
BD-17		James Park Development and Holbrook Road Improvements	$910,657
BD-20		Wheatly Heights buyout and Salado Creek Greenway Development	$3,540,384
BD-24		Rittiman: Austin Hwy. to Harry Wurzbach	$1,018,893
BD-30		Higgins: Nacogdoches to Stahl	$2,407,407
BD-33		Pecan Valley: "J" Street to IH-10	$1,200,000
BD-39		Aurelia - M.L. King to Yucca	$210,242
BD-41		Bee Street - Walters to Frank	$411,000

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
BD-42		Belgium: Picarde to Coliseum	$1,702,566
BD-43		Bitters: Broadway to Nacogdoches	$1,953,326
BD-47		Cardiff: Aransas to Dead End	$666,392
BD-53		Duval/Seguin: Pierce to Walters	$880,000
BD-56		F Street: pecan Valley to IH-10	$186,419
BD-60		G Street: Pecan Valley to dead-end	$137,042
BD-63		Hi-Lions 80 Mod Phase III & V	$5,476,000
BD-66		Holbrook Rd. Area Improvements	$1,200,000
BD-69		Leonhardt: Encanta to Weidner	$809,391
BD-81		W.W. White Phase I: Rigsby to Lord	$3,030,546
BD-82		W.W. White Road Area Streets Phase II	$2,740,932
BD-88		Carson Street: Walters to Frank	$274,064
CT-24		Deer Cross Lane - Replace LWC	$186,325
CT-37		Menger Rd. - replace LWC	$280,000
CT-44		Old Corpus Christi Rd. Bridge Widening	$400,000
D-18		NRCS Retention pond site 15R @ McAllister Park	$4,375,000
D-19		Beitel Creek north of Loop 410 Channalization	$2,200,000
D-21		Perrin Beitel Channalization	$1,100,000
D-22		Holbrook Road Channalization	$961,225
S-11		Salado Creek - R.R. Bridge Replacement	$1,001,000
S-12		Salado Creek - Channel Rectification	$1,609,000
S-13		Salado Creek - Rigsby to Roland (floodplain rectification)	$3,240,000
S-14		Salado Creek - Downstream of "J" Street Park to Rigsby Floodplain Rectification	$6,883,000
S-15		Salado Creek - "J" Street Park Channel Rectification	$2,949,000
S-18		Salado Creek - Peltz to IH-10 Floodplain Rectification	$22,028,000
S-20		Salado Creek - Eisenhauer Rd. to Ft. Sam Houston	$42,484,000
SA-14		Salado Creek Study – S. Loop 410 to E. Southcross	$75,000
SA-15		Salado Creek Study – E. Southcross to Rigsby Ave.	$75,000
TX-7		IH-35 West Frontage Rd: Holbrook to Walzem	$1,177,900
TX-11		Loop 410 at Beitel Creek	$78,171
TX-14		FM-2696 south of Cibolo Creek - Repair roadbed	
V-2		Remove 5,000' of Weidner and 2,500' of Old O'Conner Roads	$844,750
V-8		Remove 1,800' of Ira Lee from Austin Hwy. northward to limits of floodplain. Remove 600' roadway connection to Holbrook Rd. and reroute 600' of Holbrook Rd.	$345,900
V-10		Clear and Channelize 12,900' ofSalado Creek between Wetmore & Jones Maltsberger Rd.	$20,189,400
V-11		New multiple pipe culverts @ Jones Maltsberger and Mud Creek	$250,000

APPENDIX C
LIST OF POTENTIAL MITIGATION PROJECTS BY WATERSHED

KEY	EXT	DESCRIPTION	ESTIMATED COST
V-12		New multiple pipe culverts @ Jones Maltsberger and Elm Creek	$400,000
V-13		New bridge structure at Binz-Engleman Rd. at IH 35	$3,240,000
V-14		New bridge structures for frontage roads at IH 35 and reroute Seguin Rd.	$3,000,000
V-15		New multiple box culverts and raise 2,700' of Bulverde Rd.	$500,000
V-16		New W. Avenue Bridge over Salado Creek	$2,682,000
V-17		New Vicar Road Bridge along Beitel Creek	$1,500,000
V-18		New Roland Bridge at Salado Creek	$2,400,000
V-19		New W. Avenue Bridge at Panther Springs	$250,000

CALAVERAS CREEK WATERSHED

CT-1		Foster Road Structure Replacement - (3) U.S. 87 to Sulpher Springs Rd.	
CT-22		Gardner Rd. - Increase capacity of drain culvert 0.6 m south of Sulphur Springs Rd.	$68,145
CT-32		Real Rd. - replace low water crossing 0.1 m west of FM 1516	$73,834
CT-39		Zigmont Rd. - replace low water crossing 0.1 m south of Macaway Rd.	$139,188

CIBOLO CREEK WATERSHED

BB-1		Lyndon Drive	$968,813
BB-10		Lost Meadows	$165,022
BB-11		Aztec Lane	$402,390
BB-12		Bolton (11 properties, 11 w/improvements)	$530,236
CT-8		Blanco Rd. - replace LWC	$565,000
CT-9		Bulverde Rd. - replace LWC	$575,000
CT-10		Smithson Valley - replace LWC	$560,000
CT-14		Trainer Hale Rd. - replace LWC	$430,000
CT-16		Weir Rd. - Replace LWC	$425,000
CT-17		Shaeffer Rd. - replace LWC	$450,000
CT-28		Specht Rd. - replace LWC	$450,000
CT-29		Old Fredericksburg Road	$460,000
CT-35		Uhlrich Road - 0.3 m north of New Berlin Road	$185,000
CT-46		Evans Road Bridges	$1,700,000
S-31		Cibolo Creek - 2.3 m down-stream of Schaeffer Rd. - relocation and flood proofing	$852,000
S-32		Cibolo Creek - 1.3 m upstream of Schaeffer Rd. - Relocation and floodproofing	$368,000

KEY	EXT	DESCRIPTION	ESTIMATED COST
TX-14		FM 2696 south of Cibolo Creek	

MARTINEZ CREEK WATERSHED

BB-9	Schaefer Road	$479,776
CT-31	Glen Fair - Increase capacity of drain	$127,645
CT-34	New Berlin Road - replace LWC	$180,000
CT-36	Abbott Road - replace LWC	$145,000
TX-8	IH-10 S. Frontage Rd. @ Woman Hollering Creek - remove and regrade channel	$14,159
TX-9	IH-10 S. Frontage Rd. - repair rip-rap channel	$7,774
TX-13	FM 1516 @ West Saldtrillo Creek - repair erosion and clean culverts	$23,527
UC-1	Kitty Hawk Road @ Salatrillo Creek LWC replacement	$500,000

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APPENDIX D

Potential Mitigation Projects Map

CITY OF SAN ANTONIO REGIONAL FLOOD MITIGATION PLAN December 2000

Contract #.2000-001-011

(2) Large Scale Maps located in the Official file, may be copied upon request.

FEMA 100 Year Flood Plain – Appendix B   Job No. 4851.00

City of San/Bexar County/SARA Flood Control Projects – 1996 Texas Department of Transportation Projects Universal City Drainage Projects Plan

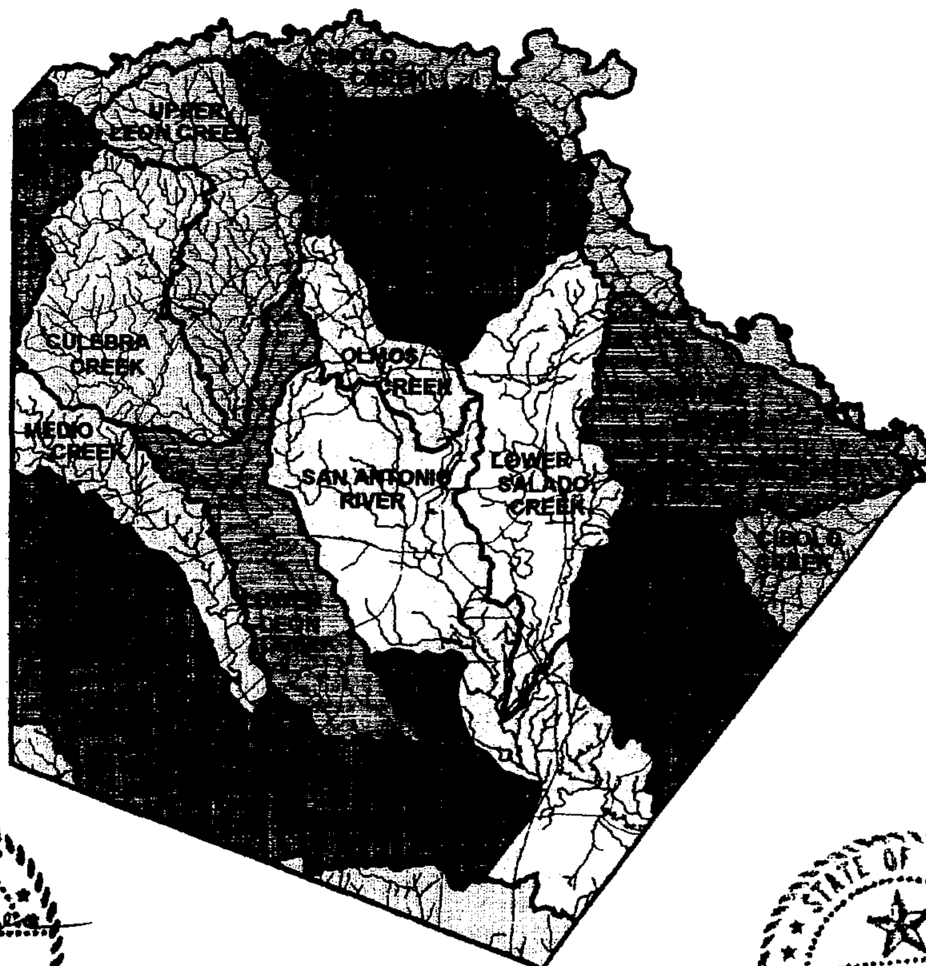
Projects –Appendix D Job No. 4851.00

Please contact Research and Planning Fund Grants Management Division at (512) 463-7926 for copies.

APPENDIX E
Bexar County Flood Analysis Report (Volume I)

BEXAR COUNTY FLOOD ANALYSIS REPORT

Volume I



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Prepared for:

BEXAR COUNTY

And

SAN ANTONIO RIVER AUTHORITY

BEXAR

SAN ANTONIO RIVER AUTHORITY

Prepared by: SAN ANTONIO RIVER AUTHORITY
ENGINEERING DEPARTMENT

DECEMBER 1, 1999

BEXAR COUNTY FLOOD ANALYSIS REPORT
DECEMBER 1, 1999

VOLUME I
TABLE OF CONTENTS

BEXAR COUNTY FLOOD ANALYSIS REPORT
DECEMBER 1, 1999

SECTION 1
EXECUTIVE SUMMARY

The flood of October 1998 devastated certain areas in Bexar County and south central Texas. As a result of this flood the San Antonio River Authority (SARA) was asked to prepare a report that analyzes the flood and presents ideas on potential flood mitigation projects that can protect the community during future floods. SARA is a political subdivision of the State of Texas created in 1937 whose jurisdiction includes Bexar, Karnes, Wilson and Goliad Counties. SARA's legislative authority includes flood control. Over the years SARA has developed many flood control projects in Bexar County and has on file a vast resource of information that was considered during the analysis. This flood analysis report also involved collection and analysis of information from many sources.

Highlights of the information collected during the study are included in Volume II of this report. This information includes past studies and investigations, discussed in detail in Section 2 of this report, and information from Bexar County, the City of San Antonio, other cities in Bexar County, and from newspapers and television stations. Information was also gathered from the United States Geological Survey, Federal Emergency Management Agency, the Natural Resources Conservation Service, National Weather Service and the Bexar Metropolitan Water District.

A general description of the October 1998 flood is included in Section 3 of this report. This section includes a meteorological summary of the event. The summary describes the meteorological conditions that created the storm and points out that even though this was an extraordinary flood event it was not necessarily unusual for South Texas. Color isohyetal maps for the 1921, 1946, and 1998 floods are included in Section 19. These maps illustrate the amount and location of rainfall for three of the biggest storms observed in Bexar County over the last one hundred years.

A Probability Frequency Analysis is presented in Section 3. The history of flooding in Bexar County and South Central Texas is again discussed. This analysis indicates that flood frequency values varied for the San Antonio River and its tributary creeks across the county and ranged from a 25-year flood to a 500-year flood.

Summaries of the performance of the Olmos Dam and the Salado, Calaveras and Martinez Dams during the October 1998 flood are included in Section 3. These detention dams all proved to be very valuable in controlling floodwater during this flood event. The Olmos Dam reached its highest recorded level and stored an estimated 11,500 acre feet of stormwater. The Salado Dams detained floodwater flow in the Salado Creek upper watershed area and stored an estimated 32,000 acre feet of stormwater. Despite this, the Wheatley Heights area along Salado Creek received massive amounts of floodwater from areas downstream of the detention dams and experienced devastating flooding. Currently under construction the Salado Dam 15R is the last dam in the Salado Creek watershed. The completion of this dam will provide additional flood control for the Salado Creek watershed. With 15R complete, the Salado Creek flood elevation during the October 1998 flood would have been reduced at Loop 410 by approximately five (5) feet.

The San Antonio Channel Improvement Project (SACIP) which was constructed by the U.S. Army Corps of Engineers performed well. It did receive erosion damage during the flood but floodwaters for the most part were contained within the banks of the river channel. An area along Martinez Creek and the Symphony Lane neighborhood along the San Antonio River did flood however.

The San Antonio River Tunnel and the San Pedro Creek Tunnel both performed admirably to divert flood flows beneath downtown San Antonio. These tunnels prevented millions of dollars in damage from occurring downtown and probably saved an unknown number of lives. Besides the tremendous reduction in flood hazards and damage, these two tunnels have dramatically improved the potential for downtown development and have proved their value as an asset to Bexar County as a whole.

In the evaluation of potential flood projects, a project priority matrix analysis was developed and is presented in Section 4. Weighted values were assigned to seven performance objectives. The performance objectives include: Hazard, Damage, Fiscal, Environmental, Legal, Development and Recreation in order of the greatest to least weighted value. The weighted evaluation values were discussed with Bexar County staff. Each potential project's objective was then rated on a scale of one to 10 to determine its individual relative rating.

The potential flood control projects are identified in Section 5 of this report. Projects are divided into two groups. Those with an identified funding source and those without. The projects with an identified funding source were not analyzed in the priority matrix analysis. These projects are indicated by green labeling on the project maps. The projects that did not have an identified funding source were analyzed in the priority matrix analysis. The analysis of the unfunded projects classified them into two categories. The categories are 1) "Projects Identified For Further Study" which are indicated by red labeling and 2) "Other Projects" which are identified by orange labeling.

After analyzing the projects in the priority matrix analysis, they were listed in order of highest to lowest ratings. Projects with a rating of 240 points or greater were identified as those which might warrant further study. Those with a rating of less than 240 points were placed in the "Other Projects" category. The projects which were identified for further study have been separated into five major watershed areas. This allows the flood control needs of the entire county to be considered on a balanced watershed to watershed basis. The total estimated cost for the "Projects Identified For Further Study" is $149,225,000. The "Other Projects" total estimated cost is $186,882,000.

The database established in this Bexar County Flood Analysis Report provides an excellent basis for further analysis and can easily adapt for future revisions or additions. The emphasis of the report was to gather as much information as possible and present the information in a format that can help define projects for future development. The projects identified in Section 5 should be studied in further detail to define immediate and apparent needs. Also, an early flood warning system for the entire county should be considered for further study.

detail to define immediate and apparent needs. Also, an early flood warning system for the entire county should be considered for further study.

SECTION 2
SUMMARY OF PAST STUDIES AND INVESTIGATIONS

Bexar County and the City of San Antonio have suffered 15 major floods since 1819. The flood of 1913 prompted the City of San Antonio to commission a flood study by the firm of Metcalf and Eddy. This study warned of the potential for additional catastrophic flood damage. The study recommended the construction of Olmos Dam and channelization of the San Antonio River through downtown. This study was completed in 1920. The Flood of 1921 proved Metcalf and Eddy correct, 51 lives were lost and $5.45 million dollars (1921 dollars) worth of damage was suffered in the City of San Antonio. Olmos Dam was completed in 1926 at a cost of $1.5 million dollars. Through the next several years, the Works Progress Administration (WPA) and the City of San Antonio worked on the recommendations of Metcalf and Eddy and spent $3.05 million dollars channelizing, straightening, enlarging and deepening the San Antonio River and its tributaries in the heart of San Antonio. The work straightened the river by constructing seven cutoff channels and effectively shortening the river by almost 9,000 feet.

The next major study of the San Antonio River was conducted by the United States Army Corps of Engineers. This study was begun in 1938 but World War II delayed its completion. The flood of 1946 cost six lives and $2.6 million dollars in damage. The preliminary Army Corps of Engineers Flood Control Examination in 1946 and the Army Corps of Engineers Survey of the San Antonio River were completed in 1950. In 1954, the Congress of the United States approved the 1946 Army Corps of Engineers report and the "San Antonio Channel Improvement Project" (SACIP) was underway. This project approved the widening, straightening and deepening of 31 miles of the San Antonio River and its tributaries within the San Antonio Metropolitan Area.

The need for soil conservation and flood control in areas outside of the San Antonio River watershed resulted in the preparation of other studies. As a result the National Resource Conservation Service (NRCS), formerly the Soil Conservation Service (SCS) studied the Salado Creek, Calaveras Creek and Martinez Creek watersheds. The NRCS built 13 Flood Retention Dams on the Salado Creek watershed with one final dam under construction at this time in McAllister Park. Six flood retention dams were built in the Martinez Creek watershed and seven flood retention structures were built in the Calaveras Creek watershed.

In 1988 Bexar County and the Texas Water Development Board commissioned a study to develop a flood protection plan for segments of Cibolo, Leon and Salado Creeks. The consulting engineering firm of CH2M-Hill was hired in 1989 to accomplish this study. The study area encompassed Cibolo Creek (25 miles long) from the Guadalupe County line to the corporate limits of Universal City, Leon Creek (3 miles long) from the Corporate limits of San Antonio to Quintana Road, Leon Creek (13 miles long) from the corporate limits of San Antonio to the end of the reach, and Salado Creek (3 miles long) from the San Antonio River to the Corporate limits of San Antonio. These creek reaches were identified in the Corps of Engineers Section 22 Study of High Flood Hazard Areas of the unincorporated areas of Bexar County dated September 1986. The study identified high life-safety hazard areas along Salado Creek, Cibolo Creek and Leon Creek. The study prioritized these project areas and laid out implementation priorities. This study recommended channelization, replacing low water crossing, widening a Southern Pacific Railroad Bridge, relocating homes and businesses out of flood plains and the installation of signs and railroad type gates at low water crossings.

In 1990, Bexar County and the San Antonio River Authority entered into an Amendatory Contract that required SARA to carry out further and additional flood control programs and projects. In preparation for the contract, SARA, the City of San Antonio and Bexar County identified thirty two (32) projects for consideration. Of these 32, several very important projects were approved for development. Two of these projects in particular, the San Antonio River Tunnel and the San Pedro Creek Tunnel, helped prevent the Flood of 1998 from flooding the downtown business district of San Antonio. The 32 project list included floodplain rectification, relocations, channelization, two flood tunnels, repairing flood gates and a Bexar County Flood Analysis.

In 1996, the City of San Antonio contracted with Pape-Dawson, Inc. to develop a Master Drainage Plan for the Leon Creek Basin and its major tributaries from U.S. Highway 90 to the north of Loop 1604. Altogether, 58.4 miles of floodplains were included in the study. The study identified 70 areas (318 structures) that would be inundated by a storm of 100-year magnitude. The study identified multiple projects such as: 46 roadway/bridge projects, four flood walls, six levees, seven buyout areas (32 properties), four channel improvement projects (removing 264 structures and two roadways from the 100-year floodplain) and a public park. This study also identified eight " Fringe Projects" (30 structures) consisting of five levees, two buyouts (12 properties) and one flood wall. The Leon Creek Master Drainage Plan also includes five regional detention facilities and four retention/recharge facilities. Several of these projects are included in a City of San Antonio bond issue and the Bexar County Infrastructure Improvements Program.

Also in 1996, the City of San Antonio contracted Rust Lichliter/Jameson to complete an Upper Olmos Creek Watershed Drainage Master Plan. Olmos Creek was studied from Loop 410 at West Avenue to its upper reaches north of Loop 1604 including approximately 11 miles of creeks. The study identified six projects for implementation including detention facilities, channel rectification, channel improvements and a bridge. Only one of these projects has been included as a City of San Antonio bond project.

The City of San Antonio, Bexar County and the San Antonio River Authority Cooperative Flood Prevention Program identified two detention projects, channel stabilization and drainage improvements along the San Antonio River in 1996. The river related projects have been identified for partial funding by a City of San Antonio bond issue. These projects will be considered for Bexar County funding on a project by project basis.

The City of San Antonio contracted Vickrey and Associates, Inc. to complete a Salado Creek Watershed Drainage Master Plan in 1996. The study includes the analysis of 55 miles of Salado Creek and its major tributaries. The study limits start at the southeast Loop 410 crossing of Salado Creek and extend upstream along Salado Creek and its tributaries to well beyond Loop 1604 on the north side of Bexar County. Included in this watershed are 13 existing NRCS/SARA flood detention dams in the Upper Salado Creek watershed. This study determined that there were 169 houses, 10 apartment buildings, 65 commercial structures, 23 recreational structures and 68 structures classified as barns or sheds within the 100-year floodplain. Identified in this study are nine proposed Mitigation Projects that are floodwater detention projects, channelization projects, re-routing of roadways to remove them from the floodplain, and a levee. There were also 12 homes and five commercial buildings proposed for acquisition. Nine bridge and culvert projects were also proposed. Numerous projects listed in this study have been funded for design and construction through various sources.

The City of San Antonio has several dozen small floodplain studies done by various engineers for developers, landowners and others. These small floodplain studies are submitted to the Federal Emergency Management Agency (FEMA) for review. Most of these studies do not require revisions to the Flood Insurance Rate Maps. These studies were not considered as part of this Flood Analysis Report.

The latest Flood Insurance study by the Federal Emergency Management Agency (FEMA) is dated in early 1996. FEMA will soon be considering revisions to its maps to include the tunnels' effect on the floodplain as well as other drainage improvements done since 1996. FEMA produces the Flood Insurance Rate Maps (FIRM) as a means for various agencies to regulate building in flood prone areas.

SECTION 3
GENERAL DESCRIPTION OF THE OCTOBER 1998 FLOOD

SECTION 3(a)
METEOROLOGICAL

General History of Flooding in South Central Texas:

Considering the widespread, devastating, record flooding of October 17, 1998, one might think that this was the biggest flood in South Texas history. There were 18 floods of record associated with the 1998 flood in the San Antonio, Guadalupe and Colorado River systems. To say this was unprecedented flooding would be to underestimate the devastating floods that occur all too regularly in south Texas and all over Texas.

Regarding property, livestock, building, and roadway damage; this flood certainly belongs in the same class as a number of storms. Numerous shorter duration storms have produced near or over 24 inches in rainfall in 12 hours including Tropical Storm Amelia on August 2, 1978, Tropical Storm Claudette on July 24, 1979, a storm at Odem on October 19, 1984, a storm at D'Hanis on May 31, 1935, a storm at Mountain Home (State Fish Hatchery) on July 2, 1932, and a storm at Thrall on June 9 through 10, 1921.

South Texas history is peppered with comparable floods as described by the following:

> A flood from June 27 through 30, 1899 produced 34 inches of rain at Hearne with over six inches of rain from northwest of Hamilton to the Gulf of Mexico. Turnersville near Gatesville measured 24 inches of rain.
>
> From December 1 through 5, 1913 a widespread area of heavy rainfall from Dallas to Liberty to Uvalde to San Saba caused the Colorado, San Barnard and Brazos Rivers to merge from below Interstate Highway 10 to the Gulf. The significance of the merging floodwater was reflected in a crest of 61.2 feet in the Brazos River at Richmond on December 10, 1913.
>
> An area from Mountain Home to Uvalde was devastated by horrendous flooding on July 2, 1932. A state fish hatchery below Mountain Home on the Johnson Creek drainage measured 35.56 inches of rain in 15 hours. This produced a crest at Hunt on the Guadalupe River of 36.6 feet.
>
> Hurricane Beulah wandered around the Texas mid and lower coastal plain on September 20 and 21, 1967, before dying over the Sierra Madre Oriental range in Northern Mexico near Monterrey. This system produced four centers over 30 inches, and 11 centers over 20 inches over the described area.
>
> Widespread flooding in 1935 produced a crest of 50 feet and flow of 481,000 cfs on the

Colorado River at Austin. This put over ten feet of water in downtown Austin businesses. Heavy rain and devastating flooding extended from El Dorado to Brady to George West to Del Rio.

The 1935 flooding was followed the next year by widespread flooding with a 30 inch center northwest of San Angelo from September 13 through 18, 1936. Heavy rain extended from Sterling City to Coleman to Ozona. The drainage produced a crest of 31.40 feet on the Colorado River at Austin.

A storm during the day on June 24, 1948 caused rainfall with centers of 24 inches above Carta Valley in Edwards County, 28 inches north of Del Rio in Val Verde County and 36 inches west of Bracketville in Kinney County. This event produced devastating flooding in local streams and down the Rio Grande River.

The 1948 flooding paled in comparison to the remnants of Hurricane Alice which produced two 35 inch centers northwest of Del Rio in the Pecos River drainage (Tom Everett Ranch) and the Devils River drainage (Vic Pierce Ranch). Flow of 1,000,050 cfs was estimated at the Pandale gage in the Pecos River and 1,140,000 cfs was measured in the Rio Grande River at Del Rio.

The remnants of Tropical Storm Amelia produced 48 inches of rain in a 52 hour pe ending 7:00 a.m. August 2, 1978 just northwest of Medina in the Rocky Creek drainage o the Medina River.

The remnants of Tropical Storm Claudette produced 42 inches of rain in 19 hours three miles northwest of Alvin beginning at noon July 24, 1979 with a storm total of 45 inches.

On May 31, 1935 a stalled upper low produced 21.83 inches in two hours and 45 minutes at D'Hanis as documented by Mr. Jarboe with the San Antonio Weather Bureau office.

On October 19, 1984 two observers in Odem, Texas measured 24.0 and 25.5 inches respectively of rain in three hours and 45 minutes. This was documented in a survey by the Corpus Christi and the Southern Region National Weather Service offices.

The above presentation is by no means a complete discussion of historical flooding. The discussion is to point out that a flood of the October 17 through 18, 1998 magnitude, although widespread and devastating, happens all too often in South Texas. This flood is by no means unprecedented over South Texas.

It is important to note that the mistakes developers put in the floodplain, Mother Nature periodically sweeps clean with heart wrenching results to mostly innocent home and business owners. If there can be a good side to this flood, it happened during the daylight hours. If the flooding in any of San Antonio, New Braunfels, Seguin, Gonzales, or Cuero had happened during the early morning hc the loss of life could have very possibly been in the hundreds.

As an example of what could have happened, the flood of September 9 and 10, 1921 put 12 feet of water through downtown San Antonio; drowned 51 persons in San Antonio; drowned 87 people near Taylor; and 93 in Williamson County. The 231 total fatalities made this the deadliest flood in Texas history. The flood was the remnants of a hurricane which made landfall south of Brownsville September 6 and produced the deadly rainfall during the late evening hours through early morning hours of September 9 and 10, 1921. The December 1913 flood resulted in 180 drownings.

Meteorology of the October 17 through 18, 1998 Flood:

Hurricanes Madeline in the Eastern Pacific near the tip of Baja and Lester in the Eastern Pacific south of Madeline near Acapulco coupled with a long wave over the Western United States (a closed low near the 4 corners area) sent very deep water vapor across Mexico through Texas into the Central/Northern Plains to the Great Lakes region. Another long wave east of the above area extending from the North Atlantic to the Yucatan Peninsula confined the water vapor plume to the above band.

A strong low level jet stream flowed from the Gulf of Mexico across the Texas mid coastal bend into Bexar County the morning of October 17, 1998. There was upper level difluence over South Central Texas. By 6:00 a.m. the area of western Bexar County extending northward to Kendall County began to experience explosive lift and rainfall. A band from near Spring Branch to near Lacoste had received four to six inches of rain and by 8:00 a.m. six to ten inches. By the late morning hours, this area would see up to 14 to 15 inches of rain.

Then, an outflow boundary pushed eastward into the prevailing low level, extremely moisture rich flow. The recording rain gauge at Wimberley showed the heavy rainfall beginning there at 8:00 a.m.. It continued to rain throughout the day and the area had received over 12 inches by 11:30 p.m.

By late morning hours, the heavy rain had extended to Hays and Travis Counties. The heavy rainfall fell in the Blanco River drainage, the Pedernales River drainage below Johnson City, and proceeded to the Onion Creek drainage above Driftwood downstream.

Comal and Guadalupe Counties received generally nine to twelve inches from late morning to early evening on October 17, 1998.

By mid day on October 18, the tropical plume and heavy rainfall shifted southeastward to the upper Texas Coastal Plain and extended into Louisiana.

Cibolo Creek Flooding:

At Selma, the gauge flooded at 22 feet with the flood stage at 17 feet. At Schertz, there was crest well above the 26 foot crest of June 22, 1997 with the flood stage at 13 feet. At 13 feet, mobile homes were floating like boats and moved downstream until they hit something permanent. There were groups of mobile homes against any permanent obstruction such as a grove of trees. Kens Trading Post located southwest of Highway 78 and Cibolo Creek is nothing but a memory. The building broke apart and floated downstream. Farther upstream in the floodplain another community of mobile homes, permanent homes, and RV's were completely destroyed and moved downstream until they encountered an obstruction. Many homes above the city park and upstream of the Highway 78 bridge flooded again as they did in June 1997. The railroad bridge trestle had water just to the tracks. Flow did not go over the top shoulders beside the tracks but got just to the shoulders a foot below the top of the bridge.

Downstream near La Vernia, sheet flow surged over the floodplain in an area well over a mile wide and up to six feet deep. Many homes flooded in this area. One lady was rescued by helicopter and fell from the basket from treetop level. She fell back into the water and was severely injured with reported damage to her spine. La Vernia volunteer firemen performed rescues in fire trucks where they could and commandeered a couple of high powered boats. The boats were destroyed in the rescue attempts. The Diamond Shamrock service station, a day care center, and a hardware store in La Vernia were flooded. A fire truck stalled in La Vernia near the Diamond Shamrock station for hours. The firemen themselves were rescued.

Downstream below Sutherland Springs, Highway 87 was flooded with several feet of water for miles. Debris dams in the trees beside the highway were testimony to remnants of houses, boats, cars items that flowed across the road.

At Falls City the creek crested at 39.9 feet with the flood stage at 20 feet. There was very heavy loss of livestock.

Salado Creek Flooding:

The upper USGS gaging station at NE Loop 410 flooded rising through 21.1 feet with the flood stage at 12 feet. Flow was over the railings of Loop 410 at Salado Creek. A prominent restaurant upstream in the Los Patios Shopping Center had four feet of water in it. It had never flooded before. All the businesses in the very nice shopping center had several feet of water in them. One business, that had never previously flooded, floated a few inches downstream and crumpled the edge of the roof in some trees. A greenhouse that had flooded a few times before was completely destroyed.

The KOA campground downstream near Gembler Road flooded horribly. RV trailers and permanent log cabins were scattered about over most of the campground. The administration office had five feet of water in it and flow was well over Gembler Road. Many homes in the floodplain were flooded severely. Numerous homes flooded in any given section of the length and breadth of the Salado Creek floodplain from below NE Loop 410 to the San Antonio River confluence. The SE Loop 13 gage flooded rising above 32.0 feet with the flood stage at 18 feet. The Wheatley Heights area near Southcross Boulevard and Pecan Valley Drive was devastated with many houses destroyed or severely damaged.

Olmos Creek Flooding:

At Dresden Drive, numerous homes flooded above Loop 410 near Lockhill Selma Street. There were auto fatalities in this area as often accompany floods of this magnitude. The McAllister Freeway flooded above Olmos Dam. The bottom of the pool is at elevation 680. The freeway begins flooding at elevation 713 and water goes through the Olmos Dam emergency spillway at elevation 728. The freeway had about eleven feet of water over it and was flooded for several days.

San Antonio River Flooding:

Olmos Creek becomes the San Antonio River just below Olmos Dam where it merges with spring flow. Two new flood tunnels on the San Antonio River and San Pedro Creek saved downtown San Antonio and homes and businesses below Brackenridge Golf Course to the old Lone Star Brewery from very serious flooding. At Loop 410 in southern San Antonio, the river crested at 36.2 feet with the flood stage at 20 feet. Several homes just below Loop 410 along the east bank had near 10 feet of water over the slabs. Flooding also occurred in several homes in the Symphony Lane neighborhood.

At Elmendorf, the river crested at 64.6 feet with the flood stage at 35 feet. Flow escaped the deep canyon of the channel and flowed over the very flat floodplain; severely flooding a house on the bank. A few houses flooded at Floresville but residential flooding was not nearly as severe as in other areas.

Near Falls City the gage flooded early in the event and five homes flooded in the southwest section of Falls City.

The San Antonio gage at Highway 281 crested at 49.5 feet with the flood stage at 16 feet. The new Dos Rios wastewater treatment plant had floodwater near the plant site.

Medina River Flooding:

There was moderate lowland flooding along the Medina River above Lacoste to above the San Antonio rain gage at Highway 281.

1998 OCTOBER FLOOD IN CENTRAL TEXAS
GENERAL INFORMATION

STATION NAME	TIME	DATE	GAUGE HEIGHT (FT)	ESTIMATED PEAK DISCHARGE (cfs)	SIGNIFICANCE OF PEAK
SAN ANTONIO RIVER					
Alamo Street	10:15 am 3:45 pm ? 4:00 am	10-17-98 10-17-98 ? 10-18-98	10.81 12.44 16.03 10.72	1,916 3,011 6,100 1,857	Max discharge 15,300 cfs 9-10-21
Mitchell Street	10:15 am 4:00 pm 3:45 am	10-17-98 10-17-98 10-18-98	11.08 13.34 2.40	8,700 12,100	Flows estimated
Loop 410 South	2:00 pm 4:00 pm 4:15 pm 5:45 pm 4:30 am	10-17-98 10-17-98 10-17-98 10-17-98 10-18-98	29 36 36+ 36+ 31	46,352 63,522 65,000+ 65,000+ 53,539	7 feet higher than previous highest peak
Elmendorf, Texas	1:30 am 12:15 am 4:15 pm	10-18-98 10-19-98 10-19-98	54.85 64.20 54.91	40,723 75,000 40,894	2 times the previous largest discharge
Falls City, Texas	12:30 pm 2.45 pm 4:15 am	10-19-98 10-20-98 10-22-98	20.61 33 21.00	23,841 70,000 25,000	1.5 times the previous largest discharge
Goliad, Texas	2:30 pm 2:00 pm 10:45 pm	10-21-98 10-22-98 10-23-98	48.58 52.87 48.98	51,360 55,000 53,872	Second highest peak
SALADO CREEK					
Wilderness Trail	8:00 am 1:15 am	10-17-98 10-18-98	12.75 13.55	? ?	
Loop 410 North (Upper Station)	2:30 pm 3:45 pm	10-17-98 10-17-98	15.73 22.40	26,774 66,000	2.4 times the previous largest discharge
Loop 13 (Lower Station)	7:45 pm 9:15 pm 10:45 am	10-17-98 10-17-98 10-19-98	28.78 32.01 15.00	13,011 ? ? 2,166	At least 2 times the previous largest discharge

STATION NAME	TIME	DATE	GAUGE HEIGHT (FT)	ESTIMATED PEAK DISCHARGE (cfs)	SIGNIFICANCE OF PEAK
Leon Creek at IH 35	4:00 pm 5:00 pm 8:45 am	10-17-98 10-17-98 10-18-98	25.27 26.04 28.52	30,098 ? ? 26,000	6 feet higher than the previous highest peak
Medina River at San Antonio	5:00 am 5:30 pm	10-18-98 10-18-98	37.98 49.45	29,955 30,000 ?	3rd highest peak
Cibolo Creek Near Falls City	11:45 pm 7:00 am 3:30 am	10-18-98 10-19-98 10-20-98	35.38 39.87 35.43	33,304 ? 33,444	Greater than 100-year peak discharge

Information and data based on U.S.G.S. Data.

SECTION 3(b)
PROBABILITY FREQUENCY ANALYSIS

The October 17 through 18, 1998 flood was just one of a number of significant floods that have occurred in the Bexar County community over the years. It is the consideration of past flood events through statistical analysis that forms the basis for probability frequency analysis. It is through such an analysis that the "100-year flood" runoff rate can be established. Although the 100-year flood is statistically predicted to occur only once in a 100-year period, that does not mean that it won't occur or even be exceeded a number of times over an extended period of time. In theory the 100-year flood has a 1% chance of occurrence in any one year.

To understand the significance of the October 1998 flood a review of past floods along the San Antonio River is necessary. As Bexar County has developed along the San Antonio River, flooding has periodically devastated the community. Flooding of the river was a recognized hazard as early as the flood in 1724 which resulted in the relocation of Mission San Antonio de Valero (the Alamo Mission) to a safer site. Old Spanish records indicate that the flood of 1819 was another particularly destructive flood. Following a cloud burst on Olmos Creek, records indicate that the 1819 flood flow estimated at 30,000 cubic feet per second (cfs) destroyed many homes along the San Antonio River. In March 1865, a somewhat smaller flood event that was estimated at 7,000 cfs also caused destruction in the downtown area. Floods in 1880 and 1899 again approached flood flow of approximately 7,000 cfs. There were two floods in 1913, one of which approached a flow of [illegible] cfs. In 1921, 51 lives were lost and approximately $5.45 million in damages resulted from a major flood of 15,000 cfs during a cloud burst over Olmos Creek. Another significant flood estimated at 6,000 cfs occurred in 1946. This flood paralyzed the downtown business section of the city. The flood of October 1998 produced an estimated flood flow of 13,500 cfs at the Mitchell Street United States Geological Service (USGS) Gage.

The south central area of Texas is very susceptible to extreme rainfall amounts. Climate and physiography are the controlling factors that increase the potential for the extreme precipitation. The Balcones Escarpment (the Hill Country) separates the limestone terrain of the Edwards Plateau from the gently sloping terrain of the Coastal Plains. Because the topography changes abruptly, this region is ideal for lift-convective thunderstorms. Moisture-laden air masses along the established tropical gulf upper atmosphere jet stream have produced some astonishing amounts of rainfall. In D'Hanis, some 30 miles west of San Antonio, 22 inches of rain fell in 2 hours and 45 minutes in May 1935. East of Austin in Thrall 32 inches of rain fell in 12 hours on September 9, 1921.

During the storm of October 1998 rainfall amounts varied from 10 inches as a base throughout the community and reached levels of 19 inches in certain areas of Bexar County (see Section 19 - Rainfall Isohyetal Maps). By definition, a 10-inch rain over a 24 hour period qualifies as a 100-year event, but a rainfall of 19-inches is a record setting occurrence and tends toward a 500-year flood.

Data from the USGS regarding flood volumes and flow rates at various locations in the area cl[illegible] indicates that the 1998 storm set a new record in the Salado Creek watershed. The rainfall amc[illegible] produced flows that far exceeded any previously recorded flood flow since 1961. In fact, the stormwater discharge in Salado Creek was 2.4 times greater than the previous highest discharge in history, according to the data recorded at the USGS gaging station upstream of Austin Highway. The data indicates that floodwater flow measured 66,000 cfs in Salado Creek during the peak period of the storm. The Salado Creek watershed study adopted by the City of San Antonio in 1997 predicted a 100-year flood flow of 57,946 cfs and a 500-year discharge rate of 73,634 cfs. Based upon the gaging station information and the watershed study predictions, this storm exceeded the 100-year flood estimate flow rates.

The flood flow in Olmos Creek resulted in the "third highest peak" in history. Even though the creek flows were slightly less than the 1991 and 1993 storms, the water levels indicated a 100-year flood. The water level in Olmos Dam reached its highest reading over the period of record which began in 1927 when the dam was completed. At an elevation of 723.61, the flood was just 4.39 feet from the top of the dam and 2.52 feet lower than the predicted 100-year flood elevation.

In analyzing the flood of 1998 it is interesting to note how the rain fell during the duration of the storm. National Weather Service gaging information just to the east of the San Antonio International Airport indicated that it began raining before 7:00 a.m. on the morning of October 17, 1998. A total of 3.1 inches of rain had accumulated by 10:30 a.m. Another intense period of rainfall occurred from 1:00 p.m. to 4:00 p.m. during which time 7.0 inches of rain fell. A third period of rainfall fell between 12:15 a.m. and 5:15 a.m. during the early morning hours of October 18, 1998. Approximately 4.7 inches of rain fell during this period. This produced three peaks in river flow at the USGS gaging station at South Loop 410. At 2:00 p.m. on October 18, 1998, a flow rate of 46,352 cfs was observed. Later in the afternoon at 4:15 p.m. over 60,000 cfs was observed. Early in the morning at 4:30 a.m. on October 18, 1998, a flow rate of 53,539 cfs was observed. In the main channel of the San Antonio River it is estimated that a 40-year event passed with the first surge followed by a 60-year event associated the second surge. The last surge approached a 50-year event in flow amount.

The engineering firm of Pape-Dawson, Inc. did an extensive analysis of the Leon Creek watershed for the storm of October 17 through 18, 1998. The study concentrated on the frequency analysis of the storm event. The most consistent frequency analysis was obtained by using the total storm pattern actual accumulation. This produced a return frequency value of approximately 33-years on the Upper Leon Creek and a value of 296-years at Highway 90 West. The study also indicated that Huebner Creek had a return frequency value of 160-years for the total storm pattern. The flood stage in Leon Creek was six (6) feet higher than the previously recorded high water mark. This mark also exceeded a 100-year flood level in sections of the Leon Creek south of Kelly Air Force Base.

In examining the 1998 storm it is interesting to note that return frequency estimations vary from area to area. Actual amounts of rainfall and how the rainfall occurred over time are key factors in the analysis. The condition of the river or creek channel is another important factor. The Flood of 1998 produced flows in excess of a 40-year event over multiple surges along the San Antonio River and flows estimated near a 500-year event along Salado Creek. In the western portion of Bexar County the flood was less significant and may have been on the order of a 25-year event because of reduced rainfall amounts spread out over a 24-hour period of time. In southern and eastern Bexar County the flood was devastating along Salado and Cibolo Creeks.

SECTION 3(c)
OLMOS DAM PERFORMANCE

As San Antonio has developed along the San Antonio River, flooding has periodically devastated the community. The flood of 1913 was particularly devastating and the City of San Antonio pressed for a solution to the flooding problem. In 1920, the firm of Metcalf and Eddy published a comprehensive engineering study titled "Report to City of San Antonio, Texas Upon Flood Prevention". The report was 346 pages, and included a detailed description of the flood problem and a comprehensive discussion on engineering analysis and solutions. It also firmly established alternatives for flood control.

The Metcalf and Eddy report included a number of interesting solutions, one of which was the consideration of a floodwater detention reservoir on Olmos Creek. The report describes detention as not being a "new principle", but having been applied at least as early as the year 1711 when the Pina and LaRoche Dams in France were built on the Loire River. The concept however was new to Texas and with the completion of Olmos Dam in 1927, it became the first of its kind of such magnitude in the state.

Olmos Dam, as part of the river flood control system, was built in 1925 to 1927 at a cost of $1.5 million. The 1,941 foot long concrete structure was founded on a limestone formation with a height of 54 feet and includes six sluice gates to control flood water releases. The structure was first put to the test in 1946 and greatly reduced the flood impact to downtown San Antonio. Because the original dam had a roadway crossing its top and studies indicated that there was the likelihood of overtopping in an extreme event which could lead to failure, it was reconstructed in the late 1970s. The roadway was relocated and Olmos Dam now has a 1,152 foot "ogee" spillway section. The reconstruction of Olmos Dam cost approximately $10 million.

Olmos Dam was again put to the test in October 1998. During a 24 hour period of time on October 17 and 18, 1998; eleven to sixteen inches of rainfall fell in the Upper Olmos Creek watershed. The rainfall runoff from the event filled the dam to a depth of 45.27 feet and was within 4.39 feet from actually overtopping the structure. It is estimated that 11,500 acre feet of floodwater was stored in the floodwater detention reservoir upstream of the structure. Approximately 75% of the structures floodwater storage capacity was utilized during the flood.

The October 1998 event was the flood of record for Olmos Dam. In its 71 year history never had a storm produced more stormwater runoff. The 1946 flood event resulted in a floodwater depth of 38.04 feet at the dam. The 1998 flood exceeded that depth by 7.23 feet. In reviewing the engineering computations done to support the modifications to Olmos Dam, the October 1998 flood came within 2.52 feet of the elevation predicted for the 100-year flood. These computations assumed all gates closed with no releases from the structure. During the 1998 flood gates were open and floodwaters were safely passed downstream.

Olmos Dam performed wonderfully. At the height of the flood it was structurally sound while effectively storing floodwaters and safely passing those floodwaters downstream. Some questions arose regarding the rate of release of floodwater from the structure. There was a concern regarding downstream flooding being aggravated by releases from stored floodwater. There was even a proposition that the floodwater releases from Olmos Dam were aggravating flooding along Salado Creek.

Olmos Dam stored an estimated 11,500 acre feet of stormwater during the October 1998 flood. Without the dam this amount of floodwater would have quickly passed downstream and would have caused higher floodwater elevations in all areas along the river to the south. It was the storage of floodwater and controlled release of flow, at rates less than what would have been produced by the flood without the dam, that helped protect downtown and areas along the river to Loop 410 and further south from flooding. Storage of floodwater did cause problems upstream of the dam however. Floodwater backed up behind Olmos Dam and onto Highway 281 during the flood and shut down the highway for a period time.

Floodwaters released from Olmos Dam were confined to and flowed down the San Antonio River. Because of the difference in the ground surface elevations between the San Antonio River and Salado Creek watershed divide, floodwater released from Olmos Dam did not flow to Salado Creek. It is physically impossible for floodwater releases from Olmos Dam to enter Salado Creek. Olmos Dam in no way contributed to, or aggravated the flooding situation on Salado Creek.

SECTION 3(d)
TUNNELS PERFORMANCE

Downtown San Antonio is protected by two flood control tunnels; the San Pedro Creek Tunnel (SPCT) which was finished in 1993 and the San Antonio River Tunnel (SART) finished in 1998. The tunnels are part of the San Antonio Channel Improvement Project authorized by United States Congress in 1954. The U.S. Army Corps of Engineers is the project federal sponsor and the San Antonio River Authority is the local sponsor. Local funding comes from Bexar County and completed facilities are operated by the City of San Antonio.

The SART is a massive flood control tunnel designed to protect downtown San Antonio from flooding that originates upstream of Josephine Street. This is accomplished by diverting a major portion of a storm event into the inlet facilities located at Josephine Street and the San Antonio River. Flood waters travel in a 24-foot diameter tunnel beneath downtown San Antonio and are released safely into the river from the tunnel outlet located at Lone Star Boulevard.

The SART has mechanical equipment at the outlet site to dewater the tunnel for inspection and maintenance activities. A tunnel recirculation system is included to recirculate tunnel waters continually in order to prevent water quality degradation in the tunnel and in the San Antonio River in the downtown area. To further enhance water quality, water features at the inlet and outlet sites are included to provide additional aeration to the recirculated water.

Both tunnels were put to the test during the October 17 through 18, 1998 flood. The watersheds upstream of the tunnel inlet structures received from 14 to 16 inches of rain over a 24 hour period of time. During the flood event, floodwaters were contained within the channels of San Pedro Creek and the San Antonio River in the immediate downtown area. During the 1998 flood downtown was protected by the combined effects of the floodwater reduction capabilities of Olmos Dam and the SPCT and SART. In contrast, the 1921 flood devastated downtown San Antonio.

In addition to protecting the downtown area from flooding the SART also prevented flooding along the river from the Interstate Highway 35 area to Lexington Avenue north of downtown. The King William Neighborhood area from Nueva Street to South Alamo Street was also protected by the SART. South of Downtown, in the area from South Alamo Street to Lone Star Boulevard, floodwaters were confined to the river channel. There were two areas that did experience flooding near the tunnel inlet. In the immediate vicinity of Josephine Street there was localized flooding. Flooding also occurred adjacent to the river from Josephine Street south to Interstate Highway 35 at Newell Street.

The actual flow rate through the tunnel was estimated by analyzing United States Geological Survey (USGS) flood flow information for the Alamo Street and Mitchell Street gages. The USGS indicated that the estimated flow at the Mitchell Street gage was 13,500 cubic feet per second (cfs) at a floodwater depth of 12.43 feet. The flow at the Alamo Street gage was estimated to be 6,610 cfs at a 16.50 foot depth. Because the Alamo Street gage is upstream of the outlet and the Mitchell Street gage is located downstream, an estimate of the tunnel flow was established by taking the difference between the two flows. Considering a flow rate of 490 cfs from an interceding drainage area, the flow rate in the SART was estimated to be 6,400 cfs during the flood. Using the high water mark at the tunnel inlet, the tunnel could have accepted 7,000 cfs. Therefore, it is estimated that the tunnel was about 90% efficient in conveying floodwater.

Because of the severity of the flood the SART did experience structural damage and operational problems during the flood. The trash racks at the tunnel inlet were overwhelmed by the size, character and amount of trash that washed to them during the flood. Logs, boards and tree limbs lodged in the drive mechanisms for the trash racks rendering most of them inoperable. But despite this problem, the SART was still estimated at being 90% efficient. Baffel walls at the throat of the inlet structure were also damaged. Erosion on the west bank of the river just north of Josephine Street was evident. At the inlet the recirculation pump vault flooded out. The only damage experienced at the SART outlet was to the tunnel dewatering pump. The damage experienced is considered minor when compared to the benefits derived by the flood protection the tunnel provided.

With the floodwater diversion into the SPCT, the area along San Pedro Creek from just south of Interstate Highway 35 was protected from flooding all the way to the tunnel outlet at Guadalupe Street. There was localized neighborhood flooding north of the tunnel inlet. There was also evidence that the mechanical trash rack system was overwhelmed by the amount and type of debris that washed to the inlet during the flood.

SECTION 3(e)
SAN ANTONIO CHANNEL IMPROVEMENT PROJECT PERFORMANCE

In September of 1946, San Antonio experienced a severe flood. As a result of the flood the U.S. Army Corps of Engineers (COE) resumed their comprehensive study of the flood problems in Bexar County originally authorized by United States Congress under the Rivers and Harbors Act of 1938. The preliminary flood control examination was completed in 1946 and the survey of the river completed in 1950. The entire study went before Congress in 1954 for consideration and approval. The COE study, titled the "San Antonio Channel Improvement Project" (SACIP) was approved by Congress in September 1954. The project called for deepening, widening and straightening 31 miles of the San Antonio River and its tributaries within the San Antonio metropolitan area.

Government funding for COE projects requires a local agency or group to act as the local sponsor. The sponsor's responsibilities includes partial funding and obtaining all necessary rights-of-way, relocation of all utilities, construction of required bridges, in-channel dams and other project features. The San Antonio River authority is the project local sponsor. Funding for the project comes from the Bexar County flood control tax and the City of San Antonio is responsible for the long term operation and maintenance for most areas of the project.

The flood of October 1998 tested the SACIP's ability to successfully convey floodwater. The SACIP provides flood protection for the San Antonio River, San Pedro Creek, Martinez Creek, Alazan Creek and Apache Creek. The SACIP project limits along the San Antonio River runs from Hildebrand Avenue to downstream of South Loop 410 on the south side of San Antonio.

The most northern reach of the project along the San Antonio River from Hildebrand Avenue to the tunnel inlet site at McAllister Freeway has not been completed. This final reach has been studied by the COE, but more study is needed. The COE proposal is to construct an open trapezoidal channel that ties to the river near the Tree House exhibit at the Witte Museum and then runs just west of Avenue B where it ties into the Catalpa Pershing Drainage Project. Once the COE study is complete it will be reviewed locally. The project will be modified to meet the community's needs based on public participation and involvement. During the October 1998 flood, this reach of the SACIP saw damage to the San Antonio Zoo, Witte Museum and the River Road neighborhood. The river in Brackenridge Park experienced erosion problems. Without Olmos Dam this area would have been devastated by the flood.

The reach of river from Josephine Street to Lone Star Boulevard is protected by the San Antonio River Tunnel. During the October 1998 flood localized flooding was experienced along the river from the tunnel inlet at Josephine Street south to Newell Street near Interstate Highway 35. The flood was of such magnitude that the amount of floodwater that flowed past the tunnel inlet was in excess of the amount predicted during design. This, combined with floodwater coming down streets and flowing into the river from local drainage systems, caused flooding. Despite the localized flooding, if it were not for the floodwater storage capability of Olmos Dam and the tunnel's ability to direct floodwater beneath downtown, this reach of the river would have received floodwater far beyond that experienced.

Floodwaters were confined within the banks of the river from the Newell Street and the Interstate Highway 35 area through Lexington Avenue. Businesses and residents were protected from flooding. Visual inspection of the river after the flood revealed areas of significant erosion. Near the Rex Apartments along the west bank of the river erosion problems were observed. South of Brooklyn Avenue the lower banks of the river showed significant signs of erosion. The foundation of the Hopps House at the Museum of Art showed signs of erosion. The foundation of the Five Points Sheraton Hotel, just north of Lexington Avenue, also experienced problems caused by floodwater erosion.

The channel along the River Walk from Lexington Avenue to Houston Street also experienced problems during the flood of 1998. The unstable condition of the lower channel walls was worsened by erosive floodwater. There were lower wall failures just north of Lexington Avenue on the east bank, just south of Lexington Avenue on the west bank and a wall and sidewalk section failed just south of Pecan Street on the east bank of the river. The cracks and structural problems in the upper walls appeared to have been aggravated by the flood. Although the businesses and residents residing near the river were protected during the flood, problems could have resulted if there would have been any major channel failure during the event. The river was flowing at bank full. With any failure that hampers the river's ability to convey floodwater comes additional risk to the development residing adjacent to the river.

The highly developed River Loop area downtown was protected from the flood. It was a combination of a number of flood control features that protected this area from flooding. First, the "Great Bend Cutoff" that was constructed in 1929 isolated this area from the main river channel. Second, floodwaters were detained by Olmos Dam which offered additional protection. Third, the San Antonio River Tunnel directed floodwater beneath the city offering additional protection. All of these features allowed the City of San Antonio Parks Department to operate the flood isolation gates known as Gate 3 and Gate 4 in a manner to prevent flooding in the River Loop area.

The area of the SACIP experiencing the least problem during the flood was from Houston Street through Alamo Street and on to the tunnel outlet at Lone Star Boulevard. The flood control channelization done by the COE from Nueva Street to Lone Star Boulevard along with the flood protection offered by the tunnel protected this area during the flood. Residences and businesses along this reach of the river were protected from the flood. Some erosion damage was noted in the river channel. An especially bad area of erosion was observed along the east bank of the river just south of Alamo Street.

Floodwaters were confined to the flood control channel of the river from Lone Star Boulevard to the river's confluence with San Pedro Creek. Again, business and residents were protected by the flood control features of the SACIP. The river flowed at bank full during the flood and some erosion damage was noted in the channel.

South of the confluence with San Pedro Creek, the amount of floodwater flow in the river significantly increased. This was caused by the fact that the amount of area draining from San Pedro Creek is about three times larger than the area draining from the river. For the most part, the reach of river from San pedro Creek south to South Loop 410 saw floodwaters contained within the flood control channel. A major exception was witnessed in the Symphony Lane Neighborhood. This low lying area adjacent to an old bend in the river did experience flooding and several houses flooded. Throughout this reach there were areas of extensive erosion damage in the flood control channel. Bank erosion was observed downstream of Ashley Road and upstream of San Juan Dam. Erosion at the rock riprap apron for the Six Mile Creek drop structure was also observed. These areas are proposed for emergency repairs by the COE. Damage was also observed in the tri-lock block erosion protection system in the channel at the San Juan Dam Lift Station.

The area of river from South Loop 410 to the beginning of the SACIP is in an area of transition from the flood control channel to the natural river section. During the flood the river was out of its banks and flooding along Villamain Road was experienced. Two residents along the east bank of the river flooded. There was extensive erosion in the lower river channel which is proposed for emergency repairs by the COE. Sidewalks and other features of the Mission Trails Project installed in the river channel were also damaged during the flood.

The SACIP includes flood control improvements to San Pedro Creek from Myrtle Street near San Pedro Park to its confluence with the San Antonio River. The San Pedro Creek Tunnel is part of this project. From Ashby Street to Myrtle Street and past San Pedro Park to the Five Points area box culverts in Flores Street offered flood protection. In this area that has historically flooded, the flood control project protected the neighborhood and adjacent businesses. The area from Five Points to Poplar Street was also protected from flooding.

The creek enters box culverts constructed by the Texas Department of Transportation at Poplar Street. Culverts extend to the San Pedro Creek Tunnel Inlet at Quincy Street. The magnitude of the October flood did cause neighborhood flooding in this reach of the creek. Just north of the tunnel inlet the Finesilver Art Complex did receive flood damage.

From the San Pedro Creek Tunnel Inlet at Quincy Street to the outlet at Guadalupe Street the tunnel protected the area from flooding. Floodwaters were diverted into the tunnel and traveled beneath this section of downtown. Areas that have historically flooded were protected. The 1946 flood was particularly devastating to this area of the city.

From the tunnel outlet to San Pedro Creek's confluence with the San Antonio River the SACIP again performed well. Residents and businesses were protected from flooding. Areas of erosion were observed in the channel bottom.

The SACIP includes improvements to Martinez Creek from Wildwood Drive, Sherwood Lane and Hildebrand Avenue to the north through the creek's confluence with Alazan Creek. For the most part, the SACIP offered protection during the flood event. However, numerous residents along

Martinez Creek from Huisache Street to Perez Street did experience substantial flooding during the October 1998 flood. Additional flood control improvements are being investigated by the City of San Antonio and the city is also considering a floodplain buyout program to remove residents from the floodplain. Flooding in this area is aggravated by the fact that the SACIP design was based on flood flows of the 1946 flood of record which are lower than the 100-year flood.

From Woodlawn Lake through the confluence with San Pedro Creek the SACIP includes flood control improvements to Alazan Creek. During the 1998 flood this area was offered significant protection by the project.

The SACIP also covers Apache Creek from N. General McMullen Drive through Elmendorf Lake and to the confluence with San Pedro Creek. This area also witnessed significant flood protection by the SACIP during the flood. The new labyrinth weir dam built at 19th Street safely passed floodwaters during the flood.

SECTION 3(f)
SALADO, CALAVERAS AND MARTINEZ CREEKS
FLOODWATER DETENTION DAMS PERFORMANCE

General Project History and Character of Watersheds:

The Salado Creek, Martinez Creek and Calaveras Creek watersheds are located in the northern and eastern portions of Bexar County. Over the years there has been the need for soil conservation and flood control in these watersheds. As a result the Natural Resources Conservation Service (NRCS), formerly known as the Soil Conservation Service (SCS), has studied these watersheds in detail. Under the authority of Public Law 83-566 the NRCS has built 13 flood detention dams on the Salado Creek watershed, with one final dam under construction in McAllister Park. Six flood detention dams were built in the Martinez Creek watershed and seven detention structures were built in the Calaveras Creek watershed.

The drainage areas of these watersheds are in mostly rural settings. However, as the area grows the watersheds are becoming urbanized. In areas that have yet to be developed, the drainage area of Salado Creek is predominately rangeland while Martinez and Calaveras Creeks are cropland. Although all of the watersheds provide flood protection for agricultural lands, Salado Creek primarily provides flood protection for developed urban areas.

The Martinez and Calaveras Creek watersheds are predominately located in the Blackland Prairie with clay soils. These soils are moderately to slowly permeable. The upper two-thirds of the Salado Creek watershed is located in the Edwards Plateau with rocky, limestone soils. The lower reaches of the watershed are located in the Blackland Prairie.

Flood Event of October 1998:

During the spring of 1998, this area of Bexar County was experiencing a period of below average rainfall. Some areas had received rainfall in late summer and early fall but soil conditions were generally dry when the October 17 through 18, 1998 storm began. Most grain crops had been harvested. Farmers had planted or were planting winter small grains. Pastures were in good to fair condition. All of the flood control detention dams were well maintained with all structures in good condition.

An isohyetal map of the October 1998 storm was developed by the National Weather Service (see Section 19 - Rainfall Isohyetal Maps). This map was based on official and unofficial rain gages and bucket surveys. The isohyetal lines on the map represent the best estimates of rainfall totals. Some differences in actual rainfall may exist because rainfall amounts may have been very heavy over small areas due to isolated squall lines. The storm was not a generalized homogenous system that moved evenly across the area.

The storm was centered in the New Braunfels and San Marcos areas with these areas receiving the greatest rainfall. Rainfall in these areas totaled from 18 to 31 inches with rain falling at a rate of two to three inches per hour for prolonged periods. The amount of rain was the greatest total rainfall recorded in this area since record keeping began in 1885.

Floodwater Detention Structures Performance:

Floodwater detention structures detain floodwater for a period of time and release it at a slower rate thus reducing downstream flooding. During the October 1998 storm, the floodwater detention structures functioned as designed and the emergency spillways protected the dams against overtopping and sudden breach type failures. All of the floodwater detention structures studied in detail reduced the peak inflow rate by 50% or more.

During the flood of October 1998, 15 of the 26 Salado, Martinez and Calaveras floodwater detention structures experienced emergency spillway flows with pool levels at two structures exceeding three feet above the spillway crest. Erosion occurred in three of the 15 spillways that flowed.

Where spillway erosion occurred it did not impair the integrity of the dam or floodwater detention function; and the structures could withstand another similar storm without loss of integrity or function. The depth of flow over the emergency spillway along with the floodwater storage capacity at the spillway crest elevation were established for the floodwater detention structures.

In the Salado Creek watershed, erosion occurred in the rock spillways of Sites 5, 8 and 9. The largest eroded volumes occurred at Site 5, then Site 9, followed by Site 8. At Site 5, erosion pockets (maximum depth of six feet) occurred in the softer limestone rock of the spillway exit. Most of the erosion at Site 8 occurred downstream of a street crossing the spillway perpendicular to the flow. This street discontinuity probably increased erosion downstream, but may have acted as a barrier to lessen upstream erosion.

Thirteen floodwater detention structures in the Salado Creek watershed provide flood protection for areas downstream. An additional structure, Site 15 Revised, is under construction and will complete the watershed project. These structures are all located in the upper reaches of the watershed, upstream of the Loop 410 bridge on Salado Creek. The thirteen completed structures control approximately forty percent of the Salado Creek drainage area. Nearly all of the area controlled is undeveloped or open space. The remainder of the drainage area downstream protected by the project is urban and developed.

Two of the largest previous recorded storms in the upper Salado Creek watershed occurred in the 1990's. The Salado Creek storm flows for these events were recorded by a USGS stream gage at the Loop 410 bridge. The estimated flow for the April 4 through 5, 1991 storm at this location was 16,000 cfs at a gage depth of 12.5 feet. The largest storm flow recorded previously in the watershed occurred on May 5 through 6, 1993. The estimated flow for this storm was 29,000 cfs at a gage depth of 17 feet. The October 17 through 18, 1998 storm was a more intense storm. Isolated areas in the upper reaches of the watershed recorded greater than 20 inches of rainfall.

This storm produced greater flows at the Loop 410 gage than previously recorded. The gage malfunctioned when it became submerged but manual field measurements were made. The gage was later brought back online to record the remaining storm flows. The peak flow at this location was estimated to be 66,000 cfs at a gage depth of 22.4 feet (approximately 707 feet msl).

An existing TR20 model was used by the NRCS to simulate the discharges and water surface elevations of this storm. High water elevations were surveyed at each of the Salado Creek sites. The stream gage at the Loop 410 bridge was also used as a reference. Antecedent Moisture Condition II was assumed to set the runoff curve numbers of the watershed. Two situations were modeled. The first used the storm rainfall. This model simulated a discharge of 42,251 cfs at the Loop 410 bridge. Although this discharge is lower than the USGS estimated peak flow at this location, many of the calculated water surface elevations are near the observed elevations.

To determine the benefits of the floodwater detention structures, the NRCS used a second model. This model simulated the storm discharges and water surface elevations with no floodwater detention structures installed and current conditions with the actual storm rainfall on the watershed. This model indicated that the water surface elevation at the Loop 410 bridge may have been five feet higher if the floodwater detention structures had not been installed. Property damage would have been millions of dollars greater and the potential for loss of life would have increased.

Many conditions can influence these models including rating tables, cross section locations, runoff curve numbers, etc. Also, the rainfall was more intense in the eastern part of the watershed near Beitel Creek, which is uncontrolled. An unnamed tributary that flows from the Longhorn Quarry at Shorts Corner flows into Salado Creek immediately upstream of the Loop 410 bridge. Beitel Creek flows into Salado Creek immediately downstream of the Loop 410 bridge. This confluence of multiple streams could have influenced the peak flow aggravating flooding downstream.

October 1998 Flood

Information on flow through SARA operated SCS dams

Creek	Site	Emergency Spillway Discharge	Depth of Flow Over Spillway	Floodwater Storage Capacity at Spillway Crest Elevation (Ac Feet)
Salado	1	no	-6.03'	4,189
	2	no	-4.75'	2,293
	4	yes	1.58'	1,982
	5	yes	2.16'	3,293
	6	yes	3.52'	1,490
	7	no	0.00'	2,340
	8	yes	4.01'	4,178
	9	yes	4.13'	1,026
	10	no	-3.33'	1,846
	11	no	-0.85'	2,596
	12	yes	0.53'	4,875
	13a	no	-0.78'	1,441
	13b	no	-5.49'	1,093
	15	not built		
			Total	32,642
Martinez	1	yes	+2'	2,295
	2	yes	+2'	718
	3	yes	+3'	1,059
	4	yes	+2'	853
	5	yes	+2'	1,030
	6a	yes	+2.64'	2,970
			Total	6,807
Calaveras	3	no	-2'	2,542
	5	no	-1'	633.6
	6	yes	+1'	3,820
	7	yes	+1'	1,309.5
	8	yes	+2'	1,187.3
	9	no	-3'	538.4
	10	no	-1.36'	2,126.2
			Total	12,157

Note: (-) indicates water level below spillway

SECTION 3(g)
PROBLEM AREAS

Medina River Watershed:

The Medina River watershed in Bexar County is sparsely populated and rural. There are many low water crossings that cross the river and its tributaries. These crossings flood often, and residents of the area are accustom to finding detour routes during storm events. The Medina River watershed received an average of 11 inches of rainfall during the October 1998 storms, with a minimum of seven inches to the southwest and up to 13 inches towards San Antonio. The Interstate Highway 35 frontage roads at Elm Creek were closed by the Texas Department of Transportation for the first time due to water over the road and a small section of roadway was washed out. The Medina River watershed area did not sustain substantial damage during the flood. This area had more extensive flooding in July of 1990. Although few flood control improvements have been done in the Medina watershed, most of the development is located outside of the floodplains.

Medio Creek Watershed:

The Medio Creek watershed in Bexar County is typically rural with subdivisions located throughout. The Medio Creek watershed received from 12 to 13.5 inches of rainfall during the October 1998 storm. This area was also flooded during the July 1990 storm more extensively than during the October 1998 storm. Many of the low water crossings were inundated by floodwater, however there was little damage reported.

Upper Leon Creek Watershed:

The Upper Leon Creek watershed is moderately populated and residential to the south and transitions to a rural setting in the north. This area received from eight to 14 inches of rainfall during the 1998 flood from north to south, respectively. The main lanes of Interstate Highway 10 at Leon Creek near Fiesta Texas were closed for the first time and covered by four feet of water. The State Highway 16 outside lanes at Leon Creek were closed due to severe scour at the bridge abutments. Numerous low water crossings were closed. There were evacuations along Leon and Huesta Creeks. The Nickel and Dime Area was severely damaged and is an identified buyout area by the City of San Antonio.

Lower Leon Creek Watershed:

The Lower Leon Creek watershed is heavily populated to the north with heavy industry and Kelly Air Force Base located near the center, and the extreme southern watershed is rural. The rainfall for the Lower Leon Creek area averaged 13 inches, with a minimum of 12 inches and greater than 14 inches in the central section. This storm closed the main lanes of Interstate Highway 35 and Highway 90 at Leon Creek for the first time, with four to five feet of water flowing over the roads. Along Huebner Creek, the Hollyhock/Whitby areas were damaged severely, and the area is proposed for a floodplain buyout. Along Leon Creek just north of Interstate Highway 35, the Plumnear area was severely damaged and is also a proposed buyout area. Property along Leon Creek just south of Interstate Highway 35 along Somerset Road is a proposed buyout area.

Culebra Creek Watershed:

The Culebra Creek watershed is highly populated in the south and transitions quickly to a rural setting in the west and north. Rainfall varied from eight to 14 inches from north to south. Due to high water on Scenic Loop Road, the Grey Forest area was isolated during the flood. Grey Forest also sustained damage from high water and has applied to FEMA for help. Farm to Market Road 471 (Culebra Road) was closed along Culebra Creek, and the Timber Path Road crossing at Culebra Creek had approximately 13 feet of water over the road. Despite these problems little damage was reported from this area.

San Antonio River Watershed:

The central section of the San Antonio River watershed contains the downtown business district, and is surrounded by highly developed, commercialized areas and many historic neighborhoods. Sparsely populated rural farmland is located to the far south where the San Antonio River exits Bexar County. Rainfall ranged from eight inches to the far south to greater than 16 inches near downtown San Antonio. The Texas Department of Transportation reported approximately ten areas on Interstate Highway 35, Interstate Highway 37, Loop 410, Highway 281 and Spurs 536 and 371 that w closed for the first time due to high water. Alamo Heights along Broadway Street, North N Braunfels Avenue and the Austin Highway was flooded severely with numerous cars washed away. Many homes and businesses were damaged by the floodwaters from Martinez Creek and Zarzamora Creek near Interstate Highway10 East and are included in buyout plans by the City of San Antonio. For the most part, the improved channels of the SACIP worked as designed. In one area the floodwater in the channel was higher than an old river loop cut off at Symphony Lane which caused flooding problems. The new tunnels worked as designed, and with minor changes to the inlet trash rack system, could be even more effective. Flooding was evident immediately upstream of both tunnel inlet structures.

Olmos Creek Watershed:

The Olmos Creek watershed is primarily urban residential and along the major thoroughfares is highly commercialized and business oriented. The Olmos Creek watershed received from 12 inches to 16 inches of rainfall during the October 1998 flood. Olmos Dam successfully contained the storm. Highway 281 through Olmos Basin near the Quarry was closed for over three days until the water levels receded. The frontage road of Loop 410 at West Avenue was closed by five feet of water. There were several rescues at different locations in the basin.

Lower Salado Creek Watershed:

The Lower Salado Creek watershed is almost entirely urbanized and residential. Rainfall amo for this watershed varied from 13 inches in the south to 17 inches in the north and east. Interstate Highway 35, Loop 410 and Austin Highway were closed for the first time due to floodwater in these areas. Salado Creek severely flooded the Wheatley Heights area. Numerous high water rescues occurred in the area and there were several vehicle related deaths. The neighborhoods along Beitel Creek were severely damaged, three areas are included in the Phase I buyout plan by the City of San Antonio. Without the upstream NRCS floodwater detention dams controlling approximately 40% of the drainage area the damage along Beitel and Salado Creeks would have been catastrophic.

Upper Salado Creek Watershed:

The Upper Salado Creek watershed is primarily urbanized and residential. Rainfall amounts varied from nine to 18 inches toward the eastern part of the watershed. Highway 281 was closed for the first time with up to five feet of water over the road. There are 13 NRCS floodwater detention dams in this watershed which helped reduce flooding. There were numerous low water crossings that flooded as well as an unusual amount of street flooding.

Calaveras Creek Watershed:

The Calaveras Creek watershed is primarily rural with scattered urban development. Calaveras Lake is located in the watershed but is a constant level lake that did not detain any floodwater. The area received rainfall amounts of 11 to 17 inches. There were several low water crossings that flooded. There are also seven NRCS floodwater detention dams in this watershed which helped reduce flooding.

Cibolo Creek Watershed:

The Cibolo Creek watershed received rainfall amounts which varied from seven to 20 inches. The watershed is split by the county line and rainfall outside the county to the north and east contributed to the flooding problems within Bexar County. There were several neighborhoods that flooded during the October 1998 flood. In Lakewood Acres, 130 homes sustained major damage. The area is proposed for floodplain buyout. Interstate Highway 10 East was closed at the Cibolo Creek with water over the road.

Martinez Creek Watershed:

The Martinez Creek watershed received 16 to 18 inches of rainfall. It is typically rural with residential areas in the upper portion of the watershed. It contains six NRCS floodwater detention dams. Even though they detained approximately 6,800 acre feet of floodwater, they all had several feet of floodwater through their emergency spillways. Interstate Highway 10 and numerous low water crossings were closed.

SECTION 4
PROJECT PRIORITY ANALYSIS

Projects in this study were analyzed considering both the tangible (reduction in flood damages) and intangible benefits of each project. The performance of each project was evaluated for its ability to satisfy certain county and community objectives. These objectives have been classified and prioritized as follows:

1. Reduce flood hazard to human life (Hazard).

2. Reduce flood damages to public and private property (Damage).

3. Provide sound fiscal guidelines and funding for project implementation (Fiscal).

4. Improve stormwater quality and mitigate other environmental effects (Environmental).

5. Provide sound legal, and administrative guidelines for project implementation (Legal).

6. Enhance property values and encourage quality neighborhood development (Development).

7. Increase recreational opportunities and open space (Recreation).

For purposes of this analysis, these objectives are defined and quantified as follows:

1. Hazard - The reduction of hazards pertains to human life, injury, and related health hazards because of floods. Hazards to humans are high where roadways are overtopped and velocities are high. The ability of each project to reduce potential hazards at the project locations is measured by the reduction in high hazard areas. A ranking of 10 would indicate the best reduction in high hazard areas and a ranking of 1 the lowest reduction.

2. Damage - The reduction in flood damages to public and private properties is estimated in this analysis. The ability of each project to reduce flood damages is estimated with the project in place. Operation and maintenance issues are considered as well. A high ranking is best.

3. Fiscal - Fiscal implications include the magnitude of capital investment required to implement each project and considers the potential benefits of the project.

4. Environmental - Each project is evaluated for its effect on stormwater quality and other environmental concerns including the effect of channelization without the opportunity for remediation. Environmental issues are evaluated according to the type of drainage facilities recommended for each project and are subjectively rated on a scale of 1 to 10, where 1 is poor performance and 10 is excellent performance.

5. Legal - Each project is evaluated in terms of its legal, fiscal, and administrative implications. The legal implications of each project are estimated by how well the project may avoid potential litigious situations, such as acquisition of residential structures. Administrative issues relate to dealing with public opinion, organization/personnel, and support systems. Each project is evaluated for how well these issues can be managed. Legal and administrative implications are subjectively rated on a scale of 1 to 10, where 1 is poor performance and 10 is excellent performance.

6. Development - Each project is evaluated for its ability to enhance property values and its effect on the quality of neighborhood development. These real estate issues are subjectively ranked on a scale of 1 to 10, where 1 is poor performance and 10 is excellent performance.

7. Recreation - Each project is evaluated for its effect on open space and recreational opportunities. The project's effectiveness for creating recreational facilities is based on the cumulative area of open space and is subjectively rated on a scale of 1 to 10, where 1 is poor performance and 10 is excellent performance.

In order to rank the importance of comparative factors, relative weights have been assigned to each of the above criteria based on professional judgement. A larger weight indicates a higher importance. Therefore, a project objective with a high weight will contribute toward a greater proportion of the total scope than will a lower weighted objective. Table 4-1 shows the numerical weight assigne each objective.

Table 4-1
Project Objective Weights

	Objective	Weight
1.	Hazard	10
2.	Damage	9
3.	Fiscal	8
4.	Environmental	5
5.	Legal	4
6.	Development	3
7.	Recreation	2

A matrix to compare the relative scope of each project is shown in Section 4. The total score of each project sums up the product of the ranks and weights of each project's objectives. The rankings are relative to each other.

Based on the matrix analysis and the project comparison discussion, the projects shown in Section 5 include projects identified for further study.

BEXAR COUNTY FLOOD ANALYSIS REPORT

PROJECT SCORING MATRIX

DECEMBER 1, 1999

ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	Hazard/10		Damage/9		Fiscal/8		Environment/5		Legal/4		Development/3		Recreation/2		TOTAL SCORE
			Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	
	BEXAR COUNTY CONST. PROJECTS																
CT-2	Keller Road Structures	$300,000	5	50	2	18	5	40	3	15	7	28	3	9	2	4	164
CT-4	City of Elmendorf Drainage Improvements	$450,000	6	60	8	72	8	64	6	30	7	28	5	15	2	4	273
CT-6	Cagnon Road Low Water Crossing Replace	$4,350,000	8	80	4	36	3	24	6	30	8	32	3	9	2	4	215
CT-7	Cagnon Road Low Water Crossing Replace	$320,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
CT-8	Blanco Road Low Water Crossing Replace	$565,000	9	90	4	36	6	48	6	30	8	32	5	15	2	4	255
CT-9	Bulverde Road Low Water Crossing Replace	$575,000	7	70	4	36	4	32	6	30	8	32	4	12	2	4	216
CT-10	Smithson Valley Low Water Crossing Replace	$580,000	9	90	4	36	6	48	6	30	8	32	5	15	2	4	255
CT-11	McDona Drainage Improvements	$830,000	9	90	7	63	6	48	5	25	5	20	6	18	2	4	268
CT-12	Applewhite Road Low Water Crossing Replace	$308,448	9	90	6	54	7	56	6	30	8	32	3	9	2	4	275
CT-13	Scenic Loop Road Low Water Crossing Replace	$230,000	9	90	6	54	8	64	6	30	8	32	6	18	2	4	292
CT-14	Trainer-Hale Low Water Crossing Replace	$430,000	9	90	4	36	5	40	6	30	8	32	3	9	2	4	241
CT-15	Holowell Road Low Water Crossing Replace	$550,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
CT-16	Weir Road Low Water Crossing Replace	$425,000	9	90	4	36	5	40	6	30	8	32	3	9	2	4	241
CT-17	Schaeffer Road Low Water Crossing Replace	$450,000	9	90	4	36	5	40	6	30	8	32	3	9	2	4	241
CT-18	Talley Road Low Water Crossing Replace	$1,650,000	7	70	4	36	3	24	5	25	7	28	3	9	2	4	196
CT-19	Pearsall Road Low Water Crossing Replace	$189,591	8	80	4	36	7	56	6	30	8	32	3	9	2	4	247
CT-20	Kenney Road Low Water Crossing Replace	$424,858	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
CT-21	Jungman Road Low Water Crossing Replace	$520,000	9	90	4	36	5	40	6	30	8	32	3	9	2	4	241
CT-22	Gardner Road Low Water Crossing Replace	$68,145	6	60	4	36	8	64	6	30	8	32	3	9	2	4	235
CT-23	Fischer Road Low Water Crossing Replace	$98,419	5	50	3	27	6	48	6	30	8	32	3	9	2	4	200
CT-24	Deer Cross Road Low Water Crossing Replace	$186,325	9	90	4	36	8	64	6	30	8	32	3	9	2	4	265
CT-25	Gross Lane Low Water Crossing Replace	$550,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	241
CT-26	Applewhite Road Low Water Crossing Replace	$840,500	9	90	4	36	5	40	6	30	8	32	3	9	2	4	249
CT-27	Zarzamora Road Low Water Crossing Replace	$280,000	9	90	4	36	6	48	6	30	8	32	3	9	2	4	231
CT-28	Specht Road Low Water Crossing Replace	$450,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	249
CT-29	Old Fredericksburg Rd. Low Water Cross Replace	$460,000	9	90	4	36	6	48	6	30	8	32	3	9	2	4	249
CT-30	Old Frio City Road Low Water Crossing Replace	$306,337	9	90	4	36	6	48	6	30	8	32	3	9	2	4	257
CT-31	Glen Fair Road Low Water Crossing Replace	$127,645	9	90	4	36	7	56	6	30	8	32	3	9	2	4	245
CT-32	Real Road Low Water Crossing Replace	$73,834	7	70	4	36	8	64	6	30	8	32	3	9	2	4	249
CT-33	O'Brien Road Low Water Crossing Replace	$548,400	9	90	4	36	6	48	6	30	8	32	3	9	2	4	239
CT-34	New Berlin Road Low Water Crossing Replace	$180,000	8	80	4	36	6	48	6	30	8	32	3	9	2	4	239
CT-35	Uhlrich Road Low Water Crossing Replace	$185,000	8	80	4	36	6	48	6	30	8	32	3	9	2	4	239
CT-36	Abbott Raod Low Water Crossing Replace	$145,000	8	80	4	36	6	48	6	30	8	32	3	9	2	4	231
CT-37	Menger Road Low Water Crossing Replace	$280,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	221
CT-38	Blue Wing Road Low Water Crossing Replace	$203,559	7	70	4	36	5	40	6	30	8	32	3	9	2	4	239
CT-39	Zigmont Road Low Water Crossing Replace	$139,188	8	80	4	36	6	48	6	30	8	32	3	9	2	4	231
CT-40	Quintana Road Low Water Crossing Replace	$424,858	8	80	4	36	5	40	6	30	8	32	3	9	2	4	221
CT-41	Jackel Road Low Water Crossing Replace	$525,000	7	70	4	36	5	40	6	30	8	32	3	9	2	4	

BEXAR COUNTY FLOOD ANALYSIS REPORT

PROJECT SCORING MATRIX

DECEMBER 1, 1999

ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	Hazard/10		Damage/9		Fiscal/8		Environment/5		Legal/4		Development/3		Recreation/2		TOTAL SCORE
			Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	
	CITY OF SAN ANTONIO PROJECTS																
BD-37	Abe Lincoln-Street and Drainage	$250,000	4	40	5	45	5	40	6	30	6	24	4	12	4	8	199
BD-39	Aurelia - Street and Drainage	$210,242	4	40	5	45	5	40	6	30	6	24	4	12	4	8	199
BD-47	Cardiff - Street and Drainage	$660,392	5	50	5	45	4	32	6	30	6	24	4	12	4	8	201
BD-50	Dempsey - Street and Drainage	$396,123	5	50	5	45	4	32	6	30	6	24	4	12	4	8	201
BD-52	Durango - Street and Drainage	$1,556,841	4	40	5	45	4	32	6	30	6	24	4	12	4	8	191
BD-54	El Monte - Street and Drainage	$400,000	4	40	5	45	5	40	6	30	6	24	4	12	4	8	199
BD-64	Hilton - Street and Drainage	$318,964	4	40	5	45	5	40	6	30	6	24	4	12	4	8	199
BD-68	Las Moras - Street and Drainage	$71,376	4	40	4	36	6	48	6	30	6	24	4	12	4	8	198
BD-80	W. French - Street and Drainage	$325,772	5	50	5	45	5	40	6	30	6	24	4	12	4	8	209
BD-82	WW White Road Ph. II - Street and Drainage	$2,740,932	5	50	5	45	4	32	6	30	6	24	4	12	4	8	201
BD-84	Waverly Ph. II - Street and Drainage	$445,000	4	40	5	45	5	40	6	30	6	24	4	12	4	8	199
BD-86	Wilson - Street and Drainage	$892,537	5	50	5	45	5	40	6	30	6	24	4	12	4	8	209

BEXAR COUNTY FLOOD ANALYSIS REPORT

PROJECT PROJECT SCORING MATRIX

DECEMBER 1, 1999

ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	Hazard/10		Damage/9		Fiscal/8		Environment/5		Legal/4		Development/3		Recreation/2		TOTAL SCORE
			Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	
	CSA REGIONAL DETENTION PROJECTS																
D-1	HUESTA CREEK DETENTION POND - @ Leon Creek	$6,250,000	7	70	9	81	5	40	6	30	3	12	6	18	7	14	265
D-2	SPRING CREEK DETENTION POND - @ Leon Creek		7	70	9	81	5	40	6	30	3	12	6	18	7	14	265
D-3	LEON CREEK DETENTION POND - @ Whitby Street		7	70	9	81	5	40	6	30	3	12	6	18	7	14	265
D-5	LEON CREEK DETENTION POND - @ Culebra Creek		7	70	9	81	5	40	6	30	3	12	6	18	7	14	265
D-6	LEON CREEK DETENTION POND - @ Heath Street		7	70	9	81	5	40	6	30	3	12	6	18	7	14	265
D-7	GOVERNMENT CANYON DETENTION POND		7	70	9	81	5	40	5	25	2	8	6	18	9	18	260
D-8	LEON CREEK @ HEATH ROAD - Channelization		8	80	9	81	5	40	3	15	4	16	7	21	7	14	267
D-9	HUEBNER CREEK @ HOLLYHOCK - Channelization		9	90	9	81	5	40	3	15	4	16	6	18	6	12	272
D-10	CULEBRA CREEK @ LOOP 1604 - Channelization		8	80	8	72	5	40	3	15	4	16	5	15	6	12	250
D-11	HELOTES CREEK @ LOOP 1604 - Channelization		9	90	9	81	5	40	3	15	3	12	6	18	7	14	270
D-12	FRENCH CREEK CHANNELIZATION	$1,334,000	8	80	8	72	5	40	3	15	3	12	5	15	6	12	246
D-13	VULCAN QUARRY DETENTION POND	$1,997,125	9	90	9	81	6	48	6	30	5	20	7	21	8	16	306
D-14	SHAVANO PARK DETENTION POND	$5,711,478	9	90	9	81	5	40	5	25	3	12	6	18	8	16	282
D-15	LOCKHILL-SELMA - George Road Channelization		10	100	9	81	5	40	3	15	4	16	5	15	6	12	279
D-16	WEST BRANCH CHANNELIZATION		9	90	9	81	5	40	3	15	4	16	5	15	6	12	269
D-17	WEST AVENUE @ LOOP 410 IMPROVEMENTS		10	100	10	90	4	32	3	15	3	12	6	18	6	12	279
D-18	NRCS RETENTION POND - Site 15R McAllister Park	$4,735,000	10	100	9	81	6	48	6	30	6	24	7	21	8	16	320
D-19	BEITEL CREEK North of Loop 410 Channelization	$2,200,000	10	100	10	90	4	32	3	15	6	24	6	18	4	8	287
D-21	PERRIN-BEITEL CHANNELIZATION	$1,100,000	9	90	9	81	6	48	3	15	6	24	4	12	5	10	280
D-22	HOLBROOK ROAD CHANNELIZATION	$800,000	9	90	9	81	7	56	3	15	4	16	5	15	5	10	283
D-24	REDLAND DETENTION POND & CHANNELIZATION		7	70	9	81	5	40	6	30	3	12	6	18	7	14	265

	CSA / SARA AREA WIDE FLOOD CONTROL PROJECTS - 1996																
SA-1	Spencer Lane at IH 10 Detention Pond	$4,600,000	7	70	9	81	5	40	5	25	3	12	6	18	7	14	260
SA-2	Shavano Park Detention Pond	$2,600,000	9	90	9	81	7	56	5	25	3	12	6	18	8	16	298

BEXAR COUNTY FLOOD ANALYSIS REPORT

PROJECT SCORING MATRIX

DECEMBER 1, 1999

ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	Hazard/10		Damage/9		Fiscal/8		Environment/5		Legal/4		Development/3		Recreation/2		TOTAL SCORE
			Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	
	1990 SARA / BEXAR CO. CONTRACT - PROJECT LIST																
S-9	Gate #2 Brackenridge Park	$493,000	1	10	2	18	5	40	5	25	8	32	1	3	8	16	144
S-11	Salado Ck. Upstream of Southton Rd, Bridge Replac.	$1,001,000	5	50	2	18	1	8	3	15	2	8	7	21	2	4	124
S-12	Salado Ck. Channel Rectification, Southton to IH410	$1,609,000	5	50	2	18	2	16	1	5	2	8	8	24	6	12	133
S-13	Salado Ck. Floodplain Rectification, Comanche Park	$6,885,000	6	60	7	63	4	32	5	25	8	32	5	15	10	20	247
S-14	Salado Ck. Floodplain Rectification, "J" to Rigsby	$6,883,000	10	100	3	27	5	40	4	20	3	12	5	15	6	12	226
S-15	Salado Creek - "J" Street Park - Channel Rectification	$2,949,000	6	60	5	45	5	40	4	20	8	32	5	15	8	16	228
S-16	Salado Ck. Floodplain Rectification, Pletz Pk. to IH 10	$22,028,000	8	80	8	72	5	40	4	20	3	12	7	21	8	16	261
S-20	Salado Ck. Floodplain Rectification, Eisenhauer to Ft. Sa	$42,484,000	8	80	8	72	1	8	4	20	3	12	6	18	8	16	226
S-21	Leon Ck. Relocations, Laredo Hwy to Quintana Rd.	$3,247,000	4	40	6	54	7	56	7	35	8	32	6	18	8	16	251
S-22	Leon Ck. Channel Rectification, City limits to New Laredo	$2,697,000	6	60	6	54	5	40	3	15	3	12	7	21	7	14	216
S-23	Leon Ck. Floodplain Rectification, Moray Rd. to city limits	$24,891,000	5	50	5	45	1	8	3	15	2	8	8	24	7	14	164
S-24	Leon Ck. Floodplain Rectification, IH 10 to Moray Rd.	$17,944,000	5	50	6	54	1	8	3	15	2	8	6	18	9	18	171
S-25	Leon Ck. Channelization, Keitha to Hwy 90 West	$4,745,000	10	100	8	72	5	40	3	15	4	16	7	21	9	18	282
S-26	Leon Ck. Reloc. / Floodproofing, Camp Bullis Rd. to IH 1	$1,020,000	5	50	6	54	5	40	3	15	5	20	2	6	2	4	189
S-27	Leon Ck. Reloc. / Floodproofing, S.P.R.R. to IH 10 Fronta	$1,020,000	5	50	6	54	5	40	3	15	5	20	2	6	2	4	189
S-28	Leon Creek - Raymond Russell Park	$6,169,000	6	60	7	63	3	24	4	20	7	28	6	18	9	18	231
S-29	Leon Ck. Reloc. / Floodproofing, IH 10 Frontage to Boern	$635,000	5	50	6	54	5	40	3	15	5	20	2	6	2	4	189
S-30	Martinez Creek - Alazan Creek to Culebra	$6,851,000	9	90	9	81	6	48	5	25	7	28	6	18	4	8	298
S-31	Cibolo Ck. Reloc. / Floodproofing, at Schaeffer Road	$852,000	9	90	9	81	8	64	3	15	5	20	3	9	2	4	283
S-32	Cibolo Ck. Reloc. / Floodproofing, Schaeffer Rd. to FM 7	$368,000	9	90	9	81	8	64	3	15	5	20	3	9	2	4	283

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BEXAR COUNTY FLOOD ANALYSIS REPORT

PROJECT SCORING MATRIX

ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	Hazard/10		Damage/9		Fiscal/8		Environment/5		Legal/4		Development/3		Recreation/2		TOTAL
			Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	SCORE
	BEXAR COUNTY PROJECT LIST FROM STUDIES																
R-5	Channel Clearing - on the East Olmos Creek north of Loc	$221,778	6	60	6	54	6	48	4	20	3	12	7	21	9	18	233
R-6	Dreamland Bridge - Dreamland and Olmos Creek	$2,676,625	9	90	5	45	5	40	6	30	8	32	3	9	2	4	250
V-2	Weidner Road along Beitel Creek, Old O'Conner Road	$844,750	9	90	9	81	7	56	4	20	6	24	6	18	7	14	303
V-8	Holbrook Reroute at Austin Highway	$345,900	9	90	7	63	8	64	5	25	6	24	5	15	7	14	295
V10	Salado Creek Rectification - Wetmore to Jones-Maltsber	$20,169,400	6	60	5	45	2	16	3	15	6	24	8	24	8	16	200
V11	Mud Creek at Jones-Maltsberger Culvert Replace	$250,000	9	90	4	36	7	56	6	30	8	32	3	9	2	4	257
V12	Elm Creek at Jones-Maltsberger Culvert Replacement	$400,000	9	90	4	36	7	56	6	30	8	32	3	9	2	4	257
V13	Salado Creek at Binz Engleman Bridge	$3,240,000	8	80	4	36	4	32	6	30	6	24	3	9	2	4	215
V14	Salado Creek at IH-35 Frontage Roads Bridges	$3,000,000	8	80	4	36	4	32	6	30	8	32	3	9	2	4	223
V15	Elm Creek at Bulverde Road Culvert Replacement	$500,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
V16	Salado Creek at West Avenue Bridge	$2,682,000	10	100	4	36	5	40	6	30	8	32	3	9	2	4	251
V17	Beitel Creek at Vicar Road Bridge	$1,500,000	9	90	4	36	4	32	6	30	8	32	3	9	2	4	233
V18	Salado Creek at Roland	$2,400,000	9	90	4	36	4	32	6	30	8	32	3	9	2	4	233
V19	Panther Springs Creek at West Avenue	$250,000	10	100	4	36	6	48	6	30	8	32	3	9	2	4	259
LC-1	Hausman Road Levee (Prevents split flow)	$26,000	9	90	9	81	10	80	6	30	5	20	5	15	5	10	326
LC-4	Ebert Road Bridge at Leon Creek	$590,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
LC-7	Grissom Road Bridge at Leon Creek	$1,273,000	9	90	4	36	6	48	6	30	8	32	3	9	2	4	249
LC-10	Ingram Road Bridge at Leon Creek	$1,813,000	10	100	4	36	5	40	6	30	8	32	3	9	2	4	251
LC-12A	Rebuild Culebra Road Bridge at Leon Creek	$2,713,000	8	80	4	36	3	24	6	30	8	32	3	9	2	4	215
LC-14	West Commerce Street Bridge at Leon Creek	$2,617,000	8	80	4	36	3	24	6	30	8	32	3	9	2	4	215
LC-15A	Pinn Road Bridge at Leon Creek	$989,000	8	80	4	36	4	32	6	30	8	32	3	9	2	4	223
LC-16A	Brownleaf Floodwall along Leon Creek	$720,000	8	80	7	63	3	24	3	15	6	24	4	12	2	4	222
LC-17	Rodriguez Park Signs and Flood Gates	$50,000	10	100	6	54	10	80	8	40	8	32	3	9	6		315
HEL-1	Galm Road Bridge at Helotes Creek	$513,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
HEL-3A	Leslie Road Bridge at Helotes Creek	$352,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
HEL-3B	Leslie Road Bridge at Helotes Creek	$363,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
HEL-3C	Leslie Road Bridge at Helotes Creek	$363,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
HEL-6	Helotes Creek Channel Improvements	$1,400,000	9	90	9	81	8	64	3	15	5	20	7	21	6	12	303

BEXAR COUNTY FLOOD ANALYSIS REPORT

PROJECT SCORING MATRIX

ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	Hazard/10 Rank	Hazard/10 Score	Damage/9 Rank	Damage/9 Score	Fiscal/8 Rank	Fiscal/8 Score	Environment/5 Rank	Environment/5 Score	Legal/4 Rank	Legal/4 Score	Development/3 Rank	Development/3 Score	Recreation/2 Rank	Recreation/2 Score	TOTAL SCORE
C-4A	Stuebing Road Bridge at Culebra Creek	$442,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
C-4B	Stuebing Road Levee	$28,000	9	90	8	72	10	80	6	30	5	20	5	15	5	10	317
C-6A	New Culebra Road Bridge at Culebra Creek	$1,310,000	9	90	4	36	5	40	6	30	8	32	3	9	2	4	241
C-7A	Culebra Creek Channelization	$143,000	8	80	8	72	7	56	4	20	5	20	6	18	5	10	276
C-8A	Culebra Road Bridge at Culebra Creek	$2,039,000	10	100	4	36	4	32	6	30	8	32	3	9	2	4	243
C-8B	Timber Path Bridge ar Culebra Creek	$817,000	9	90	4	36	5	40	6	30	8	32	3	9	2	4	241
C-8C	Old Grissom Road Bridge at Culebra Creek	$871,000	9	90	4	36	5	40	6	30	8	32	3	9	2	4	241
M-1A	Babcock Road Bridge at Maverick Creek	$301,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
M-1B	Babcock Road Bridge at Maverick Creek	$301,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
M-1D	Babcock Road Bridge at Maverick Creek	$301,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
M-2	Babcock Road Levee	$92,000	10	100	9	81	9	72	6	30	5	20	5	15	5	10	328
M-3	Babcock Road Levee	$36,000	10	100	9	81	9	72	6	30	5	20	5	15	5	10	328
M-4	Babcock Road Bridge at Maverick Creek	$448,000	9	90	4	36	8	64	6	30	8	32	3	9	2	4	265
HB-1	DeZavala Road Bridge at Huebner Creek	$609,000	9	90	4	36	6	48	6	30	8	32	3	9	2	4	249
HB-2	Cimarron Street Floodwall along Heubner Creek	$100,000	9	90	9	81	9	72	4	20	6	24	6	18	2	4	309
HB-4	Prue Road Bridge at Huebner Creek	$493,000	9	90	4	36	5	40	6	30	8	32	3	9	2	4	241
HB-5A	Lockhill Road Bridge at Huebner Creek	$288,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
HB-5B	White Bonnet Bridge at Huebner Creek	$288,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
HB-5C	Lockhill Floodwall along Huebner Creek	$172,000	9	90	7	63	5	40	3	15	6	24	6	18	2	4	254
HB-8	Eckert Road Bridge at Huebner Creek	$457,000	8	80	4	36	4	32	6	30	8	32	3	9	2	4	223
HB-10	Timber Hill Road Bridge at Huebner Creek	$928,000	9	90	4	36	5	40	6	30	8	32	3	9	2	4	241
F-2A	Hausman Road Bridge at French Creek	$597,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
F-3	Prue Road Bridge at French Creek	$512,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231
F-4A	North Verde Road Bridge at French Creek	$655,000	9	90	4	36	4	32	6	30	8	32	3	9	2	4	233
F-4B	South Verde Road Bridge at French Creek	$751,000	9	90	4	36	4	32	6	30	8	32	3	9	2	4	233
F-5A	Bandera Road Bridge Replacement at French Creek	$1,584,000	10	100	4	36	5	40	6	30	8	32	3	9	2	4	251
F-8A	Mainland Road Bridge at French Creek	$254,000	8	80	4	36	5	40	6	30	8	32	3	9	2	4	231

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PROJECT SCORING MATRIX

DECEMBER 1, 1999

ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	Hazard/10 Rank	Hazard/10 Score	Damage/9 Rank	Damage/9 Score	Fiscal/8 Rank	Fiscal/8 Score	Environment/5 Rank	Environment/5 Score	Legal/4 Rank	Legal/4 Score	Development/3 Rank	Development/3 Score	Recreation/2 Rank	Recreation/2 Score	TOTAL SCORE
	RESPONSES FROM CITIES																
	ALAMO HEIGHTS																
AH-1	North New Braunfels street drainage	$12,000,000	10	100	9	81	6	48	6	30	6	24	5	15	4	8	306
AH-2	Channel Inlet at North New Braunfels	$1,000,000	9	90	8	72	7	56	6	30	6	24	5	15	3	6	293
AH-3	Austin Highway street drainage	$2,000,000	9	90	9	81	7	56	6	30	6	24	6	18	4	8	307
AH-4	Drainage channel from Terrell Hills to Alamo Heights	$1,000,000	9	90	8	72	7	56	5	25	5	20	6	18	3	6	287
AH-5	Broadway street drainage	$15,000,000	10	100	10	90	6	48	6	30	6	24	7	21	3	6	319
	BEXAR METROPOLITAN WATER DISTRICT																
BM-1	Medio Creek Channelization	$5,813,396	5	50	5	45	3	24	4	20	8	32	6	18	5	10	199
BM-2	Medina River Cleanup and Development	$5,366,234	5	50	4	36	3	24	6	30	4	16	5	15	8	16	187
	GREY FOREST																
GF-1	Scenic Loop Road @ Helotes Creek	$1,000,000	9	90	7	63	6	48	6	30	8	32	4	12	2	4	279
GF-2	Grey Forest Road @ Helotes Creek	$300,000	9	90	7	63	6	48	6	30	8	32	4	12	2	4	279
	LEON VALLEY																
LV-1	Huebner Creek Channelization		9	90	9	81	8	64	4	20	3	12	7	21	8	16	304
LV-2	Bandera Road Bridge Channelization @ Huebner Creek	$615,000	9	90	6	54	9	72	6	30	8	32	6	18	3	6	302
LV-3	Huebner Creek Channelization	$6,780,000	9	90	5	45	6	48	5	25	4	16	7	21	8	16	261
LV-4	Evers Road @ Huebner Creek	$766,000	10	100	6	54	9	72	6	30	8	32	6	18	3	6	312
						6											
	OLMOS PARK					8											
OP-1	Shook Avenue drainage channel improvements	$1,100,000	8	80	5	45	8	64	6	30	8	32	6	18	3	6	275
	UNIVERSAL CITY																
UC-1	Kitty Hawk Road at Salatrillo Bridge Replacement	$500,000	8	80	4	36	6	48	6	30	8	32	3	9	2	4	239

SECTION 5
IDENTIFICATION OF PROJECTS

Potential flood control projects were identified through many sources. Some projects were identified by past studies and investigations and are detailed in Section 2 of this report. Other projects were identified by SARA, Bexar County, the City of San Antonio, and other municipalities or organizations. The need for many of the projects was reinforced by the October 1998 Flood.

The identified projects have been separated into three categories. The first category is defined as "Projects with an Identified Funding Source". These projects are indicated by green labeling on the maps presented in this section. The second category is "Projects Identified for Further Study" as indicated by red labeling. These projects have been selected in the Priority Analysis in Section 4 as having a high need for further study. The third category is "Other Projects" as indicated by orange labeling on the maps. As decisions are made on what projects should be further investigated, some may come from the list of "Other Projects".

The projects that did not have an identified funding source were rated in the priority matrix analysis in Section 4. There are 92 projects with a rating of 240 points or greater which are identified as those which might be considered for further study. There are 65 projects with a rating of less than 240 points which are placed in the "Other Projects" category. The selection of the 240 point project separation criteria is based on categorizing the projects with the highest potential for overall benefit. Even though a project may have made the "Other Projects" category, it may possess positive features that were not evaluated in the matrix analysis. Further investigation of that project may be warranted.

In a large comprehensive study such as this, not all pertinent information can be gathered or evaluated. Attempts were made to identify potential projects in Bexar County, however some projects may have been overlooked. Requests for information were sent to many entities. Some did not respond that may have potentially beneficial projects.

There are several types of flood control methods that define projects for further study. These include channelization, detention facilities, dams, levees and bridge construction. For the most part, buyouts or buyback programs have an identified funding source and are either in progress or currently waiting for funding approval from FEMA. It is suggested that an early flood warning system be investigated. A county wide early flood warning system could be an invaluable tool in a comprehensive flood mitigation plan. Modern technology has made early warning systems more effective and feasible. Such a system not only collects data on rainfall amounts and water levels at key locations but can be expanded to assist in other functions such as water quality monitoring.

Index of Abbreviations and Symbols

◇	City of San Antonio Road Closure and High Water List from Radio Logs
□	Bexar County Low Water Crossings
⬡	Texas Department of Transportation Road Closures - Oct. 17-18, 1998 Flood
LW	City of San Antonio Low Water Crossings
S	SARA / Bexar County Contract - Project List
BB	Bexar County and City of San Antonio Property Buy-Back Programs
CT	Bexar Bounty Proposed Construction Projects
BD	City of San Antonio Projects - 1999 Bond Election and Others
COE	Corps of Engineers Proposed Construction Projects
D	City of San Antonio Regional Detention and Channelization Facility Projects
FL	1998 Flood Problem Areas Identified By Various Sources
SA	City of San Antonio / Bexar County / SARA Flood Control Projects - 1996

Response Letters From Area Utilities and Municipalities Regarding Flood Control Needs

AH	Alamo Heights	OP	Olmos Park
BC	Bexar County	UC	Universal City
GF	Grey Forest	WC	City of Windcrest
LV	Leon Valley	BM	Bexar Metropolitan Water District

Previous Studies

V	1997 CSA Salado Creek Study BY Vickrey
CH	1989 Bexar County Watershed Study By CH2M-Hill
LC	1996 CSA Leon Creek Study By Pape-Dawson
R	1996 CSA Upper Olmos Creek Study By Rust-Lichliter

BEXAR COUNTY FLOOD ANALYSIS REPORT

DECEMBER 1, 1999

PROPOSED PROJECTS SUMMARY

WATERSHED	PROJECTS IDENTIFIED FOR FURTHER STUDY (RED)	OTHER PROJECTS (ORANGE)
MEDINA RIVER	$4,202,776 7 Projects	$18,722,765 11 Projects
LEON CREEK	$40,667,500 43 Projects	$71,041,123 31 Projects
SAN ANTONIO RIVER	$57,260,062 18 Projects	$5,436,180 13 Projects
SALADO CREEK	$42,856,975 15 Projects	$89,646,966 15 Projects
CIBOLO CREEK	$4,237,645 9 Projects	$2,035,000 6 Projects
TOTAL PROJECTS	$149,224,958 92 Projects	$186,882,034 76 Projects

PROJECT LISTING
PROJECTS WITH IDENTIFIED FUNDING SOURCE
MEDINA RIVER WATERSHED
(GREEN)

CONSTRUCTION PROJECTS:

Bexar County Proposed Construction Projects

Key	Description
CT-3	Geronimo Village Drainage ($100,000)
CT-42	Ravenfield Road Bridge / Road Construction ($1,700,000)
CT-45	PLEASANTON ROAD BRIDGE WIDENING ($400,000)

City of San Antonio 1999 Bond Election Projects

Key	Description
BD-67	Hunt Lane: Demya to US 90 ($2,349,534)

RELOCATION PROJECTS:

Key	Description
Southern Bexar County:	
BB-15	Shepard - Atascosa (2 Properties, 2 w/ improvements) ($68,880)

BEXAR COUNTY FLOOD ANALYSIS REPORT

DECEMBER 1, 1999

MEDINA RIVER WATERSHED

PROJECTS IDENTIFIED FOR FURTHER STUDY (Red)			
ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	TOTAL SCORE
CT-12	Applewhite Road Low Water Crossing Repla	$308,448	275
CT-11	McDona Drainage Improvements	$830,000	268
CT-30	Old Frio City Road Low Water Crossing Repl	$306,337	249
CT-33	O'Brien Road Low Water Crossing Replace	$548,400	249
SA-16	Medina River at FM 1937 LWC replacement (	$1,500,000	249
CT-19	Pearsall Road Low Water Crossing Replace	$189,591	247
CT-21	Jungman Road Low Water Crossing Replac	$520,000	241
	TOTAL	$4,202,776	

OTHER PROJECTS (Orange)			
ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	TOTAL SCORE
CT-7	Cagnon Road Low Water Crossing Replace	$320,000	231
CT-15	Holowell Road Low Water Crossing Replace	$550,000	231
CT-20	Kenney Road Low Water Crossing Replace	$424,858	231
CT-25	Gross Lane Low Water Crossing Replace	$550,000	231
CT-40	Quintana Road Low Water Crossing Replac	$424,858	231
CT-41	Jackel Road Low Water Crossing Replace	$525,000	221
CT-6	Cagnon Road Low Water Crossing Replace	$4,350,000	215
CT-23	Fischer Road Low Water Crossing Replace	$98,419	200
BM-1	Medio Creek Channelization	$5,813,396	199
BM-2	Medina River Cleanup and Development	$5,366,234	187
CT-2	Keller Road Structures	$300,000	164
	TOTAL	$18,722,765	

PROJECT LISTING
PROJECTS WITH IDENTIFIED FUNDING SOURCE
LEON CREEK WATERSHED
(GREEN)

CONSTRUCTION PROJECTS:

Bexar County Proposed Construction Projects

Key	Description
CT-5	BRAUN ROAD BRIDGE - Replacement of narrow bridge 0.7m West of Loop 1604 ($469,672)
CT-43	GALM ROAD BRIDGE / ROAD CONSTRUCTION ($1,400,000)
CT-47	GERONIMO FOREST DRAINAGE ($400,000)

City of San Antonio 1999 Bond Election Projects

Key	Description
BD-7	Hillside Acres Area Drainage Outfall- Constructs drainage improvements and reconstructs streets as necessary. ($646,559)
BD-9	Guilbeau Drainage at French Creek - Provides drainage improvements on Guilbeau Rd. at French Creek. ($430,000)
BD-18	Leon Creek Recreation Facilities and Detention Pond at Loop 410 / Culebra - Acquires land for a detention pond along Leon Creek, constructs a detention pond and provides outdoor recreation facilities. ($2,500,000)
BD-26	Quintana Road Drainage #64 Extension (Scheduled for Construction)
BD-28	Whitby at Huebner Creek ($444,952)
BD-29	Babcock: DeZavala to Hausman ($5,751,691)
BD-31	Hollyhock at Huebner Creek ($603,030)
BD-34	Tezel: Timber Path to Ridge Path ($1,958,975)
BD-35	36th Street: US 90 to Growdon ($3,505,026)
BD-77	Tezel: Ridge Path to Old Tezel ($2,938,463)

Texas Department of Transportation Projects

Key	Description
TX-4	FM-471 - Leon Creek Area - Drainage. ($176,100)
TX-12	FM-471 at Leon Creek - Remove gravel wash off. ($180,000)

RELOCATION PROJECTS:

Bexar County Property Buy-Back Program

Key	Description
PHASE I (Approximately 60% Complete)	
BB-17	Leon Creek Area (Plumnear Area -33 Properties) ($1,381,645)
BB-20	Huebner Creek (Hollyhock Area -3 Properties) ($244,400)
BB-22	Leon Creek (Somerset Road -1 Property) ($66,340)

BEXAR COUNTY FLOOD ANALYSIS REPORT

DECEMBER 1, 1999

LEON CREEK WATERSHED

PROJECTS IDENTIFIED FOR FURTHER STUDY (Red)			
ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	TOTAL SCORE
M-2	Babcock Road Levee	$92,000	328
M-3	Babcock Road Levee	$36,000	328
LC-1	Hausman Road Levee (Prevents split flow)	$26,000	326
C-4B	Stuebing Road Levee	$26,000	317
LC-17	Rodriguez Park Signs and Flood Gates	$50,000	315
LV-4	Evers Road @ Huebner Creek	$766,000	312
HB-2	Cimarron Street Floodwall along Heubner Cre	$100,000	309
LV-1	Huebner Creek Channelization		304
SA-13	Culebra Creek Study - Helotes Creek to Fren	$50,000	304
HEL-6	Helotes Creek Channel Improvements	$1,400,000	303
LV-2	Bandera Road Bridge Channelization at Hueb	$615,000	302
CT-13	Scenic Loop Road Low Water Crossing Repl	$230,000	292
S-25	Leon Ck. Channelization, Keitha to Hwy 90 W	$4,745,000	282
GF-1	Scenic Loop Road @ Helotes Creek	$1,000,000	279
GF-2	Grey Forest Road @ Helotes Creek	$300,000	279
C-7A	Culebra Creek Channelization	$143,000	276
D-9	Huebner Creek @ Hollyhock - Channelization		272
D-11	Helotes Creek @ Loop 1604 - Channelization		270
D-8	Leon Creek @ Heath Road - Channelization		267
D-1	Huesta Creek Detention Pond - Leon Creek	$6,250,000	265
D-2	Spring Creek Detention Pond - Leon Creek		265
D-3	Leon Creek Detention Pond - Whitby Street		265
D-5	Leon Creek Detention Pond - Culebra Creek		265
D-6	Leon Creek Detention Pond - Heath Street		265
M-4	Babcock Road Bridge at Maverick Creek	$448,000	265
LV-3	Huebner Creek Channelization	$6,780,000	261
D-7	Government Canyon Detention Pond		260
HB-5C	Lockhill Floodwall along Huebner Creek	$172,000	254
F-5A	Bandera Road Bridge Replacement at French	$1,584,000	251
LC-10	Ingram Road Bridge at Leon Creek	$1,813,000	251
S-21	Leon Ck. Relocations, Laredo Hwy to Quintan	$3,247,000	251
D-10	Culebra Creek @ Loop 1604 - Channelization		250
CT-27	Zarzamora Road Low Water Crossing Replac	$280,000	249
HB-1	DeZavala Road Bridge at Huebner Creek	$609,000	249

BEXAR COUNTY FLOOD ANALYSIS REPORT

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LEON CREEK WATERSHED

PROJECTS IDENTIFIED FOR FURTHER STUDY (Red)			
ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	TOTAL SCORE
LC-7	Grissom Road Bridge at Leon Creek	$1,273,000	249
D-12	French Creek Channelization	$1,334,000	246
C-8A	Culebra Road Bridge at Culebra Creek	$2,039,000	243
C-6A	New Culebra Road Bridge at Culebra Creek	$1,310,000	241
C-8B	Timber Path Bridge ar Culebra Creek	$817,000	241
C-8C	Old Grissom Road Bridge at Culebra Creek	$871,000	241
CT-26	Applewhite Road Low Water Crossing Replac	$840,500	241
HB-4	Prue Road Bridge at Huebner Creek	$493,000	241
HB-10	Timber Hill Road Bridge at Huebner Creek	$928,000	241
	TOTAL	$40,667,500	

OTHER PROJECTS (Orange)			
ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	TOTAL SCORE
F-4A	North Verde Road Bridge at French Creek	$655,000	233
F-4B	South Verde Road Bridge at French Creek	$751,000	233
C-4A	Stuebing Road Bridge at Culebra Creek	$442,000	231
F-2A	Hausman Road Bridge at French Creek	$597,000	231
F-3	Prue Road Bridge at French Creek	$512,000	231
F-8A	Mainland Road Bridge at French Creek	$254,000	231
HB-5A	Lockhill Road Bridge at Huebner Creek	$288,000	231
HB-5B	White Bonnet Bridge at Huebner Creek	$288,000	231
HEL-1	Galm Road Bridge at Helotes Creek	$513,000	231
HEL-3A	Leslie Road Bridge at Helotes Creek	$352,000	231
HEL-3B	Leslie Road Bridge at Helotes Creek	$363,000	231
HEL-3C	Leslie Road Bridge at Helotes Creek	$363,000	231
LC-4	Ebert Road Bridge at Leon Creek	$590,000	231
M-1A	Babcock Road Bridge at Maverick Creek	$301,000	231
M-1B	Babcock Road Bridge at Maverick Creek	$301,000	231
M-1D	Babcock Road Bridge at Maverick Creek	$301,000	231
S-28	Leon Creek - Raymond Russell Park	$6,169,000	231
HB-8	Eckert Road Bridge at Huebner Creek	$457,000	223
LC-15A	Pinn Road Bridge at Leon Creek	$989,000	223
LC-16A	Brownleaf Floodwall along Leon Creek	$720,000	222

BEXAR COUNTY FLOOD ANALYSIS REPORT

DECEMBER 1, 1999

LEON CREEK WATERSHED

OTHER PROJECTS (Orange)			
ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	TOTAL SCORE
S-22	Leon Ck. Channel Rectification, City limits to	$2,697,000	216
LC-12A	Rebuild Culebra Road Bridge at Leon Creek	$2,713,000	215
LC-14	West Commerce Street Bridge at Leon Creek	$2,617,000	215
BD-50	Dempsey - Street and Drainage	$398,123	201
BD-37	Abe Lincoln-Street and Drainage	$250,000	199
CT-18	Talley Road Low Water Crossing Replace	$1,650,000	196
S-26	Leon Ck. Reloc. / Floodproofing, Camp Bullis	$1,020,000	189
S-27	Leon Ck. Reloc. / Floodproofing, S.P.R.R. to I	$1,020,000	189
S-29	Leon Ck. Reloc. / Floodproofing, IH 10 Fronta	$635,000	189
S-24	Leon Ck. Floodplain Rectification, IH 10 to Mo	$17,944,000	171
S-23	Leon Ck. Floodplain Rectification, Moray Rd. t	$24,891,000	164
	TOTAL	$71,041,123	

PROJECT LISTING
PROJECTS WITH IDENTIFIED FUNDING SOURCE
SAN ANTONIO RIVER WATERSHED
(GREEN)

CONSTRUCTION PROJECTS:

Bexar County Proposed Construction Projects

Key	Description
CT-1	FOSTER ROAD STRUCTURE REPLACEMENT - (3) U.S.-87 to New Sulphur Springs Road
CT-48	PADRE BOULEVARD BRIDGE WIDENING ($400,000)

City of San Antonio 1999 Bond Election Projects

Key	Description
BD-1	39th Street #58M Phase II A - Street and drainage construction in area bounded by Commerce, 39th Street, Phase Street and Acme Street. ($739,108)
BD-2	Ansley Boulevard Drainage #1091 - Provides for street reconstruction and drainage. Funded for design, right-of-way acquisition and partial construction. ($2,589,491)
BD-3	Ave Maria Drainage - Street reconstruction, underground drainage system, and Constructs a concrete channel at Jackson -Keller south to the 300 block of Ave. Maria ($2,200,000)
BD-6	Culebra Drainage Project #58F (Zarzamora) - Improves drainage to Zarzamora Creek Between Culebra and Commerce. ($4,394,000)
BD-8	Flores/Breeden/Beacon Outfall Phase II (Phase I from '94 Bond Program) - Provides a drainage outfall line along San Pedro Ave. From Olmos Creek to Basse Rd., along Basse Rd. From San Pedro to Breeden, and along Breeden from Basse Rd. To Lamanda. ($1,051,700)
BD-10	Harris Storm Drainage (Alvarez, Glass, Cass, Halstead) - Design and reconstruction of Alvarez, Glass and Cass streets from Halstead to Nogalitos and Halstead from IH-10 to Glass. ($1,731,687)
BD-11	Howard Drainage (Wildwood to El Monte) - Reconstructs Howard with curb, sidewalks, driveway approaches and necessary drainage. ($737,828)
BD-14	Military Ditch #65 - Improves Six Mile Creek from Wabash across Military to Zarzamora. ($1,657,572)
BD-15	Octavia #63 Phase II - Street drainage improvements from Galdston on the north, S. Flores on the east, Chalmers and Keopke on the south and IH-35 on the west. ($3,475,901)
BD-16	Rip Rap #69 Phase II C - Improves drainage to complement Community Development Block Grant-funded projects bordered by Commercial, W. Gerald, Pleasanton and Canavan. ($3,000,000)
BD-19	San Antonio River Improvements - Provides funding to assist Bexar County and the San Antonio River Authority to make flood control improvements along the San Antonio River from Brackenridge Park to Mission Espada including the Brooklyn Dam. ($5,259,997)
BD-21	Dell Street Drainage (100 Block) ($438,817)
BD-22	Escalon Street Drainage #1008 ($963,342)
BD-23	Lockhill-Selma Road: George to Wurzbach Road ($3,500,000)
BD-25	S. Flores Drainage #70-70A, Phase II, Part 3 (87) ($2,200,000)
BD-27	Wingate / Oriental / Floyd Drainage #1050 ($1,808,181)
BD-32	Upper Six Mile Creek Drainage #83F ($4,662,459)
BD-36	39th Street #58M, Phase III ($600,652) ($600,652)
BD-40	Baylor St. - San Pedro Ck. To Flores St. ($205,998)

BD-45	Callaghan: Bandera to Horseshoe Bend ($2,900,000)
BD-46	Callaghan : W. Horseshoe Bend to Ingram ($1,618,647)
BD-48	Claremont/Eleanor/Natalen, Phase II ($687,975)
BD-49	Claremont/Eleanor/Natalen, Phase III ($800,714)
BD-51	Drury Lane: Escalon to Dead End ($144,552)
BD-55	Elsmere: Michigan to Capitol ($125,441)
BD-56	F Street: Pecan Valley to IH 10 ($186,419)
BD-57	Florida: IH37 to St. Mary's ($1,450,300)
BD-58	Frio City Road: Brazos to Zarzamora ($2,086,272)
BD-61	Gevers: IH 10 to Harding ($644,645)
BD-70	Mahncke Area Streets, Phase II ($957,918)
BD-71	McKay (400 & 500 Blks) ($157,550)
BD-73	Mitchell Street: Probandt to Roosevelt ($1,463,764)
BD-74	Mockert Street Area: (Mockert, Forest, Lambert, Klein) ($1,300,000)
BD-78	Thorain: Buckeye to S.P. Railroad ($327,750)
BD-85	Western #74 Phase III A ($943,993)

City of San Antonio / Bexar County Flood Control Projects - 1996

Key	Description
SA-4	Major drainage improvements and channel work along the San Antonio River in the areas of the proposed Mission Trails alignment. ($3,250,000)
SA-5	San Antonio River Improvements Project - Hildebrand to Josephine (Far North) ($1,992,000)
SA-6	San Antonio River Improvements Project - Josephine to Lexington (North) ($10,644,000)
SA-7	San Antonio River Improvements Project - Brooklyn Street Dam (North) ($917,000)
SA-8	San Antonio River Improvements Project - Guenther to Lone Star (South) ($1,874,000)
SA-9	San Antonio River Improvements Project - Lone Star to San Pedro Creek (South) ($1,700,000)
SA-10	San Antonio River Improvements Project - San Pedro Creek to Espada Dam (South) ($6,905,000)
SA-11	San Antonio River Improvements Project - Espada Dam to Espada Mission (Far South) ($4,232,000)
SA-12	San Antonio River Improvements Project - Espada Dam (South) ($11,675,000)

Texas Department of Transportation Projects

Key	Description
TX-1	24th Street - From Commerce to Culebra Avenue. Street and drainage construction. ($2,440,000)
TX-2	Lockhill Selma Road - From George Road to Whisper Path. Street reconstruction, widening and drainage. ($4,680,000)
TX-3	Mitchell Street - from Probandt to SP536 (Roosevelt avenue) - reconstruction, underground drainage system, widening. ($1,878,228)
TX-5	South Flores - From Alamo Street to San Pedro Creek - Reconstruct roadway with water, sewer and gas utility improvements. ($2,831,372)
TX-6	South Flores - From San Pedro Creek to Franciscan - Reconstruct roadway with water, sewer and gas utility improvements ($4,477,599)
TX-10	US-281 at Jones-Maltsberger - Repair riprap. ($30,000)

Corps of Engineers Proposed Construction Projects

Key	Description
COE-1	San Antonio River Pilot Channel south of 410 erosion
COE-2	San Antonio River Channel erosion downstream of Ashley Road
COE-3	Six Mile Creek @ San Antonio River Drop Structure eroded
COE-4	San Antonio River @ overflow to San Juan Ditch eroded
COE-5	San Antonio River @ San Juan Left Station Dam tri-lock eroded
COE-6	San Antonio River Tunnel Inlet, trash rakes, splitter walls

RELOCATION PROJECTS:

City of San Antonio:

Key	Description
BB-25	San Antonio River (Villamain Area - 2 Properties) ($365,438)
BB-26	Zarzamora Creek Area (Noriega Area - 16 Properties) (584,630)
BB-33	San Antonio River (Symphony Lane Area - 12 Properties) ($1,271,940)

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SAN ANTONIO RIVER WATERSHED

PROJECTS IDENTIFIED FOR FURTHER STUDY (Red)			
ID KEY	**PROJECT DESCRIPTION**	**ESTIMATED COST**	**TOTAL SCORE**
AH-5	Broadway street drainage	$15,000,000	319
AH-3	Austin Highway street drainage	$2,000,000	307
AH-1	North New Braunfels street drainage	$12,000,000	306
D-13	Vulcan Quarry Detention Pond	$1,997,125	306
S-30	Martinez Creek - Alazan Creek to Culebra	$6,851,000	298
SA-2	Shavano Park Detention Pond	$2,800,000	298
AH-2	Channel inlet at North New Braunfels	$1,000,000	293
AH-4	Drainage channel from Terrell Hills to Alamo	$1,000,000	287
D-14	Shavano Park Detention Pond	$5,711,478	282
D-15	Lockhill-Selma - George Road Channelization		279
D-17	West Avenue at Loop 410 Improvements		279
OP-1	Shook Avenue drainage channel improvemen	$1,100,000	275
CT-4	City of Elmendorf Drainage Improvements	$450,000	273
D-16	West Branch Channelization		269
D-24	Redland Detention Pond & Channelization		265
SA-1	Spencer Lane at IH 10 Detention Pond	$4,600,000	260
R-6	Dreamland Bridge - Dreamland and Olmos Cr	$2,676,625	250
CT-32	Real Road Low Water Crossing Replace	$73,834	245
	TOTAL	$57,260,062	

BEXAR COUNTY FLOOD ANALYSIS REPORT

DECEMBER 1, 1999

SAN ANTONIO RIVER WATERSHED

OTHER PROJECTS (Orange)			
ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	TOTAL SCORE
CT-39	Zigmont Road Low Water Crossing Replace	$139,188	239
CT-22	Gardner Road Low Water Crossing Replace	$68,145	235
R-5	Channel Clearing - on the East Olmos Creek	$221,778	233
CT-38	Blue Wing Road Low Water Crossing Replac	$203,559	221
SA-17	Pyron Road at Old San Antonio River LWC re	$300,000	221
BD-80	W. French - Street and Drainage	$325,772	209
BD-86	Wilson - Street and Drainage	$892,537	209
BD-54	El Monte - Street and Drainage	$400,000	199
BD-64	Hilton - Street and Drainage	$318,984	199
BD-84	Waverly Ph. II - Street and Drainage	$445,000	199
BD-68	Las Moras - Street and Drainage	$71,376	198
BD-52	Durango - Street and Drainage	$1,556,841	191
S-9	Gate #2 Brackenridge Park	$493,000	144
	TOTAL	$5,436,180	

PROJECT LISTING
PROJECTS WITH IDENTIFIED FUNDING SOURCE
SALADO CREEK WATERSHED
(GREEN)

CONSTRUCTION PROJECTS:

Bexar County Proposed Construction Projects

Key	Description
CT-44	OLD CORPUS CHRISTI ROAD BRIDGE WIDENING ($400,000)

City of San Antonio 1999 Bond Election Projects

Key	Description
BD-4	Blossom/Woodbury #1007 Phase II (Phase I from '94 Bond Program) - Provide a drainage system to relieve drainage problems on Woodbury Drive, Nacogdoches and Blossom Lane. ($2,200,000)
BD-5	Busby and Flamingo Drainage - Provides drainage improvements and adds curbs on Busby and Flamingo ($70,000)
BD-12	IH-35 / Gembler (Salado Creek) - Engineering and channel improvements for Salado Creek from IH-35 to Gembler Road. ($660.000)
BD-13	Lanark Drainage - Multiple box culvert, from Overland and Lakeshore west to Lanark, to pick up drainage from Walzem Creek. ($3,027,480)
BD-17	James Park Development and Holbrook Road Improvements - Acquires property, develops bikeways and nature trails along Holbrook Road near Salado Creek and Improves James Park. ($910,657)
BD-20	Wheatley Heights Buyout and Salado Creek Greenway Development - Acquires and develops stormwater and hike/bike facilities along Salado Creek between Martin Luther King Park and Southside Lions Park. ($3,540,384)
BD-24	Rittiman: Austin Hwy to Harry Wurzbach ($1,018,893)
BD-30	Higgins: Nacogdoches to Stahl ($2,407,407)
BD-33	Pecan Valley: "J" Street to IH 10 ($1,200,000)
BD-41	Bee Street: Walters to Frank ($411,000)
BD-42	Belgium: Picarde to Coliseum ($1,702,566)
BD-43	Bitters: Broadway to Nacogdoches ($1,953,326)
BD-53	Duval/Seguin: Pierce to Walters ($880,000)
BD-56	F Street: Pecan Valley to IH 10 ($186,419)
BD-60	G Street: Pecan Valley to Dead End ($137,042)
BD-63	HI Lions 80 Mod Phase III & V ($5,476,000)
BD-66	Holbrook Rd. Area Improvements Phase I ($1,200,000)
BD-69	Leonhardt: Encanta to Weidner ($809,391)
BD-81	W.W. White Phase I: Rigsby to Lord ($3,030,546)
BD-88	Carson Street: Walters to Frank ($274,064)

Texas Department of Transportation Projects

Key	Description
TX-7	IH-35 West Frontage Road - From Holbrook to Walzem Road - Repair riprap and clean out wash-off. ($1,177,900)
TX-11	IH-410 at Beitel Creek - Repair erosion and remove debris. ($78,171)
TX-14	FM-2696 South of Cibolo Creek - Repair roadbed, erosion and guardrail.

RELOCATION PROJECTS:

Bexar County Property Buy-Back Program

Key	Description
BB-14	Southton (1 Property w/ improvements)

PHASE I (Approximately 60% Complete)

BB-18	Tributary to Salado Creek (Pipestone Area -3 Properties) ($408,600)
BB-19	Beitel Creek Area (Briarglen Drive -13 Properties)
BB-21	Salado Creek (Wheatley Heights Area -145 Properties)
BB-24	Rosillo Creek Area (McNutt Area - 2 Properties)

PHASE II (Proposed)

BB-27	Salado Creek (Wheatley Heights Area -133 Properties)
BB-29	Rosillo Creek Area (McNutt Area - 20 Properties)
BB-31	Beitel Creek Area (Morga Area - 14 Properties)
BB-32	Beitel Creek Area (Wurzbach Area - 9 Properties)

BEXAR COUNTY FLOOD ANALYSIS REPORT

DECEMBER 1, 1999

SALADO CREEK WATERSHED

PROJECTS IDENTIFIED FOR FURTHER STUDY (Red)			
ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	TOTAL SCORE
D-18	NRCS RETENTION POND - Site 15R McAllis	$4,735,000	320
V-2	Weidner Road along Beitel Creek, Old O'Con	$844,750	303
V-8	Holbrook Reroute at Austin Highway	$345,900	295
D-19	BEITEL CREEK North of Loop 410 Channeliz	$2,200,000	287
D-21	PERRIN-BEITEL CHANNELIZATION	$1,100,000	280
D-22	HOLBROOK ROAD CHANNELIZATION	$800,000	283
SA-14	Salado Creek Study - South Loop 410 to East	$75,000	279
SA-15	Salado Creek Study - East Southcross to Rig	$75,000	279
CT-24	Deer Cross Road Low Water Crossing Repla	$186,325	265
S-18	Salado Ck. Floodplain Rectification, Pletz Pk.	$22,028,000	261
V19	Panther Springs Creek at West Avenue	$250,000	259
V11	Mud Creek at Jones-Maltsberger Culvert Rep	$250,000	257
V12	Elm Creek at Jones-Maltsberger Culvert Repl	$400,000	257
V16	Salado Creek at West Avenue Bridge	$2,682,000	251
S-13	Salado Ck. Floodplain Rectification, Comanch	$6,885,000	247
	TOTAL	$42,856,975	

BEXAR COUNTY FLOOD ANALYSIS REPORT

DECEMBER 1, 1999

SALADO CREEK WATERSHED

OTHER PROJECTS (Orange)			
ID KEY	PROJECT DESCRIPTION	ESTIMATED COST	TOTAL SCORE
V17	Beitel Creek at Vicar Road Bridge	$1,500,000	233
V18	Salado Creek at Roland	$2,400,000	233
CT-37	Menger Road Low Water Crossing Replace	$280,000	231
V15	Elm Creek at Bulverde Road Culvert Replace	$500,000	231
S-15	Salado Creek - "J" Street Park - Channel Rec	$2,949,000	228
S-14	Salado Ck. Floodplain Rectification, "J" to Rig	$6,883,000	226
S-20	Salado Ck. Floodplain Rectification, Eisenhau	$42,484,000	226
V14	Salado Creek at IH-35 Frontage Roads Bridg	$3,000,000	223
V13	Salado Creek at Binz Engleman Bridge	$3,240,000	215
BD-47	Cardiff - Street and Drainage	$660,392	201
BD-82	WW White Road Ph. II - Street and Drainage	$2,740,932	201
V10	Salado Creek Rectification - Wetmore to Jone	$20,189,400	200
BD-39	Aurelia - Street and Drainage	$210,242	199
S-12	Salado Ck. Channel Rectification, Southton to	$1,609,000	124
S-11	Salado Ck. Upstream of Southton Rd. Bridge	$1,001,000	133
	TOTAL	$89,646,966	

PROJECT LISTING
PROJECTS WITH IDENTIFIED FUNDING SOURCE
CIBOLO CREEK WATERSHED
(GREEN)

CONSTRUCTION PROJECTS:

Bexar County Proposed Construction Projects

Key	Description
CT-46	EVANS ROAD BRIDGES / ROAD CONSTRUCTION ($1,700,000)

Texas Department of Transportation Projects

Key	Description
TX-8	IH-10 South Frontage Road - At Woman Hollering Creek - Remove and regrade channel. ($14,159)
TX-9	IH-10 South Frontage Road - 0.4 miles west of Pfeil Road - Repair riprap channel. ($7,774)
TX-13	FM-1516 at West Salatrillo Creek - Repair erosion and clean culverts. ($23,527)
TX-14	FM-2696 South of Cibolo Creek - Repair roadbed, erosion and guardrail.

RELOCATION PROJECTS:

Bexar County Property Buy-Back Program

Key	Description
BB-1	Lyndon Dr. (33 Properties, 22 w/ improvements) ($968,813)
BB-9	Schaefer Rd. (10 Properties, 10 w/ improvements) ($479,776)
BB-10	Lost Meadows (1 Property, no improvements) ($165,022)
	Aztec/Bolton:
BB-11	Aztec Lane (17 Properties, 12 w/ improvements) ($402,390)
BB-12	Bolton (11 Properties, 11 w/ improvements) ($530,236)

BEXAR COUNTY FLOOD ANALYSIS REPORT

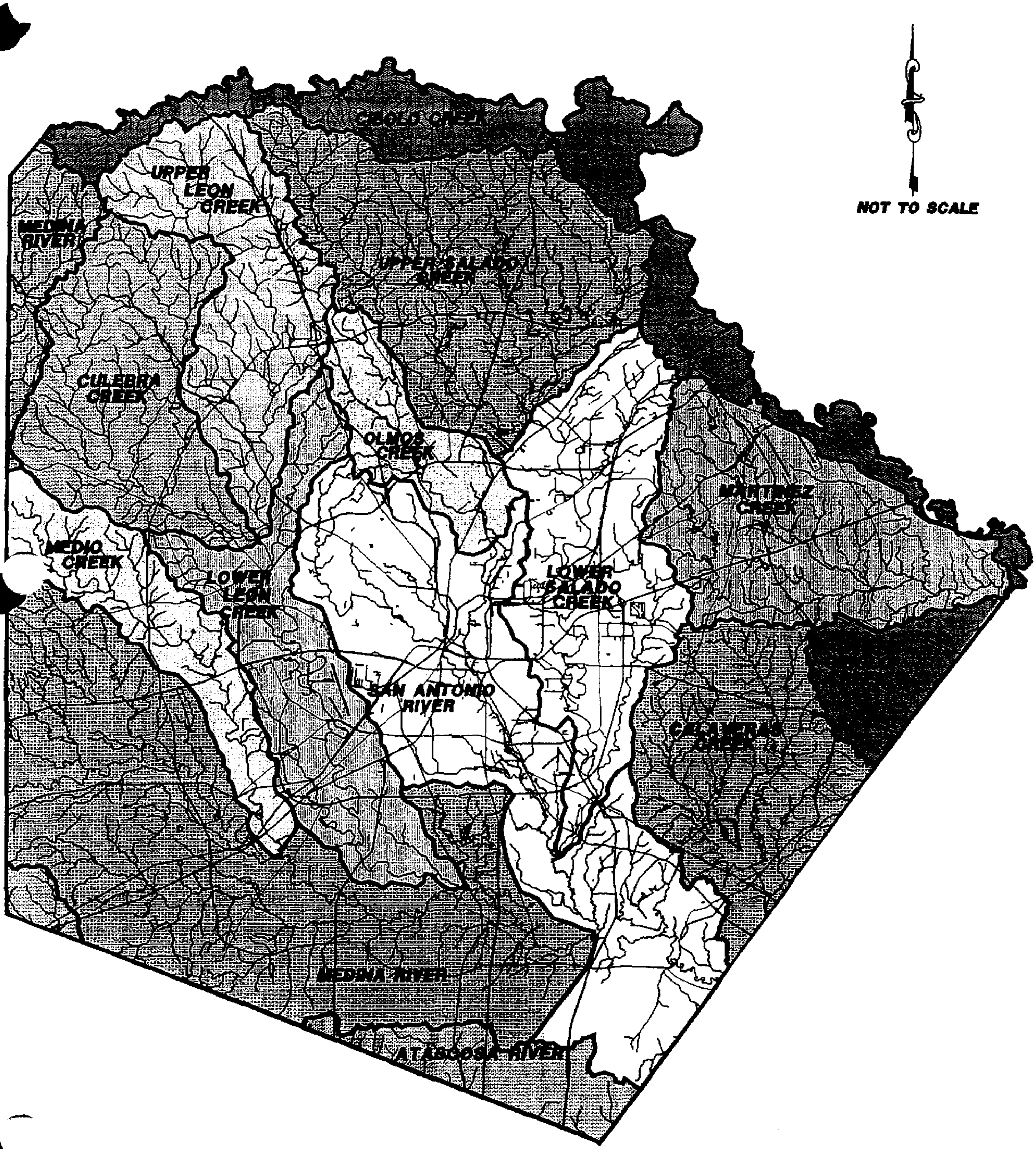
DECEMBER 1, 1999

CIBOLO CREEK WATERSHED

PROJECTS IDENTIFIED FOR FURTHER STUDY (Red)			
ID KEY	**PROJECT DESCRIPTION**	**ESTIMATED COST**	**TOTAL SCORE**
S-31	Cibolo Ck. Reloc. / Floodproofing, at Schaeffe	$852,000	283
S-32	Cibolo Ck. Reloc. / Floodproofing, Schaeffer	$368,000	283
CT-31	Glen Fair Road Low Water Crossing Replace	$127,645	257
CT-8	Blanco Road Low Water Crossing Replace	$565,000	255
CT-10	Smithson Valley Low Water Crossing Replac	$560,000	255
CT-29	Old Fredericksburg Rd. Low Water Cross Re	$460,000	249
CT-14	Trainer-Hale Low Water Crossing Replace	$430,000	241
CT-16	Weir Road Low Water Crossing Replace	$425,000	241
CT-17	Schaeffer Road Low Water Crossing Replace	$450,000	241
	TOTAL	$4,237,645	

OTHER PROJECTS (Orange)			
ID KEY	**PROJECT DESCRIPTION**	**ESTIMATED COST**	**TOTAL SCORE**
CT-34	New Berlin Road Low Water Crossing Replac	$180,000	239
CT-35	Uhlrich Road Low Water Crossing Replace	$185,000	239
CT-36	Abbott Raod Low Water Crossing Replace	$145,000	239
UC-1	Kitty Hawk Road at Salatrillo Bridge Replace	$500,000	239
CT-28	Specht Road Low Water Crossing Replace	$450,000	231
CT-9	Bulverde Road Low Water Crossing Replace	$575,000	216
	TOTAL	$2,035,000	

OVERALL WATERSHED MAP



BEXAR COUNTY FLOOD ANALYSIS REPORT

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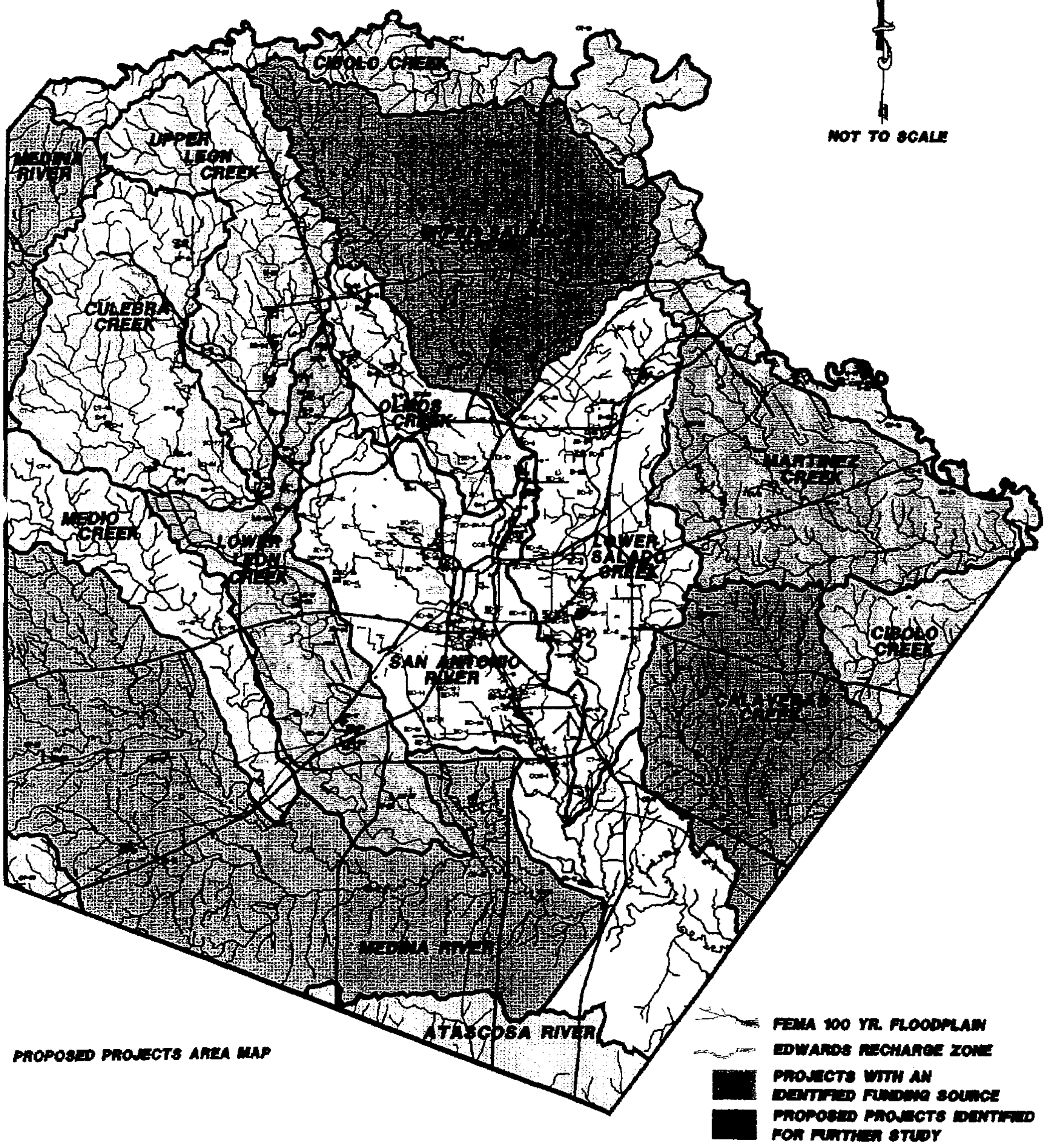
PROPOSED PROJECTS AREA MAP



BEXAR COUNTY FLOOD ANALYSIS REPORT

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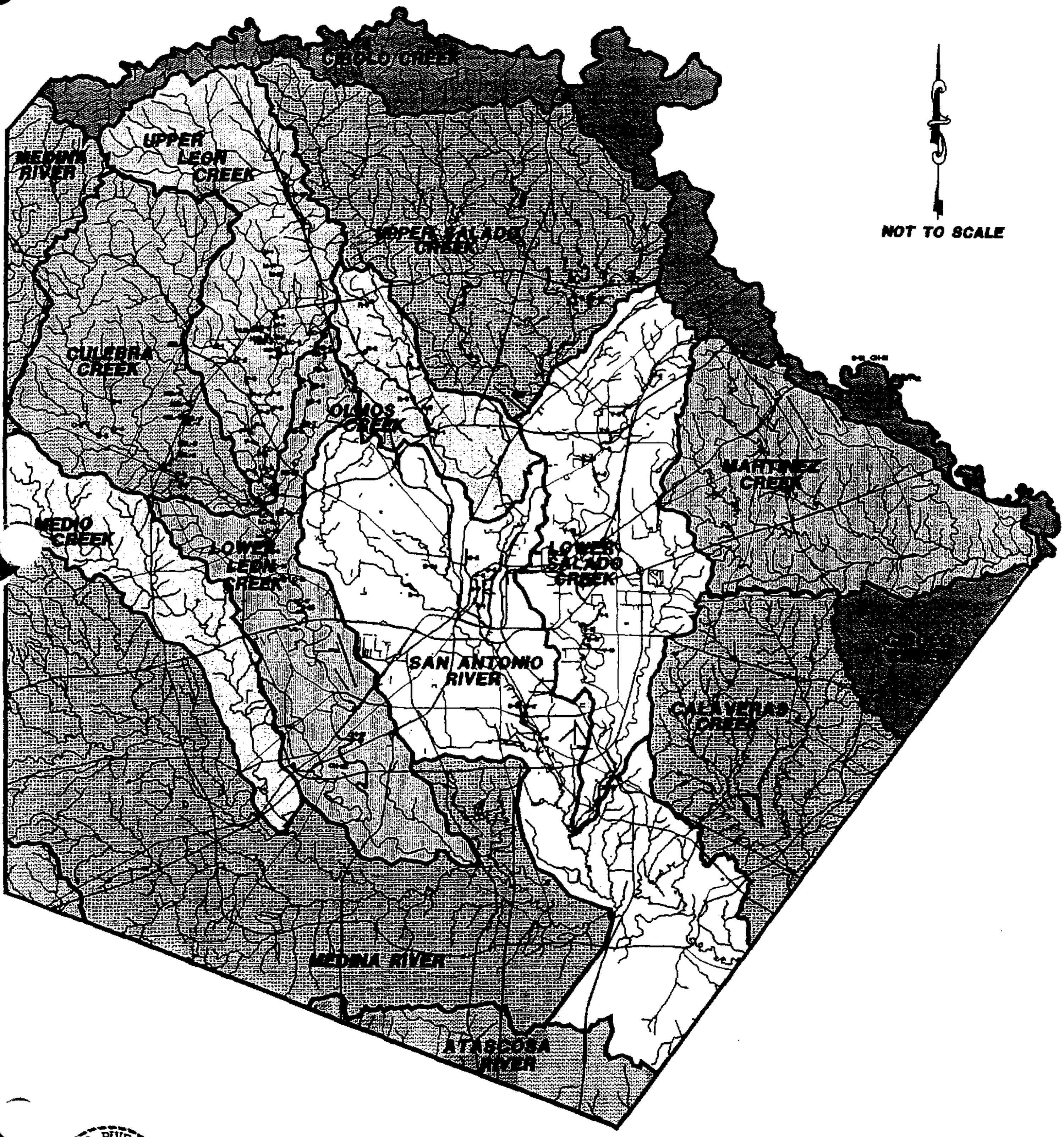
PREVIOUSLY STUDIED AREAS MAP



BEXAR COUNTY FLOOD ANALYSIS REPORT

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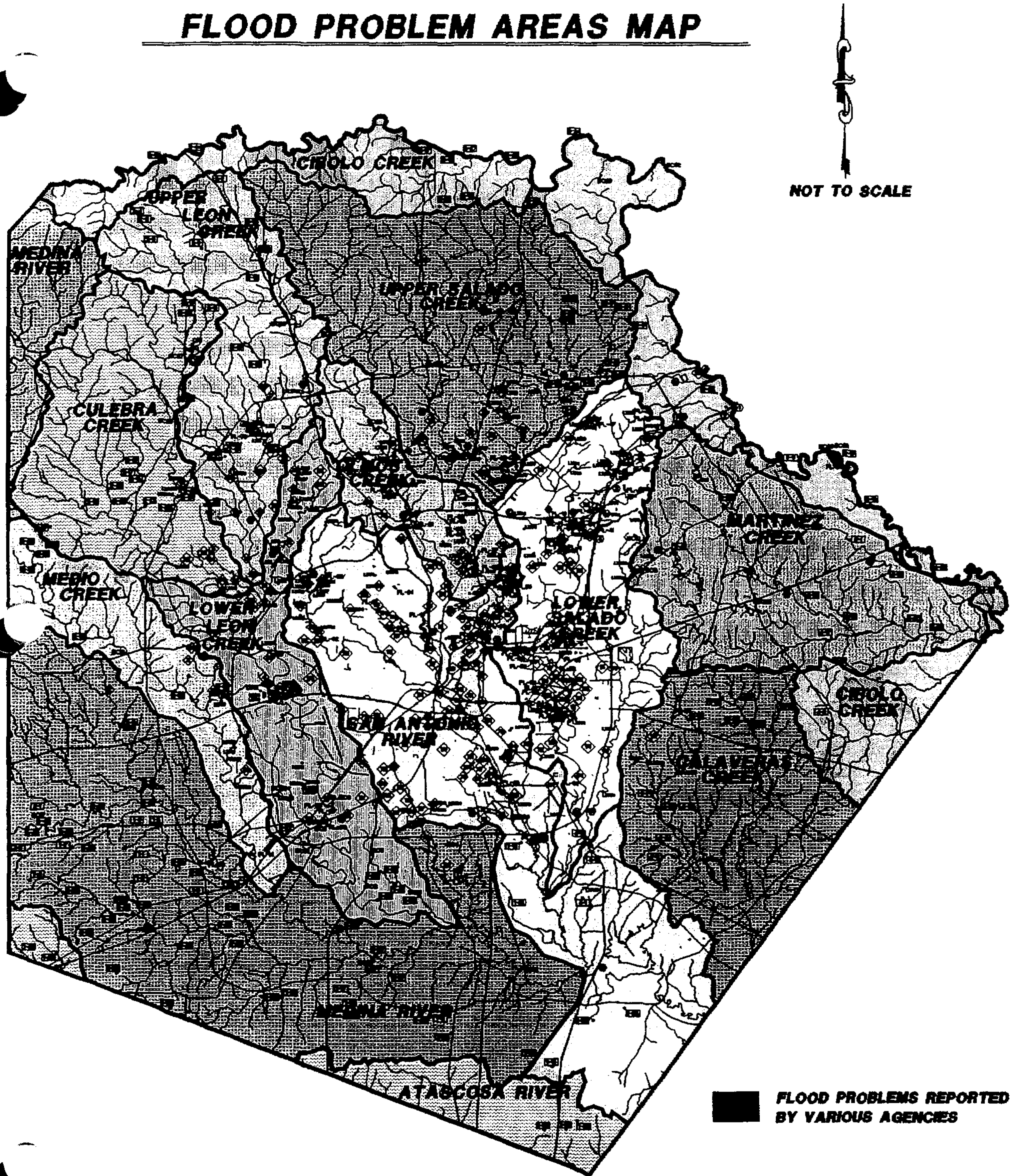
FLOOD PROBLEM AREAS MAP



BEXAR COUNTY FLOOD ANALYSIS REPORT

DECEMBER 1, 1999

APPENDIX F

Leon Creek Watershed Master Drainage Plan

Leon Creek Watershed Master Drainage Plan

City of San Antonio
Public Works Department

November 1996

Pape-Dawson Consulting Engineers, Inc.
HNTB Corporation
Maestas & Bailey, Inc.
E.L. Fly & Associates, Inc.

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SECTION I. PROJECT SCOPE & OBJECTIVES

STUDY SPONSOR & ADVISORS

The Leon Creek Watershed Master Drainage Plan project was developed by the City of San Antonio Public Works Department. This project is being funded and administered through the same department. The Public Works Department is coordinating with the San Antonio Water System, Bexar County, Texas Department of Transportation, CSA Planning Department, CSA Parks and Recreation Department, Edward's Underground Water District and other local entities to coordinate the common interest of all parties.

A citizens advisory committee was created by San Antonio's City Council to seek citizen input and insure their representation in the formulation of the Drainage Master Plan. This committee is chaired by Councilman Howard Peak and has been named the Drainage Regulation and Review Committee. Members of this committee are listed in the Table I-1 below.

Table I-1
DRAINAGE REGULATIONS & REVIEW COMMITTEE

Committee Member	Representing
Howard Peak (Chair)	City Council
Bob Ross	City Council
Linda Billa Burke	City Council
Ed Cross	Planning Commissioner
Mike Cude	Professional Engineers in Private Practice
Norm Dugas	Real Estate Council
Dan Kossl	Greater S.A. Homebuilders Assoc.
Mike Gonzales	San Antonio River Authority
June Kachtik	Open Space Advisory Board
Charlie Connors	NODD
Unknown	Near Westside neighborhood representative
Larry DeMartino	Southeast neighborhood representative
John German	CSA Department of Public Works
Ray Rendon	Bexar County Department of Public Works
staff	SAWS
Steve Ramsey	SARA
Gayle Kipp	EUWD
John Kight	CSA Project Manager

PURPOSE

The City of San Antonio has authorized this study with the intent of developing a Master Drainage Plan for the Leon Creek Basin including the Leon Creek and its major tributaries from U.S. Hwy 90 to north of Loop 1604. Flood plain limits based on existing conditions will be determined for the 10, 25, 50, 100 and 500 year storm events. Ultimate development flood plain limits will be determined for the 25 and 100 year storm events. From the existing and ultimate development flood plain analysis, projects and watershed management practices will be identified to reduce existing and potential flood hazards. A ten year plan to implement the projects, identified to reduce flood hazards, will be developed and will include an estimated cost, priority and implementation schedule.

SCOPE OF SERVICES

This project consist of developing a Master Plan for drainage improvements in the Leon Creek Watershed in the southwest, west and northwest areas of the City of San Antonio and its ETJ. Other tributaries to be included in the study are Huebner Creek, French Creek, Helotes Creek, Culebra Creek, Huesta Creek and Maverick Creek. There are approximately 58.4 miles of related flood plains included in this study.

Limits of Detailed Study

Although this study addresses the entire Leon Creek Watershed, detailed flood plain delineation, site specific analysis and project development are limited to the segments of Leon Creek described in Table I-2 below.

Table I-2
LIMITS OF FLOOD PLAIN DELINEATION STUDY

Creek	Limits of Detailed Study	Length
Leon Creek	U.S. 90 to Loop 1604	17.8 miles
Culebra Creek	Leon Creek to Galm Road	9.1 miles
Helotes Creek	Culebra Creek to Helotes city Limits	5.7 miles
Huebner Creek	Leon Creek to IH 10	8.7 miles
French Creek	Leon Creek to Helotes city Limits	7.6 miles
Huesta Creek	Leon Creek to fork in creek north of Loop 1604	3.8 miles
Maverick Creek	Leon Creek to Heuermann Road	5.7 miles
Study Total		58.4 miles

Specific Task

The study is divided into a preliminary phase and a design phase. The preliminary phase is a research or discovery effort to determine what information has been developed in the past and to generally develop background data for the design phase. After completion of the preliminary phase, design efforts will begin to develop the detailed delineation of the existing and ultimate development flood plain. Specific projects will be developed and included in a ten year master drainage plan to reduce flood hazards within the Leon Creek Watershed.

During the preliminary phase, watershed maps were developed illustrating the full limits of the Leon Creek Watershed. All available drainage studies prepared for public or private use were identified through file searches and interviews and an index of these studies was prepared. These studies were then analyzed to determine their usefulness for purposes of this watershed study. This report is a summary of the preliminary phase effort.

The design phase will encompass development of a hydrologic model of Leon Creek and its major tributaries. This model will include quantitative hydrology and hydraulic calculations for the 10, 25, 50, 100, and 500 year storm events based on existing conditions of the watershed. In areas where private property is found to be inundated by the 100 year rainfall event, projects will be developed to mitigate the flooding in each location. A map depicting the existing flood plain overlaid on the City's Block Maps will be produced in conjunction with the study. A model will also be developed for the 25 and 100 year storm event and overlaid on the City's Block Maps based on ultimate development conditions in the watershed to determine potential flood mitigation practices or identify improvement projects to offset the effects of development and prevent future development from creating flooding problems. Consideration will be given to water quality issues, potential reuse and recharge projects and proposed by SAWS and other environmental concerns. A cost estimate and ten year plan to implement the specific projects identified in the design phase will be prepared along with project priorities.

Throughout this process, all efforts will be coordinated through the City's designated watershed study manager to insure that all interested parties are represented. This may include being present at citizen group meetings and coordination meetings with other governmental agencies. Upon completion of the study, a final report will be issued to present the results and recommendations to the City.

SECTION II. DISCOVERY

INTRODUCTION

San Antonio is located in the south-central portion of Texas, approximately 150 miles from the Gulf of Mexico and 100 miles from the geographical center of Texas. Situated in Bexar County on the San Antonio River, the terrain to the northwest slopes upward to the Edwards Plateau and to the southeast it slopes downward to the Gulf Coastal Plains. These two distinct geological regions are divided by the Balcones Escarpment, a critical recharge zone for the Edwards aquifer. The rolling hills of the area account for the range in elevation from 600 feet MSL (feet above mean sea level) in southern San Antonio to 1000 feet MSL just below the Balcones Escarpment to over 1600 feet MSL in the upper reaches of Bexar County. A location map of the project area is shown on Figure II-1.

Watershed Geographic Setting

The Leon Creek Watershed is located in the northwestern portion of Bexar County stretching from the confluence of Leon Creek with the Medina River, south of Loop 410 to the southwest of the City, to the northwest limits of Bexar County. Leon Creek's total watershed area is 237 square miles at the Medina River. The watershed limits are shown on Figure II-1.

The watershed area includes a portions of the cities of San Antonio, Leon Valley and Helotes. Kelly and Lackland Air Force Bases are located in the southern portion of the watershed adjacent to US Highway 90. Just upstream of the bases near the intersection of Commerce Street and Loop 410 is the Southwest Research Institute. All of these facilities were developed prior to the 1960's.

Development of the Leon Creek Watershed has been extensive in the last 30 years or so. The vast majority of the commercial and residential development outside Loop 410 has be since the late 60's. Aerial mapping flown in the early 60's from the Soil Conservation Service, Soil survey for Bexar County, shows very little development outside of Loop 410 . Major development since the early 60's include: the Medical Center, the University of Texas at San Antonio and the USAA campus. Since the early 80's the following areas have been developed: Sea World, Fiesta Texas and The Dominion.

Figure II-1

WATERSHED LOCATION MAP

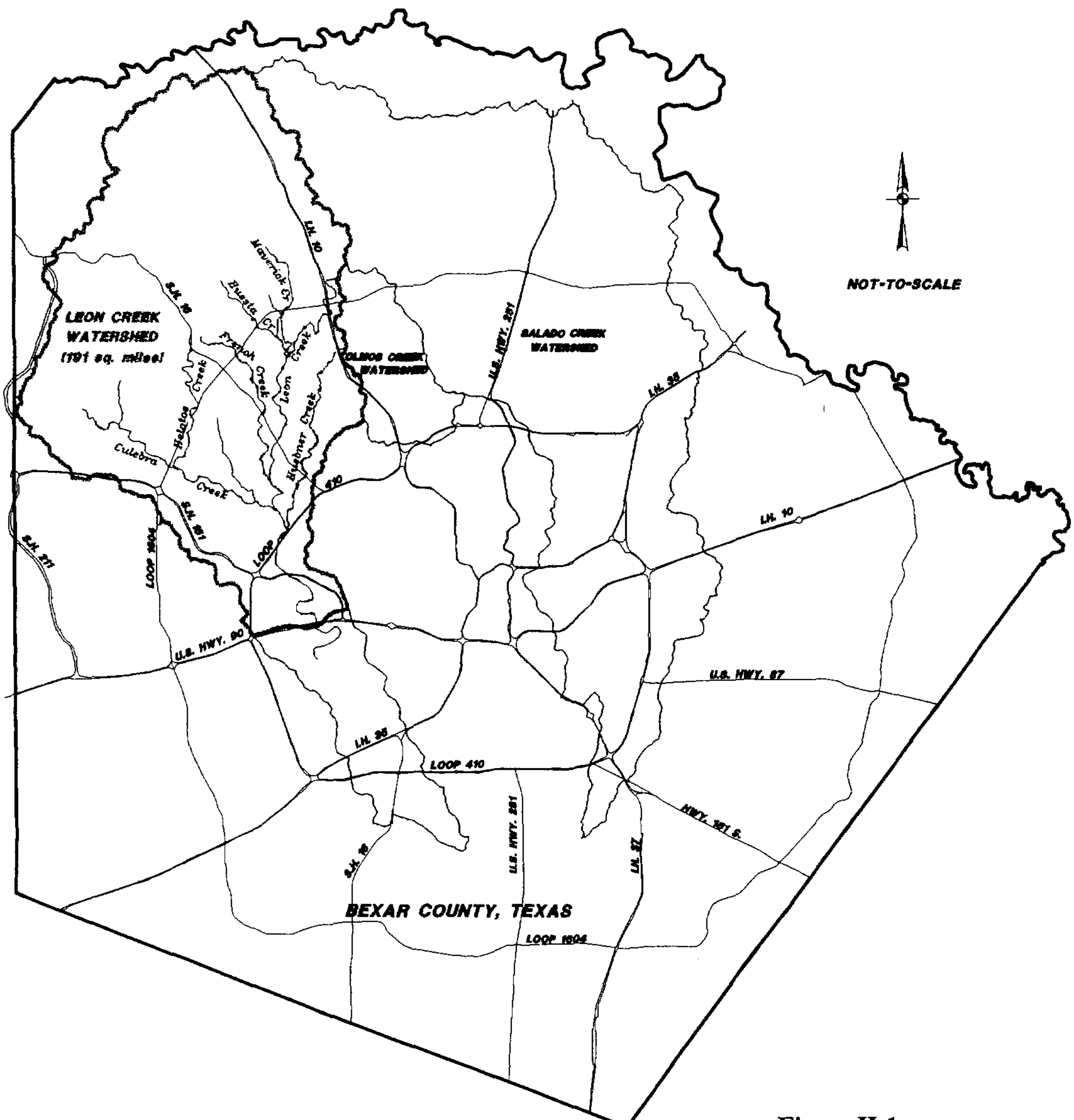

Figure II-1

WATERSHED LOCATION MAP

Leon Creek

Leon Creek originates in the northwestern portion of Bexar County. The stream flows in a southeasterly direction to its confluence with the Medina River. Within the Leon Creek Watershed are numerous other tributaries to the Leon Creek. Within The "Leon Creek Watershed Drainage Mater Plan" study area, only those segments or reaches of Leon Creek and its major tributaries shown in Table I-2 will receive specific analyses to determine the extent of the flood plain for design storm events.

HISTORIC RAINFALL & RUNOFF

The climate of San Antonio is best described as sub-tropical: continental during the winter months and hot during the summer. Due to its location between the semi-arid area to the west and the heavy rainfall area to the east and southeast, the annual rainfall of approximately 30 inches per year is sufficient for the normal production of most crops. Precipitation is reasonably distributed throughout the year, with the heaviest rains typically falling during May, in the spring, and September, in the fall. Similar to other Texas cities, rainfall in San Antonio varies greatly from year to year, ranging from approximately 10 inches in 1917 to approximately 50 inches in 1919. Recently, from December of 1992 To June of 1993, San Antonio received in the neighborhood of 50 inches of rain.

Rainfall from April through September usually occurs with thunderstorms. Large amounts falling in short periods of time create flash floods over some areas of the city. Winter precipitation occurs as light rain or drizzle, although thunderstorms and heavy rains have occurred in all months of the year. According to John Patton, of the National Weather Service, the average rain for San Antonio produces 1" to 1½" over a 50 square mile area and last for approximately 60 minutes, peaking in approximately 20 minutes. There are generally 40 to 45 of these storms each year that deposit rainfall over different parts of Bexar County.

Heavy rains over short periods of time cause flash flooding in certain sections of the city. Perhaps the worst flood of the century occurred in 1921 when 31.8 inches of rain fell in a 24 hour consecutive period of time[1]. This storm started as a hurricane along the Mexican coastline and moved inland and northeasterly across Texas. Five to nine feet of water stood in downtown San Antonio.

San Antonio's location on the Balcones Escarpment can be an intersection point for cold northern air to meet the warm moist prevailing southeast breezes of the coast. Frequently this condition results in rain, sometimes intense.

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[1] *The amount of rain officially recorded for the month of September, 1921 is 8.27 inches. The 31.8 inches of rain occurred at a non-official localized rain gage.*

Throughout the "average" year measurable rain may be expected to fall on 80 days, with thunderstorms accounting for 36 of these. Rainfall lasts for only a brief period of time during the summer months as is characteristic of showers, except when the area comes under the influence of tropical storms. Longer periods of rainfall, drizzle and fog occur during the winter months when cool air stalls and is overrun by warm moist gulf air.

Rainfall Data

Official rainfall data was obtained from the National Climatic Weather Center in Ashville, North Carolina. Monthly and annual rainfall for San Antonio is presented in Table II-1. Figure II-2 illustrates the annual rainfall totals from 1900 to 1990.

During our research we observed that rainfall intensities typically can vary widely between different geographical area of the city. For example, on April 4 & 5, 1991, in Shavano Park 10.52 inches of rain was recorded in about two hours. However, small amounts of rainfall were measured at Loop 1604/IH 10 and at Vance Jackson; both areas adjacent to Shavano Park. Another example storm event happened on June 5, 1986 traveled from the southwest to the northeast parts of town. Rainfall along this line varied from about 6 inches to over 9 inches in Windcrest. Other areas of the city not directly within the path of the storm received less rain, within the range of 4 to 5 inches.

U. S. G. S. Stream Gage Recording Station

The United States Geological Survey (USGS) maintains a stream gaging station on the Leon Creek in the vicinity of Kelly and Lackland Air Force Bases. The station records the average daily flow in Leon Creek. Data from the USGS recording station provide daily mean flows and the maximum of the average daily discharge values in cubic feet per second (cfs) during each month. This recording station does not record the instantaneous peak flow, and therefore, does not provide any data to indicate what the peak flood flow from a storm event might have been. Table II-2 shows the monthly summaries of these values for the last 10 years.

Table II-1
SAN ANTONIO RAINFALL

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1900	5.42	0.34	4.35	9.11	4.47	0.78	2.24	4.05	0.97	2.94	1.82	0.70	**37.19**
1901	0.41	0.71	0.54	0.59	2.47	1.86	3.79	0.96	4.20	0.12	0.64	0.15	**16.44**
1902	0.70	0.55	0.12	2.31	3.14	0.02	3.85	0.00	5.52	2.54	3.53	2.51	**24.79**
1903	2.39	7.88	1.29	1.74	1.95	4.75	7.52	0.20	2.96	1.61	TR	0.82	**33.11**
1904	0.30	0.64	0.16	3.25	5.93	1.73	3.50	1.97	7.74	2.86	0.24	1.06	**29.38**
1905	0.88	1.62	2.74	6.08	4.11	6.01	2.82	0.51	1.80	1.83	2.63	1.56	**32.59**
1906	0.29	1.07	1.29	3.94	0.86	0.62	4.34	2.25	1.74	1.09	1.33	1.60	**20.42**
1907	0.80	0.78	1.88	3.77	4.64	0.18	2.68	0.80	1.11	3.54	6.79	0.80	**27.77**
1908	1.01	2.42	1.31	2.87	6.07	0.30	0.66	4.27	3.92	1.47	2.61	1.61	**28.52**
1909	0.10	0.71	0.88	0.82	1.77	1.65	3.27	1.70	0.56	1.55	0.53	1.38	**14.92**
1910	0.88	0.78	0.42	3.31	1.56	0.55	1.37	0.37	0.56	3.35	1.38	1.69	**16.22**
1911	0.02	1.66	2.72	3.41	2.01	0.30	1.03	0.48	0.12	3.57	2.01	1.35	**18.68**
1912	0.28	5.12	1.86	1.78	1.49	3.22	1.27	0.29	1.47	2.74	1.45	2.76	**23.73**
1913	0.90	1.91	1.36	1.32	2.88	2.90	0.03	1.29	7.21	8.86	4.55	4.47	**37.68**
1914	0.09	1.38	0.83	5.26	5.59	0.01	0.02	7.80	2.24	5.78	3.24	1.43	**33.67**
1915	0.53	1.81	1.20	11.64	1.89	0.03	0.92	3.90	2.39	1.11	0.29	1.57	**27.28**
1916	2.25	0.01	0.79	1.85	3.85	0.49	4.53	5.07	3.78	2.57	2.14	0.33	**27.66**
1917	0.95	0.49	0.16	0.28	3.30	0.02	2.19	0.10	1.39	0.48	0.75	TR	**10.11**
1918	0.10	1.10	1.45	5.14	2.80	3.35	1.68	2.61	1.49	4.05	2.53	3.61	**29.91**
1919	3.78	1.56	1.39	3.60	3.06	7.01	7.88	2.14	7.61	8.66	1.56	2.05	**50.30**
1920	3.36	0.27	0.83	1.09	2.42	2.83	0.39	2.26	0.15	2.85	2.95	0.16	**19.56**
1921	1.40	0.23	5.91	2.78	2.01	4.59	0.48	0.45	8.27	1.02	1.16	0.23	**28.53**
1922	1.23	1.26	3.29	5.46	3.46	3.92	0.10	0.27	0.97	3.55	0.98	0.10	**24.59**
1923	0.46	5.47	3.07	3.24	1.33	0.79	2.54	2.94	2.98	1.39	4.21	4.29	**32.71**
1924	0.97	3.02	1.29	3.36	4.71	4.66	0.05	TR	2.52	0.52	0.24	2.31	**23.65**
1925	0.36	0.09	0.24	0.18	2.85	0.48	1.24	1.72	2.87	2.23	1.44	1.29	**14.99**
1926	3.42	0.08	4.77	7.06	3.33	3.57	1.37	0.31	0.43	1.82	1.99	2.24	**30.39**
1927	0.65	1.96	2.02	2.05	2.04	7.91	0.49	0.15	1.52	1.44	0.03	2.49	**22.75**
1928	0.65	2.85	2.34	1.70	3.90	3.29	1.03	1.21	6.30	1.69	2.29	2.95	**30.20**
1929	2.21	0.16	3.12	2.37	7.73	2.19	2.58	0.01	2.02	1.60	3.17	2.08	**29.24**
1930	1.25	0.94	1.76	2.20	0.89	4.03	1.99	0.41	1.74	4.01	2.69	0.88	**22.79**
1931	5.86	2.68	2.06	2.28	1.36	3.10	3.09	0.30	0.01	0.75	0.72	2.79	**25.00**
1932	3.30	1.86	1.05	2.61	2.10	1.94	5.52	6.71	8.77	0.60	0.10	1.01	**35.57**
1933	0.66	1.92	0.54	1.30	2.23	1.74	1.92	2.78	3.18	0.27	0.65	0.39	**17.58**
1934	4.88	0.43	2.05	4.56	1.65	0.18	3.83	0.88	1.95	0.19	2.88	4.17	**27.65**
1935	0.31	1.87	2.31	3.52	14.07	8.41	1.61	0.98	5.61	1.94	0.44	1.86	**42.93**
1936	0.43	0.40	2.66	2.77	6.13	6.43	2.68	2.23	4.07	1.89	2.17	1.75	**33.61**
1937	0.96	0.13	2.10	0.84	7.68	2.19	1.82	0.14	0.04	3.09	0.86	6.22	**26.07**
1938	3.35	0.33	3.82	6.06	3.88	0.65	0.91	0.44	1.82	0.13	0.63	1.24	**23.26**
1939	2.08	0.95	0.65	0.78	3.22	0.10	2.12	5.08	1.90	0.07	0.99	0.89	**18.83**
1940	0.64	1.86	0.94	2.50	4.19	7.47	0.64	1.22	1.42	4.66	2.40	2.85	**30.79**
1941	2.14	1.86	2.95	4.56	2.50	2.03	0.62	0.23	4.88	3.13	0.47	0.97	**26.34**
1942	0.13	2.01	0.29	3.48	2.19	1.95	8.19	1.88	7.67	9.56	0.47	0.64	**38.46**
1943	0.73	0.09	1.58	1.48	2.56	1.91	3.72	0.78	4.34	0.17	1.95	1.20	**20.51**
1944	3.49	1.68	3.72	0.94	6.76	1.64	TR	4.32	1.30	1.52	3.66	4.16	**33.19**
1945	2.97	3.90	2.73	2.91	1.24	5.31	1.19	1.19	3.00	3.49	1.35	1.18	**30.46**
1946	3.64	2.24	1.75	5.54	3.47	2.92	0.20	4.03	15.78	1.31	1.86	2.43	**45.17**

Table II-1 (continued)
SAN ANTONIO RAINFALL

1947	2.14	0.29	1.46	0.30	3.32	0.31	1.00	5.34	0.06	0.19	1.01	1.90	**17.32**
1948	0.61	1.86	0.59	1.40	1.59	2.96	2.35	5.83	1.98	3.24	1.00	0.23	**23.64**
1949	2.91	2.98	2.27	8.99	0.85	8.26	2.24	1.03	0.78	7.58	0.13	2.79	**40.81**
1950	0.32	1.43	0.24	3.42	2.41	1.03	1.60	6.15	3.02	0.08	0.13	0.03	**19.86**
1951	0.25	2.43	2.76	0.93	4.44	7.07	0.51	0.06	3.75	1.44	0.67	0.13	**24.44**
1952	0.81	2.01	2.34	3.40	1.91	1.80	2.75	0.00	3.02	TR	4.47	3.67	**26.18**
1953	0.41	0.90	0.53	2.08	1.00	2.19	0.01	3.12	2.48	3.06	0.34	1.44	**17.56**
1954	1.51	0.03	0.03	1.94	1.46	2.71	1.25	1.05	0.52	1.98	2.02	0.20	**14.70**
1955	1.45	2.33	1.40	0.14	4.44	2.88	1.32	0.81	0.79	0.39	1.57	0.66	**18.18**
1956	0.81	0.85	0.27	0.49	3.07	0.27	1.53	3.94	0.62	1.23	1.13	1.10	**15.31**
1957	0.51	2.53	4.19	9.32	8.22	3.49	0.73	0.21	11.10	4.71	2.90	0.92	**48.83**
1958	4.57	3.88	1.08	1.32	1.98	3.39	7.39	0.45	8.36	5.43	0.77	1.07	**39.69**
1959	0.52	2.50	0.13	2.55	2.43	1.32	1.48	3.05	1.72	5.11	2.17	1.52	**24.50**
1960	0.76	1.22	1.65	2.08	1.21	2.70	1.31	5.96	0.76	7.84	1.30	2.97	**29.76**
1961	0.68	1.79	0.03	0.32	0.17	7.87	7.04	0.15	2.24	3.39	2.09	0.70	**26.47**
1962	0.48	0.90	0.91	4.02	1.31	2.44	0.13	1.57	2.69	2.19	4.97	2.29	**23.90**
1963	0.27	3.59	0.21	1.88	3.03	2.28	0.03	0.63	1.11	2.75	1.93	0.94	**18.65**
1964	3.40	1.88	1.73	1.16	1.79	4.88	0.02	5.19	4.15	0.86	4.81	1.22	**31.09**
1965	2.40	6.43	2.30	1.97	8.18	2.42	0.08	1.65	3.13	2.69	0.91	4.58	**36.74**
1966	1.47	2.30	1.13	3.20	3.53	1.78	0.06	4.28	2.13	1.11	TR	0.42	**21.41**
1967	0.18	0.48	2.18	0.94	2.22	0.01	2.12	3.16	11.16	2.00	3.42	1.38	**29.25**
1968	8.25	1.85	1.27	1.92	2.82	2.63	1.53	0.94	2.98	0.69	4.58	0.66	**30.12**
1969	1.76	2.90	2.36	2.46	4.61	2.32	0.36	4.19	1.32	5.83	1.02	2.28	**31.41**
1970	1.10	2.66	1.98	1.13	7.30	0.89	0.91	0.95	4.35	1.31	0.01	0.01	**22.60**
1971	0.04	0.81	0.04	1.39	1.52	2.74	1.05	9.42	4.75	4.62	2.74	2.86	**31.98**
1972	1.35	0.40	0.13	1.94	11.24	2.86	3.13	4.24	1.40	1.99	2.37	0.44	**31.49**
1973	2.77	2.76	1.58	5.41	2.73	10.44	6.91	1.29	13.09	4.85	0.29	0.16	**52.28**
1974	1.36	0.04	0.94	2.18	4.28	1.02	1.28	11.14	3.85	4.09	5.39	1.43	**37.00**
1975	1.04	3.30	0.52	2.69	6.91	4.60	1.06	1.28	0.51	2.25	0.03	1.48	**25.67**
1976	0.56	0.13	1.20	5.67	5.80	1.61	5.39	2.09	3.79	8.48	2.46	1.95	**39.13**
1977	3.10	0.91	0.88	8.80	1.62	2.26	0.10	0.06	2.11	3.47	6.01	0.32	**29.64**
1978	0.68	1.76	1.71	3.62	2.45	3.96	1.43	4.97	8.86	0.55	4.91	1.09	**35.99**
1979	4.07	1.38	3.55	5.34	1.98	5.59	7.38	2.09	0.84	0.11	1.43	2.86	**36.62**
1980	0.72	0.74	0.98	1.67	6.42	0.52	0.26	2.64	5.05	1.09	3.53	0.61	**24.23**
1981	2.06	0.96	1.96	2.21	6.43	8.71	0.25	2.41	1.36	8.61	0.72	0.69	**36.37**
1982	0.72	1.28	0.69	1.23	6.42	1.37	0.14	0.55	0.87	2.84	4.54	2.31	**22.96**
1983	1.48	1.54	3.89	0.13	4.37	1.27	2.43	2.00	3.86	1.64	3.06	0.39	**26.06**
1984	1.87	0.54	1.91	0.11	3.76	1.40	TR	2.99	1.06	5.94	2.91	3.41	**25.90**
1985	2.68	1.91	2.85	3.27	2.47	8.20	5.80	0.45	4.80	3.91	3.93	0.00	**40.27**
1986	0.76	2.52	0.35	0.60	6.29	11.95	0.05	1.89	2.83	6.58	1.83	7.11	**42.76**
1987	1.13	4.78	1.10	1.48	12.85	7.69	1.21	0.33	2.24	0.44	2.53	2.18	**37.96**
1988	0.39	0.92	0.86	1.23	0.41	5.50	5.58	1.98	0.83	0.62	0.02	0.67	**19.01**
1989	2.96	0.29	1.24	2.55	0.33	3.96	0.69	0.48	1.54	5.81	1.93	0.36	**22.14**
1990	1.17	2.68	5.17	4.52	3.28	1.18	8.29	1.30	3.70	3.71	3.11	0.20	**38.31**
***AVE**	**1.56**	**1.68**	**1.66**	**2.89**	**3.61**	**3.04**	**2.20**	**2.19**	**3.25**	**2.80**	**2.02**	**1.64**	**28.34**

* For period of record shown (1900-1990).

Figure II-2
ANNUAL RAINFALL

Figure II-2
ANNUAL RAINFALL

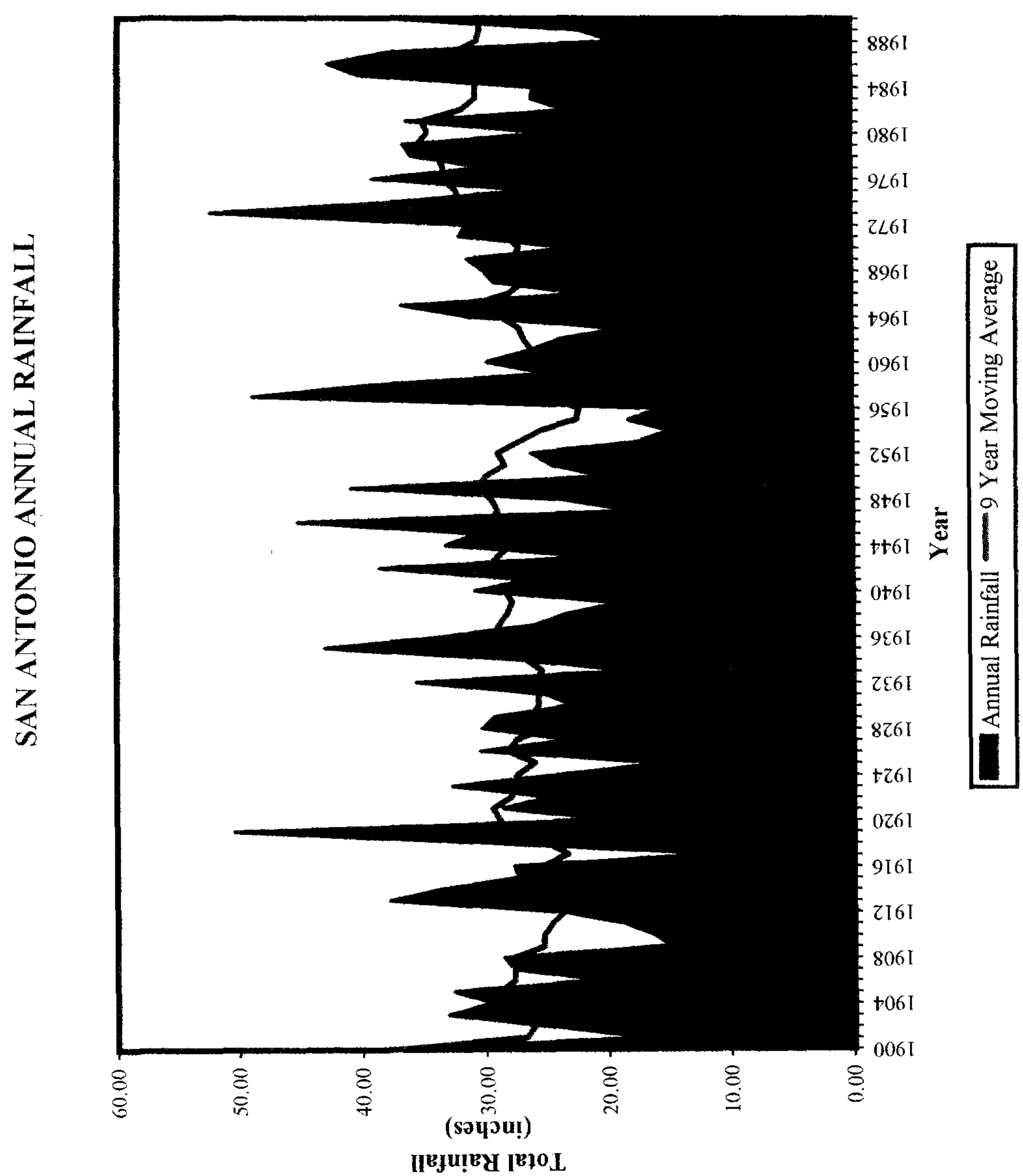

Table II-2
USGS MONTHLY STREAM FLOWS

	1985		1986		1987		1988		1989		1990		1991		1992		1993	
Month	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max	Mean	Max
Jan	14.3	72	11.6	29	21	60	9.71	12	18.1	237	5.36	11	28.1	517	116	1320	26.1	116
Feb	15.3	193	16.1	107	45.9	310	12	102	5.93	19	9.4	58	23.7	287	355	5020	56.9	355
Mar	39.5	468	9.01	14	23.5	57	12.4	150	6.46	20	21.9	186	10.4	21	192	2630	37.4	192
Apr	16.6	64	6.92	13	18.8	36	6.94	15	29.2	471	18	283	82.6	1430	46.3	218	26.5	82.6
May	16.9	150	49.3	1040	181	1150	7.61	38	5.89	11	12.4	110	37.3	348	356	3400	96.1	356
Jun	115	1660	324	4540	824	5580	10.9	100	25	361	4.96	46	50.9	804	168	1220	174	824
Jul	18.6	147	12.9	23	25.3	65	10.6	142	2.56	4.2	144	2260	23.2	182	17.4	25	29.5	144
Aug	13.9	69	8.21	21	13.8	19	11.7	222	1.94	7.1	7.03	36	4.64	17	23	156	10.1	23
Sep	25.2	111	36.1	365	11.9	39	38.3	879	1.97	3.3	7.04	27	7.12	23	20	199	17.2	38.3
Oct	56	633	69.6	426	7.3	22	6.14	11	7.18	73	6.83	42	4.94	20	21.6	69.6		
Nov	21.8	78	12.6	56	10.7	74	5.16	21	4.07	22	9.2	98	3.95	7	12.7	37.9		
Dec	11.1	16	30.3	250	12.8	41	5.05	7.4	4.62	11	5.73	6.2	575	6190	74.6	575		

Flood Events

San Antonio has experienced a number of significant floods as shown in Table II-3. This information was gathered from newspaper articles and other sources. Consequently, the duration of some of these rainfall events was not available. The most significant flood occurred in 1921. Another major flood event took place in September, 1946 when over 6 inches of rain fell in an 8 hour period and more than 10 inches of rain fell during the storm. Development in the Leon Creek Watershed has occurred primarily since the late 50's, and consequently, little flood damage has been documented.

Table II-3
FLOODS OF RECORD

Date	Description
September, 1921	up to 17" in two hours
May, 1937	6.21" in 8 hours
September, 1946	6.05" in 8 hours, 10.43" for the total storm event
May, 1965	6" prompting congressional action by Henry B. Gonzalez
September 23, 1969	6" downtown
August 8, 1974	4" in brief time with wet preceding conditions
June 13, 1981	3.2" in one hour at Kelly, 5" at Woodlawn Lake,
September 19, 1983	4.2"
June 5, 1986	9.61" reported in Windcrest
May - June, 1987	12.85" in May
June 11, 1987	7.21" in Helotes, 6.48" in 26 hours at Trailwood
May 6, 1993	7.25"

GOVERNING AND CONTROLLING AGENCIES

There are numerous agencies that have interest in the Leon Creek Watershed. During this project many of these agencies and individuals were contacted to obtain information relevant to the drainage conditions in the Leon Creek Watershed. On the following pages are summaries of the agencies and individuals contacted, reports that were reviewed and studies that were analyzed.

Agencies Contacted

During the investigation for this project many agencies were contacted for information that could be beneficial to completing this study. We have listed below the agencies contacted and the individual(s) we talked with.

Table II-4
AGENCY INTERVIEWS

Agency	Person(s) Interviewed
City of San Antonio Drainage Department	Roy Akiona, Tom Carrasco & Mendi Littman
San Antonio Water System	Jay Aldean, Tom Fox & Chris Powers
Bexar County Public Works	Ron Pena
Edwards Underground Water District	Bobby Bader
Texas Department of Transportation	Julia Brown, Preston Streicher & Judy Freisenhahn
City of Leon Valley	Jim Malone
San Antonio River Authority	Steve Ramsey
San Antonio Police Department	Desk Officer & Human Resources
San Antonio Fire Department	Lt. Jim Collins
City of San Antonio Information Services	Steve Bishop
City of San Antonio Traffic Department	Andy Ballard
Kelly Air Force Base	William Ryan
Lackland Air Force Base	Eric Staph & Gabe Gonzalez
City of San Antonio Mapping	Abner Martinez
UTSA Center for Archeological Research	Robert Hard & Ann Fox
City of San Antonio Department of Parks & Recreation	Dale Bransford
Soil Conservation Service	Dale Mengers
U.S. Army Corp of Engineers	Brian Rowe

City of San Antonio Drainage Department

Drainage Assessment for the Middle Leon Creek

Drainage Engineering of the City of San Antonio Department of Public Works prepared a Drainage Assessment for the Middle Leon Creek and Huebner Creek in October of 1993. The area included in "Middle Leon Creek" study consisted of Huebner and Leon Creeks from Huebner Road upstream to Loop 1604. Presented in this report are known problem areas within the Leon and Huebner Creek area along with proposed improvements that will address these problems. Table II-5, shown below, is a summary of these problem areas, proposed improvements and estimated costs for construction, right-of-way and engineering.

Table II-5
CSA - MIDDLE LEON CREEK DRAINAGE ASSESSMENT

Problem Area	Proposed Improvement				Cost Estimate		
	Structure	Channel	Pipe System	Realignment	Construction	ROW	Engineering
Hills & Dales Subd.	Y	Y	Y		$684,000	$16,000	$86,000
Dell Oak Subd. - Lake Breeze St.	Y			Y	$1,026,000	$243,000	$129,000
Hausman Rd. - W. of Babcock @ Huesta Creek	Y				$492,000	NA	$62,000
Hausman Rd. - E. of Babcock @ Maverick Creek	Y	Y			$650,000	$81,000	$82,000
Valley View Subd. - Nickle & Dime area Phase I	Y	Y			$1,154,000	$185,000	$145,000
Valley View Subd. - Nickle & Dime area Phase II	Y	Y			$1,963,000	$308,000	$247,000
Babcock Rd. crossing Huesta, Maverick	Y				$7,985,000	$297,000	$1,005,000
Babcock Rd. crossing Leon Creek (East)	Y			Y	$3,678,000	$306,000	$463,000
Babcock Rd. crossing Leon Creek (West)				Y	$4,259,000	$378,000	$536,000
DeZavala Rd. - North of Babcock	Y	Y			$85,000	$4,000	$11,000
Babcock Rd. - West of DeZavala Rd.	Y	Y			$419,000	$42,000	$53,000
Spring Forest Drive	Y				$635,000	$41,000	$80,000
Prue @ Huebner Creek	Y	Y			$743,000	$56,000	$60,000
White Bonnet at Lockhill Selma	Y	Y			$992,000	$112,000	$125,000
Hollyhock - West of Babcock	Y	Y			$671,000	$143,000	$85,000
Strathaven - North of Hollyhock	Y				$689,000	$63,000	$87,000
Abe Lincoln and Hollyhock			Y		$829,000	$23,000	$104,000
Whitby @ Huebner Creek	Y	Y			$527,000	$59,000	$66,000
Total					$27,481,000	$2,098,000	$3,426,000

Low Water Crossings

Many locations where streets cross creeks have little or no drainage structures. This condition is commonly known as a low water crossing. A list of low water crossings in the Leon Creek Basin was obtained from the San Antonio Fire Department and is shown in Table II-6 below.

Table II-6
LOW WATER CROSSINGS

Barricade	District	Location	Creek	Page No.	Block	Street	Block #
38	6	2000 block of Pinn Rd.	Leon, branch	613	F7	Pinn	2000
39	6	Arvil btw Keitha & Elmer	Leon, branch	614	B7		
40	6	Rodriquez	Leon	614	B7		
41	6	Military & Westbriar	Leon, branch	613	E7		
42	6	Martinique btw Barbados & Andros	Leon, branch	613	F7		
43	6	Tallahasse btw Barbados & Andros	Leon, branch	613	F7		
44	6	Westfield btw Barbados & Andros	Leon, branch	613	F7		
45	6	Biscayne btw Barbados & Andros	Leon, branch	613	F7		
68	7	W. Commerce btw Pinn & Military	Leon	613	F3	W. Commerce	
69	7	Pinn, 2500' s. of W. Commerce	Leon	613	F4	Pinn	100 - 500
70	7,8	Timber Path, 500' se of Grissom	Culebra	579	B7	Timber Path	9000-9100
72	8	Hausman, 200' e of Babcock	Huesta	513	E8	Hausman	7500
73	8	Hausman @ Roadrunner	Huesta	513	F8	Hausman	7000-7100
74	8	Hausman	Leon	514	A8	Hausman	6700
75	8	Old Fredericksburg, n of 1604	Leon	514	C5	Old Fred	15800
76	8	Hausman, 4800' w of IH10	Leon	514	B7	Hausman	6000-6100
77	8	Danvers btw Glidden & Dime	Huesta	513	E8	Danvers	short
78	8	Babcock, 100' n of Nickle	Huesta	513	E8	Babcock	12500
79	8	Babcock, 500' s of Nickle	Huesta	513	E8	Babcock	to
80	8	Babcock, 2300' s of Nickle	Huesta	547	E1	Babcock	
81	8	Babcock, 3700' s of Nickle	Leon	547	F1	Babcock	13500
89	8	Prue Rd, 1600' e of Babcock	Huebner	548	C4	6300-7000	
90	8	Lockhill, 250' e of White Bonnet	Huebner	548	C4	Lockhill @ White Bonnet	
91	8	White Bonnet, s of Lockhill	Huebner	548	C5	same	
92	8	Hollyhock, 600' w of Babcock	Huebner	548	B7	Hollyhock	6100-6500
93	8	Whitby, 200' n of Wellesly Manor	Huebner	548	B8	Whitby & Wellesly Manor	
96	8	Huebner, 400' s of Apple Green	Huebner	548	B8	Huebner @ Wade Lane	
112	7	Wurzbach, 750' s of Seville	Huebner, branch	580	B5	Wurzbach	4700-5000
113	6,7	Timberhill, n of Wurzbach	Huebner	579	F6	Timberhill	4000-4200
114	7	Ingram, 2500' e of Culebra	Leon	579	E7	Ingram btw Mabe & Northwestern Dr.	
115	8	Easterling, s of Culebra	Culebra	578	D4	Easterling	
116	8	Old Grissom, 500' e of Culebra	Culebra	579	C5	Old Grissom	Culebra

During a moderate storm event the roadway at the low water crossing is overtopped by the creek flow. Fire, Police and Public Works personnel typically put up barricades at the low water crossings to warn the public of the danger. Problems can arise when a motorist drives a vehicle into water that reaches the floorboard. The combination of the force of the water splashing on the upstream side of the vehicle coupled with the vehicle's poor traction caused by the wet conditions and the vehicle's tendency to float can push the vehicle off the road and into the creek bottom. Many cases of motorist being stranded in a low water crossing have been documented. The Fire Department keeps records of high water rescues. Table II-7 below is a listing of recent rescues.

Table II-7
RECENT LOW WATER CROSSING RESCUES

Incident No.	Location	Date
92002144	IH 35 S @ Leon creek	1/26/92
92002151	Hwy 151 @ Pinn Rd.	1/26/92
92002149	Ingram Rd. @ Potranco	1/26/92
92002169	Ingram @ Wurzbach	1/27/92
92002141	Ingram @ Wurzbach	1/26/92
92002757	Military Dr/Pearsall Rd.	2/4/92
92002740	Babcock/Hausman Rd. W	2/3/94
92002809	Babcock/Hausman Rd. W	2/4/92
92005068	Babcock/Southpoint	3/3/92
92005145	Babcock	3/4/92
92005135	Babcock/Hollyhock	3/4/92
92010234	Babcock/Nickle	5/4/92
92011159	Gen. McMullen S/EB New Hwy 90	5/14/92
92011580	Hwy 151/Pinn Rd	5/19/92
92011616	Babcock/Hausman Rd W	5/20/92
92012275	Babcock/Louis Pasteur	5/27/92
92012286	Culebra Ave	5/27/92
92012294	Culebra /Loop 1604	5/27/92
92012293	Hwy 151/Loop 410 SW	5/27/92
92012289	Culebra/Laven Dr.	5/27/92
92012371	Leon Creek/Prue Rd	5/27/92
92013405	Hwy 151/Potranco rd	6/9/92
92028521	Babcock/Hollyhock	11/19/92
93011942	Floyd Curl St./Huebner Rd	5/5/93
93011841	Eckhert/John Marshall	5/5/93
93011937	Babcock, 5700	5/5/93
93011967	Eckhert/Huebner	5/5/93
93011927	Babcock, 5700	5/5/93
93015952	Gen. McMullen S/EB New Hwy 90	6/12/93
93029135	Babcock, 2626	10/5/93

An example of a typical low water crossing incident was found in the March 4th and 5th, 1992 issue of the San Antonio Express News. Excerpts from those two issues are shown below.

"Violent thunderstorms with occasional hail and winds of more than 50 mph bore down from the west late Tuesday night, March 3rd, and early Wednesday, March 4, 1992. The storm dumped an average of 3 inches of rain across the city. Soon after the first storm began, low water crossings flooded across the Northwest Side, keeping police and firefighters hopping to respond to reports of trapped cars. In San Antonio, 26 calls for vehicles trapped in water were reported.

Among the locations where vehicles were reported trapped in high waters were the intersections of Callaghan Road below Interstate 10, Interstate 410 at Bandera Road, Babcock and Vance Jackson roads, Babcock and Huebner Roads, Hillcrest and Midcrest Drives, the 300 block of Cherry Ridge, and at Dreamland Drive and Vance Jackson Road.

Jian Ke, a student at the University of Texas at San Antonio, had to be rescued about noon Wednesday, March 4, when his car was pushed off Babcock Road into Leon Creek. The water floated his vehicle off the road and lodged it between a couple of trees. Firefighters had a difficult time getting to him because the water, about 5 feet deep, was moving fast and his electric windows would not open. A rear window had to be smashed to free the man. The rescue took about 45 minutes. Fire Caption Dennis O'Neill said: "He's lucky to be alive. If the car would have turned over, he would have been gone".

San Antonio Water System

Reuse Plan

SAWS has developed a water plan for the City of San Antonio that has many elements. The reuse of treated effluent from the City's wastewater treatment plants for non-potable uses could be a significant source of water that now is not appreciably used by the City.

Integral to the reuse program will be a need for storage facilities for seasonal and temporary storage. There could be locations within the Leon Creek Watershed that could serve a dual purpose of detention for flood abatement and storage for reuse water. Again, the amount of flood abatement achieved depends on the storage capacity of the impoundment facility. If a facility is to be shared with reuse storage, determination of a balance of storage capacity for reuse and flood abatement would be critical.

Water Quality

Although water quality is not a direct charge of this report, we did discover information on this subject. The Environmental Management staff at Kelly Air Force Base has and is developing extensive baseline data on water quality in the Leon Creek as it crosses their base. When complete, this information will be very useful for the SAWS stormwater department.

The SAWS stormwater department is also developing water quality data through a contract with the USGS.

Edwards Underground Water District

Recharge

The Edwards Underground Water District has sponsored a study to investigate recharge enhancement in the San Antonio and Guadalupe River Basins. In this study three potential recharge site were identified in the Leon Creek Watershed. These three location are:

1.	Culebra Creek	Government Canyon
2.	Helotes Creek	North of Helotes
3.	Leon Creek	Near IH10 Loop 1604 interchange

These locations were identified during the phase 1 study in a general manner. A fourth site located along Helotes Creek in the Vulcan Materials Quarry has been discussed as a potential recharge site since the study was released. During the on-going phase 2 study, field surveys of the potential recharge enhancement sites will be performed. The site evaluations should be completed by the end of 1994.

Recharge enhancement impoundment facilities may also assist in flood abatement by detaining a portion of the watershed runoff. The amount of flood abatement achieved depends on the storage capacity of the impoundment facility.

EXISTING REPORTS AND STUDIES

During this project, numerous agencies and individuals were contacted to obtain information relevant to the drainage conditions in the Leon Creek Watershed. On the following pages are summaries of the agencies and individuals contacted, reports that were reviewed and studies that were analyzed. The following paragraphs contain a synopsis of the information we collected from these interviews, reports and studies. Table II-8 below is an index of drainage reports sponsored by Public Agencies.

Table II-8
EXISTING DRAINAGE REPORTS

Report	Author	Date
Flood Insurance Study	FEMA	July 2, 1991
Flood Plain Information, Leon Creek	Corp of Engineers	April, 1971
Flood Plain Information, Huebner Creek	Corp of Engineers	June, 1973
Issues & Impacts of Stormwater Drainage, Bexar County, TX	UTSA	Summer, 1993
The Edwards Aquifer; S.A. mandates for Water Quality Protection	SAWS	April 1, 1994
Drainage Assessment for the middle Leon Creek & Huebner Creek	CSA	October 1, 1993
Recharge Enhancement Study, Guadalupe - San Antonio River Basins	HDR	Summer, 1993
Lake Travis Non-point source Pollution Control Ordinance	LCRA	January 1, 1991
Hydrologic Data for Urban Studies in San Antonio, TX metro area	USGS	May, 1976
Hydrologic Data for Urban Studies in San Antonio, TX metro area	USGS	February, 1982
Flood Protection Plan for Portions of Salado, Cibolo & Leon Creeks	CH2MHill	August, 1989
Soil Survey, Bexar County Texas	SCS	1962

Review of Reports

In reviewing the existing reports and studies we where interested in information that would be relevant for use in this study. Below is a description of the relevant portions of the reports.

Flood Insurance Study
This study includes a complete analysis of the Leon Creek. The water surface profiles for the design storm events have been used to define the floodplain limits. Although this study gave a complete picture of the Leon Creek, the base survey information of the existing ground contours was based on course data.

The study was performed in the late 70's. Portions of the study have been updated by private developers who modified the existing creek system to accommodate their developments. The resulting 1991 update of this report is a mosaic of the original analysis along with a number of updates.

***Flood Plain Information, Leon Creek* and *Huebner Creek*(2 separate reports)**
Both of these reports provide the same types of historical information for the respective creeks. Information presented includes: Background information, flood information (past, current and future) and guidelines and suggestions for floodplain management.

Issues & Impacts of Stormwater Drainage, Bexar County, TX
A product of the Environmental Sciences and Engineering Programs at the University of Texas at San Antonio, "the intent of this study is to develop a clear definition of the nature and extent of existing drainage problem"

The Edwards Aquifer; San Antonio Mandates for Water Quality Protection
This SAWS report presents regulatory requirements, organizational programming and potential activities. These items consist of:

- Regulatory Requirements
  - The Unified Development Code
  - Stormwater
  - Water Code
- Organizational Programming
  - Texas Natural Resource conservation Commission rules & regulations
  - Technical Improvements
  - Emergency Measures
- Potential Activities
  - Future Studies

Drainage Assessment for the Middle Leon Creek & Huebner Creek
This assessment presents known problem areas, projected projects to solve these problem areas and projects that are all ready funded to solve problem area.

Recharge Enhancement Study, Guadalupe - San Antonio River Basins
The Edwards Underground Water District sponsored this study to find potential recharge enhancement projects. Three potential recharge enhancement sites were listed in this report. The recharge dams may also assist in flood abatement.

Lake Travis Non-point Source Pollution Control Ordinance
This manual provides developers with guidance on the LCRA review requirements and procedures. Also outlined are best management practices to meet the LCRA standards.

Hydrologic Data for Urban Studies in San Antonio, TX metro area
Presented in these reports is a compilation of hydrologic data for various water years.

Flood Protection Plan for Portions of Salado, Cibolo & Leon Creeks
This report was sponsored by the Bexar County Public Works with a matching grant from the Texas Water Development Board. The purpose of this report was to develop a flood protection plan for segments of the Leon, Cibolo and Salado Creeks.

Review of Existing Studies

The studies generally were engineering backwater analyses of stretches of a particular creek. These studies where mostly calculations with very little text and were completed to support floodplain improvements or development activities.

The methodology used in the reviewed studies varied. Studies performed from the early 80's on were performed on a computer system, typically using HEC II (the industry standard backwater stream analysis program). Prior to the early 80's, some studies were performed on computer, some by hand and some a combination of both. Most of the studies are small stretches of the creek.

Many of the studies had historical significance in that they gave a "snapshot" of a particular reach of a creek at a point in time. Some of the information in these studies is no longer relevant due to changes in the development of the watershed and/or changes in the creek morphology.

In our review we found that the reports all used the same hydrologic parameters to base the analysis on. The Rational method is used to calculate discharges for drainage area that are less than 2000 acres. The Rational method is based upon drainage area, a cover factor and the rainfall intensities (in inches per hour). The rainfall intensities were developed by the City's drainage department in the early 70's. For areas large than 2000 acres a graph relating drainage area to discharge (DA vs Q) is used. The DA vs Q graph was also developed in the early 70's by the City's drainage department.

A listing of the existing studies reviewed is on the following page in Table II-9 and illustrated on Figure II-3. The index numbers shown on this table correspond to those shown on Figure II-3.

Table II-9
INDEX OF EXISTING STUDIES

Index	Waterway	Subdivision or Project	Engineer	Date
1	Leon	Pablo Grove, CSA landfill	Jay Aldean	90
2	Leon	Pablo Grove, CSA landfill	Jay Aldean	72-74
3	Leon	Brown Leaf	P D	87
4	Leon	Pin Oak	MBC	73
5	Leon	West Wood Park	P D	69
6	Leon	Hwy 151	TxDOT	
7	Leon	SW Research	P D	85
8	Leon	West Park	P D	83
9	Leon	Twin Creek	Vickrey	72
10	Leon	Ingram Square	Bob Opitz	79
11	Leon	Timber Creek Estates	Vickrey	79
12	Leon	Ingram Plaza	Brown	80
13	Leon	Parkwood	WF Castella	85
14	Leon	One North Place	Bain	73
15	Leon	Babcock Place		early 70's
16	Leon	Alamo Farmstead	WF Castella	82
17	Leon	French Creek Village	PD	74
18	Leon	Wildwood	WF Castella	76-85
19	Leon	Prue Road Bridge	Mike Cude	91
20	Leon	Quail Creek	Mike Cude	84
21	Leon	Heath Road	CEC	87
22	Leon	Fiesta Tx	P D	
23	Leon	Dominion	P D	83
24	Leon	IH10 Boerne Stage Road	Overby Descamps	
25	Culebra	Pipers Meadow	D R Frazier	74, 80
26	Culebra	Village	Brown	87
27	Culebra	Great Northwest unit 2	Vickrey	77-on
28	Culebra	Culebra Bridge	TxDOT	
29	Culebra	Culebra Bridge	TxDOT	
30	Culebra	Hidden Meadows	Glen Galbraith/ Cude	83
31	Culebra	Loop 1604	TxDOT	
32	Helotes	NW Crossing	MBC	86, 87
33	Helotes	New Territories	MBC	78
34	Helotes	Loop 1604	TxDOT	
35	Helotes	Hidden Meadows	Glen Galbraith	
36	French	Quail Creek	Mike Cude	
37	French	Wildwood		
38	French	Concord	Mike Cude	
39	French	Loop 1604	TxDOT	

Table II-9 (continued)
INDEX OF EXISTING STUDIES

Index	Waterway	Subdivision or Project	Engineer	Date
40	French	N. of Loop 1604	MBI	
41	French	NW Bus Park	Tom Flores	88
42	French	Cedar Springs	SEDA	87
43	Huesta	Hunters Chase	Rosin Kroesche	83 - 86
44	Huesta	North Hills Village	Brown	
45	Huesta	N. of Loop 1604	TxDOT	
46	Maverick	Loop 1604	P D	
47	Maverick	North Hills Village	Brown	

NOTE: The index number corresponds to those shown on Figure II-3.

Watershed Mapping

The Mapping Section of the City of San Antonio Department of Public Works has developed extensive mapping of the city on the Intergraph computer system. The work performed in this study will be in the Intergraph format and will be compatible in layers, colors and other program parameters.

The existing files that are referenced include:

Bexar County limits
Watershed limits (developed and labeled by SAWS)
City Streets
Street names
Railroads
State and Federal Highways
Creeks
Edwards Aquifer Recharge Limits

Site Reconnaissance

During the initial site reconnaissance, all street crossings of the creeks within the detailed study area were visited and photographs were taken. A list of these sites is shown in Table II-10 and illustrated on Figure II-4. The site numbers shown on Table II-10 correspond to those shown on Figure II-4.

Table II-10
STREET CROSSINGS WITHIN THE DETAILED STUDY AREA

Site #	Creek	Location
1	Leon	Highway 90
2	Leon	Old Highway 90 St
3	Leon	Arvil Avenue
4	Leon (Proposed Crossing)	Shady Grove Drive
5	Leon	Pinn Road
6	Leon	Highway 151
7	Leon	Commerce Street
8	Leon	Loop 410 NW
9	Leon	Culebra Road
10	Leon	Ingram Road
11	Leon	Grissom Road
12	Leon	Bandera Road
13	Leon	Babcock
14	Leon	Hausman
15	Leon	UTSA BLVD.
16	Leon	Loop 1604
17	Culebra	Old Grissom Road
18	Culebra	Timber Path
19	Culebra	Culebra
20	Culebra	Culebra
21	Culebra	Loop 1604
22	Culebra	Stuebing
23	Culebra	Galm
24	French	Mainland
25	French	Guilbeau
26	French	Bandera
27	French	Prue road
28	French	Hausman
29	French	Loop 1604
30	French	Leslie Road
31	Huebner	Ingram Road
32	Huebner	Timber Hill
33	Huebner	Bandera
34	Huebner	Evers
35	Huebner	Huebner Road
36	Huebner	Eckhert Road
37	Huebner	Babcock
37.5	W. Huebner	Eckhert Road
38	W. Huebner	Hollyhock

Table II-10 (continued)
STREET CROSSINGS WITHIN THE DETAILED STUDY AREA

39	W. Huebner	Babcock
40	W. Huebner	Lockhill road
41	W. Huebner	White Bonnet
42	W. Huebner	Prue Road
43	Huesta	Babcock
44	Huesta	Danvers Road
45	Huesta	Hausman
46	Huesta	Loop 1604
47	Maverick	UTSA Blvd.
48	Maverick	Bartlett Cocke
49	Maverick	Loop 1604
50	Helotes	Loop 1604
51	Helotes	Leslie Road
52	Helotes	Leslie Road
53	Helotes	Braun Road

NOTE: The Site #'s correspond to those shown on Figure II-4 and to the photographs in the Appendix. There is no photograph for site #28.

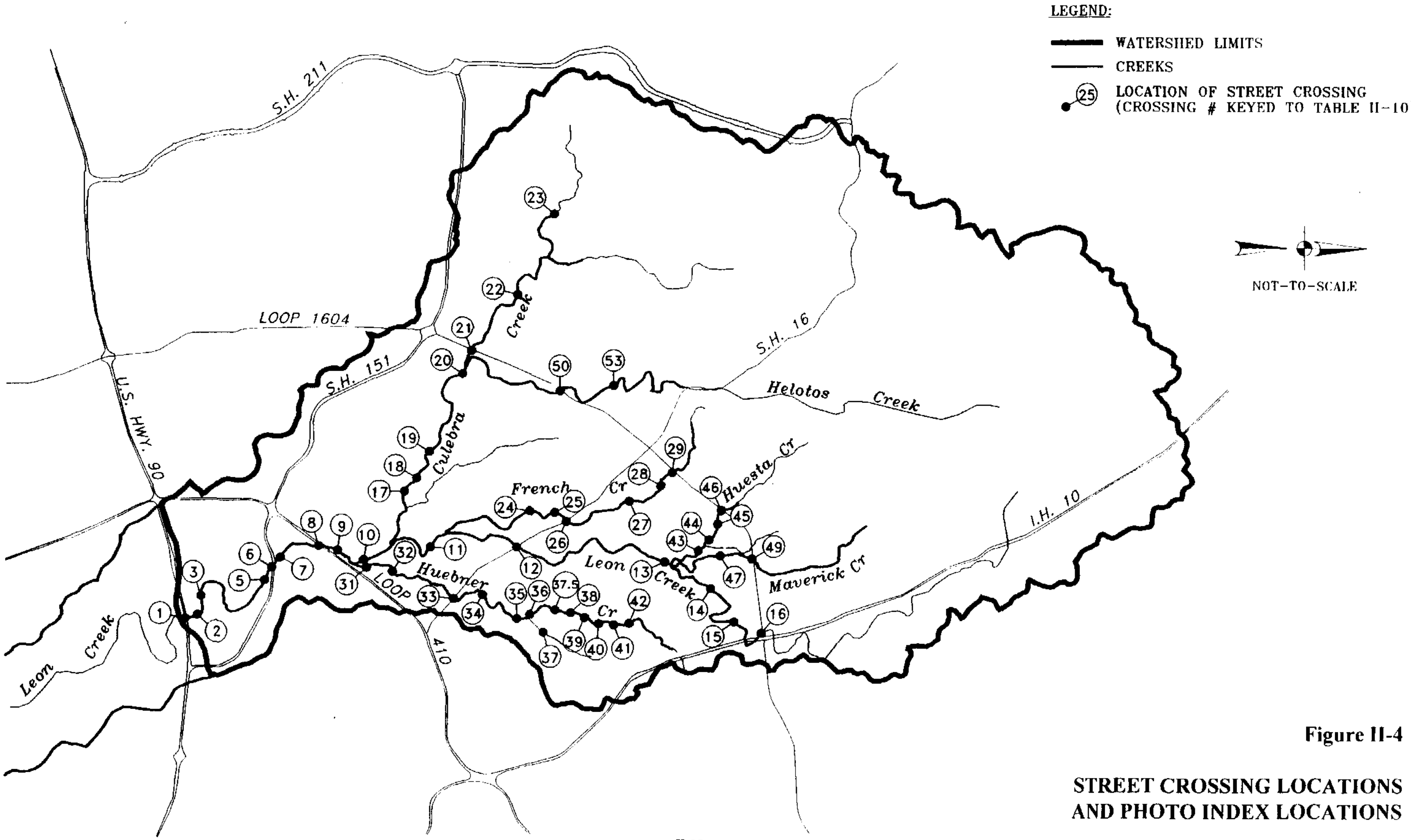

Figure II-4

STREET CROSSING LOCATIONS AND PHOTO INDEX LOCATIONS

HYDROLOGIC FORECASTING ISSUES

One of the objectives of this study is to produce a drainage master plan that establishes standards for design procedures to be followed in the future. In order to accomplish this goal, careful attention must be given to the hydrologic modeling techniques or procedures used to develop the detailed flood plain delineation. Therefore, it is appropriate to review the existing requirements and practices used in San Antonio and explore the options available for use as future design standards. This information can then be considered by the City of San Antonio and used to develop and implement design standards for future drainage projects and development. The procedures used to develop the detailed flood plain study included in the three watershed studies should also satisfy the requirements established by the Corps of Engineers for the FEMA flood study program.

The hydrologic forecasting issues addressed in this report focus on quantitative hydrology methodologies and modeling rather than hydraulic modeling. Methods of hydraulic computations and modeling are much more standardized and better understood by the engineering community. The FEMA Flood Insurance Program, administered by the Corps of Engineers, recognizes the HEC-2 Water Surface Profiles computer program as the standard tool for calculating water surface profiles. There is no reason to consider changing the methodology used in calculating water surface profiles except in specific cases where the hydraulic parameters being modeled are to complex for HEC-2.

Hydrology - Existing Practice

For subdivisions and bond projects, the Rational Method is used for watershed areas up to 2,000 acres. The SCS unit and storm hydrographs with City of San Antonio hytetographs derived from City Intensity Curves are used for watershed areas exceeding 2,000 acres. For some large streams, the U.S. Corps of Engineers Snyder's Synthetic unit hydrograph is used with the City's hytetographs to develop storm hydrographs at various points on stream. SCS routing methods are used through existing and proposed SCS dams in the area to be consistent with the design of these structures.

Rainfall Analysis

Rainfall values in the form of Intensity-Frequency-Duration Curves for San Antonio were first developed in 1920 by Metcaf & Eddy Consulting Engineers. Terrell Bartlett Engineers of San Antonio updated the intensities in 1945. Robert B. Hahn, City Drainage Engineer updated the intensities with a Gumbles Analysis from rainfall records from 1903 through 1972 in February 1973. An additional modification to this update was accomplished in 1979 to apply the results of the NWS's Hydro35 publication to the first 2 hours of intensities of the TP-40 publication. This modification did not update rainfall records through 1979.

Research of rainfall data from the NWS indicates that annual rainfall has increased since records were kept beginning in the 1885. A straight line approximation of the nine year moving average of annual rainfall indicates a definite upward trend in total annual rainfall. Based on this information, the rainfall intensity-frequency-duration curves for San Antonio were updated to include the time period from 1972 to the present. Then the Hydro35 publication techniques were used to modify the first two hours of intensities. The updated rainfall intensity curves were submitted to the City in a separate report titled "Statistical Analysis of Rainfall Records for San Antonio, Bexar County, Texas", dated August, 1994. More discussions with the NWS should also be considered so that weather trends can be identified and used in the decision process for future revisions or updates to the City's intensity curves. Another point to consider is the regional setting of the Leon Watershed. When the watershed area is considered and not a small area within the watershed, it becomes important to consider the inclusion of rainfall data from other official NWS stations such as Boerne or Rio Medina.

Analysis of Runoff

Most analysis of runoff are based on a "design storm" approach with time of concentration, frequency, runoff coefficient or infiltration rates for the various methods described above. A history of the actual runoff from actual storm events on various watersheds have been performed through the years by the U.S. Geological Survey from data gathered at local gaging stations and can be obtained by interviewing people who have witnessed actual flood events. It would be prudent to calibrate or check the hydraulic and hydrology model to actual flood events where possible. This would provide a level of comfort to the flood forecasting effort.

Available Computer Simulation Models

The HEC-1 computer program can calculate various hydrograph models including the Clark, Snyders, time area and SCS or the user can input his or her own hydrograph. HEC-1 is also capable of flood routing with several methods and combining storm hydrographs. SCS Curve Numbers can also be used with HEC-1.

The SCS TR-20 curvilinear unit hydrograph method is almost universally accepted for most watershed analysis. The methodology used in this model allows for a very flexible and realistic method of predicting the ratio of runoff to total rainfall by means of the SCS Curve Number (CN) which takes into account land management or development, soil types, slopes and vegetative cover. TR-20 will allow the user to input any rainfall distribution for hydrograph development and rating curves for routing purposes. Flood routing is accomplished by the modified attenuation-kinematic procedure.

SCS TR-55 is a quick method obtaining the peak flow and hydrographs for small Urbanized Watersheds. This method is not as accurate as the TR-20 Method.

The HEC-1 or the TR-20 computer models are the most flexible, widely recognized, and powerful tools for estimating peak flows and volumes of storm runoff. Either of these models would be well suited to the watersheds found in Bexar and surrounding Counties. A less cumbersome method such as TR-55 or the Rational Formula should continue to be used for small watersheds. These models (TR-20, HEC-1 and TR-55) work with storm volumes as well as storm peaks. This is important since one of the flood mitigation methods that will likely become more prevalent in San Antonio is storm runoff detention and or retention.

The three watershed study teams met regularly under the direction of the City's Project Manager to discuss the various hydrologic forecasting methods and computer models. Each study team calculated storm runoff for various locations in their respective watershed using all of the methods described above. These methods and computer models were evaluated for accuracy by checking the results against observed high water marks, gauging station data, previous hydrology studies and against each other method to check the sensitivity of each respective method.

Once the analysis of computer models and methodology was completed, it was determined that the SCS TR-20 methodology would be combined with the HEC-1 computer program to calculate runoff from design rainfall events. The only variation from the TR-20 methodology was the selection of the Muskingham Routing formula for use is routing storm hydrographs through the watershed.

SECTION III. EXISTING AND ULTIMATE DEVELOPMENT CONDITIONS

INTRODUCTION

As described in the scope of work, computer models were completed to determine the design runoff and resulting water surface elevations for existing and ultimate development conditions of the watershed. Storm frequencies modeled were the 10, 25, 50, 100 and 500 year rainfall events for existing conditions and the 25 and 100 year rainfall events for ultimate development conditions. The calculated water surface elevations have been used to define accurate flood plain limits or boundaries that can be used by the City to update the current FEMA maps. These new flood plain boundaries can also be used with the City's block map database to facilitate management of the flood plains by various City and County Agencies.

The 100 year water surface elevations calculated for existing conditions have been used to identify flooded structures along these creeks. These flooded structures and potential mitigation projects to remove them from the flood plain are presented in Section IV.

HYDROLOGY

Design runoff for existing and ultimate development conditions were computed using the SCS TR-20 methods within the HEC-1 computer simulation model. Based on NWS rainfall and storm event data, antecedent moisture condition II was used in the runoff model. Curve numbers (CN's) were based on soil type and slope as shown below.

Hydrologic Soil Group	SCS Curve Number
A	25
B	55
C	70
D	77

The percent impervious cover was developed from typical impervious cover conditions for the various land use categories as shown in Table III-1. Existing and projected land use was provided by the City of San Antonio's Planning Department. A weighted average CN and percent impervious cover was calculated for each sub-watershed. All of these parameters and their application to each of the three watersheds were discussed and applied consistently by the three study teams. Separate reports were submitted to the City to document the selection of CN values and percent impervious cover. A calibration check was made using various gaging stations throughout the Leon Creek watershed to verify the selection of CN values.

Table III-1
PERCENT IMPERVIOUS COVER

Land Use Category	Average Percent Impervious Cover
Residential	
1/8 acre Garden or Townhouse	65 - 85%
¼ acre Residential Lot	38%
1/3 acre Residential Lot	30%
½ acre Residential Lot	25%
1 acre Residential Lot	20%
Industrial	72 - 85%
Business & Commercial	85- 95%
Densely Developed (apartments)	65 - 85%
Streets, Roads & Parking Areas	98%

The SCS standard 24 hour storm distribution was used with the City's updated rainfall intensity values to develop the storm hydrograph. Design rainfall values were reduced for large areas using the depth area rainfall reduction method in accordance with the SCS methodology. The time of concentration for each sub-watershed was calculated based on an overland flow time and a channel flow time. The lag time used for generation of storm hydrographs was calculated as 60% of the time of concentration in accordance with the methodology used.

Hydrograph routing through the watershed was accomplished using the Muskingum method in the HEC-1 computer model. This routing method takes into account the unique characteristics of each creek segment for which a storm hydrograph is routed downstream to the next flow calculation point. By routing the storm hydrograph from its calculation point to the next downstream calculation point, natural storage or detention in the creek channel is accounted for in determination of design flows. Natural channel storage in the Leon Creek basin was found to be insignificant. Therefore, the routing parameters or channel characteristics used for hydrograph routing under ultimate development conditions were the same as those used under existing conditions. The results of the hydrology model are shown in Table III-2.

Table III-2
100 YEAR FREQUENCY DISCHARGE SUMMARY SHEET

CREEK	CALCULATION POINT NO.	LOCATION	DRAINAGE AREA (Sq. Mi.)	EXISTING CONDITION DISCHARGE (CFS)	ULTIMATE DEVELOPMENT DISCHARGE (CFS)
French	F10	Approximately 1800 L.F. downstream of FM 1560	1.48	3,853	4,414
	F20	Approximately 3800 L.F. downstream of FM 1604	7.46	14,447	16,921
	F30	Approximately 800 L.F. downstream of Guilbeau Road	11.77	17,299	20,193
	F40	Just above junction with Leon Creek	13.87	17,899	20,799
Helotes	HE10	Scenic Loop Road at Wagner Road	13.20	19,758	24,183
	HE20	Approximately 1000 L.F. downstream of S.H. 16	23.93	31,173	37,824
	HE30	At FM 1560	24.42	30,780	37,791
	HE40	AT FM 1604	29.02	30,598	37,243
	HE50	Just above junction with Culebra Creek	33.31	30,352	36,784
Upper	C10	Approximately 10,000 L.F. upstream of Galm Road along the westernmost draw of Upper Culebra Creek	11.51	16,475	19,839
Culebra	C20	Approximately 5500 L.F. upstream of Galm Road along the center draw of Upper Culebra Creek	1.45	3,335	4,003
	C30	Approximately 10,500 L.F. upstream of Galm Road along the easternmost draw of Upper Culebra Creek	1.87	3,893	4,609
Culebra	C40	At Galm Road	17.40	21,779	25,911
	C50	Approximately 7000 L.F. downstream of Galm Road	25.41	28,301	32,833
	C60	Approximately 2000 L.F. downstream of FM 1560	31.22	31,923	36,767
	C70	Approximately 4000 L.F. downstream of FM 1560	36.01	36,306	41,637
	C80	Just below junction with Helotes Creek	72.03	56,891	67,862
	C90	Approximately 4000 L.F. upstream of junction with Leon Creek	80.50	57,303	68,173
	C100	Just above junction with Leon Creek	81.07	57,153	68,005
Huebner	HB10	At Prue Road	2.52	5,529	6,191
	HB20	Approximately 1700 L.F. downstream of Huebner Road	8.20	15,188	17,199
	HB30	Just above junction with Leon Creek	12.20	17,253	19,484
Leon	L10	At FM 1604	39.37	33,162	37,166
	L20	Just below junction with Maverick & Huesta Creeks	54.88	35,394	39,596
	L30	Approximately 1200 L.F. downstream of Prue Road (below junction with Leon Creek Overflow Creek)	57.97	35,618	39,782
	L40	Approximately 2500 L.F. above FM 471 (below junction with French Creek)	75.71	43,219	49,717
	L50	Just below junction with Culebra Creek	157.59	93,198	109,415
	L60	Just below junction with Huebner Creek	170.42	97,780	114,704
	L70	Just below junction with Southwest Research Creek	187.99	99,692	116,669
	L80	At U.S. Highway 90 West (below junction with Southwest Research Creek)	190.23	99,714	116,574
Maverick	MC20	Just above junction with Leon Creek	6.04	11,067	11,961
Huesta	HU30	Just above junction with Leon Creek	5.45	10,457	11,516

HYDRAULICS

Hydraulic calculations were completed using the Corps of Engineers HEC-2 computer program. Cross section data input into the computer model were taken from an aerial topographic map provided by the City. Field elevations were taken at various locations throughout the study area to verify the elevations shown on the topographic maps. Contours on the topographic maps were shown at two (2) foot intervals and the maps were produced at a scale of 1 inch = 200 feet. Other input parameters such as bridges, culverts, low-water crossings and manning's roughness coefficient ("n" value) were determined by a combination of field reconnaissance, inspection of aerial photographs, construction plans and past experience on projects within the watershed. A complete set of hydraulic calculations has been submitted to the City under a separate report.

The Manning's roughness coefficients or n values were determined in accordance with the guidelines established by the three watershed study teams under the direction of the City's Project Manager. A separate report titled "Leon Creek N Value Analysis" was submitted to the City and served as a guide for the selection of N values. Selection of the appropriate N values were made by a combination of visual inspection of the creeks and aerial photographs. Typical N values used in this study are as follows:

Creek Segment Characteristics	Manning's N Value
Concrete lined channel	0.015
Clean, uniform vegetated channel	0.035
Large trees with little or no underbrush or deep flow depth over dense growth	0.050 - 0.055
Dense growth in overbank areas	0.060 - 0.090

Results of the 100 year existing condition water surface profiles indicated that the flow was generally confined to areas defined as being within the existing flood plain. There were isolated incidents of illegal fill encroachment into the flood plain that created wider flood plains than previously defined and areas in which development occurred outside the influence of the City's Flood Plain Ordinance. Exhibits of the existing condition flood plain for the 10, 25, 50, 100 and 500 year storm event can be found in the exhibits section of this report.

SECTION IV. RECOMMENDED MITIGATION PROJECTS

IDENTIFICATION OF PROBLEM AREAS

As part of the task of developing the Leon Creek Master Drainage Plan, this study identifies and prioritizes specific projects which will mitigate potential flood hazards. The project team utilized HEC-2 floodplain models to identify 78 specific areas where the 100 year flood presents a flooding hazard based on the existing watershed conditions. Several other potential problem areas were initially considered, but were eliminated based on more detailed analysis or are being addressed by TxDOT or other agency projects or programs. Exhibit MP-1 contained in the Exhibits section of this report shows the location of each of the 78 flood mitigation projects. For each of the problem areas a specific capital improvement project has been identified to mitigate the potentially dangerous flooding condition.

Generally, the problem areas can be categorized into three types: inundated roadways or bridges, areas where building structures flood, and a public park. Analysis and modeling of the floodplain shows that the 100 year flood peak discharge increases only very slightly under ultimate development conditions compared with that under existing conditions. Moreover, an element of the Master Plan provides for management practices which may require developers to take measures to accommodate their own discharge in future projects. Therefore, the project recommendation is based on models simulating only the existing extent of development. Appendix "B" contains Tables 1.1 - 1.7 summarizing these problem areas by stream. Figures 1.1 - 1.7 show the problem areas located on project location maps in the Appendix.

Definition of "Base" and "Fringe" Projects

Of the 78 flooded areas identified in the Leon Creek Watershed, 70 are definitely inundated by the 100 year flood. Projects in these areas are labeled as "base" projects and include all of the inundated roadway/bridge areas, approximately ninety percent of the building structures, and the park. The remaining eight sites, including the remainder of the structures, appear to be near the edge of the 100 year floodplain and may actually be outside the limits of it. Projects mitigating flooding of the inundated structures in these areas are labeled as "fringe" projects. Fringe projects will require a survey of finished floor elevation to determine their actual disposition. The fringe structures found to be in the 100 year floodplain would then be included as candidates for mitigation projects.

Project Selection

The criterion for the selection of sites for specific projects is that the 100 year flood presents a potential for damage to persons or property at the site. More specifically, the peak water surface elevation is at least as high as the pavement surface at roadways or the top of the foundations of structures. Floodwaters even a few inches above this critical elevation present safety concerns at low water crossings due to the possibility of a motorist being stranded within or swept away by flood waters. The potential for loss of life at these locations is a very real concern. Any flooding of structures presents concern for property damage and economic adversity, while more severe cases threaten the lives of inhabitants.

The problem areas are interrelated as parts of the overall watershed system; thus, in some cases one project may reclaim more than one problem area. Also, projects such as detention/retention ponds could lower peak water surface elevations, potentially decreasing flooding in multiple problem areas. Nevertheless, in the majority of cases, a single project has been selected for each problem area. Each area has been analyzed independently to arrive at the most economical method of solution for the specific site. Solutions for the problem areas employ several different strategies which are described in greater detail in the following paragraphs. 78 specific projects are recommended using selected strategies based on the characteristics of the area. Table IV-1 summarizes the recommended projects and their costs. A more detailed summary of the projects and estimated costs is included in Table 2 in the Appendix.

Funding of the projects may be borne in large part by the citizens of San Antonio in Bexar County. Additional funds may be sought from sources such as federal, state and local roadway and drainage programs, other municipalities, and in some instances, private property owners. Funding strategies are discussed in detail under a separate report entitled "Funding Strategies for Drainage Improvements" developed for the City of San Antonio Public Works Department. Table 3 in the Appendix gives a basic summary of how the cost of the 78 mitigation projects might be distributed among the responsible administrative agencies.

Priority System and Cost Benefit Ratio

Each project is given a high, moderate, or low priority based its potential to reduce flooding damages to the community. Tables 4.1a - 5.7c in the Appendix summarize projects by priority for each stream in the Leon Creek Watershed. The cost benefit ratio is one indicator of a project's value, but this ratio must be understood and applied appropriately. The benefit evaluation is estimated differently for roadway/bridge and structure protection projects. Therefore, cost benefit ratios can only be compared among roadway/bridge projects or among structure protection projects. Grouping cost benefit ratios for roadway/bridge and structure protection projects together would not be meaningful in this study.

TABLE IV-1
LEON CREEK WATERSHED
RECOMMENDED PROJECTS SCENARIO

MITIGATION PROJECTS	PROJECT DESCRIPTION	COST
70 BASE PROJECTS (318 - Structures)	1 - PUBLIC PARK (Signs and Gates)	$50,000
	46 - ROADWAYS/BRIDGES	$32,758,000
	4 - FLOODWALLS (6 - Structures)	$1,320,000
	6 - LEVEES (16 - Structures & 3 - Roadways)	$427,000
	7 - BUYOUTS (32 - Structures)	$4,593,000
	4 CHANNEL IMPROVEMENTS (264 - Structures & 2 - Roadways)	$18,390,000
	TOTAL BASE PROJECTS COST	**$57,538,000**
8 FRINGE* PROJECTS (30 - Structures)	5 - LEVEES (17 - Structures)	$205,000
	2 - BUYOUTS (12 - Structures)	$1,185,000
	1 - FLOODWALL (1 - Structure)	$152,000
	TOTAL FRINGE* PROJECTS COST	**$1,542,000**

TOTAL COST OF 78 RECOMMENDED PROJECTS **$59,080,000**

*Fringe projects include those projects near the edge of the flood plain which require detailed survey information to determine if they in fact are affected by the 100 year event.

At roadways, a project's real benefit involves public safety as well as tangible property. Quantifying such benefits requires subjective judgment. Therefore the estimation of benefits is based on the project's ability to protect the public, relative to the other roadway projects in the study. Benefits are assigned at $1 million, $1.5 million, or $2 million, depending on daily traffic using the crossing.

For projects protecting structures, the benefit associated with each project has been quantified based on the real value of the structures only. No evaluation has been made for the potential inconvenience, injury or loss of life associated with the flooding of structures.

DESCRIPTION OF MITIGATION PROJECTS

This section defines and describes the different types of solutions suggested to mitigate flooding in areas in the Leon Creek Watershed. Generally, the solutions may be grouped into two conceptual categories. One strategy is to relocate the facility away from the reaches of floodwaters. At roadways, this goal is accomplished through bridge improvements or through raising the roadway and providing a culvert for cross drainage as necessary. Occasionally the purchase and demolition of an inundated structure is the most economical means of removing such a hazard, in lieu of constructing significant infrastructure to protect it. The second strategy is to improve upon the capacity or direction of the floodwater conveyance. This method may employ channel improvements, levees, or floodwalls. At roadways, the improvement of bridges or culverts causing constrictions may accomplish the desired effect. A third strategy, which is explored in this chapter under the heading Special Projects, is to lower the discharge, and water surface elevation, using detention or recharge ponds.

Bridges

Among the inundated roadway/bridge areas, recommendations include 46 new or lengthened bridges or culverts. Two TxDOT funded bridges (Projects HEL-4 and C-5A) have been omitted from the scenario of projects because they are already programmed for construction by TxDOT.

The total estimated cost for each new bridge includes a concrete bridge structure and roadway approaches (fill and paving). Calculations have been performed to estimate the cost of construction for each bridge. First, the discharge and depth of flow are obtained under existing conditions from the HEC-2 models for all bridges. A velocity of 10 feet per second is assumed for the stream through the bridge. Dividing discharge by velocity yields an approximation of the required area for the bridge opening. Dividing the required bridge opening area by the depth yields an approximation of the required bridge length for a rectangular opening. Finally, adding twice the depth accounts for assumed 2:1 abutment slopes. The resulting calculated bridge length is increased to account for any skew to the channel, then is rounded up to the next even 10 foot interval. The bridge width is obtained by scaling the existing bridge widths from mapping or is based on known future improvements. Multiplying the bridge width by the bridge length yields the total bridge deck surface area. The bridge cost is estimated using a unit price of $40 per square foot of bridge deck surface. This unit price is based on past contracts and bid tabulations for standard pier supported, concrete bridges.

Roadway embankment cost is estimated using the roadway length, roadway width and depth of embankment. The roadway length is determined by subtracting the calculated bridge length from the overall floodplain width. The depth of embankment is ascertained from the mapping based on the average amount of fill required to elevate the roadway above the floodplain. The fill volume and area of approach pavement is then calculated and rounded up to the next even 100 cubic yard and 100 square yard intervals, respectively. Using unit prices of $8 per cubic yard for embankment and $20 per square yard for asphalt paving, the fill and paving costs are computed. The estimated total bridge construction cost is the sum of the bridge cost, approach paving cost and embankment fill cost rounded up to the next even $1,000 interval.

Three of the roadway/bridge projects identified consist of raising the roadway to prevent inundation of the roadway during the 100 year storm. All three projects require construction of a cross drain culvert as a part of the solution. The culvert size and cost is estimated similarly to that described for bridges, with the same unit price of $40 per square foot of deck surface. Project cost for raising the roadway is estimated similarly to that described for approaches to bridges.

The 46 base roadway/bridge projects recommended to provide safe passage on roadways during the 100 year storm range in project costs from $64,000 to $2,713,000. The total cost of the roadway/bridge improvements was estimated at $32,758,000. Federal, state, and local roadway and drainage funds could potentially be applied toward this total. In fact, 7 of these projects are already listed on the MPO Long Range Plan. Two additional projects are partially funded under the City's Capital Improvement Plan through the 1994 bond program. Thus, funding amounting to over $3,000,000 is already programmed. The remaining projects potentially could be included in these established roadway improvement programs.

Levees

A levee may best be defined as an earthen dam used to divert a channel without retaining the flows. Levees are best suited for those areas with wide, flat overbanks. They are not practical in areas with steep banks due to the large amount of fill required. Floodwalls are best suited for those areas with steep banks, where levees are not practical. Levee construction is generally less expensive than channel improvements or floodwalls if the proposed site is flat and the water surface profile has adequate slope to allow outfall behind the levee.

Recommendations include six base levee projects which mitigate flooding at three low water crossings and protect 16 building structures. Two of the projects (M-2 and M-3) are already listed as roadway improvements on the MPO Long Range Plan. Since the construction of levees is significantly less expensive than raising the roadway at these sites, consideration should be given to redirecting those MPO funds and incorporating levees into a more efficient solution for these two problem areas. Also identified are five additional fringe levee projects which may be required to protect 17 fringe structures if survey data proves these structures to be in the floodplain.

The levee project costs include the cost of fill and stabilization. Calculations have been performed to estimate the cost of construction for each levee. First, the length and height are estimated based on the existing conditions using HEC-2 models. The levees start upstream of the point where water flows to inundate a structure. They continue downstream to a point where the drainage behind the levee can outfall based on the water surface elevation computed in the model. The levees provide for three feet of freeboard in accordance with FEMA standards. The width is based on three to one side slopes and a 10 foot wide top. The fill volume is calculated and rounded up to the next even 100 cubic yard interval. The estimated area of stabilization is rounded up to the next even one acre increment. Using unit prices of $10 per cubic yard for embankment and $5,500 per acre for stabilization, the levee cost is computed.

The base levee projects range in cost from $26,000 to $211,000. The total cost of the six base levee projects is estimated at $427,000. The five fringe levee projects range in cost from $26,000 to $56,000. The total cost of the fringe levee projects is estimated at $205,000.

Floodwalls

A floodwall may best be defined as a reinforced concrete wall founded on a footing and used to divert a channel without retaining the flows. Improved aesthetic treatments to the wall such as construction of a top rail or colored stamped concrete is assumed in the total cost estimated. Adequate slope in the water surface profile is required to allow the drainage behind the floodwall to outfall.

Since floodwalls are generally more costly than levees per unit foot, they are proposed only in areas where the ground slope is too steep for levee construction. For example, in an area where the existing side slope is steeper than 3:1, a levee with a proposed side slope of 3:1 would not tie back into the existing slope until it reaches the bottom of the channel.

The estimated floodwall cost includes the cost of concrete. Calculations have been performed to estimate the cost of construction for each floodwall. First, the length and height are estimated based on the existing conditions using HEC-2 models. The floodwalls start upstream of the point where water flows to inundate a structure. They continue downstream to a point where the drainage behind the floodwall can outfall based on the water surface elevation computed in the model. The floodwalls provide for three feet of freeboard in accordance with FEMA standards. The wall width is assumed to be 1 foot. The footing is as wide as the wall is high. The calculated concrete volume is rounded up to the next even 10 cubic yard interval. Using a unit price of $400 per cubic yard for concrete, the floodwall cost is computed.

Four base floodwall projects are identified to protect six structures. Individual base floodwall project costs range from $100,000 to $720,000. Total cost of all four base floodwall projects is estimated to be $1,320,000.

One identified fringe floodwall project may be required to protect one fringe structure if survey data proves this structure to be in the floodplain. The total cost of this fringe floodwall project is estimated at $152,000.

Channel Improvements

Channel improvements are proposed in the areas where it is realistic to protect structures or roadways from inundation, but levees or floodwalls will not suffice. Grass lined channels with 3:1 side slopes are initially sized. However, in several areas the available width is inadequate or the velocity too high for a grass lined channel. A 2:1 side slope concrete lined channel is proposed in these areas. Channel areas where the flowline is lowered require a concrete lined drop structure. The concrete lined channelization projects are particularly expensive since only full concrete channelization of the stream is considered. The potential exists in some areas to use a relief or pilot channel rather than full concrete channelization.

The preliminary sizes of the proposed channels are based on Manning's equation using the existing discharge in the stream. Several sections taken at each site are used to estimate the approximate amount of excavation required to construct the channel.

The total channelization cost includes the cost of excavation, disposal, and concrete riprap (if required). Calculations have been performed to estimate the cost of construction for each channel. First, the length and depth are estimated based on the existing conditions using HEC-2 models. The calculated excavation volume is rounded up to the next even 1000 cubic yard interval. Using unit prices of $8 per cubic yard of excavation, $3 per cubic yard of disposal, and $30 per square yard of concrete riprap, the channel cost is computed.

Recommendations include six base channelization projects to protect 264 structures and two low-lying roadways. The base project costs range from $143,000 to $10,472,000. Project HB-9A, for which $10,472,000 is estimated to protect 167 structures, is under the jurisdiction of the City of Leon Valley. In addition, reimbursement of costs for Projects LC-5 and C-7A could be sought from the property owners who placed illegal fills in these areas. The total base channelization projects estimated cost of $18,390,000 could be substantially reduced if these other funding sources are considered.

Purchases

Structures are threatened by the 100 year flood in nine problem areas where either it is not reasonable to protect the structures or it would be less expensive to purchase the property than to make improvements to protect it. The cost of purchasing structures is estimated at $75 per square foot.

Of these nine areas, seven are base projects containing 32 structures of various sizes. The approximate costs of the base purchase projects range from $120,000 (for the single structure in Project C-8E), to $1,260,000 (for the seven structures in Project HEL-3D). The total cost of the base purchases is estimated at $4,593,000. The remaining two fringe project areas contain 12 structures of various sizes which may have to be purchased if survey data shows that they are in the floodplain. The approximate costs of the fringe purchase projects range from $210,000 (for the two structures in Project C-7B), to $975,000 (for the ten structures in Project C-5C). The total cost of the fringe purchases is estimated at $1,185,000.

Additional Projects

Project LC-17 involves installing flood warning signs and gates in Rodriquez Park to reduce the risk of loss when the park is flooded. The estimated cost of this base project is $50,000.

SPECIAL PROJECTS

The base and fringe projects identified in this study have been selected to target specific flood-prone sites. In addition to these point remedies, this comprehensive Master Plan also considers five regional detention facilities and four potential retention ponds to collect and manage flows. Locations of these five detention and four retention facilities are shown on Exhibit MP-1. Innovative use of these water features could also provide a focal point for recreational areas, or could be linked with other water resource management strategies, such as SAWS water reuse plans.

Although benefit of the detention/retention pond projects is that they may significantly reduce the number and/or magnitude of the base mitigation projects identified. These benefits are not included in the recommended project scenario. Further detailed analysis is required to determine the potential benefits of these ponds.

Detention Ponds

A detention pond may be described as a basin placed adjacent to a channel for the purpose of detaining excess flows. The advantage of using such facilities is twofold: it shaves off the peak water surface elevation at critical points along the drainage system, and it creates assets in the form of stormwater-filled basins. These projects could possibly serve as "runoff banks" for developers who prefer to pay an impact fee to support the projects in lieu of detaining runoff on their own site. Regional detention facilities are very beneficial for small high density properties where there is no practical method of detending runoff onsite. These off-channel detention basins would begin to fill when the channel water surface elevation exceeds the level of a spillway. The basin could be lined or unlined, depending its purpose within the overall stormwater management strategy. For example, a drained basin could begin to discharge slowly back into the channel immediately after the peak. This basin would be dry most of the time, creating an ideal setting for recreational land such as athletic fields. Alternatively, a lined basin could be used to contain the runoff for a longer period, allowing stormwater to be mixed with SAWS reuse water and distributed to users. Wet or dry, the basin could be used in conjunction with scenic parkland projects. Two of the ponds identified (Projects P-2 and P-3) are relatively close together and could be connected with a linear park and scenic hike and bike path. All of these detention sites are located in abandoned quarries which provides an opportunity to reclaim these unsightly areas in an aesthetically pleasing way.

The total project cost for each pond includes the cost of land acquisition at the unit cost of $2000 per acre, excavation at $6 per cubic yard, disposal and fill at $3 per cubic yard, and concrete riprap at $30 per square yard. Five potential detention pond projects are identified with costs ranging from $1,334,000 to $12,230,000. The total cost of the detention pond projects is $25,138,000. Without subsurface investigation, it is difficult to estimate the magnitude of rock excavation. Also, disposal costs could vary depending on the actual distance to the disposal site.

Leon Creek flood profiles are shown at the back of the Appendix. The preliminary hydraulic analysis of Leon Creek with all five detention ponds modeled shows that the water surface elevation at the downstream reach of Leon Creek is lowered by approximately two feet. This change does not remove any of the identified problem areas along Leon Creek, or its tributaries, from the floodplain. However, the floodplain limits for 11 sites would be reduced significantly enough to decrease the overall cost of the projects identified to protect or improve those sites.

These five detention ponds reduce the peak flow in Leon Creek by approximately 10,000 cfs or roughly 10%. Ultimate development flows calculated for this study show an average increase of approximately 15% over existing condition flows. These detention ponds would be best utilized to offset ultimate development flow increases on a regional basis should the City of San Antonio adopt a new flood plain ordinance that required detention. This would provide a facility that could reduce peak flows from properties being developed that are too small for onsite detention.

Retention Ponds

A retention pond may be described as a basin placed to interrupt a channel such that all of the channel flows are collected in the basin at that point. An outlet structure can allow for required minimum flows to be released to the downstream channel. By retaining the flows at a certain location, all downstream flooding problems are reduced to some extent. Retention ponds have potential additional benefits similar to those of detention ponds. They can be an appealing way to reclaim rock quarries and also have the potential to enhance recharging of the Edwards Aquifer if, of course, they are located over the recharge zone.

Four retention ponds were identified during the course of this study. Three of these retention ponds were modeled as a part of this study to gage the benefit of these retention facilities. The preliminary hydrologic analysis of the Leon Creek watershed with all three ponds modeled shows that only the Government Canyon and the Culebra Retention Ponds are sufficient in size to contain the peak of the 100 year storm. The Vulcan Quarry (Helotes) Retention Pond could be beneficial with more storage volume made available through future mining. Culebra Creek flood profiles are shown at the back of the appendix. With the Government Canyon and Culebra ponds in place, the water surface elevation at the downstream reach of Culebra Creek is lowered by approximately two feet. One other retention pond that should be considered is on Leon Creek in the Redland Quarry. There was not enough information available at the time of this study to assess the beneficial impact of the Redland Quarry site. Another benefit from these retention ponds is recharge to the Edward's Aquifer. All four of these potential retention sites are located over the recharge zone as shown on Exhibit MP-1..

Multi-Functional Concepts

Critical to the feasibility of the detention projects is the ability for these facilities to be multi-functional. Therefore, it is important to examine the other benefits of the five detention projects. One of these possible detention sites (Project P-1) is already being evaluated as a multi-use facility by the City and was not included our evaluation of multi-functional facilities. The basic goal of the Multi-Functional Projects is to design them to have more than one specialized use such as open space, wildlife habitat and/or recreation. There is also a need to increase the number of recreation facilities in the Leon Creek corridor where the growth has been tremendous over the past two decades. These types of muti-use facilities add to the variety of recreation and open space facilities currently available in the Leon Creek corridor as well as enhance the environmental quality and character of typical storm detention facilities.

Though each project will have its unique design, all must share common site planning goals. Each detention facility must be visually pleasing in as many conditions as possible and must be durable to withstand flood situations. Each site should include clear definition of hazardous areas and provide protection from public injury. These sites must also be accessible from more than one direction and every effort should be made to enhance natural features and materials.

Existing Recreational Facilities

The number and variety of existing recreational facilities in the Leon Creek corridor is limited. School properties and public parks with traditional group shelters and picnic sites are the only types of existing recreational areas. None of the recreational sites are linked with dedicated bicycle routes or hike/bike trails in the creek corridor. The following facilities exist within one mile east or west of Leon Creek between Highway 90 and Loop 1604

- Mateo Camargo Park [Highway 90 between Military Drive and South Callaghan Road]
- Rodriguez Park [Old Highway 90 between Military Drive and South
- Callaghan Road]
- Gustafson Stadium [N.W. Loop 410 between Culebra Road and Ingram Road]
- O.P. Schnabel Park [Bandera Road between Old Prue Road and Braun Road]

Proposed Multi-Functional Detention Projects

The proposed projects are distributed along a two and one half mile stretch of Leon Creek . The ultimate program and development of each should be tailored to the type and intensity of adjacent land use. These new projects should not duplicate nearby recreation facilities. The designs should be in harmony with hydraulic characteristics of the adjacent creek . Exhibits of these projects are shown in the exhibits section of this report.

Project P-2 and Project P-3

Project P-2 and Project P-3 are immediately adjacent to two well developed residential neighborhoods. Both sites are approximately one half mile south of O.P. Schnabel Park. Project P-2 includes approximately 140 acres. The existing topography divides the basin into two separate areas. The north is proposed as open space for storm detention area but also includes recreational trails and picnic facilities. Project P-3 covers approximately 140 acres. The northern portion is proposed for storm detention and informal recreation activities such as jogging. The 38 acres at the south are above the existing flood plain. The plan proposes that this area be purchased as part of the mitigation project. Structured recreation activities such as softball and soccer are proposed in this area.

Project P-5

Project P-5 is bordered by open land and a developing residential neighborhood. Project P-5 covers approximately 169 acres. Softball and multipurpose fields are proposed for the northern third of the site. Purchase of land for these uses will be necessary. The central third of the site is planned as storm detention and informal exercise trails. The land which composes the southern third would be acquired to serve as open space above the flood prone area.

Project P-6

Project P-6 is the largest of the proposed Multi-Functional sites at 340 acres. There are no residential neighborhoods in close or direct proximity. The limited access and coarse topography make this site a good candidate as an " Urban Wilderness". The basin area is proposed primarily as nature trails and storm detention. Picnic sites are suggested for the higher elevations. It will be necessary to purchase easements on the northeast and southwest for permanent vehicular access or arrange for access to the site from the City owned Public Works Maintenance Yard adjacent to the site.

Environmental Impact

Leon Creek is in one of the most rapidly developing sectors of San Antonio. Environmental management policies and practices have not kept pace with the intensity of urban growth. Most of the developed land along the corridor turns its back on the creek. The channel is viewed only as convenient place to discard local runoff. Without a master plan and practical conservation practices, the environmental impacts on the creek will affect larger areas of the city. These detention projects must be designed to be compatible with the ecological framework and environmental character of Leon Creek.

Design of these facilities must consider basin scour and slope erosion while providing some filtration of sediment laden stormwater. The filtration of stormwater may also be part of SAWS overall storm water pollution prevention plan for the City as part of the Environmental Protection Agency's mandated stormwater quality program (National Pollution Discharge Elimination System). In order to maintain the functional uses of these facilities, design consideration must be given to controlled release of stormwater, sediment storage and removal, and cleanup of debris deposited during extreme storm flow events.

Environmental enhancement of the Leon Creek corridor may also be achieved by the creation of wildlife habitat within designated areas of the detention pond sites. The presence of natural water flow and location within the flood plain of Leon Creek are factors critical to sustaining a variety of wildlife, especially birds in an urban setting. Careful attention to reclamation of these old quarry areas through planting with a diverse perennial native plant community and planting species that will be compatible with succession and evolution of the creek environment will insure a stable long term natural habitat with low maintenance cost.

Muti-Functional Detention Pond Cost

Cost for adding the multi-use benefits to the detention ponds were estimated based on some generalized assumptions of land use within the detention sites. Depictions of how these sites might be developed were submitted to the City under separate cover. Estimated construction cost include site infrastructure (slope stabilization, site grading, access roads and utilities), facilities (paths, trails, sports fields, shelters and restrooms), emergency and security communications and revegetation (ground cover and trees). The estimated construction cost to enhance the detention projects with muti-functional uses are shown below:

Project	Estimated Construction Cost
P-2	$ 4 million
P-3	$ 4 million
P-5	$ 8 million
P-6	$ 6 million

CONCLUSION

Table IV-1 summarizes 78 recommended projects as a single scenario for the purpose of flood mitigation in the Leon Creek watershed. In addition to the site specific projects, the Master Plan includes five regional detention facilities and four retention/recharge facilities which have immediate value in the role of peak flood abatement, plus multi-faceted advantages in providing for future flexibility in the comprehensive stormwater management scheme.

APPENDIX G

Salado Creek Watershed Study and Drainage Master Plan

SALADO CREEK WATERSHED STUDY AND DRAINAGE MASTER PLAN

Prepared for:

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Final Report

March 1997

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Executive Summary

A. Purpose

A drainage study has been performed on the Salado Creek and its major tributaries for the City of San Antonio. The purpose of this study is to provide a sound basis for the development of a master plan for future drainage improvements and development in this watershed. The study was performed in three phases which included the Preliminary, Design, and Summary Report Phases. In the Preliminary Phase existing models, precipitation and stream gage data, recharge zone development plans, dam analyses, and storm flow information gathered, reviewed and assembled. Meetings were held with the various governmental agencies which are affected or have jurisdiction on Salado Creek and its tributaries. A hydrologic model was also prepared which calculates stream flows resulting from rainfall events. The Design Phase of the study included the preparation of a hydraulic model which calculates water surface elevations and flow profiles. Water surface elevations generated by the hydraulic model were used to map the flood plains. In the Summary Report Phase of this study, various mitigation projects were identified which could remove existing structures and developable land from the flood plain and eliminate potentially dangerous flooded roadway crossings.

The Salado Creek Watershed contains an area of approximately one hundred ninety (190) square miles, that was used for the hydrologic analysis. The hydraulic analysis included 55 miles of creeks. The lengths of each creek is as follows:

Creek	Limits of Study	Length
Salado Creek	S.E. Loop 410 to N. Loop 1604	33.6 miles
Panther Springs Creek	Salado Creek to N. Loop 1604	6.0 miles
Mud Creek	Salado Creek to N. Loop 1604	5.5 miles
Elm Creek	Mud Creek to N. Loop 1604	1.5 miles
Elm Waterhole Creek	Elm Creek to N. Loop 1604	2.3 miles
Beitel Creek	Salado Creek to O'Connor Road	6.1 miles
		55 miles

The study limits started downstream of S.E. Loop 410 and extended upstream along Salado and its tributaries to Loop 1604 on the northside of San Antonio. The Watershed's boundaries cross the jurisdictions of Bexar County, The City of San the U.S. Military facilities at Fort Sam Houston, Camp Bullis and Camp and smaller suburban communities including Shavano Park, Hill Country Village, Hollywood Park, Windcrest, and Terrel Hills. Within the Watershed exist thirteen (13) flood control dams.

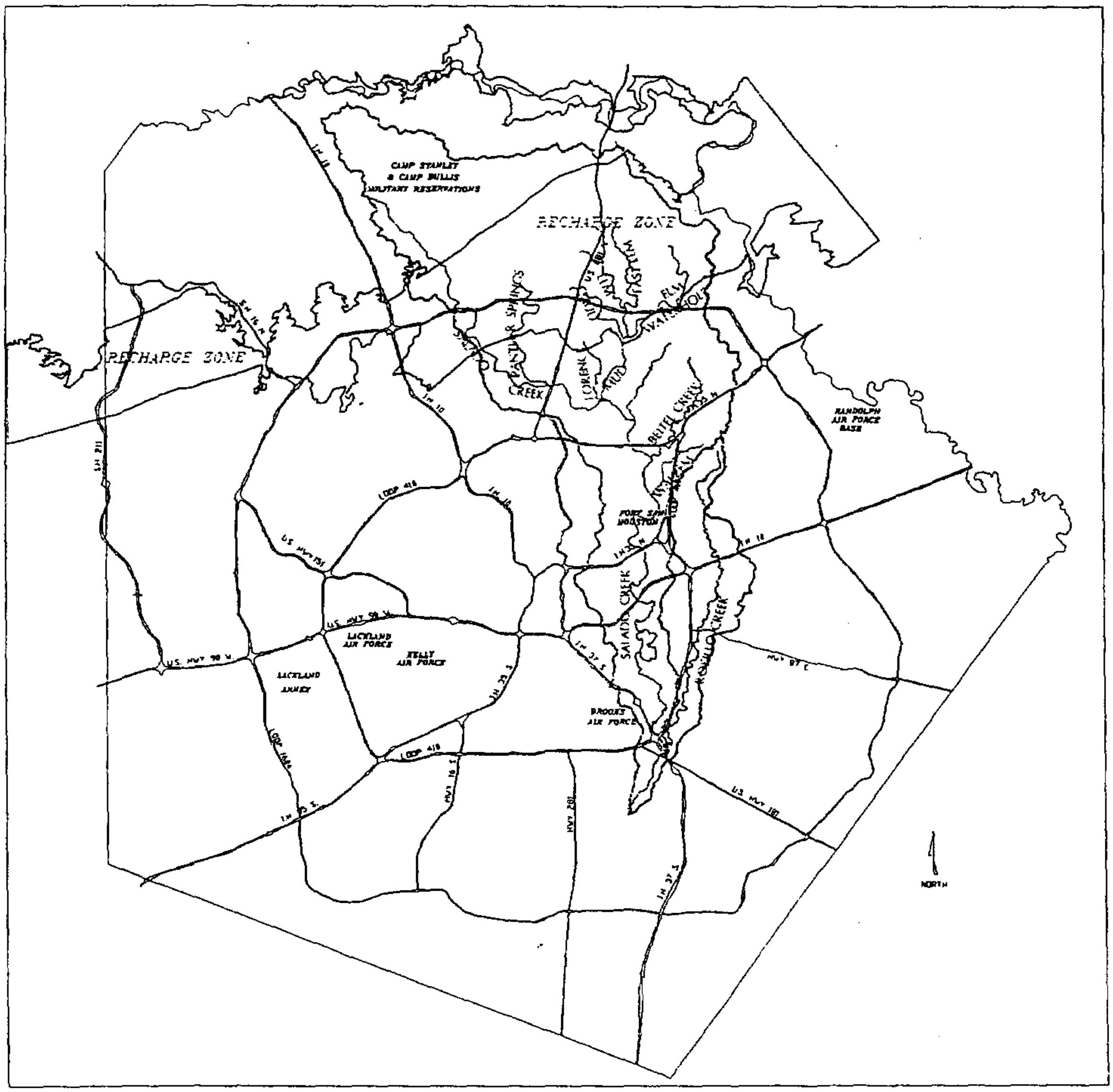


Figure 1 - "Salado Creek Watershed"

B. Preliminary Phase

Gathering data, reviewing existing hydraulic studies, and the hydrologic analyses were tasks performed in the Preliminary Phase. The hydrologic analysis is a process where rainfall data, ground surface conditions, various stream alignments and confluence rainfall data, ground surface conditions, various stream alignments and confluence locations are studied to determine stream flows which result from rainfall accumulations across the watershed. Storm water runoff generated by rainfall is affected by soil type, soil moisture conditions, vegetation, ground slope and impervious cover. Storm water flow within the various streams is also influenced by the existing flood control retarding dams. The Salado Creek Watershed is somewhat unique from the other major watersheds in San Antonio in that thirteen flood control dams exist within the upper watershed which are typically located north of Loop 1604 and within the Edwards Aquifer Recharge Zone. This study confirms that these existing dams provide significant reductions in flooding along the Salado Creek and its tributaries in the San Antonio area.

This drainage study also addressed the affect of current and future development within the Salado Creek Watershed. The source for ultimate development land use projections was the City of San Antonio, Planning Department. Information on land use indicated that approximately thirty eight percent (38%) of the land in the Salado Creek Watershed is vacant and available for development. The Planning Department projected approximately eight five percent (85%) of the undeveloped land area will actually be developed.

Storm water flows were computed for the 10, 25, 50, 100 and 500 year frequency storms within the Salado Creek study area for existing and ultimate development conditions. A comparison of the storm water flows at major road crossings is shown on Table 1. This table indicates the current Federal Emergency Management Agency (F.E.M.A) model, existing conditions model, and ultimate conditions model flows in cubic feet per second (cfs) for the 10, 50, and 100 year frequency storms.

Table 1 - "Comparison of Storm Water Flows"

	10 Year			50 Year			100 Year		
RIVER CROSSINGS	FEMA Model	HEC-1 Existing	HEC-1 Ultimate	FEMA Model	HEC-1 Existing	HEC-1 Ultimate	FEMA Model	HEC-1 Existing	HEC-1 Ultimate
Loop 1604		15414	15379		23250	23243		26676	26667
West Ave.	12200	16570	16937	17300	25001	25336	19300	28664	28982
U. S. 281	16700	17209	17622	24000	25735	26123	27000	29441	29813
Wetmore Rd	28600	26873	29435	41600	39650	42132	46600	45227	47681
Nacogdoches Rd.	28600	27673	30383	41600	40793	43476	46600	46528	49204
N.E. Loop 410	30100	28189	31178	44300	41614	44602	49100	47504	50470
Austin Hwy.	36900	32310	35875	54200	47646	51236	60500	54365	57946
Rittiman Rd.	36900	31029	34274	54300	45675	48935	61000	52097	55337
I. H. 35	36900	21900	24089	54300	32147	34408	61000	36656	38922
Commerce St.	36900	20078	22123	54300	29415	31550	61000	33526	35674
Rigsby Ave.	36900	18247	20134	54300	26672	28661	61000	30382	32394
E. Southcross Blvd.	36900	14139	15567	54300	20512	21986	61000	23250	24723
S.E. Military Dr.	36900	14139	15567	54300	20512	21986	61000	23250	24723
S.E. Loop 410	36900	13292	14657	54300	19262	20673	61000	21822	23236

C. Design Phase

The hydraulic analysis performed in the Design Phase is a process where the stream shape or cross section and vegetated condition are considered to determine the depth of storm water flows and the resulting flooded area that is caused by rainfall events. Roadway crossings and other man made improvements tend to create restrictions within the stream bed area which also may impact the depth and the conditions of storm water flow within a stream. The cross-sections and channel slopes used in the study were based on aerial mapping prepared for the Leon, Upper Olmos, and Salado Creek watershed studies by United Aerial Mapping Company and provided by the City of San Antonio. The study also addressed the existing conditions within the creeks related to vegetation and other encroachments such as fill materials and structures. Previous flood study information and stream gage records maintained by the United States Geological Survey were also reviewed and incorporated into the study. Field investigation of the various creeks within the study area was included in the study. Many areas within the floodplains are not accessible because right-of-way or easements do not exist for access and the embankment areas are densely vegetated. The study results show that the Salado Creek between S.E. Loop 410 and N.E. of Loop 410 possesses a unique linear channel storage

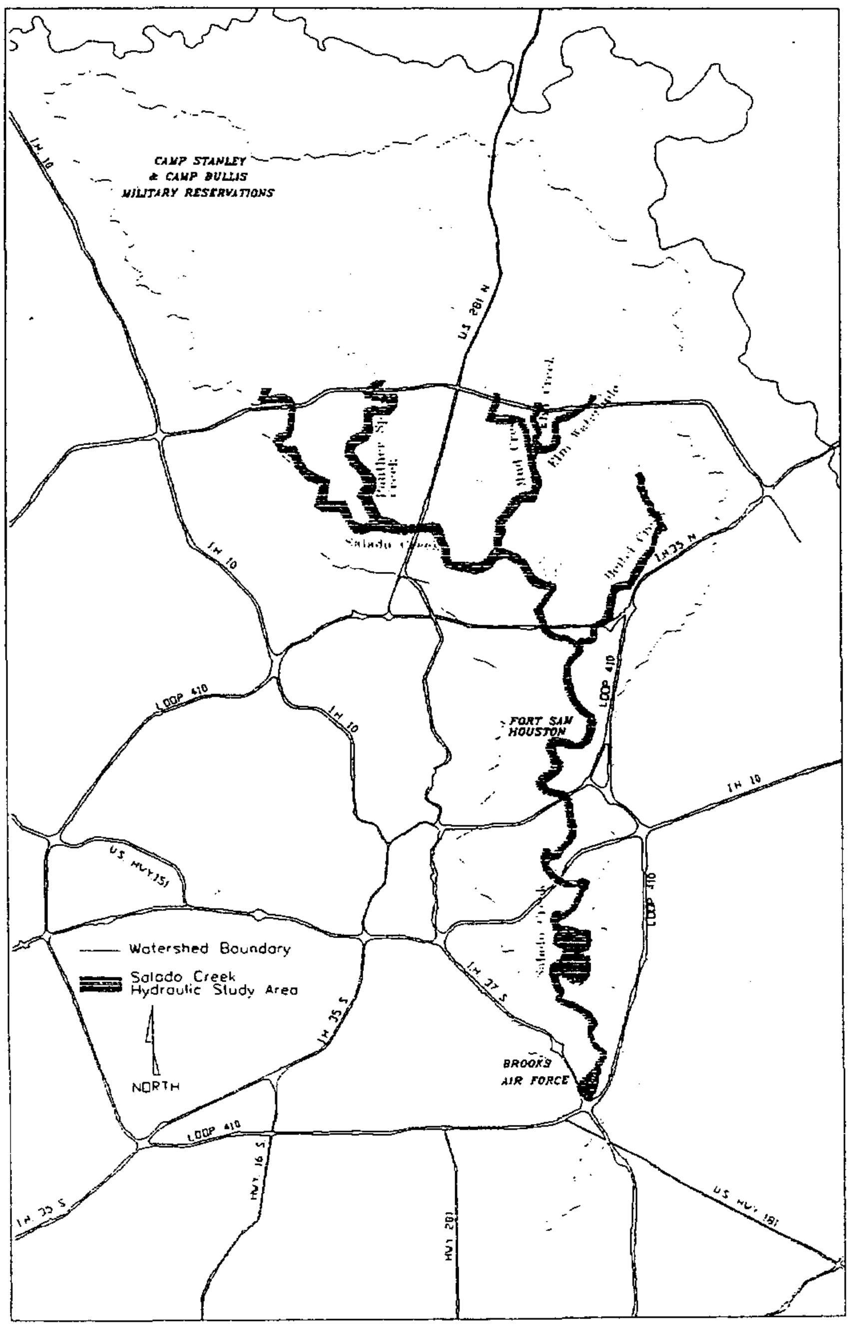


Figure 2 - "Hydraulic Study Area"

accessible because right-of-way or easements do not exist for access and the embankment areas are densely vegetated. The study results show that the Salado Creek between S.E. Loop 410 and N.E. of Loop 410 possesses a unique linear channel storage condition. Linear channel storage (detention) occurs when storm water flows along the banks and outside the banks is slowed down by dense vegetation and flatter slopes. Existing conditions along the lower 20 miles of Salado Creek consist of wide flat stream sections and relatively flat slopes. Storage conditions are increased within these areas by dense vegetation growth within the floodplain areas. This linear storage provides a significant reduction of storm water flows downstream.

D. Summary Phase

Upon completion of the hydrologic and hydraulic models for the Salado Creek Watershed, the floodplains for the 10, 25, 50, 100, and 500 year frequency storms were mapped. In the Summary Phase, mitigation projects were identified for reducing and eliminating flooding of structures and roadways.

Flood prone areas have been identified based on this study. The impact of the 100 year frequency storm and its resultant floodplain on existing structures has been identified. One hundred sixty nine (169) houses and ten (10) apartment buildings are located within the floodplain. Sixty five (65) commercial and industrial type structures are also located within the floodplain with an additional twenty three (23) structures identified as recreational use type facilities. Another sixty eight (68) structures have been identified as barns or sheds. Major areas of flooding for a 100 year storm event exist in the East Park Subdivision (Wheatley Heights) south of Martin Luther King Drive. There are approximately ninety nine (99) residential structures within this area. There are also forty four (44) homes in the Garden Court East and Fairfield Village North Subdivisions and Gemini Drive area. Ten (10) apartment buildings have been found to be in the floodplain within the Renaissance Village North and Villa Apartments. Eighteen (18) commercial and industrial buildings located in the Austin Highway Industrial Subdivision are in the floodplain. A list of the structures located in the floodplain is provided in Chapter 5 of the report. A field survey confirming the floor elevation of these structures has been obtained. Thus, all structures having finished floor elevations above the floodplain are not included in the floodplain. Numerous roadways have been identified in the floodplain. A complete list of roadways crossing the creeks in the study is included in Chapter 3. Roadways with low water crossings have been identified.

Ten (10) projects have been identified for mitigation of the flooding that occurs during the 100 year storm event and nine (9) additional projects have been identified that can eliminate existing flooded roadways. Projects developed for mitigation are listed in Table 2 with a description provided in Chapter 4 of the report. These projects will eliminate the majority of the residential and commercial structural flooding problems that occur during the 100 year storm event. Estimated construction costs are provided, but easement and right-of-way cost have not been included.

Table 2 - "Proposed Mitigation Projects"

Project No.	Project Description	Estimated Costs
1	Flood Control Dam at Site #15r	$ 6,000,000*
2	Remove 5000' of Weidner and 2500' of Old O'Connor Rds., Reroute 1200' of Lookout Rd and enlarge railroad bridge structure	$ 844,750
3	Channelize Beitel Creek, 4000' east of Garden Court East Subdivision (Esm't. Acquisition Cost Not Included)	$ 1,330,737
4	Reroute and raise 4600' of Holbrook Rd. to elevations equal to 25 Year Floodplain	$ 961,226
5	Construct a 4400' long levee from MLK Blvd. to the south between Salado Creek and East Park Subdivision (Wheatley Heights)	$ 458,857
6	Remove brush and small trees to height of 6' along lower 20 miles of Salado Creek (Esm't. Acquisition cost Not Included)	$ 7,418,075+
7	Channelize 600' of Beitel Creek from Vicar to Perrin Beitel and 2000' downstream of Perrin Beitel (Esm't. Acquisition Cost Not Included)	$ 685,726
8	Remove 1900' of Ira Lee from Austin Hwy. northward to limits of floodplain. Remove 600' roadway connection to Holbrook Rd. and reroute 600' of Holbrook Rd.	$ 345,900
9	Clear and channelize 5000' of Salado Creek south of Martin Luther King Drive (Not Recommended)	$ 3,490,725++
10	Clear and channelize 12900' of Salado Creek between Wetmore Road and Jones Maltsberger Road (Not Recommended)	$20,189,400++
TOTAL ESTIMATED COST		**$4,627,196.00**

* Cost not included in Total Estimated Cost (Federally Funded Project)
+ Cost not included in Total Estimated Cost (Project not Recommended)
++ Cost not included in Total Estimated Cost (Project not Recommended)

Several structures exist within the floodplain which appear to have no feasible or cost effective alternative for mitigation. Those properties remaining in the floodplain are listed in Table 3. The cost as provided are based on 1996 Bexar County Appraisal District property tax information.

The remaining mitigation projects described in this report address existing roadway flooding. Most of the roadways identified as being flooded have drainage structures that are to small for the storm water flows resulting from a 100 year storm event. Only one of the roadways, Jones Maltsberger Road, does not have any drainage structure and exists as a low water crossing at Mud Creek and Elm Creek. The street crossings identified for new drainage structures are listed in Table 4.

Table 3 "Flooded Properties"

Structures	Location	Appraised Value	Flood Depth
4 Houses	236 Holbrook Rd.	$56,100	6 feet
	243 Holbrook Rd.	$21,900	6 feet
	274 Holbrook Rd.	$36,200	6 feet
	Holbrook Rd.	$80,000	6 feet
1 Commercial Bldg	4354 Industrial Ctr	$680,000	4.5 feet
1 House	12522 Maltsberger Lane	$426,500	4 feet
2 Houses	205 Cresthill Rd.	$32,500	4 feet
	207 Cresthill Rd.	$85,200	3.5 feet
3 Buildings	11919 N. Weidner Rd.	$91,000	3-4 feet
	11609 N. Weidner Rd.	$21,800	3-4 feet
	11603 N. Weidner Rd.	$104,300	3-4 feet
1 Commercial Bldg	3400 Nacogdoches Rd.	$246,700	2-3 feet
1 House	3722 Bunche Rd.	$18,500	2 feet
2 Houses	12656 West Ave.	$80,000	2 feet
	12678 West Ave.	$30,980	2 feet
2 Houses	311 North Loop W.	$56,800	2 feet
	239 North Loop W.	$68,200	2 feet
TOTAL ESTIMATED COST		**$2,136,680**	

Table 4 - "Proposed Bridge and Culvert Projects"

Project No.	Project Description	Estimated Costs
1	New Bridge Structure at West Avenue and Salado Creek	$ 3,567,060
2	New Multiple Box Culverts at West Avenue and Panther Springs Creek	$ 332,500
3	New Bridge Structure at Vicar Rd. and Beitel Creek	$ 1,995,000
4	2 New Bridges Structures at Roland St.	$ 3,192,000
5	New Multiple Pipe Culverts at Jones Maltsberger and Mud Creek	$ 332,500
6	New Multiple Box Culverts at Jones Maltsberger and Elm Creek	$ 532,000
7	New Bridge Structure at Binz-Engleman Rd.	$ 4,309,200
8	New Bridges Structures for Frontage Roads at IH35 and Reroute Seguin Rd. (TxDOT)	$ 3,990,000
9	New Multiple Box Culverts and Raise 2700' of Bulverde Rd. at Redland Road	$ 665,000
TOTAL ESTIMATED COST		**$18,915,260**

The selection of the mitigation projects is based upon the results of this study which defines existing and ultimate development conditions within the watershed. Two projects

Brush clearing within the banks of Salado Creek should be avoided. Limited clearing along the outer banks should not have adverse effects on the linear detention benefits in Salado Creek. Project No. 9 which includes the channelization of Salado Creek south of Martin Luther King Drive would significantly change the aesthetics and wild life habitat features of the natural floodway. This project has a much greater cost than Project No. 5 which provides the same benefits. The environmental characteristics would significantly be changed by brush clearing or channelization of the creeks. Salado Creeks natural conditions provide erosion and sedimentation control along with the linear detention. A minor problem Salado Creek does have is debris that has either washed in or been dumped. Debris such as tires, lumber, and other trash should be removed. A clean natural Salado Creek provides an environment that is beneficial for all.

Benefit has also been gained from the Flood Control Program implemented by the U.S.D.A. Soil Conservation Service and San Antonio River Authority. Flood water reductions resulting from the thirteen Flood Retarding Dams has greatly reduced the number of properties that would be adversely effected. Thus requirements for mitigation have greatly been reduced and the cost estimated for eliminating flooding problems is less than would be anticipated otherwise. Total estimated costs for the recommended flood mitigation projects, flooded property, bridge and culvert projects is $25,679,135. Included are TxDOT costs associated with their highway system and the value of flooded properties. With these costs deducted the total cost is reduced to $19,552,455.

2

Introduction

A. Scope of Project

A study of Salado Creek and its major tributaries was authorized in April, 1994 by the City of San Antonio. The purpose of the study is to map the floodplains and develop projects that will mitigate the flooding identified by the study. Floodplains have been redrawn and mapped for the 10, 25, 50, 100, and 500 year frequency storms. Mitigation projects which can eliminate flooding problems caused by a 100 year frequency storm have been identified in this study. These projects form the basis for the Drainage Master Plan for the Salado Creek Watershed. These projects have been prioritized based benefits and costs. Presented with this report, are hydrologic and hydraulic models, new floodplain maps, and a definition of mitigation projects for a master plan.

The watershed study tasks were performed in three phases; a Preliminary Phase, Design Phase, and Summary Phase. Research, investigation, and hydrologic modeling were performed in the Preliminary Phase. Research efforts included gathering data on flooding complaints, previous flood studies, precipitation and stream flood gage records, aerial mapping, U.S.G.S. mapping, soil characteristics, plans for culverts, bridges, and dams, and land use information. Field investigation involved observing and photographing the creeks, bridges and culverts. Hydrologic models were created for the drainage areas above the Salado and Rosillo Creek confluence. Watershed subareas were networked along Salado Creek and its tributaries. Rainfall input in the form of precipitation hydrographs are used to compute runoff for each subarea. The runoff discharged into the creeks is routed down the stream network using unit hydrograph techniques. Runoff hydrographs are combined at the nodes along the network producing new hydrographs and peak discharges at each node. The hydrologic model computed discharges for the 10, 25, 50, 100, and 500 year frequency storms.

In the Design Phase, water surface profiles were computed using the hydrologic model storm water flows for the 10, 25, 50, 100, and 500 year frequency storms. Hydraulic modeling of Salado Creek along with the major tributaries: Beitel Creek, Mud Creek, Elm Creek, Elm Waterhole Creek, and Panther Springs Creeks was performed in the Design Phase. During the initial hydraulic analysis of the lower 20 miles of Salado Creek it became evident that a significant reduction of storm water flow was occurring. Reduction of the storm water flow could only be attributed to linear channel storage. This required that the study be expanded to include a storage analysis to accommodate this unexpected condition. Utilizing the hydrologic and hydraulic models a storage analysis was completed for existing conditions and ultimate development. The effect of storage on the water surface elevations is significant and lowered 100 year flood elevations approximately four and a half (4.5) feet in the southern reaches of Salado Creek. Water surface elevations derived from the hydraulic model were used to prepare floodplain maps showing the new floodplains for the 10, 25, 50, 100, and 500 year frequency storms under existing conditions. The new floodplains are shown on aerial maps produced by United Aerial Mapping for the City of San Antonio. These maps revealed the existing structures and roadways that are subject to flooding. Projects were identified and developed which could mitigate flooding where practical. Costs were developed for the mitigation projects and the projects prioritized for implementation based on benefits and costs.

The Summary Report Phase was the final phase and included the preparation of this report, compilation of data from the Preliminary and Design Phases, development of summary and recommendations, and presentation to the public. This Summary Report contains details of the investigations, criteria of the project, and details of the models and analyses. Included in the report are the appendices, research data, the model's inputs and summary outputs. Also provided are descriptions of the processes, results of the modeling, mitigation projects and alternatives with recommendations and estimated costs.

B. Salado Creek Watershed

The Salado Creek Watershed is a drainage basin of approximately 190 square miles. Storm runoff from the drainage basin as shown in Figure 1 is characterized by components of surface runoff (sheet flow), street flows (shallow concentrated flow), stream flows(channelized flows) and reservoirs(storage). These components are linked by a stream network that is used to create a HEC-1 Model. HEC-1 is an abbreviation for a computer program developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center. This program is widely used for developing hydrologic models.

The entire watershed is subdivided into smaller drainage areas that are identified as subareas. The Salado Creek Watershed was divided into eighty-five subareas as shown in Figure 3. Runoff from the subareas was computed using the sheet flow, shallow concentrated flow, and channelized flow. The computed runoff from each subarea was discharged into channels or creeks as storm water flow. Storm water flows routed in the stream network are combined with the runoff from adjacent subareas to compute the peak storm water flows in the creeks.

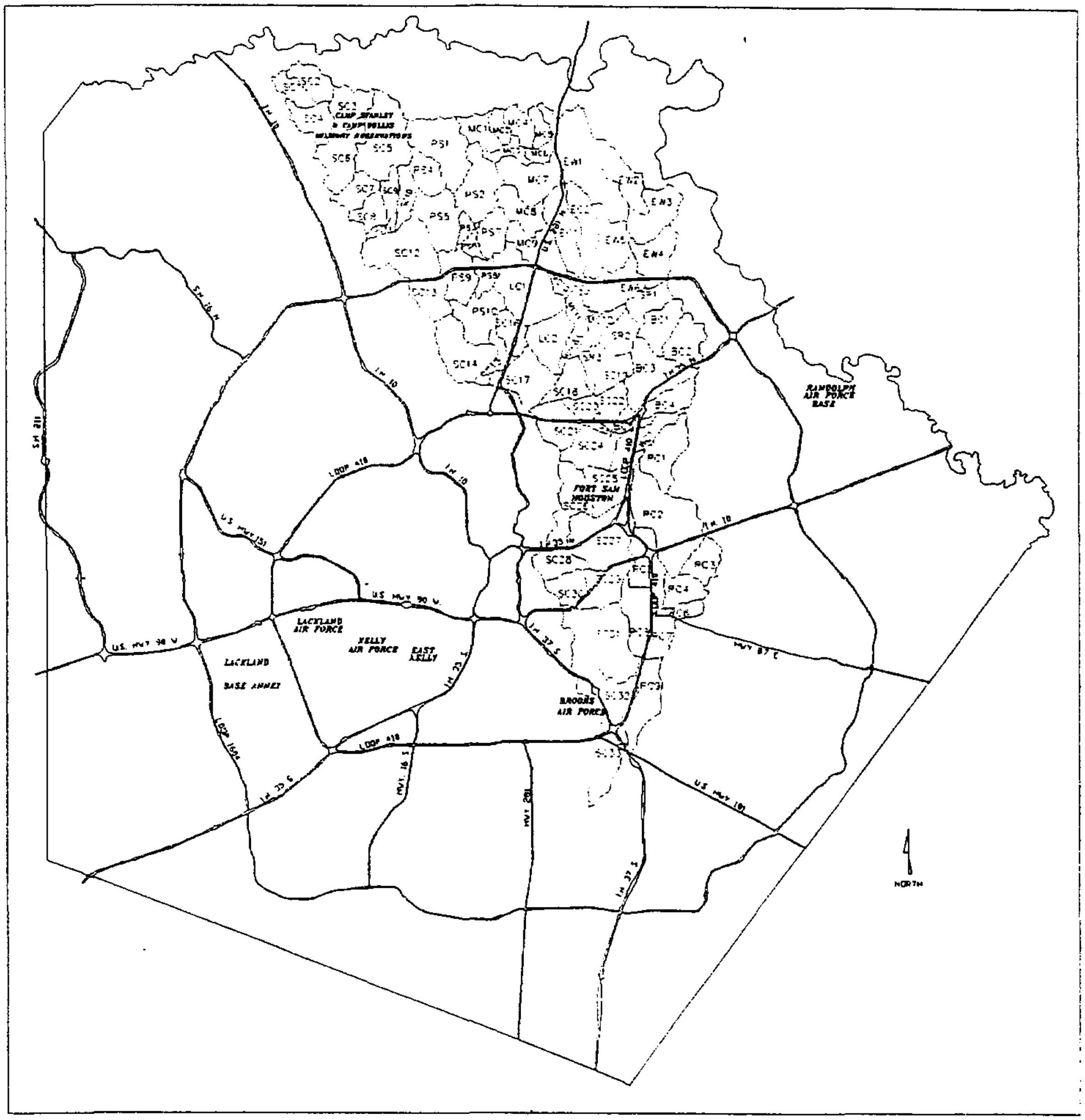


Figure 3 - "Salado Creek Watershed - Subareas"

I. Salado Creek and Tributaries

Salado Creek runs through eastern San Antonio and Bexar County. The Salado Creek ends in southeastern Bexar County as a tributary to the San Antonio River. Following Salado Creek upstream from its convergence with the San Antonio River, it travels in a northeasterly direction for approximately two to three miles. At the location where the Salado Creek crosses S.E. Loop 410 it turns northward and except for a slight east and west meandering, the creek follows a northerly direction to N.E. Loop 410. Continuing upstream, the Creek turns west to northwest prior to crossing Nacogdoches Road. From Nacogdoches Road, Salado Creek travels in a west northwesterly direction through northern San Antonio. After Salado Creek crosses West Avenue, it turns northward, traveling in a north, northwesterly direction towards Loop 1604. Upstream of Loop 1604, Salado Creek meanders in a northwesterly direction through a portion of the lower hill country. The upper reach of Salado Creek travels through the Leon Springs Military Reservation, but does not reach the northern limits of Bexar County or Interstate Highway 10. Salado Creek's upper limits and drainage area are defined by a ridge east of Interstate Highway 10 and south of the Bexar County line. Salado Creek lies solely within Bexar County and as shown in Figure 4 is approximately 43 miles in length.

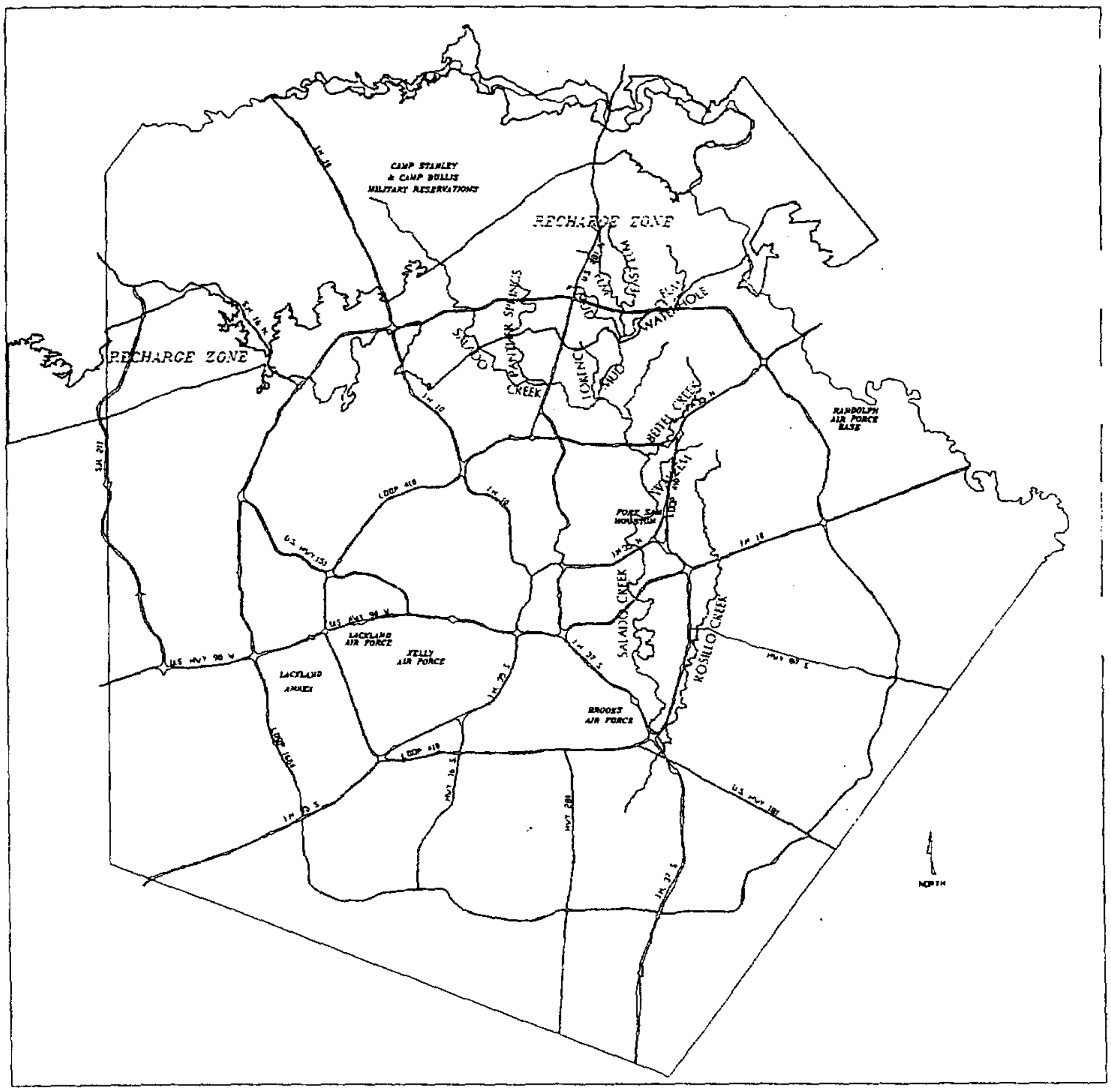


Figure 4 - "Salado Creek and Tributaries"

There are several tributaries that exist within the Salado Creek watershed, including Panther Springs Creek, Lorence Creek, Mud Creek, Beitel Creek, Walzem Creek, Rosillo

Creek, Quail Creek, and several unnamed creeks. Elm Creek and Elm Waterhole Creek are tributaries of Mud Creek.

II. Drainage Basin

Salado Creek and each of its tributaries has a drainage basin. The subareas have been identified according to the drainage basin wherein they lie. SC signifies Salado Creek and likewise PS for Panther Springs Creek, LC for Lorence Creek, MC for Mud Creek, EC for Elm Creek, EW for Elm Water Hole Creek, BC for Beitel Creek, WC for Walzem Creek, and RC for Rosillo Creek. SR signifies Stahl Road because the tributary in that drainage basin was unnamed.

Rosillo Creeks drainage basin has been included for the purpose of evaluating backwater effects. Rosillo creek is outside the limits of the hydraulic study area, however, backwater created at the Salado and Rosillo Creek was analyzed.

Topography

Topography within the Salado Creek Watershed varies in the upper and lower areas of the watershed. The upper area is in the Edwards Plateau and is hilly with steeper slopes. In this area, the Salado Creek and tributary creeks have cut steep valleys through the land and because this area is the larger portion of the watershed it contributes a large amount to the total stream flow. A combination of rocky and clay soils also contribute to the larger runoff. Rock, clays, and steep slopes create nearly impervious conditions and this reduces the effect of development and its associated impervious cover on storm water flows. Salado Creek as it runs from West Avenue across north San Antonio to N.E. Loop 410, has a milder slope, however, the drainage basins around the creek still have steeper slopes. The southern or lower areas of the watershed are located in the Blackland Prairies. Slopes across the drainage basins and along the creek in the lower area south of N.E. Loop 410 are even more mild. Elevations in the watershed range from 500 feet above mean sea level to over 1500 feet. Upper watershed areas, having the steeper slopes, vary in elevation from 700 feet to 1500 feet above mean sea level. This variation in elevation occurs from N.E. Loop 410 to the upper limits of the watershed. The lower watershed varies from 500 feet at S.E. Loop 410 to 700 feet at N.E. Loop 410.

Soils

To evaluate the rainfall and runoff relationship for the drainage basin it is necessary to assess the characteristics of the existing soils. Data was obtained from the United States Department of Agriculture, Soil Conservation Service now identified as U.S.D.A. Natural Resources Conservation Service. Soil data was obtained in database files (Soil Survey Geographic Data Base) which is the same data published in the "Soil Survey for Bexar County, Texas". The database contains characteristics for the various soil types located in Bexar County. Included with the database was a digitized graphic file showing the location of the various soils. The Salado Creek Watershed and graphic file of the soils were overlain and the soil types within the watershed were identified. Soil types are classified by Hydrologic Soil Groups. The four Hydrologic Soil Groups are A, B, C, and

D. The definition or soil characteristics of the four Hydrologic Soil Groups are provided in Table 5. A list of soil types found in the Salado Creek Watershed is provided in Table 6. The soil types within the Salado Creek Watershed were grouped according to the Hydrologic Soil Groups and mapped accordingly as shown in Figure 5. A single small area of Eufalia sand (Hydrologic Soil Group A) was found in the watershed. This area was used as Hydrologic Soil Group B to simplify the computation of land use and soil groups.

Table 5

Definition of the SCS Hydrologic Soil Groups

A	These Soils have a high infiltration rate. They are chiefly deep, well drained sands or gravels. (Low Runoff Potential)
B	These Soils have a moderate infiltration rate when thoroughly wet. They are moderately deep, well drained soils of moderately fine to moderately course texture.
C	These Soils have a slow infiltration rate when wet. They are soils with a layer that impedes downward movement of water and soils of Moderately fine to fine texture.
D	These Soils have a slow infiltration rate. They are chiefly clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan at or near the surface, and shallow soils over nearly impervious material. (High Runoff Potential)

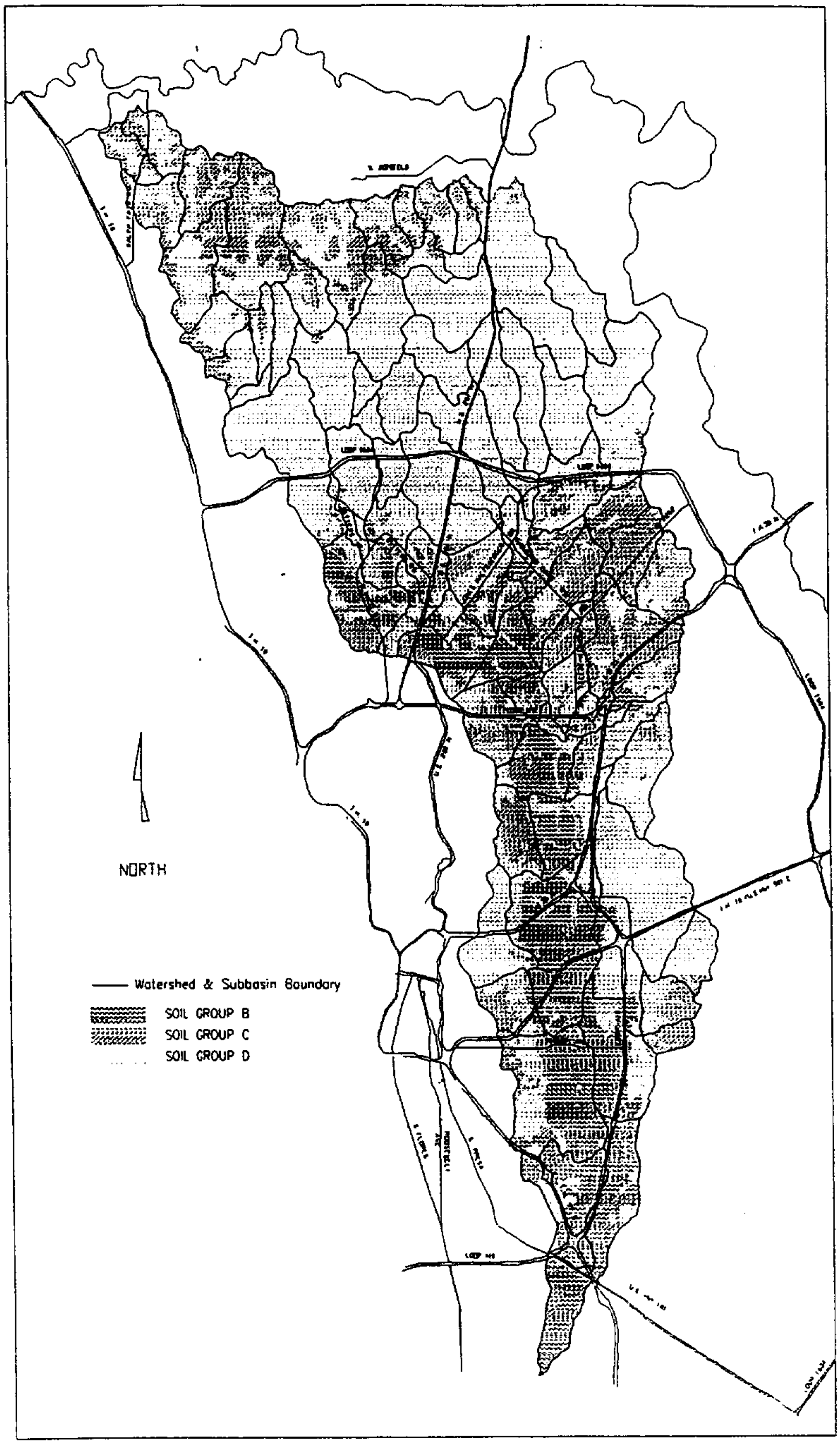


Figure 5 - "Soil Groups Within Salado Creek Watershed"

Table 6 - "Soil Types in Salado Creek Watershed"-

SOIL GROUP	SOIL TYPE	SOIL NAME
A	EuC	EUFAULA SAND (ALUF)
B	DmC	DUVAL LOAMY FINE SAND
	DnB	DUVAL FINE SANDY LOAM
	DnC	DUVAL FINE SANDY LOAM
	DsC2	DUVAL SOILS
	Fr	FRIO CLAY LOAM (SUNEV)
	Go	GOWEN CLAY LOAM
	Gu	GUILLED LAND (SUNEV)
	KaB	KARNES LOAM (ATCO)
	KaC	KARNES LOAM (ATCO)
	KcC2	KARNES CLAY LOAM (ATCO)
	LvA	LEWISVILLE SILTY CLAY
	LvB	LEWISVILLE SILTY CLAY
	LvC	LEWISVILLE SILTY CLAY
	PaA	PATRICK SOILS
	PaB	PATRICK SOILS
	PaC	PATRICK SOILS
	VaA	VENUS LOAM (SUNEV)
	VaB	VENUS LOAM (SUNEV)
	VcA	VENUS CLAY LOAM (SUNEV)
	VcB	VENUS CLAY LOAM (SUNEV)
	VcC	VENUS CLAY LOAM (SUNEV)
	WmA	WILLACY LOAM
	WmB	WILLACY LOAM
	Za	ZAVALA FINE SANDY LOAM
	Zg	ZAVALA AND GOWEN SOILS
C	AuB	AUSTIN SILTY CLAY
	AuC	AUSTIN SILTY CLAY
	BpC	BRACKETT CLAY LOAM (WHITEWRIGHT)
	BrD	BRACKETT SOILS (KERRVILLE)
	BrE	BRACKETT SOILS (KERRVILLE)
	BsC	BRACKETT-AUSTIN COMPLEX (WHITEWRIGHT)
	BtE	BRACKETT-TARRANT ASSOC. (KERRVILLE)
	HgD	OLMOS, HILLY GRAVELLY LAND
	HkB	HOCKLEY LOAMY FINE SAND (WILCO)
	HkC	HOCKLEY LOAMY FINE SAND (WILCO)
	HkC2	HOCKLEY LOAMY FINE SAND (WILCO)
	LfB	LEMING LOAMY FINE SAND
	SaB	SAN ANTONIO CLAY LOAM
	SaC	SAN ANTONIO CLAY LOAM
	SaC2	SAN ANTONIO CLAY LOAM
	ScB	STEPHEN SILTY CLAY
	ScC	STEPHEN SILTY CLAY
	Tb	TARRANT SOILS (EDDY)
	WbB	WEBB FINE SANDY LOAM (FLORESVILLE)
	WbC	WEBB FINE SANDY LOAM (FLORESVILLE)
	WeC2	WEBB SOILS (FLORESVILLE)
	WeC3	WEBB SOILS (FLORESVILLE)
D	Ca	CRAWFORD CLAY (ANHALT)
	Cb	CRAWFORD AND BEXAR STONY SOILS (ANHALT)
	CfA	CROCKETT FINE SANDY LOAM (MIGUEL)
	CfB	CROCKETT FINE SANDY LOAM (MIGUEL)
	CkC2	CROCKETT SOILS (MIGUEL)
	HnB	HOUSTON CLAY (HEIDEN)
	HnC2	HOUSTON CLAY (HEIDEN)
	HnC3	HOUSTON CLAY (HEIDEN)
	HoD3	HOUSTON-SUMTER CLAYS (HEIDEN)
	HsA	HOUSTON BLACK CLAY
	HsB	HOUSTON BLACK CLAY
	HsC	HOUSTON BLACK CLAY
	HtA	HOUSTON BLACK CLAY (BRANYON)
	HtB	HOUSTON BLACK CLAY (BRANYON)
	HuB	HOUSTON BLACK GRAVELLY CLAY
	HuC	HOUSTON BLACK GRAVELLY CLAY
	HuD	HOUSTON BLACK GRAVELLY CLAY
	Kr	KRUM COMPLEX
	OrA	ORELIA SANDY CLAY LOAM
	OrB	ORELIA SANDY CLAY LOAM
	Pt	PITS AND QUARRIES
	TaB	TARRANT ASSOC. (ECKRANT)
	TaC	TARRANT ASSOC. (ECKRANT)
	TaD	TARRANT ASSOC. (ECKRANT)
	Tc	TRINITY CLAY (TINN)
	Tf	TRINITY AND FRIO SOILS (TINN)

3

Preliminary Phase

The preliminary phase included research, investigation, and hydrologic modeling. The tasks and efforts are detailed as follows.

A. Research

I. Existing Data

Research performed for this study included visiting and interviewing representatives of various City, County, State, and Federal agencies to locate, identify, and subsequently analyze available data on Salado Creek and its tributaries. Several tables presented in Appendix A list the agencies and data reviewed. Data analyzed included several previous studies of Salado Creek including an analysis by the U.S. Army Corps of Engineers in 1969, the F.E.M.A. floodplain analysis, and a watershed study completed by the U.S. Department of Agriculture Soil Conservation Service in 1994. The methodologies, assumed conditions, and floodway characteristics used in these studies were also evaluated. Other hydraulic studies identified in the City of San Antonio files were for land development projects performed by other engineering consultants.

Evaluation of the studies included review of the techniques, modeling softwares, and objectives. The F.E.M.A. floodplain analysis and studies performed for land development were the only studies which specifically defined floodplains. Most of the studies reviewed were performed for analysis and simulation of previous floods and flood control projects.

II. Historical Storms

The initial task required to develop the hydrologic model involved research of historical rain fall and creek flow data. Historical data dates to the early 1900's, but accurate records of creek flow depths and storm water flows did not begin until the 1960's. The United States Geological Survey (U.S.G.S.) began installing stream gaging stations on the creeks in Bexar County, in the 1960's. Continuous recording gages that measure creek flow depth and precipitation have been utilized for the past twenty six years.

Two gages have been maintained by the U.S.G.S. on Salado Creek; one at N.E. Loop 410 and the other at S.E. Military Drive. Other gaging sites were utilized in the 1970's but have been removed. In 1990, the City of San Antonio established an Early Flood

Warning System which included the installation of precipitation and stream gages. A stream gage is maintained at Interstate Highway 10 and Salado Creek and Precipitation gages have been installed at numerous locations within San Antonio. Other sources of precipitation data are the U.S.G.S. and the National Weather Service (N.W.S.). A precipitation gage is maintained by the U.S.G.S. at N.E. Loop 410 and a gage is maintained by the N.W.S. at the San Antonio International Airport. These agencies have provided data from their gages that was recorded during past storms.

Stream and Watershed conditions were evaluated for each of the largest storm events recorded in the past twenty five years. Conditions such as existing land development, construction of dams and other structures along Salado Creek were the main criteria used to narrow the selection of storms to those that occurred in the 1990's. The land use data had been updated by the City of San Antonio in 1991 and twelve flood control dams were complete with the thirteenth dam under construction. The largest storms that have occurred since 1990 were on April 4-5, 1991 and May 5-6, 1993. Precipitation and stream gage data pertaining to these storms is presented in Appendix B. Descriptions of the storms were provided by the N.W.S. along with isohyetals of the storm rainfall totals. The isohyetals shown in Figures 6 & 7 represent rainfall distribution patterns of the two storms. The rainfall data shown represents approximate rainfall totals for the duration of the storm. The rainfall patterns are interpolated from numerous gage reports which are scattered over the City.

The largest rainfall totals for each storm occurred in different areas. Rainfall during the April 4-5, 1991 storm had higher concentrations west of the watershed and produced larger storm water flows in those areas. Although the storm was centered outside the Salado Creek Watershed, the storm water flows produced in Salado Creek are the second largest recorded since 1990. The largest storm water flows recorded in the Salado Watershed occurred during the May 5-6, 1993 storm. The highest rainfall totals were in the mid region of the watershed. Storm water flows produced in Salado Creek were measured at the three stream gaging stations described previously. The stream gages at Interstate Highway 10 and N.E. Loop 410 malfunctioned in May 1993 and did not record the peak storm water flows in Salado Creek. A manual field measured depth of the storm water flow at the approximate time of the peak flow was taken at N.E. Loop 410. All three stream gaging stations shown on Figure 8 were operating in April 1991 and recorded continuously through the storm.

Although the May 5-6, 1993 storm produced larger runoff and discharges in Salado Creek, the recorded data was incomplete. Data recorded during the April 4-5, 1991 storm was utilized in the HEC-1 and HEC-2 models for comparison and verification of the models.

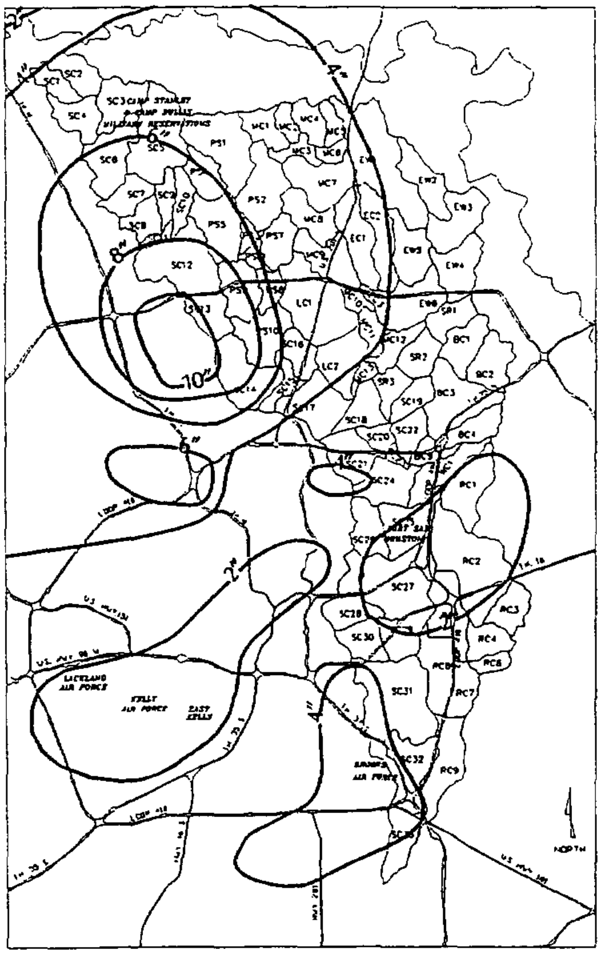


Figure 6 - "Rainfall Isohyetals - April 4-5, 1991

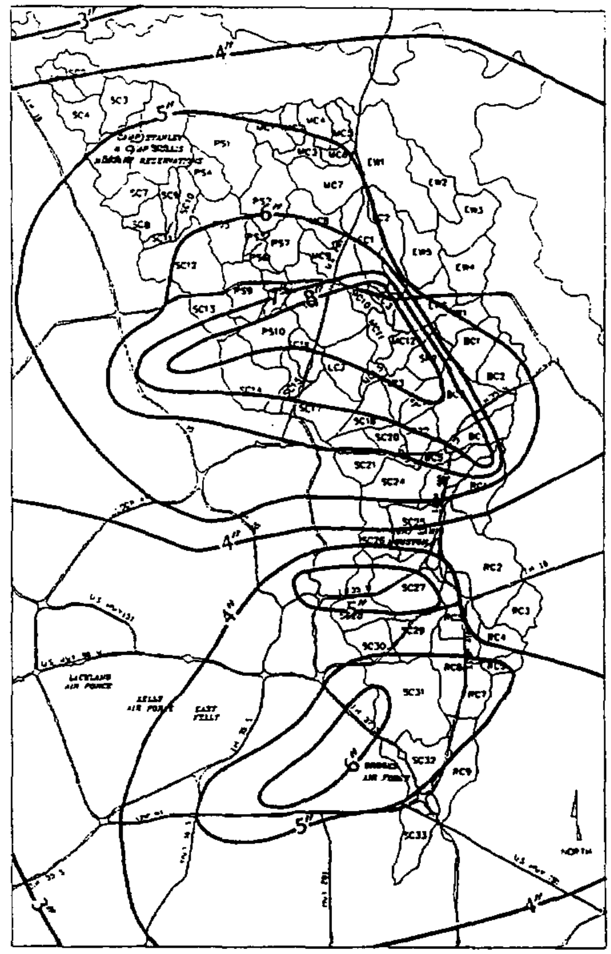


Figure 7 - "Rainfall Isohyetals - May 5-6, 1993

B. Investigation

I. Floodway Conditions

Investigations included field observation of Salado Creek and its tributaries to evaluate conditions along the creek. Observations along Salado Creek, Beitel Creek, Mud Creek, Elm Creek, Elm Waterhole Creek, and Panther Springs Creek revealed no evidence of maintenance. Heavy native vegetation is growing along the embankments and prevents mower access. Vegetation in the upper reaches of Salado Creek, including Panther Springs Creek, Mud Creek, Elm Creek, and Elm Waterhole Creek is moderate to dense in growth. The floodway of Salado Creek east of Jones Maltsberger Road contains very dense vegetation. Very dense vegetation also exists along Mud Creek as it meanders through McAllister Park. Lower Salado Creek has very dense vegetation with some areas being severely overgrown. These creeks remain in a natural condition in most areas, however, several areas have been cleared to create parks and golf courses without modification of the actual creek structure. Photographs of existing structures and

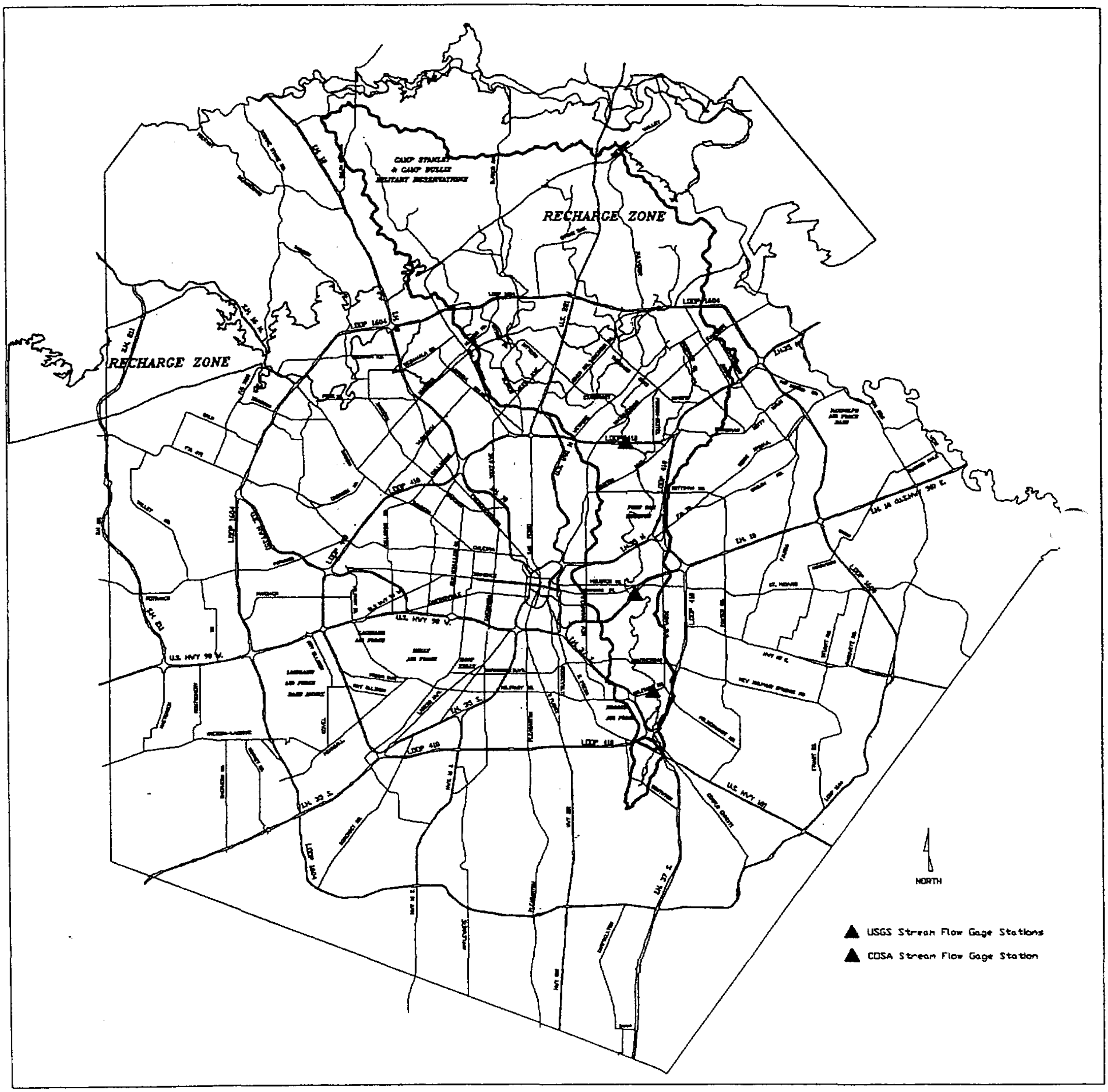


Figure 8
Stream Flow Gage Stations

conditions observed are contained in Volume II, Appendix C. Field investigation did identify several channelized sections within Salado Creek and it's tributaries. Channelization was identified along Salado Creek between Nacogdoches and Wetmore Road. This area of Salado Creek is all that was observed that has been channelized, except for roadway crossings. Beitel Creek upstream and downstream of N.E. Loop 410 has been channelized by the development process. Additional channelization has occurred in the upper reach of Beitel Creek at the O'Connor Road and Nacogdoches Road crossings. Channelization has also occurred on Mud Creek, Elm, and Elm Waterhole Creek around Thousand Oaks and Redland Oaks Road. The channelization that has occurred primarily consists of clearing and reshaping of the earthen channel sections. In two locations, however, the channel has been lined with concrete. Concrete channels have been built on Beitel Creek between Vicar Drive and N.E. Loop 410 and on Salado Creek under the IH-35 bridge.

Fill and debris deposits within the flood plain of Salado Creek on the north side of San Antonio International Airport were observed on properties owned by the City of San Antonio. Fill Materials were stock piled adjacent to the floodplain at Arion Parkway and U.S. Hwy. 281.

II. Structures

Field investigation revealed that a variety of drainage structures exist within the banks and floodway of the Salado Creek and its tributaries. These structures include pipe culverts, box culverts, bridges and dams. A list of existing structures and their locations is provided in Table 7. These structures have been examined in the field and documented with photographs. Available as-built plans were obtained for these structures and utilized in the hydrologic and hydraulic analyses.

Bridges and Culverts

The majority of the bridges at road crossings that were observed were designed and constructed by the Texas Department of Transportation. As-built plans for these bridges were obtained from the Texas Department of Transportation and were utilized in development of the hydraulic model. Culverts exist in several locations including Interstate Highway 35, Interstate Highway 10, N.E. Loop 410, and Loop 1604. Several other culverts are located across Salado Creek and the tributaries that were constructed by developers or the City of San Antonio. Culvert crossings on Salado Creek flood on a regular basis. Other small Creek culverts that flood are located at Vicar Drive on Beitel Creek and West Avenue on Panther Springs Creek. Flooded roadway crossings are identified by * in Table 7.

Table 7 - "Existing Structures"

CREEK	CROSSING	STRUCTURE	DOWNSTREAM STATION	UPSTREAM STATION
Salado	S.E. Loop 410	Bridge	20440	20729
	S.E. Military Dr.	Bridge	33188	33294
	E. Southcross	Bridge	43166	43308
	* Roland	Culverts	50191	50255

Continue **Table 7 - "Existing Structures"**

CREEK		CROSSING	STRUCTURE	DOWNSTREAM STATION	UPSTREAM STATION
		Rigsby	Bridge	54551	54608
		Rice	Bridge	61634	61680
		Martin Luther King	Bridge	63552	63615
	*	MLK Park Rd.	Culverts	66969	67031
		I.H. 10	Bridge	69770	69937
		Commerce St.	Bridge	72015	72092
		Houston St.	Bridge	73040	73098
		Gembler	Bridge	81369	81444
		S. Pac. R.R.	Trestle	86460	86482
	*	I.H. 35	Bridge & Culverts	87081	87445
	*	Seguin Rd.	Culverts	87570	87609
		Mis-Kan-Tex R.R.	Trestle	90489	90507
	*	Binz-Engleman	Culverts	92110	92176
	*	W.W. White Rd.	Culverts	96242	96336
	*	Rittiman Rd.	Bridge	110026	110103
	*	Eisenhauer	Bridge	114557	114620
	*	Austin Hwy.	Bridge & Culverts	115915	116126
	*	N. Loop 410	Bridge & Culverts	125239	125541
	*	Nacogdoches	Bridge	132303	132365
		Mis-Pac R.R.	Bridge	138032	138061
		Wetmore Rd.	Bridge	138121	138194
	*	Entrance Ave.	Culverts	141965	142019
	*	Bitters Rd.	Culverts	144266	144420
	*	Bitters Rd.	Culverts	145362	145424
		Jones Maltsberger	Bridge	151236	151311
		U.S. Hwy 281	Bridge	157091	157442
	*	West Ave.	Culverts	161964	162051
		Vista Del Norte	Bridge	168226	168291
		Blanco Rd.	Bridge	170905	170967
	*	Old Blanco Rd.	None	171621	
		Huebner Rd.	Bridge	181787	181924
		Loop 1604	Bridge	192321	192471
Panther Springs	*	North Loop Rd	None	433	
	*	West Ave.	Culverts	1182	1272
		SCS Dam #7	Spillway	3955	4347
		Bitters Rd	Bridge	11248	11323
		Mission Ridge Dr	Bridge	15658	15750
		SCS Dam #6	Spillway	16921	17234
		Loop 1604	Bridge	30251	30655
Mud	*	Starcrest	None	1104	
	*	Buckhorn	Culverts	4990	5046
		Thousand Oaks	Culverts	11103	11201
	*	Jones Maltsberger	None	19633	
		SCS Dam #10	Spillway	20351	20776
		Loop 1604	Bridge	28182	28489

Continue **Table 7 - "Existing Structures"**

CREEK	CROSSING	STRUCTURE	DOWNSTREAM STATION	UPSTREAM STATION
Elm Waterhole	Redland Rd.	Culverts	5549	5628
	* Bulverde Rd	None	6822	
	Classen Rd.	Culverts	9807	9863
	Loop 1604	Bridge	11091	11576
Elm	Redland Rd.	Culverts	3198	3320
	* Jones Maltsberger	None	5075	
	Loop 1604	Culvert	6878	7316
Beitel	Perrin Beitel	Bridge	2802	2870
	* Vicar Dr.	Culverts	3370	3416
	N.E. Loop 410	Bridge	4839	5321
	Mis-Pac R.R.	Trestle	15592	15620
	Mis-Pac R.R.	Trestle	18842	18877
	* Shertz Rd.	Culverts	19067	19112
	* Weidner Rd.	Culverts	21854	21888
	O'Connor Rd.	Bridge	23842	23919
	* Old O'Connor	Culverts	24641	24674
	* Lookout Rd.	Culverts	25123	25172
	Mis-Kan-Tex R.R.	Bridge	25205	25217
	O'Connor Rd.	Culverts	26903	26975
	Nacogdoches Rd.	Culverts	29995	30087

* Flooded Crossing

Floodwater Retarding Dams

Within the upper Salado Creek watershed, are thirteen (13) floodwater retarding dams (see Figure 9). Over fifty percent of the total area within the watershed or 74,989 acres of land is located above the dams. These dams were designed and constructed under a Flood Control Program that resulted from the "Small Watershed Protection and Flood Prevention Act, Public Law 566" passed in 1954. The Salado Creek Flood Control Program was started in the late 1960's after being approved by Congress in 1962 and amended in 1968 and 1971. The U.S.D.A. Natural Resources Conservation Service and the San Antonio River Authority worked in cooperation in planning and constructing the dams. Sixteen dams were originally planned for the Flood Control Program. In 1964 the McAllister Park Proposed Master Land Use Plan was completed and included the fourteenth dam (15r). See Appendix F. The City of San Antonio is an additional sponsor of this dam as owner of the site. The dam in McAllister Park is expected to cost approximately $6,000,000. This estimate was provided by Mr. Trent Street, Design Engineer for the U.S.D.A. Natural Resources Conservation Service.

The Salado Creek Flood Control Program (Table 8) began with the design and construction of the first Floodwater Retarding Dam at Site No. 2. To date, thirteen (13) dams have been completed with the thirteenth having been completed in mid 1996.

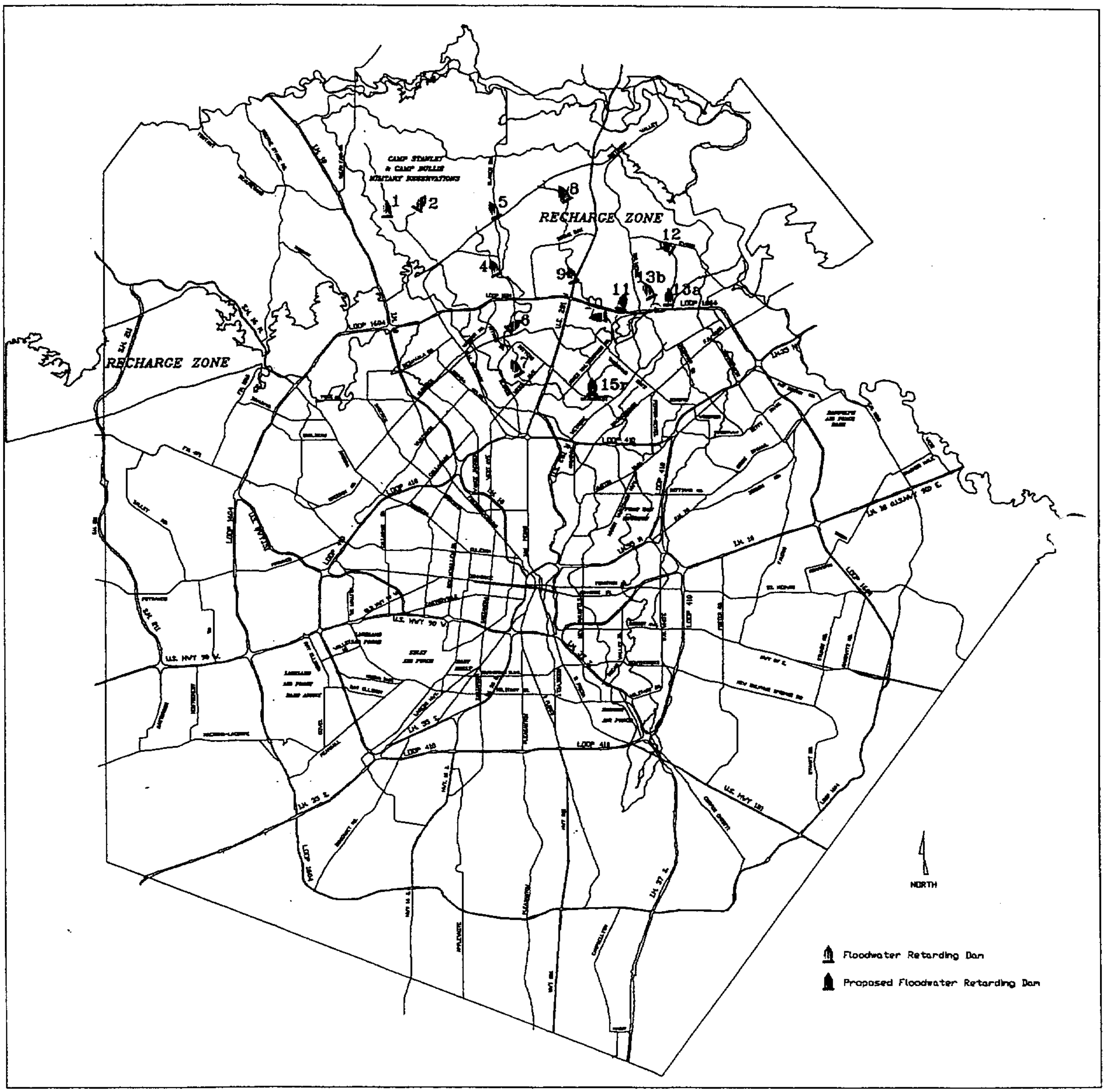


Figure 9
Floodwater Retarding Dams

Figure 9 shows the thirteen existing dams and proposed dam in McAllister Park. The first twelve dams were constructed at a cost of approximately $17,000,000. The thirteenth dam at Site No. 10 cost approximately $5,000,000. The fourteenth and final dam planned in the Salado Creek Flood Control Program at site #15r, is designated to be constructed under the Federally Funded Program.

Other benefits have been gained from these floodwater retarding dams, including, recharge of the Edwards Aquifer, water conservation, and erosion control. Several of the dams were built over the recharge zone and make significant contributions to recharge of the Edwards Aquifer.

Table 8

SALADO CREEK FLOOD CONTROL PROGRAM

Site No.	Completion Date	Drainage Area Acres	Storage Area Acre-Feet	Dam Height Feet
1	11-25-75	7,232	4,189	75
2	03-05-71	3,674	2,293	55
4	10-31-72	3,526	1,982	55
5	10-18-76	5,670	3,293	58
6	03-09-82	2,928	1,490	62
7	04-25-87	3,710	2,340	47
8	05-16-73	7,154	4,178	62
9	03-09-82	1,517	1,026	49
10	1996	3,061	1,846	66
11	04-07-80	4,198	2,596	65
12	06-06-74	8,128	4,875	70
13A	08-13-76	2,099	1,441	43
13B	08-22-75	1,619	1,093	46
15R	Proposed	6,440	3,405	44

III. Land Use

Existing Development

The City of San Antonio Planning Department provided the land use categories and location database used in this study. Land uses included eight primary use categories described as follows: (10) Residential, (20) Commercial, (30) Industrial, (40) Services, (50) Open Space, (60) Agricultural, (70) Transportation, and (80) Vacant. Descriptions of the different land uses are presented in Appendix D. All land uses were divided and regrouped into seven categories according to average percentage of impervious cover. The seven categories that resulted are dispersed residential; residential; densely developed residential, such as apartments; business and commercial; industrial and institutional; open space and parks; and streets, roads, and parking areas. Table 9 lists the categories, land uses, and the average percent impervious cover used in this study. The seven different land uses were mapped over the Salado Creek Watershed and Figure 10 presents the resulting land uses in the Salado Creek Watershed. The areas of each land use within the subareas and their corresponding category characteristics were used as parameters in the HEC-1 modeling to compute runoffs. The landuses in the Salado Creek Watershed show that 46,340 acres which is 38 percent of the land is undeveloped or open space.

Table 9 - "Land Use Categories"

CATEGORY	LAND USE	AVERAGE % IMPERVIOUS
11	Dispersed Residential	20
12	Residential	38
13	Densely Developed (Apartments)	75
21	Business and Commercial	90
31	Industrial	78
51	Open Space, Range Land, Parks, and Agricultural	0
71	Streets, Roads, and Parking Areas	98

Ultimate Development

The majority of undeveloped land is in the upper watershed as shown on Figure 10. The City of San Antonio, Planning Department provided projections for ultimate development for the 46,340 acres of available, undeveloped land. The Development projections show 55% to be developed as residential, 5% to be developed as dense residential, 15% to be developed as commercial, 5% to be developed as industrial, 5% to be developed as roads, streets or parking areas, and 15% to be retained as open space or park land. In areas within and above the Recharge Zone, residential development is projected to be dispersed residential. All other areas below the recharge zone are projected to be residential.

C. Hydrologic Modeling

I. Theoretical Assumptions

There are certain assumptions that must be made in the application of all simulations and models. Hydrologic modeling requires that several assumptions be made to compute

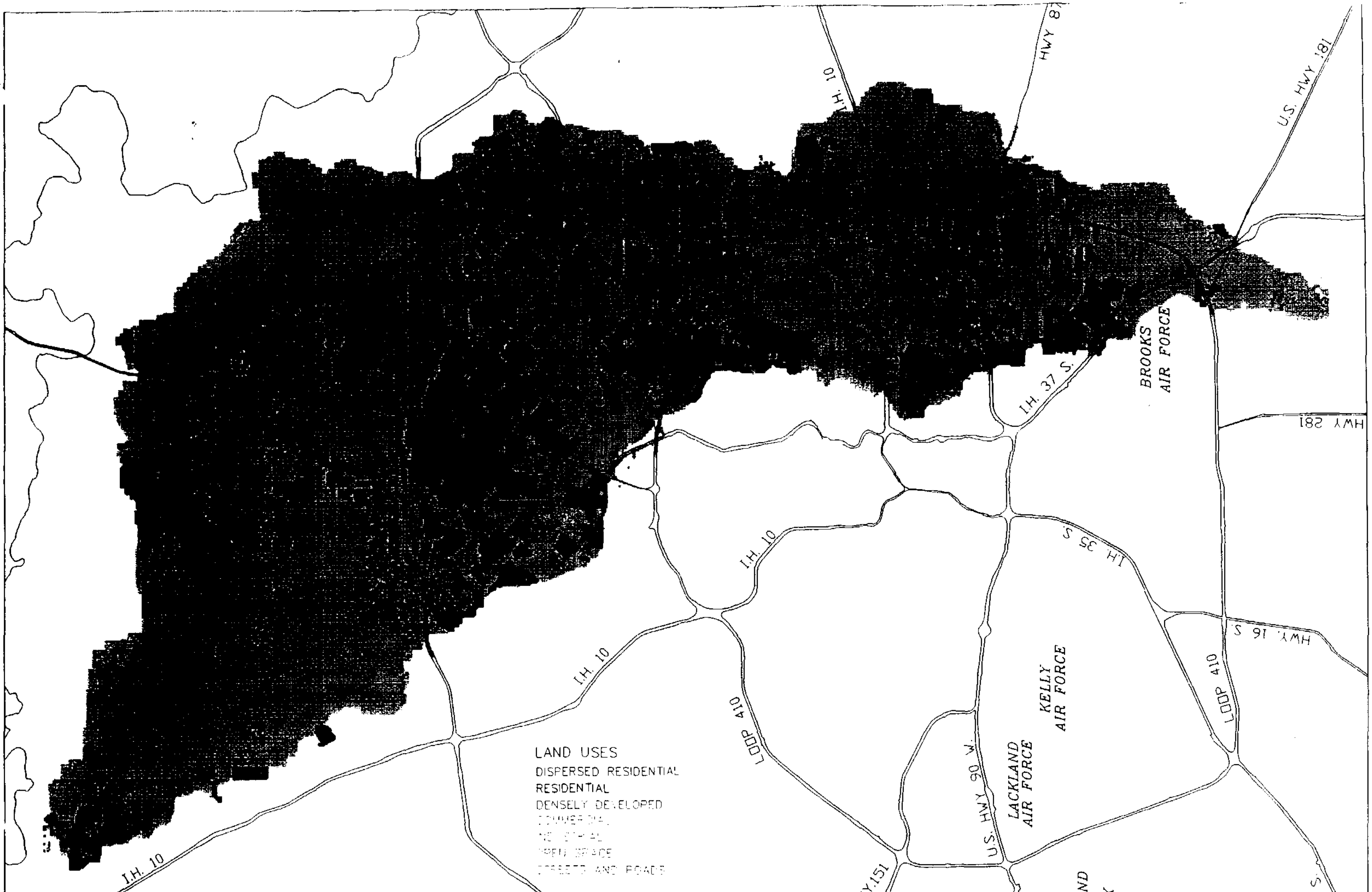


Figure 10 - Landuses in Salado Creek Watershed

runoff and losses. Included in a hydrologic model are initial losses and uniform losses that are associated with rainfall. Initial and uniform losses result from infiltration, interception, and depressions. After the initial loss of rainfall is determined, then uniform losses of rainfall runoff are determined based upon the assumption that they occur at a constant rate. Several variables are used to determine the initial and uniform losses, including soil type, slope, land use, and antecedent soil moisture condition.

During the Preliminary Phase, meetings were held with the City of San Antonio and the Consultants performing the Olmos Creek and Leon Creek Studies to review and discuss methodology. By a consensus it was determined that the Soil Conservation Service Methodology as outlined in SCS National Engineering Handbook, Section 4, Hydrology (NEH-4) was to be used for the hydrologic model.

Therefore, the Soil Conservation Service Methods were used for establishing rainfall runoff losses. As specified by the City of San Antonio, the initial rainfall abstraction (Ia) in the HEC-1 runoff simulation process was determined for all events using the standard SCS equation, which is a function of runoff curve number (CN), as follows:

$$Ia = 0.2 * [(1000 - 10 * CN) / CN]$$

The hydrologic soil group and land use are combined to create a hydrologic soil - cover complex. Runoff curve numbers have been assigned to the hydrologic soil cover complexes by the Soil Conservation Service.

The City of San Antonio selected the CN values with agreement by all consultants so that this study and others would be uniform. Presented below are the CN values and their associated hydrologic soil groups.

HYDROLOGIC SOIL GROUPS	A	B	C	D
SCS RUNOFF CURVE NUMBER (CN)	25	55	70	77

An average CN value for each subarea was calculated using the above CN values and the area of each hydrologic soil group. Tables 10 and 11 present the weighted average CN values for each subarea. Average CN values for existing conditions are presented in Table 10 and Table 11 presents values obtained for ultimate development. Likewise, the weighted average percent impervious cover for each subarea was obtained by averaging the area by land use category and applying the average percent impervious values presented in Table 9.

For all simulations of storm events using the HEC-1 model of the Salado Creek Watershed, a five-minute computational time step has been used. This time step provides sufficient temporal resolution to describe typical variations in rainfall and runoff patterns as they have been observed within the Salado Creek Basin and is consistent with time step requirements for the SCS unit hydrograph method. The five minute time step also provides a convenient time frame for distributing the reported historical measured rainfall

Table 10 - SCS RUNOFF CURVE NUMBERS FOR EXISTING CONDITIONS

SOIL TYPES	B							C							D								
LANDUSE	11	12	13	21	31	51	71	11	12	13	21	31	51	71	11	12	13	21	31	51	71		
% IMPERVIOUS	20	38	75	90	78	0	98	20	38	75	90	78	0	98	20	38	75	90	78	0	98		
SCS CN-VALUE	55	55	55	55	55	55	55	70	70	70	70	70	70	70	77	77	77	77	77	77	77	AVERAGE	AVERAGE
SUBAREAS	AREA (acres)							AREA (acres)							AREA (acres)							CN	% IMPERVIOUS
SC1									219.2				170			144.7				332.4		74	15.962
SC2						33			114.9		1.8		332.5			28.9				671.5		74	4.758
SC3													1005							639.8		73	0.000
SC4								3.4					535.2		6.2					819.5		74	0.141
SC5						0.7							1962.8							1665		73	0.000
SC6								68					864.8		9.2					1288		74	0.692
SC7						25							316.4							783.8		75	0.000
SC8								17.4					236.4							751.6		75	0.346
SC9													160.5							567.5		75	0.000
SC10																				917.8		77	0.000
SC11																				340.1		77	0.000
SC12																		77.2		3374.5	11	77	2.318
SC13		42.3				136.2									188.6	219.9				746	52.4	74	13.621
SC14	0.92	301.8	52	24.8	155.9	627.4			198.7	66.9	2.8	200.8	113.2	0.92		357	32	35	95.9	394.7		66	31.926
SC15	24.8	13.8	2.1	42.3	6.2	116.8	25.8					3.7			45.1	341	8	103.9	24.2	68	12.9	71	42.032
SC16	86.5		7.6	20.2	22.8	66.1	26.7	24.8	24.8	22.5	20.2	67.7	57.1	20.2	346.9	128.8	14.2	3.7	42.8	69.9	27.6	71	36.319
SC17	75.4		3.2	837.4	9.7	273.3	19.3	3.7	92	12.2	109.5	36.6	51.6	41.4	95.7	72.7	14	335	42.1	247.5	25.8	65	59.507
SC18	1.8	193	20.2	331	60.8	241.8	47.8	4.6		1.4	21.2	4.1	148.1	9.2	6.4	1.8	4.1	126	12.5	104.9	15.6	61	48.497
SC19						7.4		16.6	132.6	33.6	173	100.8	177.6	18.4	6.2	46.9	20.2	104	60.8	102.2	8.3	72	51.025
SC20	62.6	142.7	28.8	9.2	86.3	97.5	15.6								70.8	81	5.5		16.6	66.3	8.3	63	36.079
SC21	8.3	193.2	29.7	3.7	89	18.4	47.8		282.4	5.3		15.9	2.8	2.8	46	532.4	52.9	182.2	158.6	77.3	106.7	71	53.186
SC22	0.92	114.9	19.5	5.5	58.7	39.5	18.4		46.9	13.8	15.6	41.4	35.9		6.4	158.2	47.6	80	142.8	232.7	17.5	71	45.554
SC23		46	10.6	4.6	31.7	35	20.2									3.7	2.1		6.2	71.7		63	35.336
SC24	35	270.6	45.5	13.8	136.7	333.9	11		277	28.7	8.3	86.3	100.3	30.4	12.9	288.1	18.6		55.9	164.7	2.8	65	35.277
SC25	9.2	74.5	10.8		32.4	937.9	9.2						34		12	212.4	43.2	92	129.8	383.3	86.5	65	22.101
SC26			2.5		7.6	172			646	9	1.8	26.9	43.2	1.8		199.4	70.8		212.6	119.6	3.7	71	38.416
SC27	9.2	240.1	35.9	579.6	107.6	1212.7	228.2	5.5	2.8		35	3.7	108.3	39.6	0.92	33.1	92.2	183.1	276.7	457.8	188.6	63	43.533
SC28		5.5	5.3	2.8	15.9	41.4	9.2						11	0.92		807.4	188.3	135.2	564.9	163.7	76.4	76	55.037
SC29	5.5	522.1	29.7	100.3	89	457.7	88.3		26.7	5.5	5.5	16.6	99.3	2.8	0.92	87.4	6.7	0.92	20	30.4	6.4	59	35.214
SC30		102.1	3.7	29.4	11	14.7	14.7		262	24.8	3.7	74.6	64.4	9.2		340.2	42.1	54.3	126.3	149.5	46	72	46.116
SC31	135.2	645.2	29	52.4	86.9	1626.2	9.2	7.4	483	27.8	31.3	83.5	195	41.4	2.8	824.3	34.3	83.7	102.8	369.9	40.5	64	26.312
SC32	18.4	2.8	1.4	12	4.1	1169	199.6	42.3	318.2	14.7	14.7	44.2	226.3	51.5	47.8	5.5	3.2	21.2	9.7	470.1	72.7	64	20.583
SC33	17.5	12	1.1	41.4	3.5	1171.7	40.5	11		4.4	10.1	13.1	254.9	9.2	5.5			1.8	0.92	7.4	2.8	58	7.992
PS1	4.6					115.9		239.1					917.2		105.8	9.2				1766.1		74	2.324
PS2								152.7	16.6				86.5		149	174.8				1897		76	5.373
PS3																		3.7		407.6		77	0.810
PS4													330.1							888.3		75	0.000
PS5													40.1					26.7		2201.6		77	1.059
PS6																6.4	2.1		6.2	403.9		77	2.113
PS7															58.9	290.7	6	1.8	17.9	915.4		77	11.027
PS8																162.8	8	1.8	24.2	512.4	48.8	77	17.966
PS9						35.9									1.8	455.3	6.4	32.2	19.4	1124.9	72.7	77	16.787
PS10	4.6	109.5	5.7		17.3	253	19.3								235.4	752.2	20.5	5.5	61.4	541.7	9.2	73	24.044
LC1	3.7	47.8	3.7		11	2.7									748	1473.9	81.9	41.4	245.6	1029.4	176.6	77	31.127
LC2		50.6		196.9	2.8	11		15.6	221.6	14.2	12.9	42.8	94.7		64.4	780.9	10.8	9.2	32.4	433.3		73	34.746
MC1								350.5	46				82.8		424.1	69				149		74	17.712
MC2								239	1.8				8.3		289.6	0.92				34.1	4.6	74	19.239
MC3								105.8	5.5				90.2		81					380		75	5.955
MC4								149	9.2				225.4		144.4					426.9	1.8	74	6.683
MC5								0.92				0.92	168.2		25.8					447.6		75	0.942
MC6																		1.92		472.9	3.7	77	1.119
MC7															97.5			4.6	3.7	2226.1	22.1	77	2.047
MC8																11				1486.4		77	0.279
MC9															64.4	103	3.4	151.7	10.4	1548.7	58.9	77	13.241
MC10															5.5	89.2	6		17.9	337.6	32.2	77	17.407
MC11	0.92	90.2		8.3	0.92	69									59.8	266.9	16.3	3.7	49	300	0.92	73	24.332

Table 10 - SCS RUNOFF CURVE NUMBERS FOR EXISTING CONDITIONS

SOIL TYPES	B							C							D								
LANDUSE	11	12	13	21	31	51	71	11	12	13	21	31	51	71	11	12	13	21	31	51	71		
% IMPERVIOUS	20	38	75	90	78	0	98	20	38	75	90	78	0	98	20	38	75	90	78	0	98		
SCS CN VALUE	55	55	55	55	55	55	55	70	70	70	70	70	70	70	77	77	77	77	77	77	77	AVERAGE	AVERAGE
SUBAREAS	AREA (acres)							AREA (acres)							AREA (acres)							CN	% IMPERVIOUS
MC12		76.4			1.8	83.7		11	99.4		38.6		250.4		0.92	266.9		4.6	3.7	179.4	0.92	71	21.094
MC13	0.92	28.5				116.7		3.7	78.2			1.8	54.2			12.9			2.8	122.2		67	11.841
EC1															92.7	358.7	3.7	39.6	11	1679.6	47.8	77	11.136
EC2															50.6	36.8		26.7		1902.1		77	2.387
EC3	19.3					11									6.4	33.1	5	14.7	15.2	348.6	40.5	76	17.465
EW1								42.3				0.92	204.2		358.8		7.1	20.2	21.4	4143.2	44.2	77	3.396
EW2																				1686.3		77	0.000
EW3																		158.2		1979.3		77	6.661
EW4						7.4			17.5		115		29.5	6.4		0.92		298.9		1406.1	28.5	76	21.658
EW5															87.4	8.3		219.9		1494.8		77	12.072
EW6		39.6		0.92		454.5	39.6								13.8	160.1		158.2	3.7	1214.2	47.8	71	14.556
SR1						54.3		2.8	251.2	9.4		28.3	493			58.9	1.4		4.1	262		71	13.023
SR2						1.8	0.92	22.1	430.4	3.7	14.7	11	390.9	6.4	34	71.8	1.4	13.8	4.1	248.2	7.4	72	20.413
SR3	1.8	41.4		12	0.92	43.3		27.6	65.3		268.6	1.8	102.1	8.3	6.4	14.7	1.6	246.6	4.8	99.4	24.8	71	58.397
BC1								40.5	534.4	37.5	11	112.5	557.3	5.5	3.7	94.8	3.2	1.8	9.7	139.8	0.92	71	25.221
BC2								98.4	125.1	6.2	13.8	18.6	120.5	17.5	49.7	479.2	9.9	48.8	29.7	605.1	11	75	24.075
BC3								81.9	664.3	28.7	345.9	86.3	632	95.7	1.8	341.3	6.7	281.5	20	286.1	0.92	72	40.642
BC4								22.1	199.6	22.3	54.3	66.9	294.4	82.8	21.2	218.9	1.8	13.8	5.6	313.6	3.7	73	29.400
BC5		22.1	5.5	1.8	16.6	0.92	16.6	0.92	51.5	16.5	13.8	49.7	42.3	48.8	3.7	115.9	15.4	31.3	46.2	124.2	27.6	72	49.449
WC1		91.1	5.7	1.8	17.3	18.4			162.8	5.7	4.6	17.3	10.1		1.8	702.3	68.1	34	204.2	208	76.4	74	44.234
RC1						0.92	11		66.2	4.6	0.92	13.8	74.6	3.7	8.3	652.4	31	64.4	93.2	1129.8	32.2	76	22.388
RC2															14.7	1140.8	92	567.2	276	2462.9	165.6	77	29.528
RC3								19.3		1.7	9.2	4.8	55.2		35.9			14.7		1089.5	6.4	76	3.545
RC4								69			4.6		460.9	3.7		49.7	1.6	18.4	4.8	563.9	4.6	74	5.627
RC5	0.92		12.6	69	38	293.3	54.3		60.7						134.3	171.1	20.5	236.1	61.4	836.5	189.5	72	33.559
RC6						2.8	1.8		5.5		1.8	0.92	376.8			1.8		1.8	1.8	122.3	12.9	72	4.251
RC7		96.8	1.4	36.8	4.1	146.5	51.5		12		11		18.4	1.8	0.92	244.2	1.1	20.2	3.5	505.7	20.2	70	23.412
RC8	33.1	820.1	40.5	35	121.4	333.1	69	0.92	5.5		28.5	0.92	79.1	13.8		248.4	3.9	13.8	11.7	55.3	2.8	60	36.843
RC9	24.8	5.5	2.7	91.1	8.3	1411.3	100.3	4.6	4.6		115.9		189.5	3.7				44.2	1.8	291.8	1.8	60	15.244

+ SOIL GROUP DEFINITIONS - TABLE 5

* LANDUSE LISTED IN TABLE 4

Table 11 - SCS RUNOFF CURVE NUMBERS FOR ULTIMATE DEVELOPMENT

SOIL TYPES	B							C							D								
LANDUSE	11	12	13	21	31	51	71	11	12	13	21	31	51	71	11	12	13	21	31	51	71		
% IMPERVIOUS	20	38	75	90	78	0	98	20	38	75	90	78	0	98	20	38	75	90	78	0	98		
SCS CN VALUE	55	55	55	55	55	55	55	70	70	70	70	70	70	70	77	77	77	77	77	77	77	AVERAGE	AVERAGE
SUBAREAS	AREA (acres)							AREA (acres)							AREA (acres)							CN	% IMPERVIOUS
SC1									219.2				170			144.7				332.4		74	15.962
SC2						33			114.9		1.8		332.5			28.9				671.5		74	4.758
SC2													1005							639.8		73	0.000
SC4								3.4					535.2		6.2					819.5		74	0.141
SC5						0.7							1962.8							1665		73	0.000
SC6								68					864.8		9.2					1288		74	0.692
SC7						25							316.4							783.8		75	0.000
SC8								17.4					236.4							751.6		75	0.346
SC9													160.5							567.5		75	0.000
SC10																				917.8		77	0.000
SC11																				340.1		77	0.000
SC12																		77.2		3374.5	11	77	2.318
SC13	68.8	42.3	6.3	18.8	6.3	29.7	6.3								377.1	408.4	34.3	102.8	34.3	163.3	86.7	74	37.761
SC14	318	301.8	80.8	111.3	184.7	137.4	28.8		255.9	72.1	18.4	206	24.8	6.1		556.5	50.1	89.4	114	86.5	18.1	66	48.184
SC15	83.8	13.8	7.5	58.4	11.6	25.5	31.2					3.7			45.1	375.4	11.1	113.3	27.3	14.9	16	71	50.279
SC16	86.5	33.4	10.6	29.3	25.8	14.6	29.7	24.8	53.7	25.1	28.1	70.3	12.5	22.8	346.9	164.1	17.4	13.3	46	15.4	30.8	71	43.867
SC17	75.4	138.1	15.8	875.1	22.3	59.7	31.9	3.7	118.1	14.6	116.6	39	11.2	43.8	95.7	197.8	25.4	369.1	53.5	54.1	37.2	65	69.815
SC18	1.8	315.2	31.3	364.3	71.9	53	58.9	4.6	74.9	8.2	41.6	10.9	32.4	16	6.4	54.8	8.9	140.5	17.3	23	20.4	61	64.230
SC19						7.4		16.6	222.4	41.8	197.5	109	38.7	26.6	6.2	98.6	24.9	118.1	65.5	22.3	13	72	63.010
SC20	62.6	192	33.3	22.6	90.8	21.3	20.1								70.8	114.5	8.5	9.1	19.6	14.7	11.3	63	46.284
SC21	17.6	193.2	29.7	3.7	89	9.1	47.8		282.4	5.3		15.9	2.8	2.8	46	571.5	56.5	192.9	162.2	16.7	110.3	71	55.093
SC22	0.92	134.9	21.3	10.9	60.5	8.7	20.2		65	15.4	20.5	43	8.1	1.6	6.4	275.8	58.3	112.1	153.5	50.9	28.2	71	57.661
SC23		63.7	12.2	9.4	33.3	7.7	21.8									39.9	5.4	9.9	9.5	15.7	3.3	63	55.186
SC24	35	439.4	60.8	59.8	152	73.2	26.3		323.1	33.3	22.1	90.9	26.6	35	12.9	371.3	26.2	22.7	63.5	36	10.4	65	48.636
SC25	9.2	548.6	53.9	129.3	75.5	205.2	52.3		17.2	1.6	4.7	1.6	7.3	1.6	12	407.1	60.9	145.1	147.5	82.4	104.2	65	50.433
SC26		86.9	10.4	23.7	15.5	37.7	7.9		667.8	11	7.8	28.9	9.4	3.8		259.9	76.3	16.5	218.1	26.1	9.2	71	47.944
SC27	622.2	240.1	91.6	746.8	163.3	265.4	283.9	5.5	57.5	4.8	49.9	8.7	23.9	44.6	0.92	264.5	113.2	246.2	297.7	100.3	209.6	63	60.637
SC28		26.4	7.2	8.5	17.8	9.1	11.1		5.6				5.4	0.92		890.1	195.8	157.8	572.4	35.9	83.9	76	59.503
SC29	5.5	732.4	50.2	161.7	109.5	124.5	108.8		76.9	10.1	19.2	21.2	21.6	7.4	0.92	102.8	8.1	5.1	21.4	6.6	7.8	59	50.367
SC30		102.1	3.7	29.4	11	14.7	14.7		294.6	27.8	12.6	77.6	13.9	12.2		415.8	49	74.9	133.2	32.6	52.9	72	52.855
SC31	135.2	1468.2	103.8	276.8	161.7	354.4	84	7.4	584.2	37	58.9	92.7	38.6	50.6	2.8	1011.3	51.3	134.7	119.8	80.9	57.5	64	45.622
SC32	18.4	2.8	1.4	12	4.1	1169	199.6	42.3	318.2	14.7	14.7	44.2	226.3	51.5	47.8	5.5	3.2	21.2	9.7	470.1	72.7	64	20.583
SC33	17.5	12	1.1	41.4	3.5	1171.7	40.5	11		4.4	10.1	13.1	254.9	9.2	5.5			1.8	0.92	7.4	2.8	58	7.992
PS1	4.6					115.9		239.1					917.2		105.8	9.2				1766.1		74	2.324
PS2								152.7	60.3	4	11.9	4	18.9	4	1107.8	174.8	87.2	261.5	87.2	415.1	87.2	76	32.965
PS3															206		18.7	59.9	18.7	89.3	18.7	77	34.536
PS4													330.1							888.3		75	0.000
PS5													40.1					26.7		2201.6		77	1.059
PS6																210.6	20.7	55.7	24.8	88.2	18.6	77	43.778
PS7															58.9	753.4	48.1	128	60	200.2	42.1	77	41.637
PS8																421.8	31.5	72.4	47.7	112.3	72.3	77	47.115
PS9		18.1	1.6	4.9	1.6	8.1	1.6								1.8	1023.9	58.1	187.3	71.1	246.1	124.4	77	45.423
PS10	4.6	237.4	17.3	34.9	28.9	55.4	30.9								235.4	1026	45.4	80.2	86.3	118.5	34.1	73	40.891
LC1	3.7	47.8	3.7		11	2.7									748	1994.2	129.2	183.3	292.9	225.3	223.9	77	42.616
LC2		56.2		196.9	2.8	5.4		15.6	269.5	18.6	26	47.2	20.5	4.4	64.4	999.9	30.7	68.9	52.3	94.9	19.9	73	46.283
MC1								392.4	46	3.8	11.4	3.8	18.1	3.8	424.1	144.3	6.8	20.5	6.8	32.8	6.8	74	25.943
MC2								239	6				4.1		289.6	18.2	1.6	4.7	1.6	7.3	6.2	74	22.077
MC3								151.4	5.5	4.1	12.4	4.1	19.8	4.1	273.1		17.5	52.4	17.5	83	17.5	75	30.122
MC4								262.9	9.2	10.4	31.1	10.4	49.2	10.4	360.2		19.6	58.8	19.6	93.5	21.4	74	29.904
MC5								85.9		7.7	23.2	8.6	36.9	7.7	252		20.6	61.7	20.6	97.9	20.6	75	33.529
MC6															239		21.7	67.1	21.7	103.6	25.4	77	34.751
MC7															1222.7		102.3	306.9	106	491.7	124.4	77	34.073
MC8																762.3	68.3	204.9	68.3	325.3	68.3	77	43.109
MC9															64.4	885.8	74.6	365.2	81.6	338.8	130.1	77	47.682
MC10															5.5	259.8	21.5	46.5	33.4	74	47.7	77	47.215
MC11	0.92	125.1	3.2	17.8	4.1	15	3.2								59.8	418.5	30.1	45.1	62.8	65.6	14.7	73	42.732

Table 11 - SCS RUNOFF CURVE NUMBERS FOR ULTIMATE DEVELOPMENT

SOIL TYPES	B							C							D								
LANDUSE	11	12	13	21	31	51	71	11	12	13	21	31	51	71	11	12	13	21	31	51	71		
% IMPERVIOUS	20	38	75	90	78	0	98	20	38	75	90	78	0	98	20	38	75	90	78	0	98		
SCS CN VALUE	55	55	55	55	55	55	55	70	70	70	70	70	70	70	77	77	77	77	77	77	77	AVERAGE	AVERAGE
SUBAREAS	AREA (acres)							AREA (acres)							AREA (acres)							CN	% IMPERVIOUS
MC12		118.7	3.8	11.5	5.6	18.5	3.8	11	226	11.5	73.1	11.5	54.8	11.5	0.92	357.6	8.2	29.3	11.9	39.4	9.1	71	42.833
MC13	0.92	87.5	5.4	16.1	5.4	25.4	5.4	3.7	105.6	2.5	7.5	4.3	11.8	2.5		74.7	5.6	16.8	8.4	26.8	5.6	67	41.838
EC1															92.7	1207.7	80.9	271.1	88.2	367.5	125	77	43.591
EC2															50.6	998.2	87.4	288.9	87.4	416.3	87.4	77	43.092
EC3	19.3	5.6				5.4									6.4	209.3	21	62.8	31.2	76.3	56.5	76	48.355
EW1								145.5		9.4	28.1	10.3	44.7	9.4	2453		197.5	591.3	211.8	906.7	234.6	77	33.965
EW2															852.3		77.5	232.5	77.5	369	77.5	77	34.053
EW3															1000.4		90.9	431	90.9	433.4	90.9	77	38.182
EW4	3.7					3.7			32.4	1.4	119.1	1.4	6.3	7.8		711.6	64.6	492.7	64.6	307.8	93.1	76	54.127
EW5															87.4	763.8	68.7	426	68.7	327.1	68.7	77	47.700
EW6		269.3	20.9	63.6	20.9	99.4	60.5								13.8	773.8	55.8	325.6	59.5	265.7	103.6	71	48.325
SR1		27.4	2.5	7.5	2.5	11.9	2.5	2.8	500.4	32.1	68	51	107.7	22.7		191.3	13.4	36.1	16.1	57.5	12	71	42.990
SR2						1.8	0.92	22.1	628	21.7	68.6	29	85.4	24.4	34	197.3	12.8	48	15.5	54.3	18.8	72	42.261
SR3	1.8	63.3	2	18	2.9	9.4	2	27.6	116.9	4.7	282.7	6.5	22.3	13	6.4	64.9	6.2	260.3	9.4	21.7	29.4	71	69.286
BC1								40.5	816.1	63.1	87.8	138.1	122	31.1	3.7	165.5	9.6	21.1	16.1	30.6	7.3	71	44.589
BC2								98.4	186	11.7	30.4	24.1	26.5	23	49.7	785	37.7	132.2	57.5	132.5	38.8	75	43.232
BC3								81.9	983.7	57.7	433	115.3	138.5	124.7	1.8	485.9	19.8	320.9	33.1	62.8	14	72	54.419
BC4								22.1	348.4	35.8	94.9	80.4	64.5	96.3	21.2	377.4	16.2	57	20	68.7	18.1	73	49.250
BC5		22.1	5.5	1.8	16.6	0.92	16.6	0.92	72.9	18.4	19.6	51.6	9.4	50.7	3.7	178.7	21.1	48.4	51.9	27.2	33.3	72	60.455
WC1		100.4	6.5	4.3	18.1	4.2	0.8		167.9	5.7	4.6	17.3	5		1.8	807.4	77.7	62.7	213.8	45.4	86	74	50.346
RC1						0.92	11		107.2	8.3	12.1	17.5	11.2	7.5	629.7	652.4	87.5	233.9	149.7	169.5	88.7	76	43.130
RC2															1369.3	1140.8	215.1	936.6	399	369.4	288.7	77	48.863
RC3								49.7		4.5	17.5	7.6	8.3	2.8	635.1		54.5	178.1	54.5	163.4	60.9	76	37.846
RC4								322.5		23	73.7	23	69.1	26.7	310.1	49.7	29.8	103	33	84.6	32.8	74	37.767
RC5	162.2		27.3	113	52.7	44	69		60.7						594.4	171.1	62.3	361.6	103.2	125.5	231.3	72	52.777
RC6						2.8	1.8	207.2	5.5	18.8	58.3	19.8	56.5	18.8	67.3	1.8	6.1	20.1	7.9	18.3	19	72	39.118
RC7	80.6	96.8	8.7	58.8	11.4	22	58.8	10.1	12	0.92	13.8	0.92	2.8	2.7	279	244.2	26.4	96	28.8	75.9	45.5	70	44.533
RC8	216.3	820.1	57.2	85	138	50	85.7	44.4	5.5	4	40.3	4.9	11.9	17.8	30.4	248.4	6.7	22.1	14.5	8.3	5.6	60	45.883
RC9	801	5.5	73.3	302.8	78.9	211.7	170.9	108.8	4.6	9.5	144.3	9.5	28.4	13.2	155		14.1	86.5	15.9	42.3	15.9	60	45.682

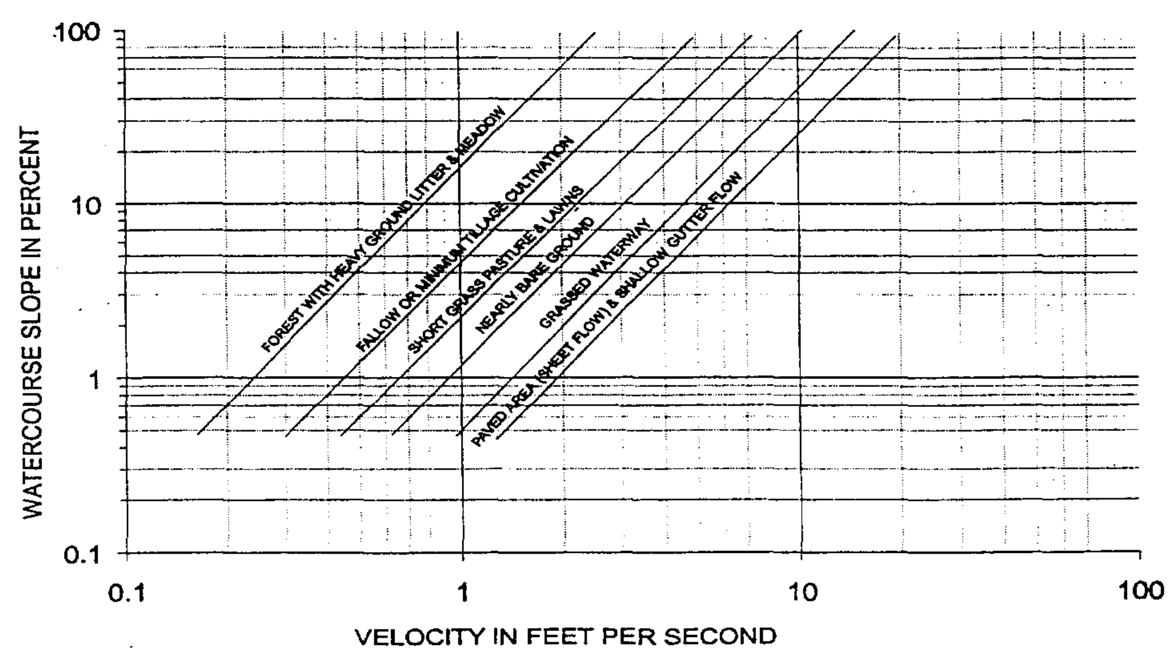
at recording precipitation gages located within the watershed and allows complete simulations of storms extending over a period of several days.

II. HEC-1 Model

Subareas

The Watershed was divided into eighty five (85) subareas. The upper watershed is defined by 57 subareas and covers about 139 square miles of area. The lower watershed has been divided into the lower Salado and Rosillo drainage areas. The lower Salado consists of 19 subareas and Rosillo consists of 9 subareas which cover about 51 square miles of area. Rainfall runoff was computed by determining the time of concentration of the overland flow within a subarea. Overland flows from each subarea are generated from sheet flow, shallow concentrated flow and channelized flows. Travel time is computed by dividing the travel distance by the average velocity of the overland storm water flow. Travel distances are established by determining a path for storm water flow through a subarea. Figure 11 - "Average Velocities for Estimating Travel Time for Overland Flow" was used in determining velocities for sheet flow and shallow concentrated flow. The average velocities for channel flow conditions have been estimated based on Manning's uniform flow equation. Travel times were computed for each of sheet flow, shallow concentrated flow and channelized flow. The Time of Concentration for each subarea is the sum of the three individual travel times. The SCS Lag Time, as required for use in the SCS unit hydrograph method, is equal to sixty percent of the Time of Concentration.

FIGURE 11. AVERAGE VELOCITIES FOR ESTIMATING TRAVEL TIME FOR OVERLAND FLOW.



"The Effects of Urbanization on Small Watersheds"

The reach routings that route the subarea runoffs from node to node along Salado Creek and the tributaries incorporate channelized flows. Computations are presented in Tables 12 and 13 - Summary of Time of Concentration and Reach Routing Calculations for existing conditions and ultimate development conditions.

Dams and Reservoirs

Within the Salado Creek Watershed, there are thirteen (13) existing Soil Conservation Service Floodwater Retarding Dams. These floodwater retarding structures were constructed for flood control, for the purpose of reducing flood flows and sediment loadings downstream. Included in the HEC-1 model analysis were floodwater storage capacities and outflow characteristics for each SCS structure using the Modified Puls method. Storage-Capacity-Discharge tables were developed from Engineering plans, reports, and previous hydraulic simulations prepared by the SCS and obtained from the San Antonio River Authority. These plans and reports are included in Appendix E.

Storm Simulation

As previously stated, two historical storms were selected for verification of the models. These storms occurred on April 4-5, 1991 and May 5-6, 1993. From the data for each storm, three precipitation recordings were used for interval distributions. Precipitation data for each of the two storm events was entered in the HEC-1 model as weighted precipitation gages. Total storm precipitation determined from the rainfall isohyetals were input as weighted averages for each subarea based upon the nearest precipitation gage. Rainfall patterns were based on three precipitation gages. These three gages recorded the rainfall in intervals used in the HEC-1 model. These gages are located at SCS Floodwater Retarding Dam No. 5, the U.S.G.S. Salado Creek (Upper Station), and at Spur 122 and Salado Creek. These gages were used for storm simulation of the April 4 - 5, 1991 event.

An antecedent soil moisture condition II was initially assumed for the storm of April 4-5, 1991. The results obtained from the HEC-1 model were larger than recorded data from April 4-5, 1991. Further review of rainfall records for the area indicated that the soil moisture conditions were drier than condition II. Re-running the HEC-1 model using antecedent moisture condition I, produced results that were lower than recorded data from April 4-5, 1991. It was thus determined that soil conditions prior to the April 4 - 5, 1991 storm were in between the two conditions. An average of the two conditions was used and the results of the hydrologic model compared very favorably to the recorded data of the April 4-5, 1991 storm.

Likewise, three precipitation gage intervals were used for the May 5-6, 1993 storm, however the locations of the precipitation gages were not evenly distributed. One gage is located at the San Antonio International Airport, the second at the U.S.G.S. Salado Creek (Upper Station) and the third at 3002 E. Southcross. Soil antecedent moisture conditions were reset to antecedent moisture condition II for the May 5-6, 1993 storm. The model

Table 12 - SUMMARY OF TIME OF CONCENTR... .JN AND REACH ROUTING CALCULATIONS
Salado Creek Watershed Drainage Master Plan
Existing Conditions Land Use

Based on procedures described in "Urban Hydrology for Small Watersheds", TR-55, USDA Soil Conservation Service, June 1986.

SUB-WATER-SHED ID	SHEET FLOW					SHALLOW CONCENTRATED FLOW					CHANNEL/PIPE FLOW					TIME OF CONC.	SCS LAG TIME	REACH ROUTING TIME				
	Length Feet	Mannings "n" -	Slope Ft/Ft	Velocity Ft/Sec	Travel Time Minutes	Length Feet	Slope Ft/Ft	Channel Type -	Velocity Ft/Sec	Travel Time Minutes	Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Travel Time Minutes	Minutes	Hours	Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Routing Time Hours
SC1	250	0.110	0.088	1.40	3.0	1500	0.047	unpaved	3.30	7.6	11000	0.012	0.050	10.1	18.2	29	0.288	-	-	-	-	-
SC2	300	0.110	0.007	0.40	12.5	1050	0.062	unpaved	3.80	4.6	11600	0.013	0.050	10.5	18.5	36	0.356	8600	0.007	0.045	7.6	0.312
SC3	200	0.110	0.100	1.50	2.2	1100	0.055	unpaved	3.50	5.2	14000	0.014	0.050	10.9	21.5	29	0.289	-	-	-	-	-
SC4	250	0.110	0.040	0.95	4.4	1400	0.036	unpaved	2.90	8.0	12600	0.011	0.050	9.6	21.8	34	0.342	7600	0.005	0.045	6.5	0.327
SC5	250	0.110	0.040	0.95	4.4	700	0.057	unpaved	3.60	3.2	10800	0.006	0.050	7.1	25.3	33	0.329	5400	0.007	0.045	6.8	0.219
SC6	300	0.110	0.033	0.85	5.9	1250	0.056	unpaved	3.55	5.9	14800	0.013	0.050	10.5	23.6	35	0.353	5900	0.006	0.045	6.3	0.258
SC7	200	0.110	0.100	1.50	2.2	950	0.079	unpaved	4.30	3.7	7200	0.018	0.050	12.3	9.7	16	0.157	7600	0.005	0.045	6.5	0.327
SC8	250	0.110	0.070	1.25	3.3	1200	0.108	unpaved	5.00	4.0	9500	0.015	0.050	11.2	14.1	21	0.214	-	-	-	-	-
SC9	250	0.110	0.008	0.42	9.9	200	0.350	unpaved	9.00	0.4	6800	0.024	0.050	15.3	7.4	30	0.303	2500	0.004	0.045	5.8	0.120
						800	0.106	unpaved	5.00	2.7	6000	0.012	0.050	10.1	9.9							
SC10	300	0.110	0.037	0.91	5.5	400	0.250	unpaved	7.60	0.9	800	0.050	0.050	22.0	0.6	30	0.301	-	-	-	-	-
						580	0.103	unpaved	4.90	2.0	4600	0.022	0.050	14.6	5.2							
											10000	0.013	0.050	10.5	15.9							
SC11	250	0.110	0.007	0.40	10.4	600	0.233	unpaved	7.50	1.3	3200	0.030	0.050	17.1	3.1	24	0.242	10700	0.005	0.05	5.8	0.511
						950	0.058	unpaved	3.70	4.3	2800	0.010	0.050	9.2	5.1							
SC12	150	0.110	0.013	0.55	4.5	850	0.082	unpaved	4.40	3.2	10200	0.010	0.050	9.2	18.5	59	0.593	13500	0.0054	0.055	7.8	0.480
						2150	0.033	unpaved	2.75	13.0	11000	0.010	0.050	9.2	20.0							
SC13	200	0.110	0.040	0.95	3.5	4100	0.025	unpaved	2.40	28.5	12400	0.005	0.060	5.4	38.2	70	0.702	19800	0.0044	0.055	6.8	0.808
SC14	300	0.080	0.010	0.70	7.1	2800	0.014	unpaved	1.80	25.9	19400	0.004	0.060	4.7	68.6	110	1.105	5000	0.0033	0.065	4.9	0.283
						850	0.012	unpaved	1.60	8.9												
SC15	250	0.080	0.012	0.76	5.5	1400	0.029	unpaved	2.55	9.2	4550	0.016	0.060	9.4	8.0	44	0.444	-	-	-	-	-
						1400	0.029	paved	3.45	6.8	5200	0.006	0.060	5.8	15.0							
SC16	200	0.080	0.073	1.90	1.8	1200	0.035	unpaved	2.80	7.1	11300	0.014	0.060	8.8	21.3	30	0.302	14200	0.003	0.06	4.4	0.900
SC17	300	0.080	0.010	0.70	7.1	1100	0.038	unpaved	3.00	6.1	11600	0.005	0.060	5.3	36.7	97	0.974	9700	0.0018	0.045	6.1	0.444
						3500	0.019	paved	2.80	20.8												
						2800	0.013	unpaved	1.75	26.7												
SC18	300	0.080	0.013	0.80	6.3	6600	0.003	unpaved	1.00	110.0	6900	0.004	0.065	4.4	26.4	170	1.699	-	-	-	-	-
						1100	0.027	paved	3.25	5.6												
						2200	0.012	unpaved	1.70	21.6												
SC19	200	0.080	0.040	1.42	2.3	5200	0.019	paved	2.80	31.0	8300	0.008	0.065	6.2	22.5	56	0.558	7900	0.0025	0.08	3.8	0.576
SC20	250	0.080	0.008	0.64	6.5	3350	0.018	paved	2.70	20.7	3300	0.003	0.065	3.8	14.6	44	0.439	-	-	-	-	-
						500	0.070	unpaved	4.00	2.1												
SC21	300	0.110	0.007	0.40	12.5	1300	0.025	unpaved	2.45	8.8	9000	0.004	0.065	4.4	34.5	85	0.851	4300	0.002	0.075	2.2	0.553
						4050	0.013	paved	2.30	29.3												
SC22	400	0.110	0.013	0.55	12.1	1600	0.038	paved	3.80	7.0	10800	0.008	0.065	6.1	29.6	49	0.488	-	-		-	-
SC23	200	0.110	0.040	0.95	3.5	2300	0.014	paved	2.40	16.0	300	0.017	0.065	8.9	0.6	63	0.630	7700	0.0023	0.065	2.5	0.846
						1300	0.019	unpaved	2.20	9.8	3700	0.001	0.075	1.9	33.1							
SC24	300	0.160	0.020	0.67	7.5	4100	0.010	paved	2.00	34.2	2100	0.028	0.075	9.9	3.6	89	0.892	17400	0.0015	0.07	2.2	2.188
											11000	0.005	0.075	4.2	44.0							
SC25	400	0.160	0.008	0.42	15.9	3500	0.026	paved	3.20	18.2	17100	0.002	0.075	2.6	108.2	168	1.677	-	-	-	-	-
						3050	0.010	paved	2.00	25.4												

Table 12 - SUMMARY OF TIME OF CONCENTRATION AND REACH ROUTING CALCULATIONS
Salado Creek Watershed Drainage Master Plan
Existing Conditions Land Use

Based on procedures described in "Urban Hydrology for Small Watersheds", TR-55, USDA Soil Conservation Service, June 1986.

SUB-WATER-SHED ID	SHEET FLOW					SHALLOW CONCENTRATED FLOW					CHANNEL/PIPE FLOW					TIME OF CONC.	SCS LAG TIME	REACH ROUTING TIME				
	Length	Mannings "n"	Slope	Velocity	Travel Time	Length	Slope	Channel Type	Velocity	Travel Time	Length	Slope	Mannings "n"	Velocity	Travel Time			Length	Slope	Mannings "n"	Velocity	Routing Time
	Feet	-	Ft/Ft	Ft/Sec	Minutes	Feet	Ft/Ft	-	Ft/Sec	Minutes	Feet	Ft/Ft	-	Ft/Sec	Minutes	Minutes	Hours	Feet	Ft/Ft	-	Ft/Sec	Hours
SC26	250	0.160	0.008	0.42	9.9	550	0.027	unpaved	1.70	5.4	10200	0.009	0.075	5.6	30.4	74	0.736	19500	0.0014	0.065	2.2	2.471
						4350	0.018	paved	2.60	27.9												
SC27	250	0.160	0.003	0.28	14.9	5300	0.003	paved	1.00	88.3	450	0.011	0.075	6.2	1.2	220	2.196	-	-	-	-	-
						2750	0.013	paved	2.30	19.9	350	0.014	0.075	7.0	0.8							
						1100	0.005	unpaved	0.70	26.2	13200	0.003	0.075	3.2	68.2							
SC28	350	0.160	0.003	0.28	20.8	3300	0.006	paved	1.55	35.5	3000	0.007	0.075	4.9	10.1	127	1.265	17600	0.0013	0.065	2.2	2.208
						1500	0.009	unpaved	0.95	26.3	400	0.025	0.075	9.3	0.7							
						1150	0.020	paved	2.80	6.8	9700	0.011	0.075	6.2	26.2							
SC29	300	0.200	0.003	0.28	17.9	4800	0.001	paved	1.00	80.0	2400	0.027	0.080	9.1	4.4	228	2.276	-	-	-	-	-
						1800	0.006	unpaved	0.80	37.5	9200	0.001	0.080	1.7	87.8							
SC30	200	0.200	0.005	0.34	9.8	1400	0.009	paved	1.90	12.3	11400	0.007	0.080	4.6	41.1	118	1.183	22900	0.0018	0.07	2.3	2.802
						4300	0.016	unpaved	1.30	55.1												
SC31	300	0.200	0.007	0.21	23.8	1300	0.012	unpaved	1.10	19.7	9000	0.013	0.080	6.3	23.8	163	1.632	18000	0.002	0.075	2.4	2.100
											14200	0.002	0.080	2.5	95.8							
SC32	300	0.200	0.004	0.16	31.3	4400	0.014	unpaved	1.20	61.1	15400	0.003	0.065	2.8	90.7	183	1.830					
SC33	300	0.200	0.010	0.25	20.0	2300	0.016	unpaved	1.30	29.5	7200	0.004	0.080	3.5	34.4	136	1.357	-	-	-	-	-
											9400	0.003	0.080	3.0	51.8							
PANTHER SPRINGS CREEK																						
PS1	200	0.110	0.117	1.60	2.1	1000	0.057	unpaved	3.60	4.6	5400	0.024	0.050	14.2	6.3	44	0.435	5200	0.005	0.045	6.1	0.238
											15200	0.008	0.050	8.3	30.5							
PS2	300	0.110	0.050	1.10	4.5	1400	0.100	unpaved	4.90	4.8	13400	0.011	0.050	9.6	23.2	33	0.325	6900	0.008	0.045	8.2	0.234
PS3	300	0.110	0.033	0.85	5.9	2700	0.024	unpaved	2.40	18.8	6200	0.007	0.050	7.7	13.5	38	0.381	-	-	-	-	-
PS4	200	0.110	0.133	1.75	1.9	1000	0.078	unpaved	4.30	3.9	9300	0.016	0.050	11.6	13.4	19	0.191	11400	0.01	0.045	9.1	0.347
PS5	300	0.110	0.050	1.10	4.5	1200	0.087	unpaved	4.50	4.4	8600	0.020	0.050	13.9	10.3	19	0.193	8100	0.003	0.045	5.0	0.450
PS6	300	0.110	0.033	0.85	5.9	3300	0.060	unpaved	3.70	14.9	5100	0.006	0.050	7.1	12.0	33	0.327	-	-	-	-	-
PS7	150	0.110	0.007	0.40	6.3	2300	0.052	paved	4.50	8.5	12850	0.012	0.050	10.1	21.3	36	0.361	14200	0.0029	0.05	4.9	0.810
PS8	300	0.110	0.017	0.62	8.1	1600	0.029	unpaved	2.50	10.7	8200	0.005	0.050	6.5	21.1	46	0.460	7300	0.0039	0.05	3.9	0.525
						1200	0.026	paved	3.20	6.3												
PS9	300	0.110	0.043	0.98	5.1	1600	0.051	unpaved	3.40	7.8	4000	0.020	0.050	12.7	5.3	38	0.384	4200	0.006	0.045	6.7	0.175
											400	0.010	0.050	8.9	0.7			5500	0.004	0.05	5.4	0.282
											11200	0.011	0.050	9.6	19.4							
PS10	300	0.080	0.007	0.60	8.3	3600	0.013	unpaved	1.80	33.3	8800	0.013	0.050	10.2	14.4	56	0.560	4000	0.0013	0.06	2.1	0.540
LORENCE CREEK																						
LC1	300	0.110	0.010	0.47	10.6	1000	0.035	unpaved	2.80	6.0	12200	0.014	0.060	8.8	23.0	70	0.704	15100	0.004	0.055	4.7	0.887
											1600	0.006	0.060	5.8	4.6							
											9800	0.007	0.060	6.2	26.2							
LC2	300	0.080	0.027	1.20	4.2	2400	0.027	unpaved	2.50	16.0	14000	0.004	0.060	4.7	49.5	83	0.827					
						2500	0.027	paved	3.20	13.0												
MUD CREEK																						
MC1	300	0.110	0.067	1.20	4.2	1400	0.036	unpaved	2.90	8.0	11000	0.011	0.050	9.6	19.0	31	0.313	-	-	-	-	-
MC2	200	0.110	0.125	1.70	2.0	1800	0.044	unpaved	3.10	9.7	3200	0.017	0.050	12.0	4.5	23	0.229	9000	0.008	0.045	8.4	0.297

Table 12 - SUMMARY OF TIME OF CONCENTR… …ON AND REACH ROUTING CALCULATIONS
Salado Creek Watershed Drainage Master Plan
Existing Conditions Land Use

Based on procedures described in "Urban Hydrology for Small Watersheds", TR-55, USDA Soil Conservation Service, June 1986.

SUB-	SHEET FLOW					SHALLOW CONCENTRATED FLOW					CHANNEL/PIPE FLOW					TIME	SCS	REACH ROUTING TIME				
WATER-SHED ID	Length Feet	Mannings "n" -	Slope Ft/Ft	Velocity Ft/Sec	Travel Time Minutes	Length Feet	Slope Ft/Ft	Channel Type -	Velocity Ft/Sec	Travel Time Minutes	Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Travel Time Minutes	OF CONC. Minutes	LAG TIME Hours	Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Routing Time Hours
											4600	0.015	0.050	11.2	6.8							
MC3	200	0.110	0.100	1.50	2.2	1500	0.067	unpaved	3.90	6.4	2800	0.014	0.050	10.9	4.3	28	0.284	-	-	-	-	-
											6600	0.006	0.050	7.1	15.5							
MC4	200	0.110	0.075	1.30	2.6	2500	0.050	unpaved	3.40	12.3	7400	0.014	0.050	10.9	11.4	26	0.262	-	-	-	-	-
MC5	150	0.110	0.067	1.25	2.0	900	0.044	unpaved	3.10	4.8	10500	0.016	0.050	11.6	15.1	22	0.219	3500	0.006	0.045	7.3	0.134
MC6	250	0.110	0.020	0.67	6.2	1600	0.053	unpaved	3.50	7.6	5800	0.016	0.050	11.6	8.3	22	0.222	5800	0.006	0.045	7.3	0.221
MC7	250	0.110	0.016	0.60	6.9	1700	0.040	unpaved	3.00	9.4	9200	0.014	0.050	10.9	14.1	31	0.305	11500	0.007	0.045	7.9	0.406
MC8	200	0.110	0.050	1.10	3.0	1500	0.080	unpaved	4.40	5.7	11800	0.013	0.050	10.5	18.8	28	0.275	12700	0.0054	0.05	6.2	0.567
MC9	200	0.110	0.050	1.10	3.0	3400	0.040	unpaved	3.00	18.9	15700	0.008	0.050	8.0	32.7	55	0.546	12500	0.0056	0.055	5.8	0.603
MC10	250	0.110	0.016	0.60	6.9	350	0.017	unpaved	2.00	2.9	4800	0.006	0.060	5.8	13.8	32	0.321	9600	0.0035	0.055	5.1	0.523
						1300	0.050	paved	4.50	4.8												
						750	0.053	unpaved	3.50	3.6												
MC11	200	0.035	0.025	1.60	2.1	700	0.043	unpaved	3.10	3.8	12600	0.005	0.060	5.3	39.8	49	0.493	-	-	-	-	-
						900	0.044	paved	4.10	3.7												
MC12	300	0.035	0.067	2.55	2.0	850	0.029	paved	3.50	4.0	14400	0.009	0.060	7.1	33.9	45	0.446	6800	0.0037	0.06	4.5	0.418
						650	0.023	unpaved	2.30	4.7												
MC13	250	0.035	0.008	0.90	4.6	3200	0.023	paved	3.10	17.2	8200	0.005	0.060	5.3	25.9	52	0.519	-	-	-	-	-
						600	0.025	unpaved	2.40	4.2												
ELM CREEK																						
EC1	300	0.110	0.020	0.67	7.5	1900	0.052	unpaved	3.60	8.8	20000	0.008	0.050	8.0	41.6	58	0.579	-	-	-	-	-
EC2	200	0.110	0.067	1.20	2.8	2300	0.045	unpaved	3.40	11.3	22800	0.009	0.050	8.5	44.8	59	0.588	8100	0.0045	0.045	4.3	0.524
EC3	300	0.110	0.007	0.40	12.5	1100	0.027	unpaved	2.60	7.1	9800	0.013	0.050	10.2	16.0	36	0.356	-	-	-	-	-
ELM WATERHOLE CREEK																						
EW1	200	0.110	0.150	1.80	1.9	800	0.088	unpaved	4.50	3.0	8200	0.017	0.050	12.0	11.4	91	0.912	-	-	-	-	-
											31200	0.006	0.050	6.9	75.0							
EW2	300	0.110	0.007	0.40	12.5	1800	0.047	unpaved	3.30	9.1	5200	0.018	0.050	12.3	7.0	52	0.515	7100	0.008	0.045	8.2	0.241
											12600	0.010	0.050	9.2	22.9							
EW3	300	0.110	0.020	0.67	7.5	2800	0.023	unpaved	2.30	20.3	4800	0.007	0.050	7.5	10.7	38	0.384	2200	0.014	0.045	10.8	0.057
EW4	200	0.110	0.060	1.20	2.8	400	0.050	unpaved	3.40	2.0	9000	0.013	0.050	10.5	14.3	19	0.191	8000	0.003	0.05	4.0	0.560
EW5	300	0.110	0.007	0.40	12.5	1700	0.042	unpaved	3.10	9.1	11600	0.015	0.050	11.2	17.2	39	0.388	12400	0.003	0.05	4.0	0.869
EW6	250	0.110	0.008	0.42	9.9	1400	0.036	unpaved	2.80	8.3	17500	0.007	0.050	7.5	39.0	57	0.572	-	-		-	-
STAHL ROAD																						
SR1	300	0.080	0.017	0.90	5.6	3000	0.027	paved	3.30	15.2	9200	0.010	0.060	7.5	20.6	41	0.413	10100	0.006	0.045	6.7	0.421
SR2	300	0.080	0.017	0.90	5.6	1200	0.026	unpaved	2.50	8.0	10000	0.006	0.060	5.8	28.9	46	0.462	12200	0.006	0.045	6.7	0.509
						500	0.012	paved	2.20	3.8												
SR3	300	0.080	0.017	0.90	5.6	2800	0.025	unpaved	2.40	19.4	10200	0.006	0.065	5.3	31.9	57	0.569	-	-	-	-	-
BIETEL CREEK																						
BC1	300	0.110	0.023	0.71	7.0	2300	0.032	unpaved	2.80	13.7	12800	0.009	0.060	7.1	30.2	51	0.509	-	-	-	-	-
BC2	300	0.110	0.057	1.20	4.2	1400	0.041	unpaved	3.00	7.8	11200	0.010	0.060	7.5	25.0	37	0.370	16400	0.0043	0.045	6.0	0.760
BC3	300	0.080	0.013	0.80	6.3	1400	0.029	unpaved	2.60	9.0	17900	0.008	0.060	6.7	44.7	60	0.599	-	-	-	-	-
BC4	300	0.080	0.010	0.70	7.1	2800	0.045	unpaved	3.20	14.6	11800	0.011	0.070	6.7	29.3	61	0.609	8600	0.0035	0.045	6.8	0.351

Table 12 - SUMMARY OF TIME OF CONCENTRATION AND REACH ROUTING CALCULATIONS
Salado Creek Watershed Drainage Master Plan
Existing Conditions Land Use

Based on procedures described in "Urban Hydrology for Small Watersheds", TR-55, USDA Soil Conservation Service, June 1986.

SUB-WATER-SHED ID	SHEET FLOW Length Feet	Mannings "n" -	Slope Ft/Ft	Velocity Ft/Sec	Travel Time Minutes	SHALLOW CONCENTRATED FLOW Length Feet	Slope Ft/Ft	Channel Type -	Velocity Ft/Sec	Travel Time Minutes	CHANNEL/PIPE FLOW Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Travel Time Minutes	TIME OF CONC. Minutes	SCS LAG TIME Hours	REACH ROUTING TIME Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Routing Time Hours
											2600	0.007	0.070	5.3	8.2							
											900	0.022	0.070	9.5	1.6							
BC5	300	0.080	0.010	0.70	7.1	500	0.018	unpaved	2.10	4.0	10850	0.009	0.070	6.0	30.2	61	0.606	-	-	-	-	-
						2550	0.013	paved	2.20	19.3												
WALZEM CREEK																						
WC1	300	0.110	0.073	1.30	3.8	5300	0.040	unpaved	3.00	29.4	19000	0.007	0.075	4.9	64.3	98	0.976	-	-	-	-	-
ROSILLO CREEK																						
RC1	300	0.110	0.050	1.10	4.5	1200	0.021	paved	2.80	7.1	8600	0.008	0.065	6.1	23.6	84	0.840	20900	0.003	0.05	4.1	1.419
						1150	0.009	paved	1.90	10.1	9400	0.005	0.065	4.8	32.6							
						1300	0.032	paved	3.60	6.0												
RC2	300	0.110	0.004	0.30	16.7	3200	0.004	paved	1.10	48.5	6600	0.003	0.065	3.7	29.6	214	2.136	-	-	-	-	-
											5000	0.006	0.065	5.3	15.8							
											18800	0.002	0.065	3.0	103.1							
RC3	400	0.110	0.003	0.24	27.8	2600	0.015	unpaved	1.90	22.8	8800	0.003	0.065	3.7	39.4	120	1.199	9700	0.003	0.05	4.1	0.659
						1200	0.004	unpaved	1.10	18.2												
						400	0.005	paved	1.40	4.8												
						500	0.006	unpaved	1.20	6.9												
RC4	300	0.110	0.003	0.17	29.4	2800	0.012	unpaved	1.60	29.2	5100	0.008	0.070	5.6	15.1	156	1.560	-	-	-	-	-
											5400	0.000	0.070	1.1	82.3							
RC5	300	0.110	0.003	0.17	29.4	650	0.005	unpaved	1.10	9.8	15400	0.002	0.070	2.8	91.0	158	1.582	-	-	-	-	-
											8200	0.006	0.070	4.9	28.0							
RC6	300	0.110	0.012	0.51	9.8	2050	0.020	unpaved	2.20	15.5	7400	0.008	0.075	5.3	23.4	49	0.487	14900	0.002	0.055	3.0	1.363
RC7	300	0.110	0.003	0.25	20.0	1400	0.019	unpaved	2.10	11.1	14400	0.004	0.075	3.7	64.4	96	0.955	-	-	-	-	-
RC8	450	0.110	0.003	0.25	30.0	16500	0.003	paved	1.30	211.5	3600	0.008	0.080	4.9	12.1	256	2.565	25600	0.003	0.055	3.7	1.912
											400	0.025	0.080	8.7	0.8							
											600	0.008	0.080	4.9	2.0							
RC9	400	0.160	0.003	0.18	37.0	1500	0.006	unpaved	1.20	20.8	24800	0.002	0.080	2.5	167.4	242	2.425	-	-	-	-	-
						1050	0.009	paved	1.90	9.2												
						1300	0.031	unpaved	2.70	8.0												

Table 13 - SUMMARY OF TIME OF CONCENTR. N AND REACH ROUTING CALCULATIONS R 7/9/96

Salado Creek Watershed Drainage Master Plan

Ultimate Development Land Use

Based on procedures described in "Urban Hydrology for Small Watersheds", TR-55, USDA Soil Conservation Service, June 1986.

SUB-WATER-SHED ID	SHEET FLOW Length Feet	Mannings "n" -	Slope Ft/Ft	Velocity Ft/Sec	Travel Time Minutes	SHALLOW CONCENTRATED FLOW Length Feet	Slope Ft/Ft	Channel Type -	Velocity Ft/Sec	Travel Time Minutes	CHANNEL/PIPE FLOW Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Travel Time Minutes	TIME OF CONC. Minutes	SCS LAG TIME Hours	REACH ROUTING TIME Length Feet	Slope Ft/Ft	Mannings "n" -	Vel. Ft/Sec	Routing Time Hours
SC1	250	0.110	0.088	1.40	3.0	1500	0.047	unpaved	3.30	7.6	11000	0.012	0.050	10.1	18.2	29	0.288	-	-	-	-	-
SC2	300	0.110	0.007	0.40	12.5	1050	0.062	unpaved	3.80	4.6	11600	0.013	0.050	10.5	18.5	36	0.356	8600	0.007	0.045	7.6	0.312
SC3	200	0.110	0.100	1.50	2.2	1100	0.055	unpaved	3.50	5.2	14000	0.014	0.050	10.9	21.5	29	0.289	-	-	-	-	-
SC4	250	0.110	0.040	0.95	4.4	1400	0.036	unpaved	2.90	8.0	12600	0.011	0.050	9.6	21.8	34	0.342	7600	0.005	0.045	6.5	0.327
SC5	250	0.110	0.040	0.95	4.4	700	0.057	unpaved	3.60	3.2	10800	0.006	0.050	7.1	25.3	33	0.329	5400	0.007	0.045	6.8	0.219
SC6	300	0.110	0.033	0.85	5.9	1250	0.056	unpaved	3.55	5.9	14800	0.013	0.050	10.5	23.6	35	0.353	5900	0.006	0.045	6.3	0.258
SC7	200	0.110	0.100	1.50	2.2	950	0.079	unpaved	4.30	3.7	7200	0.018	0.050	12.3	9.7	16	0.157	7600	0.005	0.045	6.5	0.327
SC8	250	0.110	0.070	1.25	3.3	1200	0.108	unpaved	5.00	4.0	9500	0.015	0.050	11.2	14.1	21	0.214	-	-	-	-	-
SC9	250	0.110	0.008	0.42	9.9	200	0.350	unpaved	9.00	0.4	6800	0.024	0.050	15.3	7.4	30	0.303	2500	0.004	0.045	5.8	0.120
						800	0.106	unpaved	5.00	2.7	6000	0.012	0.050	10.1	9.9							
SC10	300	0.110	0.037	0.91	5.5	400	0.250	unpaved	7.60	0.9	800	0.050	0.050	22.0	0.6	30	0.301	-	-	-	-	-
						580	0.103	unpaved	4.90	2.0	4600	0.022	0.050	14.6	5.2							
											10000	0.013	0.050	10.5	15.9							
SC11	250	0.110	0.007	0.40	10.4	600	0.233	unpaved	7.50	1.3	3200	0.030	0.050	17.1	3.1	24	0.242	10700	0.005	0.05	5.8	0.511
						950	0.058	unpaved	3.70	4.3	2800	0.010	0.050	9.2	5.1							
SC12	150	0.110	0.013	0.55	4.5	850	0.082	unpaved	4.40	3.2	10200	0.010	0.050	9.2	18.5	58	0.582	13500	0.0054	0.055	7.8	0.480
						1900	0.033	unpaved	2.75	11.5	11250	0.010	0.050	9.2	20.4							
SC13	200	0.110	0.040	0.95	3.5	3600	0.025	unpaved	2.40	25.0	13000	0.005	0.060	5.4	40.1	69	0.686	19800	0.0044	0.055	6.8	0.808
SC14	300	0.080	0.010	0.70	7.1	2500	0.014	unpaved	1.80	23.1	19700	0.004	0.060	4.7	69.6	109	1.088	5000	0.0033	0.065	4.9	0.283
						850	0.012	unpaved	1.60	8.9												
SC15	250	0.080	0.012	0.76	5.5	1400	0.029	unpaved	2.55	9.2	4550	0.016	0.060	9.4	8.0	44	0.444	-	-	-	-	-
						1400	0.029	paved	3.45	6.8	5200	0.006	0.060	5.8	15.0							
SC16	200	0.080	0.073	1.90	1.8	1200	0.035	unpaved	2.80	7.1	11300	0.014	0.060	8.8	21.3	30	0.302	14200	0.003	0.06	4.4	0.900
SC17	300	0.080	0.010	0.70	7.1	1100	0.038	unpaved	3.00	6.1	12400	0.005	0.060	5.3	39.2	94	0.941	9700	0.0018	0.045	6.1	0.444
						3000	0.019	paved	2.80	17.9												
						2500	0.013	unpaved	1.75	23.8												
SC18	300	0.080	0.013	0.80	6.3	6000	0.003	unpaved	1.00	100.0	7500	0.004	0.065	4.4	28.7	162	1.622	-	-	-	-	-
						1100	0.027	paved	3.25	5.6												
						2200	0.012	unpaved	1.70	21.6												
SC19	200	0.080	0.040	1.42	2.3	4600	0.019	paved	2.80	27.4	8900	0.008	0.065	6.2	24.1	54	0.538	7900	0.0025	0.08	3.8	0.576
SC20	250	0.080	0.008	0.64	6.5	3000	0.018	paved	2.70	18.5	3650	0.003	0.065	3.8	16.1	43	0.432	-	-	-	-	-
						500	0.070	unpaved	4.00	2.1												
SC21	300	0.110	0.007	0.40	12.5	1300	0.025	unpaved	2.45	8.8	9450	0.004	0.065	4.4	36.2	84	0.836	4300	0.002	0.075	2.2	0.553
						3600	0.013	paved	2.30	26.1												
SC22	400	0.110	0.013	0.55	12.1	1600	0.038	paved	3.80	7.0	10800	0.008	0.065	6.1	29.6	49	0.488	-	-		-	-
SC23	200	0.110	0.040	0.95	3.5	2000	0.014	paved	2.40	13.9	600	0.017	0.065	8.9	1.1	61	0.615	7700	0.0023	0.065	2.5	0.846
						1300	0.019	unpaved	2.20	9.8	3700	0.001	0.075	1.9	33.1							
SC24	300	0.160	0.020	0.67	7.5	3600	0.010	paved	2.00	30.0	2600	0.028	0.075	9.9	4.4	86	0.859	17400	0.0015	0.07	2.2	2.188
											11000	0.005	0.075	4.2	44.0							
SC25	400	0.160	0.008	0.42	15.9	3100	0.026	paved	3.20	16.1	17800	0.002	0.075	2.6	112.6	168	1.676	-	-	-	-	-
						2750	0.010	paved	2.00	22.9												

Table 13 - SUMMARY OF TIME OF CONCENTRATION AND REACH ROUTING CALCULATIONS
Salado Creek Watershed Drainage Master Plan
Ultimate Development Land Use

Based on procedures described in "Urban Hydrology for Small Watersheds", TR-55, USDA Soil Conservation Service, June 1986.

SUB-WATER-SHED ID	SHEET FLOW Length Feet	Mannings "n" -	Slope Ft/Ft	Velocity Ft/Sec	Travel Time Minutes	SHALLOW CONCENTRATED FLOW Length Feet	Slope Ft/Ft	Channel Type -	Velocity Ft/Sec	Travel Time Minutes	CHANNEL/PIPE FLOW Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Travel Time Minutes	TIME OF CONC. Minutes	SCS LAG TIME Hours	REACH ROUTING TIME Length Feet	Slope Ft/Ft	Mannings "n" -	Vel. Ft/Sec	Routing Time Hours
SC26	250	0.160	0.008	0.42	9.9	550	0.027	unpaved	1.70	5.4	10700	0.009	0.075	5.6	31.9	72	0.719	19500	0.0014	0.065	2.2	2.471
						3850	0.018	paved	2.60	24.7												
SC27	250	0.160	0.003	0.28	14.9	4800	0.003	paved	1.00	80.0	950	0.011	0.075	6.2	2.6	212	2.116	-	-	-	-	-
						2550	0.013	paved	2.30	18.5	550	0.014	0.075	7.0	1.3							
						1100	0.005	unpaved	0.70	26.2	13200	0.003	0.075	3.2	68.2							
SC28	350	0.160	0.003	0.28	20.8	3000	0.006	paved	1.55	32.3	3300	0.007	0.075	4.9	11.2	124	1.243	17600	0.0013	0.065	2.2	2.208
						1500	0.009	unpaved	0.95	26.3	400	0.025	0.075	9.3	0.7							
						1150	0.020	paved	2.80	6.8	9700	0.011	0.075	6.2	26.2							
SC29	300	0.200	0.003	0.28	17.9	4300	0.001	paved	1.00	71.7	2900	0.027	0.080	9.1	5.3	220	2.202	-	-	-	-	-
						1800	0.006	unpaved	0.80	37.5	9200	0.001	0.080	1.7	87.8							
SC30	200	0.200	0.005	0.34	9.8	1400	0.009	paved	1.90	12.3	11900	0.007	0.080	4.6	42.9	114	1.137	22900	0.0018	0.07	2.3	2.802
						3800	0.016	unpaved	1.30	48.7												
SC31	300	0.200	0.007	0.21	23.8	1300	0.012	unpaved	1.10	19.7	9000	0.013	0.080	6.3	23.8	163	1.632	18000	0.002	0.075	2.4	2.100
											14200	0.002	0.080	2.5	95.8							
SC32	300	0.200	0.004	0.16	31.3	4400	0.014	unpaved	1.20	61.1	15400	0.003	0.085	2.8	90.7	183	1.830					
PANTHER SPRINGS CREEK																						
PS1	200	0.110	0.117	1.60	2.1	1000	0.057	unpaved	3.60	4.6	5400	0.024	0.050	15.3	5.9	43	0.435	5200	0.005	0.045	6.1	0.238
											15200	0.008	0.050	8.2	30.9							
PS2	300	0.110	0.050	1.10	4.5	1400	0.100	unpaved	4.90	4.8	13400	0.011	0.050	9.6	23.2	33	0.325	6900	0.008	0.045	8.2	0.234
PS3	300	0.110	0.033	0.85	5.9	2400	0.024	unpaved	2.40	16.7	6500	0.007	0.050	7.7	14.1	37	0.367	-	-	-	-	-
PS4	200	0.110	0.133	1.75	1.9	1000	0.078	unpaved	4.30	3.9	9300	0.016	0.050	11.6	13.4	19	0.191	11400	0.01	0.045	9.1	0.347
PS5	300	0.110	0.050	1.10	4.5	1200	0.087	unpaved	4.50	4.4	8600	0.020	0.050	13.9	10.3	19	0.193	8100	0.003	0.045	5.0	0.450
PS6	300	0.110	0.033	0.85	5.9	3000	0.060	unpaved	3.70	13.5	5400	0.006	0.050	7.1	12.7	32	0.321	-	-	-	-	-
PS7	150	0.110	0.007	0.40	6.3	2000	0.052	paved	4.50	7.4	13150	0.012	0.050	10.1	21.8	35	0.355	14200	0.0029	0.05	4.9	0.810
PS8	300	0.110	0.017	0.62	8.1	1600	0.029	unpaved	2.50	10.7	8200	0.005	0.050	6.5	21.1	46	0.460	7300	0.0039	0.05	3.9	0.525
						1200	0.026	paved	3.20	6.3												
PS9	300	0.110	0.043	0.98	5.1	1600	0.051	unpaved	3.40	7.8	4000	0.020	0.050	13.9	4.8	38	0.384	4200	0.006	0.045	6.7	0.175
											400	0.010	0.050	8.9	0.7			5500	0.004	0.05	5.4	0.282
											11200	0.011	0.050	9.4	19.9							
PS10	300	0.080	0.007	0.60	8.3	3200	0.013	unpaved	1.80	29.6	9200	0.013	0.050	10.2	15.0	53	0.530	4000	0.0013	0.06	2.1	0.540
LORENCE CREEK																						
LC1	300	0.110	0.010	0.47	10.6	1000	0.035	unpaved	2.80	6.0	12200	0.014	0.060	8.8	23.0	70	0.704	15100	0.004	0.055	4.7	0.887
											1600	0.006	0.060	5.8	4.6							
											9800	0.007	0.060	6.2	26.2							
LC2	300	0.080	0.027	1.20	4.2	2100	0.027	unpaved	2.50	14.0	14600	0.004	0.060	4.7	51.6	81	0.812					
						2200	0.027	paved	3.20	11.5												
MUD CREEK																						
MC1	300	0.110	0.067	1.20	4.2	1400	0.036	unpaved	2.90	8.0	11000	0.011	0.050	9.6	19.0	31	0.313	-	-	-	-	-
MC2	200	0.110	0.125	1.70	2.0	1800	0.044	unpaved	3.10	9.7	3200	0.017	0.050	12.0	4.5	23	0.229	9000	0.008	0.045	8.4	0.297
											4600	0.015	0.050	11.2	6.8							
MC3	200	0.110	0.100	1.50	2.2	1500	0.067	unpaved	3.90	6.4	2800	0.014	0.050	10.9	4.3	28	0.284	-	-	-	-	-

Table 13 - SUMMARY OF TIME OF CONCENTR[illegible]N AND REACH ROUTING CALCULATIONS
Salado Creek Watershed Drainage Master Plan
Ultimate Development Land Use

Based on procedures described in "Urban Hydrology for Small Watersheds", TR-55, USDA Soil Conservation Service, June 1986.

SUB-WATER-SHED ID	SHEET FLOW Length Feet	Mannings "n" -	Slope Ft/Ft	Velocity Ft/Sec	Travel Time Minutes	SHALLOW CONCENTRATED FLOW Length Feet	Slope Ft/Ft	Channel Type -	Velocity Ft/Sec	Travel Time Minutes	CHANNEL/PIPE FLOW Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Travel Time Minutes	TIME OF CONC. Minutes	SCS LAG TIME Hours	REACH ROUTING TIME Length Feet	Slope Ft/Ft	Mannings "n" -	Vel. Ft/Sec	Routing Time Hours
											6600	0.006	0.050	7.1	15.5							
MC4	200	0.110	0.075	1.30	2.6	2200	0.050	unpaved	3.40	10.8	7700	0.014	0.050	10.9	11.8	25	0.252	-	-	-	-	-
MC5	150	0.110	0.067	1.25	2.0	900	0.044	unpaved	3.10	4.8	10500	0.016	0.050	11.6	15.1	22	0.219	3500	0.006	0.045	7.3	0.134
MC6	250	0.110	0.020	0.67	6.2	1600	0.053	unpaved	3.50	7.6	5800	0.016	0.050	11.6	8.3	22	0.222	5800	0.006	0.045	7.3	0.221
MC7	250	0.110	0.016	0.60	6.9	1700	0.040	unpaved	3.00	9.4	9200	0.014	0.050	10.9	14.1	31	0.305	11500	0.007	0.045	7.9	0.406
MC8	200	0.110	0.050	1.10	3.0	1500	0.080	unpaved	4.40	5.7	11800	0.013	0.050	10.5	18.8	28	0.275	12700	0.0054	0.05	6.2	0.567
MC9	200	0.110	0.050	1.10	3.0	3000	0.040	unpaved	3.00	16.7	16100	0.008	0.050	8.0	33.5	53	0.532	12500	0.0056	0.055	5.8	0.603
MC10	250	0.110	0.016	0.60	6.9	350	0.017	unpaved	2.00	2.9	4800	0.006	0.060	5.8	13.8	32	0.321	9600	0.0035	0.055	5.1	0.523
						1300	0.050	paved	4.50	4.8												
						750	0.053	unpaved	3.50	3.6												
MC11	200	0.035	0.025	1.60	2.1	700	0.043	unpaved	3.10	3.8	12600	0.005	0.060	5.3	39.8	49	0.493	-	-	-	-	-
						900	0.044	paved	4.10	3.7												
MC12	300	0.035	0.067	2.55	2.0	850	0.029	paved	3.50	4.0	14400	0.009	0.060	7.1	33.9	45	0.446	6800	0.0037	0.06	4.5	0.418
						650	0.023	unpaved	2.30	4.7												
MC13	250	0.035	0.008	0.90	4.6	2800	0.023	paved	3.10	15.1	8600	0.005	0.060	5.3	27.2	51	0.510	-	-	-	-	-
						600	0.025	unpaved	2.40	4.2												
ELM CREEK																						
EC1	300	0.110	0.020	0.67	7.5	1900	0.052	unpaved	3.60	8.8	20000	0.008	0.050	8.0	41.6	58	0.579	-	-	-	-	-
EC2	200	0.110	0.067	1.20	2.8	2000	0.045	unpaved	3.40	9.8	23100	0.009	0.050	8.3	46.2	59	0.588	8100	0.0045	0.045	4.3	0.524
EC3	300	0.110	0.007	0.40	12.5	1100	0.027	unpaved	2.60	7.1	9800	0.013	0.050	10.2	16.0	36	0.356	-	-	-	-	-
ELM WATERHOLE CREEK																						
EW1	200	0.110	0.150	1.80	1.9	800	0.088	unpaved	4.50	3.0	8200	0.017	0.050	12.0	11.4	91	0.912	-	-	-	-	-
											31200	0.006	0.050	6.9	75.0							
EW2	300	0.110	0.007	0.40	12.5	1800	0.047	unpaved	3.30	9.1	5200	0.018	0.050	12.3	7.0	52	0.515	7100	0.008	0.045	8.2	0.241
											12600	0.010	0.050	9.2	22.9							
EW3	300	0.110	0.020	0.67	7.5	2400	0.023	unpaved	2.30	17.4	5200	0.007	0.050	7.5	11.6	36	0.364	2200	0.014	0.045	10.8	0.057
EW4	200	0.110	0.060	1.20	2.8	400	0.050	unpaved	3.40	2.0	9000	0.013	0.050	10.5	14.3	19	0.191	8000	0.003	0.05	4.0	0.560
EW5	300	0.110	0.007	0.40	12.5	1700	0.042	unpaved	3.10	9.1	11600	0.015	0.050	11.2	17.2	39	0.388	12400	0.003	0.05	4.0	0.869
EW6	250	0.110	0.008	0.42	9.9	1400	0.036	unpaved	2.80	8.3	17500	0.007	0.050	7.5	39.0	57	0.572	-	-		-	-
STAHL ROAD																						
SR1	300	0.080	0.017	0.90	5.6	2500	0.027	paved	3.30	12.6	9700	0.010	0.060	7.5	21.7	40	0.399	10100	0.006	0.045	6.7	0.421
SR2	300	0.080	0.017	0.90	5.6	1200	0.026	unpaved	2.50	8.0	10000	0.006	0.060	5.8	28.9	46	0.462	12200	0.006	0.045	6.7	0.509
						500	0.012	paved	2.20	3.8												
SR3	300	0.080	0.017	0.90	5.6	2500	0.025	unpaved	2.40	17.4	10500	0.006	0.065	5.3	32.8	56	0.557	-	-	-	-	-
BIETEL CREEK																						
BC1	300	0.110	0.023	0.71	7.0	2000	0.032	unpaved	2.80	11.9	13100	0.009	0.060	7.1	30.9	50	0.498	-	-	-	-	-
BC2	300	0.110	0.057	1.20	4.2	1400	0.041	unpaved	3.00	7.8	11200	0.010	0.060	7.5	25.0	37	0.370	16400	0.0043	0.045	6.0	0.760
BC3	300	0.080	0.013	0.80	6.3	1400	0.029	unpaved	2.60	9.0	17900	0.008	0.060	6.7	44.7	60	0.599	-	-	-	-	-
BC4	300	0.080	0.010	0.70	7.1	2500	0.045	unpaved	3.20	13.0	12100	0.011	0.070	6.7	30.1	60	0.600	8600	0.0035	0.045	6.8	0.351
											2600	0.007	0.070	5.3	8.2							
											900	0.022	0.070	9.5	1.6							

Revised 7/9/96

Table 13 - SUMMARY OF TIME OF CONCENTRATION AND REACH ROUTING CALCULATIONS
Salado Creek Watershed Drainage Master Plan
Ultimate Development Land Use

Based on procedures described in "Urban Hydrology for Small Watersheds", TR-55, USDA Soil Conservation Service, June 1986.

SUB-WATER-SHED ID	SHEET FLOW					SHALLOW CONCENTRATED FLOW					CHANNEL/PIPE FLOW					TIME OF CONC.	SCS LAG TIME	REACH ROUTING TIME				
	Length Feet	Mannings "n" -	Slope Ft/Ft	Velocity Ft/Sec	Travel Time Minutes	Length Feet	Slope Ft/Ft	Channel Type -	Velocity Ft/Sec	Travel Time Minutes	Length Feet	Slope Ft/Ft	Mannings "n" -	Velocity Ft/Sec	Travel Time Minutes	Minutes	Hours	Length Feet	Slope Ft/Ft	Mannings "n" -	Vel. Ft/Sec	Routing Time Hours
BC5	300	0.080	0.010	0.70	7.1	500	0.018	unpaved	2.10	4.0	11200	0.009	0.070	6.0	31.2	59	0.590	-	-	-	-	-
						2200	0.013	paved	2.20	16.7												
WALZEM CREEK																						
WC1	300	0.110	0.073	1.30	3.8	4800	0.040	unpaved	3.00	26.7	19500	0.007	0.075	4.9	66.0	96	0.965	-	-	-	-	-
ROSILLO CREEK																						
RC1	300	0.110	0.050	1.10	4.5	1000	0.021	paved	2.80	6.0	9000	0.008	0.065	6.1	24.7	83	0.830	20900	0.003	0.05	4.1	1.419
						1150	0.009	paved	1.90	10.1	9400	0.005	0.065	4.8	32.6							
						1100	0.032	paved	3.60	5.1												
RC2	300	0.110	0.004	0.30	16.7	2500	0.004	paved	1.10	37.9	6900	0.003	0.065	3.7	30.9	206	2.056	-	-	-	-	-
											5400	0.006	0.065	5.3	17.1							
											18800	0.002	0.065	3.0	103.1							
RC3	400	0.110	0.003	0.24	27.8	1800	0.015	unpaved	1.90	15.8	9800	0.003	0.065	3.7	43.9	114	1.143	9700	0.003	0.05	4.1	0.659
						1000	0.004	unpaved	1.10	15.2												
						400	0.005	paved	1.40	4.8												
						500	0.006	unpaved	1.20	6.9												
RC4	300	0.110	0.003	0.17	29.4	2100	0.012	unpaved	1.60	21.9	5800	0.008	0.070	5.6	17.1	132	1.322	-	-	-	-	-
											5400	0.001	0.070	1.4	63.8							
RC5	300	0.110	0.003	0.17	29.4	650	0.005	unpaved	1.10	9.8	15400	0.002	0.070	2.8	91.0	158	1.582	-	-	-	-	-
											8200	0.006	0.070	4.9	28.0							
RC6	300	0.110	0.012	0.51	9.8	1600	0.020	unpaved	2.20	12.1	7850	0.008	0.075	5.3	24.8	47	0.468	14900	0.002	0.055	3.0	1.363
RC7	300	0.110	0.003	0.25	20.0	1200	0.019	unpaved	2.10	9.5	14600	0.004	0.075	3.7	65.3	95	0.949	-	-	-	-	-
RC8	450	0.110	0.003	0.25	30.0	8000	0.003	paved	1.30	102.6	11600	0.008	0.080	4.9	39.1	176	1.765	25600	0.003	0.055	3.7	1.912
											400	0.025	0.080	8.7	0.8							
											1100	0.008	0.080	4.6	4.0							
RC9	400	0.160	0.003	0.18	37.0	1300	0.006	unpaved	1.20	18.1	25200	0.002	0.080	2.5	170.1	241	2.412	-	-	-	-	-
						1050	0.009	paved	1.90	9.2												
						1100	0.031	unpaved	2.70	6.8												

results compared very favorable to the recorded data. Both historical storms were simulated with the HEC-1 model providing verification of the hydrologic modeling.

The final step of the hydrologic analysis involved applying the theoretical storms to the watershed. Rainfall intensities for the City of San Antonio were analyzed and updated during the Preliminary Phase. These updated rainfall intensities were used with the understanding that the City of San Antonio will incorporate them into a future update of it's Unified Development Code, Chapter 35 of the City Code. Rainfall data for the 10, 25, 50, 100, and 500 year frequency storms was incorporated into the study using a storm duration period of twenty four (24) hours with a SCS twenty four (24) hour Type-II rainfall distribution.

Table 14 - "Comparison of Storm Water Flows"

	10 Year			50 Year			100 Year			500 year		
RIVER CROSSINGS	FEMA Model	HEC-1 Existing	HEC-1 Ultimate	FEMA Model	HEC-1 Existing	HEC-1 Ultimate	FEMA Model	HEC-1 Existing	HEC-1 Ultimate	FEMA Model	HEC-1 Existing	HEC-1 Ultimate
Loop 1604		15132	15108		22880	22843		26313	26271		34246	34192
West Ave.	12200	16271	16635	17300	24808	25142	19300	28600	28908	58000	37475	37750
U. S. 281	16700	16901	17285	24000	25411	25830	27000	29201	29601	81000	38043	38383
Wetmore Rd	28600	26476	28999	41600	39405	41839	46600	45151	47505	130000	58627	60756
Nacogdoches Rd.	28600	27262	30004	41600	40617	43308	46600	46563	49167	130000	60522	62897
N.E. Loop 410	30100	27797	30768	44300	41448	44360	49100	47498	50294	140000	61647	64169
Austin Hwy.	36900	31871	35441	54200	47406	51008	60500	54340	57770	150000	70460	73634
Rittiman Rd.	36900	30608	33850	54300	45145	48372	61000	51537	54606	160000	66331	69061
I. H. 35	36900	21606	23792	54300	31762	33987	61000	36299	38447	170000	46939	49071
Commerce St.	36900	19811	21853	54300	29106	31209	61000	33341	35386	170000	43490	45783
Rigsby Ave.	36900	18006	19889	54300	26462	28426	61000	30426	32358	170000	40300	42748
E. Southcross Blvd.	36900	18006	18843	54300	26462	26922	61000	30426	30669	170000	40300	40868
S.E. Military Dr.	36900	18006	18843	54300	26462	26922	61000	30426	30669	170000	40300	40868
S.E. Loop 410	36900	17180	18990	54300	25260	27161	61000	29101	30981	170000	38858	41329

Ultimate development projections, as provided by the City of San Antonio Planning Department, were used to compute storm water flows for ultimate development conditions. All subareas except for those within the Camp Bullis area were adjusted for ultimate development using these projections. The time of concentration was adjusted for subareas that contained shallow concentrated flow travel lengths greater than 2000 feet by converting twenty(20) percent of the length to channelized flow. In subarea SC17, the reach routing from SC16 was modified to model the channelization of the creek that is being considered along the north side of the San Antonio Airport. The results of the HEC-1 (hydrologic) Model for ultimate development conditions are compared with those of existing conditions in Table 14 - Comparison of Storm Water Flows. Included in the comparison are the storm water flows obtained from FEMA. The storm water flows are presented in cubic feet per second (cfs).

A final modification of the HEC-1 model was made which removed storage routing for the thirteen (13) SCS Floodwater Retarding Dams. The 100 year theoretical storm was then applied. The storm water flows obtained by this Model run are compared to the previous existing condition results shown in Table 14. The SCS Floodwater Retarding

Dams produce more than a fifty (50) percent reduction in stream flows in the areas south of Loop 1604. Most of the dams are located on the Recharge Zone of the Edwards Aquifer and provide substantial recharge to the Aquifer, however, this study does not quantify the recharge effects of those structures. Table 15 shows the comparison of the approximate existing conditions model with and without the thirteen floodwater retarding dams at several locations along the creek.

Table 15 - "Comparison of Approximate 100 Year Frequency Storm Water Flows with and without the Floodwater Retarding Dams"

RIVER CROSSING	HEC-1 MODEL	MINUS DAMS
Loop 1604	26313	42500
Loop 1604 (Panther Sp.)	8415	30500
Bitters Rd. (Panther Sp.)	7507	30500
West Ave. (Panther Sp.)	515	31000
Loop 1604 (Mud Ck.)	7194	26500
Thousand Oaks (Mud Ck.)	12895	62500
Loop 1604 (Elm Ck.)	137	15500
Loop 1604 (Elm Waterhole)	683	28500
West Ave.	28600	72000
U. S. 281	29201	72000
Wetmore Rd	45151	117000
Nacogdoches Rd.	46563	117500
N.E. Loop 410	47498	114000
Perrin Beitel (Beitel Ck.)	22059	22500
Austin Hwy.	54304	112000
Rittiman Rd.	51537	105500
I. H. 35	36299	70500
Commerce St.	33341	63000
I. H. 10	33341	63000
E. Southcross Blvd.	30426	55500
S.E. Military Dr.	30426	55500
S.E. Loop 410	29101	49000

4

Design Phase

A. Hydraulic Modeling

I. HEC-2 Model

Aerial Mapping was prepared by United Aerial Mapping and furnished by the City of San Antonio. Stream cross sections were produced for the Salado Creek and tributaries based upon the aerial mapping. Cross section characteristics were defined with Manning's roughness coefficients that represent the vegetation and varied floodway conditions observed along Salado Creek. Sections were placed at approximate intervals of 500 feet with variations depending upon the influence of curvature of the creek and structures that cross the creek. Each section was located perpendicular to the flow and extended to the limits of the mapping. Adjustments were made in placement of the cross-sections when bridge structures, culverts and cutbacks were encountered. Table 7 indicates the sections located at bridge and culvert crossings. Modeling of culvert and bridge structures was based upon plans obtained from the City of San Antonio and the Texas Department of Transportation. When plans were not available, the structure was measured and detailed by field survey. Along Salado Creek and the tributaries exist several low water crossings. These crossings are individually addressed as mitigation projects in this report.

The original F.E.M.A. models use roughness coefficients ranging from 0.035 to 0.075. Investigation and analysis of the Salado Creek suggest that these coefficients are not adequate to define the existing conditions of the Salado Creek. Since very thick vegetation exists along lower Salado Creek, stream cross sections along the lower regions of Salado Creek have been defined with coefficients ranging from 0.030 to 0.11. The coefficients were adjusted downward in areas where less vegetation is present. In several areas clearing has been done to create parks, golf courses and other similar use sites. In these areas where brush has been removed and the area is being maintained, roughness coefficients were adjusted downward. Higher roughness coefficients were used in the very dense to extremely dense vegetated areas along the Creek.

Five water surface profiles are produced by the HEC-2 model representing the 500, 100, 50, 25, and 10 year frequency storms. Storm water flows derived from the HEC-1 model are entered at sections representative of HEC-1 node locations. The HEC-1 nodes and HEC-2 sections with approximate locations are presented in Table 16.

Table 16 - "HEC-1 Node Locations"

WATERSHED	HEC-1 NODE	DESCRIPTION OF LOCATION	HEC-2 SECTION
Salado Creek	07S	Loop 1604	192321
	08S	Approximately 2000' Downstream of Huebner Road	178997
	08S2	Above the Confluence with Panther Springs Creek	160212
	09S	Below the Confluence with Panther Springs Creek Downstream of West Avenue	158339
	10S	U.S. Highway 281	154764
	10S2	Above the Confluence with Lorence Creek and Mud Creek	142679
	10S3	Above the Confluence with Mud Creek and Below the Confluence with Lorence Creek	140634
	11S	Below the Confluence with Mud Creek Upstream of Wetmore Road	138339
	11S2	Wetmore Road	132303
	12S	Nacogdoches Road	129765
	13S	N.E. Loop 410	125025
	14S	Approximately 2100' Downstream of N.E. Loop 410	121219
	15S	Above the Confluence with Beitel Creek	119314
	16S	Below the Confluence with Beitel Creek at Austin Highway	116016
	17S	Approximately 1000' Upstream of Rittiman Road Above the Confluence with Walzem Creek	111094
	18S	Approximately 640' Downstream of Rittiman Road	109387
	19S	Approximately 1000' Upstream of Binz-Engleman Road	93170
	20S	Houston Street	73661
	21S	Rigsby Avenue	56041
	22S	S.E. Military Drive	33188
	23S	S.E. Loop 410	19500
	24S	Confluence with Rosillo Creek	15140
Panther Springs	SCS6	Approximately 1400' Upstream of Bitters Road	12704
	07P	Approximately 2000' Downstream of Bitters Road	9891
	08P	Above SCS Dam No. 7	4347
	SCS7	Mouth of Panther Springs Creek	433
Mud Creek	SCS10	Above SCS Dam No. 10	16365
	08M	Above the Confluence of Mud, Elm, and Elm Waterhole Creeks	15865
	09M	Approximately 1700' Upstream of Buckhorn Road inside McAllister Park	6767
	10M	Mouth of Mud Creek	620
Elm Creek	01E	Approximately 440' Upstream of Jones Maltsberger	5541
	02E	Mouth of Elm Creek	184
Elm Waterhole	04W	Approximately 900' Downstream of Classen Road	8918
Creek	05W	Mouth of Elm Waterhole Creek	32
Beitel Creek	00B	Approximately 920' Downstream of Nacogdoches Road	24953
	01B	Old O'Connor Road	19112
	02B	Approximately 5100' Upstream of N.E. Loop 410	10435
	03B	Approximately 3200' Upstream of N.E. Loop 410	8557
	04B	Mouth of Beitel Creek	210

II. Depth-Discharge Rating Curves

Data collected on the storms that occurred on April 4-5, 1991 and May 5-6, 1993 was analyzed using the HEC-2 hydraulic model and the results were compared to the depth-discharge data obtained from the U.S.G.S. Comparison of this data, showed significant variation in the Depth-Discharge relationship. Using the Hydraulic Model, new Depth

Figure 12 - Depth-Discharge Rating Curve
Upper Salado Creek Gaging Station

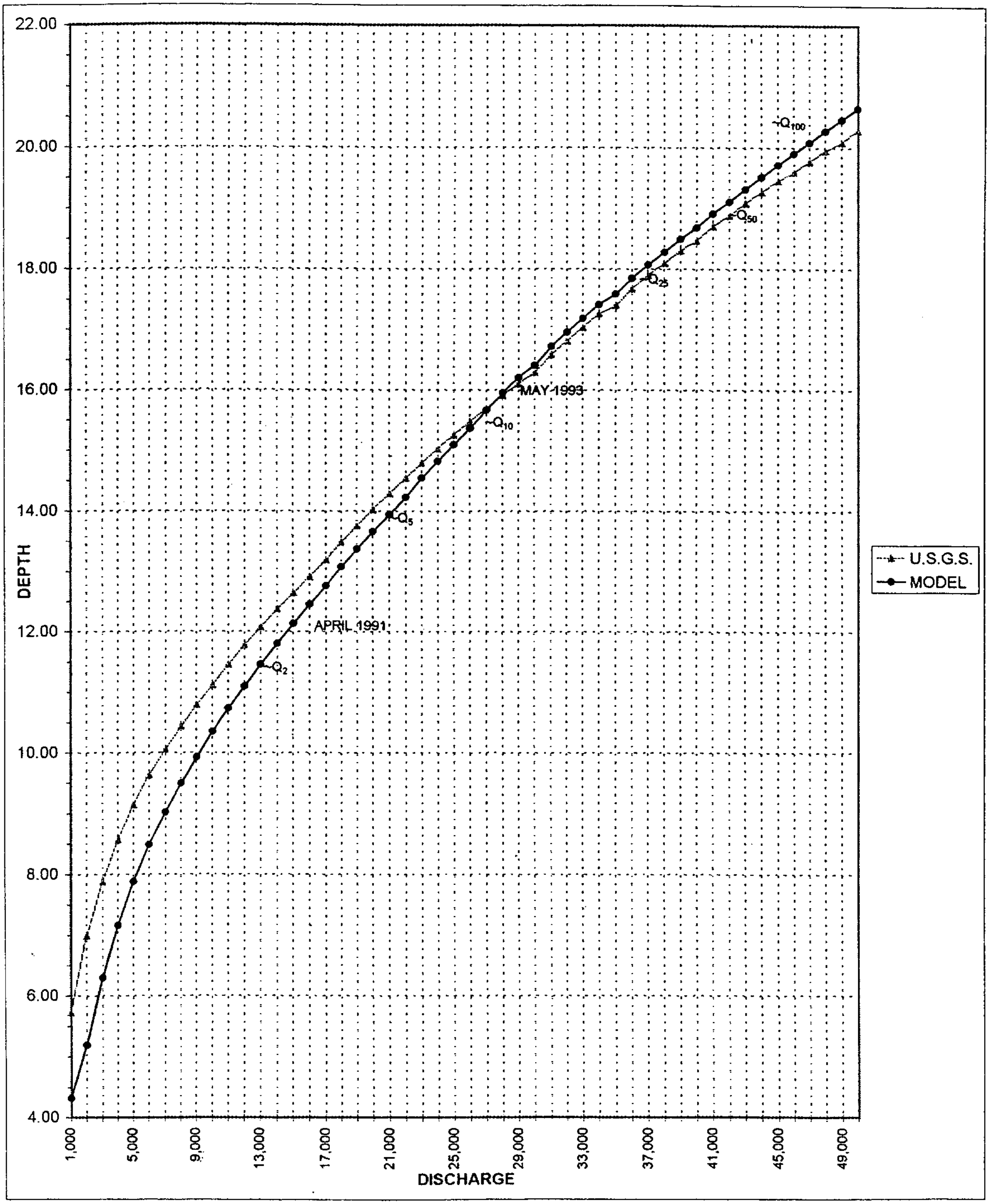
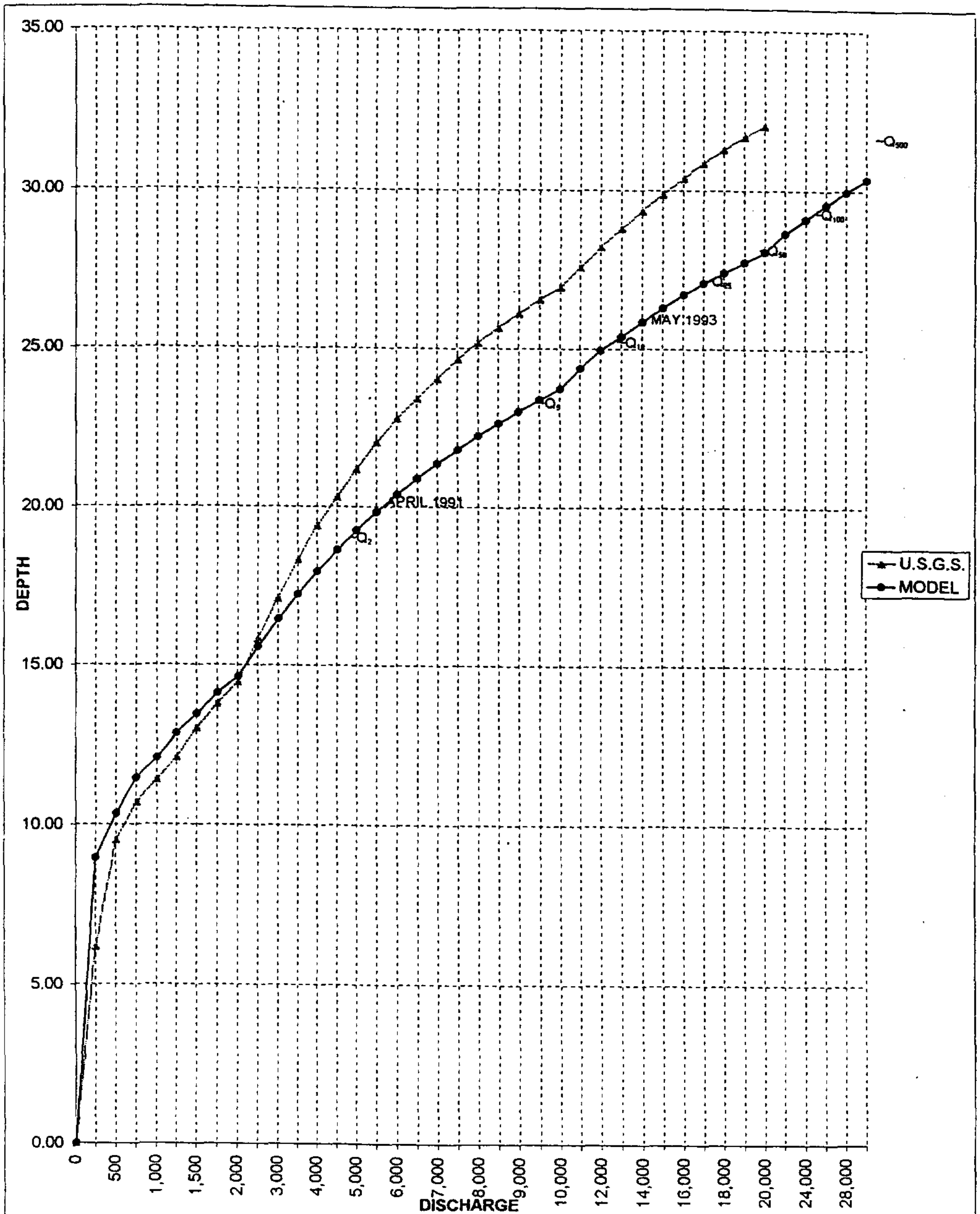


Figure 13 - Depth-Discharge Rating Curve
Lower Salado Creek Gaging Station



down the west side is approximately 6,980 feet requiring a travel time of approximately twenty three (23) minutes. Distance of travel on the east fork is approximately 18,900 feet requiring a travel time of approximately seventy (70) minutes. Distance and travel time are approximately three times larger for the east fork. The greater travel time along the east fork causes a delay in the peak storm water flow. Approximately sixty five (65) percent of the storm water flow in the east fork is returned to the storm water flow in the west fork at the confluence. The additional loss of storm water flow resulting from the split flow produced comparable storm water flows and depths to gage records at Salado Creek (Lower Station).

After completion of the storage analysis, the HEC-2 model for the April 4-5, 1991 storm (1991SAL.DAT) generated water surface elevations comparable to gage records. The HEC-2 model produced depths that compared very closely with stream gage recordings of the two U. S. Geological Survey stream gages and the City of San Antonio stream gage at the Interstate Highway 10 crossing of Salado Creek. The difference between the output of the model and the actual gage recording was less than half a foot at each of the three gage stations. At the upper gaging station a peak of 12.04 feet was recorded and at the lower gaging station a peak of 20.98 feet was recorded. The USGS Expanded Rating Tables show a datum difference of 2.5 feet at the Upper Gaging Station and 6.35 feet at the Lower Gaging Station. Thus the measured depth of flow at the Upper Station is 12.04 - 2.5 or 9.54 feet and the measured depth at the Lower Station is 20.98 - 6.35 or 14.63 feet. The City of San Antonio's stream flow gage station at IH 10, identified as Sensor #4764 was recording during the April 1991 storm. The recorded peak gage height during the storm was 603.36.

The HEC-2 model simulation produces a depth of 9.35 feet at the upper gaging station at section 403 and a depth of 14.79 feet at the lower gaging station at section 178. The Model produces a water surface elevation of 603.36 at the IH 10 gage that is located at section 260. Direct comparison of the depths at the stream flow gaging stations to the depths generated by the model provided verification of the model. Comparisons of the depths are as follows.

GAGE	MEASURED DEPTH	SIMULATED DEPTH	DIFFERENCE
USGS at Loop 410	9.54	9.35	0.19
COSA at IH 10	16.46	16.46	0.00
USGS at Loop 13	14.63	14.79	0.16

C. Floodplain Delineation

The final step in the hydraulic analysis involved applying theoretical storm water flows of the 500, 100, 50, 25 and 10 year frequency rainfall events to the hydraulic model.

Application of these storm water flows generated water surface elevations for each of these storms at each cross section. The resulting water surface elevations were plotted at each cross section. Interpolation of elevations between the sections establishes the limits for the floodplains. However, floodplain limits interpolated through or adjacent to existing structures have been adjusted. The determination of whether or not these structures are flooded was verified with foundation elevations.

Maps generated from the hydraulic modeling represent the 100 year floodplain under existing conditions. The HEC-2 model water surface elevations were compared with the water surface elevations provided on the Flood Insurance Rate Maps (FIRM) prepared by F.E.M.A. Previous comparisons of the discharges with the F.E.M.A. model had shown variations from slight in the upper reaches to great in the lower reaches and water surface elevation comparisons show varied differences. In areas along the lower reaches where the new storm water flows are much smaller, the new water surface elevations compare in a range from lower to higher than the F.E.M.A. water surface elevations.

The HEC-2 modeling based upon ultimate development is approximately one half foot to one foot higher than existing conditions water surface elevations. Increases which would normally be expected as a result of ultimate development, are largely being mitigated by the presence of the existing floodwater retarding dams. Floodplain Maps were not produced for ultimate development conditions, however, comparisons of existing conditions and ultimate development water surface elevations for a 100 year frequency storm are provided in Table 17.

Table 17 - "Comparison of Water Surface Elevations"
Existing Conditions vs. Ultimate Development

LOCATION	SECTION	EXISTING ELEVATION	ULTIMATE ELEVATION
S.E. Loop 410	20729	537.95	538.29
S.E. Military Dr.	33294	555.29	555.17
E. Southcross	43308	565.66	566.06
Rigsby	54608	591.56	591.91
Rice	61680	603.56	603.80
Martin Luther King	63615	605.61	605.94
I.H. 10	69937	612.21	612.78
Commerce St.	72092	615.87	616.37
Gembler Rd.	81444	624.73	625.08
I.H. 35	87445	635.46	636.07
Binz-Engleman Rd.	92176	646.80	647.56
W.W. White Rd.	96336	648.60	649.34
Rittiman Rd.	110103	672.34	672.75
Eisenhauer Rd.	114620	681.31	681.81
Austin Hwy.	116126	686.61	687.48
N.E. Loop 410	125541	705.80	706.31
Nacogdoches Rd.	132365	721.49	721.90
Wetmore Rd.	138194	729.05	730.15
Jones Maltsberger Rd.	151311	768.93	769.01
U.S. Hwy. 281	157442	788.52	788.66
West Ave.	162051	807.54	807.53
Vista Del Norte	168291	830.89	830.98
Blanco Rd.	170967	842.76	842.84
Huebner Rd.	181924	891.88	891.96
Loop 1604	192471	951.68	951.73
West Ave.	1272	797.07	797.13
Thousand Oaks	11201	777.06	777.54
Redland Rd.	5628	820.68	821.53
Classen Rd.	9863	824.39	826.99
Loop 1604	11576	828.29	830.53
Redland Rd.	3320	817.03	817.94
Loop 1604	7316	832.35	834.34
Perrin Beitel	2870	706.47	706.76
Vicar Rd.	3416	707.11	707.45
N.E. Loop 410	5321	711.96	711.92
Weidner Rd.	21888	781.00	781.38
O'Connor Rd.	23919	783.04	783.29

D. Mitigation Projects

Flooding of buildings became evident in several locations as the floodplains were being mapped. The number of structures identified as being located in the floodplain is 335. The number of residential structures is 179 and commercial or industrial structures number 65. The remaining 91 structures are sheds, pavilions, barns, stables, etc. The greatest area of flooding occurs south of Martin Luther King Drive in East Park Subdivision where stream sections are broad and flat. Ninety-Nine residences, two churches, and four apartment buildings are located in the floodplain. Other locations where multiple structures are flooded are along Holbrook Road, North Loop Road west of U.S. Hwy. 281, Nacogdoches Road, Garden Court East subdivision along Beitel Creek, Austin Hwy. Industrial Subdivision and Fairfield Village North Subdivision. Singular structures are flooded along the lower regions of Salado Creek and Beitel Creek. A list of the structures identified in the floodplain is provided in Table 19.

Projects considered to mitigate flooding include construction of detention dams, performing localized channelization, clearing stream vegetation, construction of levees, re-routing of roadways, and property acquisition. The first project evaluated was dam site No. 15r, the final proposed Natural Resources Conservation Service Floodwater Retarding Dam. This structure will be located in McAllister Park north of Starcrest Drive and it includes a temporary storage reservoir as originally planned in the McAllister Park Proposed Master Land Use Plan. The land was purchased by the City of San Antonio for flood control use and the Master Land Use Plan was completed in 1964. The Master Land Use Plan is included in Appendix F. According to Mr. Trent Street, Design Engineer with the Natural Resources Conservation Service, the floodwater retarding dam is scheduled for design in October 1996. Construction of the project will depend upon future funding allocations. Allocation of funds for the construction of dam 15r do not appear very likely through 1998. Land for the reservoir is currently being utilized by the City Parks and Recreation Department as a portion of McAllister Park. McAllister Park has become very popular with residents in the northern area of the City of San Antonio. Concerns raised by patrons of the park have created an issue concerning the design of the dam. If these concerns are abated, the dam must be designed so that it will not interfere with the continued utilization of park facilities. Temporary storage will occur in the reservoir when floodwater accumulates and portions of the park will become flooded for short periods depending upon the severity of the storm event. However, water will be quickly released until the reservoir is drained. The dam structure for this project will have a height of 44 feet and the reservoir storage capacity will be 3400 acre-feet. The National Resources Conservation Service has estimated the cost of construction at $6,000,000.

The second project developed for mitigation is located on upper Beitel Creek in the area of Lookout Road, Weidner Road and Old O'Connor Road. All three roadways and approximately 400 feet of Leonhardt Street are within the floodplain. New Wurzbach Parkway is also planned for construction through this area. This project would include rerouting Leonhardt Street and raising it above the floodplain to intersect with Wurzbach

Parkway. Portions of Weidner and Old O'Connor located within the floodplain are to be closed. Five thousand feet of Weidner Road and two thousand five hundred feet of Old O'Conner will be removed. Lookout Road will be rerouted to the east outside the floodplain to intersect with Old O'Connor Road. A railroad crossing at this location will be widened decreasing the embankment encroachment on the floodway.

Project three of the mitigation projects includes channelization of a section of Beitel Creek. Beitel Creek has been channelized from N.E. Loop 410 upstream to an area just south of Garden Court East Subdivision. Constructing an earthen channel from the existing channel, upstream for 3500 to 4000 feet will lower the creek and water surface elevations and narrow the sections. The channel would be adjacent to Garden Court East Subdivision.

Raising and rerouting Holbrook Road between Eisenhauer and Rittiman Roads is the fourth mitigation project. The project involves moving the roadway to the east, away from Salado Creek and raising its elevation. This project was evaluated individually and in conjunction with other projects. Alignment for the relocated roadway was established adjacent to existing buildings so that the structures are not affected. Raising the roadway to an elevation higher than the 25 year frequency flood will provide future mitigation of the 100 year frequency flood when Dam No. 15r is constructed.

Project five was evaluated individually and in conjunction with other projects. This project consists of a levee that is sized to contain water within the floodway. The levee would be constructed south along Salado Creek from the embankment of Martin Luther King Drive. The length of the levee will be approximately 4400 feet extending around East Park Subdivision along the west side of Salado Creek. The height of the levee will vary from four feet to seven and one half feet and the sides of the levee will be graded at a four to one slope with sodding for erosion control. The top width of the levee is thirty feet to provide for paths for either pedestrian, bicycle, or vehicular traffic. The top width can be varied according to intended use.

The sixth mitigation project evaluated, consists of brush clearing along lower Salado Creek. As described in Chapter 3, dense vegetation was observed along the banks and overbank areas along lower Salado Creek. The project limits are the bridge structures at S.E. Loop 410 and at N.E. Loop 410. The total length of the project is approximately 20 miles. This project does not include modification of creek sections. The project involves only the removal of grass, weeds, brush, small trees, and the small lower branches of trees up to a height of five or six feet. The project would leave significant trees that are larger than 3 inches in diameter in place. Existing dense vegetation along with the broad sections of Salado Creek currently provide significant linear storage. Clearing of the underbrush will have the detrimental effect of decreasing the linear storage and increasing flood elevations downstream by a substantial amount.

The seventh project developed and evaluated for mitigation is located on the lower end of Beitel Creek. The project involves channelization. Upstream of Vicar Road is an existing concrete channel. The conditions downstream of Vicar Drive are natural with the west bank of Beitel having been cleared of vegetation except for grasses. This project extends the concrete channel underneath Vicar Drive and transitions the channel into an earthen trapezoid section. An earthen trapezoidal channel section would be constructed downstream of Vicar Drive and past Perrin Beitel. Approximate length of the channelization would be 2,600 linear feet. Vicar Drive will be reconstructed with a new bridge crossing Beitel Creek.

Rerouting Holbrook Road at Austin Highway is the eighth mitigation project. Included in the project is closure and removal of the access roadway connecting Ira Lee Road and Holbrook Road under Austin Highway. Holbrook Road would be rerouted to a higher elevation for intersection with Austin Highway.

Project nine was evaluated as an alternative to the levee adjacent to East Park Subdivision (Project five). This project involves clearing Salado Creek and channelizing for a length of 5000 feet. Channelization would be performed south of Martin Luther King Drive and would consist of the construction of an earthen trapezoidal channel.

A channelization project at the San Antonio International Airport(S.A.I.A.) was evaluated as project ten. This project includes channelization of the Salado Creek within the limits of the Airport property. The project reroutes the natural channel through this area, reducing the overall length by approximately 2,300 linear feet to follow the proposed Wurzbach Parkway. Modeling the project involved creating a trapezoidal channel within the HEC-2 model. The stream sections that would be affected by this rerouting were replaced with trapezoidal channel sections. Routing of the Salado Creek was adjusted to follow the alignment of the Wurzbach Parkway with a reduction in overall length of approximately 2300 feet. The affects on water surface elevations were evaluated under ultimate development with the mitigation projects in place. A new earthen channel along Wurzbach Parkway will lower water surface elevations and eliminate the flooding of ten buildings at the upper end of the project.

The eleventh project analyzed is a detention pond in the Longhorn Quarry. This project was evaluated as an alternative to project three. The detention pond would require a diversion of flow through an adjacent box culvert under Wurzbach Parkway into the Longhorn Quarry west of Beitel Creek. Using a split flow diversion on Beitel Creek at section 3050, reduced flows were computed for complete mitigation of flooding downstream of this location. The size of the detention pond required for the diverted flow is approximately 1300 acre-feet. After it was determined that the Quarry had the capacity for only 400 acre-feet of storage, the analysis focused on smaller diversions. The diversion of flows for a 400 acre-foot detention pond does reduce flooding. A detention pond at Longhorn Quarry does not provide the benefits necessary to justify the cost. The limitation of storage capacity eliminated the project from further consideration.

I. Project Costs

The proposed floodwater retarding dam 15r is a proposed federally funded project, however, a cost estimate is provided to compare with other proposed mitigation projects. Funding for the project has not been allocated and the Natural Resources Conservation Service cannot predict when the allocation may occur. It is suggested that either lobbying for project funding or the partial allocation of funds by local agencies could provide the necessary impetuous to secure speedy federal funding.

Estimated costs for the other mitigation projects and roadway structures are presented in Table 18. Included in Table 18 are proposed acquisitions. Properties that are not benefiting from the mitigation projects have been identified for acquisition. Estimated values of the properties are based upon Bexar District appraisals. The mitigation projects developed provide relief for the majority of flooding problems identified, but do not solve all flooding problems. Thus, acquisition is the most cost effective alternative for removing some properties with buildings from the hazard of flooding. Benefits of the recommended mitigation are addressed in Chapter 5.

TABLE 18
PRELIMINARY COST ESTIMATE - MITIGATION PROJECTS
SALADO CREEK

DESIGN COMPONENTS	UNIT	UNIT COST	NUMBER OF UNITS	CONSTRUCTION COSTS PER COMPONENT	TOTAL COST PER PROJECT
1. Floodwater Retarding Dam No. 15r	LS				$6.000.000 *
2. Reroute Lookout and Leonhardt Rds.					
Right of Way	AC	$10.000	8	$80.000	
Misc. (Utilities. Fences. etc.)				$500.000	
Total Construction Costs				*$500.000*	
Mobilization (11%)				$55.000	
Preparation of ROW (4%)				$20.000	
Subtotal				$575.000	
Contingencies (10%)				$57.500	
Engineering (11%)				$63.250	
Administration (7%)				$40.250	
Stormwater Pollution Control (5%)				$28.750	
TOTAL				$844.750	$844.750
3. Channelization Beitel Creek					
Channelization (Section 9933 to 13285)					
Excavation/Disposal of Material	CY	$6	103600	$621.600	
Right of Way	AC	$10.000	38	$380.000	
Total Construction Costs				*$621.600*	
Mobilization (11%)				$68.376	
Preparation of ROW (4%)				$24.864	
Subtotal				$714.840	
Contingencies (10%)				$71.484	
Engineering (11%)				$78.632	
Administration (7%)				$50.039	
Stormwater Pollution Control (5%)				$35.742	
TOTAL				$1.330.737	$1.330.737
4. Reroute Holbrook Rd.					
Right of Way	AC	$10.000	12	$120.000	
Misc. (Utilities. Fences. etc.)				$550.000	
Total Construction Costs				*$550.000*	
Mobilization (11%)				$60.500	
Preparation of ROW (4%)				$22.000	
Subtotal				$632.500	
Contingencies (10%)				$63.250	
Engineering (11%)				$69.575	
Administration (7%)				$44.275	
Stormwater Pollution Control (5%)				$31.625	
TOTAL				$961.225	$961.225
5. Levee					
Embankment	CY	$9	5300	$47.700	
Right of Way	AC	$10.000	8	$80.000	
Misc. (Utilities. Fences. etc.)				$200.000	
Total Construction Costs				*$247.700*	
Mobilization (11%)				$27.247	
Preparation of ROW (4%)				$9.908	
Subtotal				$284.855	
Contingencies (10%)				$28.486	
Engineering (11%)				$31.334	
Administration (7%)				$19.940	
Stormwater Pollution Control (5%)				$14.243	
TOTAL				$458.857	$458.857
6. Channel Clearing (Station 20729 to 125239)	AC	$2.500	1940	$4.850.000	
Total Construction Costs				*$4.850.000*	
Mobilization (11%)				$533.500	
Preparation of ROW (4%)				$194.000	
Subtotal				$5.577.500	
Contingencies (10%)				$557.750	
Engineering (11%)				$613.525	
Administration (7%)				$390.425	
Stormwater Pollution Control (5%)				$278.875	
TOTAL				$7.418.075	$7.418.075

TABLE 18
PRELIMINARY COST ESTIMATE - MITIGATION PROJECTS
SALADO CREEK

DESIGN COMPONENTS	UNIT	UNIT COST	NUMBER OF UNITS	CONSTRUCTION COSTS PER COMPONENT	TOTAL COST PER PROJECT
7. Channelization (Beitel Creek)					
Channelization (Section 210 to 3370)					
Excavation/Disposal of Material	CY	$6	42800	$256,800	
Right of Way	AC	$10,000	14	$140,000	
Misc. (Utilities, Fences, etc.)				$100,000	
Total Construction Costs				*$356,800*	
Mobilization (11%)				$39,248	
Preparation of ROW (4%)				$14,272	
Subtotal				$410,320	
Contingencies (10%)				$41,032	
Engineering (11%)				$45,135	
Administration (7%)				$28,722	
Stormwater Pollution Control (5%)				$20,516	
TOTAL				$685,726	$685,726
8. Reroute Holbrook Rd. at Austin Hwy.					
Right of Way	AC	$10,000	4	$40,000	
Misc. (Utilities, Fences, etc.)				$200,000	
Total Construction Costs				*$200,000*	
Mobilization (11%)				$22,000	
Preparation of ROW (4%)				$8,000	
Subtotal				$230,000	
Contingencies (10%)				$23,000	
Engineering (11%)				$25,300	
Administration (7%)				$16,100	
Stormwater Pollution Control (5%)				$11,500	
TOTAL				$345,900	$345,900
9. Channelization					
Channel Clearing (Station 54659 to 63552)	AC	$2,500	112	$280,000	
Excavation/Disposal of Material	CY	$6	170000	$1,020,000	
Right of Way	AC	$10,000	112	$1,120,000	
Misc. (Utilities, Fences, etc.)				$250,000	
Total Construction Costs				*$1,550,000*	
Mobilization (11%)				$170,500	
Preparation of ROW (4%)				$62,000	
Subtotal				$1,782,500	
Contingencies (10%)				$178,250	
Engineering (11%)				$196,075	
Administration (7%)				$124,775	
Stormwater Pollution Control (5%)				$89,125	++
TOTAL				$3,490,725	$3,490,725
10. Channelization (SAIA)					
Channel Clearing (Station 138339 to 151236)	AC	$2,500	180	$450,000	
Excavation/Disposal of Material	CY	$5	2400000	$12,000,000	
Misc. (Utilities, Fences, etc.)				$750,000	
Total Construction Costs				*$13,200,000*	
Mobilization (11%)				$1,452,000	
Preparation of ROW (4%)				$528,000	
Subtotal				$15,180,000	
Contingencies (10%)				$1,518,000	
Engineering (11%)				$1,669,800	
Administration (7%)				$1,062,600	
Stormwater Pollution Control (5%)				$759,000	++
TOTAL				$20,189,400	$20,189,400

TABLE 18
PRELIMINARY COST ESTIMATE - MITIGATION PROJECTS
SALADO CREEK

DESIGN COMPONENTS	UNIT	UNIT COST	NUMBER OF UNITS	CONSTRUCTION COSTS PER COMPONENT	TOTAL COST PER PROJECT
Structures (Bridges, Culverts)					
Bridges:					
West Ave. at Salado Creek				$2,682,000	
Vicar Rd. at Beitel Creek				$1,500,000	
Binz-Engleman Rd. at Salado Creek				$3,240,000	
IH 35 Frontage Roads at Salado Creek				$3,000,000	
Roland St. at Salado Creek				$2,400,000	
Culverts:					
West Ave. at Panther Springs Creek				$250,000	
Jones Maltsberger at Mud Creek				$250,000	
Jones Maltsberger at Elm Creek				$400,000	
Bulverde Rd. at Redland Rd.				$500,000	
Total Construction Costs				$14,222,000	
Mobilization (11%)					
Preparation of ROW (4%)					
Subtotal					
Contingencies (10%)				$1,422,200	
Engineering (11%)				$1,564,420	
Administration (7%)				$995,540	
Stormwater Pollution Control (5%)				$711,100	
TOTAL				$18,915,260	$18,915,260
Buy-out remaining Houses or Properties within100-year Floodplain					
Cresthill Rd.	EA	$58,850	2	$117,700	
East Park Subdivision	EA	$18,500	1	$18,500	
Holbrook Rd.	EA	$48,550	4	$194,200	
Nacogdoches Rd.	EA	$246,700	1	$246,700	
Maltsberger Lane	EA	$426,500	1	$426,500	
North Loop Rd.	EA	$62,500	2	$125,000	
West Ave.	EA	$55,490	2	$110,980	
N.E. Loop 410	EA	$680,000	1	$680,000	
Weidner Rd.	EA	$72,367	3	$217,100	
TOTAL				$2,136,680	$2,136,680
Grand Total					$25,679,135

* Cost not included in Grand Total (Federally Funded Project)
\+ Cost not included in Grand Total (Project not Recommended)
++ Cost not included in Grand Total (Project not Recommended)

5

Summary Phase

A. Floodplain Maps

Delineation of the floodplains has produced a set of new floodplain maps at a scale of 1"=200'. Maps generated are based upon the hydrologic and hydraulic modeling produced with this study. The floodplains produced and mapped are the 10, 25, 50, 100, and 500 year frequency storm limits under existing development conditions. The new maps are based on the aerial maps provided by the City of San Antonio and the new floodplains have been indicated on the aerial topographic maps.

B. Mitigation

The Salado Creek Watershed is similar to the other watersheds in Bexar County, yet it has unique features that provide the benefit of detention. The watersheds have similar soils, land uses, geologic features, vegetative habitats, and climates. The detention features that are unique to the Salado Creek Watershed provide flood control, erosion and sedimentation control, and recharge of the Edwards Aquifer. Results produced by these features are the same goals sought when considering and designing mitigation projects.

Mitigation projects were developed for the elimination of structural flooding. The mitigation projects have been analyzed and evaluated for benefit and cost. Seven projects of the ten developed will provide a significant reduction of flooding and are recommendations of this study. The other three projects do not provide cost effective or sufficient relief and/or create additional flooding downstream and are not recommended.

C. Recommendations for Master Drainage Plan

Projects proposed for mitigation of flooding were described in Chapter 4 and the benefits gained from construction of the recommended projects are presented in Table 19. Implementation of the proposed projects has been prioritized based on benefits gained. Prioritized implementation is also presented in Table 19. Description of the prioritization, benefit, and cost are provided as follows.

In the first two columns of the benefit and cost matrix is a list of the structures within the floodplain and their location. The first row of the matrix presents the projects by number as identified in Chapter 4. An example is project five shown in column three which represents the proposed levee project south of Martin Luther King Drive. Structures listed in that column benefit from this project with the estimated cost of the project provided at the bottom of the column. The remaining columns represent the other proposed projects identified by number in the first row. Projects were prioritized by greatest benefits produced.

Projects six and nine are not recommended based upon higher cost and negative dowstream effects associated with their construction. Properties that do not benefit from the proposed mitigation projects are proposed for acquisition and presented in the column titled Acquisition in Table 19. Mitigation for these properties is either cost prohibitive or unfeasible. Values for the individual properties were presented in Table 18, Chapter 4. The last column displays a project that the City of San Antonio has initiated at the San Antonio International Airport. Analysis of the project with the HEC-2 model revealed benefits for seven structures adjacent to the project.

New bridges and culverts were not included in Table 19, however, priority has been determined for new crossings. Priority for new bridge and culvert projects is based upon average daily traffic flows and utilization from area development. A new bridge at West Avenue and Salado Creek along with new box culverts at West Avenue and Panther Springs creek are placed first in priority. Second priority is placed on a new bridge for Vicar Drive at Beitel Creek. The bridges and culverts are prioritized as follows:

1. West Avenue at Salado Creek and Panther Springs Creek	$ 3,899,560
2. Vicar Road and Beitel Creek	$ 1,995,000
3. Roland Street at Salado Creek	$ 3,192,000
4. Jones Maltsburger and Mud Creek	$ 332,500
5. Jones Maltsburger and Elm Creek	$ 532,000
6. Binz-Engleman Road and Salado Creek	$ 4,309,200
7. I.H. 35 Frontage Road and Salado Creek	$ 3,990,000
8. Bulverde Road and Elm Waterhole Creek	$ 665,000
GRAND TOTAL	$18,516,260

Locations of the proposed projects and acquisitions are shown on Figure 14.

D. Summary

This Salado Creek Watershed study was performed for the purpose of preparing a Drainage Master Plan. The Drainage Master Plan consist of the flood plain maps and the projects identified for mitigation of flooding. Utilizing the flood plain maps for regulating future development can prevent additional flooding problems. An implementation of the projects recommended in this study can eliminate existing flooding problems.

An important feature that should be preserved is the natural condition of Salado Creek. Linear channel storage determined and verified with this study is natural detention that has reduced the storm water flows and water surface elevations along the lower Salado Creek. Alteration of the natural conditions will create an increase in flooding in downstream areas. Maintaining the linear channel storage can be done by retaining the existing conditions which include the dense vegetation. Debris and rubbish that has been dumped into the creeks should be cleaned up to preserve the environment.

In conclusion of this study, it has been determined that $25,679,135 can eliminate a majority of the flooding problems within the Salado Creek Watershed. Inclusion of federally funded project Dam #15 eliminates the remainder of the flooding problems. It is recommended that efforts be made to ensure the design and construction of the federally funded Floodwater Retarding Dam to be located in McAllister Park. The proposed dam will provide significant mitigation benefits that are worth the effort associated with implementation of this project. As with the existing thirteen dams, a large reduction in storm water flows and water surface elevations will result.

Table 19
Mitigation Benefit and Cost Matrix
Salado Creek Watershed
Drainage Master Plan

PRIORITIZED PROJECT IMPLEMENTATION		5	7	***1	3	4	8	2	**6	**9	Acquisition	*S.A.I.A. Channel
STRUCTURES	LOCATION	PROPERTIES AND STRUCTURES REMOVED FROM THE FLOODPLAIN										
6 Houses	Cresthill Rd.										6 Houses	
99 Houses	East Park Subdivision	80 Houses		19 Houses							1 House	
4 Apartment Bldgs.	East Park Subdivision	4 Bldgs.										
2 Churches	East Park Subdivision	2 Churches										
1 Houses	Holbrook Rd.			1 House								
3 Houses	Holbrook Rd.										3 Houses	
2 Commercial Bldgs.	Holbrook Rd.			2 Bldgs.								
1 Office	Holbrook Rd.					1 Office						
1 Church Academy	Holbrook Rd.					1 Church						
Flea Market	Holbrook Rd.			1 Bldg.					1 Bldg.			
Trailer Park	Holbrook Rd.			1 Park								
3 Houses	Holbrook Rd.					3 Houses						
Flooded Roadway	Rittiman Rd.			1 Roadway								
15 Commercial Bldgs.	Eisenhauer Rd.											
Flooded Roadway	Eisenhauer Rd.			1 Roadway								
Flooded Roadway	Ira Lee Rd.			1 Roadway								
2 Houses	Ira Lee @ Loop 410			2 Houses					1 House			
5 Commercial Bldgs.	Los Patios Village			4 Bldgs.								
4 Commercial Bldgs.	Nacogdoches Rd.										6 Bldgs	
Flooded Roadway	Nacogdoches Rd.			1 Roadway								
7 Houses	Gemini Dr.			8 Houses								
3 Commercial Bldgs.	Bitters Rd.											3 Bldgs.
4 Commercial Bldgs.	Jones Maltsberger Rd.											4 Bldgs.
1 House	Maltsberger Lane										1 House	
2 Commercial Bldgs.	Beacon Circle Industrial Subd.											
1 House	North Loop Rd.										1 House	
4 Houses	North Loop West										4 Houses	
Flooded Roadways	West Avenue											
Flooded Roadway	Starcrest Rd.											
Flooded Roadways	Jones Maltsberger Rd.											
Flooded Roadway	Bulverde Rd. at Redland Rd.											
24 Houses	Fairfield Village North		24 Houses									
6 Apartment Bldgs.	Renaissance Village North		6 Bldg.									
1 Commercial Bldg.	Perrin Beitel Rd.		1 Bldg.									
1 Commercial Bldg.	Vicar Dr.		1 Bldg.									
1 Commercial Bldg.	Loop 410										1 Bldg.	
13 Houses	Garden Court East Subd.				13 Houses							
18 Commercial Bldgs.	Austin Hwy. Industrial Subdivision				18 Bldgs.							
Flooded Roadway	Shertz Rd.											
5 Houses	Weidner Rd.										5 Houses	
4 Commercial Bldgs.	Weidner Rd.										4 Bldgs	
Flooded Roadways	Weidner, Old O'Conner, & Lookout							3 Roadways				
	Estimated Costs	$ 458,857	$ 685,726	$ 6,000,000	$ 1,330,737	$ 961,225	$ 345,900	$ 844,750	$ 7,418,075	$ 3,490,725	$ 2,136,680	

* Existing Preliminary Stage Project ** Construction not Recommended *** Federally Funded Project TOTAL $ 6,763,875

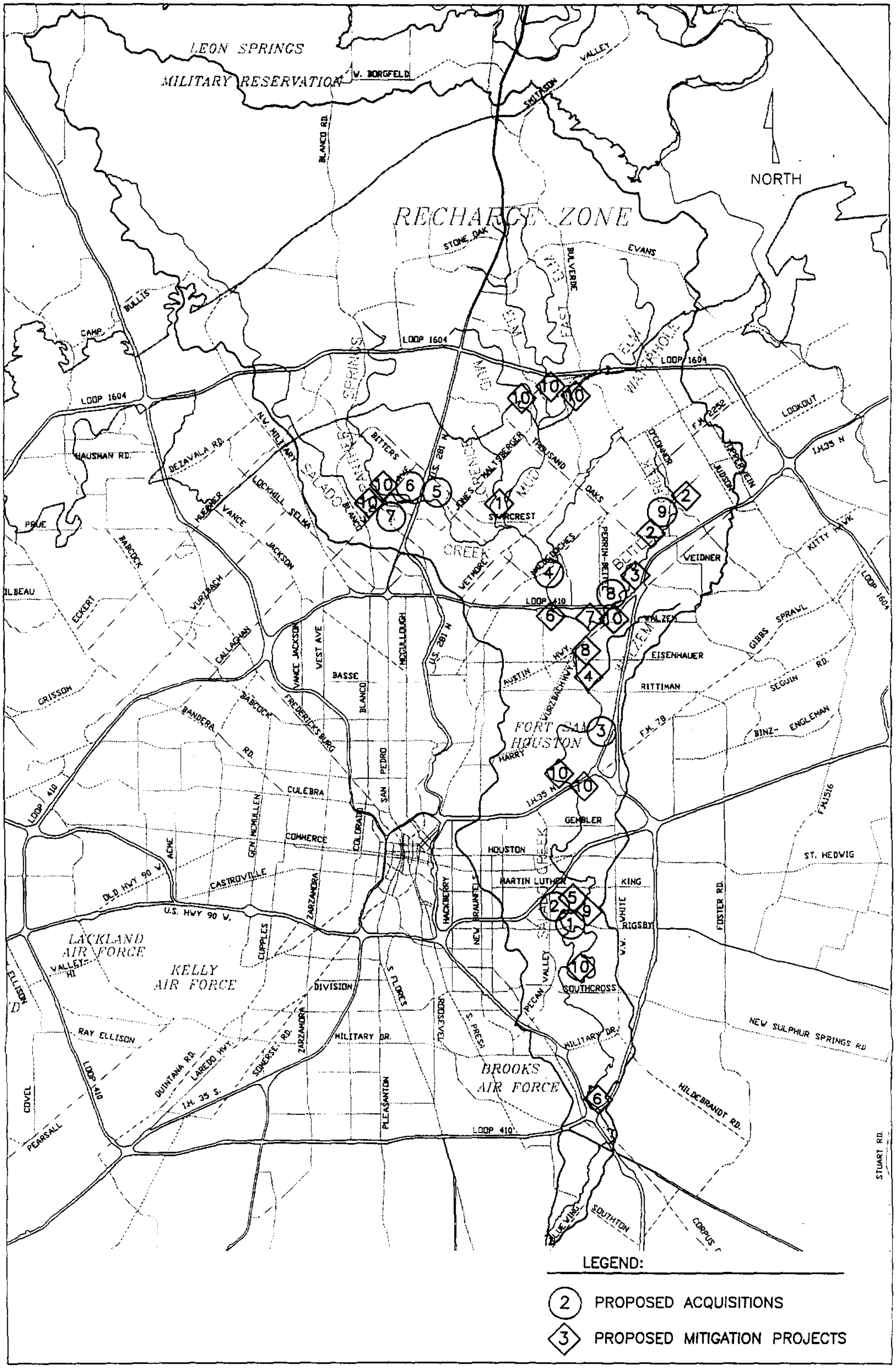
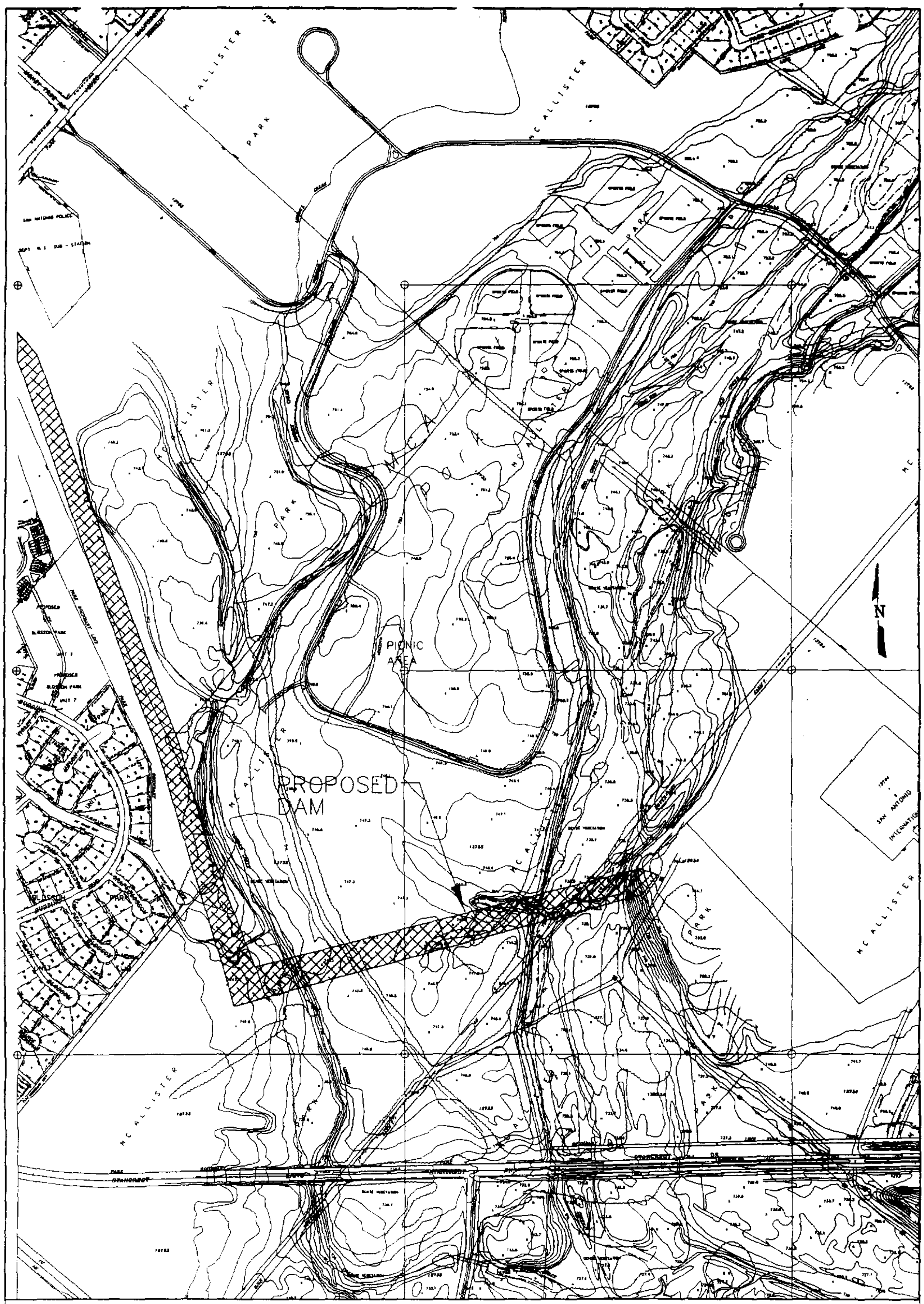
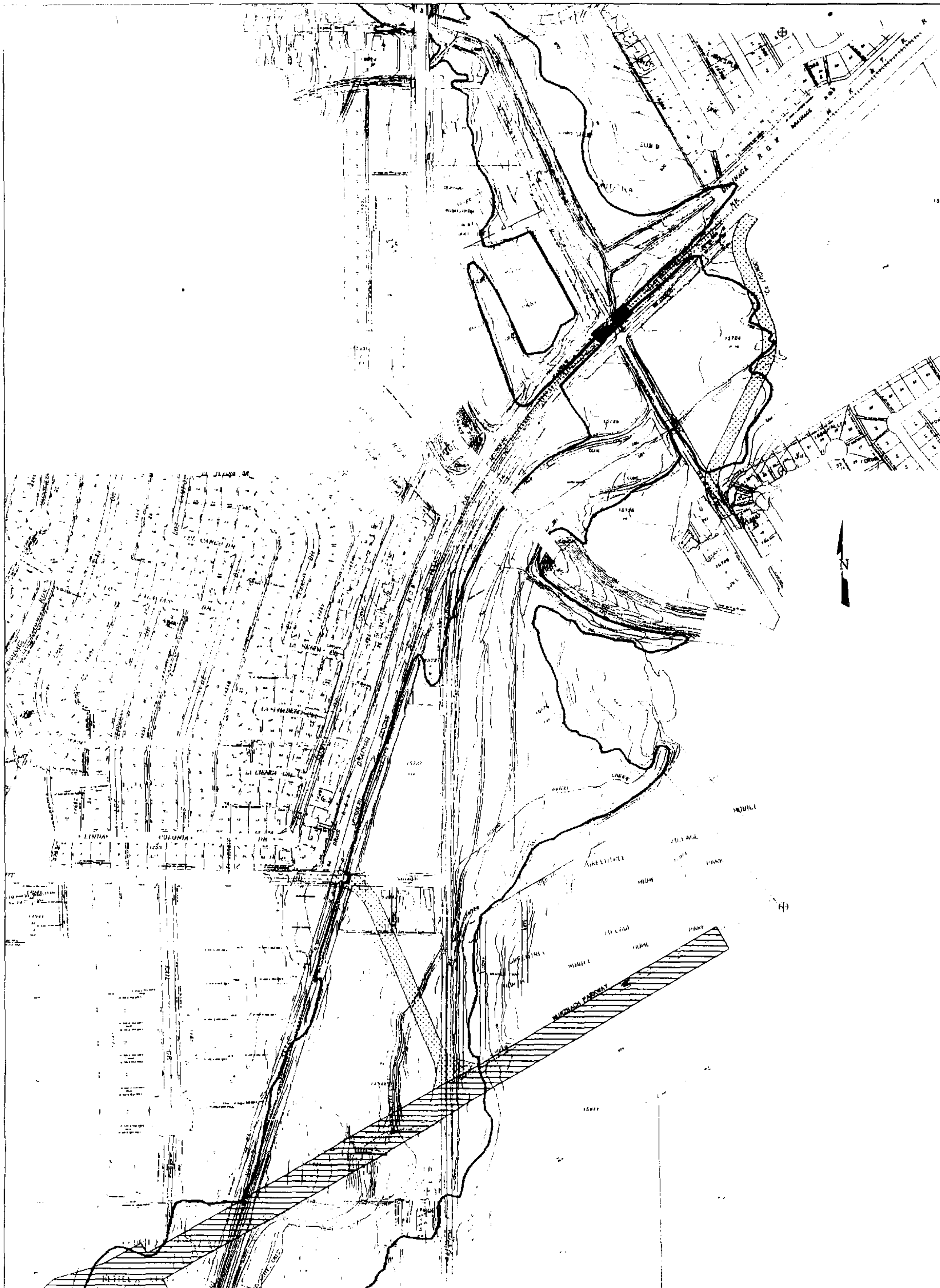


Figure 14 - "Proposed Mitigation Projects and Acquisitions"



MITIGATION PROJECT # 1
LOCATION: LOWER MUD CREEK
DESCRIPTION: FLOODWATER RETARDING DAM #15r
IN McALLISTER PARK
ESTIMATED COST: $ 6,000,000

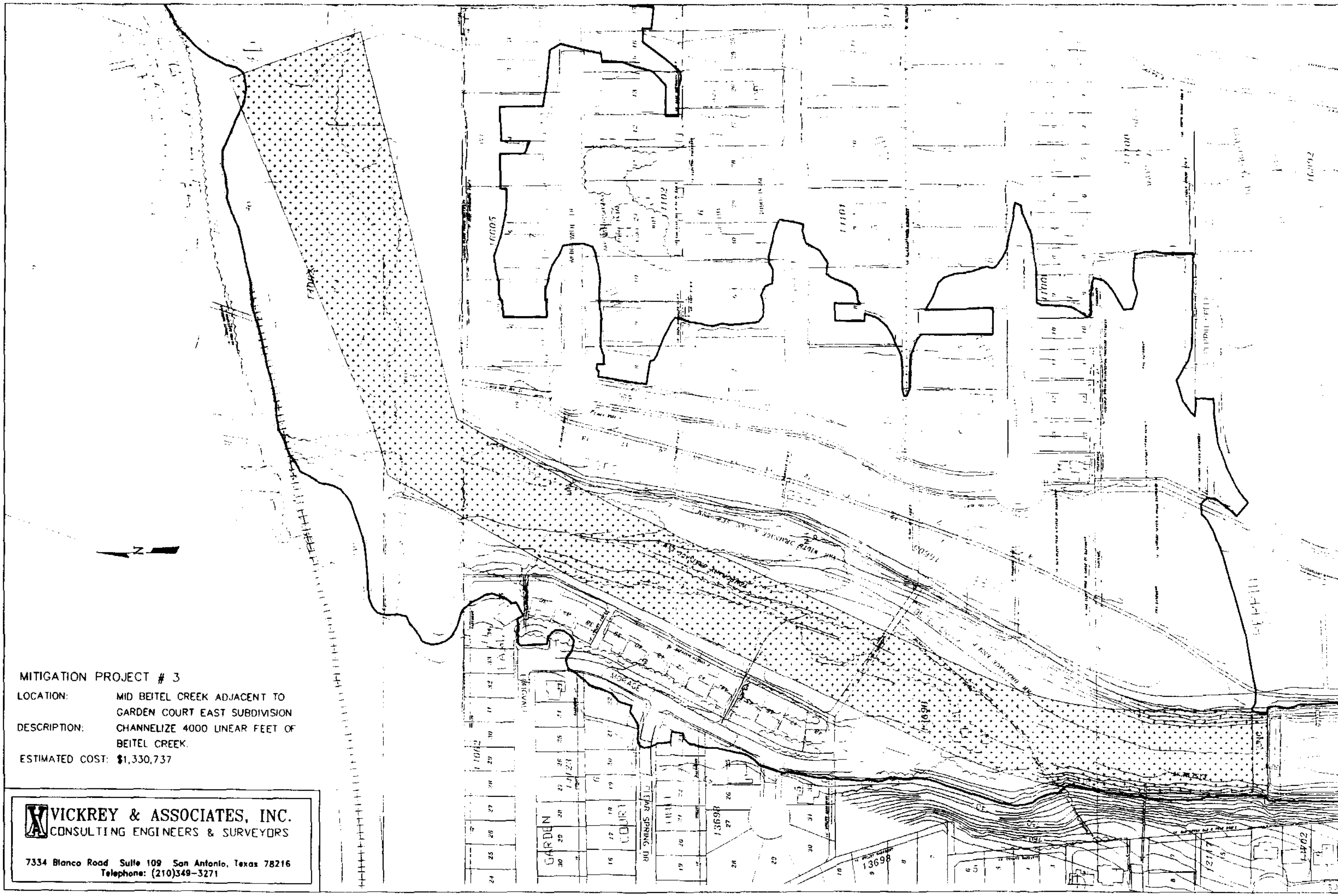
VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS & SURVEYORS
7334 Blanco Road Suite 109 San Antonio, Texas 78216
Telephone: (210)349-3271



MITIGATION PROJECT # 2
LOCATION: UPPER BEITEL CREEK AT O'CONNOR ROAD
DESCRIPTION: REMOVE PORTION OF WEIDNER AND OLD O'CONNOR RDS. FROM SERVICE AND REROUTE LOOKOUT AND LEONHARDT RDS. EXPAND RAILROAD CROSSING STRUCTURE.
ESTIMATED COST: $844,750

LEGEND
REMOVE ROADWAY
NEW RAILROAD CROSSING
NEW ROADWAY

VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS & SURVEYORS
7334 Blanco Road Suite 109 San Antonio, Texas 78216
Telephone: (210)349-3271



MITIGATION PROJECT # 3

LOCATION: MID BEITEL CREEK ADJACENT TO GARDEN COURT EAST SUBDIVISION

DESCRIPTION: CHANNELIZE 4000 LINEAR FEET OF BEITEL CREEK.

ESTIMATED COST: $1,330,737

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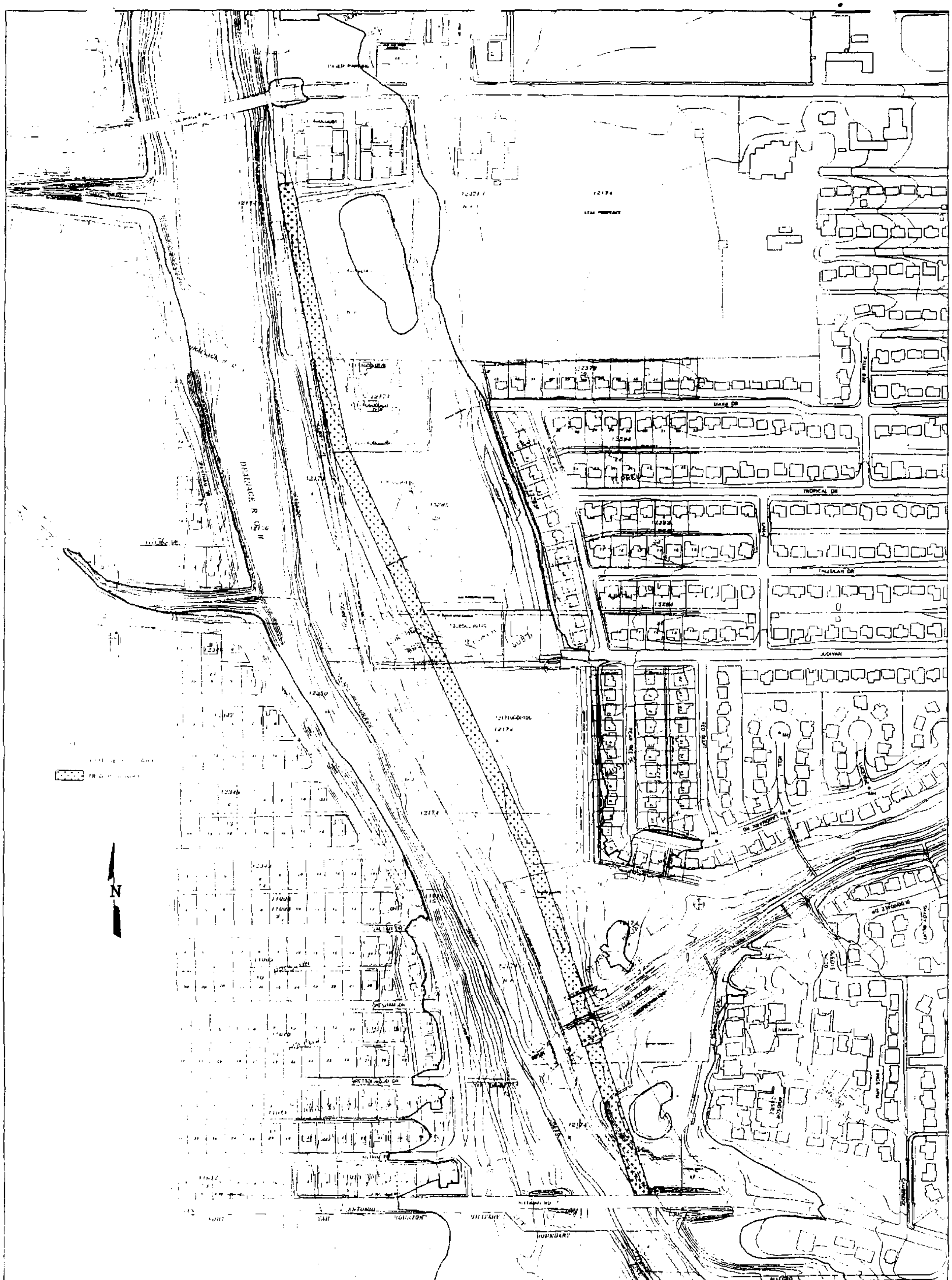

MITIGATION PROJECT # 4

LOCATION: LOWER SALADO CREEK

DESCRIPTION: REROUTE HOLBROOK RD. AND ELEVATE ROADWAY ABOVE 25 YEAR STORM ELEVATION

ESTIMATED COST: $1,000,000

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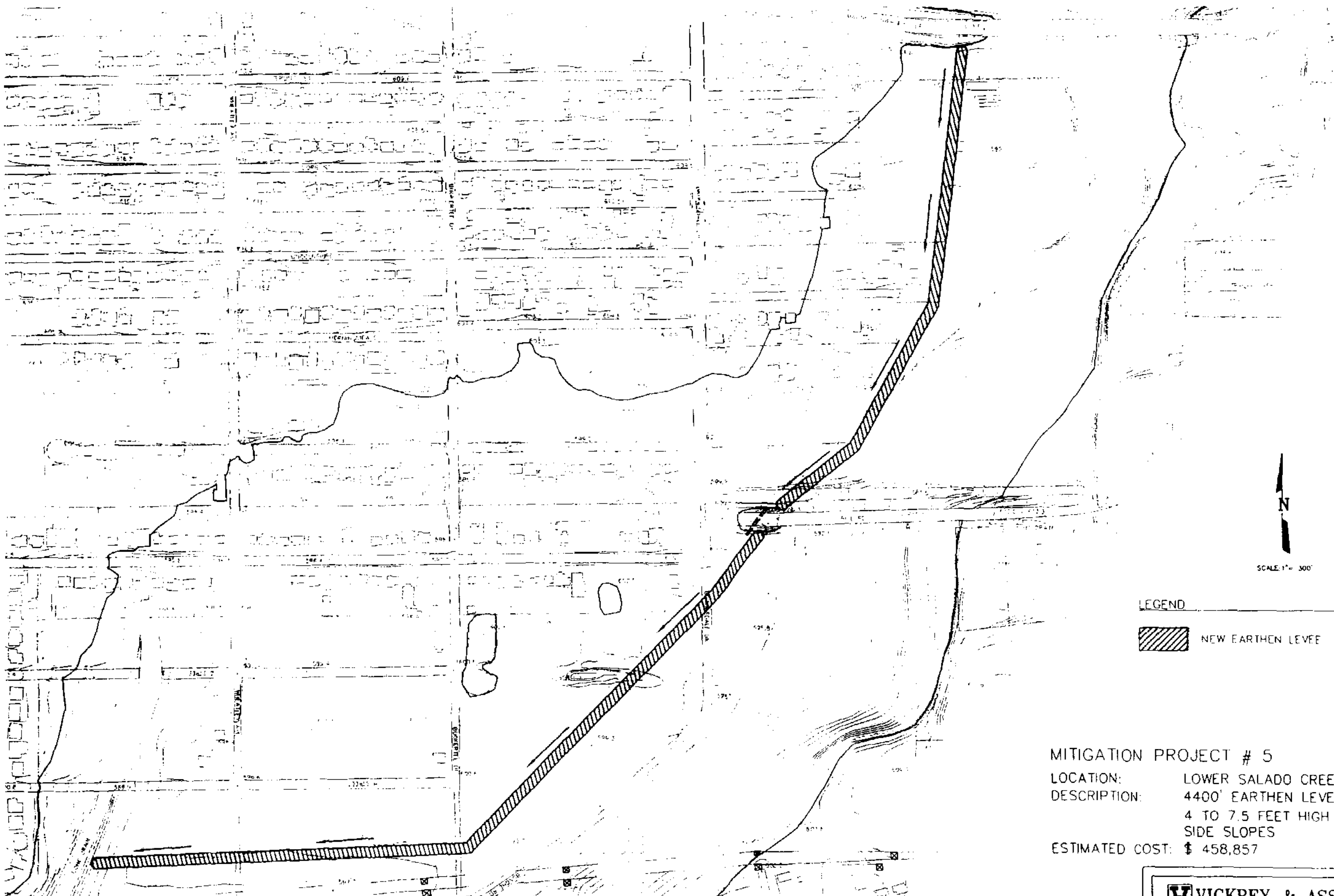


MITIGATION PROJECT # 5

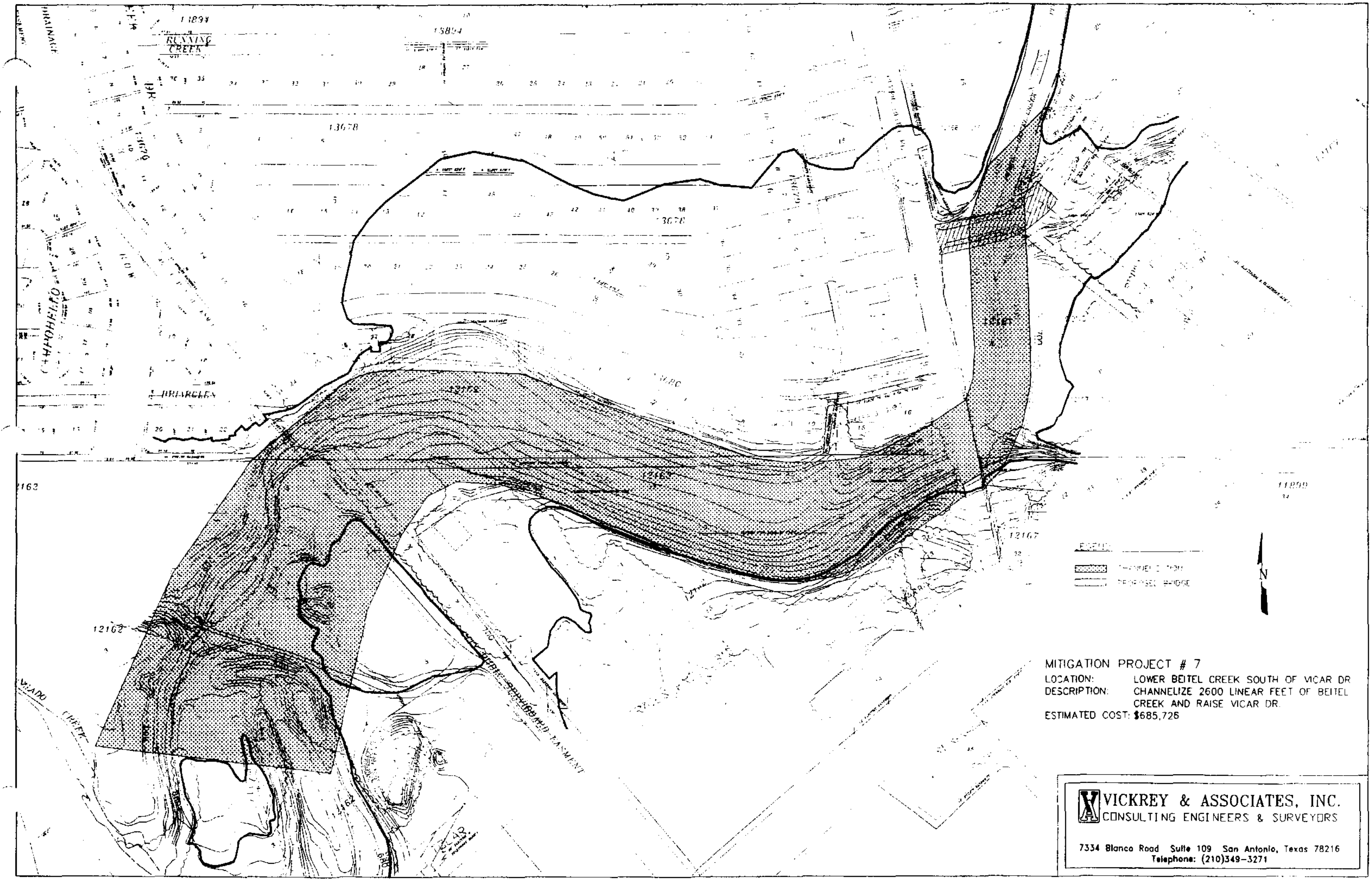
LOCATION: LOWER SALADO CREEK

DESCRIPTION: 4400' EARTHEN LEVEE – APPROXIMATELY 4 TO 7.5 FEET HIGH WITH 3:1 OR 4:1 SIDE SLOPES

ESTIMATED COST: $ 458,857

VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS & SURVEYORS

7334 Blanco Road Suite 109 San Antonio, Texas 78216
Telephone: (210)349-3271



MITIGATION PROJECT # 7

LOCATION: LOWER BEITEL CREEK SOUTH OF VICAR DR

DESCRIPTION: CHANNELIZE 2600 LINEAR FEET OF BEITEL CREEK AND RAISE VICAR DR.

ESTIMATED COST: $685,726

VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS & SURVEYORS

7334 Blanco Road Suite 109 San Antonio, Texas 78216
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LEGEND

NEW ROADWAY

REMOVE ROADWAY

MITIGATION PROJECT #8

LOCATION: MIDDLE SALADO CREEK AT AUSTIN HWY.

DESCRIPTION: REROUTE HOLBROOK RD FOR ALL WEATHER ACCESS AND REMOVE ROADWAY CONNECTION TO IRA LEE RD RECLASSIFY IRA LEE AS A PARK ROAD AND INSTALL GATES.

ESTIMATED COST: $345,900

VICKREY & ASSOCIATES, INC.
CONSULTING ENGINEERS & SURVEYORS

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APPENDIX H

Upper Olmos Creek Watershed Master Drainage Plan

APPENDIX H
Upper Olmos Creek Watershed Master Drainage Plan

Upper Olmos Creek Watershed Master Drainage Plan for the City of San Antonio

Job No. 67187
December 1995
Revised February 1996

RUST LICHLITER/JAMESON
Environment & Infrastructure
Consulting Engineers, Scientists and Planners
2929 Briarpark Drive, Suite 600, Houston, Texas 77042-3203

1.0 PROJECT DESCRIPTION

1.1 Project Authorization

In November of 1993, the City of San Antonio issued a request for Statements of Interest and Qualifications for the performance of Drainage Master Plans for three watersheds. The three watersheds include the Upper Olmos Creek Watershed, the Salado Creek Watershed and the Leon Creek Watershed. The latter two watershed studies were authorized to begin in the Spring of 1994 while the Upper Olmos Creek Watershed study was authorized to begin with City Council action on June 23, 1994. The City of San Antonio Public Works Department developed the project scope and objectives as discussed below and guided the progress of the projects. This report details the completed engineering services for the Upper Olmos Creek Watershed Drainage Master Plan project.

1.2 Purpose and Objectives

The Upper Olmos Creek Watershed Drainage Master Plan study was designed to provide the City of San Antonio and its citizens with a comprehensive plan with which to manage storm water runoff and minimize recurrent flooding of roads and structures. The limits of the study include the Olmos Creek watershed and main channel from the intersection of Loop 410 and West Avenue to a point upstream of Dreamland Road. From this point, the study includes both West Olmos Creek and East Olmos Creek (also known as Elm Creek) upstream to their limits in the watershed to the north of Anderson Loop 1604. Approximately 11 miles of drainage ways are included in the study effort.

1.3 Scope of Services

The Scope of Services for the Upper Olmos Creek Watershed Drainage Master Plan is divided into four engineering tasks. These are listed below along with a brief description of each:

A. <u>Preliminary Phase</u>

The Preliminary Phase of the Scope of Services for the Olmos Creek project involved the development of a watershed map illustrating the full limits of the watershed from Loop 410 at West Avenue to the headwaters north of Anderson Loop 1604. This Phase also involved the collection of all previous drainage studies including submittals to FEMA, Corps of Engineers studies, San Antonio River Authority studies, City and County studies, and studies for development purposes or street projects. These studies were analyzed with respect to their individual and collective contribution to the hydraulic and hydrologic understanding of the watershed.

The Preliminary Phase also involved extensive field reconnaissance and data collection with regard to recurrent flooding locations, drainage problems, low water crossings and watershed/subarea drainage boundaries. A photographic log of the significant hydraulic features was prepared as part of the field work. In addition, several informal information exchange meetings were held with citizens and other interested parties to discuss drainage issues in the watershed. Section 2.0 of this report presents the details of the services completed as part of the Preliminary Phase.

B. Design Phase

The Design Phase of the project involves all services relative to the development of the recommended Master Drainage Plan for Upper Olmos Creek. Specifically, this phase includes the development of hydrological models for the watershed based upon existing conditions and future full development of the watershed using land use projections provided by the City of San Antonio. The 10, 25, 50, 100 and 500 year flows for both conditions of development were predicted for the watershed. In addition, hydraulic models were developed for existing and future development conditions and analyzed to determine the 10, 25, 50, 100 and 500 year flood plains for existing development and the 100 and 500 year flood plains for future development conditions. Areas were identified where private property is inundated as a result of the 100 year rainfall event and a project was designed to mitigate the flooding for both existing and future development conditions. The Design Phase of the study is presented in Section 3.0.

C. Financial Plan

The Financial Plan portion of the Scope of Services for the Upper Olmos Creek Watershed project involved the development of a financing plan to fully implement the recommended Drainage Master Plan over a ten-year period, including a proposed funding source, proforma and schedule. An implementation plan is included within the Financial Plan presented in Section 4.0 of this report.

D. Development Criteria - Phase 1

As part of the Scope of Services for the Upper Olmos Creek Watershed Drainage Master Plan, a specific task has been identified to research and define new development criteria for the City of San Antonio which would address the drainage issues identified in the three watershed studies. This task encompasses the entire City and is closely tied in to the work being performed by the Drainage Regulation and Review Committee established by the City Council and SAWS Water Quality Task Force. The City of San Antonio established this Committee to insure a venue for interagency discussion and cooperation and for citizen input into the development of the drainage criteria. This committee has also reviewed the development of the three Drainage Master Plans and has had input into their design.

Phase 1 of the Development Criteria task is covered under this contract and is presented under separate cover in Appendix C. Phase 2 is projected to be performed under an Additional Services contract in 1996. The portions covered under this contract include a determination of San Antonio's goals for managing stormwater drainage as well as a comprehensive survey of ten other large cities with respect to drainage/stormwater management practices. The task also includes the identification of specific options for the City of San Antonio to implement in order to effectively manage stormwater drainage in both flood-prone and environmentally sensitive areas. Phase 2 of the Development Criteria task will involve the development of actual methods to implement the proposed criteria, including development of City ordinances and other political avenues.

3.6 Recommended Master Drainage Plan

A presentation of the four scenarios was made to the City staff and the Drainage Criteria Review Committee on August 28 and 29, 1995. At this time, a recommendation was made to adopt Scenario A as the Master Drainage Plan for Upper Olmos Creek for the reasons outlined below. Exhibit 16 shows the locations of each component contained in Scenario A.

Scenario A is estimated to cost about $5.7 million less than Scenario B. This indicates that the channel project along Olmos Creek included in Scenario B would only add the removal of 29 houses in Dreamland Oaks (estimated value of $2,900,000) as a benefit over Scenario A and therefore Scenario B does not appear to be cost effective. Similarly, Scenario A costs about $9.8 million less than Scenario C. Even with maximum use of the detention reservoir sites, Scenario C only removes one additional house in Shavano Park when compared to Scenario A. Again, Scenario C does not appear to be cost effective.

Scenario D, which includes the buy-out of all of the structures shown within the 100-year flood plain boundary on the existing conditions flood plain maps (with the exception of the commercial properties near Loop 410), is estimated to cost about $1 million more than Scenario A. However, certain costs, ie. legal fees associated with condemnation and buy-out, have been estimated from much smaller scale voluntary buy-out projects and may be significantly more than the 20 percent estimated in Table 3-18. As discussed previously, this scenario does not address related issues such as street flooding, property flooding, erosion, etc.

In addition to the cost analysis described above, Scenario A satisfies the selection criteria more completely than any of the other alternatives developed for the study:

- Effectiveness in reducing structural flooding: Scenario A removes 33 structures from the effective 100-year flood. Under Scenario A it is assumed that the 42 structures remaining in the 100-year flood plain would be bought out by the City.
- Reduction of dollar damages from flood events: Scenario A eliminates damages to structures during the 100-year and lesser storm events. The scenario also eliminates most street flooding and confines most of the flood waters to the main channels, thus reducing damages to streets, landscaping, automobiles parked along streets, and other previously threatened property. Implementation of this scenario would also reduce current community costs associated with high water rescues from low-water street crossings and from flooded homes.
- Reduction of street flooding and channel erosion: Access to homes and businesses along the channel would be enhanced by Scenario A. The scenario reduces the over bank flood plain and therefore eliminates long-term street flooding adjacent to the channel in most areas. By using detention to reduce the amount of runoff reaching the channel and to slow flood waters in the channel, the progression of ongoing erosion problems along the West Fork would be retarded.

- Elimination of flood hazards: The most serious flood hazard in the Upper Olmos Creek watershed occurs at low-water crossings of major streets. Both Dreamland Drive and Lockhill Selma Road are raised and converted to all weather crossings in Scenario A.
- Provision of a "buffer" along the main channels: Scenario A greatly increases the level of comfort experienced by residents along Olmos Creek and the West and East Forks by lowering the 100-year flood water surface elevation. Under current conditions, in many locations homes are actually surrounded by flood waters on adjacent property and streets and are only raised above the flood waters by the thickness of the structure's slab. In other locations, the flood plain boundary was mapped around a structure based on the highest elevation adjacent to the slab (the assumption was made that the slab would be constructed level with the highest ground surface on the pad site - the possibility of split-level homes following the ground elevation downward was not considered in the mapping procedure). With the components of Scenario A in place, the 100-year water surface is lowered and the flood plain boundary would be moved away from most of these structures. thereby providing a buffer zone around many structures.
- Enhancement of the watershed through multiple-use facilities: All three of the detention facilities included in Scenario A could provide multiple uses to the community. The Vulcan Quarry site is a significant recharge feature for the underlying aquifer. In addition, unexcavated areas which currently are used as roads and office/parking areas will be cleared and converted to City park facilities. The Shavano Park detention area is within the Edwards Aquifer Recharge Zone and may have naturally occurring recharge features within the detention site. By minimizing the amount of excavation used in the design of the facility (either Option 1 or 2), most of this area can be left undisturbed and preserved as wildlife habitat. Similarly, the Lockhill Selma detention area can function as a detention facility as well as either a natural preserve or a park area. If maintenance is assumed by adjacent neighborhoods, the vegetation may be manicured and recreational facilities such as park benches/tables, jogging paths, etc. may be added. In addition, bicycle or hiking trails could possibly be incorporated into the main channel from Loop 410 to Dreamland Drive during the channel clearing project to maximize use of the Olmos Creek stream corridor. The purchase and demolition of groups of threatened homes in Dreamland Oaks and near Orsinger Road would allow the conversion of the flood plain property to park facilities or open space.
- Preservation of natural habitat: As discussed above, the natural vegetation in both the Shavano Park and Lockhill Selma detention facilities can be left mostly intact. In addition, the upstream detention facilities included in Scenario A detain enough flood runoff so that channel improvement projects on the East and West Forks are not necessary. By limiting channel clearing to the Olmos Creek channel downstream of Dreamland Drive, most of the stream corridors along the East and West Forks are left in their natural state.

The Committee and the City of San Antonio engineering staff agreed to the recommendation of Scenario A as the Master Drainage Plan for Upper Olmos Creek, pending the solicitation of public comment. A public meeting was held on November 15, 1995, during which the study and the selection of the Master Drainage Plan were reviewed in detail. Based on the comments received during the meeting, Scenario A is this study's recommended Master Drainage Plan for Upper Olmos Creek.

4.3 Implementation Plan

The recommended Master Drainage Plan for Upper Olmos Creek may be implemented by the City of San Antonio in a series of phases. The Texas Department of Transportation initiated construction of the Phase 1 channel improvement project downstream of Loop 410 in the Fall of 1995. Phase 2 of the TxDOT project is not scheduled to be implemented within the next five-year construction period; however, the City of San Antonio is discussing with TxDOT the possibility of moving this project up to an earlier schedule.

The City of San Antonio also began negotiations in 1995 to obtain the Vulcan Materials Quarry on the West Fork of Olmos Creek, as well as the 55 acre site required to implement the detention facility on the East Fork near the City of Shavano Park. In addition, replacement of Lockhill Selma with an all-weather crossing has already been approved for funding through an earlier City of San Antonio bond election, and the project is scheduled for design and construction in 1996.

Table 4-2 shows a possible implementation schedule for the recommended Master Drainage Plan assuming completion of the infrastructure projects within a ten year time frame. This schedule assumes the funding is available for each year's scheduled projects and that the City of San Antonio receives necessary support from adjacent municipalities and Bexar County as necessary prior to the initiation of a scheduled project. The entire Master Drainage Plan can be implemented within the ten year time frame shown in Table 4-2 at a capital expenditure in 1995 dollars of between $0.2 and $2 million per year. The typical annual expenditure on construction projects is in the range of $1.0 to $2.0 million. If additional funding is available, the schedule can be accelerated to fit into a shorter time period of approximately six years without violating the constraints of the critical path.

TABLE 4-2
IMPLEMENTATION SCHEDULE FOR INFRASTRUCTURE
MASTER DRAINAGE PLAN FOR UPPER OLMOS CREEK

YEAR OF CONSTRUCTION (YEAR 1 = 1996)	1	2	3	4	5	6	7	8	9	10
1. TxDOT Phase 1 and 2	■						■	■		
2. Vulcan Quarry Detention		▒	▒							
3. Shavano Park Detention				■	■	■				
4. Lockhill Selma Road and Detention	▒						■			
5. Channel Clearing										▒
6. Dreamland Bridge								▒	▒	
Annual Construction Cost ($ Millions 1995)	1.6	1.0	1.0	1.7	2.0	2.0	0.9	1.3	1.4	0.2

The critical path for construction of the projects is shown by highlighting the controlling projects in bold type. These projects must be implemented in a specific order to avoid hydraulic problems and adverse impacts in the drainage system. For example, the Shavano Park detention basin must be constructed prior to constructing a constriction at Lockhill Selma which would back-up water behind the road during the 100-year storm event. This is due to the very limited amount of freeboard between the existing 100-year flood plain and the houses upstream of Lockhill Selma. By detaining water in the Shavano Park facility, the 100 year water surface elevation upstream of Lockhill Selma is lowered, thereby allowing the flow of water under the road to be constricted with culverts in order to create a ponding area upstream of the road.

Without the Shavano Park detention facility in place, the 100 year flood must be allowed to flow freely under the Lockhill Selma all-weather crossing in order to maintain the current flood plain level upstream. If the road is reconstructed as an all-weather crossing in 1996 as anticipated, the culverts under the roadway can be designed and constructed to allow full passage of the 100 year flood event, while also allowing for modifications to be made to constrict the flow when reconfigured as a detention facility (shown on Table 4-2 as occurring in Year 6 following construction of the Shavano Park facility).

Similarly, the TxDOT Phase 1 and 2 channel improvements must be completed before any channel clearing project is constructed. A large flood plain currently exists immediately upstream of Loop 410, indicating that structural flooding in this area would be aggravated by any increase in flows resulting from channel clearing upstream.

The approximately $13.1 million total cost for the infrastructure projects identified in the recommended plan may be reduced to $12.9 million if the City of San Antonio elects not to include the channel clearing project from Station 2800 to 11200 (lower reach of Olmos Creek below the confluence of the East and West Forks). The clearing project lowers the water surface elevation of the 100 year frequency event by as much as two feet downstream of the confluence; however, according to the map shown in Exhibit 3-6, this component only removes one additional house from the 100 year flood plain. If the slab elevation of this house on Old Brook near channel Station 5500 is verified by the City to be above elevation 796.6 feet, it is out of the 100 year flood plain as a result of the rest of the Scenario A components without the channel clearing project. In this case, the channel clearing project could be eliminated from the recommended Master Drainage Plan for Upper Olmos Creek. If the house slab is below elevation 796.6 feet, a second option would be for the city to buy-out this house instead of implementing the channel clearing project. Although the channel clearing project appears to be a relatively low-cost project, it should be remembered that the costs for the project estimated in this study do not account for the continued maintenance of the cleared channel on a regular basis.

APPENDIX I

City of San Antonio Master Drainage Projects List

MASTER DRAINAGE PROJECTS BY DRAINAGE PROJECT NUMBER

PROJ #	EXT	DRAINAGE PROJECT NAME/LOCATION	DISTRICT	STATUS
1	A	BROADWAY - E. HILDEBRAND TO BURR RD	9	
1	B	BURR RD	9	GROUND WATER PROBLEM
5	A	CUNNINGHAM	2	UNDER SIZED
6	E	E GRAYSON	1,2	UNDER SIZED
8		BRACKENRIDGE	2	UNDER SIZED
16		E. HOUSTON	2	PARTIAL FUNDED FOR CONSTRUCTION
16	ALT	W.NUEVA/S ALAMO	1	UNDER SIZED
24		CONRAD ST	1, 5	PHASE B DONE
27		ROMANA PLAZA	1	CONSTRUCTED WITH TRI PARTY
29		CAMDEN - JONES TO NEWELL	1	
34		E MULBERRY	1,9	
35		DRAINAGE CHANNEL - RIPLEY/R.R.	1	
35	X	SAN PEDRO/HUISACHE/MARK TWAIN MIDDLE SCHOOL OUTFALL	1	
35	Y	HICKMAN EXTENTION TO FREDERICKSBURG	1	
39	A	ZARZAMORA	5	
39	J			
39	U	EL JARDIN	6	
39	V	36th STREET @ HWY 90	6	
46	C	BAYLOR ST	5	??? CHECK NOGALITOS
52	A	HACKBERRY	3	
52	B	FAIR/PINE	3	
54		GREER STORM DRAIN PROJ	3	
55	ADDITION	GEVER ST. DRAINAGE	3	
56	B	LENNON COURT - CLARK AVE TO IH 37	3	
56	X	S PRESA TO SAN ANTONIO RIVER OUTFALL	3	??? CHECK WITH SARA
57	A	WOODLAWN/CAMINO SANTA MARIA, OVERHILL	7	APPROVED PHASE A - PROJECT ON HOLD
57	B	ROLLINS, WAVERLY, FINAL PHASE	7	FUNDED FOR CONSTRUCTION
58	F	CULEBRA DRAINAGE	7	
58	BX	DELL STREET DRAINAGE	7	PART CONSTRUCTION FUNDED
58	BZ	QUILL	7	
58	I&J	SCIENCE PARK	7	UNDER CONSTRUCTION
58	M	ACME, PROSPERITY, ELDRIDGE	6	??? PLANS ONLY MBC - ACME/ JOE BLANKS
61	P	SOUTHLAWN - MERIDA TO CASTROVILLE	6	PARTIALLY UNDER CONSTRUCTION
63		W HART/S FLORES/OCTAVIA (OCTAVIA #63)	5	PARTIAL FUNDED FOR CONSTRUCTION
65	D	WABASH	3	
66	A	EAST SAYERS - PLEASANTON TO S. FLORES	3, 4	
68	A	CLOVIS 1974 BONDS	4	
68	D	GARNETT	3	
68	RIPRAP	KENDALIA/COMMERCIAL	3, 4	
69	A	MAYFIELD/BOSWELL/DICKSON	3, 4	??? CHECK SOUTH FLORES PLANS
69	RIPRAP	GERALD - NOBLE TO PLEASANTON	4	
69	RIPRAP 2D	CANAVAN/BRUNSWICK/TUPPER	4	FUNDED FOR DESIGN
71	N	OVERBROOK - SUNSHINE DR. TO BALCONES	7	
71	Z	WILSON - SOUTH OF WOODLAWN	7	PARTIAL FUNDED FOR DESIGN
73	A	BARBARA DR DRAINAGE -MCCULLOUGH	9	DESIGNED
73	B	BARBARA DR DRAINAGE	9	DESIGNED
73	C	THAMES	9	
74				
74	A	VIDOR	9	
74	B	BELFAST AND RIDGECREST	9	
74	C	TERRA ALTA DR. OUTFALL	9	
74	X	LORENE TO SAHARA	9	
75	A	VANDIVER	10	
75	B	CAVE LN	10	
75	C	HASKIN	10	
75	D	KENILWORTH	10	
75	E	BUSBY	9	
76		BEITEL CREEK	10	PARTIAL UNDER DESIGN/ PARTIAL BY DEVELOPERS
76	C	RANDOLPH BLVD TRIB	BC	
77		DEVONSHIRE/BROOKSIDE	10	

78		HARRY WURZBACH TO CORINNE	10	
81	B	DOLLARHIDE/POLLYDALE	3	
82	A	BROOKS FIELD OUTFALL	3	
83	A	BRANCHES OF SIX MILE CREEK	3, 4	
83	B	BRANCHES OF SIX MILE CREEK	4	
83	C	BRANCHES OF SIX MILE CREEK	3, 4	
83	D	BRANCHES OF SIX MILE CREEK	4	PARTIAL DEVELOPER - CHECK IN FIELD
83	X PH-II	ASHLEY/ESPADA	3	
83	XE	OPPENHEIMER	3	
84	A	KENWOOD NORTH	1,9	CONSTRUCTED? - CHECK IN FIELD
84	B	KENWOOD NORTH	1,9	CONSTRUCTED? - CHECK IN FIELD
85	A	BUCKEYE/ EDGEBROOK	1	CHECK IN FIELD
86		VANCE JACKSON/FREILING	1	
87	E	ROCK CREEK	8	PARTIAL WITH VANCE JACKSON
88		OLMOS CR-OLMOS DAM TO HILDEBRAND	9	
88	E	ORSINGER RD SLEEPY HOLLOW	8	
89		PERSHING CREEK	2	POSSIBLY BY DEVELOPERS
90	A	SALADO CREEK 281 TO WETMORE	9	REMOVE - SHOW FLOOD PLAIN
90	B	SALADO CREEK AUSTIN HWY TO NACOGDOCHES	10	REMOVE - SHOW FLOOD PLAIN
91		N NEW BRAUNFELS	9,10	
92	A	LANARK	10	FUNDED FOR CONSTRUCTION
97	B	TRAILWOOD, HOLLYRIDGE, COLEBROOK	7	
98	A	CULEBRA ROAD - GOODRICH TO HAMILTON	1, 7	PLANS ONLY BY TXDOT - LAN
114	B PH-II	E HOUSTON/SAPPHIRE	2	PLANS BY HALLENBERGER
114	C	W.W.WHITE-AREA STs. PH II	2	FUNDED FOR DESIGN
114	C	RICE , WWWHITE TO SEMLINGER	2	NEEDS PHASE II OUTFALL
149		DEL ALAMO - JEFFERSON / W. MARTIN / SA RIVER	1	
150	A	AUSTIN ST-HACKBERRY TO AVE. B	2	CHECK WITH TXDOT
150	B	LAMAR-HACKBERRY TO AUSTIN ST	2	
150	C	BURNET-CHERRY TO LIVE OAK	2	
150		BROOKLYN-AVE B TO AUSTIN ST	1	
152		RITTIMAN OUTFALL	10	
153		NACOGDOCHES	10	PLANS BY VICKREY?
154	A	CENTER PARK EAST	2	HECK DETENTION SYSTEM SOUTH OF EISENHAUER
154	B	FRATT RD	2	
155		SCHERTZ / WEIDNER	10	
202		E.WHITE-MISSION TO ROOSEVELT	3	
203	EXT	SPRINGFIELD EXTENTION	2	CHECK 114B DESIGN
204		RIGSBY	2	
205		HOLMGREEN RD OUTFALL	2	
206		JO MARIE / WW WHITE	3	
251	A	CALLAGHAN EAST TO OLD HIGHWAY 90	6	
251	B	S CALLAGHAN RD COMMERCE TO 90 MPO PROJ	6	MPO PROJECT
252	A	CHANNEL PARALLEL TO OLD HIGHWAY 90 & ACME	6	
252	B	S CALLAGHAN RD OLD HIGHWAY 90 TO CASTROVILLE	6	
254		CAMP/S.ALAMO	1	
303		BRAZOS AND ARBOR	1	
1000		BELFORD ST - DUBLIN TO UTOPIA	3	
1001		BAKER ST DRAINAGE	5	
1002		FORTUNA 36TH ST DRAINAGE	7	CONSTRUCTED? - CHECK IN FIELD
1004		PARHAVEN	9	
1005		MOANA ST	2	
1006		HUTCHINS - ZARZAMORA TO COMMERCIAL	4	
1007		BLOSSOM / WOODBURY	10	FUNDED FOR CONSTRUCTION
1009		WILMA JEAN - ROCKWELL	3, 4	
1012		FERTILE VALLEY FARMS SUBD	10	PART FUNDING FOR CONSTRUCTION
1014		NACOGDOCHES- BROADWAY TO NEW BRAUNFELS UNDER CONST	9	PARTIALLY UNDER CONSTRUCTION
1015		ZARZAMORA S.W.MILITARY TO IH 35	4	
1016		WENZEL RD - RIDGEMEADOW TO TOPPERWEIN	10	
1017		COKER LN STOUT EXT	2	
1019		ROBERTS ST. NW 19 TO ALAZAN CREEK	1	

1020		ADELE - DREXEL TO FAIR AVE	2	
1022		BRANIFF- TURBO TO 281	9	FUNDED FOR DESIGN ONLY
1023		BRABACH - ROOSEVELT TO SIX MILE CK	3	
1024		W. VILLARET - PALO ALTO COLLEGE	4	
1025		BEL MEADE	2	
1026		COCA COLA DR - E. HOUSTION TO E COMMERCE	2	
1027		CASTLERIDGE - SHADY GROVE TO PINN	6	
1028		DE CHANTLE AREA	7	
1029		CUMBERLAND - NOGALITOS TO GARLAND	5	
1030		EMIL RD - WW WHITE TO IH 10	2	CHECK 114B DESIGN
1031		FORMOSA - CULLIN TO PLEASANTON	3	
1033		OXFORD TRACE	7	
1034		LINDENWOOD	9	
1035		E MAGNOLIA - MAIN TO CARLETON	1,9	
1036		KENTWOOD MANOR -LORENCE CREEK	9	
1037		PASO DE NORTE	9	
1038		STAHL ROAD - BELL TO BRIARPOINT	10	
1039		HAWTHORNE - FLORES	5	
1040		WOODLAWN- BANDERA TO ZARZAMORA	7	UNDER CONSTRUCTION?
1041		CLAY ST DRAINAGE	5	
1043		COMMERCIAL - GILLETTE TO SIX MILE CREEK	3	ALSO COVERED BY #1077
1045		W. KIRK - NEIMEYER TO CAROLYN	5	
1046		MAIN AVE / OLD GUILBEAU / SAN ANTONIO RIVER	1	
1047		MAYFIELD - ZARZAMORA TO IH35	4	
1048		PLACID DR DRAINAGE	7	
1049		SIMS AREA DRAINAGE	5	
1052		PROJ #71-A & B CHANNEL RECONSTRUCTION	7	
1053		AARON @ COMMERCIAL & CULLIN TO ASCOT	4	
1054		ZARZAMORA - GUADALUPE TO APACHE CREEK	5	CONSTRUCTED?
1055		CRAIG, FRENCH, ASHBY, MART. CREEK	7	PARTIAL DESIGN FUNDED -W. FRENCH
1056		MC CULLOUGH AT N ST MARYS	1	
1058		MISSION ROAD AREA - PACKAGE 3?	3	PARTIAL FUNDED FOR CONSTRUCTION
1060		LOMAX	8	
1061		NICKLE AND DIME AREA DRAINAGE	8	PARTIAL CONSTRUCTION / BUYOUTS
1062		SOUTH RIDGE PARK SUBDIVISION OUTFALL	4	
1064		LOOP 410/NACOGDOCHES (75-Y ADDITIONS)	9, 10	DESIGN BY TXDOT. FUNDED FOR CONSTRUCTION
1065		PARLIAMENT @ BLANCO	9	
1066		VESTAL PLACE - COMMERCIAL TO PLEASANTON	3	
1068		SHOOK AVE	9	
1069		EARTHEN CHANNEL PATRICIA TO BLANCO	9	
1071		PARALLEL	4	
1072		VALLEY FORGE	10	
1074		LIGUSTRUM DRAINAGE	7	CONSTRUCTED? - CHECK IN FIELD
1075		LOCKHILL SELMA -WEST AVE. TO BLANCO	9	
1076		STRINGFELLOW - SOUTHCROSS TO KASHMUIR	3	
1077		COMMERCIAL - PETALUMA TO IH 410	3	
1078		CHANDLER - WW WHITE TO DEAD END	3	
1079		MOUNTAIN VIEW	6	
1080		VEDA MAE - SHEARER HILLS	9	
1081		PEGGY/STUTIS	2	
		PHASE B APACHE CREEK	5	PLANNING ONLY
		UPPER OLMOS CREEK	8	

APPENDIX J
City of San Antonio Ordinance No. 86711

AN ORDINANCE 86711

DECLARING THE DRAINAGE OF THE CITY TO BE A PUBLIC UTILITY; ADOPTING THE PROPOSED DRAINAGE REGULATIONS DEVELOPED BY THE DRAINAGE REGULATIONS COMMITTEE TO REQUIRE ON-SITE DETENTION OF STORMWATER AND ADDITIONAL REGULATION OF STORMWATER CONVEYANCE; ADOPTING A FEE-IN-LIEU OF ON-SITE DETENTION POND POLICY; AUTHORIZING THE FOLLOWING ONE TIME FEES (RESIDENTIAL - $1,200.00, MULTI FAMILY - $1,600.00 NON-RESIDENTIAL LESS THAN 65% IMPERVIOUS COVER $2,600.00, GREATER THAN 65% IMPERVIOUS COVER - $3,000.00 PER ACRE); APPROPRIATING $100,000.00 FROM THE STORMWATER DRAINAGE UTILITY FUND TO PROVIDE FOR STAFFING AND ADMINISTRATIVE COSTS ASSOCIATED WITH THE PROGRAM DURING THE FISCAL YEAR 1997-98; AMENDING THE CITY CODE TO REFLECT SUCH CHANGES INCLUDING AMENDING THE UNIFIED DEVELOPMENT CODE AS FOLLOWS: 1) ARTICLE I, DIVISION 3, ADDING THE DEFINITIONS FOR "DRAINAGE SYSTEM," "STORMWATER DRAINAGE FEE," "SWALE," "WATERCOURSE," AND "WATER SHED" AND AMENDING THE DEFINITION OF FLOOD INSURANCE SITE MAP; 2) ARTICLE II, DIVISION 1, ADDING "DRAINAGE MASTER PLAN," AMENDING IMPACT FEES; AND AMENDING PRELIMINARY OVERALL DEVELOPMENT PLAN (POADP) INFORMATION REQUIREMENTS; AND 3) ARTICLE IV TO REFLECT NEW DRAINAGE REGULATIONS THAT REQUIRE ON-SITE STORMWATER DETENTION OR PAYMENT OF FEE-IN-LIEU OF DETENTION AND REQUIRING COMPLIANCE WITH ADDITIONAL REGULATIONS RELATED TO STORMWATER CONVEYANCE, TO BE EFFECTIVE OCTOBER 20, 1997.

(AMENDS CHAPTER 35 OF THE CITY CODE)

WHEREAS, the City of San Antonio City Council in order to develop a strategy and methodology for improving the City's stormwater drainage system empowered the Drainage Regulation Committee as referenced in Section 35-4020 of the City Code as amended by this ordinance; and

WHEREAS, the Committee after meeting on a regular basis over numerous months developed significant revisions to the City's Unified Development Code to provide for the safe and environmentally sensitive conveyance of stormwater, including the requirement that new development provide for on-site detention of stormwater; and

WHEREAS, said revisions were reviewed by the Planning Commission at a public hearing and approved with the recommendation that developers be provided the option to contribute to the construction of a regional detention pond system in lieu of providing on-site detention; and

WHEREAS, said revisions were reviewed by City Council at a public meeting, and at that time City Council directed staff to provide for the adoption of provisions that would permit the payment of a fee-in-lieu of on-site detention; and

WHEREAS, staff working with the Planning Commission's Land Development Service Committee has recommended that a drainage utility be created in order to provide funding for the Regional Detention Pond System and Channel Improvement Program; **NOW THEREFORE**.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF SAN ANTONIO:

SECTION 1. Chapter 34 (entitled "Water and Sewers") of the San Antonio City Code is hereby amended by adding a new Article VII, Sections 34-1101 through 34-1116, inclusive, (entitled "Drainage Utility") as is set forth in Appendix A of this ordinance and which is hereby adopted and approved as if fully set forth herein.

SECTION 2. Chapter 35, Exhibit B (entitled "Forms") is amended to include Section 35-B212, Form L (entitled "Regional Stormwater Management Participation Form") and Section 35-B213, Form M (entitled "City of San Antonio Drainage Department HEC Submittal Checklist") as is set forth in Appendix B of this Ordinance and which is adopted as if fully set forth herein.

SECTION 3. Chapter 35 Article I, Division 3, Section 35-1041 (entitled "Definitions") is hereby amended by adding the language that is underlined (added) to the existing text of said section as follows:

Sec. 35-1041. Definitions.

Drainage System: All streets, gutters, inlets, swales, storm sewers, channels, streams, or other pathways, either naturally occurring or man-made, which carry and convey stormwater during rainfall events.

Flood insurance rate map (FIRM): *Means an official map of a community, on which the Federal Emergency Management Agency has delineated both the areas of special flood hazards and the risk premium zones applicable to the community. The map is divided into zones which are used for setting rates of flood insurance. Insurance rates, the type of permit, and requirements of the permit will vary depending on the zone in which a property is located.*

Regional Stormwater Improvements (RSI): means regional detention and retention ponds, watershed protection, land purchase, waterway enlargement, channelization, and improved conveyance structures.

Stormwater Drainage Fees: A method or mix of methods for providing adequate, stable and equitable funding for a comprehensive storm water or drainage program. The financing mechanisms included in the method may include, but not be limited to, user fees, new development impact fees, or surcharges on other utility fees.

Swale: A low lying or depressed stretch of land without a defined channel or tributaries.

Watercourse: A natural or man-made channel through which stormwater flows.

Watershed: A region or area bounded peripherally by a summit or high boundary line and draining ultimately to a particular watercourse or body of water.

SECTION 4. Chapter 35 Article II, Division 1, (entitled "Master Plan Elements and Conformity") is amended by adding Section 35-2039 (entitled "Drainage Master Plan") and the language that follows:

Sec. 35-2039. Drainage Master Plans.

As the City continues to define and adopt drainage master plans for specific watersheds contained in whole or in part within the City limits and its ETJ, development will be required to conform to the elements of the plan for each particular watershed. The preservation of the inherent characteristics of natural drainage features and of the natural flood plain where practical is an adopted goal of each watershed drainage plan. The guidance for the drainage master plans was provided by the Drainage Regulation Review Committee in February 1996. The first two goals stated in the report are to "Ensure that stormwater management considers and provides reasonable safety from flood hazards for people and property" and to "Integrate stormwater management with natural resource enhancement and protection, compliance with environmental regulations and with creating appropriate development." The drainage master plans developed by the City for each watershed provide long-range guidance for managing the stormwater from existing and future land uses in the most efficient ways possible, with consideration for continued development, reduced flooding potential, adequate stormwater conveyance, increased aquifer recharge, water quality, habitat protection, and increased recreational opportunities.

SECTION 5. Chapter 35 Article II, Division 1, Section 35-2052 (entitled "Impact fees") is hereby amended by adding the language that is underlined (added) to the existing text of said section as follows:

Sec. 35-2052. Impact fees.

(a) Impact fees for water and sanitary sewer capital facilities are established in Article V in accordance with the requirements of V.T.C.A., Local Government Code Chapter 395 which relates to the financing of capital improvements required by new development in political subdivisions. Chapter 395 specifically sets forth the process which political subdivisions must follow in order to impose legally authorized impact fees as a means to fund the costs of capital improvements necessitated by and attributable to new development. The city has followed that process in adopting Article V of this code. Impact fees for capital improvements related to drainage may be implemented on a watershed specific basis in conjunction with City Council adoption of individual watershed master drainage plans.

SECTION 6. Chapter 35 Article II, Division 2, Section 35-2075 (entitled "Information required") is hereby amended by adding the language that is underlined (added) to the existing text of said section as follows:

Sec. 35-2075. Information required.

(i) One hundred-year flood plain limits as identified from the most current Flood Insurance Rate Maps published by the Federal Emergency Management Agency for the City of San Antonio and/or the applicable county. <u>In cases where the one hundred-year flood plain for a particular watercourse is not shown on the published FIRM, a Professional Engineer shall develop a preliminary one-hundred year flood plain for each watercourse serving a watershed in excess of 100 acres.</u>

SECTION 7. Chapter 35 Article IV, Division 2, Section 35-4011 (entitled "Development plats") is hereby amended by adding the language that is underlined (<u>added</u>) to the existing text of said section as follows:

Sec. 35-4011. Development plats.

(b) The city adopts the following general plans, rules, and ordinances to govern development plats of land within the city and its extraterritorial jurisdiction to promote the health, safety, morals, and general welfare of the city and the sage orderly, and healthful development of the city.

1) the city's master Plan, including all of its component plans
2) City Public Service's plans and regulations pertaining to the extension of electric and gas service
3) San Antonio Water System's Waterworks Master Plan.
4) the Unified Development Code (Chapter 35 of the City Code)
5) <u>Any applicable watershed Master Drainage Plan adopted by the City.</u>

SECTION 8. Chapter 35 Article IV, Division 3, is (entitled "Subdivision Design Standards") is amended by adding Section 35-4020 (entitled "General Design Guidelines") and the language that follows:

Sec. 35-4020. General Design Guidelines.

In May 1994, the San Antonio City Council appointed a Drainage Regulation Review Committee to make recommendations concerning the City's management of stormwater drainage. The City recognizes that watercourses and their associated watersheds within the city of San Antonio's jurisdiction represent significant and irreplaceable recreational and aesthetic resources and contribute to the economic and environmental health of the City. In addition, all of the watersheds within the City are vulnerable to concentrated surface water runoff, disturbance of wildlife habitat, nonpoint source pollution and sedimentation resulting from development activities and should be developed in a sensitive and innovative manner. In order to minimize the possibility of adverse impacts on both water quantity and water quality during development, the following general standards shall apply to all development:

(a) All land disturbing or land filling activities or soil storage shall be undertaken in a manner designed to minimize surface runoff, erosion and sedimentation, and to safeguard life, limb, property and the public welfare in accordance with the City of San Antonio clearing and grading ordinance. Innovative land management to reduce clearing and disruption of natural vegetation and soils is encouraged. Clearing of existing vegetation or any other development activities by the site owner or developer should be limited to those necessary for surveying or geological testing before release of a development plan or subdivision construction plans by the City. Site plans which incorporate natural floodplains and green belts into the overall development concept are strongly supported by the City.

(b) Innovative runoff management practices designed to meet Section 35-4029 of the UDC. enhance the recharge of groundwater. and maintain the function of critical environmental features are encouraged.

(c) Erosion and sedimentation controls in accordance with the specifications established by the Director of Public Works in compliance with the National Pollution Discharge Elimination System permitting requirements for the City are required.

(d) Projects shall not be considered complete until restoration has been made in accordance with NPDES requirements.

(e) Where possible, multiple uses of drainage facilities and open space shall be incorporated by the owner or developer of a new subdivision. Alternative uses such as public recreation, horse/bike/hiking trails, walking paths, nature preserves, wildlife habitat areas, etc. are encouraged subject to the approval of the Director of Public Works.

SECTION 9. Chapter 35 Article IV, Division 3, Section 35-4029 (entitled "Drainage facilities") is hereby amended by adding the language that is underlined (added) and deleting the language that is stricken (~~deleted~~)to the existing text of said section as follows:

Sec. 35-4029. Drainage facilities.

~~Drainage facilities shall be provided and constructed as specified in Exhibit A included at the end of this chapter.~~

The recommendations contained in the report from the Drainage Regulation Review Committee have been incorporated into the following guidelines for the design and construction of drainage facilities within the City of San Antonio.

(a) The owner or developer of property to be developed shall be responsible for the conveyance of all stormwater flowing through the property. This responsibility includes the stormwater flowing onto the property by any other developed property as well as the drainage naturally flowing through the property by reason of topography. Future upstream development shall be accounted for by assuming ultimate development when sizing drainage systems as specified in Exhibit A, Division 4 of this chapter.

(b) New Development: Peak stormwater runoff rates from all new development shall be less than or equal to the peak runoff rates from the site's predevelopment conditions for the 5-, 25- and 100-year design storm events, except as provided in Section e(3) which follows.

(c) Redevelopment: Peak stormwater runoff rates from an area of redevelopment due to zoning or replatting shall be less than or equal to the peak runoff rates produced by existing development conditions for the 5-, 25- and 100-year design storm events, except as provided in Section d (3) which follows.

(d) Stormwater Detention: Stormwater detention shall be required for all new developments or redevelopment of individual parcels of property to mitigate peak flowrates to predevelopment or existing development conditions as stated in (b) and (c) above.

(1) The maximum allowable outflow rate from the detention facility must be restricted to the flow rate from the undeveloped or existing development tract for the 5-, 25- and 100-year frequency. Best Management Practices shall be used in the design of detention facilities in accordance with Exhibit A, Division 4 of this chapter, and standards defined by the

Director of Public Works. The timing of the hydrograph released from the detention facility must be checked against the timing of the flowrate in the first open watercourse to prevent any increase in the peak flowrate in the receiving watercourse. For detention basins constructed in-line on an existing watercourse, the creation of the basin shall not increase flood elevations in the channel upstream of the new development boundaries

(2) On-site detention is required where regional detention facilities are not available. On-site detention facilities must be privately owned and should be maintained by the community association or property owner. A maintenance schedule shall be submitted to the Public Works Department and approved by the Director of Public Works prior to approval of construction plans.

(3) General locations and sizes of regional detention facilities have been identified in the Master Drainage Plan for the major watersheds in the City's jurisdiction. The ownership of regional detention facilities may either be public or private. The creation of private regional detention facilities designed to service one or several developments is encouraged. In watersheds where public regional detention facilities exist, mitigation of increased stormwater runoff from new construction must be located in these facilities. In the design of drainage facilities for new development or redevelopment upstream of a regional detention facility, the Base Flood Elevation (BFE) in the receiving channel may not be increased between the development and the regional detention facility, unless the increased floodplain is contained within an easement or the receiving channel has sufficient capacity to contain the increased BFE within its banks. Temporary detention may be required for the development until sufficient capacity in the outfall channel is provided to accommodate increased flows. Maintenance of publicly owned facilities will be the responsibility of the City. Maintenance of private facilities is the responsibility of the property owner or the community association and must be specified in the maintenance schedule submitted to the City. A maintenance schedule for both publicly owned and privately owned facilities must be approved by the Director of Public Works prior to approval of construction drawings.

(4) Multi-Use Facilities are encouraged (e.g., enhance water quality, satisfy NPDES requirements, enhance ground water recharge, provide open space, provide recreation or other amenities, and/or provide habitat) and may be utilized on a case-by-case basis.

(5) The use of multi-use detention facilities to alleviate existing flooding problems, enhance and provide amenities for older neighborhoods, and support the revitalization of economically depressed areas is encouraged in public and private redevelopment initiatives.

(6) Stormwater retention with permanent wet pool or pumped detention systems will not be acceptable methods of stormwater mitigation unless the facility will remain privately owned, operated, and maintained. The City will approve the use of a pumped facility for private use under the following conditions:

(a) A gravity system is not feasible from an engineering and economic standpoint.

(b) At least two pumps are provided, each of which is sized to pump the design flowrate:

(c) The selected design outflow rate must not aggravate downstream flooding.

(d) Controls and pumps shall be designed to prevent unauthorized operation and vandalism.

(e) Adequate assurance is provided that the system will be operated and maintained on a continuous basis.

(7) Stormwater detention facilities should be located in topographically depressed areas where possible. When necessary, dams may be constructed to detain flows. All proposed dams shall conform to the following items:

(a) All dams over six feet above existing natural ground shall be approved by the Dam Safety Team of the Texas Natural Resources Conservation Commission for safety. All other new dams shall be designed in accordance with acceptable design criteria as approved by the Director of Public Works, or his authorized representative.

(b) All hydrology and hydraulic properties of a dam will be reviewed by the Department of Public Works with regard to spillway design, freeboard hydraulics, backwater curves and downstream effects due to the dam site.

(c) The spillway section of any earthen dam with a height greater than six feet shall be large enough to pass a PMP (Probable Maximum Precipitation) flood, as defined by the NRCS, without overtopping the crest of the dam in accordance with TNRCC regulations.

(d) A 100 year frequency flood shall be routed through the proposed dam and all land subject to flooding shall be dedicated as drainage easement or right-of-way. An unobstructed 15-foot access easement around the periphery of the flooded area shall be dedicated as drainage easement for facilities which require regular mowing or other ongoing maintenance, at the discretion of the Director of Public Works. An unobstructed 15 ft. access right of way shall be established which connects the drainage easement adjacent to the dam structure to a road or alley.

(e) All spillway discharges shall be adequately routed to the centerline of the natural low below the dam site. The adequate routing of spillway discharges pertains to the hydraulic routing of the 100 year frequency flood for dedication of drainage easement limits. PMP flood routing or breaches will only be considered for safety considerations (that is, the placement of buildings and the setting of minimum floor slab elevations below the dams).

(f) Maintenance of all private dam structures shall be the responsibility of the current Owner, including periodic inspection and repair of any portion found sub-standard. Maintenance issues identified by the City or State during inspections shall be the responsibility of the current owner.

(g) Any proposed concrete dam structure need not have spillway capable of routing a PMP flood, however, it shall be shown to be structurally capable of withstanding any range of flood conditions with regard to possible failure due to sliding, overturning, and structural integrity, up to and including the PMP flood.

(h) Development below existing dams will take into account the original design conditions of the existing dam. Breachage checks will be required, dependant upon location of development with respect to dam site.

(e) Regional Stormwater Management Program. The Regional Stormwater Management Program provides for the administration, planning, design and construction of regional drainage improvements using fees (stormwater development fee) paid by the owners of proposed developments. Regional Stormwater Management uses a watershed-wide approach to analyze potential flooding problems, identify appropriate mitigation measures and select site locations and design criteria for Regional Stormwater Improvements (RSI). These improvements include regional detention and retention ponds, watershed protection, land purchase, waterway enlargement, channelization, and improved conveyance structures. The Regional Stormwater Management Program allows developers to voluntarily participate in the program, with the approval of Director of the Department of Public Works, rather than constructing the on-site detention controls required by Subsection (b), (c) and (d) of this Section where the resulting use of the regional drainage improvements will produce no identifiable adverse impact to other properties due to the increased runoff from the proposed development.

The stormwater development fee in lieu of on-site detention must be paid prior to a plat being released for recordation by the City of San Antonio. The fee shall be determined in accordance with the provisions of Chapter 34 , Article VII of this Code.

(f) Streets. Streets may be designed to convey stormwater runoff in accordance with the design criteria established in Exhibit A, Division 4 of this chapter; however, all weather lanes on arterial and collector public streets shall be required to allow vehicular access.

(1) One lane in each direction on arterial streets shall remain free of water during a 25-year storm event. A maximum flow depth to the top of curb on a standard collector street section will be allowed during a 25-year storm event. An arterial street is a street so designated on the current major thoroughfare plan. A collector street is a street with a width of forty-four (44) feet or more and not shown as an arterial street on the current major thoroughfare plan. Design of streets shall consider public safety and limit potential conflicts between stormwater conveyance, traffic, parking, pedestrian access, ADA requirements, and bicycle traffic.

(2) Where streets cross existing or proposed watercourses, all weather crossings shall be required. Culverts or bridges shall be adequate to allow passage of the 25 year design storm, plus required freeboard, or the 100 year frequency design storm, whichever is greater. If the watercourse is designed for the 25 year frequency, the structure must pass this flow. In addition, calculations must be presented which show that the structure does not increase the 100 year flood plain elevations upstream or downstream of the crossing, unless the increase in the 100 year floodplain is contained within a drainage easement. In cases of streets crossing major creeks or rivers as defined by the City's Flood Plain Ordinance (Ord. No. 57969), the structure shall be designed to provide for the passage of the 100 year frequency storm event.

(3) Local street design shall consider the following in regard to street stormwater conveyance:

(a) Stormwater conveyance on local streets shall be designed to account for the cumulative impact of peak flows and runoff volumes on the local system as it progresses downgrade.

(b) A general note must be placed on the plat for residential lots which states that finished floor elevations must be a minimum of 8 inches above final adjacent grade. A grading plan, including slab elevations, shall be prepared which indicates a drainage plan for all lots in the subdivision. Grading plans must include specific paths for the direction of drainage flow away from the building pads on the lot.

(c) Curb cuts for driveways on all streets shall be designed for compatibility with the stormwater conveyance function of streets.

(d) Potential flooding problems or conflicts at the connection points where new or modified drainage systems (including streets, storm sewers, etc.) and the existing portions of the downstream street system and stormwater conveyance system shall be identified and resolved either in the design of the new or modified drainage system or in modifications to the existing system.

(g) Drainage Channels and Watercourses. This section addresses proposed improvements or modifications to drainage channels and watercourses required to convey stormwater runoff from or through the proposed development.

(1) Except as authorized by a development plan approved by the Director of Public Works or his designee, no person shall place or cause to be placed any obstruction of any kind in any watercourse within the city and its ETJ. The owner of any property within the city, through which any watercourse may pass, shall keep the watercourse free from any obstruction not authorized by a development plan.

(2) Modifications to existing watercourses or newly created open channels may be designed as earth, sodded or as concrete lined channels. Liners other than sodding or concrete which enhance the aesthetics or habitat value of the watercourse and which reduce future maintenance requirements are encouraged. Preliminary planning for the applicability of channel liners shall be reviewed with the Director of Public Works or his representative prior to the submittal of construction plans for approval. The proposed channel must be designed to convey the 25 year frequency storm with freeboard. In addition, alterations to major creeks as delineated in the City's Flood Plain Ordinance must be designed for the 100 year frequency storm event.

(3) Constructed channels or drainage improvements shall follow existing swales, or other low areas present in predevelopment areas where practical in order to minimize the cost of the improvement or modification and to allow for overland flow to follow its natural drainage pattern.

(4) The proposed channel modifications shall preserve the natural and traditional character of any existing watercourse and adjacent land to the greatest extent feasible and shall consider the natural movement and velocities of stormwater within the predevelopment watercourse.

(5) Planned multiple-use of a watercourse is encouraged (e.g. bike paths or greenbelt). If multiple use of the watercourse is to be incorporated, the maintenance of the amenities will be the responsibility of the community association or a public entity. These amenities would require special overlay easements for public or private use. Property will be dedicated to the City for drainage and specifically identified multi-use purposes.

(6) Design of new channels or alterations to existing channels shall consider future maintenance requirements. A maintenance schedule must be submitted to and approved by the Director of Public Works prior to approval of construction plans.

(h) Construction of habitable structures within the regulatory flood plain is not allowed. No development or other encroachment is allowed in a floodplain which will result in any increase in the base flood elevations within the flood plain during discharge of water of a base flood, unless the floodplain is contained within an easement. Where construction of roads, bridges or other nonhabitable structures in the floodplain is allowed by the Director of Public Works, a Professional Engineer registered in the State of Texas must provide an engineering analysis indicating that the foundation and structure will not cause any increase in the elevations of the base flood unless the floodplain is contained within an easement.

(i) Preservation of the natural floodplain and native vegetation contained therein is encouraged. Understory growth which impedes flow may be cleared within the banks of watercourses within the proposed development with Public Works approval but removal of large trees with diameters greater than eight inches is discouraged. Lower branches of large trees may be trimmed to provide a vertical clearance of eight feet. The alteration of natural vegetation or unique features within the floodplain of major watercourses shall comply with the appropriate Master Drainage Plan for the watershed. Permanent alterations to natural vegetation must be included in the maintenance schedule submitted to the City.

(j) Diversion of stormwater away from the natural watercourse will not be allowed except within the boundaries of the property controlled by the Developer, provided that the diverted water is returned to the watercourse within which it would naturally have been flowing prior to leaving the Developer's property. An analysis of the timing of the diverted hydrograph on watersheds greater than 20 acres, as it reenters the receiving watercourse, must be performed to show that the peak flowrate in the receiving watercourse has not been increased as a result of the diversion.

(k) The proposed subdivision shall have at least one vehicular access above the regulatory flood plain of an existing dedicated street or roadway. All proposed subdivisions traversed by an area of floodplain where the "buildable" portion of the subdivision is severed by the flood plain, shall provide an adequate access to the "buildable" portion of every lot. An adequate access shall be as defined by Attachment "C" of the Flood Plain Ordinance (Ord. No. 57969).

(l) Submittal: To standardize the review process and minimize the time for approval by the City during review of the plat and construction drawings for a subdivision, a complete submittal regarding the analysis of existing drainage conditions and the design of modifications or new drainage facilities is necessary. The owner of the property to be developed is required by the Director of Public Works to provide, at the owners expense and as a condition of construction plan approval, a drainage report for the total development area to be ultimately constructed. The drainage report must include a letter signed and sealed by a Professional Engineer with text descriptions, exhibits, calculations and models. The drainage report will contain all of the necessary support data, methodologies used in calculations, and conclusions. A checklist is included in Exhibit B of this chapter that will be used by the City reviewer as a guide during the evaluation of all stormwater drainage reports submitted to the City. The purpose of the checklist is to expedite the review process for both the engineer and the City, and to aid the engineer in the preparation of reports for the City's review. The drainage report shall be submitted to the Director of Public Works prior to approval of any construction plans.

SECTION 10. Chapter 35 Article IV, Division 4, Subdivision A, Section 35-4119 (entitled "Street construction") is hereby amended by adding the language that is underlined (added) to the existing text of said section as follows:

Sec. 35-4119. Street construction.

(a) All streets shall be constructed, with respect to base, surfacing, curbs, and geometric design criteria in accordance with the standards and specifications described in Exhibit A, and shall be subject to inspection and approval by the Director of Public Works.

(b) Streets. Streets may be designed to convey stormwater runoff in accordance with the design criteria established in Exhibit A, Division 4 of this chapter; however, all weather lanes on arterial and collector public streets shall be required to allow vehicular access.

(1) One lane in each direction on arterial streets shall remain free of water during a 25-year storm event. A maximum flow depth to the top of curb on a standard collector street section will be allowed during a 25-year storm event. An arterial street is a street so designated on the current major thoroughfare plan. A collector street is any street with a width of forty-four (44) feet or more and not shown as an arterial street on the current major thoroughfare plan. Design of streets shall consider public safety and limit potential conflicts

between stormwater conveyance, traffic, parking, pedestrian access, ADA requirements, and bicycle traffic.

(2) Where streets cross existing or proposed watercourses, all weather crossings shall be required. Culverts or bridges shall be adequate to allow passage of the 25 year design storm, plus required freeboard, or the 100 year frequency design storm, whichever is greater. If the watercourse is designed for the 25 year frequency, the structure must pass this flow. In addition, calculations must be presented which show that the structure does not increase the 100-year flood plain elevations upstream or downstream of the crossing, unless the increase in the 100 year floodplain is contained within a drainage easement. In cases of streets crossing major creeks or rivers as defined by the City's Flood Plain Ordinance (Ord. No. 57969), the structure shall be designed to provide for the passage of the 100 year frequency storm event.

(3) Local street design shall consider the following in regard to street stormwater conveyance:

(a) Stormwater conveyance on local streets shall be designed to account for the cumulative impact of peak flows and runoff volumes on the local system as it progresses downgrade.

(b) A general note must be placed on the plat for residential lots which states that finished floor elevations must be a minimum of 8 inches above finished adjacent grade. A grading plan, including slab elevations, shall be prepared which indicates a drainage plan for all lots in the subdivision. Grading plans must include specific paths for the direction of drainage flow away from the building pads on the lot.

(c) Curb cuts for driveways on all streets shall be designed for compatibility with the stormwater conveyance function of streets.

(d) Potential flooding problems or conflicts at the connection points where new or modified drainage systems (including streets, storm sewers, etc.) and the existing portions of the downstream street system and stormwater conveyance system shall be identified and resolved either in the design of the new or modified drainage system or in modifications to the existing system.

SECTION 11. Chapter 35 Article IV, Division 5, Subdivision B, Section 35-4213 (entitled "Data required for letters of certification") is hereby amended by adding the language that is underlined (added) to the existing text of said section as follows:

Sec. 35-4213. Data required for letters of certification.

(a) To obtain the required letters of certification, an applicant for plat approval shall submit the following data to the certifying agencies/departments. All data shall be annotated with the plat number of the associated plat.

(b) To the director of public works:

(1) Streets, alleys, sidewalks, crosswalks and drainage structures. Three (3) copies of plans and profiles as specified by Exhibit A to these regulations. Also, if a proposed plat traverses or is contiguous with a state maintained facility, a permit from the State Department of Highways and public Transportation indicating approval of the proposed access point and right-of-way.

(2) Storm drainage.

a. Two (2) copies of the proposed plat showing two-foot contours in areas where the slope does not exceed five (5) percent and five-foot contours in areas where the slope exceeds five (5) percent. All street widths and grades shall be indicated on the plat, and runoff figures shall be indicated on the outlet and inlet side of all drainage ditches and storm sewers and at all points in the street at changes of grade or where the street enters another street or storm sewer or drainage ditch. Drainage easements shall be indicated.

b. A general location map of the subdivision showing the entire watershed. (A USGS quadrangle is satisfactory.)

c. Calculations showing the anticipated storm water flow including watershed area, percent runoff and time of concentration. <u>The 100 year floodplain limits as identified for the most current FIRM published by FEMA for the City of San Antonio and/or the applicable county shall be shown on the proposed plan and submitted with the drainage report. In the case that the floodplain boundary for a watercourse is not shown on the FIRM, a Professional Engineer, using methodologies approved by the Director of Public Works, shall develop the 100 year flood plain limits for each watercourse serving a watershed in excess of 100 acres.</u>

d. When a drainage channel, storm sewer or other drainage facility or other requirements are necessary, complete plans and specifications shall be submitted showing complete construction detail, including calculations showing <u>the</u> basis for design <u>performed</u> in accordance with Exhibit A <u>and included in a Submittal Report as outlined in Section 35-4029 (l)</u>.

SECTION 12. Chapter 35 Article IV, Division 5, Subdivision B, Section 35-4218 (entitled "Standards for approval") is hereby amended by adding the language that is underlined (<u>added</u>) to the existing text of said section as follows:

Sec. 35-4218. Standards for approval.

The planning commission shall approve a plat if it conforms to:

(a) The master plan of the city and its current and future streets, alleys, parks, playgrounds, and public utility facilities;

(b) The transportation plan and major thoroughfare plan for the extension of major thoroughfares, streets, and public highways within San Antonio and in its extraterritorial jurisdiction, taking into account access to and extension of sewer and water mains and the instrumentalities of public utilities;

<u>(c) Any applicable watershed Master Drainage Plan adopted by the City.</u>

<u>(d)</u> The rules and regulations contained within this chapter.

SECTION 13. Chapter 35 Article IV, Division 5, Subdivision B, Section 35-4284 (entitled "Drainage easements") is hereby amended by adding the language that is underlined (<u>added</u>) and deleting the language that is stricken (~~deleted~~)to the existing text of said section as follows:

Sec. 35-4284. Drainage easements.

(a) Where a subdivision is traversed by a watercourse, drainageway, natural channel or stream, there shall be provided an easement or right-of-way conforming substantially to the limit of such watercourse, plus additional width to accommodate future needs. Such easement or right-of-way requirements shall be determined by the criteria set out in Exhibit A included at the end of this chapter. ~~Easements for earth channels shall extend a minimum of two (2) feet on one side and fifteen (15) feet (or seventeen (17) feet when utilities are installed) on the opposite side of the extreme limits of the channel, when such channel does not abut an alley or roadway.~~ If the easement contains utilities the easement or right-of-way shall be increased to 17 feet on that side of the channel, to provide access to the channel for maintenance purposes and to provide access to the utility companies. Such access areas shall slope towards the channel at a rate of not more than 1 inch per foot per foot in width. Earthen channels used for interceptor drains for intercepting sheet flow may be constructed without an access road if they comply with the design standards to interceptor drains. Where designed channel bottoms exceed 100 feet in width, the fifteen foot extra width shall be provided on both sides of the channel. A driveable access way shall be provided in flood plain easements for the length of the easement when regular maintenance of the floodplain is required.

Easements for natural watercourses shall be the 100 year floodplain or the 25 year plus freeboard whichever is greater. In floodplain areas where ongoing maintenance is required or the floodplain will be reserved for use by the public or neighborhood association, the drainage easements shall be maintained by the neighborhood association or a public entity and the property will be dedicated to the City as a multi-use drainage easement.

(b) An unobstructed access right of way connecting the drainage easement with an alley or roadway parallel to or near the easement shall be provided at a minimum spacing of one access right of way at approximately 1,000-foot intervals. The access right of way shall be a minimum of 15 feet in width and shall be maintained clear of obstructions that would limit vehicular access.

(c) In those cases where drainage easements cross lot and property lines, a statement shall be added to the plat that no fencing or structures that will interfere with adequate drainage flow will be allowed on or across such lines. Fencing will be allowed across drainage easements only in accordance with the following restrictions:

(1) Bottom of fence shall be a minimum of the flow depth, plus freeboard above design flow line of channel or drain.

(2) A hinged gate will be placed across the entire width of the drainage easement.

(d) Interceptor drainage easements and channels shall be provided where the drainage area to the back of platted lots exceeds one average residential lot depth. Interceptor drains shall be constructed prior to the issuing of building permits on any lot that would be affected by natural drainage being intercepted.

(e) All developments shall provide for adequate drainage and outfall easement at the lower end of the site into an existing street, alley, drainage easements or right-of-way, or to the centerline of an existing natural drain. Where proposed street, storm sewer, or open channel does not discharge into a natural low or into an existing adequate drainage easement within the property being developed, then facilities and drainage easements of adequate width to contain the design discharge shall be constructed and dedicated to the centerline of an existing natural low within the same watershed. However, where the natural low lies within the developer's property, the developer will be required only to plat an easement to the centerline of the natural low, provided that the easement is adequate to accommodate the facilities that will be built in conjunction with the future development of that property.

SECTION 14. Chapter 35 Article IV, Division 7, Subdivision A, Section 35-4304 (entitled "Statement of Purpose") is hereby amended by adding the language that is underlined (added) and deleting the language that is stricken (~~deleted~~)to the existing text of said section as follows:

35-4304. Statement of purpose.

~~It is the purpose of this division to promote the public health, safety, and general welfare and to minimize public harm and private losses in special flood hazard areas with provisions designed:~~

The purpose of this division is to provide land use controls necessary to qualify the City for flood insurance under requirements of the National Flood Insurance Act of 1968 with provisions designed:

(a) To protect human life and property exposed to the hazards of flooding;

(b) To avoid increasing flood levels or flood hazards or creating new flood hazards areas;

(c) To minimize public and private property losses due to flooding;

(d) To preserve the natural floodplains where at all possible;

~~(b)~~(e) To ensure that potential property owners are notified if property is in a special flood hazard area;

~~(c)~~(f) To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

~~(d)~~(g) To minimize prolonged business interruptions;

~~(e)~~(h) To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in special flood hazard areas;

~~(f)~~(i) To minimize expenditure of future public money for costly flood control projects; and

~~(g)~~(j) To help maintain a stable tax base by providing for the sound use and development of flood prone areas in such a manner as to minimize future flood blight areas.

SECTION 15. Chapter 35 Article IV, Division 7, Subdivision A, Section 35-4305 (entitled "Methods of reducing flood losses") is hereby amended by adding the language that is underlined (added) and deleting the language that is stricken (~~deleted~~)to the existing text of said section as follows:

Sec. 35-4305. Methods of reducing flood losses.

In order to accomplish its purposes, this division uses the following methods:

(a) Restricts or prohibits uses that are dangerous to health, safety or property in times of flood, or cause ~~excessive~~ increases in flood heights or velocities:

(b) Requires that uses vulnerable to floods, including public facilities which serve such uses, be protected against flood damage at the time of initial construction;

(c) Controls~~, in the sense or providing authoritative guidance,~~ the alteration of natural flood plains, their protective barriers and stream channels;

(d) Prevents the construction of barriers which will divert flood waters and subject other lands to greater flood hazards;

(e) Controls~~, in the sense of providing authoritative guidance,~~ development which would cause greater erosion or potential flood damage such as grading, dredging, excavation, and filling.

SECTION 16. Chapter 35 Article IV, Division 7, Subdivision A, Section 35-4308 (entitled "Basis for establishing the areas of special flood hazards") is hereby amended by adding the language that is underlined (<u>added</u>) and deleting the language that is stricken (~~deleted~~)to the existing text of said section as follows:

Sec. 35-4308. Basis for establishing the areas of special flood hazards.

The areas of special flood hazard identified by the Federal Emergency Management Agency in a scientific and engineering report entitled "The Flood Insurance Study for the City of San. Antonio, Texas", ~~dated December 15, 1983,~~ <u>updated periodically by the Federal Emergency Management Agency,</u> together with the accompanying Flood Insurance Rate Maps and Flood Hazard Boundary--Floodway Maps and any revisions thereto, are hereby adopted by reference and declared to be a part of these regulations. The areas of special flood hazard identified by the Federal Emergency Management Agency on its Flood Insurance Rate Maps (FIRM), ~~Community Panel Number 480045 0001-0059, dated December 15, 1983~~ <u>currently published for the City of San Antonio and surrounding counties</u> shall be used as the controlling study for the base flood (100-year frequency flood) within the city limits of San Antonio <u>and its ETJ</u>. Similar studies done by FEMA shall also be used for control in the city of San Antonio's area of extraterritorial jurisdiction, along with the flood plain information reports prepared by the United States Corps of Engineers, and the United States Geological Survey, Water Resources Division District Office, Austin, Texas, 1:24,000 U.S.G.S. quadrangle maps as prepared for the Federal Emergency Management Agency or the latest revisions thereof. These reports and maps are available for inspection by the public in the office of the city drainage engineer. <u>Information and studies sanctioned and adopted by City Council subsequent to publication of the Flood Insurance Study and associated FIRM which update the base flood elevations, flood plain boundaries or flows shall also be used for control.</u>

SECTION 17. Chapter 35 Article IV, Division 7, Subdivision B, Section 35-4322 (entitled "Duties and responsibilities of flood plain administrator") is hereby amended by adding the language that is underlined (<u>added</u>) and deleting the language that is stricken (~~deleted~~)to the existing text of said section as follows:

Sec. 35-4322. Duties and responsibilities of flood plain administrator.

Duties and responsibilities of the city flood plain administrator shall include, but not be limited to:

(a) Maintain and hold open for public inspection all record pertaining to the provisions of these regulations;

(b) Review, approve or deny all applications for development permits required by section 35-4331 of this chapter;

(c) Review permits for proposed development to assure that all necessary permits have been obtained from these federal, state or local governmental agencies from which prior approval is required;

(d) Where interpretation is needed as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions) the Director of Public Works shall make the necessary interpretation;

(e) Notify adjacent communities ~~and the Texas Water Commission~~ prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency.

(f) Assure that maintenance is provided within the altered or relocated portion of a watercourse so that the flood carrying capacity is not diminished, where appropriate easements are provided;

(g) When base flood elevation data for various flood prone areas has not been provided in accordance with section 35-4308, the director of public works shall obtain, review, and reasonably utilize any base flood elevation data available from a federal, state or other source, in order to administer the provisions of this division.

(h) Construction of habitable structures within the regulatory floodplain (base flood) is not allowed unless the flood plain is revised with a flood plain permit. No new construction, substantial improvements, or other development (including cut and/or fill) shall be permitted within zones A and A0-A30 on the community's flood insurance rate maps unless it is first demonstrated by engineering data submitted by the applicant's engineer in accordance with the various requirements and procedures as set forth in this division that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood at any point within the community.

SECTION 18. Chapter 35 Article IV, Division 7, Subdivision B, is amended by adding Section 35-4323 (entitled "enforcement") add adding text of said section as follows:

Sec. 35-4323. Enforcement.

If any person violates any provisions of these regulations, the Director of Public Works shall notify the City Attorney and direct him to take whatever action is necessary to remedy the violation, including but not limited to, filing suit to enjoin the violation and submitting a request to FEMA for denial of flood insurance.

SECTION 19. Chapter 35 Article IV, Division 7, Subdivision C Section 35-4331 (entitled "requirement") is hereby amended by adding the language that is underlined (<u>added</u>) and deleting the language that is stricken (~~deleted~~)to the existing text of said section as follows:

Sec. 35-4331. Requirement.

~~A flood plain development permit shall be required for all land development in any area of special flood hazard to ensure conformance with the provisions of this division.~~

<u>Construction of habitable structures within the regulatory floodplain (100-year frequency floodplain) is not allowed. No development or other encroachment is allowed in a floodplain which will result in any increase in the base flood elevations within the floodplain during discharge of water of a base flood unless the floodplain is contained within an easement. Where construction of structures in a floodplain is allowed by the Director of Public Works, a floodplain development permit shall be required to ensure conformance with the provisions of this division. In addition, all land development in any area of special flood hazard shall be required to have a floodplain development permit.</u>

SECTION 20. Chapter 35 Article IV, Division 7, Subdivision D Section 35-4342 (entitled "Specific standards") is hereby amended by adding the language that is underlined (<u>added</u>) and deleting the language that is stricken (~~deleted~~)to the existing text of said section as follows:

Sec. 35-4342. Specific standards.

In all areas of special flood hazards where base flood elevation data has been provided in accordance with these regulations, the following provisions are required:

~~(a) *Residential construction.* New construction or substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to one (1) foot above the base flood elevation. A registered professional civil engineer, registered architect, or registered public surveyor shall submit a certification to the director of public works that the standard of this subsection is satisfied. Floodproofing will not be allowed as a substitute for the lowest floor, including basement, being elevated one (1) foot above the base flood elevation.~~

<u>(a) *Residential construction.* Construction of habitable structures within the regulatory floodplain (base flood) is not allowed unless the flood plain is revised with a flood plain permit.</u>

SECTION 21. Chapter 35, Exhibit A, Division 4 (entitled "Storm Drainage"), Sec. 35-A401 through Sec. 35-A405, inclusive, of the San Antonio City Code is hereby amended by adding the language that is underlined (<u>added</u>) and deleting the language that is stricken (~~deleted~~) to the existing text of such Sections and is set forth in Appendix C of this ordinance and which is hereby adopted and approved as if fully set forth herein.

SECTION 22. Chapter 35, Exhibits, Exhibit A, Division 6 of the City of San Antonio City Code is hereby amended by deleting the existing Figure VI and Figure X and adding new Figure VI, Figure X, Figure XIV, and Figure XV as set forth in Appendix D of this ordinance and which are hereby adopted and approved as if fully set forth herein.

SECTION 23. Attachment I is authorized for adoption into fiscal year 1997/1998 annual budget in Fund 29-023 (Stormwater Operating Fund) in Project 29-023001 (Drainage Detention

Project). The personnel complement and budget appropriations, for the Department of Public Works, contained therein is authorized.

SECTION 24. A report shall be made to City Council on an annual basis detailing the revenue and expenditure from the stormwater development fees collected and expended for the Regional Stormwater Management Program.

SECTION 25. Should any Article, Section, Part, Paragraph, Sentence, Phrase, Clause, or Word of this ordinance, or any appendix thereof, for any reason be held illegal, inoperative, or invalid, or if any exception to or limitation upon any general provision herein contained be held to be unconstitutional or invalid or ineffective, the remainder shall, nevertheless, stand effective and valid as if it had been enacted and ordained without the portion held to be unconstitutional or invalid or ineffective.

SECTION 26. It is officially found, determined, and declared that the meeting at which this ordinance is adopted was open to the public and public notice of the time, place, and subject matter of the public business to be considered at such meeting, including this ordinance, was given, all as required by Texas Revised Civil Statutes Annotated as amended Title 5, Chapter 532, Government Code. It is further found that provisions of this ordinance are intended to protect the public health, safety, welfare, and, that a public hearing was held prior to the adoption of this ordinance as required by V.T.C.A., Local Government Code Section 212.003.

SECTION 27. The publishers of the City Code and the Unified Development Code are authorized to amend said Codes to reflect the changes adopted herein.

SECTION 28. This ordinance shall become effective October 20, 1997.

PASSED AND APPROVED this the 25 th day of September, 1997.

M A Y O R
Howard W. Peak

ATTEST:
City Clerk

APPROVED AS TO FORM:
City Attorney

Appendix A

Article VII Drainage Utility

34-1101 Declaring the drainage of the City to be a public utility

City Council hereby: adopts Texas Local Government Code Chapter 402 Subchapter C (entitled "Municipal Drainage Utility Systems"); declares the drainage of the city to be a public utility, to be known as the City of San Antonio Drainage Utility: and dedicates to the drainage utility all city owned property, real and personal, facilities, materials and supplies constituting the city's drainage system as constituted on the effective date of this division and as may be acquired in the future, to be used for the purpose of the drainage utility.

34-1102 Establishment and Revision to Drainage Utility Service Area

(a) Pursuant to the authority granted by Texas Local Government Code § 402.044(8)(B) the drainage service area includes all land within the municipal boundaries and unincorporated extraterritorial jurisdiction of the City.

(b) The drainage utility district area may be extended by future city council action to the extent and in a manner authorized by state law.

34-1103 Establishment and Revision of Drainage Charges

The City Council hereby establishes drainage charges to be paid by users of benefited property in the service area of the Drainage Utility. The determination of the schedule of drainage charges is deemed nondiscriminatory, reasonable and equitable to provide regional detention and retention ponds, watershed protection, land purchase, waterway enlargement, channelization, improved conveyance structures and administration of the Drainage Utility. The schedule of authorized drainage charges is as follows:

(a) Stormwater development fee. The stormwater development fee is a one time drainage charge assessed against developers who elect to have their property served by the Drainage Utility pursuant to Sec. 35-4029(e) of this code.

(1) The stormwater development fee shall be determined by acreage and property use according to the following fee schedule:

<u>One-family (unattached) and two family (duplex) developments</u>
$1,200.00 per acre or $750.00 per lot, whichever is less

<u>Residential development - other than one-family and two-family</u>
$1,600.00 per acre

<u>Non-residential (less than 65% impervious cover)</u>
$2,600.00 per acre

<u>Non-residential (65% or more impervious cover)</u>
$3,000.00 per acre

(2) The stormwater development fee shall not be assessed against drainage easements or rights of usage (if either is in a pervious condition) or permanent detention facilities

(3) As part of the drainage report, required in Sec. 35-4029(1) of this code, the developer shall provide notice of intent to be serviced by the Drainage Utility District by filing a participation form as provided in Chapter 35 Exhibit B of this code.

(b) Stormwater drainage service fee: The stormwater drainage service fee shall be billed and collected as prescribed in Sec. 34-235 of this Code.

34-1104 through 34-1110 reserved

34-1111 Drainage Utility Fund

(a) A separate fund shall be created, effective as of the effective date of this chapter, known as the Drainage Utility Fund, for the purpose of identifying and controlling all revenues and expenses attributable to the Drainage Utility. All drainage charges collected by the City, except the stormwater drainage service fee, after the effective date of this chapter, and other monies City Council may wish to designate for this fund, shall be deposited in the Drainage Utility Fund. Such utility revenues shall be used for the purposes of administration, studies, engineering, construction, reconstruction and other reasonable and customary charges associated with the operation of the Drainage Utility. The stormwater drainage service fee shall be deposited as prescribed in Sec. 34-235 of this Code.

(b) Stormwater development fees shall be used specifically for the Regional Storm Water Management Program as authorized in Sec. 35-4029(e) of this code. These funds shall be recorded and accounted for in a manner that insures that said funds are expended solely for expenses accrued by the Regional Stormwater Management Program. The balance of funds on deposit in the account at the end of any fiscal year shall remain in the account and not be absorbed into the general fund.

34-1112 through 34-1115 reserved

34-1116 Administration; Rules and Regulations

(a) The Director of the Department of Public Works shall be responsible for the administration of this division. The Director shall develop necessary rules, regulations and procedures necessary for the administration of the chapter including a methodology for considering variances.

(b) The Director of Public Works shall develop a procedure to provide for appeals of drainage charge disputes. The procedure shall provide for a prompt hearing before and decision by the Director.

(c) The decision of the Director may be appealed to City Council. Any appeal to City Council shall be in writing and received within 15 days after the date of the Director's decision. The City Clerk shall upon receipt place the appeal on the next available City Council agenda.

REGIONAL STORMWATER MANAGEMENT PARTICIPATION FORM

DATE: ______________________________

NAME OF SITE: ______________________________

ADDRESS OF SITE: ______________________________

WATERSHED: ______________________________

TYPE OF DEVELOPMENT: ______________________________

ACREAGE OF PARTICIPATION: ______________________________

OWNER-DEVELOPER: ______________________________

ENGINEER/CONTACT: ______________________________

FIRM: ______________________ PHONE: ______________

POADP FILE NUMBER: ______________

PLAT NO. ______________

COST PER ACRE: ______________

TOTAL COST: ______________

I am the owner(s), or an agent of the owner, authorized to execute this acknowledgment, of the above described property. It is acknowledged that the proposed development of the property will impact the above noted watershed and that said development falls under the provisions of Ordinance No. __________ passed and approved the ______ day of ___________, 1997. Further, it is acknowledged that I have elected to pay a stormwater development fee, in the applicable amount as set out in the current fee schedule, in lieu of constructing on-site facilities.

____
OWNER

It is acknowledged that the stormwater development fee for development of property, as described above, is hereby accepted. It is further acknowledged that said fee shall be placed into the Regional Stormwater Management Program account and shall be used solely in the manner prescribed in Ordinance No. _______ passed and approved the ______ day of ___________, 1997.

____
CITY

CITY OF SAN ANTONIO DRAINAGE DEPARTMENT
HEC-2 SUBMITTAL CHECKLIST

Project ______________________________

Engineer ______________________________

Stream ______________________________ Date ______________

The purpose of this checklist is to aid the engineer in the preparation of HEC-2 studies and reports and to expedite the City of San Antonio's review procedure.

Submission Package

_____ Signed, sealed, and dated by a engineer certified to practice in the State of Texas

_____ Signed checklist

_____ 3-1/2" diskette with all input files

_____ Copy of condensed printouts

Narrative

_____ Table of Contents

_____ Abstract or executive summary

_____ Introduction

- _____ project description and history
- _____ location
- _____ scope and objective of analysis
- _____ previous and related studies that may effect this analysis

_____ Methodology

- _____ sources of discharges
- _____ bridge routines
- _____ base or effective models (mention source)
- _____ revised-base model
- _____ proposed model

_____ Summary, conclusions, and recommendations

- _____ water surface elevation impacts

Tables

_____ Water surface comparison table at each cross section

_____ Floodway table

_____ Cross section numbering table (if stationing changes)

Exhibits

_____ Vicinity Map

_____ Plan view of project reach

_____ Water surface profiles for design storm

_____ Channel cross sections

_____ Bridge cross sections

_____ Plan view of bridge

_____ Photographs (if available)

Appendices

_____ Pertinent correspondence (meeting notes, etc...)

_____ Survey and /or Certified "As-Built" information for all revisions to base model

_____ Sample calculations

______________________________ ______________

Name of Submitter Date

____

PE Registration Number

ATTACHMENT 1
DRAINAGE SUBDIVISION CHECKLIST

INCLUDED IN
SUBMITTAL

______ 1. U.S.G.S. Quadrangle map showing overall drainage areas, runoff coefficients, time of concentration, intensity and Q's.

______ 2. Subdivision Master Drainage Plan with overall interior drainage area of subdivision showing drainage areas, time of concentration runoff coefficients, intensities, and Q's for the street and alley flows and also channel and underground system design.

______ 3. Subdivision plat showing interior drainage areas, time of concentration, runoff coefficients, intensities, Q's for street and alley flows and also channel and underground system design.

4. <u>DRAINAGE CALCULATIONS REQUIRED FOR:</u>

______ A. Open channel design

______ B. Underground systems

______ C. Box culverts

______ D. Pipe culverts

______ E. Hydraulic jump

______ F. Super elevation in channel bends

______ G. Retard spacing

______ H. Backwater curves with cross sections

______ I. Drawdown curves with cross sections

______ J. Energy dissapators

______ K. Hydraulic grade lines of pipes

______ L. (1) Inlets on grades
(2) Inlets in sump

______ M. Drop curb openings

______ N. Sidewalk culverts

______ O. AR2/3 calculations with cross sections

______ P. Weir formulase structures:

_______ Q. Orifice formulas

_______ R. Grade to drain channels

_______ S. Upstream pickup and flared section

_______ T. Downstream Backwater Control and Flare to match downstream condition

_______ U. Show required free board

_______ V. Improper "N" value

_______ W. Improper velocity used

_______ X. Improper easement width

_______ Y. Show access road on each sodded channel

_______ Z. Improper runoff coefficient used

_______ A-A. Improper time of concentration used

_______ B-B. Improper Q's used

_______ C-C. Steel calculations for box culvert

_______ D-D. Street Q's for 5 yr. (30' street)and 25 yr. (greater than 44' street) frequency showing street capacities are correct based on Figure IX in Subdivision Regulations.

_______ 5. Subdivision Plat showing all interior drainage easements, outfall drainage easements, U.S.G.S. contour map and all other necessary drainage information.

_______ A. Show outfall drainage easements to the centerline of existing natural low.

_______ B. Show finished fill contours

_______ C. Show interceptor drainage easements

6. <u>TYPICAL DETAILS ON PLANS REQUIRED FOR:</u>

_______ A. Box culvert with headwalls or wingwalls

_______ B. Pipe culverts with headwalls or wingwalls

_______ C. Culvert headwalls shown with proper safety measures.

_______ D. Drop curb openings

_____ E. (1) Inlets on grade
(2) Inlets on sump

_____ F. Drop structures

_____ G. Retards

_____ H. Sidewalks over drains

_____ I. Guard post installations

_____ J. Guard rail on structures

_____ K. Header curb

_____ L. Energy dissapators

_____ M. Junction boxes

_____ N. Concrete lined channels with free board

_____ O. Earth sodded channels with free board

_____ P. Other concrete structures:

____

_____ Q. Grade to drain sections

_____ R. Transition sections

_____ S. Fencing for vertical wall channels greater than 2' deep

_____ T. Other: ______________________________

____

_____ U. Side slope

_____ V. Note: Adjacent lots shall be graded to provide access and drainage to adjacent street and drainage systems.

_____ 7. Complete street plans and profiles

_____ 8. Complete drainage plan and profile including the following requirements:

_____ A. Proposed flowline slopes with grades and elevations shown every 50' in profile.

_____ B. Proposed top of channel profile

_____ C. Existing ground right and left profile at property line

_____ D. Finished fill profiles

_____ E. Locations and size of culverts

_____ F. Drop structures

_____ G. Retards

_____ H. Grade to drain profiles

_____ I. Flowline elevations at every 50' station and at each structure and change in grade

_____ J. Junction boxes

_____ K. Channel plan views

_____ L. Channel sections

_____ M. Pipes with hydraulic grade lines on profile

_____ N. Cross sections of existing natural channels or lows which are not to be improved, but left in natural state and dedicated to high water calculated

_____ O. Angles, bearings, distances, etc., for structures, channels, etc.

_____ P. Lot grading layout drains

_____ Q. Culvert structural details

_____ 9. Unit and Storm Hydrographs for major streams (Over 2,000 acres

_____ 10. Drainage easements to the centerline of natural low

_____ 11. Cost Estimate

_____ 12. Engineer's Seal

_____ 13. Other

EXHIBIT A

Sec. 35-A401. Design criteria.

~~(a) Method of computing runoff. The basis of computing runoff shall be the rational formula or some other method provided it is acceptable to the director of public works.~~

~~(b) Run off calculations. Run off rates shall be computed at not less than the following:~~

~~Table IX.~~ ~~Average Runoff Percentage~~				
	~~Slope~~			
~~Character of Area~~	~~Up to 1%~~	~~Over 1% Up to 3%~~	~~Over 3% Up to 5%~~	~~Flow Over 5%~~
~~Business or commercial areas (90% or more impervious)~~	~~95~~	~~96~~	~~97~~	~~97~~
~~Densely developed areas (80% to 90% impervious)~~	~~85~~	~~88~~	~~91~~	~~95~~
~~Closely built residential areas and school sites~~	~~75~~	~~77~~	~~80~~	~~84~~
~~Undeveloped areas~~	~~68~~	~~70~~	~~72~~	~~75~~
~~Average residential areas~~	~~65~~	~~67~~	~~69~~	~~72~~

~~(c) In all cases, wet antecedent conditions shall be assumed. Runoff rates shall be computed on the basis of ultimate development of the entire watershed to the proposed subdivision. For determination of time for concentration, times shall be figured on the basis that there shall be an improved drainage system upstream from the point under construction.~~

(a) Method of computing runoff.

(1) For drainage areas less than 640 acres, the basis for computing runoff shall be the rational formula or some other method provided it is acceptable to the Director of Public Works.

(2) For drainage areas 640 acres or greater, the basis for computing runoff shall be a unit hydrograph method, preferably the Soil Conservation Service (SCS) TR-20 method as contained in the U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-1 "Flood Hydrograph Package".

(3) Hydraulic calculations for determining the impact of increased runoff due to development, of on-site or regional detention, of channel modifications or of channel structures (i.e. bridges, culverts, etc.) shall be performed by using the U.S. Army Corps of Engineers HEC-2 "Water Surface Profiles" or HEC-RAS "River Analysis System" computer models. The current hydraulic model maintained by the City of San Antonio must be updated to reflect changes in flow, channel configuration (including alterations to vegetation) and channel structures. The updated model should be submitted to the Director of Public Works for use and distribution as the latest existing conditions hydraulic model for the channel.

(b) Runoff Calculations.

(1) In all cases, wet antecedent conditions shall be assumed. For the SCS method, antecedent moisture condition II shall be used in the runoff model.

(2) For drainage areas less than 640 acres, runoff rates shall be computed at not less than the following:

Table IX.
Average Runoff Percentage

Character of Area	Slope: Up to 1%	Over 1% Up to 3%	Over 3% Up to 5%	Flow Over 5%
Business or commercial areas (90% or more impervious)	95	96	97	97
Densely developed areas (80% to 90% impervious)	85	88	91	95
Closely built residential areas and school sites	75	77	80	84
Undeveloped areas	68	70	72	75
Cultivated	35	60	80	90
Average residential areas	65	67	69	72

(3) For drainage areas 640 acres or greater, the unit hydrograph method shall be used by determining the SCS Curve Number (CN) directly from soil types and using the impervious cover parameter (RIMP in the HEC-1 model) to represent variations in land use. The SCS Curve Numbers adopted for use by the City of San Antonio are shown in Table X.

Table X.
SCS Curve Numbers by Soil Type

Hydrologic Soil Group	SCS Curve Number
A	25
B	55
C	70
D	77

The percent impervious cover for typical land use types in San Antonio are presented in Table XI. The SCS standard 24-hour rainfall distribution shall be applied for runoff calculations. Rainfall intensities as adopted for the City of San Antonio are given in Table XII and on Figure X. The lag value for a subarea shall be calculated by taking the length of the longest channel and dividing it by the average velocity in the channel (typically 2 feet per second to 8 feet per second).

Table XI.
Percent Impervious Cover by Land Use

Land Use Category	Average Percent Impervious Cover
Residential	
1/8 acre Garden or Townhouse	65 - 85%
1/2 acre Residential Lot	38%
1/3 acre Residential Lot	30%
1/4 acre Residential Lot	25%
1 acre Residential Lot	20%
Industrial	72 - 85%
Business & Commercial	85 - 95%
Densely Developed (apartments)	65 - 85%
Streets, Roads & Parking Areas	98%

Table XII.
Design Rainfall Values

Duration	Frequency				
	10-Year	25-Year	50-Year	100-Year	500-Year
5 minute	0.64	0.73	0.80	0.87	1.03
15 minute	1.39	1.59	1.75	1.91	2.25
60 minute	2.90	3.43	3.84	4.25	5.20
2 hour	3.66	4.42	4.99	5.57	6.95
3 hour	4.23	5.04	5.64	6.23	7.60
6 hour	4.99	5.89	6.52	7.13	8.47
12 hour	5.55	6.58	7.32	8.05	9.68
24 hour	6.55	7.78	8.78	9.91	12.75

Routing of the runoff hydrograph through the channel from one subarea calculation point to the next in the HEC-1 shall be computed using one of the following methods:

(a) Normal depth channel routing - for channel reaches where overbank storage is insignificant;

(b) Muskingum method - for channel reaches where channel and /or overbank storage is significant;

(c) Kinematic wave method - for channel reaches where inflow from overbank runoff or multiple point sources (Example: storm sewer outfalls) is significant and where hydrograph attenuation is insignificant.

Channel routing methodologies currently being applied in the existing HEC-1 model of the watershed should not be replaced with a different methodology without approval from the Director of Public Works. Manning's roughness coefficients ("n" values) for use in routing methods or in hydraulic calculations discussed in (a)(4) above shall be consistent with the values listed in Table XIII.

Table XIII.
Manning's Roughness Coefficient

Channel Description	Mannings "n" Value
Concrete Lined Channel	0.015
Grass Lined Channel with regular maintenance	0.035
Grass Lined Channel without recent maintenance	0.050
Vegetated Channel with trees, little or no underbrush	0.055
Natural Channel with trees, moderate underbrush	0.075
Natural Channel with trees, dense underbrush	0.090
Overbank Description	
Pasture	0.050 - 0.055
Trees, little or no underbrush, scattered structures	0.060 - 0.075
Dense vegetation, multiple fences and structures	0.075 - 0.090

(c) Runoff rates shall be computed on the basis of ultimate development of the entire watershed to the proposed development. The determination of ultimate development shall be based on consideration of the requirements of detention for new development inside the City of San Antonio and the possible lack of detention requirements for new development not within the City of San Antonio's corporate limits. Areas included within parks, green belts or regulatory flood plains shall be considered to remain undeveloped. For determination of time of concentration, times shall be computed on the basis of existing drainage system upstream from the point under consideration, unless improvements to the drainage system have been identified as planned capital improvement projects by the City of San Antonio, Bexar County, the Texas Department of Transportation, or other government entity.

(d) Street velocities for local streets may be approximated according to proposed slopes from Figure IX, Storm Drainage, Street Velocities and Capacities Flowing Curb Full. ~~Rainfall intensities shall be obtained from Figure X.~~

(e) Submittal of Development Plan. A proposal for development including a grading plan, drainage plan and such drawings, documents and other information necessary to illustrate completely the proposed development shall be submitted to the Department of Public Works prior to or concurrent with the plat submittal. The drainage plan shall include a written report which includes the following information, as applicable:

(1) A vicinity map of the site and affected reach of the outfall channel.

(2) A detailed map of the area and the outfall channel with all pertinent physiographic information.

(3) A watershed map showing the existing and proposed drainage area boundary along with all subarea delineations and all areas of existing and proposed development.

(4) Discharge calculations specifying methodology and key assumptions used including a table of discharges at key locations.

(5) Hydraulic calculations specifying methodology used, assumptions and values of the design parameters.

(6) Profiles of the affected channels, including water surface elevations for the specified design frequencies, all existing and proposed bridge, culvert and pipeline crossings, the location of all tributary and drainage confluences, and the location of all hydraulic structures.

(7) Detention basin design calculations, including those used for design of the control structure.

(8) Right-of-way and easement requirements, and a map showing locations of all rights-of-way and easements.

(9) A soils report which addresses erosion and slope stability of new or altered channels and detention facilities.

(10) A computer diskette of all existing and proposed condition HEC-1 and HEC-2 models used in analysis.

A checklist for the submittal package is included as Attachment 1. A checklist for the preparation of a HEC-2 model is included as Attachment 2.

(Ord. No. 65513, § 2(f), 8-13-87)

Sec. 35-A402. Streets.

(a) Streets may be used for storm water drainage only if the calculated storm water flow does not exceed the flows outlined in Figure IX or the velocity does not exceed ten (10) feet per second. Local streets shall be designed on a basis of a five (5) year frequency~~,~~. ~~all other streets on a ten (10) year frequency.~~ One lane in each direction on arterial streets shall remain free of water during a 25-year storm event. A maximum flow depth to the top of curb on a standard collection street section will be allowed during a 25-year storm event. Where streets are not capable of carrying storm waters as outlined above, drainage channels or storm sewers shall be provided. Street width shall not be widened beyond the width as determined by the street classification for drainage purposes.

(b) Where storm sewers are required, design shall be based on a twenty-five (25) year frequency, and the entire twenty-five (25) year discharge shall be picked up ~~at the point where the street can no longer handle the runoff flowing curb full. No allowance shall be made for overruns or partial street flows combined with storm sewer flows at initial pickup point.~~ by the inlet. Inlets and underground systems shall be designed on a twenty-five (25) year frequency; street discharges, after initial pickup, may be based upon street classification for frequency required. Partial flow past the inlet will be allowed when the capacity of all downstream street systems can accommodate the flow.

(Ord. No. 65513, § 2(f), 8-13-87)

Sec. 35-A403. Concrete lined channels.

(a) The design of concrete lined channels shall be based on a twenty-five (25) year frequency. The design is subject to the approval of the Director of Public Works and shall comply with the following general requirements:

Table ~~X~~XIV. Drainage Freeboard for Concrete Lined and Earth Channels	
Design Depth of Flow	Required Freeboard
____	
0 to feet 5 feet	0.5 foot
5 to 10 feet	10% of design depth
10 feet and over	1.0 foot

(b) From the top of the concrete lining to the top of the ditch, a side slope not steeper than two (2) horizontal to one (1) vertical shall be required; nor shall the slope be less than twelve (12) to one (1).

(c) For normal conditions, the concrete lining shall be a minimum of ~~four (4)~~ five (5) inches thick and reinforced with No. 3 round bars placed not more than eighteen (18) inches on center in both directions. Where surcharge, nature of ground, height and steepness of slope, etc. become critical, design shall be in accordance with latest structural standards. All concrete lining shall develop a minimum compressive strength of not less than ~~two thousand five hundred (2,500)~~ three thousand (3,000) pounds per square inch in twenty-eight (28) days.

(d) Maximum concrete riprap side slopes shall be one and one-half to one, unless actual soils test data submitted by soils engineer shows steeper, special design is allowable. A minimum of two hundred (200) pounds per square foot surcharge shall be used.

(e) Vertical walls will not be permissible ~~in~~ for depths greater than ~~not to exceed~~ two (2) feet unless properly fenced or enclosed.

(f) Easements or rights-of-way for concrete lined channels shall extend a minimum of two (2) feet on both sides of the extreme limits of the channel. "Extreme limits" of the channel shall mean the side slope intercept with the natural ground or proposed finished ground elevation.

(g) A minimum N value of roughness coefficient of 0.015 shall be used for a wood float type surface finish. This N value is as used in Manning's formula.

(Ord. No. 65513, § 2(f), 8-13-87; Ord. No. 73398, § 1(Att. B), 3-28-91)

Sec. 35-A404. Earth channels.

The design of earth channels shall be based on a twenty-five (25) year frequency subject to the approval of the director of public works, and shall comply with the following general specifications:

(a) The depth of the earth channel shall be for the design depth of the flow plus the required freeboard as specified in section 35-A403(a).

(b) The side slope shall not be steeper than three (3) horizon to one (1) vertical.

(c) Easements or rights-of-way for earth channels shall conform to the requirements stated in Section 35-4284 and shall extend a minimum of two (2) feet on one side and fifteen (15) feet for an access road on the opposite side of the extreme limits of the channels when such channels do not parallel and adjoin an alley or roadway. When such channels do parallel and adjoin an alley or roadway, the easement or right-of-way shall extend a minimum of two (2) feet on both sides of the extreme limits of the channel. Where utilities are installed in the access road of the drainage right-of-way, the right-of-way shall extend two (2) feet on one (1) side and seventeen (17) feet on the opposite side of the design limits of the channel. These seventeen (17) feet are to provide an access way along the channel with a maximum cross slope of one (1) ~~one-half (0.5)~~ inch per foot toward the channel. Where designed channel bottoms exceed 100 feet in width, the fifteen foot extra width shall be provided on both sides of the channel.

(d) The N value of roughness coefficient as used in Manning's formula shall ~~be 0.035 for earth channels.~~ be determined from Table XIII.

(Ord. No. 65513, § 2(f), 8-13-87)

Sec. 35-A405. Velocity control.

(a) The following velocity chart shall be used for scour protection and to determine the type of drain which shall be used. Concrete lined channels may also be used at velocities less than eight (8) feet per second if so desired by the engineer.

~~Table XIXV.~~ ~~Velocity Control~~	
~~Velocity~~	~~Type Drain Required~~
~~1 to 6 fps~~	~~Earth~~
~~6 to 8 fps~~	~~Concrete retards required~~
~~8 fps and over~~	~~Concrete lining or drop structures required~~

Table XV.
Velocity Control

Velocity (fps)	Type of Drain Required	Hydraulic Radius (ft.)	Correction Factor	Maximum Permissible Velocity (fps)
1 to 6	Earth (Maximum Average Velocity = 6 fps)	0 - 1	0.8	5
		1 - 3	0.9	5.5
		3 - 5	1.05	6.3
		5 - 8	1.15	6.9
		8 - 10	1.225	7.35
		Over 10	1.25	7.5
6 to 8	Concrete Retards	NA	NA	NA
$\geq$ 8	Concrete Lining or Drop Structures	NA	NA	NA

Exhibit A
Page 11 of 17

(b) Where velocities are in the supercritical range, allowance shall be made in the design for the proper handling of the water. For a suggested method of computing retard spacing, see Division 5, Drainage Supplement, of this exhibit.

(Ord. No. 65513, § 2(f), 8-13-87)

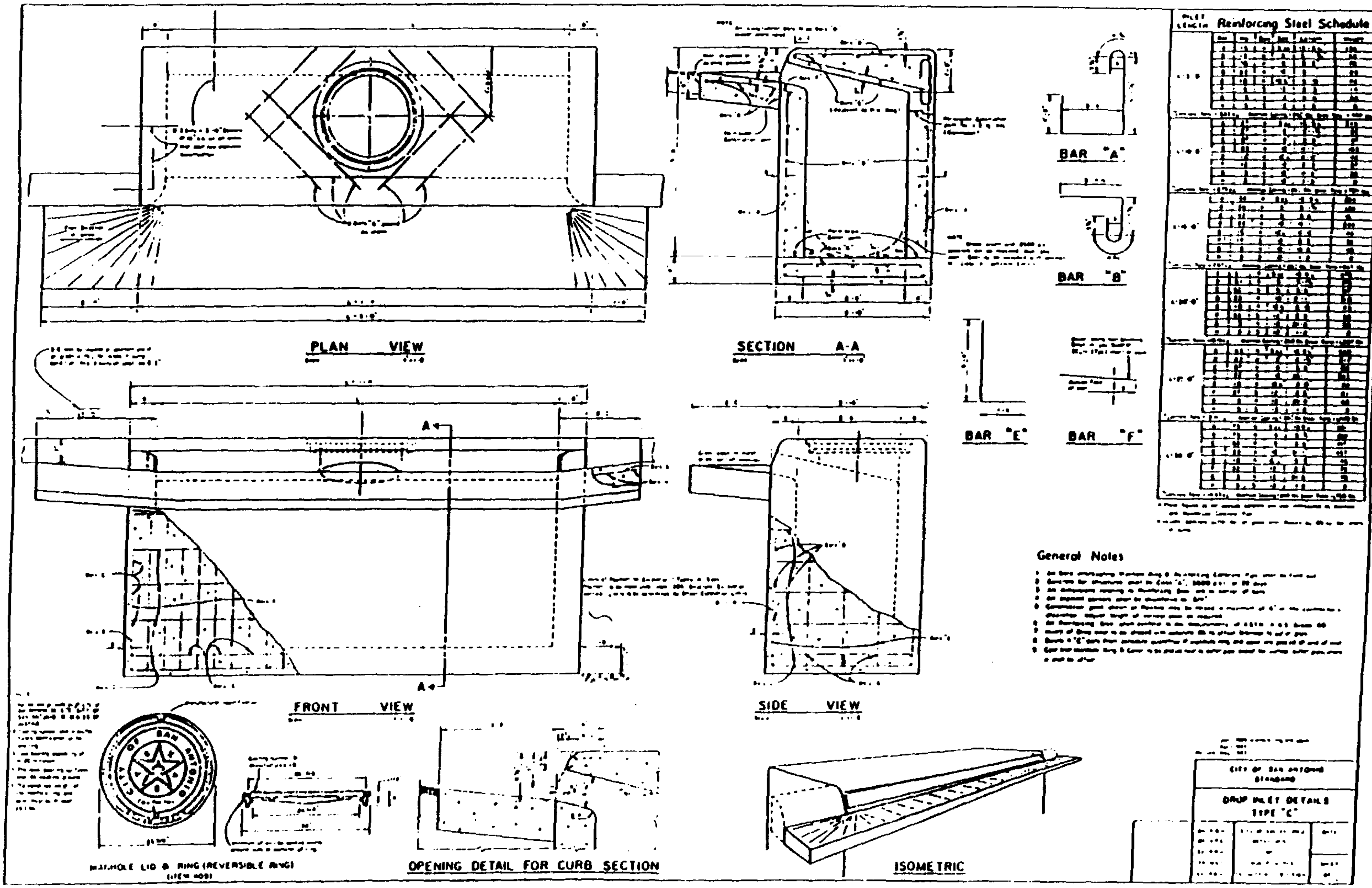
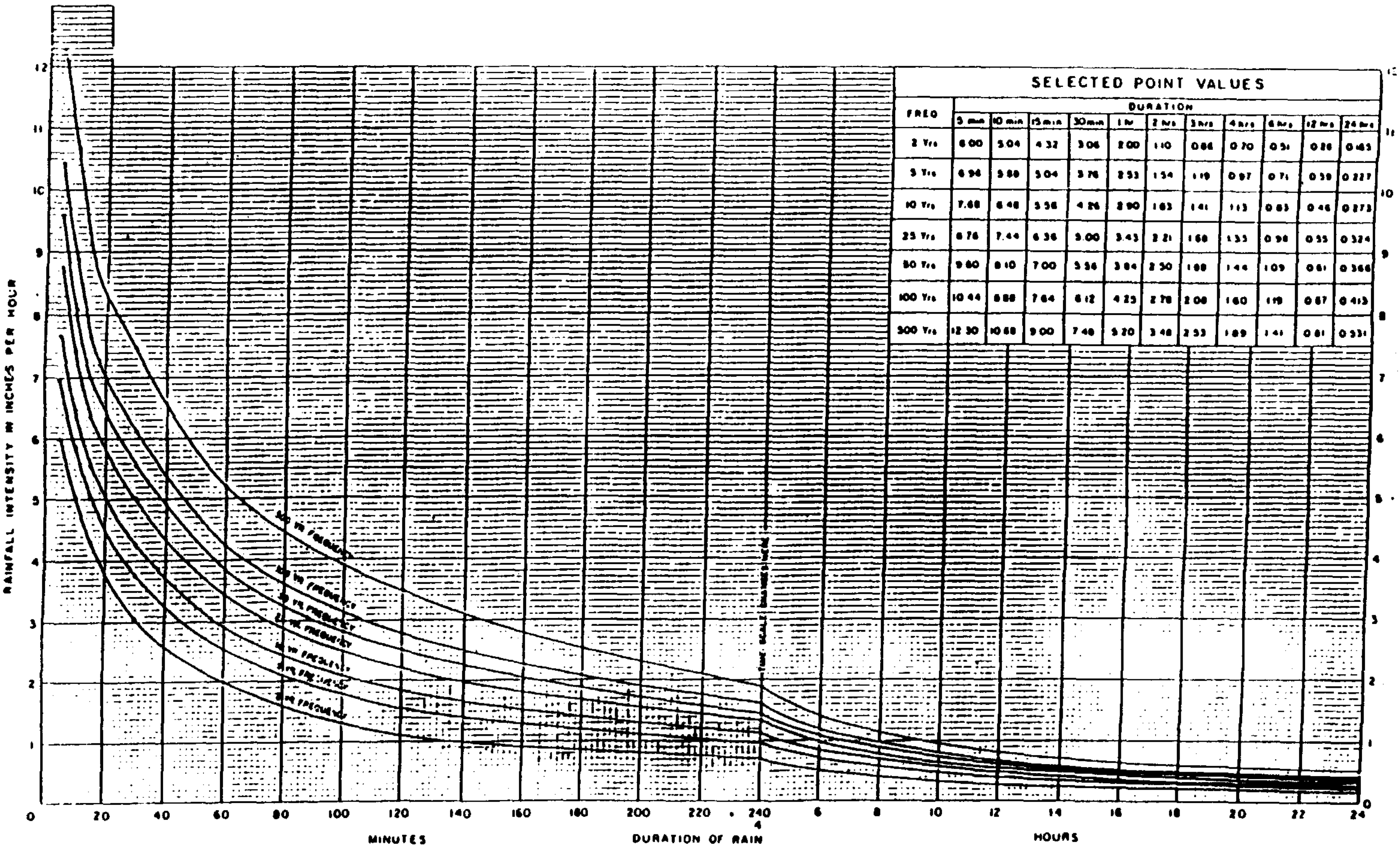

Reinforcing Steel Schedule
BAR "A"
BAR "B"
BAR "E"
BAR "F"
PLAN VIEW
SECTION A-A
FRONT VIEW
SIDE VIEW
General Notes
MANHOLE LID & RING (REVERSIBLE RING)
OPENING DETAIL FOR CURB SECTION
ISOMETRIC
DROP INLET DETAILS
TYPE "C"

Figure VI

RAINFALL INTENSITIES FOR SAN ANTONIO, BEXAR COUNTY, TEXAS

FOR VARIOUS FREQUENCIES AND DURATIONS

CITY OF SAN ANTONIO, TEXAS JANUARY, 1997



SELECTED POINT VALUES

FREQ	DURATION										
	5 min	10 min	15 min	30 min	1 hr	2 hrs	3 hrs	4 hrs	6 hrs	12 hrs	24 hrs
2 Yrs	6.00	5.04	4.32	3.06	2.00	1.10	0.86	0.70	0.51	0.28	0.145
5 Yrs	6.94	5.80	5.04	3.76	2.53	1.54	1.19	0.97	0.71	0.39	0.227
10 Yrs	7.68	6.48	5.56	4.26	2.90	1.63	1.41	1.13	0.83	0.46	0.273
25 Yrs	8.76	7.44	6.36	5.00	3.43	2.21	1.68	1.35	0.96	0.55	0.324
50 Yrs	9.60	8.10	7.00	5.56	3.84	2.50	1.88	1.44	1.09	0.61	0.366
100 Yrs	10.44	8.88	7.64	6.12	4.25	2.78	2.08	1.60	1.19	0.67	0.413
500 Yrs	12.30	10.68	9.00	7.48	5.20	3.48	2.53	1.89	1.41	0.81	0.531

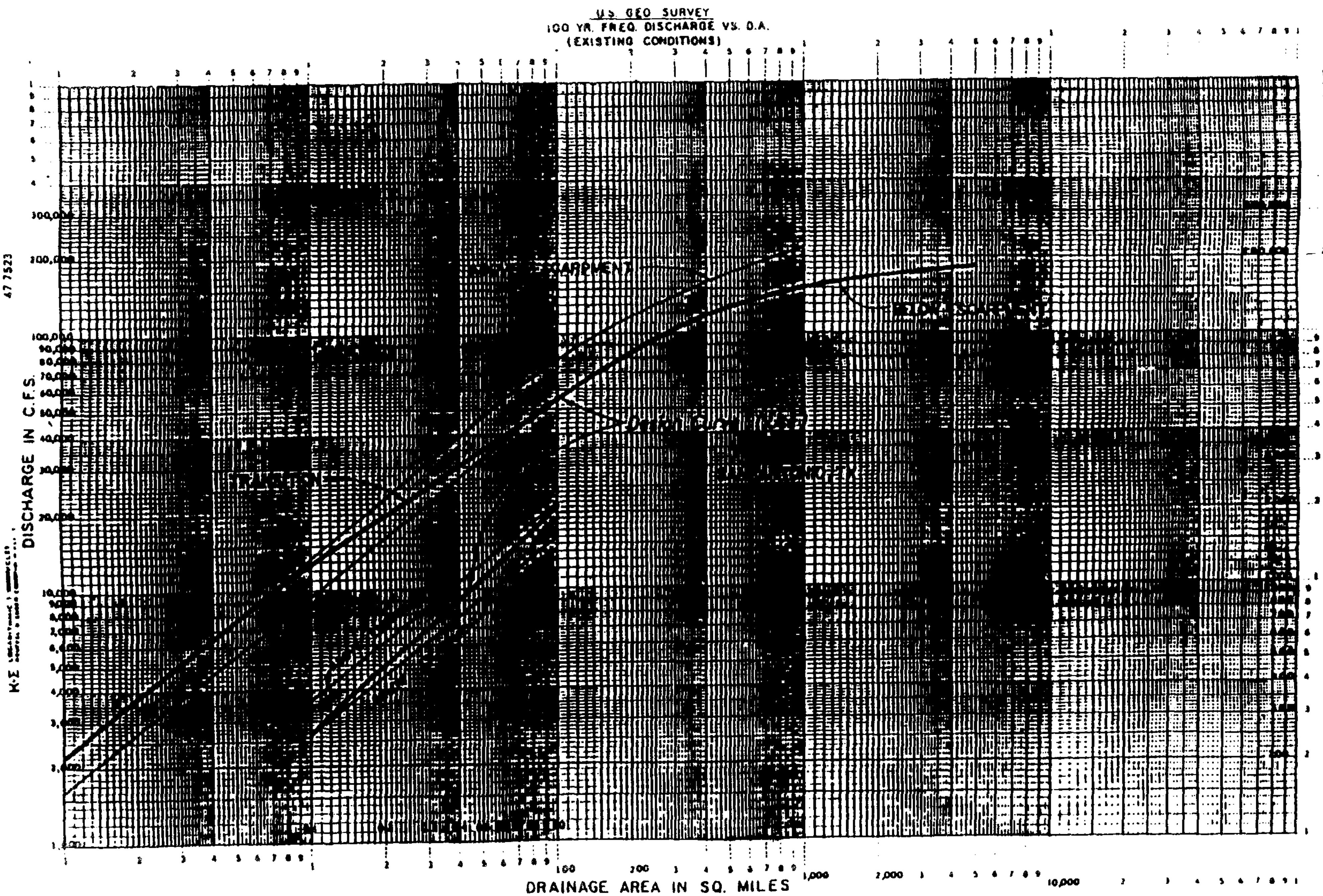
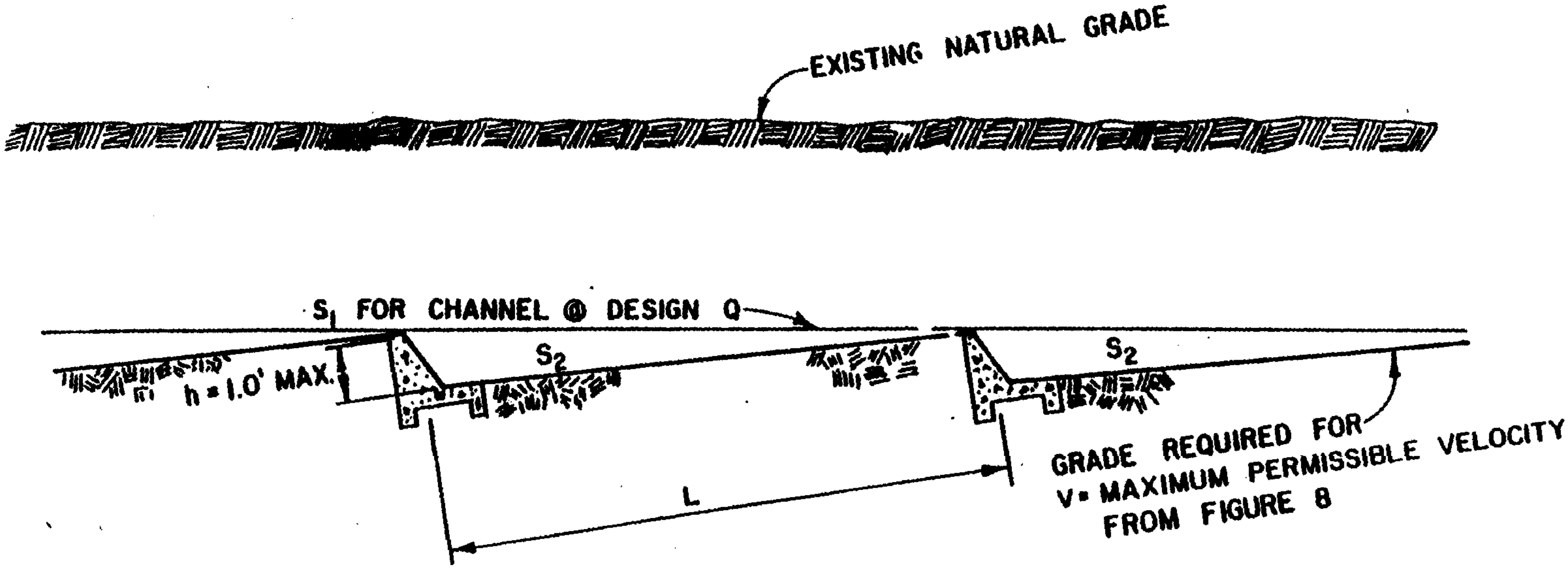

U.S. GEO SURVEY
100 YR. FREQ. DISCHARGE VS. D.A.
(EXISTING CONDITIONS)
DISCHARGE IN C.F.S.
DRAINAGE AREA IN SQ. MILES
100
200
1,000
2,000
10,000
1,000
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
100,000
200,000
300,000
K-E
47 7523

Figure XIV

RETARD SPACING CRITERIA



NOTE: S_1 will be a grade that will approximately parallel the existing natural ground, so that cut section will remain constant.

VELOCITY @ S_1

5 – 8 f.p.s. – retards required
8 or more – riprap channel required

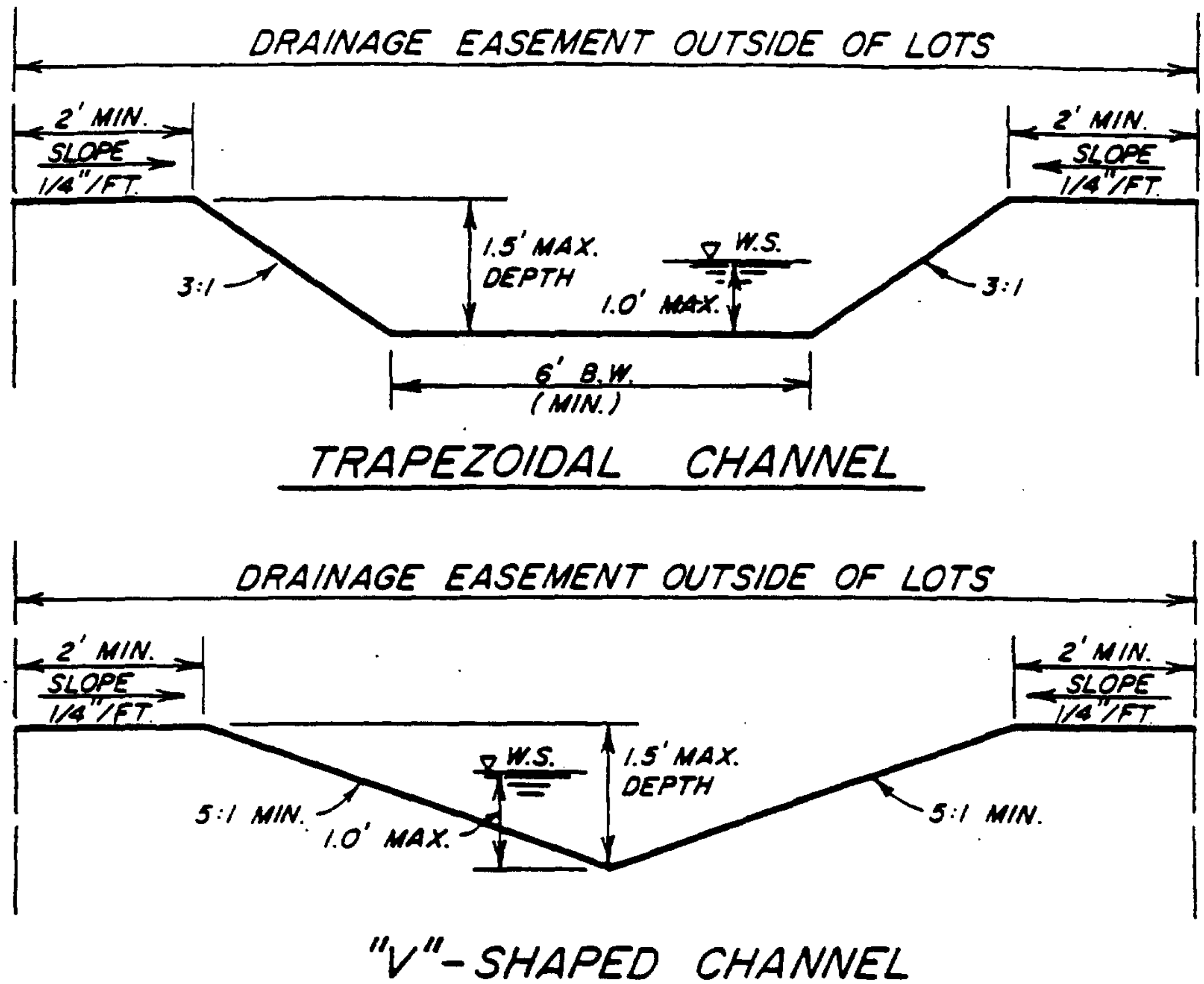
$$S_2 = \frac{(nv)^2}{(1.486\ R^{2/3})^2}$$

V = Maximum permissible velocity from Fig 8

$$\text{Spacing} = \frac{h}{S_1 - S_2}$$

h = Vertical differential of flow lines at drop-structure or retard with maximum value of 1.0 foot.

SUBDIVISION STANDARD



NO RETARDS
VEL. CONTROL

STANDARDS FOR INTERCEPTOR DRAINS FOR INTERCEPTING SHEET FLOW
(WITHOUT ACCESS EASEMENT REQ'D)

APPENDIX K

City of San Antonio Buy Back Program, 1998

1998 bd Buyout Summary	Totals	Percent Complete
Parcels to Buy	267	
Parcels Purchased	156	58.43%
Estimate of Funds Required to Buy	$13,247,461.24	
Funds Expended	$7,821,297.00	59.04%

1. "Amount Paid" refers to the amount negotiated by staff and authc to be paid by City Council. Parcels which have not been to City Council for p. authorization will not have a number in this column.
2. "Estimate of Remainder" is an estimate by staff of an amount which will ultimately be paid but is still being negotiated.
3. Appraisals in Martinez Creek have begun but are not complete. Staff has estimated a total appraised value based on limited actual appraisal data.

#	P	Parcel Number	Owner Name	Parcel Address	Total Tax Value	Amount of Appraisal	Amount Paid	Estimate of Remainder	Estimate of Final Cost
1	1	15102	Porras, Amador	4599 Plumnear	$ 9,600	$ 30,000	$ 33,000		
2	1	15103	Broom, Evelyn G.	4597 Plumnear	$ 23,200	$ 35,000	$ 35,000		
3	1	15104	Broom, Evelyn G.	4593 Plumnear	$ 7,500	$ 7,500	$ 7,500		
4	1	15105	Zamarripa, Rosalie	4591 Plumnear	$ 40,400	$ 65,000	$ 71,500		
5	1	15108	Hernandez, Jesus C.	4497 Plumnear	$ 9,900	$ 20,000	$ 20,000		
6		15109	Gonzalez, Eduardo	4491 Plumnear	$ 9,300	$ 4,500		$ 6,860	
7		15110	Reyes, Ramon &	4475 Plumnear	$ 26,100	$ 4,500		$ 4,500	
8	1	15118	Price, James T. &	4602 Plumnear	$ 5,500	$ 12,000	$ 13,200		
9	1	15119	Price, James T. &	4596 Plumnear	$ 11,000	included above	"	$ -	
10	1	15120	Price, James T. &	4594 Plumnear	$ 12,200	included above	"	$ -	
11	1	15121	Price, James T. &	4590 Plumnear	$ 24,000	$ 37,500	$ 41,250		
12	1	15122	Mata, Amparo A.	4588 Plumnear	$ 20,300	$ 35,000	$ 38,500		
13		15123	Laney, Joe B.	4584 Plumnear	$ 13,500	$ 50,000		$ 50,000	
14	1	15124	Chavez, Issac &	4578 Plumnear	$ 6,600	$ 7,500	$ 8,250		
15		15125	Vector Financial Svcs.	4572 Plumnear	$ 9,500	$ 7,500		$ 7,500	
16	1	15127	Eichler, George Allen	4544 Plumnear	$ 17,800	$ 35,000	$ 35,000		
17		15129	Kellum, Charles L. &	4520 Plumnear	$ 6,600	$ 7,500		$ 7,500	
18	1	15130	Santellan, Hipolita R. &	4494 Plumnear	$ 20,500	$ 30,000	$ 33,000		
19		15131	Kellum, Charles L. &	4476 Plumnear	$ 11,500	$ 38,000		$ 38,000	
20	1	15132	Cruz, Lillian Etal	4468 Plumnear	$ 20,700	$ 37,500	$ 37,500		
21		15133	Eichler, George Allen	4464 Plumnear	$ 6,000	$ 12,000		$ 12,000	
		15136	Eichler, George Allen	4464 Plumnear	$ 6,000	included in #15133			
22	1	15134	Eichler, George Allen	4440 Plumnear	$ 18,000	$ 35,000	$ 35,000		
23	1	15135	Eichler, George Allen	4436 Plumnear	$ 51,000	$ 55,000	$ 55,000		
23	**16**		**Plumnear Totals**	**69.57%**	**$ 386,700**	**$ 566,000**	**$ 463,700**	**$ 126,360**	**$ 590,060**
1	1	15151	Carlisle, Carson O. Etux	1811 Pipestone	$ 117,100	$ 215,000	$ 230,000		
1		15151	Carlisle, Carson O. Etux	1811 Pipestone	$ 6,900	"	"		
2	1	15153	Jones, A. Keith	16606 Springhill Drive	$ 55,000	$ 70,000	$ 77,000		

Prepared by Dave Pasley

Source: Public Works Dept.
Real Estate Section

#	P	cel Number	Owner Name	Parcel Address	Total Tax Value	Amount of Appraisal	Amount Paid	Estimate of Remainder	ate of Final Cost
3	1	15154	Pettyjohn, Russel Etux	16606 Ledgestone Drive	$ 101,200	$ 145,000	$ 152,250		
3	**3**		**Pipestone Totals**	**100.00%**	**$ 280,200**	**$ 430,000**	**$ 459,250**	**$ -**	**$ 459,250**
1	1	14821	Lazor, Joseph M. & Doyle, Densie	4130 Briarglen Drive	$ 61,900	$ 68,000	$ 82,100		
2	1	14822	Hawk, Richard & Hawk, Marcela Gracia	4134 Briarglen Drive	$ 66,300	$ 80,000	$ 96,600		
3	1	14823	Locke, David W. & Edith	4138 Briarglen Drive	$ 69,600	$ 82,000	$ 99,050		
4	1	14824	Ratliff, Margaret Jean	4142 Briarglen Drive	$ 67,000	$ 71,000	$ 90,000		
5	1	14825	Lujan, Rene J. & Martha A	4146 Briarglen Drive	$ 66,900	$ 69,000	$ 83,350		
6	1	14826	Butler, Cynthia S. & Schauer, Ruby Lee L/E	4150 Briarglen Drive	$ 60,600	$ 67,000	$ 81,000		
7	1	14827	Boynes / Blanchet	4154 Briarglen Drive	$ 78,600	$ 76,000	$ 91,800		
8	1	14828	Murillo, Ralph and Barr-Finch, Diane M.	4158 Briarglen Drive	$ 62,300	$ 67,000	$ 81,000		
9	1	14829	Azzoz, Abdoh M. & Grammer, Diane E.	4204 Briarglen Drive	$ 55,300	$ 65,000	$ 81,000		
10	1	14830	Kostelnik, Paul L.	4206 Briarglen Drive	$ 56,000	$ 60,000	$ 62,000		
11	1	14831	Foster, Steven D.	4210 Briarglen Drive	$ 78,000	$ 150,000	$ 220,000		
12	1	14832	Net 2 LP % The LCP Group	4114 Briarglen Drive	$ 202,500	$ 144,040	$ 375,000		
12	**12**		**Briarglen Totals**	**100.00%**	**$ 925,000**	**$ 999,040**	**$ 1,442,900**	**$ -**	**$ 1,442,900**
1		15166	Wassifuddin, Mohammad	6130 Babcock Road	$ 85,200	$ 155,000		$ 155,000	
2		15167	Dusek, Milton	6141 Hollyhock Street	$ 75,000	$ 90,000		$ 90,000	
3	1	15168	Stokes, Elizabeth Ann	6185 Hollyhock Street	$ 65,600	$ 100,000	$ 100,000		
3	**1**		**Hollyhock Totals**	**33.33%**	**$ 225,800**	**$ 345,000**	**$ 100,000**	**$ 245,000**	**$ 345,000**
1	1	14889-os	Giddens, Ruben	830 Morningview	$ 19,200	$ 33,000	$ 33,500		
2	1	14867-rm	McGarity, Clifton	626 Dorie	$ 34,800	$ 59,000	$ 64,000		
3	1	14890-os	Reed, Charlie	834 Morningview	$ 18,200	$ 50,000	$ 56,000		
4	1	14870-rm	Boulden, Elizabeth	638 Dorie	$ 17,000	$ 27,000	$ 29,700		
5	1	14931-rm	Cline, Tommie & wife	1022 Yucca	$ 33,500	$ 30,000	$ 35,000		
6	1	14910-jq	Epstein, Steven Jay	1222 Yucca	$ 16,000	$ 35,000	$ 35,000		
7	1	14937-rm	Haygood, Marvin	1046 Yucca	$ 18,000	$ 30,000	$ 33,000		
8	1	15045-os	Hinson, (Hill) Mary	975 F	$ 45,700	$ 65,000	$ 71,500		
9	1	14996-rm	Jones, Kenneth	1038 F	$ 22,500	$ 36,000	$ 39,600		
10	1	14900-rm	Latkovich, Peter	1235 Yucca	$ 14,400	$ 29,500	$ 32,500		
11	1	14949-jq	Lewis, Willie P. & Louise D.	1142 Yucca	$ 32,700	$ 54,000	$ 59,400		
12	1	14964-jq	Marinez, Joe I.	1043 F	$ 24,200	$ 37,500	$ 41,250		
13	1	14945-os	Phillips, Laura W.	1126 Yucca	$ 23,100	$ 40,000	$ 44,000		
14	1	14942-jq	Preston, John C.	1114 Yucca	$ 22,100	$ 29,000	$ 31,900		

#	P	cel Number	Owner Name	Parcel Address	Total Tax Value	Amount of Appraisal	Amount Paid	Estimate of Remainder	ate of Final Cost
15	1	14982-os	Ray, Charles	978 F	$ 23,700	$ 37,500	$ 41,250		
16	1	14906-os	Rector, Cophra Ann	1206 Yucca	$ 46,200	$ 54,000	$ 59,400		
17	1	14948-rm	Salas,. Rosa	1138 Yucca	$ 22,000	$ 30,000	$ 33,000		
18	1	15009-rm	Steward, Clem Etux	1140 F	$ 6,310	$ -	$ 6,310		
19	1	15007-rm	Steward, Clem W.	1136 F	$ 43,300	$ 65,000	$ 71,500		
20	1	15008-rm	Steward, Clem W. Etux	1138 F	$ 6,310	$ -	$ 6,310		
21	1	14985-os	Williams, Jerelyne	990 F	$ 23,600	$ 37,500	$ 37,500		
22	1	14954-rn	Williams, Ervin & Sybil J	1003 F	$ 16,400	$ 25,000	$ 27,500		
23	1	14941-rm	Younger, Darrell R.	1110 Yucca	$ 14,500	$ 30,000	$ 33,000		
24	1	14990-rn	Adams, James E.	1014 F	$ 23,500	$ 30,000	$ 34,500		
25	1	14993-jq	Brown, Nellie	1026 F	$ 22,600	$ 48,000	$ 52,800		
26	1	15021-jq	Brown, Nellie	1027 G	$ 6,300	$ -	included above		
27	1	14969-jq	Cardona, Martha Silvia C/S	1115 F	$ 15,700	$ 27,000	$ 31,050		
28	1	14911-jq	Hall, Zeolar S. & Clyde	1226 Yucca	$ 23,400	$ 52,000	$ 57,200		
29	1	15001-rn	Hayes, Hardin	1106 F	$ 15,500	$ 30,000	$ 33,000		
30	1	14927-jq	Johnson, Howard L. & Wife	1006 Yucca	$ 31,500	$ 40,000	$ 44,000		
31	1	14946-jq	Lee, Jesse, Jr. & Willie Mae	1130 Yucca	$ 24,300	$ 41,000	$ 45,100		
32	1	14933-os	Masters, Zula M.	1030 Yucca	$ 38,400	$ 53,000	$ 58,300		
33	1	15002-rm	McKinney, Charles	1110 F	$ 21,200	$ 42,000	$ 42,000		
34	1	14943-rm	Parson, Clarence	1118 Yucca	$ 25,900	$ 37,500	$ 41,250		
35	1	15049-rm	Rome, Archie W. Etux	983 F	$ 20,100	$ 26,000	$ 28,600		
36	1	14974-rm	Solar, Henry	1139 F	$ 6,500	$ 6,500	$ 6,700		
37	1	14930-jq	Stevenson, Vivien K.	1018 Yucca	$ 38,700	$ 60,000	$ 66,000		
38	1	14977-rm	Sullivan, Ellis & Eugene	1151 F	$ 47,100	$ 76,000	$ 88,700		
39	1	14978-rm	Sullivan, Ellis & Eugene	1155 F	$ 7,400	included above	included above		
40	1	14979-rm	Sullivan, Ellis & Eugene	1159 F	$ 1,000	included above	included above		
41	1	14955-jq	Walker, Oscar R., Jr. & Mattie E.	1007 F	$ 22,900	$ 41,000	$ 47,150		
42	1	14932-rm	Alexander, Ranon & Janice	1026 Yucca	$ 27,600	$ 45,000	$ 51,750		
43	1	14951-rm	Collins, Curtis	1150 Yucca	$ 33,400	$ 50,000	$ 55,000		
44	1	14935-jq	Daniel, Laura Ann	1038 Yucca	$ 32,400	$ 40,000	$ 47,000		
45	1	14926-jq	Richardson, William Jr. & Wife	1002 Yucca	$ 27,400	$ 40,000	$ 40,000		
46	1	14983-rm	Richardson, Ronald & Debra	982 F	$ 36,500	$ 45,000	$ 45,000		
47	1	14891-jq	Roberts, Leon & Quincy	838 Morningview	$ 42,000	$ 50,000	$ 60,500		
48	1	14896-rn	Russ, Alexander M.	1211 Yucca	$ 6,030	$ 30,000	$ 34,500		
49	1	14957-os	Williams, R.E.	1015 F	$ 21,300	$ 39,000	$ 42,900		
50	1	14981-rm	McGhee, Gloria	974 F	$ 49,700	$ 82,000	$ 90,200		

Source:Public Works Dept.
Real Estate Section

Prepared by Dave Pasley

#	P	Parcel Number	Owner Name	Parcel Address	Total Tax Value	Amount of Appraisal	Amount Paid	Estimate of Remainder	Date of Final Cost
51	1	15006-rm	Henderson, Geneva, ET AL	1126 F	$ 27,000	$ 42,500	$ 52,600		
52	1	14973-rm	Morrow, Geneva Henderson	1135 F	$ 6,200	$ 6,200	$ 6,200		
53	1	14972-rm	Morrow, Geneva Henderson	1131 F	$ 6,200	$ 6,200	$ 6,200		
54	1	14879-rn	Murphy, Rex Mooney ET AL	843 Morningview	$ 16,000	$ 28,000	$ 32,200		
55	1	14991-jq	Tillman, Joshua C. & Beulah M.	1018 F	$ 21,400	$ 30,000	$ 34,500		
56	1	15046-rm	Rosenstein, Morris	987 F	$ 16,600	$ 30,000	$ 30,000		
57	1	15044-rm	Banks, Earlie	635 Dorie	$ 25,500	$ 30,000	$ 33,000		
58	1	15003-rm	Childs, Eddie H., Sr. & Loretta	1114 F	$ 20,100	$ 50,000	$ 55,000		
59	1	14868-jq	Garrison, Henry W., Et Ux	630 Dorie	$ 17,500	$ 36,000	$ 36,000		
60	1	15047-rm	Garza, Raul "B"	1047 Yucca	$ 30,000	$ 39,000	$ 47,000		
61	1	15047-rm	Garza, Raul "A"	1043 Yucca	$ 30,000	$ 47,000	$ 47,000		
62	1	15047-rm	Garza, Raul "C"	1051 Yucca	$ 30,000	$ 47,000	$ 47,000		
63	1	14892-jq	Lopez, Richard L.	842 Morningview	$ 31,400	$ 49,000	$ 57,350		
64	1	15013-jq	Luddington, Geneva H.	1154 F	$ 24,400	$ 42,500	$ 48,875		
65	1	14872-jq	Tyrone, Thelma Mickey	811 Morningview	$ 18,700	$ 30,000	$ 30,000		
66	1	14976-jq	Paredez, Jose & Concepcion	1147 F	$ 26,400	$ 38,000	$ 41,800		
67	1	14866-os	Ramirez, Gustavo B & Maria J.	622 Dorie	$ 26,500	$ 53,000	$ 58,300		
68	1	15000-rm	Roberts, Marie	1102 F	$ 21,200	$ 31,000	$ 35,000		
69	1	14940-jq	Vasquez, Antonio Z.	1106 Yucca	$ 22,400	$ 29,000	$ 29,000		
70	1	14936-jq	Williams, Rena Nadine Etal	1042 Yucca	$ 29,400	$ 54,000	$ 59,400		
71	1	15051-jq	Hardie, Maudel Nolan	995 F	$ 18,900	$ 27,000	$ 27,500		
72	1	14975-rm	Perryman, Billie J. Mrs.	1143 F	$ 23,400	$ 36,000	$ 41,400		
73	1	14984-rm	Bell, Dorothy N.	986 F	$ 26,500	$ 44,000	$ 48,400		
74	1	14962-rm	Napier, Iona	1035 F	$ 23,700	$ 30,000	$ 35,400		
75	1	15055-rm	Williams, Carnell & Marva B.	623 Dorie	$ 32,000	$ 51,000	$ 56,100		
76	1	14865-jq	Wright, Eloise & Joseph	618 Dorie	$ 35,700	$ 47,000	$ 55,460		
77	1	15057-rm	Ebaben, Rafael L., Etux	3722 Bunche	$ 16,800	$ 33,000	$ 37,950		
78	1	14947-rm	Franklin, Joan	1134 Yucca	$ 47,600	$ 44,000	$ 44,000		
79	1	14863-jq	Hall, Willie V.	610 Dorie	$ 31,200	$ 40,000	$ 47,200		
80	1	14950-rm	Jackson, Harvey G. & Ada L.	1146 Yucca	$ 23,200	$ 37,000	$ 37,000		
81	1	14897-rn	Rodriguez, John & Monica	1219 Yucca	$ 10,000	$ 45,000	$ 51,750		
82	1	15050-rm	Bonner, Albert Etux	991 F	$ 18,500	$ 28,000	$ 28,000		
83	1	14885-jq	Johnson, Vernon & wife	814 Morningview	$ 16,600	$ 26,000	$ 26,000		
84	1	14898-rn	Sanchez, Poli H.	1223 Yucca	$ 25,300	$ 37,000	$ 37,000		
85	1	14963-jq	Wallace, Bemasteine & Mary P.	1039 F	$ 22,000	$ 28,000	$ 32,200		
86	1	14887	Clay, Harold C/S	822 Morningview	$ 27,900	$ 36,000	$ 39,600		

Source:Public Works Dept.
Real Estate Section

Prepared by Dave Pasley

#	P	Parcel Number	Owner Name	Parcel Address	Total Tax Value	Amount of Appraisal	Amount Paid	Estimate of Remainder	Estimate of Final Cost
87	1	14986-rn	Hill, Albert, Jr.	994 F	$ 30,600	$ 40,000	$ 48,379		
88	1	15048-os	Irvin, Kernneth W.	979 F	$ 20,000	$ 31,000	$ 34,100		
89	1	14995-rn	Jones, Jimmie & Louise	1034 F	$ 23,600	$ 40,000	$ 44,000		
90	1	15065	Greentree Financial	838 Sterling	$ 27,000	$ 38,000	$ 38,000		
91	1	14907-os	Rector, John J., Sr & wife	1210 Yucca	$ 5,930	Pay Tax Value	$ 6,523		
92	1	14905-os	Rector, John J., Sr. & wife	1202 Yucca	$ 5,900	Pay Tax Value	$ 6,490		
93	1	14992-os	Fuller, Joe Ann	1022 F	$ 49,900	$ 56,000	$ 61,600		
94	1	15020	Fuller, Louis & Jo Ann	1023 G	$ 6,300	Pay Tax Value	$ 6,300		
95	1	15054	James, Kenneth E.	835 Sterling	$ 18,300	$ 37,000	$ 40,700		
96	1	14944	Smith, Ann Margaret	1122 Yucca	$ 30,200	$ 44,000	$ 57,500		
97	1	14864	Hardeman, Elvin	614 Dorie	$ 11,900	$ 22,000	$ 22,000		
98	1	14956-rm	Knowlton, Betty Jo	1011 F	$ 24,300	$ 33,000	$ 37,950		
99	1	14928-rm	Love of God Ministries	1012 Yucca	$ 24,100	$ 63,000	$ 63,000		
100	1	14929-rm	Love of God Ministries	1012 Yucca	$ 2,710	included above	included above		
101	1	14880-rn	Ramos, Reynaldo & wife	847 Morningview	$ 29,800	$ 40,000	$ 46,000		
102	1	14959-rn	Rodriguez, Samuel & Sylvia	1023 F	$ 22,700	$ 32,000	$ 32,000		
103	1	14960-rn	Rodriguez, Samuel R. & Sylvia	1027 F	$ 15,700	$ 25,000	$ 25,000		
104	1	14971-jq	Russell, Bernice	1127 F	$ 14,100	$ 41,000	$ 47,150		
105	1	14938-jq	Ruiz, Ester M.	1050 Yucca	$ 36,100	$ 45,000	$ 50,000		
106	1	14934-jq	Tolliver, Ozell	1034 Yucca	$ 32,800	$ 52,000	$ 57,200		
107	1	14882-rm	Easley, Wallace Lee	802 Morningview	$ 33,100	$ 53,000	$ 53,000		
108	1	14883-rm	Easley, Wallace Lee	804 Morningview	$ 23,500	$ 31,000	$ 31,000		
109	1	14939-jq	Mann, Margaret Fayette	1102 Yucca	$ 21,200	$ 29,000	$ 34,900		
110	1	14894	Easley, Wallace Lee	1203 Yucca	$ 5,900	$ 5,900	$ 5,900		
111	1	14895	Easley, Wallace Lee	1207 Yucca	$ 5,900	$ 5,900	$ 5,900		
112	1	14881-jq	Gonzales, Antonio V.. & Wife	851 Morningview	$ 7,600	$ 7,500	$ 7,500		
113	1	14967-jq	Garrison, Pauline	1107 F	$ 61,590	$ 40,000	$ 56,100		
114	1	15056-jq	Walker, Bennie Diane	639 Dorie	$ 30,700	$ 43,000	$ 43,000		
115	1	15043-rn	Penix, Kathrine	1167 H	$ 55,200	$ 77,000	$ 55,200		
116	1	15043-rn	Penix, Kathrine	1167 H	included above	included above	included above		
117	1	14871-rm	Johnson, Paulette	1310 Brooksdale	$ 22,800	$ 33,000	$ 37,950		
118	1	14958-rn	Davis, Odie Elli, ET AL	1019 F	$ 22,100	$ 28,000	$ 30,800		
119		14886	BEXAR COUNTY	818 Morningview	$ -	$ 36,000		$ 36,000	
120		14902	Bexar County	1243 Yucca	$ -	$ 51,000		$ 51,000	
121		14899-rm	Buffin, Willie V.	1231 Yucca	$ 21,600	$ 45,000		$ 51,750	
122		14952-rm	Burleson, Rufus	1154 Yucca	$ 24,400	$ 41,000		$ 47,150	

Source:Public Works Dept.
Real Estate Section

Prepared by Dave Pasley

#	P	Parcel Number	Owner Name	Parcel Address	Total Tax Value	Amount of Appraisal	Amount Paid	Estimate of Remainder	Estimate of Final Cost
123		15005-jq	Clark, Idaline	1122 F	$ 20,100	$ 33,000		$ 37,950	
124		14965-jq	Coleman, Reuben V.	1047 F	$ 23,700	$ 49,000		$ 56,350	
125		14862-jq	First Gibraltar Bank	606 Dorie	$ 29,200	$ 44,000		$ 44,000	
126		14874-rn	Hernandez, Juan S. & wife	819 Morningview	$ 31,500	$ 46,000		$ 52,900	
127		15060-jq	Hoffman, Tommy	3734 Bunche	$ 7,300	$ 7,500		$ 8,625	
128		15077	Miller, George Harold	902 Sterling		$ 72,500		$ 83,375	
129		14994-jq	Richardson, Dewitt T. Sr.	1030 F	$ 22,300	$ 31,000		$ 35,650	
130		14877-rn	Ruiz, Martha	835 Morningview	$ 28,300	$ 34,000		$ 39,100	
131		14878-rn	Ruiz, Ed & Martha	839 Morningview	$ -	included above		$ -	
132		14873	San Antonio H.O.Corp.	815 Morningview	Exempt	$ 59,000		$ 59,000	
133		14968-rm	Taylor, Johnnie Mae Sanders	1111 F	$ -	$ 65,000		$ 74,750	
134		15004-jq	Watson, Booker T. Est.	1118 F	$ 15,600	$ 26,000		$ 29,900	
135		15076		1167 H		$ 29,000		$ 33,350	
136		14997	Wheatley Hts. 1st Bap Church	1042 F	Exempt	$ 275,000		$ 275,000	
137		14998	Wheatley Hts. First Bap Church	1046 F	Exempt	included above			
138		14999	Wheatley Hts. First Bap. Church	1050 F	Exempt	included above			
139		15025	Wheatley Hts.1st Bap. Church	1043 G	Exempt	included above			
140		15026	Wheatley Hts.1st Bap. Church	1047 G	Exempt	included above			
141		15027	Wheatley Hts. 1st Bap Church	1051 G	Exempt	included above			
142		15028	Wheatley Hts. 1st Bap Church	1103 G	Exempt	included above			
143		15029	Wheatley Hts. 1st Bap Church	1107 G	Exempt	included above			
143	**118**		**Wheatley Heights Totals**	**82.52%**	**$ 3,003,780**	**$ 5,108,700**	**$ 4,581,847**	**$ 1,015,850**	**$ 5,597,697**
1	1	15171	Paredez, Felix, III & Jill	9486 Somerset Road	$ 66,340	$ 240,000	$ 510,400		
1	**1**		**Somerset Road Totals**	**100.00%**	**$ 66,340**	**$ 240,000**	**$ 510,400**	**$ -**	**$ 510,400**
1.0		15357	MEDELLIN, ANDREW T & YOLANDA	738 Arbor Pl	$ 11,800				
2.0		15358	ACOSTA, JOSE ANTONIO & DORA	745 Arbor Pl	$ 12,800				
3.0		15306	DE LEON, JOHN & EUSTOLIO G	640 Cincinnati Av	$ 31,700				
4.0		15307	ROTHER, ROBERT S & DORA	642 Cincinnati Av	$ 32,570				
5.0		15308	SALINAS, ALTAGRACIA	646 Cincinnati Av	$ 41,100				
6.0		15304	ELIAS, AMALIA G	1402 Craig Pl W	$ 68,010				
7.0		15356	RODRIGUEZ, JOSE S	744 Delgado St	$ 10,100				
7.5		15356	RODRIGUEZ, JOSE S	747 ARBOR PL	$ 7,700				
8.0		15340	ZAMOT, JOHN T & CARMEN M	100 Jeffery	$ 46,200				
9.0		15341	SALINAS, PAUL MICHAEL & ESTHER G.	103 Jeffery	$ 36,300				

#	P	. cel Number	Owner Name	Parcel Address	Total Tax Value	Amount of Appraisal	Amount Paid	Estimate of Remainder	L .ate of Final Cost
10.0		15342	PERALES, HECTOR & MARIA M	104 Jeffery	$ 48,600				
11.0		15343	LINN, MARGARET A	107 Jeffery	$ 32,800	$ 45,000			
12.0		15344	GARIBAY, LUIS R & AMELIA C	108 Jeffery	$ 33,600	$ 45,000			
13.0		15345	MACIEL, DANIEL & EULALIA	109 Jeffery	$ 40,100	$ 46,000			
14.0		15361	ESPARZA, PATRICIO & MARIA A	935 Leal St	$ 24,000				
14.5		15361	ESPARZA, PATRICIO V &	933 LEAL ST	$ 5,450				
15.0		15362	COLUNGA, JOSE ANGEL	938 Leal St	$ 10,600	$ 25,000			
16.0		15348	MCKINNEY, VIRGINIA	628 Lombrano St	$ 12,000				
17.0		15349	FIGUEROA, JOSE A & ANGELINA	632 Lombrano St	$ 12,500				
18.0	1	15350	YOUNG, GLADYS	638 Lombrano St	$ 21,800	$ 32,500	$ 32,500		
19.0		15346	JAGGI, LEWIS	643 Lombrano St	$ 12,800				
20.0		15281	AGUILAR, BENTURA	1440 Magnolia Av W	$ 54,200				
21.0		15282	HERNANDEZ, GUADALUPE E & ALICE	1442 Magnolia Av W	$ 48,600				
22.0		15283	MORENO, ALEX L & LUCY S	1443 Magnolia Av W	$ 52,000				
23.0		15284	Hernandez Maria De La Luz	1414 Mistletoe Av W	$ 40,000	$ 39,000			
24.0		15285	ESSING, SUSAN G	1418 Mistletoe Av W	$ 78,700				
25.0		15286	CAVAZOS, DOLORES R	1419 Mistletoe Av W	$ 52,100	$ 52,000			
26.0		15287	RAMIREZ, RAFAEL S & MARINA M	1423 Mistletoe Av W	$ 77,500				
27.0		15288	LANCASTER, NANCY KATHLEEN	1424 Mistletoe Av W	$ 57,100				
28.0		15289	MUNIZ, ROBERTO H & ROSEMARY	1427 Mistletoe Av W	$ 58,400				
29.0		15290	NOLL, JACOB F	1428 Mistletoe Av W	$ 44,400				
30.0		15291	REYNA, ANGELITA R	1431 Mistletoe Av W	$ 52,700				
31.0		15292	GALAN, RICHARD G	1432 Mistletoe Av W	$ 46,170	$ 55,000			
32.0		15293	GRIFFIN, TIMOTHY L & NANCY W	1435 Mistletoe Av W	$ 56,400				
33.0		15305	BISHOP, ALFRIEDA DURAND	2203 Navidad St N	$ 16,000				
34.0		15353	JAMES, EDGAR & CHRISTINE	611 Rivas St	$ 16,200				
35.0		15354	HUDSPETH, CARL	630 Rivas St	$ 11,800				
35.5		15354	HUDSPETH, CARL & OSSIE	628 RIVAS ST	$ 500				
36.0		15355	VILLARREAL, HERIBERTO & MARTHA	636 Rivas St	$ 14,000				
37.0		15359	MARTINEZ, MARGARET	836 Ruiz St	$ 18,300				
38.0		15360	MARTINEZ, SUSANA & ALFRED	839 Ruiz St	$ 43,500				
39.0		15331	Barron Guadalupe C.	1806 Sabinas St N	$ 37,000	$ 70,000			
40.0		15332	Hurtado Edward & Velia R.	1808 Sabinas St N	$ 19,600	$ 29,800			
41.0		15333	Thurman Molly Ann	1812 Sabinas St N	$ 43,300	$ 60,000			
42.0	1	15334	Perez Angel Silva, Jr. & Delia	1816 Sabinas St N	$ 43,900	$ 65,000	$ 72,000		
43.0	1	15335	Angulo Cecelia	1820 Sabinas St N	$ 30,700	$ 57,000	$ 62,700		

#	P	cel Number	Owner Name	Parcel Address	Total Tax Value	Amount of Appraisal	Amount Paid	Estimate of Remainder	ate of Final Cost
44.0		15336	Gutierrez Ariel & Maria	1824 Sabinas St N	$ 44,900				
45.0		15337	Castillo Alicia	1828 Sabinas St N	$ 43,400				
46.0		15338	SHOOK, HAROLD H & ELIZABETH L	2003 Sabinas St N	$ 32,600				
47.0		15339	ESQUIVEL, JESSE & YOLANDA	2007 Sabinas St N	$ 35,500				
48.0		15300	MEDELLIN, DORA ELIA	2403 Sabinas St N	$ 40,400				
49.0		15301	MORGAN, JAMES R & GLORIA C	2405 Sabinas St N	$ 37,700				
50.0		15302	PORTO, ANTONIO & GUADALUPE	2407 Sabinas St N	$ 30,000				
51.0		15303	LOPEZ, RUTH R & REBECCA R	2409 Sabinas St N	$ 41,300				
52.0		15351	RUIZ, MARIA IGNACIA G	1313 San Jacinto N	$ 17,100				
53.0		15352	VILLANUEVA, CAMILO V &CARMEN	1403 San Jacinto N	$ 29,100				
54.0		15347	JAGGI, LEWIS F	1520 Trinity St N	$ 43,400				
55.0		15309	Spielhagen Eric J.	464 University Av	$ 28,900				
56.0		15310	1376 Family LTD Partnership	468 University Av	$ 39,200				
57.0		15311	Marin Benito & Teresa	502 University Av	$ 35,800	$ 38,000			
58.0		15312	Lopez Gabriel & Angelita	506 University Av	$ 36,000	$ 41,000			
59.0	1	15313	Esquivel Sergio & Martha	510 University Av	$ 41,500	$ 61,000	$ 61,000		
60.0		15314	Navarro Norma A. & Jacob Campos	512 University Av	$ 36,600	$ 52,000			
61.0		15315	Gonzales Roberto H.	514 University Av	$ 30,700	$ 34,000			
62.0	1	15316	Espinosa Joe E.	516 University Av	$ 27,600	$ 35,000	$ 35,000		
63.0		15317	Vasquez Andrea	518 University Av	$ 31,400	$ 32,000			
64.0		15318	VASQUEZ, ELVIRA R	523 University Av	$ 40,300				
65.0		15319	CAMPOS, PASCUAL H JR & HORTENSIA	527 University Av	$ 57,400				
66.0		15320	GARZA, ANDREW JR & HELEN T	531 University Av	$ 26,500				
67.0		15321	GONZALEZ, ANTONIO	535 University Av	$ 25,600				
68.0		15322	WONG, FEDERICO & LYDIA	539 University Av	$ 39,800				
69.0		15323	GARCIA, ALVARO V & ANTONIA A	543 University Av	$ 25,300				
70.0		15324	FLORES, MANUEL G & MARIA	547 University Av	$ 24,000				
71.0		15325	CALDERA, MIGUEL A	551 University Av	$ 30,800	$ 37,000			
72.0		15326	MALDONADO, SAUL & THERESA	555 University Av	$ 28,500				
73.0		15327	SANCHEZ, DANIEL A	600 Waverly Av	$ 40,800	$ 47,000			
74.0		15328	ARDILA, FRANK	604 Waverly Av.	$ 36,500				
75.0		15329	HERNANDEZ, UMBERTO & WF	608 Waverly Av	$ 31,060				
76.0		15330	CAVAZOS, ELOSIA C	616 Waverly Av	$ 33,610				
77.0		15294	GARCIA, ANTHONY & JANE	1402 Woodlawn W	$ 56,700				
78.0		15295	HAFKIN, SAUL & MARY C/O FRANCES TYLER	1406 Woodlawn W	$ 39,200				
79.0		15296	CAVAZOS, MARY R	1410 Woodlawn W	$ 65,200				

#	P / cel Number	Owner Name	Parcel Address	Total Tax Value	Amount of Appraisal	Amount Paid	Estimate of Remainder	ate of Final Cost
80.0	15297	JIMINEZ, EFREN	1412 Woodlawn W	$ 78,600				
81.0	15298	WATSON, STEPHEN J	1419 Woodlawn W	$ 66,400				
82.0	15299	EPSTEIN, ABRAHAM & ANGELA	1421 Woodlawn W	$ 51,000				
82	**5**	**Martinez Creek Totals**	**6.10%**	**$ 3,065,970**	Staff Estimate for Martinez Creek Properties **$ 4,012,162**	**$ 263,200**	**$ 4,038,954**	Staff Estimate for Martinez Creek Properties **$ 4,302,154**
267	**156**	**Total**	**58.43%**	From Bexar Appraisal Records **$ 7,953,790**	**$ 11,700,902**	Amount Authorized by City Council. Payment subject to closing **$ 7,821,297**	Staff Estimate **$ 5,426,164**	Staff Estimate **$ 13,247,461**

Prepared by Dave Pasley

Source:Public Works Dept.
Real Estate Section

City of San Antonio Phase I Buyout Program

#	Address #	Street	Area	Project Type	Total Project Cost
1	4403	Plumnear	Leon Creek	Buyout	
2	4407	Plumnear	Leon Creek	Buyout	
3	4411	Plumnear	Leon Creek	Buyout	
4	4415	Plumnear	Leon Creek	Buyout	
5	4436	Plumnear	Leon Creek	Buyout	
6	4440	Plumnear	Leon Creek	Buyout	
7	4455	Plumnear	Leon Creek	Buyout	
8	4464	Plumnear	Leon Creek	Buyout	
9	4468	Plumnear	Leon Creek	Buyout	
10	4475	Plumnear	Leon Creek	Buyout	
11	4476	Plumnear	Leon Creek	Buyout	
12	4491	Plumnear	Leon Creek	Buyout	
13	4494	Plumnear	Leon Creek	Buyout	
14	4497	Plumnear	Leon Creek	Buyout	
15	4519	Plumnear	Leon Creek	Buyout	
16	4520	Plumnear	Leon Creek	Buyout	
17	4532	Plumnear	Leon Creek	Buyout	
18	4544	Plumnear	Leon Creek	Buyout	
19	4545	Plumnear	Leon Creek	Buyout	
20	4572	Plumnear	Leon Creek	Buyout	
21	4578	Plumnear	Leon Creek	Buyout	
22	4584	Plumnear	Leon Creek	Buyout	
23	4588	Plumnear	Leon Creek	Buyout	
24	4590	Plumnear	Leon Creek	Buyout	
25	4591	Plumnear	Leon Creek	Buyout	
26	4593	Plumnear	Leon Creek	Buyout	
27	4594	Plumnear	Leon Creek	Buyout	
28	4596	Plumnear	Leon Creek	Buyout	
29	4597	Plumnear	Leon Creek	Buyout	
30	4599	Plumnear	Leon Creek	Buyout	
31	4602	Plumnear	Leon Creek	Buyout	
32	8478	Quintana	Leon Creek	Buyout	
33	9486	Somerset	Leon Creek	Buyout	
			Total Leon Creek		**$ 1,381,645**
1	1811	Pipestone	Salado Creek Area	Buyout	
2	16606	Springhill	Salado Creek Area	Buyout	
3	16606	Ledgestone	Salado Creek Area	Buyout	
			Total Salado Creek Area		**$ 408,600**
1	4130	Briarglen	Beitel Creek	Buyout	
2	4134	Briarglen	Beitel Creek	Buyout	
3	4138	Briarglen	Beitel Creek	Buyout	
4	4142	Briarglen	Beitel Creek	Buyout	
5	4146	Briarglen	Beitel Creek	Buyout	
6	4150	Briarglen	Beitel Creek	Buyout	
7	4154	Briarglen	Beitel Creek	Buyout	
8	4158	Briarglen	Beitel Creek	Buyout	

City of San Antonio Phase I Buyout Program

9	4202 Briarglen	Beitel Creek	Buyout		
10	4204 Briarglen	Beitel Creek	Buyout		
11	4206 Briarglen	Beitel Creek	Buyout		
12	4210 Briarglen	Beitel Creek	Buyout		
13	4214 Briarglen	Beitel Creek	Buyout		
		Total Beitel Creek		**$**	**1,476,640**
1	6130 Babcock	Huebner Creek	Buyout		
2	6141 Hollyhock	Huebner Creek	Buyout		
3	6185 Hollyhock	Huebner Creek	Buyout		
		Total Huebner Creek		**$**	**244,400**
1	1310 Brooksdale	Salado Creek	Buyout		
2	3722 Bunche	Salado Creek	Buyout		
3	3734 Bunche	Salado Creek	Buyout		
4	606 Dorie	Salado Creek	Buyout		
5	610 Dorie	Salado Creek	Buyout		
6	614 Dorie	Salado Creek	Buyout		
7	618 Dorie	Salado Creek	Buyout		
8	622 Dorie	Salado Creek	Buyout		
9	623 Dorie	Salado Creek	Buyout		
10	626 Dorie	Salado Creek	Buyout		
11	630 Dorie	Salado Creek	Buyout		
12	635 Dorie	Salado Creek	Buyout		
13	638 Dorie	Salado Creek	Buyout		
14	639 Dorie	Salado Creek	Buyout		
15	970 Dorie	Salado Creek	Buyout		
16	974 F	Salado Creek	Buyout		
17	975 F	Salado Creek	Buyout		
18	978 F	Salado Creek	Buyout		
19	979 F	Salado Creek	Buyout		
20	982 F	Salado Creek	Buyout		
21	983 F	Salado Creek	Buyout		
22	986 F	Salado Creek	Buyout		
23	987 F	Salado Creek	Buyout		
24	990 F	Salado Creek	Buyout		
25	991 F	Salado Creek	Buyout		
26	994 F	Salado Creek	Buyout		
27	995 F	Salado Creek	Buyout		
28	1003 F	Salado Creek	Buyout		
29	1007 F	Salado Creek	Buyout		
30	1011 F	Salado Creek	Buyout		
31	1014 F	Salado Creek	Buyout		
32	1015 F	Salado Creek	Buyout		
33	1018 F	Salado Creek	Buyout		
34	1019 F	Salado Creek	Buyout		
35	1022 F	Salado Creek	Buyout		
36	1023 F	Salado Creek	Buyout		
37	1026 F	Salado Creek	Buyout		
38	1027 F	Salado Creek	Buyout		
39	1030 F	Salado Creek	Buyout		

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40	1034 F	Salado Creek	Buyout
41	1035 F	Salado Creek	Buyout
42	1038 F	Salado Creek	Buyout
43	1039 F	Salado Creek	Buyout
44	1042 F	Salado Creek	Buyout
45	1043 F	Salado Creek	Buyout
46	1046 F	Salado Creek	Buyout
47	1047 F	Salado Creek	Buyout
48	1050 F	Salado Creek	Buyout
49	1051 F	Salado Creek	Buyout
50	1102 F	Salado Creek	Buyout
51	1106 F	Salado Creek	Buyout
52	1107 F	Salado Creek	Buyout
53	1110 F	Salado Creek	Buyout
54	1111 F	Salado Creek	Buyout
55	1114 F	Salado Creek	Buyout
56	1115 F	Salado Creek	Buyout
57	1118 F	Salado Creek	Buyout
58	1122 F	Salado Creek	Buyout
59	1126 F	Salado Creek	Buyout
60	1127 F	Salado Creek	Buyout
61	1131 F	Salado Creek	Buyout
62	1135 F	Salado Creek	Buyout
63	1139 F	Salado Creek	Buyout
64	1143 F	Salado Creek	Buyout
65	1147 F	Salado Creek	Buyout
66	1154 F	Salado Creek	Buyout
	1136		
	1138		
67	1140 F	Salado Creek	Buyout
	1151		
	1155		
68	1159 F	Salado Creek	Buyout
69	1026 F (+1027 G)	Salado Creek	Buyout
70	1023 G	Salado Creek	Buyout
71	1027 G	Salado Creek	Buyout
72	1043 G	Salado Creek	Buyout
73	1047 G	Salado Creek	Buyout
74	1051 G	Salado Creek	Buyout
75	1103 G	Salado Creek	Buyout
76	1107 G	Salado Creek	Buyout
77	1167 H	Salado Creek	Buyout
78	1167 H	Salado Creek	Buyout
79	1167 H	Salado Creek	Buyout
80	802 Morningview	Salado Creek	Buyout
81	804 Morningview	Salado Creek	Buyout
82	811 Morningview	Salado Creek	Buyout
83	814 Morningview	Salado Creek	Buyout
84	815 Morningview	Salado Creek	Buyout
85	818 Morningview	Salado Creek	Buyout
86	819 Morningview	Salado Creek	Buyout

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87	822 Morningview	Salado Creek	Buyout
88	827 Morningview	Salado Creek	Buyout
89	830 Morningview	Salado Creek	Buyout
90	834 Morningview	Salado Creek	Buyout
91	835 Morningview	Salado Creek	Buyout
92	838 Morningview	Salado Creek	Buyout
93	839 Morningview	Salado Creek	Buyout
94	842 Morningview	Salado Creek	Buyout
95	843 Morningview	Salado Creek	Buyout
96	847 Morningview	Salado Creek	Buyout
97	851 Morningview	Salado Creek	Buyout
98	830 Sterling	Salado Creek	Buyout
99	835 Sterling	Salado Creek	Buyout
100	838 Sterling	Salado Creek	Buyout
101	902 Sterling	Salado Creek	Buyout
102	1002 Yucca	Salado Creek	Buyout
103	1006 Yucca	Salado Creek	Buyout
104	1012 Yucca	Salado Creek	Buyout
105	1015 Yucca	Salado Creek	Buyout
106	1018 Yucca	Salado Creek	Buyout
107	1022 Yucca	Salado Creek	Buyout
108	1026 Yucca	Salado Creek	Buyout
109	1030 Yucca	Salado Creek	Buyout
110	1034 Yucca	Salado Creek	Buyout
111	1038 Yucca	Salado Creek	Buyout
112	1042 Yucca	Salado Creek	Buyout
113	1043 Yucca	Salado Creek	Buyout
114	1046 Yucca	Salado Creek	Buyout
115	1047 Yucca	Salado Creek	Buyout
116	1050 Yucca	Salado Creek	Buyout
117	1051 Yucca	Salado Creek	Buyout
118	1102 Yucca	Salado Creek	Buyout
119	1106 Yucca	Salado Creek	Buyout
120	1110 Yucca	Salado Creek	Buyout
121	1114 Yucca	Salado Creek	Buyout
122	1118 Yucca	Salado Creek	Buyout
123	1122 Yucca	Salado Creek	Buyout
124	1126 Yucca	Salado Creek	Buyout
125	1130 Yucca	Salado Creek	Buyout
126	1134 Yucca	Salado Creek	Buyout
127	1138 Yucca	Salado Creek	Buyout
128	1142 Yucca	Salado Creek	Buyout
129	1146 Yucca	Salado Creek	Buyout
130	1150 Yucca	Salado Creek	Buyout
131	1154 Yucca	Salado Creek	Buyout
132	1202 Yucca	Salado Creek	Buyout
133	1203 Yucca	Salado Creek	Buyout
134	1207 Yucca	Salado Creek	Buyout
135	1206 Yucca	Salado Creek	Buyout
136	1210 Yucca	Salado Creek	Buyout
137	1211 Yucca	Salado Creek	Buyout

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138	1219 Yucca	Salado Creek	Buyout		
139	1222 Yucca	Salado Creek	Buyout		
140	1223 Yucca	Salado Creek	Buyout		
141	1226 Yucca	Salado Creek	Buyout		
142	1231 Yucca	Salado Creek	Buyout		
143	1235 Yucca	Salado Creek	Buyout		
144	1239 Yucca	Salado Creek	Buyout		
145	1243 Yucca	Salado Creek	Buyout		
		Total Salado Creek		**$**	**5,689,303**
1	9486 Somerset Road	Leon Creek	Buyout		
		Total Leon Creek		**$**	**66,340**
1	738 Arbor	Martinez Creek	Buyout		
2	745 Arbor	Martinez Creek	Buyout		
3	640 Cincinnati	Martinez Creek	Buyout		
4	642 Cincinnati	Martinez Creek	Buyout		
5	646 Cincinnati	Martinez Creek	Buyout		
6	1402 Craig Pl. W	Martinez Creek	Buyout		
7	744 Delgado	Martinez Creek	Buyout		
8	100 Jeffery	Martinez Creek	Buyout		
9	103 Jeffery	Martinez Creek	Buyout		
10	104 Jeffery	Martinez Creek	Buyout		
11	107 Jeffery	Martinez Creek	Buyout		
12	108 Jeffery	Martinez Creek	Buyout		
13	109 Jeffery	Martinez Creek	Buyout		
14	935 Leal	Martinez Creek	Buyout		
15	938 Leal	Martinez Creek	Buyout		
16	628 Lombrano	Martinez Creek	Buyout		
17	632 Lombrano	Martinez Creek	Buyout		
18	638 Lombrano	Martinez Creek	Buyout		
19	643 Lombrano	Martinez Creek	Buyout		
20	1414 Magnolia	Martinez Creek	Buyout		
21	1418 Magnolia	Martinez Creek	Buyout		
22	1419 Magnolia	Martinez Creek	Buyout		
23	1423 Magnolia	Martinez Creek	Buyout		
24	1424 Magnolia	Martinez Creek	Buyout		
25	1427 Magnolia	Martinez Creek	Buyout		
26	1428 Magnolia	Martinez Creek	Buyout		
27	1431 Magnolia	Martinez Creek	Buyout		
28	1432 Magnolia	Martinez Creek	Buyout		
29	1435 Magnolia	Martinez Creek	Buyout		
30	1440 Magnolia	Martinez Creek	Buyout		
31	1442 Magnolia	Martinez Creek	Buyout		
32	1443 Magnolia	Martinez Creek	Buyout		
33	2203 Navidavid	Martinez Creek	Buyout		
34	611 Rivas	Martinez Creek	Buyout		
35	630 Rivas	Martinez Creek	Buyout		
36	636 Rivas	Martinez Creek	Buyout		
37	836 Rivas	Martinez Creek	Buyout		
38	839 Rivas	Martinez Creek	Buyout		

City of San Antonio Phase I Buyout Program

39	1806 Sabinas	Martinez Creek	Buyout		
40	1808 Sabinas	Martinez Creek	Buyout		
41	1812 Sabinas	Martinez Creek	Buyout		
42	1816 Sabinas	Martinez Creek	Buyout		
43	1820 Sabinas	Martinez Creek	Buyout		
44	1824 Sabinas	Martinez Creek	Buyout		
45	1828 Sabinas	Martinez Creek	Buyout		
46	2003 Sabinas	Martinez Creek	Buyout		
47	2007 Sabinas	Martinez Creek	Buyout		
48	2403 Sabinas	Martinez Creek	Buyout		
49	2405 Sabinas	Martinez Creek	Buyout		
50	2407 Sabinas	Martinez Creek	Buyout		
51	2407 Sabinas	Martinez Creek	Buyout		
52	1313 San Jacinto N	Martinez Creek	Buyout		
53	1403 San Jacinto N	Martinez Creek	Buyout		
54	1520 Trinity	Martinez Creek	Buyout		
55	464 University	Martinez Creek	Buyout		
56	468 University	Martinez Creek	Buyout		
57	502 University	Martinez Creek	Buyout		
58	506 University	Martinez Creek	Buyout		
59	510 University	Martinez Creek	Buyout		
60	512 University	Martinez Creek	Buyout		
61	514 University	Martinez Creek	Buyout		
62	516 University	Martinez Creek	Buyout		
63	518 University	Martinez Creek	Buyout		
64	523 University	Martinez Creek	Buyout		
65	527 University	Martinez Creek	Buyout		
66	531 University	Martinez Creek	Buyout		
67	535 University	Martinez Creek	Buyout		
68	539 University	Martinez Creek	Buyout		
69	543 University	Martinez Creek	Buyout		
70	547 University	Martinez Creek	Buyout		
71	551 University	Martinez Creek	Buyout		
72	555 University	Martinez Creek	Buyout		
73	600 Waverly	Martinez Creek	Buyout		
74	604 Waverly	Martinez Creek	Buyout		
75	608 Waverly	Martinez Creek	Buyout		
76	616 Waverly	Martinez Creek	Buyout		
77	1402 Woodlawn	Martinez Creek	Buyout		
78	1406 Woodlawn	Martinez Creek	Buyout		
79	1410 Woodlawn	Martinez Creek	Buyout		
80	1412 Woodlawn	Martinez Creek	Buyout		
81	1419 Woodlawn	Martinez Creek	Buyout		
82	1421 Woodlawn	Martinez Creek	Buyout		
		Martinez Creek Total		**$**	**3,557,015**
1	2506 McNutt	Rosillo Creek	Buyout		
2	2614 McNutt	Rosillo Creek	Buyout		
		Total Rosillo Creek		**$**	**49,305**

City of San Antonio Phase I Buyout Program

1	9655 Villamain	San Antonio River	Buyout		
2	9723 Villamain	San Antonio River	Buyout		
		Total San Antonio River		**$**	**365,438**
1	254 Noriega	Zarzamora Creek	Buyout		
2	258 Noriega	Zarzamora Creek	Buyout		
3	262 Noriega	Zarzamora Creek	Buyout		
4	302 Noriega	Zarzamora Creek	Buyout		
5	306 Noriega	Zarzamora Creek	Buyout		
6	310 Noriega	Zarzamora Creek	Buyout		
7	314 Noriega	Zarzamora Creek	Buyout		
8	402 Noriega	Zarzamora Creek	Buyout		
9	406 Noriega	Zarzamora Creek	Buyout		
10	410 Noriega	Zarzamora Creek	Buyout		
11	414 Noriega	Zarzamora Creek	Buyout		
12	418 Noriega	Zarzamora Creek	Buyout		
13	422 Noriega	Zarzamora Creek	Buyout		
14	5201 Marconi	Zarzamora Creek	Buyout		
15	5202 Rubidouz	Zarzamora Creek	Buyout		
16	5203 Rubidouz	Zarzamora Creek	Buyout		
		Total Zarzamora Creek		**$**	**584,630**

City of San Antonio Phase II Buyout Program

#	Address #	Street	Area	Project Type	Total Project Cost
1	1310	Brooksdale	Salado Creek	Buyout	
2	1526	Brooksdale	Salado Creek	Buyout	
3	1526	Brooksdale	Salado Creek	Buyout	
4	1530.1	Brooksdale	Salado Creek	Buyout	
5	1534	Brooksdale	Salado Creek	Buyout	
6	3706	Bunche	Salado Creek	Buyout	
7	3719	Bunche	Salado Creek	Buyout	
8	3723	Bunche	Salado Creek	Buyout	
9	3723.1	Bunche	Salado Creek	Buyout	
10	3726	Bunche	Salado Creek	Buyout	
11	3730	Bunche	Salado Creek	Buyout	
12	3734	Bunche	Salado Creek	Buyout	
13	3744	Bunche	Salado Creek	Buyout	
14	3746	Bunche	Salado Creek	Buyout	
15	3750	Bunche	Salado Creek	Buyout	
16	3750	Bunche	Salado Creek	Buyout	
17	3760	Bunche	Salado Creek	Buyout	
18	3802	Bunche	Salado Creek	Buyout	
19	3802.1	Bunche	Salado Creek	Buyout	
20	3802.7	Bunche	Salado Creek	Buyout	
21	3802.8	Bunche	Salado Creek	Buyout	
22	3848	Bunche	Salado Creek	Buyout	
23	3855.1	Bunche	Salado Creek	Buyout	
24	3858	Bunche	Salado Creek	Buyout	
25	3858	Bunche	Salado Creek	Buyout	
26	3860	Bunche	Salado Creek	Buyout	
27	3874	Bunche	Salado Creek	Buyout	
28	3878	Bunche	Salado Creek	Buyout	
29	3906	Bunche	Salado Creek	Buyout	
30	3914	Bunche	Salado Creek	Buyout	
31	3930	Bunche	Salado Creek	Buyout	
32	3938	Bunche	Salado Creek	Buyout	
33	602	Dorie	Salado Creek	Buyout	
34	627	Dorie	Salado Creek	Buyout	
35	631	Dorie	Salado Creek	Buyout	
36	634	Dorie	Salado Creek	Buyout	
37	1002	F	Salado Creek	Buyout	
38	1006	F	Salado Creek	Buyout	
39	1031	F	Salado Creek	Buyout	
40	1042	F	Salado Creek	Buyout	
41	1131	F	Salado Creek	Buyout	
42	1136	F	Salado Creek	Buyout	
43	1139	F	Salado Creek	Buyout	
44	1142	F	Salado Creek	Buyout	
45	1150	F	Salado Creek	Buyout	
46	1151	F	Salado Creek	Buyout	
47	934	G	Salado Creek	Buyout	
48	935	G	Salado Creek	Buyout	

City of San Antonio Phase II Buyout Program

49	1002	G	Salado Creek	Buyout
50	1002.1	G	Salado Creek	Buyout
51	1002.2	G	Salado Creek	Buyout
52	1011	G	Salado Creek	Buyout
53	1015	G	Salado Creek	Buyout
54	1019	G	Salado Creek	Buyout
55	1023	G	Salado Creek	Buyout
56	1024	G	Salado Creek	Buyout
57	1030	G	Salado Creek	Buyout
58	1030.4	G	Salado Creek	Buyout
59	1030.5	G	Salado Creek	Buyout
60	1031	G	Salado Creek	Buyout
61	1039	G	Salado Creek	Buyout
62	1102	G	Salado Creek	Buyout
63	1102.1	G	Salado Creek	Buyout
64	1103	G	Salado Creek	Buyout
65	1103.1	G	Salado Creek	Buyout
66	1103.2	G	Salado Creek	Buyout
67	1123	G	Salado Creek	Buyout
68	1126	G	Salado Creek	Buyout
69	1126.1	G	Salado Creek	Buyout
70	1126.6	G	Salado Creek	Buyout
71	1126.7	G	Salado Creek	Buyout
72	1126.8	G	Salado Creek	Buyout
73	1131	G	Salado Creek	Buyout
74	1135	G	Salado Creek	Buyout
75	1143	G	Salado Creek	Buyout
76	1147	G	Salado Creek	Buyout
77	1151	G	Salado Creek	Buyout
78	1127.8	H	Salado Creek	Buyout
79	1130.4	H	Salado Creek	Buyout
80	1170	H	Salado Creek	Buyout
81	1171.9	H	Salado Creek	Buyout
82	1202	H	Salado Creek	Buyout
83	1202.1	H	Salado Creek	Buyout
84	1202.7	H	Salado Creek	Buyout
85	1203.1	H	Salado Creek	Buyout
86	1203.2	H	Salado Creek	Buyout
87	1203.4	H	Salado Creek	Buyout
88	1203.5	H	Salado Creek	Buyout
89	1203.6	H	Salado Creek	Buyout
90	1234	H	Salado Creek	Buyout
91	1234.2	H	Salado Creek	Buyout
92	1234.3	H	Salado Creek	Buyout
93	1243	H	Salado Creek	Buyout
94	1302	H	Salado Creek	Buyout
95	1302.2	H	Salado Creek	Buyout
96	1303	H	Salado Creek	Buyout
97	1303.4	H	Salado Creek	Buyout
98	1303.7	H	Salado Creek	Buyout
99	1303.8	H	Salado Creek	Buyout

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100	1303.9	H	Salado Creek	Buyout	
101	840	I	Salado Creek	Buyout	
102	1027	I	Salado Creek	Buyout	
103	1102	I	Salado Creek	Buyout	
104	1102.5	I	Salado Creek	Buyout	
105	1102.7	I	Salado Creek	Buyout	
106	826	Morningview	Salado Creek	Buyout	
107	827	Morningview	Salado Creek	Buyout	
108	838	Morningview	Salado Creek	Buyout	
109	839	Morningview	Salado Creek	Buyout	
110	843	Morningview	Salado Creek	Buyout	
111	850	Morningview	Salado Creek	Buyout	
112	115	Rice	Salado Creek	Buyout	
113	123	Rice	Salado Creek	Buyout	
114	127	Rice	Salado Creek	Buyout	
115	902	Sterling	Salado Creek	Buyout	
116	1078	Wheatley	Salado Creek	Buyout	
117	1003	Yucca	Salado Creek	Buyout	
118	1007	Yucca	Salado Creek	Buyout	
119	1012	Yucca	Salado Creek	Buyout	
120	1027	Yucca	Salado Creek	Buyout	
121	1031	Yucca	Salado Creek	Buyout	
122	1035	Yucca	Salado Creek	Buyout	
123	1158	Yucca	Salado Creek	Buyout	
124	1203	Yucca	Salado Creek	Buyout	
125	1210.1	Yucca	Salado Creek	Buyout	
126	1210.2	Yucca	Salado Creek	Buyout	
127	1230	Yucca	Salado Creek	Buyout	
128	1234	Yucca	Salado Creek	Buyout	
129	1238	Yucca	Salado Creek	Buyout	
130	1243	Yucca	Salado Creek	Buyout	
131	1247	Yucca	Salado Creek	Buyout	
132	1250	Yucca	Salado Creek	Buyout	
133	1019 & 1023	Yucca	Salado Creek	Buyout	
			Total Salado Creek Area		**$ 1,423,675**
1	638	Rivas	Martinez Creek	Buyout	
2	650	Cincinnati	Martinez Creek	Buyout	
3	702	Cincinnati	Martinez Creek	Buyout	
4	1418	Woodlawn, W	Martinez Creek	Buyout	
5	1606	Trinity, N	Martinez Creek	Buyout	
6	620	Menchaca	Martinez Creek	Buyout	
7	1317, 1321 & 1325	San Jacinto, N	Martinez Creek	Buyout	
8	1547	Poplar, W	Martinez Creek	Buyout	
9	1607	Poplar, W	Martinez Creek	Buyout	
10	1610	Poplar, W	Martinez Creek	Buyout	
11	1619	Poplar, W	Martinez Creek	Buyout	

City of San Antonio Phase II Buyout Program

12	1435	Woodlawn, W	Martinez Creek	Buyout	
13	635	Lombrano	Martinez Creek	Buyout	
14	747	Arbor	Martinez Creek	Buyout	
15	628	Rivas	Martinez Creek	Buyout	
			Total Martinez Creek		**$ 1,280,836**
1	5402	Natho	Rosillo Creek	Buyout	
2	5414	Natho	Rosillo Creek	Buyout	
3	5418	Natho	Rosillo Creek	Buyout	
4	2402	McNutt	Rosillo Creek	Buyout	
5	2406	McNutt	Rosillo Creek	Buyout	
6	2410	McNutt	Rosillo Creek	Buyout	
7	2414	McNutt	Rosillo Creek	Buyout	
8	2418	McNutt	Rosillo Creek	Buyout	
9	2422	McNutt	Rosillo Creek	Buyout	
10	2426	McNutt	Rosillo Creek	Buyout	
11	2430	McNutt	Rosillo Creek	Buyout	
12	2504	McNutt	Rosillo Creek	Buyout	
13	2510	McNutt	Rosillo Creek	Buyout	
14	2514	McNutt	Rosillo Creek	Buyout	
15	2518	McNutt	Rosillo Creek	Buyout	
16	2520	McNutt	Rosillo Creek	Buyout	
17	2630	McNutt	Rosillo Creek	Buyout	
18	2606	McNutt	Rosillo Creek	Buyout	
19	2610	McNutt	Rosillo Creek	Buyout	
20	2626	McNutt	Rosillo Creek	Buyout	
			Total Rosillo Creek Area		**$ 164,800**
1	4464	Plumnear	Leon Creek	Buyout	
2	4520	Plumnear	Leon Creek	Buyout	
3	4550	Plumnear	Leon Creek	Buyout	
4	4602	Plumnear	Leon Creek	Buyout	
5	4610	Plumnear	Leon Creek	Buyout	
6	9371	IH 35 S	Leon Creek	Buyout	
7	9395	IH 35 S	Leon Creek	Buyout	
8	9405	IH 35 S	Leon Creek	Buyout	
9	0	New Laredo Hwy.	Leon Creek	Buyout	
			Total Leon Creek Area		**$ 412,599**
1	9726	Morga	Beitel Creek	Buyout	
2	9722	Morga	Beitel Creek	Buyout	
3	9718	Morga	Beitel Creek	Buyout	
4	9714	Morga	Beitel Creek	Buyout	
5	9710	Morga	Beitel Creek	Buyout	
6	9706	Morga	Beitel Creek	Buyout	
7	9702	Morga	Beitel Creek	Buyout	
8	9614	Morga	Beitel Creek	Buyout	
9	9610	Morga	Beitel Creek	Buyout	
10	9606	Morga	Beitel Creek	Buyout	
11	9602	Morga	Beitel Creek	Buyout	
12	9518	Morga	Beitel Creek	Buyout	

City of San Antonio Phase II Buyout Program

13	9514	Morga	Beitel Creek	Buyout	
14	9510	Morga	Beitel Creek	Buyout	
			Total Beitel Creek Area		**$ 752,000**
1	11609	Weidner	Beitel Creek	Buyout	
2	999	Weidner	Beitel Creek	Buyout	
3	5432	Leonhardt	Beitel Creek	Buyout	
4	0	Weidner	Beitel Creek	Buyout	
5	11603	Weidner	Beitel Creek	Buyout	
6	11603	Weidner	Beitel Creek	Buyout	
7	11611	Weidner	Beitel Creek	Buyout	
8	11919	Weidner	Beitel Creek	Buyout	
9	12121	Weidner	Beitel Creek	Buyout	
			Total Beitel Creek Area		**$ 700,200**
1	1607	Pyron, E.	San Antonio River	Buyout	
2	1623	Pyron, E.	San Antonio River	Buyout	
3	1629	Pyron, E.	San Antonio River	Buyout	
4	1606	Pyron, E.	San Antonio River	Buyout	
5	7151	Symphony	San Antonio River	Buyout	
6	7150	Symphony	San Antonio River	Buyout	
7	7134	Symphony	San Antonio River	Buyout	
8	7120	Symphony	San Antonio River	Buyout	
9	7138	Symphony	San Antonio River	Buyout	
10	7122	Symphony	San Antonio River	Buyout	
11	7118	Symphony	San Antonio River	Buyout	
12	7110	Symphony	San Antonio River	Buyout	
			Total San Antonio River Area		**$ 1,271,940**
1	0	Babcock	Huesta Creek	Buyout	
2	13231	Danvers	Huesta Creek	Buyout	
3	13303	Danvers	Huesta Creek	Buyout	
4	13307	Danvers	Huesta Creek	Buyout	
5	13315	Danvers	Huesta Creek	Buyout	
6	13319	Danvers	Huesta Creek	Buyout	
7	13323	Danvers	Huesta Creek	Buyout	
8	13405	Danvers	Huesta Creek	Buyout	
9	13411	Danvers	Huesta Creek	Buyout	
10	13415	Danvers	Huesta Creek	Buyout	
11	13214,13218,13222	Dime	Huesta Creek	Buyout	
12	13226 & 13230	Dime	Huesta Creek	Buyout	
13	13234	Dime	Huesta Creek	Buyout	
14	13302	Dime	Huesta Creek	Buyout	
15	13306	Dime	Huesta Creek	Buyout	
16	13310	Dime	Huesta Creek	Buyout	
17	13311	Dime	Huesta Creek	Buyout	
18	13314 & 13318	Dime	Huesta Creek	Buyout	
19	13319	Dime	Huesta Creek	Buyout	
20	13322 & 13326	Dime	Huesta Creek	Buyout	
21	13330	Dime	Huesta Creek	Buyout	
22	13334	Dime	Huesta Creek	Buyout	

City of San Antonio Phase II Buyout Program

23	7347	Glenney	Huesta Creek	Buyout	
24	13527	Glidden	Huesta Creek	Buyout	
25	13427	Glidden	Huesta Creek	Buyout	
26	13431	Glidden	Huesta Creek	Buyout	
27	13435	Glidden	Huesta Creek	Buyout	
28	13439	Glidden	Huesta Creek	Buyout	
29	13523	Glidden	Huesta Creek	Buyout	
30	13531	Glidden	Huesta Creek	Buyout	
31	13603	Glidden	Huesta Creek	Buyout	
32	13607, 13611	Glidden	Huesta Creek	Buyout	
33	7321	Nickle	Huesta Creek	Buyout	
34	7324	Nickle	Huesta Creek	Buyout	
			Total Huesta Creek Area		**$ 733,210**
246 Buyout Tracts			**Phase II Buyout Total**		**$ 6,739,259**

APPENDIX L
City of San Antonio Low Water Crossings

LOW WATE. JROSSINGS

WATERSHED ABBREVIATIONS:

LEON = LEON CREEK WATERSHED
SAL = SALADO CREEK WATERSHED
OLMOS = OLMOS CREEK WATERSHED
USA = UPPER SAN ANTONIO RIVER WATERSHED
LSA = LOWER SAN ANTONIO RIVER WATERSHED

MEDIO = MEDIO CREEK WATERSHED
MEDINA = MEDINA CREEK WATERSHED
MART = MARTINEZ CREEK WATERSHED
CAL = CALAVERAS CREEK WATERSHED
CIB = CIBOLO CREEK WATERSHED

* LWC SHOWN ON MAP BUT PREVIOUSLY NOT INCLUDED IN THIS LIST.

LWC No	STREET NAME	WATER-SHED	CREEK NAME	MAP No.	DIST. NO.	DATE INSPECT	FLOOD SIGNS	FLOOD GAGE	No TRAF LANES	CULVERT	DNSTR BARR	STR. LIGHTS	POSTED MPH
1	HAUSMAN RD., 200' EAST OF BABCOCK	LEON	MAVERICK	E	8	05/03/94	YES	YES	2	48"	NONE	NONE	45
2	HAUSMAN RD. @ ROADRUNNER	LEON	MAVERICK TRIB.	E	8	05/03/94	YES	YES	2	NONE	NONE	ONE	45
3.1	OLD FREDERICKSBURG RD., NORTH OF 1604	LEON	LEON	E	8	05/03/94	YES	YES	2	7-3'X7'	NONE	NONE	NONE
4	HAUSMAN RD., 4800' WEST OF IH-10	LEON	LEON	E	8	05/03/94	YES	YES	2	36"	NONE	NONE	45
5	DANVERS BTW. GLIDDEN & DIME	LEON	HUESTA	E	8	05/03/94	YES	YES	2	12"X18"	NONE	NONE	NONE
*5.1	HAUSMAN RD., 4500' EAST OF LOOP 1604	LEON	HUESTA	E	9								
6	BABCOCK RD., 100' NORTH OF NICKLE	LEON	HUESTA	E	8	05/03/94	YES	YES	2	NONE	NONE	NONE	NONE
7	BABCOCK RD., 500' SOUTH OF NICKLE	LEON	HUESTA	E	8	05/04/94	YES	YES	2	2-30"	NONE	NONE	NONE
8	BABCOCK RD., 2300' SOUTH OF NICKLE	LEON	MAVERICK	E	8	05/04/94	YES	YES	2	NONE	NONE	ONE	25
9	BABCOCK RD., 3700' SOUTH OF NICKLE	LEON	LEON	E	8	05/04/94	YES	YES	2	2-30"	NONE	ONE	25
10	GEORGE RD., WEST OF NW MILITARY	OLMOS	E. OLMOS	E	8	05/04/94	YES	YES	2	NONE	NONE	NONE	35
11	OLD BLANCO RD., NORTH OF VOELCKER	SAL	SALADO	E	8, 9	05/04/94	YES	YES	2	NONE	YES	YES	NONE
12.1	PASO DEL NORTE, 700' WEST OF SAN PEDRO	SAL	LORENCE TRIB.	E	9	05/04/94	YES	YES	2	2-18"	YES	NONE	NONE
12.2	ENCINO GRANDE, SOUTH OF PASO DEL NORTE	SAL	LORENCE TRIB.	E	9	05/04/94	ONE	YES	2	2-24"	NONE	NONE	NONE
12.3	RIO BRAVO @ RIO SECO	SAL	LORENCE TRIB.	E	9	05/04/94	YES	YES	2	NONE	NONE	NONE	NONE
13	WEST AVE., SOUTH OF INTERPARK	SAL	SALADO TRIB.	E	9	05/04/94	YES	YES	4	24"	YES	YES	45
14	SUGRCREST BTW. PARKSTONE & HAPPY HOLLOW	SAL	LORENCE TRIB.	F	9	05/04/94	YES	YES	2	48"	NONE	YES	NONE
15	COPPERHILL BTW. PARKSTONE & HAPPY HOLLOW	SAL	LORENCE TRIB.	F	9	05/04/94	YES	YES	2	NONE	NONE	YES	NONE
16	LEDGESTONE @ MOUNT JOY	SAL	LORENCE TRIB.	F	9	05/09/94	YES	YES	2	4.5'X6'	YES	ONE	NONE
17	SPRINGHILL BTW. PIPESTONE & MT. EVEREST	SAL	LORENCE	F	9	05/09/94	YES	YES	2	4.5'X6'	YES	ONE	NONE
18	JONES MALTSBERGER, SOUTH OF REDLAND	SAL	MUD	F	10	05/09/94	YES	YES	2	NONE	NONE	NONE	40
19	HENDERSON PASS, SOUTH OF MOSS BRIAR	SAL	LORENCE	F	9	05/09/94	YES	YES	4	4-24"	YES	YES	25 & 30
20	STAHL RD., 2100' EST OF WETMORE RD.	SAL	MUD TRIB.	F	10	05/09/94	YES	YES	2	28"X42"	YES	YES	NONE
21	STAHL RD., NORTH OF BELL	SAL	MUD TRIB.	F	10	05/10/94	YES	YES	2	2-18"	NONE	YES	35
22	STAHL RD. SOUTH OF JUNG	SAL	MUD TRIB.	F	10	05/10/94	NO	NO	2	15" & 2-18"	NONE	NONE	35
22.1	JUNG RD. @ STAHL RD.	SAL	MUD TRIB.	F	10	05/10/94	YES	YES	2	18"	NONE	NONE	35
23	JUDSON RD., 400' EAST OF NACOGDOCHES	SAL	BEITEL TRIB.	F	10	05/10/94	YES	YES	2	6-20"X28"	YES	YES	20
24	JUDSON RD. @ LOOKOUT RD.	SAL	BEITEL TRIB.	F	10	05/10/94	YES	YES	2	6-3.5'X7'	NONE	YES	45
24.1	LOOKOUT RD., 100' NORTHEAST OF JUDSON RD.	SAL	BEITEL TRIB.	F	10	05/10/94	YES	YES	2	3-2'X7'	NONE	ONE	NONE
24.2	LOOKOUT RD., 200' SOUTHWEST OF TOPPERWEIN	SAL	BEITEL TRIB.	F	10	05/10/94	YES	YES	2	4-28"X40"	NONE	NONE	NONE
25	PRUE RD., 1600' EAST OF BABCOCK RD.	LEON	HUEBNER	H	8	05/12/94	YES	YES	2	24"	NONE	YES	40

LWC No	STREET NAME	WATER-SHED	CREEK NAME	MAP No.	DIST. NO.	DATE INSPECT	FLOOD SIGNS	FLOOD GAGE	No TRAF LANES	CULVERT	DNSTI BARR	TR. LIGHTS	POSTED MPH
26	LOCKHILL, 250' EAST OF WHITE BONNET	LEON	HUEBNER	H	8	05/12/94	YES	YES	2	30"	NONE	YES	NONE
27	WHITE BONNET, SOUTH OF LOCKHILL	LEON	HUEBNER	H	8	05/12/94	YES	YES	2	30"	NONE	YES	NONE
28	HOLLYHOCK, 600' WEST OF BABCOCK	LEON	HUEBNER	H	7	05/12/94	YES	YES	2	NONE	NONE	TWO	30
29	WHITBY RD., 200' NORTH OF WELLESLEY MANOR	LEON	HUEBNER	H	7	05/12/94	YES	YES	2	18"	NONE	ONE	30 & 35
30	HUEBNER RD., 400' WEST OF FLOYD CURL	LEON	E. FORK HUEBNER	H	8	05/12/94	YES	YES	2	18"	NONE	YES	40
31	BABCOCK RD., 1000' SOUTH OF HUEBNER	LEON	E. FORK HUEBNER	H	8	05/12/94	YES	YES	2	2-30"	NONE	ONE	45
32	HUEBNER RD., 400' SOUTH OF APPLE GREEN	LEON	HUEBNER	H	7, 8	05/12/94	ONE	YES	2	3-24"	NONE	YES	40
33	MEDICAL DR., 200' WEST OF WURZBACH	USA	ZARZAMORA	H	8	05/12/94	YES	YES	4	3-5'X10'	YES	YES	35
34	SLEEPY HOLLOW @ SUNBURST	OLMOS	W. OLMOS	H	8	05/12/94	YES	YES	2	NONE	NONE	YES	NONE
35	ORSINGER RD., 250' WEST OF SLEEPY HOLLOW	OLMOS	W. OLMOS	H	8	05/16/94	ONE	YES	2	14"X21"	NONE	ONE	35
36	VANCE JACKSON @ ORSINGER RD.	OLMOS	W.OLMOS TRIB.	H	8	05/16/94	YES	YES	2	NONE	NONE	YES	20 & 35
37	VANCE JACKSON, SOUTH OF TREEHILL	OLMOS	W. OLMOS TRIB.	H	8	05/16/94	YES	YES	2	NONE	NONE	YES	35
38	GEORGE RD., EAST OF LOCKHILL SELMA	OLMOS	E. OLMOS TRIB.	H	8	05/16/94	YES	YES	2	NONE	NONE	ONE	35
39	LOCKHILL SELMA, 500' NORTH OF WURZBACH	OLMOS	E. OLMOS	H	8	05/16/94	YES	YES	2	NONE	YES	YES	45
40	LOCKHILL SELMA, 400' NORTH OF WHISPER PATH	OLMOS	E. OLMOS TRIB.	H	8	05/18/94	ONE	YES	2	2-24"	NONE	YES	35
41	VANCE JACKSON, 200' SOUTH OF SCENIC	OLMOS	W. OLMOS TRIB.	H	8	05/18/94	YES	YES	2	2-3'X9'	NONE	YES	35
42	DREAMLAND, SOUTH OF RR CROSSING	USA	OLMOS	H	8	05/18/94	YES	YES	2	3-24"	YES	YES	35
42.1	ALGERITA DR., 1000' NW OF VANCE JACKSON	USA	OLMOS TRIB.	H	8	06/20/94	NO	NO	2	NONE	NONE	NONE	NONE
43	LOCKHILL SELMA, SOUTH OF BELAIR	USA	OLMOS TRIB.	H	9	05/18/94	YES	YES	2	4.5'X6'	NONE	YES	35
44	WEST AVE., NORTH OF LOOP RD.	SAL	SALADO TRIB.	H	9	05/18/94	YES	YES	4	24"	NONE	YES	45
45	WEST AVE. @ NORTH LOOP RD.	SAL	SALADO	H	9	05/18/94	YES	YES	4	4'X8'	NONE	YES	40
45.1	W. NORTH LOOP RD. 1300' E. OF WEST AVE.	SAL	SALADO TRIB.	H	7	05/18/94	YES	YES	2	NONE	NONE	NONE	NONE
46	NORTH LOOP, 150' S.E. OF NORTH LOOP RD.	SAL	SALADO	H	9	05/18/94	YES	YES	2	NONE	NONE	NONE	NONE
47	MALTSBERGER LN., 925' EAST OF SAN PEDRO	SAL	SALADO	H	9	05/18/94	YES	YES	2	NONE	NONE	ONE	NONE
48	McCULLOUGH, NORTH OF WOLF RD.	USA	OLMOS TRIB.	H	9	05/18/94	YES	YES	2	24"	NONE	ONE	NONE
49	WOLF @ PLYMOUTH	USA	OLMOS TRIB.	H	9	05/18/94	YES	YES	2	24"	NONE	TWO	NONE
50	NORTHERN, WEST OF 281 NORTH	USA	OLMOS TRIB.	H	9	05/19/94	YES	YES	2	3-15"	NONE	YES	NONE
51	HALM, EAST OF JONES MALTSBERGER	USA	OLMOS TRIB.	H	9	05/19/94	YES	YES	2	3-24"	YES	YES	NONE
52	JACKSON KELLER, SOUTH OF SOUTH SEA	USA	OLMOS TRIB.	H	9	05/19/94	YES	YES	2	NONE	YES	YES	20 & 35
53	McCULLOUGH @ BARBARA	USA	OLMOS TRIB.	H	9	05/19/94	YES	YES	4	2-6'X8'	YES	YES	35
54	McCULLOUGH, 600' SOUTH OF JACKSON KELLER	USA	OLMOS	H	9	05/19/94	YES	YES	5	BRIDGE	YES	YES	40
55	WURZBACH, 750' SOUTH OF SEVILLE	LEON	HUEBNER TRIB.	H	7	05/19/94	ONE	YES	2	2-44"X60"	YES	YES	40
56	WURZBACH, 2000' NORTH OF TIMBERHILL	LEON	HUEBNER TRIB.	H	7	05/19/94	ONE	YES	2	2-36"	YES	YES	40
57	TIMBERHILL, NORTH OF WURZBACH	LEON	HUEBNER	H	7	05/19/94	YES	YES	2	60"	YES	YES	30
58	INGRAM, 2500' EAST OF MABE	LEON	LEON	H	6, 7	05/19/94	ONE	YES	2	2-30"	NONE	YES	40
59	TIMBER PATH, 500' SOUTHEAST OF GRISSOM RD.	LEON	CULEBRA	G	6	05/12/94	YES	YES	2	4'X8'	NONE	YES	45
59.1	EASTERLING, SOUTH OF CULEBRA	LEON	CULEBRA TRIB.	G	6	05/10/94	YES	YES	2	48"	NONE	NONE	NONE
60	OLD GRISSOM, 500' EAST OF CULEBRA	LEON	CULEBRA	G	6	05/12/94	YES	YES	2	24"	NONE	NONE	NONE

LWC No	STREET NAME	WATER-SHED	CREEK NAME	MAP No.	DIST. NO.	DATE INSPECT	FLOOD SIGNS	FLOOD GAGE	No TRAF LANES	CULVERT	DNST BARR	TR. LIGHTS	POSTED MPH
61	PARKWAY, 500' EAST OF CALLAGHAN	USA	ZARZAMORA TRIB.	H	7	05/23/94	YES	YES	2	18"&2-24"	NONE	YES	NONE
62	CALLAGHAN RD., 100' EAST OF WOODSIDE	USA	ZARZAMORA	H	7	05/23/94	YES	YES	2	12"	YES	YES	40
63	SILVERCREST BTW. WOODSIDE & HORSESHOE	USA	ZARZAMORA TRIB.	H	7	05/23/94	YES	YES	2	NONE	NONE	YES	NONE
64	SILVERCREST, 100' NORTHWEST OF MAJESTIC	USA	ZARZAMORA	H	7	05/23/94	YES	YES	2	15"	NONE	TWO	NONE
65	OAK KNOLL, 500' EAST OF E. HORSESHOE BEND	USA	ZARZAMORA	H	7	05/23/94	YES	YES	2	3-24"	YES	YES	NONE
66	OAK KNOLL BTW. HORSESHOE BEND & MAJESTIC	USA	ZARZAMORA	H	7	05/23/94	YES	YES	2	2-18"/2-30"	NONE	YES	NONE
67	E. HORSESHOE BEND & OAKWOOD	USA	ZARZAMORA TRIB.	H	7	05/23/94	YES	YES	2	18"	YES	YES	NONE
67.1	W. QUILL DR. @ OAKWOOD DR.	USA	UPPER APACHE	H	7	06/20/94	YES	YES	2	NONE	YES	YES	30
68	MAJESTIC BTW. OAKNOLL & HORSESHOE BEND	USA	ZARZAMORA	H	7	05/23/94	YES	YES	2	4-4.5'X6'	YES	YES	NONE
69	CALLAGHAN RD. BTW. FARRAGUT & SLOAN	USA	ZARZAMORA TRIB.	H	6, 7	05/23/94	YES	YES	4	18"	YES	YES	NONE
70	CALLAGHAN RD. & HEMPHILL	USA	ZARZAMORA TRIB.	H	6, 7	05/23/94	YES	YES	3	18"	YES	YES	20
70.1	LAVEN, SOUTH OF CULEBRA	USA	ZARZAMORA	H	6	05/23/94	YES	NO	2	2-24"	NONE	YES	NONE
71	DANVILE & OVERBROOK	USA	ALAZAN TRIB.	H	7	06/20/94	YES	YES	2	18"	YES	ONE	NONE
72	SPENCER LN., EAST OF BALCONES	USA	ALAZAN TRIB.	H	1	06/20/94	YES	YES	2	2--9'X4'	YES	YES	NONE
73	McNEEL & OVERBROOK	USA	ALAZAN TRIB.	H	7	06/20/94	YES	YES	2	NONE	NONE	YES	NONE
74	DEVINE, 400' NORTH OF DICK FREDERICK	USA	OLMOS	H	9	06/20/94	YES	YES	2	3-72"	YES	ONE	35
75	E. MULBERRY @ SAN ANTONIO RIVER	USA	S.A. RIVER	H	1, 9	05/03/94	YES	YES	2	BRIDGE	YES	YES	20 & 35
76	STARCREST, 600' WEST OF NE ENTRANCE	SAL	LORENCE	I	9	06/20/94	YES	YES	4	2-3'X10'	NONE	YES	40
77	STARCREST, 580' EAST OF NE ENTRANCE	SAL	MUD	I	9	06/20/94	YES	YES	4	2-3'x10'	YES	YES	45
78	BITTERS RD., 2600' WEST OF NE ENTRANCE	SAL	SALADO	I	9	06/21/94	ONE	YES	2	28"x42"	NONE	NONE	NONE
79	NE ENTRANCE RD., 1000' SOUTH OF STARCREST	SAL	SALADO	I	9	06/20/94	YES	YES	2	2-36"	YES	NONE	NONE
80	BITTERS RD., 75' WEST OF NE ENTRANCE RD.	SAL	SALADO TRIB.	I	9	06/20/94	ONE	YES	2	48"	NONE	NONE	NONE
81	NE ENTRANCE RD., 500' NORTH OF BITTERS	SAL	SALADO TRIB.	I	9	06/20/94	YES	YES	2	18"	NONE	NONE	NONE
82	CHEEVER BTW. TESORO & TEE CEE	SAL	SALADO TRIB.	I	10	06/22/94	YES	NO	2	4-10'x5'	YES	NONE	NONE
83	NACOGDOCHES RD. @ BULVERDE	SAL	SALADO TRIB.	I	10	06/22/94	ONE	YES	4	5-9'X4'	YES	YES	NONE
84	NACOGDOCHES RD. 750' S. OF OLD PERRIN BEITEL	SAL	SALADO TRIB.	I	10	06/22/94	YES	YES	2	2-8'X4'	NONE	YES	40
85	O'CONNOR, NORTH OF LOOKOUT RD.	SAL	BEITEL TRIB.	I	10	06/22/94	YES	NO	2	18"&36"	NONE	NONE	NONE
86	LEONHARDT, 500' SOUTH OF ENCANTE	SAL	BEITEL TRIB.	I	10	06/21/94	YES	YES	2	2-48"	YES	NONE	35
87	LEONHARDT, 400' EAST OF ENCANTE	SAL	BEITEL TRIB.	I	10	06/21/94	YES	YES	2	18"	YES	YES	35
88	WEIDNER, SOUTH OF LEONHARDT	SAL	BEITEL TRIB.	I	10	06/21/94	YES	YES	2	3-10'X6'	NONE	YES	35
89	SCHERTZ, 1000' WEST OF MKT CROSSING	SAL	BEITEL	I	10	06/21/94	YES	YES	2	35"X24"	NONE	YES	40
90	SCHERTZ, WEST OF WEIDNER @ RR CROSSING	SAL	BEITEL TRIB.	I	10	06/21/94	YES	YES	2	2-18"	YES	YES	40
91	WEIDNER, 500' NORTH OF SCHERTZ	SAL	BEITEL TRIB.	I	10	06/21/94	YES	YES	2	30"&24"	YES	YES	35
92	WEIDNER, 50' EAST OF GRAND PARK	SAL	BEITEL TRIB.	I	10	06/21/94	YES	YES	2	NONE	YES	YES	25
93	EAGLECREST, WEST OF WEIDNER	SAL	BEITEL TRIB.	I	10	06/21/94	YES	YES	2	NONE	YES	YES	25
94	CAVE LN. BTW. DUNDEE & KENNILWORTH	SAL	SALADO TRIB.	I	10	06/21/94	YES	YES	2	NONE	NONE	YES	NONE
95	VANDIVER & IRVINGTON	SAL	SALADO TRIB.	I	10	05/16/94	YES	YES	2	NONE	NONE	YES	NONE
96	VICAR, 100' EAST OF PERRIN BEITEL	SAL	BEITEL TRIB.	I	10	05/16/94	YES	YES	3	7-6'X5'	YES	YES	NONE

LWC No	STREET NAME	WATER-SHED	CREEK NAME	MAP No.	DIST. NO.	DATE INSPECT	FLOOD SIGNS	FLOOD GAGE	No TRAF LANES	CULVERT	DNST BARR	TR. LIGHTS	POSTED MPH
97	AUSTIN HWY. @ IRA LEE	SAL	SALADO	I	10	05/16/94	YES	YES	2	8-10'X3'	NONE	YES	NONE
97.1	IRA LEE, NORTH OF AUSTIN HWY.	SAL	SALADO	I	10	05/16/94	YES	YES	2	42"X29"	NONE	YES	NONE
98	DELL OAK @ ASHLAND	SAL	WALZEM	I	10	05/16/94	YES	YES	2	2-10'X1'	NONE	YES	NONE
99	OVERLAND & LAKESHORE	SAL	WALZEM	I	10	05/16/94	YES	YES	2	NONE	NONE	YES	15
100	BLAKELY, 450' WEST OF VANDIVER	SAL	SALADO TRIB.	I	10	05/16/94	YES	YES	2	2-24"	YES	YES	NONE
101	GIBBS SPRAWL, 700' N.E. OF CASTLE CROSS	MART	RITTIMAN	I	2	06/21/94	YES	YES	2	4-42"X29"	NONE	NONE	35
102	RITTIMAN, 3000' WEST OF CASTLE CROSS	SAL	ROSILLO	I	2	06/21/94	(ROAD & STRUCTURE BEING REBUILT)						
103	GIBBS SPRAWL @ ROSILLO CRK.	SAL	ROSILLO	I	2	06/21/94	YES	YES	2	15"+2-30"	NONE	ONE	15
104	OLD SEGUIN @ SALADO CRK	SAL	SALADO	I	2	06/21/94	YES	YES	2	5-9'X2'	NONE	NONE	NONE
105	CREEKVIEW, WEST OF CURRENCY	SAL	PERSHING	I	2	06/21/94	YES	YES	2	3-18"	YES	YES	20
106	W. COMMERCE BTW. PINN RD. & MILITARY	LEON	LEON	L	6	06/10/94	YES	YES	4	2-72"	YES	YES	45
107	PINN RD., 2500' SOUTH OF WEST COMMERCE	LEON	LEON	L	6	06/10/94	YES	YES	2	24"	NONE	YES	35
108	LAUREL @ HARPE	USA	SAN PEDRO	L	1	05/02/94	YES	YES	2	2-6'X2'	YES	YES	NONE
109	2000 BLK. PINN RD.	LEON	LEON TRIB.	L	6	06/10/94	YES	BROKE	2	7-10'X6'	YES	YES	35
110	ARVIL BTW. KEITHA & ELMER	LEON	LEON	L	6	06/13/94	YES	NO	2	2-24"	NONE	NONE	NONE
111	RODRIGUEZ & LEON CRK.	LEON	LEON	L	6	06/13/94	YES	YES	2	2-30"	NONE	NONE	NONE
112	MILITARY & WESTBRIAR	LEON	LEON TRIB.	L	6	06/10/94	YES	YES	5	NONE	YES	YES	35
112.1	HARNESS LN., 300' N. OF MARBACH RD.	LEON	SW RESEARCH TR.	L	6	06/20/94	YES	YES	2	9-49"X33"	YES	(COMM)	NONE
112.2	MEADDOW WAY, 300' N. OF MARBACH RD.	LEON	SW RESEARCH TR.	L	6	06/20/94	YES	YES	2	2-49"X33"	YES	(COMM)	NONE
113	MARTINIQUE BTW. BARBADOS & ANDROS	LEON	LEON TRIB.	L	6	06/10/94	YES	YES	2	NONE	NONE	YES	NONE
114	TALLAHASSE BTW. BARBADOS & ANDROS	LEON	LEON TRIB.	L	6	06/10/94	YES	YES	2	1-8'X2'	YES	YES	NONE
115	WESTFIELLD BTW. BARBADOS & ANDROS	LEON	LEON TRIB.	L	6	06/10/94	YES	YES	2	1-10'X2'	YES	YES	30
116	BISCAYNE BTW. BARBADOS & ANDROS	LEON	LEON TRIB.	L	6	06/10/94	YES	YES	2	1-10'X2'	YES	YES	NONE
117	RAY ELLISON @ OLD VALLEY HI	MEDIO	MEDIO TRIB.	L	4	05/19/94	NO	YES	2	3-36"	NONE	YES	40
118	RAY ELLISON, 300' NORTH OF MEDINA BASE	MEDIO	MEDIO TRIB.	L	4	05/19/94	ONE	YES	2	3-36"	NONE	ONE	40
119	RAY ELLISON @ HIDDEN VALLEY	MEDIO	MEDIO TRIB.	L	4	05/19/94	YES	YES	2	NONE	NONE	YES	40
120	COVEL & MEDIO CRK.	MEDIO	MEDIO	L	4	05/19/94	ONE	NO	2	5-10'X10'	NONE	YES	NONE
*121	WHITEWOOD NORTH OF MEDINA BASE	LEON	LEON	L	5								
122	FEDORA BTW. DEMPSEY & CLEGG	LEON	INDIAN TRIB.	L	4	05/19/94	ONE	YES	2	NONE	NONE	YES	NONE
123	HILLBURN BTW. DEMPSEY & CLEGG	LEON	INDIAN TRIB.	L	4	05/19/94	ONE	YES	2	NONE	NONE	YES	NONE
124	GAVILAN BTW. DEMPSEY & CLEGG	LEON	INDIAN TRIB.	L	4	05/19/94	YES	YES	2	NONE	NONE	YES	NONE
125	HAYDEN BTW. DEMPSEY & CLEGG	LEON	INDIAN TRIB.	L	4	05/19/94	YES	YES	2	NONE	NONE	YES	NONE
125.1	WAR CLOUD, 350' E. OF RUNNING HORSE	LEON	INDIAN CR.	L	4	06/20/94	YES	NO	2	8-42"X29"	REPAIR	NONE	NONE
126	MISSION PARKWAY UNDER SOUTHCROSS	USA	S.A. RIVER	L	3	05/18/94	YES	NO	2	NONE	NONE	YES	NONE
127	SOUTHCROSS & BOXELDER	USA	S.A. RIVER TRIB.	L	3	05/18/94	YES	YES	2	NONE	YES	ONE	NONE
128	MISSION PARKWAY, SOUTH OF NAPIER	USA	S.A. RIVER	L	3	05/18/94	YES	NO	2	30"	NONE	NONE	NONE
129	MISSION PARKWAY, @ SAN ANTONIO RIVER	USA	S.A. RIVER	L	3	05/18/94	YES	NO	2	30"	NONE	NONE	NONE
132	PETALUMA BTW. LUDTKE & GARNETT	USA	SIX MILE TRIB.	L	3	05/18/94	YES	YES	2	NONE	NONE	YES	30

LWC No	STREET NAME	WATER-SHED	CREEK NAME	MAP No.	DIST. NO.	DATE INSPECT	FLOOD SIGNS	FLOOD GAGE	No TRAF LANES	CULVERT	DNSTI BARR	TR. LIGHTS	POSTED MPH
133	PETALUMA, 2900' WEST OF BASCUM	USA	SIX MILE TRIB.	L	3	05/18/94	YES	YES	2	1-10'X2'	NONE	ONE	30
134	ROCKWELL & ANSLEY	USA	SIX MILE TRIB.	L	4	05/18/94	SOME	YES	2	30"	NONE	YES	30
135	ANSSLEY BTW. LUDTKE & GARNETT	USA	SIX MILE TRIB.	L	3	05/18/94	YES	YES	2	NONE	YES	ONE	30
137	GILLETTE @ ESCALON	USA	SIX MILE TRIB.	L	3	05/18/94	YES	NO	2	NONE	NONE	YES	35
138	MAUERMANN & COMANCHE CRK.	LEON	COMANCHE	L	4	05/18/94	YES	NO	2	36"	NONE	NONE	40
139	KINGKREST, EAST OF LONGLEAF	SAL	SALADO TRIB.	M	2	05/10/94	YES	YES	2	NONE	NONE	YES	NONE
141	QUINTA @ VISTA	SAL	SALADO TRIB.	M	2	05/09/94	YES	YES	2	NONE	NONE	YES	NONE
144	ROLAND @ ARRID	SAL	SALADO	M	2,3	05/09/94	SHOT	PAINT	2	8-6'X6'	YES	YES	40
145	ROLAND, WEST OF TERRON	SAL	SALADO	M	2,3	05/09/94	YES	YES	2	4-6'X4'	YES	YES	40
146	HIAWATHA, EAST OF NOPAL	USA	S.A. RIVER TRIB.	M	3	05/09/94	YES	YES	2	NONE	NONE	YES	NONE
147	NOPAL, NORTH OF FAIR	USA	S.A. RIVER TRIB.	M	3	05/09/94	YES	YES	2	NONE	YES	YES	NONE
148	SINCLAIR @ ROSILLO CRK.	SAL	ROSILLO	M	2	05/09/94	YES	YES	2	2-18"	NONE	YES	15
149	S. NEW BRAUNFELS @ KOEHLER CT.	USA	S.A. RIVER TRIB.	M	3	05/09/94	YES	YES	4	3-36"	YES	YES	40
*150	PECAN VALLEY DR. @ DOLLARHIDE	SAL	SALADO										
151	MISSION PARKWAY BTW. MILITARY & ANSLEY	USA	S.A. RIVER	M	3	05/09/94	YES	NO	2	2-18"	NONE	NONE	15
152	OLD CORPUS CHRISTI, SOUTH OF HENDERSON	LSA	S.A. RIVER TRIB.	M	3	05/03/94	YES	YES	2	1-18"	YES	YES	NONE
153	W.W. WHITE @ ROSILLO CRK.	SAL	ROSILLO	M	3	05/04/94	ONE	BENT	2	4-8'X6'	YES	NONE	40
154	SULPHUR SPRINGS, EAST OF LODI	CAL	CALAVERAS TRIB.	M	2,3	05/04/94	YES	YES	2	2-42",2-48"	YES	YES	45
155	SULPHUR SPRINGS, WEST OF LODI	CAL	CALAVERAS TRIB.	M	2,3	05/04/94	YES	YES	2	2-10'X6'	YES	YES	45
156	SULPHUR SPRINGS BTW. FOSTER & GARDNER	CAL	CALAVERAS	M	2,3	05/04/94	ONE	YES	2	4-10'X4'	YES	NONE	45
157	SULPHUR SPRINGS, EAST OF BECK	CAL	HONDO	M	2,3	05/04/94	YES	YES	2	1-9'X6'	YES	NONE	45
158	SHANE, EAST OF BOBBY ALLEN	LSA	S.A. RIVER TRIB.	M	3	05/03/94	YES	YES	2	24"X18"	NONE	NONE	30
158.1	NANCY CAROLE WAY, 500' W. OF SOUTHTON	LSA	S.A. RIVER TRIB.	M	3	06/09/94	YES	YES	2	4-18"	NONE	NONE	NONE
159	SOUTHTON RD., 4700' WEST OF IH-37	LSA	S.A. RIVER TRIB.	M	3	05/04/94	YES	YES	2	4-36"	NONE	NONE	40
160	BRAUN RD. 1300' NORTHEAST OF FM 1604	LEON	HELOTES TRIB.	G	8	05/10/94	YES	YES	2	4.5'X11"	NONE	NONE	35
160.1	LESLIE RD., 1300' SOUTHWEST OF BRAUN RD.	LEON	HELOTES	G	8	05/10/94	YES	YES	2	NONE	NONE	NONE	35
160.2	LESLIE RD.M 3200' SOUTHWEST OF BRAUN RD.	LEON	HELOTES	G	8	05/10/94	YES	YES	2	24"	NONE	NONE	NONE
161	HORAL DR. @ REVLON	MEDIO	MEDIO TRIB.	K	4	05/25/94	YES	YES	4	NONE	YES	YES	30
162	HAUSMAN RD. 4700' N. OF BANDERA	LEON	FRENCH	G	8	06/17/94	NO	NO	2	3-30"	NONE	NONE	40
162.1	HAUSMAN RD. 3900' N. OF BANDERA	LEON	FRENCH	G	8	06/17/94	NO	NO	2	NONE	NONE	NONE	40
162.2	HAUSMAN RD., 5200' NORTH OF BANDERA RD.	LEON	FRENCH	G	8	06/17/94	YES	NO	2	NONE	NONE	NONE	40
163	PRUE RD., 1500' NORTH OF BANDERA RD.	LEON	FRENCH	G	8	05/10/94	YES	YES	2	NONE	NONE	NONE	35
164	DELL PL. & FREEMAN	USA	APACHE CR. TRIB.	H	7	05/25/94	NO	NO	2	NONE	YES	YES	NONE

APPENDIX M

The Emergency Operations Plan for the City of San Antonio

SAN ANTONIO EMERGENCY MANAGEMENT

THE EMERGENCY OPERATIONS PLAN FOR THE CITY OF SAN ANTONIO

PURPOSE:

THE PURPOSE OF THIS DOCUMENT IS TO DESCRIBE THE ORGANIZATION, STAFF, AND COORDINATION NECESSARY TO ENSURE THE CONTINUED OPERATION OF CITY GOVERNMENT UNDER EMERGENCY CONDITIONS. THE PLAN RECOGNIZES THE CITY'S RESPONSIBILITY FOR SAVING LIVES. MINIMIZING DAMAGE, AND ALLEVIATING SUFFERING. FURTHERMORE, IT PROVIDES FOR ASSISTANCE IN RESTORATION AND REHABILITATION OF SOCIETY IN THE EVENT OF A NATURAL DISASTER OR NATIONAL EMERGENCY.

September 1997

TO ALL RECIPIENTS:

Transmitted herewith is the revised Emergency Management Plan for the City of San Antonio. This plan supersedes all previous editions. It provides a framework in which the city can plan and perform their respective emergency functions during a disaster or national emergency.

This plan will be reviewed annually, and revised as required. All recipients are requested to advise San Antonio Emergency Management of any changes that might result in its improvement or increase it's usefulness. Plan changes will be transmitted to all addressees on the distribution list.

JOE CANDELARIO,
ASSISTANT FIRE CHIEF,
SAEM COORDINATOR

DATE

FOREWORD

The City of San Antonio is legally responsible for providing for the health, welfare, and safety of it's citizens in the event of an emergency. This responsibility is vested in the city government. The Mayor, as Chief Executive, is the Emergency Management Director, and is charged with ensuring the development and implementation of an Emergency Management Program for the City of San Antonio. The San Antonio Emergency Management Office has been designated to coordinate accomplishment of the various plans and actions necessary to carry out this program.

The San Antonio Emergency Management Plan, with its Annexes, is intended to address situations requiring the coordinated action of several different agencies to respond effectively to an emergency condition. This major coordination effort differs from those emergencies handled on a daily basis by local fire protection, law enforcement, and medical service personnel.

This Emergency Management Plan focuses on all four of the major phases of emergency management; mitigation, preparedness, response, and recovery. These involve activities that eliminate or reduce the probability of a disaster -- MITIGATION; those activities which governments, organizations, and individuals develop to save lives and minimize damage -- PREPARATION; actions that are taken during or immediately after a disaster and are designed to prevent loss of lives or property and provide emergency assistance -- RESPONSE; and short and long term activities designed to return conditions to their normal state RECOVERY.

The San Antonio Emergency Management Plan, and the Annexes that detail the specific actions required by various city agencies, are reviewed annually to ensure they are as current as possible. Comments or questions regarding this plan, or its Annexes, should be directed to the San Antonio Emergency Management Office, 115 Auditorium Circle, San Antonio, TX 78205.

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*Non-departmental Offices

Non-city Agencies

American Red Cross (Director)
Bexar County Emergency Management Coordinator
Brooks AFB (Disaster Preparedness)
City Public Service
Fort Sam Houston (Disaster Preparedness)
Kelly AFB (Disaster Preparedness)
Lackland AFB (Disaster Preparedness)
Randolph AFB (Disaster Preparedness)
Salvation Army (Coordinator)
San Antonio Water Systems (SAWS)
State Emergency Management

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ATTACHMENTS

RECORD OF CHANGES

CHANGE # & DATE	DATE POSTED	POSTED/ENTERED BY

CITY OF SAN ANTONIO

EMERGENCY MANAGEMENT PLAN

I. AUTHORITY.

The organizational and operational concepts set forth in this plan are promulgated under authorities listed below. Copies of these documents are available for review in the San Antonio Emergency Management Office.

A. FEDERAL.

1. Federal Civil Defense Act of 1950, PL 81-920 as amended.

2. The Disaster Relief Act of 1974, PL 93-288 as amended.

3. Emergency Management Assistance, 44 US Code 2.1 (Oct. 1, 1980).

B. STATE.

1. Vernon's Texas Code Annotated, Government Code, Chapter 418, Emergency Management, 70th Legislature, 1987, The Texas Disaster Act of 1975, as amended.

2. Executive Order of the Governor, November 17, 1991.

C. LOCAL.

City Ordinance #67229, dated June 2, 1988.

II. PURPOSE.

The City of San Antonio is legally responsible to provide for the health, welfare, and safety of its citizens when a disaster or similar emergency crisis occurs. The purpose of this plan is to provide for effective emergency management in such circumstances. It seeks to mitigate the efforts of a hazard to prepare for measures to be taken that will preserve life and minimize damage, to respond during emergencies and provide necessary assistance, and to establish a recovery system in order to return the city to it's normal state of affairs. The plan attempts to define who, what, when, where, and how in order to mitigate, prepare, respond to, and recover from the effects of natural disasters, technological accidents, national emergencies, acts of war, or other major incidents.

III. SITUATION AND ASSUMPTIONS.

A. SITUATION.

1. The greater San Antonio metropolitan area has a population exceeding a million people. San Antonio is located within Bexar County in south Central Texas, approximately 280 miles south of Dallas, 200 miles west of Houston, and 150 miles from the US/Mexican border at Eagle Pass and Laredo.

2. San Antonio is primarily a military bio-technical area with extensive hospital and medical research facilities, a significant petroleum industry, excellent retail market, light industry, and numerous banking and financial institutions. Five large military bases make the city an important military, med-tech, financial, and marketing center.

3. Interstate Highways 10, 35, and 37 converge within the city limits, and Loops 410 and 1604 circle the city. Amtrak, Burlington , Sante Fe, Southern Pacific, and Union Pacific Railroads service the city, along with a multi-terminal International Airport. Other methods of transportation include Greyhound Bus Lines, air charter services, and trucking companies.

4. San Antonio is served by a council manager form of government. City services include paid fire, police, and public works personnel.

5. Water obtained from the Edwards Underground Aquifer is distributed by the San Antonio Water System (SAWS). The City Public Service Board supplies electric and gas utilities. Telephone service is supplied by Southwestern Bell and several independents.

6. Numerous radio and TV stations service the city, including a cable TV network.

7. In the event of military attack, San Antonio (with Brooks AFB, Fort Sam Houston, Kelly AFB, Lackland AFB, and Randolph AFB) is considered a target of relative military importance.

8. San Antonio and it's environs have in the past been subjected to structural fires, severe brush fires, minor water contamination, major chemical spills, floods, severe winter weather, tornadoes, and severe electrical storms.

9. Due to an unusual temperature climate, San Antonio has minimal snow removal equipment and little capability to cope with major snow or ice storms.

10. San Antonio, because of its location, will be the focal point for evacuation when the Texas Gulf Coast area (Brownsville to Galveston Bay) is threatened by a hurricane.

11. San Antonio is a major tourist destination and may have as many as 300,000 visitors present during any particular period.

12. Due to its military, business, and tourism functions San Antonio is a potential target for terrorist activities.

B. ASSUMPTIONS.

1. Because of its geographical location, topography, demography, and past disaster history, San Antonio can be assumed to be subject to emergencies resulting from the following contingencies:

   a. Tornado.

   b. Flash flooding.

   c. Major transportation accidents.

   d. Major fires.

   e. Utility outages or shortages.

   f. Hazardous material spills.

   g. Water contamination.

   h. Enemy attack.

   i. Civil disturbances or terrorism.

2. A significant snow or ice storm could completely paralyze the city.

3. In the event of a hurricane with projected landfall on the Texas Gulf Coast, San Antonio will be the initial safe-haven destination for thousands of evacuees from the coastal areas.

4. Since San Antonio military installations are not targets of primary strategic importance, nuclear attack or other national emergencies are not likely to occur without warning. However, in the event of nuclear attack, San Antonio would probably receive destructive thermonuclear damage, massive casualties, loss of emergency capabilities, follow-on effects of radioactive

fallout, and be isolated from outside communications and assistance for an indeterminate period.

5. In the event of severe international tension, the nationwide Crisis Relocation Plan may be implemented by the President of the United States through the Governor. When the plan is implemented, San Antonio will be expected to relocate approximately a million citizens to outlying areas.

IV. CONCEPT OF OPERATIONS.

A. LOCAL GOVERNMENT RESPONSIBILITIES.

1. It is the responsibility of the government to undertake comprehensive emergency management in order to protect life and property from the effects of hazardous events. Local government has the primary responsibility for emergency management activities. The preparedness and response activities will be those outlined in this plan. A local state of disaster may be declared by the Mayor. The effect of the declaration is to activate the recovery and rehabilitation aspects of the plan and to authorize the furnishing of aid and assistance. When the emergency exceeds the city's capability to respond, assistance will be requested from the state government. The federal government will provide assistance to the state where needed.

2. This plan is based on the concept that the emergency functions for the various groups involved in Emergency Management will generally parallel their normal day-to-day functions. To the maximum extent possible, the same personnel and material resources will be employed in both cases.

3. Those day-to-day functions which do not contribute directly to the emergency operation may be suspended for the duration of the emergency. The efforts that would normally be required for those functions will be

redirected to the accomplishment of emergency tasks by the agency concerned.

4. A comprehensive emergency management plan is concerned with all types of hazardous situations which may develop in the community. It accounts for activities before and after (mitigation and recovery) as well as during (preparedness and response) emergency operations. These phases of emergency operation are outlined in paragraph IVB.

B. PHASES OF MANAGEMENT.

1. Mitigation. Mitigation activities are those that eliminate or reduce the probability of a disaster occurring. Also included are those long-term activities which lessen the undesirable effects of unavoidable hazards.

2. Preparedness. Preparedness activities serve to develop the response capabilities needed in the event an emergency should arise. Planning and training are among the activities conducted under this phase.

3. Response. Response is the actual provision of emergency services during a crisis. These activities help to reduce casualties and speed recovery from damages. Response activities including warning, evacuation, rescue, and other similar operations. It may or may not involve activation of the Emergency Operations Center (EOC) depending on the severity of the emergency.

4. Recovery. Recovery is both a short term and long term process. Short term operations seek to restore vital services to the community and provide for the basic needs of the public. Long term recovery focuses on restoring the community to its normal or improved state of affairs. The recovery period is also an opportune time to institute mitigation measures, particularly those related to the recent emergency. Examples of long term recovery actions would be temporary housing and food,

restoration of non-vital government services, and reconstruction of damaged areas.

V. ORGANIZATION AND ASSIGNMENT OF RESPONSIBILITIES.

A. GENERAL.

1. The Mayor of each incorporated municipalities is responsible for emergency management planning and operations for that jurisdiction. The County Judge is responsible for emergency management planning and operations for that area of the county outside of the corporate limits of the incorporated municipalities of the county.

2. Most of the departments within the city have emergency functions in addition to their normal duties. Each department is responsible for developing and maintaining their own emergency management procedures. Specific responsibilities are outlined under the section entitled Task Assignments, as well as in individual Annexes. Attachment 2 details how the city is organized for emergencies. Attachment 3 defines all of the Annex functional areas and responsible department or agency.

B. ORGANIZATION.

Executive Group. The Executive Group is referred to in this plan as a single body, but in fact has several components with representation from numerous agencies involved in emergency operations. The members of the group include both elected and appointed executives with certain legal responsibilities. This group advises the Mayor, as Emergency Management Director, on policy actions required during emergency situations.

C. <u>EXECUTIVE GROUP RESPONSIBILITIES</u>.

1. The Mayor is primarily responsible for:

   a. Developing and directing the overall preparedness program for the city.

   b. Making emergency policy decisions.

   c. Declaring a state of emergency and activating the EOC, when necessary.

   d. Implementing the emergency powers of local government.

   e. Keeping the public and the disaster district informed of the situation.

   f. Requesting outside assistance, when necessary.

2. The City Manager is responsible for:

   a. Assuring that all city departments develop, maintain, and exercise their respective service Annexes to this plan.

   b. Supporting the overall preparedness program and organizational requirements.

   c. Serving as administrative head of the Executive Group during EOC activation.

   d. Implementing the policies and decisions of the governing body.

   e. Directing the emergency operations response of city services.

3. The Emergency Management Coordinator is responsible for:

a. Serving as Staff Advisor to the Mayor, and City Manager on emergency matters.

b. Coordinating the planning and general preparedness activities of the municipal government.

c. Analyzing the emergency skills needed by city forces, and arranging the training necessary to provide those skills.

d. Preparing and maintaining a resource inventory.

e. Ensuring the operational capability of the EOC.

f. Keeping the governing body apprised of the city's preparedness status and anticipated needs.

g. Serving as day-to-day liaison between city and state emergency management organizations.

h. Maintaining liaison with organized emergency volunteer groups and private agencies.

i. Initiating and monitoring increased readiness actions among city services when disaster threats occur.

j. Developing and maintaining this emergency management plan.

k. Searching for ways and means required to mitigate the damaging effects associated with any potential hazard.

D. EMERGENCY SERVICES.

1. Each of the services listed is a necessary component of effective emergency management. The individual responsible for each service will develop, maintain, and

exercise the systems and procedures necessary for the performance of their functions. Each Department Head is responsible for developing a service Annex and Standard Operating Procedures (SOPs) detailing how that service is to be provided. Additionally, each Department Head is responsible for coordinating the activities of outside agencies called in to assist in the performance of that service.

2. Following each service assignment is a brief list of the major tasks associated with that function. A more detailed listing of tasks and assignments will be found in the appropriate service Annex.

E. <u>EMERGENCY SERVICES RESPONSIBILITIES</u>.

1. Warning and Communications (see Annexes A and B) - SAEM Coordinator & SAEM Communications Coordinator.

   a. Receive and disseminate messages to city officials.

   b. Maintain contact with Disaster District 3B EOC.

   c. Coordinate use of all public and private communication systems necessary during emergency operations (including EBS).

   d. Disseminate emergency public information as requested.

   e. Prepare and maintain Annex A and B to this plan and supporting SOPs.

2. Shelter/Mass Care (see Annex C) Director, Disaster Services, American Red Cross.

   a. Secure facilities for mass sheltering and feeding of displaced disaster victims.

b. Secure sources of clothing for disaster victims.

c. Secure sources for emergency food supplies and arrange method of purchasing.

d. Coordinate operations of shelter facilities, whether they are to be operated by the City, local volunteers, or by organized relief agencies such as the American Red Cross.

e. Provide for health and sanitation needs of people in shelters.

f. Provide necessary support to non-city agencies operating shelters.

g. Provide for emergency stocking and marking of shelters.

h. Designate shelter management personnel.

i. Provide for assignment of radiological monitors to shelters in the event of radioactive fallout.

j. Prepare and maintain Annex C to this plan, and supporting SOPs.

3. Radiological Protection (see Annex D) - Metropolitan Health District, Director.

   a. Establish and maintain a radiological monitoring and reporting network.

   b. Secure initial and refresher training for monitors and instructions.

   c. Under fallout conditions, provide city officials and department heads with information on fallout rates, allowable doses, and fallout projections.

d. Provide input to the statewide monitoring and reporting system.

e. Coordinate activities of all city services performing monitoring activities.

f. Provide monitoring services and operational advice at the scene of accidents involving radioactive materials.

g. Prepare and maintain Annex D to this plan, and support SOPs.

4. Evacuation (see Annex E) - SAEM Coordinator, San Antonio Emergency Management.

   a. Define responsibilities of city departments and private sector groups.

   b. Identify high hazard areas and number of potential evacuees.

   c. Coordinate evacuation planning, to include:

      (1) Movement control.

      (2) Health/medical requirements.

      (3) Transportation needs.

      (4) Emergency Public Information (EPI) materials.

      (5) Shelter/reception.

   d. Prepare and maintain Annex E to this plan, and support SOPs.

   e. Maintain Crisis Relocation Plan (CRP).

5. Fire Protection and Rescue (see Annex F) - Fire Chief.

   a. Fire prevention.

   b. Fire suppression.

   c. Emergency Medical Services (EMS).

   d. Inspection of damaged area for fire hazards.

   e. Damage reconnaissance and reporting.

   f. Explosive ordinance reconnaissance.

   g. Weather reconnaissance.

   h. Disaster area evacuation.

   i. Prepare and maintain Annex F to this plan, and supporting SOPs.

6. Police Protection and Services (see Annex G) - Police Chief.

   a. Law enforcement.

   b. Traffic control.

   c. Crowd control.

   d. Isolation of damaged area.

   e. Damage reconnaissance and reporting.

   f. Explosive ordnance reconnaissance.

   g. Weather reconnaissance.

   h. Disaster area evaluation.

i. Prepare and maintain Annex G to this plan, and support SOPs.

7. Health and Medical Services (see Annex H) - Director, San Antonio Metropolitan Health District.

   a. Maintain close coordination with Bexar County Medical Society on all aspects of emergency health and medical care matters/facilities with particular emphasis on coordination of patient loads during emergencies.

   b. Provide the following:

      (1) Public health protection.

      (2) Radiological defense service.

      (3) Disaster health service.

      (4) Mortuary service.

      (5) Vital statistics.

      (6) Veterinary service (to include disposal of dead animals).

   c. Provide a qualified representative to coordinate the utilization of city medical and health assets.

   d. Develop emergency health and sanitation standards and procedures.

   e. Evaluate health and sanitation conditions in shelters.

   f. Prepare and maintain Annex H to this plan, and SOPs for Emergency Management.

8. Public Information (see Annex I) - Director, Community Relations.

   a. Compile and prepare emergency information for the public in case of an emergency.

   b. Arrange for media representatives to receive regular briefings on the city's status during extended emergency situations.

   c. Secure printed and photographic documentation of the disaster situations.

   d. Handle unscheduled inquiries from the media and public.

   e. Handle all inquiries pertaining to persons displaced, injured, or dead.

   f. Prepare and maintain Annex I to this plan, and supporting SOPs.

9. Damage Assessment (see Annex J) - Director, Building Inspections.

   a. Establish a damage assessment team from among city departments with assessment capabilities and responsibilities.

   b. Develop systems for reporting and compiling information on dollar damage to tax-supported facilities, and to private property.

   c. Assist in determining geographic extent of damage area.

   d. Compile estimates of damage for use by the Mayor in requesting disaster assistance.

e. Evaluate effect of damage on city's economic index, tax base, bond ratings, insurance ratings, etc., for use in long range recovery planning.

f. Prepare and maintain Annex J to this plan, and supporting SOPs.

g. Search for ways to mitigate potential hazards in the event of hazard recurrence.

10. Public Works (see Annex K) - Director, Public Works.

a. Assessment of damage to streets, bridges, traffic control devices, waste water treatment system, and other public works facilities.

b. Condemnation of unsafe structures.

c. Direct temporary repair of essential facilities.

d. Barricading of hazardous areas.

e. Priority restoration or streets and bridges.

f. Protection and/or restoration of waste treatment and disposal systems.

g. Augmentation of sanitation services.

h. Debris or snow removal.

i. Prepare and maintain Annex K to this plan, and supporting SOPs.

11. Utilities (see Annex L) - Director, Public Works.

a. Priority restoration of electrical service to vital facilities.

b. Provision of emergency power sources as required.

c. Coordination of private utilities recovery activities.

d. Damage assessment and identification of recovery time for affected utility systems.

e. Storage of water treatment and supply systems.

f. Prepare and maintain Annex L to this plan, and supporting SOPs.

12. Resource Management (see Annex M) - Director, Human Resources.

a. Establish procedures for employing temporary personnel for disaster operations.

b. Establish and maintain a manpower reserve.

c. Coordinate deployment of reserve personnel to city departments requiring augmentation.

d. Establish emergency purchasing procedures and/or a disaster contingency fund.

e. Maintain records of emergency related expenditures for purchases and personnel.

f. Prepare and maintain Annex M to this plan, and supporting SOPs.

13. Emergency Operations Center (see Annex N) - Coordinator, San Antonio Emergency Management.

a. Coordinate disaster response activities.

b. Maintain contact with state and county Emergency Management agencies, and neighboring jurisdictions EOCs or emergency personnel.

c. Maintain the EOC in an operating mode at all times.

d. Assign representatives, by title, to report to the EOC and develop procedures for EOC activation.

e. Coordinate recording of emergency activity.

f. Coordinate recovery activities and completion of disaster relief requests.

g. Develop and identify duties of staff, use of displays and message forms, and procedures for EOC activation.

h. Prepare and maintain Annex N to this plan, and supporting SOPs

14. Human Services (see Annex O) - Director, Community Initiatives.

a. Coordinate with American Red Cross, Salvation Army, San Antonio Metropolitan Ministries, and other relief agencies.

b. Obtain emergency food, clothing, and shelter.

c. Coordinate the distribution of food, clothing, and shelter.

d. Prepare and maintain Annex O to this plan, and supporting SOPs.

15. Hazardous Materials (see Annex Q) - Coordinator, San Antonio Emergency Management.

a. Identify all potentially hazardous materials that could cause an emergency situation.

b. Assure that Annex Q (Hazardous Materials) is current and adequate to handle an emergency involving hazardous materials.

c. Ensure that prompt response to a hazardous material emergency will minimize deleterious effects to life, property, water, and the ecology.

d. Search for ways, city ordinances, codes, etc., to minimize the frequency of hazardous materials emergency situations.

e. Communicate with other city departments to guarantee the necessary coordination to handle emergency incidents.

f. Examine hazardous material accident reports, to change and improve SOPs and mitigate potential damages.

g. Provide hazardous material disposal.

h. Provide personnel with knowledge of chemical compounds, hazards associated with them, and methods for possible neutralization.

i. Provide personnel to act as liaison between outside testing laboratories and the city.

j. Provide chemical analysis services through the city's own laboratory.

k. Provide environmental sampling of soil and water.

l. Provide ground water, surface water, and soil contamination assessment.

m. Prepare and maintain Annex Q to this plan, and supporting SOPs.

16. Transportation (see Annex S) - Coordinator, San Antonio Emergency Management.

    a. Identify local transportation resources and arrange for their use in emergencies.

    b. Coordinate deployment of transportation equipment to city services requiring augmentation.

    c. Establish and maintain a reserve pool of drivers, maintenance personnel, parts, and tools.

    d. Maintain records on use of privately owned transportation equipment and personnel for purpose of possible reimbursement.

    e. Prepare and maintain Annex S to this plan, and supporting SOPs.

17. Legal Services (see Annex U) - City Attorney.

    a. Advise city officials on emergency powers of local government and procedures necessary to:

        (1) Implement wage, price, and rent controls.

        (2) Establish rationing of critical resources.

        (3) Establish curfews.

        (4) Restrict or deny access.

        (5) Specify routes of egress.

        (6) Limit or restrict use of water or other utilities.

        (7) Use any publicly or privately owned resource with or without payment to the owner.

b. Review and advice city officials on possible liabilities arising from disaster operations, including the exercising of any or all of the aforementioned powers.

c. Prepare or recommend legislation to implement the emergency powers that may be required during an emergency.

d. Advise city officials and department heads on records keeping requirements and other documentation necessary for the exercising of emergency powers.

e. Prepare and maintain Annex U to this plan, and supporting SOPs.

F. <u>OTHER AGENCIES</u>.

The following departments and agencies are not assigned a specific function in this plan will be prepared to make their resources available for emergency duty at the direction of the City Manager.

1. City Agencies:

   a. Alamodome.

   b. Arts & Cultural Affairs.

   c. Asset Management

   d. Aviation.

   e. Budget & Management Analysis

   f. City Clerk.

   g. City Council Offices.

h. Code Compliance.

i. Community Relations.

j. Convention Center Expansion Office.

k. Convention Center Facilities.

l. Convention & Visitors Bureau.

m. Economic Development.

n. Finance.

o. Housing & Community Development.

p. Information Services.

q. Intergovernmental Relations.

r. Internal Review.

s. International Affairs.

t. Library.

u. Municipal Courts.

v. Parks & Recreation.

w. Planning.

x. Purchasing & General Services.

y. Youth Initiatives.

2. Non-city Agencies.

   a. City Public Service.

   b. Salvation Army.

   c. San Antonio Water Systems (SAWS).

   d. Southwestern Bell.

   e. VIA Transit.

VI. DIRECTION AND CONTROL.

A. GENERAL.

The Mayor of San Antonio, as Emergency Management Director, is responsible for assuring that coordinated, effective emergency response systems are developed and maintained. Existing agencies of the government will perform emergency activities closely related to those they perform routinely. Specific positions and agencies are responsible for fulfilling their obligations as presented in the Basic Plan and individual Annexes. Department Heads will retain control over their employees and equipment unless directed otherwise by the Emergency Management Director. Each agency is responsible for having its own Standard Operating Procedures to be followed during response operations. Outside assistance, whether from other political jurisdictions or from organized volunteers groups, will be requested and used only as an adjunct to existing city services, and only when the emergency threatens to expand beyond the city's response capabilities.

B. EMERGENCY OPERATIONS CENTER (EOC).

Response activities will be coordinated from the Emergency Operations Center (EOC), which is located in the basement of the I.O. Martinez Building at 115 Auditorium Circle. The EOC will be activated by the Mayor or Emergency

Management Coordinator upon notification of a possible or actual emergency. All Department Heads or other personnel having duty assignments in the EOC will report to the center when it is activated. If required, an Alternate EOC with reduced staff will be established at the University of Texas at San Antonio or a designated mobile EOC.

C. ORGANIZATION OF CITY SERVICES FOR EMERGENCIES.

City departments and agencies will maintain the same organizational structure during emergency operations as exists under normal conditions. No new chain of command is created for emergencies. All personnel assigned to perform an emergency function will be under the command of the responsible individual through their normal supervisory chain.

D. EMERGENCY AUTHORITY.

1. The City of San Antonio Ordinance (#67229) regarding establishment and implementation of an Emergency Management Plan is provided at Attachment 5.

2. In accordance with the Texas Disaster Act of 1975, as amended (Section 418.106 and 418.108), the Mayor may take extraordinary measures in the interest of effective emergency management. Procedures associated with emergency powers are contained in Annex U.

3. All physical resources within the City of San Antonio, whether publicly or privately owned, may be utilized when deemed necessary by the Mayor. The City of San Antonio assumes no financial or civil liability for the use of such resources; however, accurate records of such use will be maintained in case reimbursement becomes possible.

VII. INCREASED READINESS CONDITIONS.

A. BUILDUP PERIOD.

Most emergencies follow some recognizable buildup period during which actions can be taken to achieve a state of maximum readiness. General departmental actions are outlined in the appropriate Annex while more specific actions will be detailed in Standard Operating Procedures (SOPs).

B. INCREASED READINESS CONDITIONS TERMS.

The following terms will be used as a means of increasing the city's alert posture

1. CONDITION 4. The term "CONDITION 4" will be used by the city to denote a situation that causes a higher degree of readiness than is normally present in day-to-day operations.

   a. CONDITION 4 actions could be triggered by the onset of a particular hazard vulnerability season, such as: hurricane season, tornado season, flash flood season, fire threats due to sever drought, etc.

   b. An increase in international tensions could trigger CONDITION 4.

   c. The potential for local civil unrest could trigger CONDITION 4.

   d. Declaration of "CONDITION 4" by the Emergency Management Director/Coordinator will generally require the initiation of the increased readiness activities identified in each Annex.

2. CONDITION 3. The term "CONDITION 3" will be used by the city to refer to a situation that presents a greater potential threat than "CONDITION 4", but poses no

immediate threat to life and/or property. This condition includes situations that could develop into a hazardous condition.

a. CONDITION 3 actions could be generated by a severe weather watch issued by the National Weather Service such as:

   (1) Hurricane Watch. Issued when a hurricane becomes a possible threat to a coastal area.

   (2) Tornado Watch. Issued to alert persons to the possibility of a tornado development in a specific area, for a specific period of time. Persons in the watch areas should maintain their daily routine but be prepared to respond to a tornado warning.

   (3) Flash Flood Watch. Issued to alert persons to the possibility of a flash flood in a designated area due to heavy rains occurring or expected to occur. Persons should remain alert and be prepared to take immediate action.

   (4) Winter Storm Watch. Issued when there is a threat of severe winter weather in a particular area.

b. The term "CONDITION 3" could be generated when an international situation has deteriorated to the point that enemy attack is a possibility. This condition probably would allow sufficient time for an orderly evacuation and/or preparation of shelters.

c. CONDITION 3 actions could also be generated when a small scale, localized civil unrest is present.

d. Declaration of CONDITION 3 by the Emergency Management Director/Coordinator will generally require the initiation of the increased readiness activities identified in each Annex.

3. CONDITION 2. The term "CONDITION 2" will be used by the city to signify that a hazardous situation with a significant potential and probability of causing loss of life and/or property. This condition will normally require some degree of warning to the public.

a. CONDITION 2 actions could be triggered by severe weather warning information issued by the National Weather Service such as:

(1) Hurricane Warning. Issued when hurricane conditions are expected in a specific coastal area within 24 hours or less. Hurricane conditions include:

(a) Sustained winds of 74 MPH or greater.

(b) Dangerously high water or a combination of dangerously high water and exceptionally high waves, even though expected winds may be less than hurricane force.

(2) Tornado Warning. Issued when a tornado has actually been sighted in the area or indicated by radar, and may strike in the vicinity of the city.

(3) Flash Flood Warning. Issued to alert persons that flash flooding is imminent or occurring on certain streams or designated areas and immediate action should be taken.

(4) Winter Storm Warning. Issued when heavy snow (4 inches or more in a 12 hour period,

or 6 inches or more in a 24 hour period), sleet, or freezing rain are forecast to occur separately or in combination.

b. CONDITION 2 actions could be generated when an international situation has deteriorated to the point that enemy attack is possible. This condition may/may not allow sufficient time for an orderly evacuation.

c. CONDITION 2 actions could also be triggered by civil disorder with relatively large-scale localized violence.

d. Declaration of "CONDITION 2" by the Emergency Management Director will generally require the initiation of the increased activities identified in each Annex.

4. CONDITION 1. The term "CONDITION 1" will be used by the city to signify that hazardous conditions are imminent. This condition denotes a greater sense of danger than associated with a CONDITION 2 event.

a. CONDITION 1 actions could be generated by severe weather warning information issued by the National Weather Service combined with factors making the event more imminent, such as:

(1) Hurricane landfall predicted in 12 hours or less.

(2) Tornado sighted especially close to a populated area or moving in the path of a populated area.

(3) Flooding is imminent or occurring at specific locations.

b. CONDITION 1 actions could be generated when an enemy attack is imminent based on the evaluation of intelligence data. This warning (ATTACK WARNING) is declared and disseminated by the Federal Emergency Management Agency (FEMA) National Warning Center over the FEMA National Warning System (NAWAS).

c. CONDITION 1 actions could also be implemented when civil disorder precautions large scale and wide spread violence.

d. Declaration of CONDITION 1 by the Emergency Management Director will generally require the initiation of the increased readiness activities in each Annex.

VIII. CONTINUITY OF GOVERNMENT.

A. LINES OF SUCCESSION.

To ensure continuity of government during threatened or actual disaster, the following line of succession is established: Mayor, City Manager, Assistant City Manager(s). Line of succession to each department head is according to the Standard Operating Procedure (SOP) established by each department.

B. PRESERVATION OF RECORDS.

In order to provide normal government operations following a disaster, steps must be taken to protect vital records. These records would include legal documents, as well as personal documents, such as property deeds and tax records. The principal causes of damage to records are fire and water; therefore, essential records should be protected accordingly.

IX. ADMINISTRATION AND SUPPORT.

A. SUPPORT.

Requested for state or federal assistance, including the Texas National Guard or other military services, will be made to the Department of Public Safety District Headquarters in San Antonio. All such requests will be made by the Mayor, or in his name by another official specifically authorized by him.

B. AGREEMENTS AND UNDERSTANDINGS.

Should local resources prove to be inadequate during an emergency, requests will be made for assistance from other local jurisdictions and other agencies in accordance with existing or emergency negotiated mutual aid agreements and understandings. Such assistance may take the form of equipment, supplies, personnel, or other available capabilities. All agreements will be formalized in writing, whenever possible.

C. REPORTS AND RECORDS.

Required reports will be submitted to the appropriate authorities in accordance with individual Annexes.

D. RELIEF ASSISTANCE.

All individual relief assistance will be provided in accordance with the policies set forth in state and federal provisions.

E. CONSUMER PROTECTION.

Consumer complaints pertaining to alleged unfair or illegal business practices will be referred to the State Attorney General's Consumer Protection Division.

X. PLAN DEVELOPMENT, DISTRIBUTION, MAINTENANCE, AND IMPLEMENTATION.

A. EFFECTIVE PLANS.

If a plan is to be effective its contents must be known and understood by those who are responsible for its implementation. The Coordinator will brief the appropriate sections to private sector organizations, individuals, and local officials concerning their assigned emergency responsibilities and ensure proper distribution of the plan and changes to the plan.

B. PLAN DISTRIBUTION.

The SAEM Office will distribute the Basic Plan and associated Annexes to all departments with responsibilities defined within either the Basic Plan or Annexes.

C. DEVELOPMENT AND MAINTENANCE OF ANNEXES.

All agencies will be responsible for the development and maintenance of their respective Annexes and SOPs identified in SECTION V, Organization and Assignment of Responsibilities.

D. PLAN ANNUAL REVIEW.

The Coordinator will be responsible for ensuring that an annual review of the plan is conducted by all officials involved. Required changes will be made and the updates, based on deficiencies identified by drills and exercises, changes in local government structure, technological changes, etc., will be distributed to all departments. Recertification will be accomplished every two years.

E. ANNUAL ACTIVATION.

The plan will be activated at least once a year, in the form of a simulated emergency, in order to provide practical experience to those having EOC responsibilities.

F. PREVIOUS EDITIONS.

This plan supersedes and rescinds all previous editions of the San Antonio Emergency Management Plan and is effective upon signing by the Mayor. If any portion of this plan is held invalid by judicial or administrative ruling, such ruling shall not affect the validity of the remaining portions of the plan.

G. UPDATES AND/OR CHANGES.

Updates and/or changes to this plan will be made as required.

ATTACHMENTS. Page

HOWARD W. PEAK
MAYOR, CITY OF SAN ANTONIO

DATE

ATTACHMENT 1

REFERENCES

1. Federal Emergency Management Agency (FEMA), 1987. CCA General Program Guideline, CPG 1-3.

2. FEMA, 1984. Objectives for Local Emergency Management, CPG 1-5.

3. FEMA, 1981. Disaster Operations, CPG 1-6.

4. FEMA, 1981. Guide for Increasing Local Government Civil Defense Readiness During Periods of International Crisis, CPG 1-7.

5. FEMA, 1985. Guide for Development of State and Local Emergency Operations Plans.

6. FEMA, 1988. Guide for Review of State and Local Emergency Operations Plans, CPG 1-8A.

7. National Response Team (NRT), 1988. Criteria for Review of Hazardous Material Emergency Plans, NRT-1A.

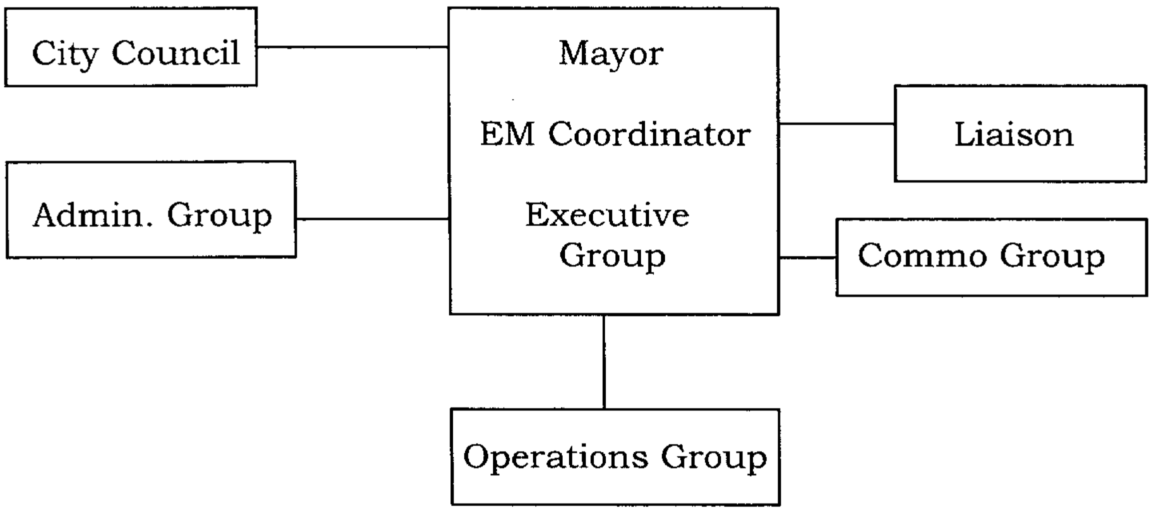
8. FEMA, 1987. Guide for the Development of a State and Local Continuity of Government Capability, CPG 1-10.

9. Texas Department of Public Safety, Division of Emergency Management, 1990. Local Emergency Management Plan Development Handbook, DEM-10.

10. DEM, 1988. State of Texas Emergency Management Plan.

ATTACHMENT 2

SAN ANTONIO EMERGENCY OPERATIONS CENTER
ORGANIZATION CHART



Executive Group
- Mayor
- EM Coordinator
- City Manager
- Law Enforcement
- Fire/Rescue
- Legal Advisor
- Health/Medical (MHD)
- Health/Medical (UMH)
- Finance
- Parks & Recreation
- Aviation
- Human Resources
- Building Inspection
- Public Works
- Public Information
- Community Initiatives

Communications Group
- City Communications
- Amateur Radio Volunteers

Operations Group
- Asst. City Manager
- Law Enforcement
- Fire
- EMS/Rescue
- Health/Medical (MHD)
- Public Works
- City Public Works
- San Antonio Water Systems
- American Red Cross
- Parks & Recreation
- Building Inspection

Administrative Group
- General Support/Clerks
- Phones/Messengers
- Security

Liaison Function
- Military - National Guard
- (DPS - Div. of Emer Mgmt)

ATTACHMENT 3

FUNCTIONAL RESPONSIBILITIES MATRIX

FUNCTIONS												
Communications				P				S		S	C	
Damage Assessment		P		S					S		S	
Evacuation	S			S				S			P	
Fire Protection				P							S	
Hazard Mitigation		S		S				S		S	P	
Health and Medical				S	P			S			S	
Community Initiatives	S				P						S	
Law Enforcement								P			S	
Legal			P								S	
Public Information									P		S	
Public Works										P	S	
Radiological Protection				S							C	P
Resource Management							P				S	
Shelter/Mass Care	P			S				S			C	
Transportation						P					S	
Utilities										P	S	
Warning				P							C	

P = Primary Responsibility S = Secondary Responsibility C = Coordination Responsibility

ATTACHMENT 4

ANNEX ASSIGNMENT

ANNEX	SUBJECT	ASSIGNED TO
A	WARNING	Emergency Management Coordinator
B	COMMUNICATIONS	SAEM Communications Center
C	SHELTER/MASS CARE (PARTS 1 & II)	Director, Disaster Services American Red Cross
D	RADIOLOGICAL PROTECTION	Director, Metropolitan Health District
E	EVACUATION	Emergency Management Coordinator
F	FIRE PROTECTION & RESCUE	Fire Chief
G	POLICE PROTECTION & SERVICES	Police Chief
H	HEALTH & MEDICAL	Director, Metropolitan Health District
I	PUBLIC INFORMATION	Director, Community Relations
J	DAMAGE ASSESSMENT	Director. Building Inspections
K	PUBLIC WORKS	Director, Public Works
L	UTILITIES	Director, Public Works
M	RESOURCE MANAGEMENT	Director, Human Resources
N	EMERGENCY OPERATIONS CENTER	Emergency Management Coordinator
O	COMMUNITY INITIATIVES	Director, Community Initiatives
P	HAZARD MITIGATION	Emergency Management Coordinator
Q	HAZARDOUS MATERIALS	Emergency Management Coordinator
S	TRANSPORTATION	Emergency Management Coordinator
U	LEGAL	City Attorney

APPENDIX N

October 1999
City of San Antonio
Regional Detention
Facilities Project

JLK, LDH

2-10-99

CITY OF SAN ANTONIO

P.O. Box 839966 San Antonio, Texas 78283-3966

February 2, 1999

To All Interested Parties:

The City of San Antonio is soliciting Requests for Qualifications to engage Professional Engineering Services in connection with the following Project: **"REGIONAL DETENTION FACILITIES PROJECT."** The purpose of this project is to initiate, perform, carry out and manage the engineering and other professional services required to develop a system of regional detention facilities and ancillary projects across the City of San Antonio, Texas.

The selection process utilized by the City of San Antonio is a comparative evaluation of the Interest Statements and is based primarily on criteria such as consultant qualification, experience and quality of service. Additionally, consultant services in the architecture and engineering categories are also evaluated based on compliance with the applicable provisions of the City's Small Business Economic Development Advocacy (SBEDA) Program.

Pursuant to Ordinance #69403, it is the policy of the City of San Antonio to involve qualified small business and local business enterprises to the fullest extent possible in the selection of professional and discretionary contracts. Your interest statement will be evaluated and points given based on the estimated percentage to be provided in the following categories:

Minority Business Enterprise
African-American Owned Business Enterprise
Women-Owned Business Enterprise
Small Business Enterprise

Points are also given if your firm qualifies as a local business. A firm or its subcontractor(s) may qualify in more than one category. A selection committee headed by the Director of Public Works will select the consultant for the project based on an individual firm's rank.

For more information concerning the SBEDA process or to inquire about completing an application to have your business certified by the City of San Antonio in one or more of the categories, please contact Terri Williams, SBEDA Manager at 207-3915. Also, the

SBEDA form that is required to be completed provides detailed information and definitions concerning the SBEDA process.

Please review the attached "Scope of Work" and, if interested, complete the enclosed interest statement and all supporting forms and documents as part of your qualifications submittal. **Please provide four (4) copies of all documents submitted.**

The City of San Antonio currently maintains a limit for Errors and Omissions coverage of $700,000. If you are selected for any of the above projects, you will be expected to provide coverage at this level. The new requirements apply to both architects and engineers.

The following required forms are included in this packet: Interest Statement, SBEDA For Projects $200,000 and Above and Ethics Disclosure Form. All of the forms need to be completed and submitted in order for your submittal to valid.

If you do not wish to be considered, it will not affect your being considered for any future work with the City of San Antonio, nor will it be construed as a lack of interest in performing any services for the City of San Antonio.

Qualifications and Interest Statements must be received in this office no later than 4:00 p.m., Friday, March 5, 1999, to be considered. These may be delivered to the following address: Norma Rodriguez, City Clerk, City of San Antonio, 100 Military Plaza, 2nd Floor or mailed to Norma Rodriguez, City Clerk, City of San Antonio, P.O. Box 839966, San Antonio, Texas 78283-3966. **Please make sure and label your submittal as REGIONAL DETENTION FACILITY DESIGN INTEREST STATEMENTS.** Failure to properly identify your proposals may result in your firm being omitted from the selection list or rejected for not being received in a timely manner.

If you have any questions, please contact Laura Davis at 207-2299.

Sincerely,

Gabriel Perez
Capital Programs Manager

cc: Bob Opitz, P.E., Development Review and Drainage
File

REGIONAL DETENTION FACILITY DESIGN INTEREST STATEMENTS

A professional engineering services contract(s) will be awarded for the development of regional stormwater detention facilities within the following watersheds located within the City of San Antonio:

Upper Olmos Creek Watershed
Leon Creek Watershed
Salado Creek Watershed

The overall objective of this project is to assist the City in the development of a regional detention facility system for each watershed cited above. Implementation of the various elements of the system will reduce existing flooding and offset the impact of new development. A drainage utility has been established for this purpose, initial funding has been authorized and an initial projects' listing has been identified. The firm selected will assist the city in planning, designing, financing, and constructing these facilities.

The RFQ will permit the evaluation of an engineering firms' ability and experienced in performing engineering services related to watershed planning, facility design, and hydraulic studies. Selected services will include demonstrated ability to analyze, plan, locate, design, acquire land, construct, manage and operate, if desired by the City, regional stormwater detention facilities along the identified watersheds.

At a minimum, the interested firms must demonstrate the following qualifications:

- Experience and expertise at the Principal, Project Manager, and Project Engineer level in the following specialties:
    - Regional Stormwater Management Systems.
    - Dam and Spillway Structural Design Capabilities.
    - Design, Construction and Operation of both on and off-stream operation Detention Systems.
    - Geotechnical Studies and Hydrology.
    - Park, Recreational, and Entertainment facility planning, design and construction. MGE
    - Facility and Operational Maintenance of Stormwater Systems. Bruce Burris / Orange
    - Financing Urban Drainage Utility Systems in Texas.

- Demonstrated capability as evidenced by a list of other projects similar in nature performed within the last five (5) years:

  - Watershed analysis
  - Large/regional stormwater detention facilities
  - Watershed program and project management

- Other skills required and must be demonstrated include:

  - Organizational Skills:
  - Ability to complete program tasks within six (6) months
  - Identification of proposed experienced project manager with whom city staff will have direct contact during performance of the contract
  - Ability to conduct public hearings, meetings and manage public relations by providing resident requests in project design

Preparation of the Statement of Qualifications:

The Statement of Interest will be limited to 10 pages. It will identify other firms and subcontractors that will be involved and the personnel proposed to conduct the work. Resumes and additional project write-ups may be included in appendices. Overall proposal, including appendices shall be limited to 30 pages, single sided, using standard 10 point type. The Statement of Interest will include as a minimum, the following information:

- Key project personnel and specific roles
- Listing of detailed detention projects completed or progress with name and phone number of the client contract for each project.
- If teams of firms are proposed, indicate the relationship of each firm to the prime and who will provide any sub-team project management.
- Explain how the firm or team will provide engineering and staff support during the duration of the project. Provide details of current staff size, both local and corporate wide. Please identify source of resources, local or out-of-town, to be assigned to this project.
- Specifically address the team's experience with handling design of both on and off stream detention systems as well as reduction of pollution from storm waters, sediment pond considerations, inlet grating design and outflow structure methodology.

- Provide an overview of how Best Management Practices will be included within the project in light of the City's current Drainage Ordinance, proposed Clearing and Site Grading Ordinance and its proposed Technical Guidance Manual.

Qualifications Review:

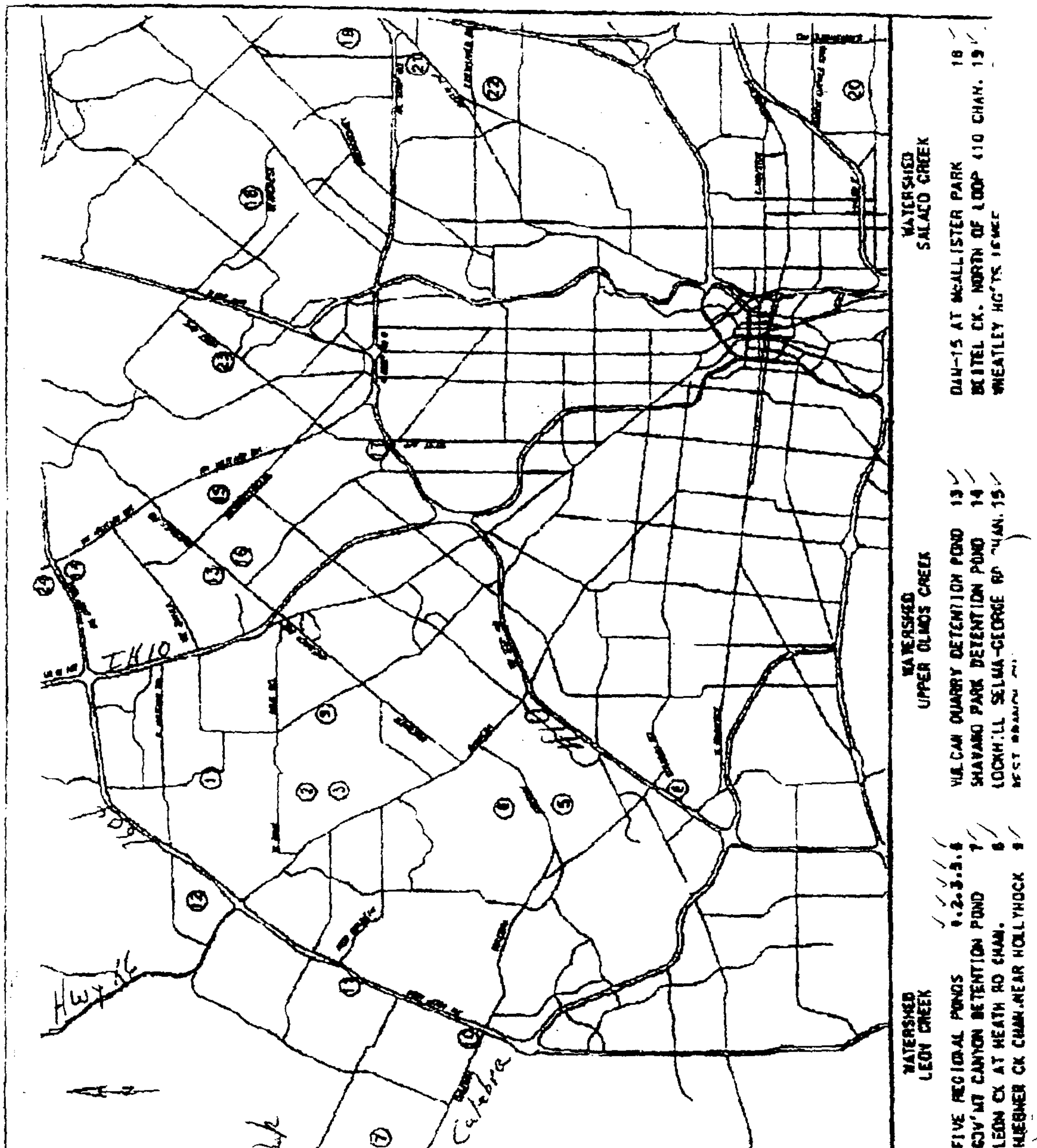
The following factors will be used in the evaluation of responding firms:

- Specialized experience of the firm in the performance of complex hydrologic and hydraulic analyses. (Maximum of 10 points)
- Demonstrated experience of the firm in performing analysis, studies and evaluation of completed Flood Insurance Studies with relation to the City's need for inclusion of detention facilities within the watershed. (Maximum of 20 points)
- Demonstrated experience of key personnel in the performance of drainage design, open channel hydraulics and stormwater detention including regional detention. (Maximum of 20 points).
- Experience of the firm in the development of Regional Stormwater Detention Plans for major urban watersheds which are being or have been implemented in whole or in part by a responsible governmental entity. (Maximum of 20 points)
- Firm's experience in working with local governmental agencies. (Maximum of 10 points)
- Compliance with SBEDA rules and regulations (Maximum of 20 points)

Following an in-depth evaluation of the qualifications and experience submitted, the City of San Antonio will select a short list of firms (minimum of three), from which individual interviews will be conducted by the selection review committee. Upon the completion and selection of one or more qualified forms for one or more of the watersheds, the City of San Antonio will move directly into detailed scope and cost negotiations with the firm or firms selected.

SUBMISSION DATE:

The statement of qualifications requested by this announcement will be received by the City Clerk's Office of the City of San Antonio, prior to 4:00 PM, Friday, March 5, 1999. Failure to submit Qualifications by this date will result in automatic non-consideration for the work described within this request.



Robert Aguirre - 299-1171

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1-D

5/20

APPENDIX O

City of San Antonio Flood Assessment Report - October 17-18, 1998

CITY OF SAN ANTONIO

Flood Assessment Report

Presented to City Council
December 1998

EXECUTIVE SUMMARY

The Flood of 1998 will not soon be forgotten in San Antonio. During the 24-hour period of October 17-18. San Antonio experienced an unprecedented amount of rainfall which reached 19 inches in some areas of the city. Due to the convergence of mid and high level moisture from Hurricanes Madeleine and Lester in the Pacific and the early morning arrival of a micro-scale disturbance. the rainfall was far greater than anticipated.

The storm and rainfall on these days were monumental in scope, qualifying as a 100-year flood and in some areas approached a 500-year flood. With this record-level storm, the City was pressed to deal with the devastation caused by such a natural disaster. The City's reaction was quick and decisive. Below are some highlights of the extent of the storm to this unprecedented catastrophe.

- 11 lives lost due to vehicles in flooded areas
- 192 rescues by San Antonio firefighters, saving 461 men, women and children from rising waters
- 5,184 calls for service to the San Antonio Police Department
- 123 major accidents handled by the Police Department
- Over 1,200 dwelling units and businesses sustained damage
- Over $115 million in damage to public and private property throughout San Antonio
- Over $71 million in damage to City of San Antonio facilities
- 3 command centers set up to provide relief assistance to more than 5,500 flood victims
- Over 10,000 immunizations administered to flood victims and others assisting in clean up efforts
- $250,000 of voucher assistance distributed
- 480 tons of debris collected from 576 miles of street
- 21,375 tons of debris collected from approximately 8 miles of channel

While the event has passed. San Antonio is assessing the tremendous damage left by the devastation. To assist in the process, the City convened an Assessment Working Group which included representatives from public service agencies. These agencies are City of San Antonio departments, Bexar County Emergency Management, San Antonio River Authority, National Weather Service, American Red Cross, Salvation Army, Texas Department of Transportation, City Public Service, San Antonio Water System. Southwestern Bell, Bexar Metropolitan Water District, VIA and Bexar Metropolitan 911 Network District.

The group was divided into committees that addressed six key areas:

- Early Warning Systems
- Emergency Response

- Infrastructure
- Communication/Coordination
- Relief Measures
- Reconstruction/Damage Assessment

The committees were charged with addressing the following four questions:

1) What was the extent of the event and potential for recurrence?
2) What worked well?
3) What did not work well?
4) What improvements can reasonably be made for the future?

The analysis by the working group is detailed in the following report and summarized below.

Early Warning Systems

Effective notification and activation of the Emergency Operations Center (EOC) enabled immediate coordination to respond to the event. Flash flood warnings were provided to the citizens throughout the day.

This incomparable event provides the City an opportunity to reevaluate the EOC's location, technology and space requirements necessary to enhance emergency management capabilities. The City should also explore the feasibility of purchasing a computer-aided program for a city-wide early warning system and immediately take measures to improve the existing early warning system.

Emergency Response

The City's emergency resources comprehensively provided stabilization to the event and implemented strategies to handle ongoing and potential issues. The departments were effective in communicating and re-deploying emergency personnel. Improvements to the City's new dispatch and radio system will enhance the response from the emergency resources.

In anticipation of the rain, barricades were pre-positioned in known low water crossings. An immediate plan to increase the timely placement of pre-positioned barricades by police officers and firefighters is being developed. Emergency personnel should remain at these locations to instruct motorists not to drive around the barricades.

Infrastructure

The recent completion of the underground tunnels directed large volumes of water to flow under downtown; subsequently preventing flooding from the area. Other drainage facilities, including detention ponds and drainage channels, constructed throughout the City over the past 50 years helped prevent further damage. The proposed McAllister dam and $110 million in improvements as a result of studies in the Upper Olmos, Salado and Leon Creek watersheds should be implemented. Coordination of planning, constructing and financing of flood control improvements must continue.

The technology to quickly predict flood levels and the potential impact on neighborhoods should be acquired. Notice and evacuations could have occurred in a more timely manner with such a system. Other technological improvements should include an automated mapping system in the EOC and expanded GPS and GIS capabilities. The current mapping system should be integrated and coordinated with all governmental agencies for maximum efficiency.

Communications/Coordination

In this area, immediate contact with the media allowed information from the EOC to be issued quickly to the public. Internal communications systems were utilized to the fullest capacity. The brief recovery period after service interruption at the SWB Central Office is notable.

To enhance communication efforts, it is recommended that field personnel be equipped with technology to access real time data. Also, the city government access channel should be upgraded to electronically update vital information. A program to educate citizens about natural disasters and an ongoing neighborhood awareness program should be developed by the City.

Relief Measures

To assist individuals and families impacted by the flood, the City established three command centers where volunteers distributed more than $250,000 in housing, food, clothing and medicine vouchers. The collaborative public and private efforts accelerated emergency relief assistance to residents.

The health and human services agencies should review the City's Emergency Operatnos Plan to better coordinate provision of emergency relief services during these types of events.

Reconstruction/Damage Assessment

Because of subdivision and drainage regulations imposed in the last 30 years, less damage was seen in the newer developed areas. From a rebuilding perspective, a command post facilitated information to residents about property acquisition or construction options. Public and private lenders cooperated to provide options for flood victims.

A common definition for damage assessment and a coordinated effort in assessing and reporting the damages should be established between the City and participating agencies.

Closing

During disasters, the City of San Antonio's response is guided by its Emergency Operations Plan. In the coming months, the City will begin development of disaster-specific plans such as weapons of mass destruction, ice, heat and floods. These will be included as addenda to the overall Emergency Operations Plan.

It is likely that San Antonio will experience another flood disaster, since floods are one of the most common and widespread of all-natural disasters. Most communities in the United States experience some kind of flooding after tropical rains, thunderstorms or hurricanes. San Antonio is no exception. Geographically, San Antonio is located within a 200-mile radius where most of the United States heavy rain records have been set, according to the National Weather Service. Contributing variable factors are the Balcones Escarpment, proximity to the Gulf of Mexico and its rich atmospheric moisture sources, upper level moisture feed from the eastern Pacific Ocean, and an optimum path for transiting upper level disturbances embedded in the westerlies. Thus, the potential for a rainfall of the magnitude of the October 17-18, 1998 event is unpredictable and San Antonio remains "at risk" for this type of natural disaster.

We would like to thank the agency representatives for their work and contribution to this report.

OVERVIEW

OVERVIEW OF EVENT

City officials began the day on Saturday, October 17th expecting an ordinary 1- to 2-inch rain that would be triggered by a cold front moving through the area. Public Works crews placed barricades at the various low water crossings throughout the city, in anticipation of flooding which would be precipitated by this rain. This was due to the convergence of a strong low level moisture feed from the Gulf of Mexico and mid and high level moisture from Hurricanes Madeleine and Lester in the Pacific. The deep convection was initiated by the early Saturday morning arrival of a micro scale disturbance embedded in the high level flow moving across Texas from the southwest to the northeast. Once initiated, the deep convection became self sustained. A level of 10.63 inches of rain was measured at the Airport in the first few hours.

As a result of the National Weather Service (NWS) warning of heavy rainfall with localized flooding of low water crossings, the Office of Emergency Management prepared to activate the Emergency Operations Center (EOC). Subsequently, the EOC notified key City personnel and agencies of an impending threat. These included the Fire Chief, Police Chief, Emergency Medical Services (EMS), Public Information Office (PIO), Public Works, Assistant City Manager, Red Cross and the Texas Division of Emergency Management.

The rainfall amount varied from 10 inches as a base throughout San Antonio and reached levels of 19 inches in certain areas.. By definition, a 10-inch rain over 24 hours qualifies as a 100-year event in its own right, but a rainfall of 19 inches is a record-setting occurrence and tends toward a 500-year flood.

Data from the United States Geological Service (USGS) regarding flood volumes and flow rates at various locations in the region clearly indicates that the storm set a new record in the Salado Creek watershed. The rainfall amounts far exceeded any previously recorded rainfall since 1961. In fact, the stormwater discharge in Salado Creek was "2.4 times greater than the second largest discharge" in history, according to the data recorded at the USGS gauging station upstream of Austin Highway. The data indicates that the water flow measured 66,000 cubic feet per second (cfs) in Salado Creek during the peak period of the storm. The Salado Creek Watershed Study adopted by the City in 1997 predicted a 100-year flood flow of 57,946 cfs and a 500-year discharge rate of 73,634 cfs. Based upon the gauging station information and the watershed study predictions, this storm exceeded the 100-year flood parameters.

The flood flow in Olmos Creek resulted in the "third highest peak" in history. Even though the creek flows were slightly less than the 1991 and 1993 storms, the water levels indicated a 100-year flood. Additionally, the flood stage in Leon Creek was six (6) feet higher than the previously recorded high water mark. This mark also exceeded a 100-year flood level. particularly in the sections of the creek south of Kelly AFB.

Finally, the flood levels in the San Antonio River at South Loop 410 were "7 feet higher than the previous highest peak stage".

Maps indicating watersheds throughout Bexar County and rainfall levels are attached.

The event was widespread and impacted the safety of all emergency service personnel throughout the city. The storm taxed all resources available to the Police and Fire Departments of the City of San Antonio, as well as other public safety entities in the surrounding communities. The SAPD received 5,184 calls for service and handled 123 major accidents. Normally, flooding in one or two watersheds results in multiple rescues. Unlike any other incident, this event resulted in 192 water rescues by the Fire Department, saving 461 men, women and children from rising waters. Unfortunately, 11 deaths occurred when vehicles in the flooded areas were swept away.

The high waters created an immediate environmental and public health concern for the community. The San Antonio Metropolitan Health District administered more than 10,000 immunizations to flood victims and others assisting in clean up efforts. There were 38,000 pounds of mostly commercial food product condemned and over 6,000 acres of property sprayed for the control of mosquito breeding. All efforts were a proactive approach necessary to prevent the spread of disease throughout the San Antonio community.

The floodwaters also caused substantial damage to more than 1,150 dwelling units and 49 commercial properties. There was over $115 million in damage to public and private property throughout San Antonio, including utilities, roadways and communication systems, with more than $71 million to City of San Antonio facilities. The extensive runoff resulted in the collection of 480 tons of debris from 576 miles of street. Also collected were 21,375 tons of debris from approximately 8 miles of channels such as creeks, tributaries and rivers.

In an effort to provide immediate emergency relief to impacted families and individuals, the Red Cross opened 7 shelters within the City limits for a total of 10 shelters throughout Bexar County. By Tuesday, October 20th, the City established 3 strategically located command centers to provide comprehensive assistance. Approximately 5,000 volunteers provided assistance to more than 6,000 flood victims, resulting in the disbursement of more than $250,000 in purchased food and housing vouchers. Two weeks after the flood, FEMA opened its disaster relief centers.

Two command centers were later established to implement a property acquisition program managed by staff from Public Works, Community Initiatives and Asset Management. At this time, staff is working with 99 families who have qualified for the program in the most affected area, Wheatley Heights. The public and private housing providers and lenders have mobilized to package housing options for displaced flood victims.

In summary, the potential for a rainfall of this magnitude is unpredictable and San Antonio remains "at risk" for the recurrence of this type of natural disaster. It is imperative that the City, County and surrounding jurisdictions continue to prepare for natural, man-made or war-caused disasters threatening life, property and the San Antonio resources.

COMMITTEE REPORTS

EARLY WARNING SYSTEMS

WHAT WORKED WELL

During this event. all agencies reacted promptly and immediately coordinated efforts to respond to the situation. A key component in the City's Emergency Operations Plan is the affiliation with outside agencies, such as the National Weather Service, Red Cross, Salvation Army, HAM Radio Operators, utility companies, Bexar County Emergency Management and local military installations. The Office of Emergency Management meets with these agencies on a regular basis to discuss emergency management matters, incidents and lessons learned from any prior experiences. The regular contact is vital to a successful communication with these agencies that provide information on available resources to the community during emergency situations.

Annual exercises. such as Hurricane. Haz-Mat and Joint Military, ensure proper deployment of personnel and equipment for a rapid response to catastrophic events. These exercises are required by the State Office of Emergency Management.

Due to the magnitude of the event, he NWS did an excellent job of providing the community with conditions and forecasts and began issuing flash flood warnings early Saturday morning and continued to do so throughout the day. This warning advised citizens to stay alert and to seek refuge in higher elevations if they lived in low-lying areas subject to flooding.

From the EOC. the Fire Department Public Information Office maintained constant communications with the electronic media issuing weather-related information, providing the community with vital information and advising motorists to use extreme caution and seek alternate routes.

Close contact with the State's local Disaster District also provided for the deployment of two military helicopters for use in the rescue operations.

WHAT DID NOT WORK WELL

Some of the early flood warning sensors became disabled in several areas such as Salado Creek due to the volume of water and large amounts of debris flowing through the channels.

Although severe weather bulletins were broadcast throughout the event, there is a need to develop an alternate notification process to alert the citizens living in flood prone areas.

Key personnel from other agencies should have been notified in a timely manner to enhance early warning to the community.

Because of widespread flooding which occurred in many surrounding jurisdictions. coordination efforts should have included all affected communities rather than only Bexar County.

There was a lack of non-emergency personnel at the EOC to provide staff/clerical support and handle the high volume of calls.

An experienced staff meteorologist and hydrologist on staff would have assisted in the interpretation of key weather information.

RECOMMENDATIONS

Improvements should be focused in several categories, ranging from the addition of new personnel, acquisition of new technology, and re-deployment of key City personnel to coordinate with outside agencies.

A feasibility study regarding location, modernization and staffing needs of the EOC should be conducted to enhance management capabilities.

The City should explore the feasibility of purchasing a computer-aided program that would enhance the existing early warning system, such as an automatic telephone call down system.

Non-emergency staff should be deployed to the EOC in a timely manner in order to answer phones, keep statistics, run errands and handle minor problems. Additionally, key City personnel and other critical outside agencies such as VIA. SWB. SAWS and the Red Cross should be stationed at the EOC or in a centralized location away from operations personnel.

Another area that would have immediate impact on service delivery would be the addition of a meteorologist and a hydrologist, who would provide EOC staff with immediate weather related information, therefore increasing the City's ability to respond to this type of natural event. The meteorologist would assist in interpreting radar weather system and continue to work with the NWS to improve interpretations of weather data. Duties would include monitoring and interpreting NWS hazardous weather outlook products, watches, warnings, and forecasts. The staff hydrologist would be responsible for incorporating storm water-modeling output, rainfall network input and NWS forecast model interpretation.

The City should also make necessary improvements to the existing early warning system in order to provide better and faster notification to those living in flood prone areas. The improvements should include the ability to meet the requirements of special needs groups, such as the hearing impaired, sight impaired or physically disabled. The system must address the issue that some people who are directly threatened by hazardous conditions may ignore, not hear, or understand the warning issued by the City.

A fiber connection providing a video signal to the EOC should be in place; however, equipment and software requirements must be addressed. The capability of providing Transguide video signals to the EOC is essential to emergency operations. Computer equipment such as laptops, personal computers and enhanced telecommunications are also necessary. The EOC should also continue working with the NWS to incorporate technological advances in interpreting the radar weather system

EMERGENCY RESPONSE

WHAT WORKED WELL

The City's Emergency Response team, which includes Fire, Police, Public Works and Parks and Recreation, responded comprehensively and rapidly stabilized the situation; therefore, minimizing the extent of deaths or loss of property due to this catastrophic event.

The re-deployment of Police officers from their regular duties to the flood related problems was handled efficiently. Security at evacuated neighborhoods was managed without any major incidents.

Staffing and supervisory support at the Fire Department was escalated to meet the ever-increasing needs caused by this emergency. All call-taker and dispatch positions were staffed throughout the day and fire suppression units were assigned to certain District Chiefs, who were located in areas of high incidences. This assignment of units relieved major radio traffic and assisted in reducing redundant responses to the same location.

Strategies were developed by the Emergency Team to handle ongoing and potential problems thus reducing the likelihood for emergencies.

Efforts by Communication Center personnel to maintain EMS unit coordination were excellent. To alleviate the impact of hazardous driving conditions for the EMS units, the "Closest Hospital Policy" was implemented early on and continued for a 24-hour period. Policies that have been in-place for some time allowed EMS units to function efficiently and effectively. These included but were not limited to aggressive and frequent unit re-locations, extended activation and other adjustments to Peak Period Units and Closest Hospital Policy.

The recent implementation of the four-person staffing plan provided an increased number of personnel for performance of rescues. The additional staffing contributed not only to rescuing civilians, but also protecting firefighters. The Incident Command System (expanded to a Unified Command System) provided better utilization and coordination of fire-fighting field units.

The water rescue training provided to the Technical Rescue Team (TRT) and all firefighters proved beneficial and in some cases saved firefighters lives. The TRT was broken into five teams, staffing five apparatus and working as five rescue companies. The aerial platforms utilized by Fire personnel have consistently proved their worth. The platforms were utilized by fire personnel in a safe, rapid and efficient manner to retrieve stranded victims within their reach. Fire personnel rescued at least 175 people by the use of boats, jet skis, carrying people out, walking people out and even using rope systems. They also recovered 6 bodies during and after the flood.

The effective use of inflatable rafts, outboard motors and jet skis played an important role in rescue efforts. The availability of equipment provided rescue personnel with the proper tools necessary in achieving their rescue objectives.

The Public Works crews were prepared and responded quickly by setting out barricades on those streets with low water crossings. As normal procedure, crews pre-positioned barricades in known low water crossings the evening prior to the event.

Throughout the flood event, the Texas Department of Transportation (TxDOT) kept the residents abreast of the current status of the State's highways. Reports of highway conditions were updated and available through the TxDOT internet site, as well as a 1-800 number. As locations flooded, appropriate maintenance sections of TxDOT were notified by SAPD and Courtesy Patrols. Maintenance employees began placing barricades and traffic control devices early Saturday.

The use of cameras and changeable message signs (CMS) proved to be a valuable asset in keeping the public informed of freeway closures. The DTN data weather system installed by SAPD proved beneficial to both TxDOT and SAPD in their monitoring efforts during the flood.

WHAT DID NOT WORK WELL

The heavy call volume impacted the Fire Department Communications Center. The computer system was not adaptable to prioritization, making this task difficult. Also, the computer screens did not allow the dispatchers to view previously assigned dispatches: the dispatchers were unable to determine if a unit had already been dispatched to a specific address or location.

Relocation of Fire Suppression units and the lack of sufficient water rescue equipment, such as inflatable rafts, outboard motors and jet skis, were also a problem. Fire units were dispatched from their relocated stations; therefore causing a delay in response times due to their unfamiliarity with the area.

Rescue efforts were hampered by a few individuals who continued to return to flooded neighborhoods. There were also several citizens who initially refused to be rescued from their stranded vehicles.

The SAPD dispatch personnel failed to notify in a timely manner the flood situation to the Night Duty Officer and the Executive Command level officers.

The Public Works High Water Detection System provided good early warning information about the statistics of low water crossings but was eventually overwhelmed. Some locations became non-functional by trash/debris.

Continuous taping of radio channels throughout the weekend did not occur in a timely manner since "vendor" technicians were not responsive.

There were more than 100,000 calls placed to TxDOT's 1-800 number for Highway Condition Reports during the two-day event. The volume of calls exceeded the resources available to respond and many callers complained about the inability to reach a live voice. Unfortunately, some public citizen calls got through to the Transguide Control Room and interrupted critical operations at that office.

A Transguide telecommunications hub at US 281 near Basse Road became inoperable as a result of the flood.

RECOMMENDATIONS

During the event, the Fire Department's only radio technician was out in the field assisting in water rescues. The availability of additional radio technicians would have increased efficiency by providing necessary technical support to deal with this type of large-scale emergency. The department should have additional spare radios in its inventory for future catastrophic events. At the time of the floods, the Police Department provided 15 radios to the Fire Department.

Enhancements to improve the current computer dispatch system will greatly assist in the delivery of emergency services.

The feasibility of acquiring laptop computers to replace obsolete MDT's should be explored. This technology would have proven invaluable to on-scene commanders.

Fire and EMS "on-duty" shift commanders should be relocated to the Communications Center in order to coordinate operational issues with dispatch considerations.

Additionally, Medium Rescue Companies should be situated around the City to effectively place teams in strategic positions to immediately begin rescue efforts.

Expansion of the TRT is being planned with the opening of new Fire Station # 11. This will prove to be an asset under similar circumstances. Furthermore, the swift water rescue capabilities should be expanded to cope with a similar or even lesser situations. This could be accomplished through the addition of watercraft and other swift water rescue equipment. A list of additional resources (i.e. jet skies, rafts, etc.) and emergency numbers outside the department should also be developed for emergency situations. TRT members should train with military helicopters to establish a plan for large-scale rescues relating to this type of event. This form of training will also provide staff with essential knowledge of what military helicopters can and cannot do. A pre-determined criterion should be established to determine when outside resources such as the Texas Task Force I, UTHSC and National Guard could be contacted for swift water rescue assets and staffing.

The San Antonio police dispatch personnel should provide timely notification to the Night Duty Officer (Acting Chief) and the Executive Command level officers of these catastrophic natural disasters. Procedures have been implemented to handle these situations

The City should make an effort to identify those residents who live within the 100-year flood plain and advise them of the impending dangers associated with rapidly rising water. Additionally, the pre-planning of low water crossings and compilation of a database identifying crossings and potential problems should be expanded. This will allow major high water crossings to be earmarked for barricades immediately by Public Works.

City staff should also be trained in order to operate the EOC's "telephone bank".

Public Works Department should develop a plan to provide rotation of personnel to replace initial emergency response people who have been on-duty for more than 24 hours.

Barricade devices need to be improved from the current sawhorse type device. Barricade devices also need to be distributed to fire stations and to police officers on patrol in order to close streets faster. Problem intersection or streets most susceptible to floods or traffic problems need to be identified and monitored as well.

The High Water Detection System should be reviewed to enhance performance (i.e. location of antennas, level sensors and flasher units).

The TxDOT SAT District is working with the Austin Headquarters to make improvements to the 1-800 system to better inform the public during emergency events.

Changes are also being considering to the phone system at the SAT District office to separate business calls from citizen calls.

A current contract for directly feeding data from the downtown pump stations to Transguide is underway to insure that flooding of the pump stations is known before water begins to flood the lower level of IH 35.

The EOC should establish a communication link through VIA's communication system, as well as have representatives from VIA at the EOC command center to provide assistance. Additionally, the city should utilize VIA's access to the Transguide communication system at the Robert Thompson transfer station located on the Alamodome grounds.

INFRASTRUCTURE

WHAT WORKED WELL

The in-channel dam (San Antonio River) and the two flood gates protecting the downtown Riverwalk worked very effectively with minimal damage occurring along the main channel of the Riverwalk. No damage occurred in the commercial River Bend area.

Communication between the Parks and Recreation and Public Works Departments, the barge concessionaire and other businesses along the Riverwalk prevented both property damage and possible life threatening situations.

The San Antonio River Tunnel worked well, carrying an estimated 5,900 cubic feet of water per second (cfs) during the storm. The San Pedro Creek tunnel also worked as planned.

The other drainage facilities built throughout the City over the past fifty years also worked as planned, particularly in the Dreamland area, along Alazan, Apache, Martinez Creeks, and along the Leon Creek and its tributaries. The 7 detention ponds on Calaveras Creek and 6 dams on the Martinez Creek in eastern Bexar County also worked as planned, thereby reducing flood damage in those watersheds.

Although flooding occurred in the portion of the Salado Creek Watershed below Loop 410, the 13 detention dams built by the San Antonio River Authority and the U.S. Natural Resources Conservation Service over the past 30 years in the upper reaches of this watershed worked as planned and minimized flooding and damage along Mud Creek, Elm Creek, Long's Creek, Panther Springs Creek and the Upper Salado Creek.

The TxDOT Transguide System traffic surveillance cameras located along almost 50 miles of San Antonio freeways provided valuable views of a number of key locations during the storm thereby helping City officials make critical decisions.

TxDOT downtown storm sewer pump stations along IH 35 operated at capacity although the stations were substantially flooded through Sunday morning.

Interagency cooperation between City Departments, TxDOT, Bexar County and the surrounding communities facilitated the sharing of information of critical information to appropriate agencies for their necessary action.

WHAT DID NOT WORK WELL

Current existing methods of notification did not work well enough to prevent, in some cases. severe property damage and loss of life. The technical capabilities to analyze the rain event, accurately determine what is occurring in each of the watersheds. and relay that information to the public were not effective.

Critical low water crossings were not completely closed to all traffic at the first sign of flooding. Even though barricades were in place, people were not effectively prevented from going around them.

The trash rakes at the San Antonio River Tunnel and the San Pedro Creek tunnel did not function at their optimal capacity.

Due to power failure during the storm, the electrically operated flood gates had to be operated by hand. In addition, about 50,000 CPS customers experienced power outages during the peak of the storm. Although some service was restored after a short period of time, other customers were without power for 2-3 days. This was caused by the loss of two major tower structures in the Salado Creek flood plain downstream of Austin Highway. Two gas lines on bridges were ruptured but fixed within 24 hours and no gas service was lost.

SAWS lost a few water lines but water service was restored promptly. The water system was never contaminated. Many sewer lines overflowed into streets and creeks, but the treatment plants did not have unauthorized discharges. A few sewer lines were washed out, but those repairs were made quickly, and the breaks were reported to TNRCC.

The Bexar Metropolitan Water District had limited loss of service. One location was on Stone Oak Parkway due to a washout caused by the extreme volume of water which overtopped the SARA dam upstream.

RECOMMENDATIONS

A better system is needed to quickly predict flood levels and determine the impact on neighborhoods so that notice can be given and evacuations accomplished in a timely manner.

Investment in computerized equipment for the EOC and at other critical locations including the Public Works Streets and Drainage Office, CPS, SAWS, and Transguide is critical to ensure quality decisions are made and emergency services, including evacuation, are rendered in a timely manner.

Other technical resources needed include automated mapping in the above facilities. GPS and GIS capabilities also need to be expanded. The technical systems currently in use at all of the governmental agencies and public utilities need to be integrated and coordinated for maximum efficiency and quality decision making.

Develop an immediate plan to pre-position barricades at each low water crossing to provide the timely placement of barricades by police officers and firefighters. Public Safety personnel should remain at these locations to instruct motorists not to drive around the barricades. Ideally, a barricade system needs to be designed that will prevent motorists from entering a low water crossing at all.

Public Works, in cooperation with TxDOT, needs to develop a mapping system that shows the best routes to travel during high water events so that low water crossings or areas routinely flooded can be avoided. This will assist all emergency personnel in maneuvering around the City safely and quickly.

The City needs to reevaluate the flood early warning system and the electronic equipment at the low water crossings to ensure that the components are working and are reliable, and if not, redesign the systems to ensure that they are always operational.

The design and operation of the trash rakes at the San Antonio River and San Pedro Creek tunnel inlets need to be analyzed and possibly redesigned to correct problems that prevent the most efficient flow of water.

The instrumentation package for the tunnels and the downtown dams protecting the Riverwalk need to be reviewed, analyzed, and advertised for bids as soon as possible to assist in the continued efficient operation of these facilities.

The City and SARA need to analyze the existing access to the tunnel and ensure that floods do not block that access or put employees in jeopardy during high water conditions.

The emergency generator at the Olmos Dam needs to be serviced and possibly upgraded to provide sufficient emergency back-up power to operate the flood gates during a power failure.

TxDOT will consider the design and implementation of a reflective marker system, to be mounted above typical flood levels, at critical storm drains that tend to get clogged with debris. This will facilitate the timely location of these drains (which may remain underwater for several hours or days) so that they can be cleaned to improve drainage.

CPS should reexamine the policy of locating transmission lines and facilities in creeks, drainage ways or attached to bridges in order to prevent loss of power.

All governmental agencies should work together in planning, constructing and financing needed flood control improvements. Bexar County is a key element in the funding of these projects, because of the Flood Control tax. All local jurisdictions must join together and support the expansion of this funding source and the use of the proceeds to eliminate flooding throughout the County. Support is also needed to further strengthen the County and City flood plain management regulations, expand staff components to enforce those regulations, and provide direction for new development away from flood prone areas.

Recently, the City conducted watershed studies in the Upper Olmos, Salado, and Leon Creek watersheds which have all been adopted by the City Council. The watershed studies identified about $110 million in improvements that need to be implemented as soon as possible. Revenues from the monthly drainage fees paid by all residents and businesses in the City, and those fees paid by builders and developers in lieu of constructing on-site detention ponds need to be utilized to repay the debt on about $60 million in bonds. The sale of bonds will allow for the early construction of the regional detention ponds and associated drainage improvements.

Since Lorence Creek, Beitel Creek and Walzem Creek do not have detention dams, these creeks combined to cause major flooding on Briar Glen (near Austin Highway and Perrin Beitel Road), Holbrook, Willowwood, Gembler Road, and Wheatley Heights areas. The proposed dam in McAllister Park will detain the stormwaters from Lorence Creek, and reduce flood levels throughout the Salado Creek Watershed.

Subdivision codes and drainage ordinances along with FEMA floodplain management requirements have protected homes built in new subdivisions over the past 30 years. The recently passed Drainage Ordinance now requires on-site detention ponds for all new developments, or a cash contribution to help build new regional detention ponds. This landmark legislation will protect the downstream property owners from increased flooding as the City grows further upstream in the watersheds. It also provides for resolution of many existing flooding problems.

COMMUNICATION/COORDINATION

WHAT WORKED WELL

Given the magnitude of the flood and its city-wide destruction, coordination among local agencies and the response from local media was outstanding. Immediate coverage of the storm provided by electronic media was valuable to the success of the emergency response by the City. Live shots of the river in the downtown area provided immediate confirmation that the releases from the Olmos Dam were not flooding downtown. Similarly, live shots from flooded areas across the city allowed for better understanding of the full impact of this storm.

Coordination with media allowed for information from the EOC to be passed on to the public quickly and with no editing. Because of the "breaking news" nature of the situation, media needed up-to-the-minute information. This let city officials appear "live" on radio and TV throughout the day to deliver the City's message.

Information was provided to media and made available on the City's homepage. Media were able to update the citizens about street closures by logging onto the City's website and directing viewers/listeners to do the same. Phone contacting of media with important messages continued throughout the day although some City personnel were making those calls from home.

The use of pagers allowed for effective communication with key personnel in signaling the opening of the EOC. Internal communication systems (MDTs, radios, computer services, land and cellular phones and pagers) were utilized to their fullest capacity.

With regard to Southwestern Bell (SWB), central service interruptions were limited to one center, the Capital Central Office. Other switching centers experienced the loss of commercial power; however back-up sources operated properly and prevented service outages. Recovery period after service interruption at the SWB Central Office is notable. Customers were back in service within 1.5 hours. As the storm intensified, SWB mobilized additional technicians to assist in repair operations. Ninety-five technicians were brought in from other areas of the state to assist in restoring service to impacted areas. Contingencies and back-up plans worked.

Finally, the 911 System as a whole functioned properly. When 911 was down, 7-digit emergency calls were still being received and processed due to the immediate dissemination of information by the media.

WHAT DID NOT WORK WELL

Although information was made immediately available to the media, coordination of information disseminated from outside the EOC to the media and public could have been better coordinated. In emergencies such as this event, it is critical to have a coordinated message and limit the number of spokespersons to minimize conflicting information to citizens.

More assistance was needed in the EOC to handle media-related requirements. Once it was determined that additional staff was needed in this area, staff members were unable to travel to the EOC due to the rising waters. Assistance also was needed in EOC as media questions transitioned from full-blown emergency to post emergency communications.

With the information flowing to the media, the EOC was prevented from monitoring media broadcasts for accuracy due to lack of TV equipment at the EOC. This situation has been remedied with the installation of TV equipment in the days after the flood.

Additionally, there was a lack of knowledge as to who was responsible for the station crawl feature. This system provides important information to television viewers.

At some point, the Public Works "Station 1" phone number was provided as a number for all issues and citizens incorrectly assumed that street closure staff could answer any flood-related question. Staff was only prepared to respond to calls related to street closures and low water crossings.

Finally, water entered the basement of Southwestern Bell's capital central office, causing a power outage resulting in temporary interruption of some communication services such as 911, interoffice network switching capabilities, wireless and paging services for a period of 1.5 hours.

RECOMMENDATIONS

The City should take a proactive role in educating the general public on disaster preparedness, specifically what to do during a disaster and how to begin the recovery process. This public education would include informing residents who currently live in flood plains about the potential for disaster do's and don'ts and tips for particular situations. Information about flood plains and flood insurance should be included in this campaign. Additionally, education and outreach efforts should be targeted to mobile home owners and their families who are sometimes the most vulnerable populations during times of natural disasters. A shuttle service should be maintained from impacted neighborhoods to any mobile command post. *The Community Relations Office anticipates creating a program by June 1999.*

Develop a program to target those properties in flood plain areas and provide property owners and/or renters with flood plain related information, such as drainage regulations, flood insurance availability, and property acquisition options. The program will provide the necessary information, contact phone numbers, maps, etc., so that residents can make appropriate decisions about the risks of living in a flood prone area.

The EOC must implement a Joint Information Center (JIC) which would incorporate Public Information Officers from key agencies. These PIOs would be alerted early to come to the EOC and then scaled back when necessary and work hand in hand with the EOC to compile information, operate a "news" desk, provide news analysis, news releases and media monitoring as well as handle spokesperson duties. Also, a media area with "live" feed capability should be established near the EOC. *Implementation can commence second quarter 1999.*

To disseminate rapid information to key staff and media, a media paging system with short text messages should be implemented. *Proposed implementation is second quarter of 1999.*

The media was extremely helpful in providing information, however, it is still necessary to schedule follow-up meetings with media to identify efficient communication issues and concerns. *These meetings will begin to be scheduled January 1999.*

It will be important to review procedures for utilization of TV station crawl capability to eliminate confusion about "emergency" information for surrounding municipalities and determine final approval for channel override. *One initial meeting has been held with more to be scheduled in the second quarter of 1999.*

Upgrade City Hall Information Channel, 21-CHIC, so that Public Works road closures, TxDOT and SAPD information can be listed and updated electronically rather than manually. Possibly integrate local road closures with TxDOT's 1-800 number for a wider distribution of information. *The Information Services Department (ISD) is currently assessing the hardware and software requirements and expects implementation to take place in the fourth quarter.*

Establish a dedicated weather channel that provides current weather conditions in the San Antonio area on a twenty-four hour basis. Work with Paragon Cable to deliver this service.

Better communication link to National Weather Service emergency hotline for immediate information.

Public Works field personnel need appropriate technology to provide real-time data from low water crossings in order to effectively communicate the status of rising water throughout the watersheds. *ISD has estimated that technology can be available by the second quarter 1999.*

Establish secondary telephone number for city road closures that public can utilize for information in order to minimize burden on main road closure number. *Proposed implementation and cost have not been determined.*

Create an educational campaign that focuses on alternative "emergency" numbers so that the 911 lines do not get tied up. Utilize adding upcoming three-digit Call Center number as potential alternative during emergency situations. *Proposed implementation of the Call Center is fourth quarter 1999.*

Entry points where water entered SWB's capital central office have been sealed. Improved back-up power capabilities have been identified and will be implemented. Batteries have been replaced, recharged and augmented. *SWB has completed this task.*

Continue improvements in the diversification of routing for 911 and SWB trunk services. *SWB And Metro 911 are continuing to make improvements in this area.*

Expand EOC contact list to include all regional public and private communication providers (public/private). *This task has been completed.*

RELIEF MEASURES

WHAT WORKED WELL

To address the immediate housing needs of displaced residents, the Red Cross opened three emergency shelters in area high schools. Within two days, the City of San Antonio established mobile command posts, in strategic locations, which provided temporary assistance to individuals and families. These services included immunizations, housing, food, clothing and medicine vouchers for 1,634 San Antonio families. Individuals and families affected by the flood received over $250,000 in emergency services purchased from local merchants and area motels. Over 10,000 immunizations (Tetanus/ Flu/Hepatitis A) were provided free of charge to prevent the spread of infectious diseases.

The City partnered with the following non-profit agencies in order to provide ongoing support services Wesley; Presa; Ella Austin; Guadalupe Community Centers; Catholic Charities; and Helping Hands. This effort reached an additional 145 families, providing an additional $14,000 worth of emergency service vouchers. A total of 6,467 individuals received immediate support through the City and agencies efforts.

City departments worked cooperatively and effectively to address health and human services, clean-up needs and safety and security issues.

The community responded to the tragedy of the flood in an overwhelmingly generous manner. Corporations and individual residents volunteered to assist with cleanup efforts and assisted with staffing needs at the mobile command centers. Additionally, residents donated cash, food, and clothing to flood victims. HEB and the San Antonio Food Bank also provided major assistance through the donation of food to the mobile command centers.

WHAT DID NOT WORK WELL

Traditionally, FEMA and Red Cross serve as the first providers of health and human disaster relief services. However, other national and regional disasters delayed the immediate participation of FEMA and Red Cross.

The Red Cross reported that staffing resources were limited due to previous recent disasters in the region, principally the Del Rio flood. The Red Cross headquarters facilities were damaged by flood waters, resulting in the loss of forms, communications, and office space. Also, the city's health and human services agencies do not regularly rehearse disaster relief preparedness. As a result of this activity, health and human service providers did not become heavily involved during the early stages of the flood. This late involvement contributed to a slow initial response by health and human service providers.

The Public Works Department, other city employees and volunteers experienced some difficulty with removal of dead animal carcasses (i.e. horses and cows). In some cases, owners awaiting insurance adjusters did not cooperate with the removal of debris or dead animals in a timely manner.

The Salvation Army had storage problems due to the large quantities clothing donations. Community donations of perishable and non-perishable items were at times mixed and thus improperly stored, making distribution of needed supplies difficult.

RECOMMENDATIONS

The Department of Community Initiatives (DCI) should take the lead in coordinating the health and human services Emergency Contingency Plan with the City's Emergency Operations Plan. Moreover, DCI should coordinate the delivery of emergency and transitional health and human disaster relief services until the Red Cross and FEMA can assume responsibility. DCI was also encouraged to coordinate the participation of both private and public sector health and human services organizations. Additionally, this contingency plan should work from the premise that the City will be the first responder to health and human services needs in times of disasters.

Health and human services issues must be addressed and services available in the early stages of any disaster. The Departments of Community Initiatives and Health will be prepared to report to the EOC immediately.

In the health and human services component of the Emergency Operations Plan, it is essential that all appropriate partners are involved in the continuing development of the plan. Suggested partners include the American Red Cross, United Way, Salvation Army, Center for Health Care Services, and others as appropriate. The partners' roles and responsibilities should be clearly defined in the plan, with regular rehearsal and financial support.

The immediate deployment of crisis management teams to the mobile command centers would alleviate and address trauma from the event in a timely manner. The United Way database could be used to begin providing mental health group support to those individuals and families affected by the flood. The City should continue to locate and use mobile units in impacted areas. The location of the mobile centers served as a psychological boost for these devastated neighborhoods.

The City should maintain an effective partnership with FEMA so that the mobile command centers are informed of the most current status of FEMA disaster assistance and provide this knowledge to residents. The Emergency Management Plan must address the transition from emergency operation centers to a central command post directing relief efforts throughout the city. Documentation of services should be maintained in order to make adjustments to the services.

RECONSTRUCTION/DAMAGE ASSESSMENT

WHAT WORKED WELL

The immediate establishment of command in strategic locations provided critical information and assistance to residents effected by the flood.

Field inspectors from the Departments of Building Inspections and Code Compliance surveyed the entire city and identified 23 areas where flood damage occurred. In these areas, they found 633 single family, 328 manufactured (mobile) homes and 196 multifamily units with flood damage. In addition, 49 commercial structures were also affected.

In the clean up effort, Public Works personnel removed 480 tons of debris from 576 miles of streets, and 21,375 tons of debris from approximately 8 miles of channels such as creeks, tributaries, rivers, etc. There were immediate repairs to 15 streets and 6 capital improvement projects involving damage to inlets, sidewalks, brick pavers and curbs.

Once access was granted by owners, Public Works crews retrieved 33 dead horses and 3 other livestock.

City staff provided assistance at three area relief centers and supplied volunteers with workers gloves, garbage bags, pitch forks and dust respirators.

Follow-up mobile information centers were implemented in target areas of the city to provide residents information on the City's Property Acquisition Program and conduct an intake assessment related to the extent of damage and the property owners' desires to sell. Staffs from the Public Works, Asset Management and Community Initiatives Departments, as well as FEMA, provided residents with information and answered questions. Approximately 99 families qualified for the program in the Wheatley Heights area; 12 structures in the Briar Glen area and 34 properties in the Plumnear area.

The mobilization of public and private housing lenders and services are being provided to offer housing options for the flood victims who were in the targeted buyout areas. Public and private dollars are being combined to provide the best package to meet the needs of the residents. These housing lenders and providers include the San Antonio Board of Realtors (SABOR), the Greater San Antonio Builders Association (GSABA), the San Antonio Development Agency (SADA), the San Antonio Housing Authority (SAHA), Neighborhood Housing Services (NHS), the San Antonio Housing Trust, and the Enterprise Foundation.

The City and non-profit agencies have compiled an inventory of available property. They have also identified units that may be rehabilitated and opportunities for the construction of new homes. The San Antonio Board of Realtors has also made available their Multiple Listings for the City and specifically in the surrounding area of the Wheatley Heights neighborhood. All these efforts provide housing options to residents to either stay in their neighborhood outside of the flood plain or relocate to another area of the city. Indications are that some residents will choose to purchase a home that is in close proximity to their current home but outside the flood plain.

WHAT DID NOT WORK WELL

The damage assessment process was not effectively coordinated among the various agencies.

RECOMMENDATIONS

Begin by developing a common definition for assessing damage between COSA, Red Cross and FEMA. Following that, a program for coordinated damage assessment to structures and facilities reporting between COSA, Southwestern Bell, CPS, SAWS, Bexar Metropolitan and Red Cross should be developed.

For future disasters, pre-prepared informational handouts regarding permits procedures, contractors, etc. should be delivered by an assigned team that has plotted damaged areas. This instantaneous plotting of damaged areas can be accomplished through the use of GIS equipment and/or laptop computers.

Policies and procedures for a property acquisition program should be used for future disasters. This should include target areas, key players, a central clearing house for developing a data base on the extent of damage and follow-up services to be provided. A timeline for the program, legal issues and other necessary modifications to programs and policies must be continually reviewed and revised as appropriate.

A working relationship with the public and private housing lenders and providers should be maintained to develop a plan of action for future use. The providers should also identify funds for gap financing to be used in future disaster situations.

Assessment Working Group Committees

Early Warning Systems

Joe Candelario, Co-Chair	COSA-Fire Department/Emergency Mgmt
Al Dreumont, Co-Chair	National Weather Service
Rick Cortez	COSA-Fire Department
Carl Mixon	Bexar County Emergency Management
Larry Eblen	National Weather Service
Rocky Aranda	COSA-Public Works
Rolando Bono	COSA-City Manager's Office

Emergency Response

Chief Robert Ojeda, Co-Chair	COSA-Fire Department
Chief Al Philipus, Co-Chair	COSA-Police Department
John Bohuslar	TX DOT
Brett Schneider	Bexar Metro - 911
Larry Parker	VIA
Bert Pfiester	SWB
Jan Holubec	SWB
Bob Wallace	SWB
Marion Stringer	VIA
Manuel Longoria	COSA-Police Department
Lisa Lott	COSA-City Manager's Office

Infrastructure

John German, Co-Chair	COSA-Public Works
Fred Pfeifer, Co-Chair	SARA
Steve Kauffman	SWB
Roxanne Galindo	SWB
Ron Smudy	COSA-Parks & Rec.
Sam Sanchez	COSA-Health
Tony Arredondo	TxDOT
Gus Gonzalez	SAWS
Michael Martin	Bexar County
Steve Ramsey	SARA
Keith Pyron	Bexar Met Water District
Chuck Ahrens	Bexar Met Water District
Ken Fiedler	CPS
Ron Schaefer	CPS
Lou Lendman	COSA-Budget

Coordination/Communication

Frank Stromboe, Co-Chair	City Manager's Office
Tony Bosmans, Co-Chair	COSA-Community-Relations
Tess Goodwin	SWB
Gary Moeller	COSA-ISD
Brad Parrott	SWB
Jose Medina	COSA-ISD
Elizabeth Colunga	Bexar Metro 911
Carl Wedige	COSA-Fire Department
Carmen Vazquez-Gonzalez	COSA-Community Relations
Pam Bransford	COSA-Public Works
Travis Bishop	COSA-City Manager's Office
Paula Stallcup	COSA-Intergovernmental Relations

Relief Measures

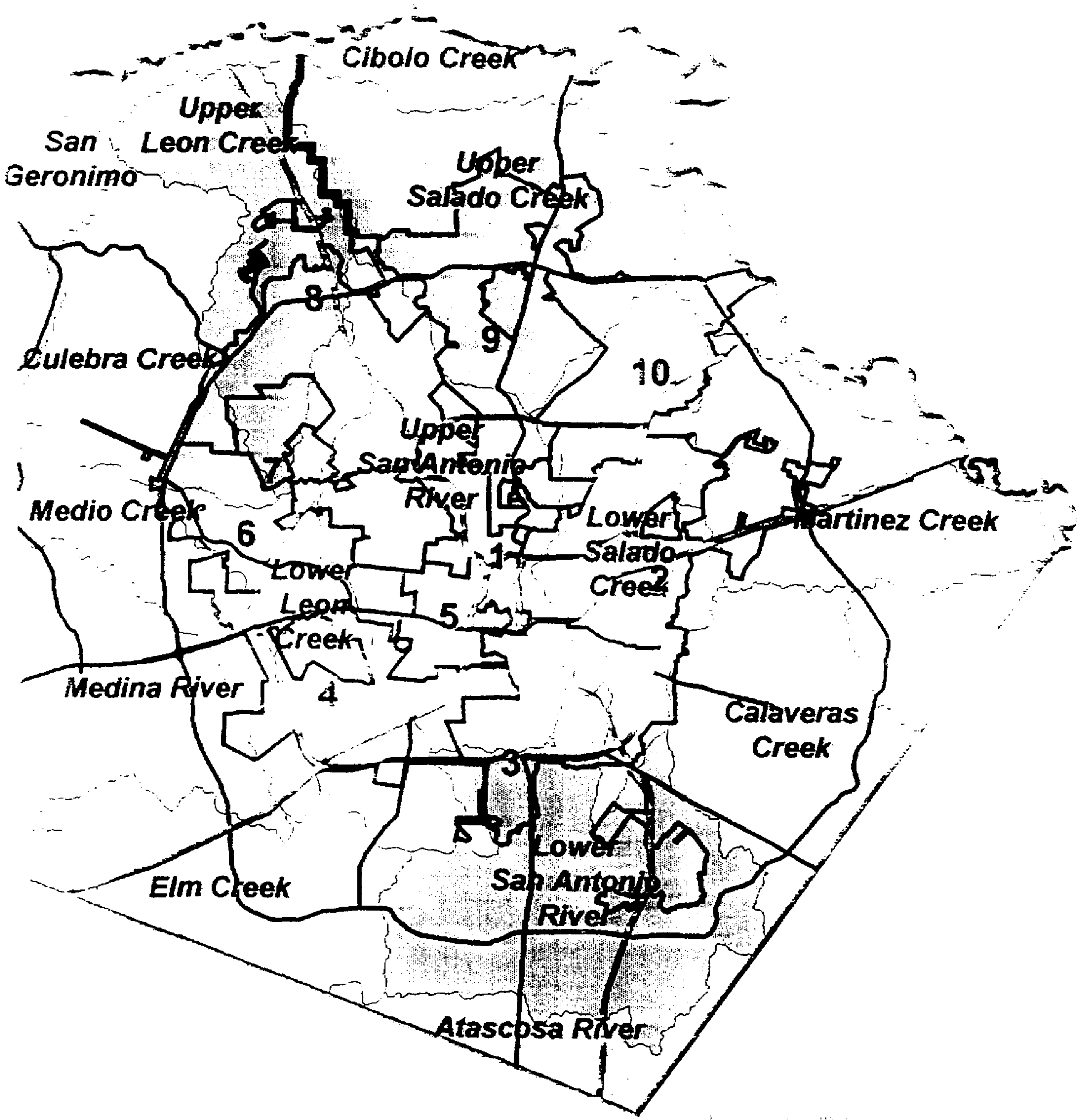
Dennis J. Campa, Co-Chair	COSA-Community Initiatives
Frances Gonzalez, Co-Chair	COSA-Neighborhood Action
Larry Johnson	American Red Cross
Fernando Guerra	COSA-Health
Raquel Favela	COSA-Neighborhood Action
Sandy Jenkins	COSA-Neighborhood Action
Maggie Gonzales	COSA-City Manager's Ofc
P.G. Mendez	COSA-Public Works
Capt. Robert Winters	Salvation Army
Nancy Sheppard	COSA-Community Initiatives

Reconstruction/Damage Assessment

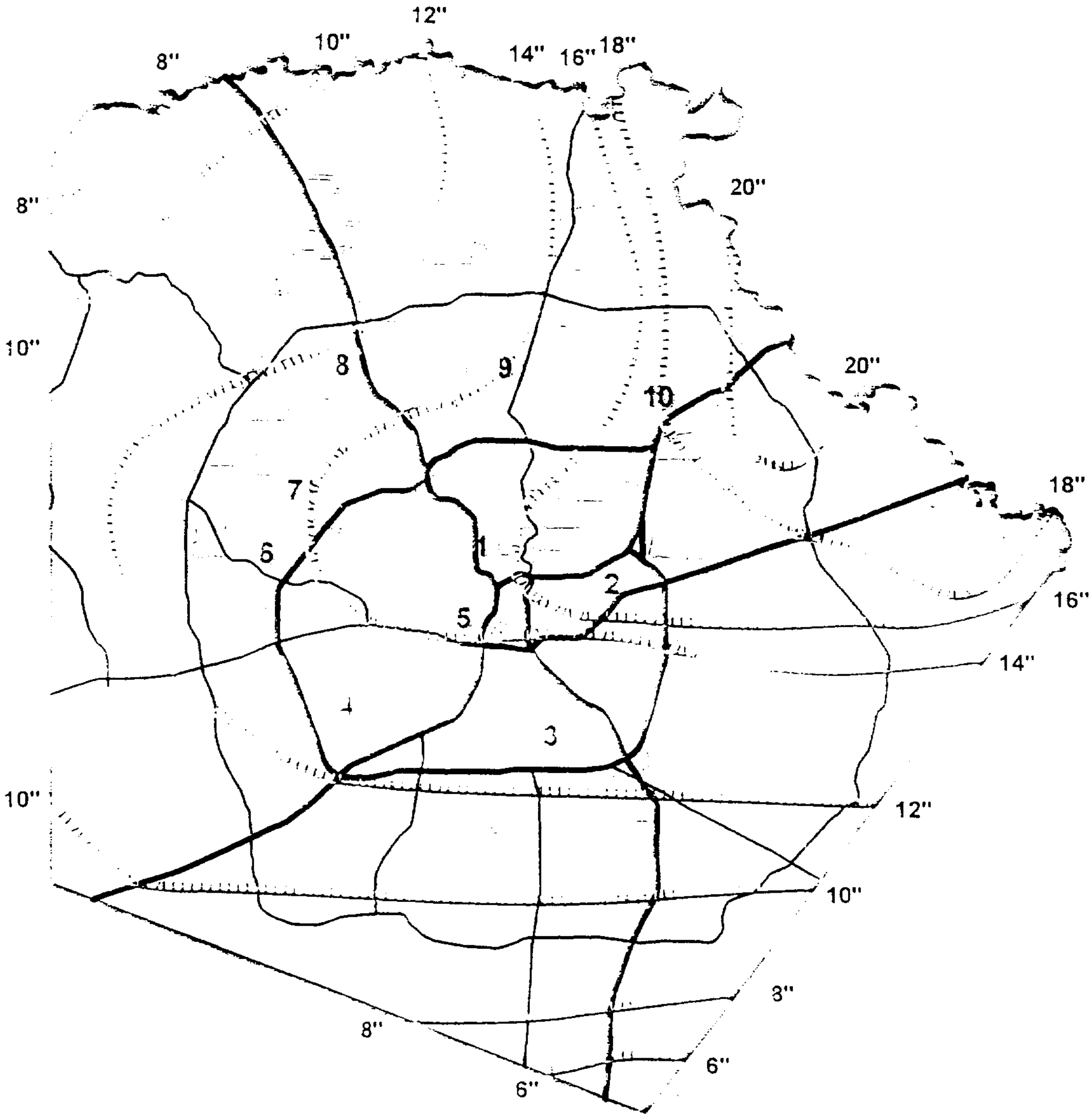
Emil Moncivais, Co-Chair	COSA-Planning
Gene Camargo, Co-Chair	COSA-Building Inspections
Steven Carvel	SWB
Martin Rodriguez	COSA-Code Compliance
Roy Akiona	COSA-Public Works
Robert Knox	American Red Cross
Chris Brady	COSA-City Manager's Office
Oscar Serrano	COSA-Asset Management
Gwen McCarville	COSA-Housing & Community Development
Betsy Erne	COSA-City Manager's Office
Cynthia Martinez	COSA-Neighborhood Action

BEXAR COUNTY WATERSHEDS

Watersheds of Bexar County



RAINFALL LEVELS



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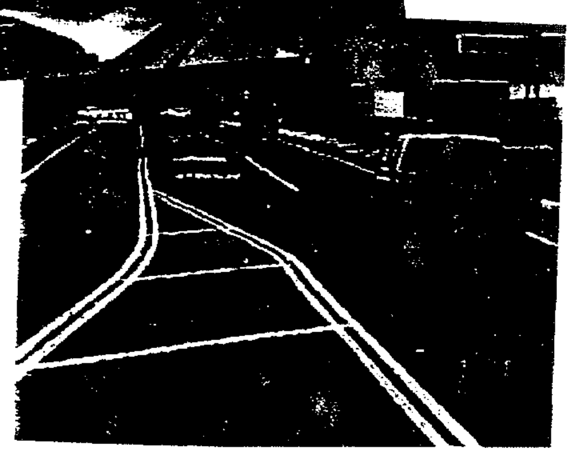
COMMITTEE PARTICIPANTS

APPENDIX P

1999 City of San Antonio Bond Election

$140.2 MILLION BOND ELECTION



...stem improvements

$140.2 MILLION BOND ELECTION

Projects by Proposition

Projects by City Council District

Voting Information

$140.2 MILLION BOND ELECTION

Projects by Proposition

Projects by City Council District

Voting Information

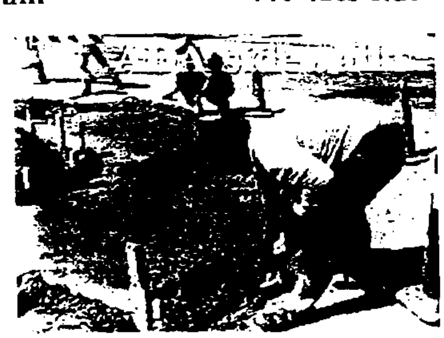
Callaghan Road
econstruction
(W. Horseshoe Bend
to Ingram Road)
Reconstructs Callaghan to a four-lane road with a left turn lane. Also provides sidewalks and necessary drainage improvements. (District 7) **$338,000** *MPO 2000 Project*

Central Business District
to San Antonio College
Bicycle Transportation
Provides signage and markings for bicycle path from the Alamo to San Antonio College via Alamo, 4th Street, Lexington and Howard Streets. (District 1) **$11,000** *MPO 2000 Project*

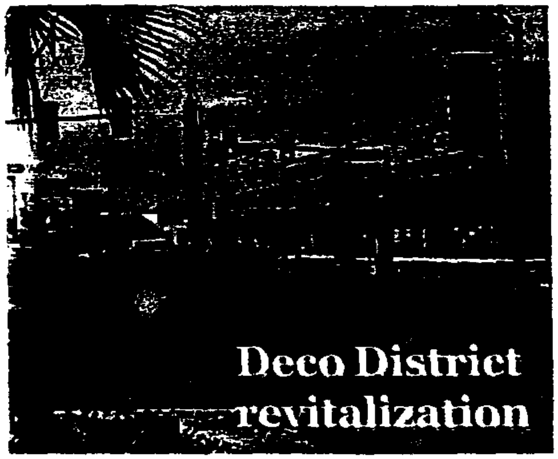
Cincinnati Bicycle
Transportation
(St. Mary's University
to Navidad)
Provides bicycle signage and markings for bike path. (District 1 and 7) **5,000** *MPO 2000 Project*

Cincinnati/Ashby
Bicycle Transportation
(Navidad to N. St. Mary's)
Provides signage and markings for bicycle path. (District 1) **6,000** *MPO 2000 Project*

City-wide Americans
with Disabilities Act (ADA)
Sidewalk Program
Reconstructs or adds sidewalks to meet ADA requirements. (City-wide) **$125,000** *MPO 2000 Project*



City-wide
Sidewalks
MPO/ADA
Provides for the improvement of sidewalks to meet ADA requirements. (City-wide) **$250,000** *MPO 2002 Project*



Clark (Fair to Southcross)
Reconstructs roadway with curbs, sidewalks and drainage. (District 3) **$550,000** *MPO 2003 Project*

Clark Sidewalks
(Southcross to Hot Wells)
Constructs sidewalks on Clark from Southcross to Hot Wells (District 3) **$153,410** *MPO 2003 Project*

Creswell
(Houston to Dead End)
Reconstruct streets with curbs, sidewalks, driveway approaches and necessary drainage. Also replaces water and sewer mains. (District 2) **$253,000**

Danbury Sidewalks
(Between Nacogdoches
and Broadway)
Provides sidewalks with curbs on Danbury between Nacogdoches and Broadway. (District 10) **$117,000**

Deco District
(Fredericksburg
Road)
Provides street and pedestrian enhancements as part of the Neighborhood Commercial Revitalization Program, providing commercial revitalization on Fredericksburg Road between IH-10 and Vance Jackson. (District 1, 7 and City-wide) **$400,000**

Demya Reconstruction
(Hunt to Loop 410)
Reconstructs the roadway, constructs and repairs sidewalks, and improves drainage. (District 4) **$227,000** *MPO 2002 Project*

East-West Huebner
Access over Railroad
Track
Develops a plan for improving the access and safety of traffic on Huebner and on Wurzbach at railroad tracks. (District 8) **$200,000**

El Monte BD-54
(Blanco to San Pedro)
Provides engineering only for project to include curbs, sidewalks, driveway approaches and necessary drainage improvements. (District 1) **$400,000**

Fay Street/St. Joseph
(Creighton to
New Laredo Highway)
Provides funding for Phase II of street reconstruction project that will include curbs, sidewalks, driveway approaches and necessary drainage improvements. (District 5) **$949,000**

Florida (IH-37 to St. Mary's)
Reconstructs roadway and provides three traffic lanes, sidewalks and necessary drainage improvements. (District 1) **$1,450,300**

Frio City Road BD-58
Reconstruction
(Brazos to Zarzamora)
Provides City's share of MPO project to reconstruct Frio City Road to a four-lane roadway to include left turn lane, curbs, sidewalks, drainage and signal modifications on Zarzamora. (District 5) **$521,000** *MPO 2000 Project*

Callaghan Road Reconstruction (W. Horseshoe Bend to Ingram Road)
Reconstructs Callaghan to a four-lane road with a left turn lane. Also provides sidewalks and necessary drainage improvements. (District 7) **$338,000** *MPO 2000 Project*

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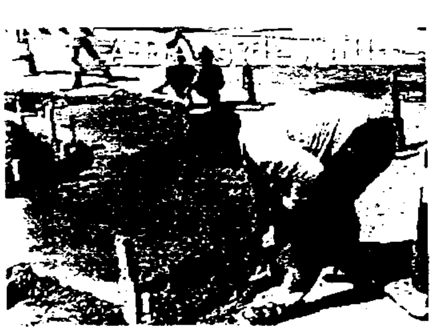

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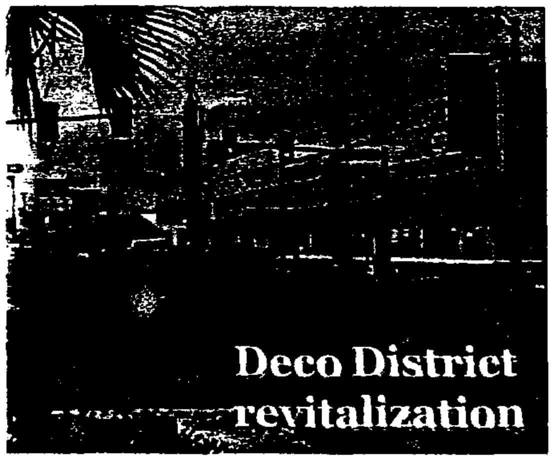

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Reconstructs the roadway, constructs and repairs sidewalks, and improves drainage. (District 4) **$227,000** *MPO 2002 Project*

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Provides funding for Phase II of street reconstruction project that will include curbs, sidewalks, driveway approaches and necessary drainage improvements. (District 5) **$949,000**

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Reconstructs roadway and provides three traffic lanes, sidewalks and necessary drainage improvements. (District 1) **$1,450,300**

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Provides City's share of MPO project to reconstruct Frio City Road to a four-lane roadway to include left turn lane, curbs, sidewalks, drainage and signal modifications on Zarzamora. (District 5) **$521,000** *MPO 2000 Project*

Larkspur Elementary Sidewalks
Provides sidewalks with curbs around Larkspur Elementary School. (District 9) **$5,000**

Leland Park Terrace Curb Reconstruction
Constructs curbs along Busby Drive where necessary. (District 9) **$200,000**

Leon Creek Bike Path Phase I
Funds engineering design for the construction of bicycle paths from Bandera to Babcock. (District 7 and 8) **$56,000** *MPO 2002 Project*

Lockhill-Selma (West Avenue to N.W. Military)
Reconstructs and widens Lockhill-Selma and adds curbs, sidewalks and necessary drainage improvements. (District 9) **$718,081** *MPO 2003 Project*

Malone Bike Lane (Theo-Quintana to Concepcion Park)
Provides bicycle signage and markings. (District 3 and 5) **$15,000** *MPO 2001 Project*

Market Square Rehabilitation
Rehabilitates pedestrian areas and improves site drainage. (District 1) **$500,000**

Mayfield (S. Zarzamora to IH-35)
Reconstructs roadway with curbs, sidewalks and necessary drainage improvements. (District 4) **$1,400,000** *MPO 2003 Project*

McCarty Sidewalks and Curbs (Lorene to Blanco)
Constructs sidewalks and curbs on outhside of street. (District 9) **$50,000**

McCullough (Basse to Railroad Tracks)
Reconstructs McCullough and provides turn lane, sidewalks, curbs, drainage and bike lanes. (District 9) **$587,605** *MPO 2003 Project*

Medical at Fredericksburg
Provides the City's share of access improvements to Medical Drive from IH-10 to the Medical Center. Includes right-of-way, signals and other traffic safety improvements. (District 8 and City-wide) **$785,000** *MPO 2003 Project*

Medical Drive Engineering (IH-10 to Fredericksburg)
Provides funds for engineering design to be used to construct improved access at Fredericksburg Road from IH-10 to the Medical Center. (District 8) **$225,000** *MPO 2002 Project*

Mission Trails Construction
Constructs streets, bikeways, sidewalks, drainage and other enhancements along the Mission Trails. (District 3) **$400,000** *MPO 2003 Project*

Mockert Street Area BD-74 **(Mockert, Forest, W. Lambert, Kline, Cass)**
Reconstructs Mockert Street and other connecting streets in the Mockert Street area including St. Philip of Jesus area with curbs, sidewalks, driveway approaches and necessary drainage improvements. (District 5) **$1,300,000**

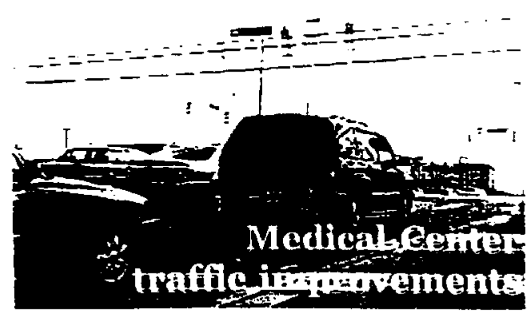
Montana Street Bike Lane (Alamodome to Walters)
Provides bicycle signage and markings from the Alamodome to Walters Street at St. Phillips College. (District 2) **$10,000** *MPO 2000 Project*

Monterrey Street Reconstruction (San Joaquin to 36th Street)
Reconstructs street with curbs, sidewalks, driveway approaches and necessary drainage improvements. (District 6) **$845,987**

Monticello (S. Gevers to Hillje)
Reconstructs road with curbs, sidewalks, driveway approaches and necessary drainage improvements. (District 3) **$157,000**

Nacogdoches (Loop 410 to Danbury)
Widens Nacogdoches to five lanes with curbs, sidewalks and necessary drainage improvements. (City-wide) **$666,854** *MPO 2003 Project*

Nakoma (U.S. Highway 281 to Warfield)
Widens and reconstructs Nakoma west of Highway 281 to include curbs, sidewalks and necessary drainage improvements. (District 9) **$109,471** *MPO 2003 Project*



Northington (S.W. 36th to S.W. 35th)
Removes and reconstructs the street base and paving, repairs and adds sidewalks and driveway approaches, and corrects drainage problems. (District 6) **$182,344**

Pecan Overlay (Main to Jefferson)
Mills and overlays Pecan from Main to Jefferson. (District 1) **$48,000** *MPO 2000 Project*

Larkspur Elementary Sidewalks
Provides sidewalks with curbs around Larkspur Elementary School. (District 9) **$5,000**

Leland Park Terrace Curb Reconstruction
Constructs curbs along Busby Drive where necessary. (District 9) **$200,000**

Leon Creek Bike Path Phase I
Funds engineering design for the construction of bicycle paths from Bandera to Babcock. (District 7 and 8) **$56,000** *MPO 2002 Project*

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Reconstructs and widens Lockhill-Selma and adds curbs, sidewalks and necessary drainage improvements. (District 9) **$718,081** *MPO 2003 Project*

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McCullough (Basse to Railroad Tracks)
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Northington (S.W. 36th to S.W. 35th)
Removes and reconstructs the street base and paving, repairs and adds sidewalks and driveway approaches, and corrects drainage problems. (District 6) **$182,344**

Pecan Overlay (Main to Jefferson)
Mills and overlays Pecan from Main to Jefferson. (District 1) **$48,000** *MPO 2000 Project*

Southwest Craft Center Intersection Improvements (Navarro and Augusta)
Provides sidewalk and pedestrian amenities between Southwest Craft Center and Central Library. (District 1 and City-wide) **$200,000**

Stahl at O'Connor, Judson, Higgins Reconstruction
Provides for intersection improvements and street reconstruction on Stahl Road at Higgins, O'Connor, and Judson Road. (District 10) **$456,000** *MPO 2002 Project*

Starcrest Reconstruction (Stuntman to Jones-Maltsberger)
Reconstructs Starcrest with four lanes and includes sidewalks and safety improvements. (District 9) **$229,000** *MPO 2000 Project*

Tezel Reconstruction (Ridge Path to Old Tezel)
Reconstructs Tezel Road to provide four lanes, realignment, turn lanes, sidewalks and required drainage improvements. (District 6) **$735,000** *2001 MPO Project*

Tezel Reconstruction (Timberpath to Ridge Path)
Widens the intersection and provides left turn lanes. (District 6) **$490,000** *MPO 2001 Project*

Tezel Road Pedestrian Enhancements
Provides pedestrian and site improvements to complete Tezel Road. (District 6 and 7) **$200,000** *MPO 2002 Project*

Thousand Oaks Extension Improvements
Provides for improvements at five intersections on Thousand Oaks between U.S. Highway 281 and Jones-Maltsberger at Broken Oak, Ledge View, Turkey Point, Pebble Forest and Oak Leigh. (District 9) **$211,000** *MPO 2000 Project*

U.S. Highway 281/Railroad Crossing at Quarry Market
Supplements budget for the Jones-Maltsberger Road street widening project. (District 9) **$250,000** *MPO 2003 Project*

Uhr Lane Reconstruction (Higgins to Thousand Oaks)
Reconstructs Uhr Lane to provide three lanes, sidewalks, safety enhancements and necessarydrainage. (District 10) **$481,000** *MPO 2000 Project*

UTSA (Downtown Campus) to Our Lady of the Lake University Corridor Bicycle Transportation
Provides bicycle signage and markings from Frio to 24th Street. (District 1 and 5) **$74,000** *MPO 2000 Project*

Vandiver Bicycle Transportation (Loop 410 to Rittiman)
Provides bike signs and wide curb lanes on Vandiver from Loop 410 to Rittiman. (District 10) **$11,000** *MPO 2002 Project*

Villaret Bicycle Transportation (Zarzamora to Highway 16)
Provides bike signs and shared lanes on Villaret from Zarzamora to Highway 16. (District 4) **$10,000** *MPO 2002 Project*

Walters Bicycle Transportation (Rigsby to Fair Avenue)
Provides bike signs and wide curb lanes on Walters from Rigsby to Fair Avenue. (District 2 and 3) **$5,000** *MPO 2002 Project*

West Craig (Elmendorf to Josephine Tobin)
Reconstructs West Craig with curbs, sidewalks, driveway approaches and necessary drainage improvements. (District 7) **$450,000**

Woodlawn Area Streets Engineering
Provides engineering studies to widen Maiden, Camino Santa Maria, Woodlawn and Cincinnati. (District 7) **$9,000** *MPO 2002 Project*

Woodlawn Avenue (Bandera to Maiden)
Reconstructs roadway with curbs, sidewalks and drainage. (District 7) **$1,187,000** *MPO 2003 Project*

Woodlawn Avenue (San Antonio to Lake)
Reconstructs Woodlawn Avenue with curbs, sidewalks, driveway approaches and necessary drainage improvements. (District 7) **$450,000**

Zarzamora Bike Lane (IH-35 to Loop 410)
Provides bicycle signage and markings. (District 4) **$6,000** *MPO 2001 Project*

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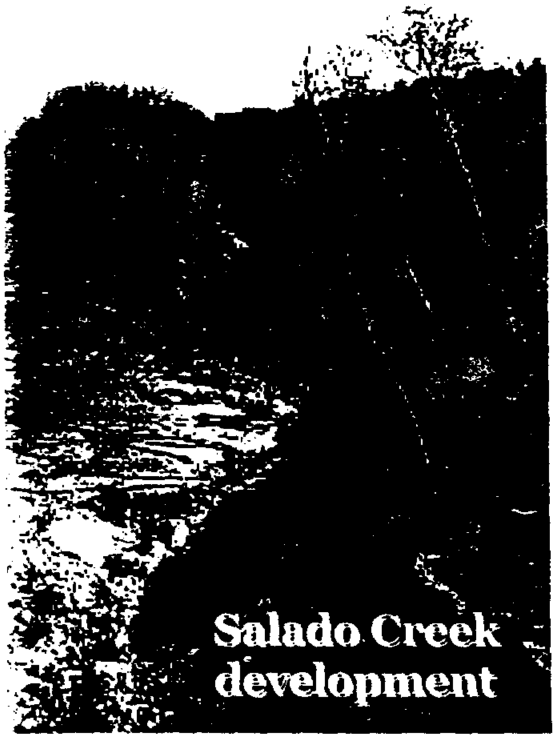
#12.2 M



These four projects, while providing for drainage improvements, also will accommodate parks and recreation improvements.

James Park Development and Holbrook Road Improvements BD-17

Acquires property, develops bikeways and nature trails along Holbrook Road near Salado Creek and improves James Park. (District 2) **$910,657**

Leon Creek Recreation Facilities and Detention Pond at Loop 410/Culebra BD-18

Acquires land for a stormwater detention pond along Leon Creek, constructs a detention pond and provides outdoor recreation facilities. (City-wide) **$2,500,000**

San Antonio River Improvements BD-19

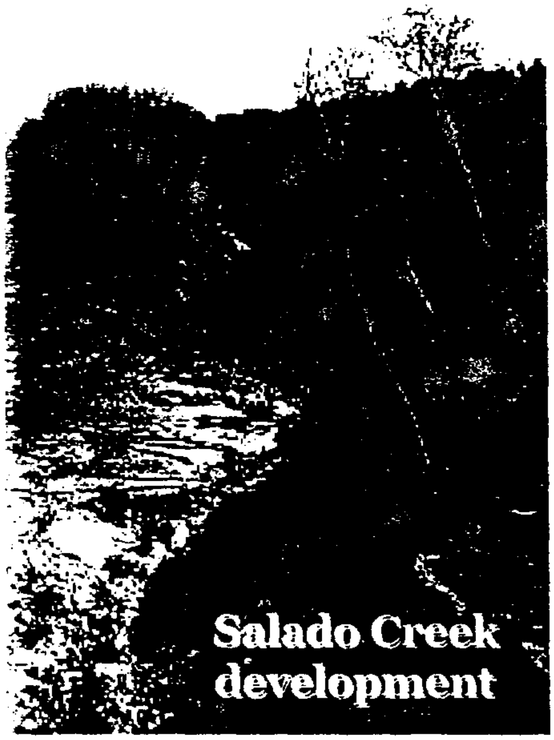
Provides funding to assist Bexar County and the San Antonio River Authority to make flood control improvements along the San Antonio River from Brackenridge Park to Mission Espada including the Brooklyn Dam. City funding will be aided by the Flood Control Tax and private-funding sources. (District 3 and City-wide) **$5,259,997**

Wheatley Heights Buyout and Salado Creek Greenway Development BD-20

Acquires and develops stormwater and hike/bike facilities along Salado Creek between Martin Luther King Park and Southside Lions Park. Level of greenway development is contingent on actual reimbursements from the Federal Emergency Management Agency for City funds spent as a result of the October 1998 flood. (District 2 and City-wide) **$3,540,384**

3.

#12.2 M



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Historic Civic Center River Link
Provides a connection to the River Walk from Main Plaza and enhances access to the Historic Civic Center area along Commerce and Dolorosa Streets. (District 1, 9 and City-wide) **$2,500,000**

Jefferson Pocket Park/Monuments Improvements
Rehabilitates urban spaces at Fredericksburg/North/Vollum and at Woodlawn/Tobin/Mistletoe. (District 7) **$50,000**

Jimmy Flores Park Improvements
Develops outdoor recreation improvements. (District 4) **$300,000**

Kallison Park
Rehabilitates outdoor park facilities (District 10). **$50,000**

Knollcrest and Merry Oaks (Gateway Terrace)
Acquires property and provides remediation and site improvements. (District 4) **$250,000**

Lackland Terrace Park and Center Improvements
Develops multi-use room addition to center and new playground. (District 6) **$426,900**

Lady Bird Johnson Park Improvements
Develops public outdoor recreation facilities. (District 10) **$393,984**

Las Palmas Walking Trail
Develops lighted walking trail. (District 5) **$200,000**

Lee's Creek Park Improvements
Develops landscaping, irrigation, fencing and trail. (District 7) **$50,000**

Leon Creek Greenway - District 7
Acquires land and develops greenway facilities along Leon Creek south of Bandera Road. (District 7 and City-wide) **$500,000**

Leon Creek Greenway - District 8
Acquires land and develops greenway facilities along Leon Creek north of Prue Road. (District 8) **$289,217**

Lone Star Brewery Site Park Land Acquisition and Development
Redevelopment of the Lone Star Brewery area which may include water rights acquisition, park land acquisition and development and street improvements. (District 5) **$1,000,000**

Lorence Creek Linear Park and Upper Salado Creek Greenway Development
Acquires land and develops trails along Lorence Creek between Blossom and McAllister Parks and along Salado Creek between Blanco Road and Huebner Road. (City-wide) **$932,422**

Mahnke Park Development - Phase II
Develops walking trails, lighting, landscaping and park equipment. (District 9) **$110,000**

Medina Base Road at Loop 410
Acquires vacant land and develops basic park improvements. (District 4) **$646,000**

Miller's Pond Park Development
Improves youth athletic fields and rehabilitates basketball court. (District 4) **$100,000**

Monticello Park Improvements
Rehabilitates landscaping and irrigation. (District 7) **$60,000**

New Territories Park Development
Develops outdoor park improvements. (District 8) **$195,839**

Northridge Park
Rehabilitates outdoor park facilities. (District 10) **$75,000**

Northwood Park
Rehabilitates outdoor park facilities. (District 10) **$25,000**

Oak Haven Park
Rehabilitates outdoor recreation facilities. (District 9) **$50,000**

Olmos Basin Park Rehabilitation and Trail System Development
Constructs additional parking for sports fields at Basse and McCullough. Rehabilitates parking lots and roads, picnic area, playground and provides for trails within Olmos Basin north of Hildebrand. (District 9 and City-wide) **$1,258,727**

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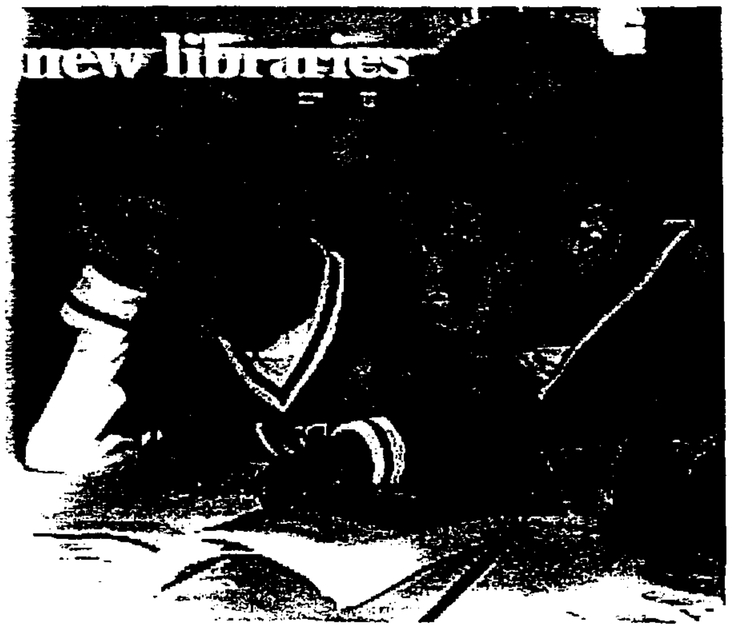


Branch Library (Camp Bullis/I.H.-10 Area)
Constructs a new branch library to include community meeting room, computers and library resources such as books, CD's, videos. (District 8) **$2,807,728**

Branch Library (Comanche Lookout Area)
Constructs a new branch library in the Comanche Lookout Park area to include community meeting room, computers and library resources such as books, CD's, videos. (District 10) **$3,000,000**

Branch Library (Pinn Road/ Military Drive Area)
Constructs a new branch library to include community meeting room, computers and library resources such as books, CD's, videos. (District 4, 6 and City-wide) **$2,799,144**

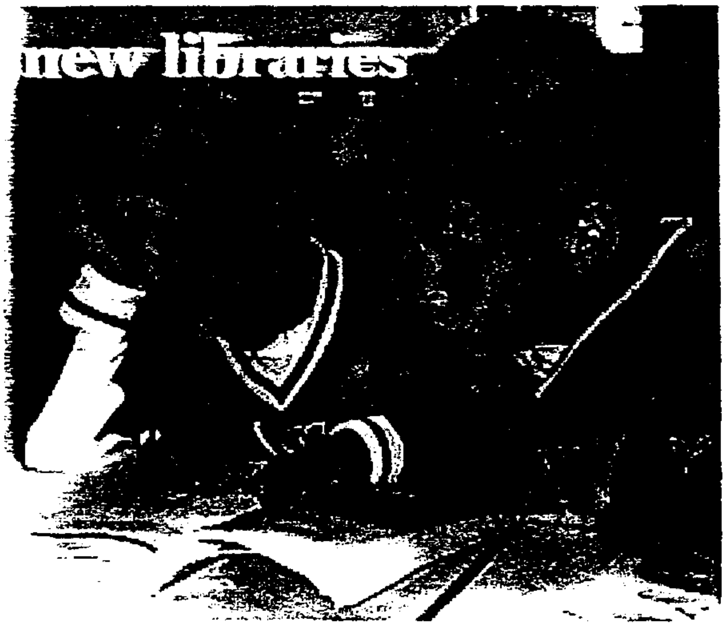
Branch Library (O.P. Schnabel Area)
Constructs a new branch library in the O.P. Schnabel Park area to include community meeting room, computers and library resources such as books, CD's, videos. (District 7 and 8) **$2,812,418**

Brook Hollow Branch Library Expansion
Expands the Brook Hollow Branch Library to accommodate additional materials and study areas. (District 9) **$500,000**

Great Northwest Branch Library Expansion
Expands the Great Northwest Branch Library to accommodate additional materials and study areas. (District 6 and 7) **$1,239,000**

Landa Branch Library Improvements
Renovates building's exterior facade. (District 9) **$50,000**

The San Antonio Public Library Foundation or private sources will assist with the purchase of initial library resources for newly-constructed branch libraries.



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Alamo/Broadway Corridor Bicycle Transportation
Arbor (Trinity to San Marcos)
Avenue B (North) Bikelane
Avenue B (South) Bikelane
Blanco Reconstruction (Lullwood to Summit)
Central Business District to San Antonio College Bicycle Transportation
Cincinnati Bicycle Transportation (St. Mary's University to Navidad)
Cincinnati/Ashby Bicycle Transportation (Navidad to N. St. Mary's)
Deco District - Street & Pedestrian Enhancements
El Monte (Blanco to San Pedro)
Florida (IH 37 to St. Mary's)
Houston Street Redevelopment
King William Area Bicycle Transportation
Market Square Rehabilitation
Pecan Overlay (Main to Jefferson)
SAC to UTSA Bicycle Transportation
Southtown Street Improvements
Southwest Craft Center Intersection Improvements (Navarro/Augusta)
UTSA Downtown Campus to OLLU Corridor Bicycle insportation (Frio to 24th St.)

Flores/Breeden/Beacon Outfall Phase II

Centro de Artes Building
Deco District - Travis Building Renovation
Frank Garrett Center
Historic Civic Center River Link
San Antonio River Visitor Services Station
San Pedro Park Rehabilitation Phase II
San Pedro Playhouse

Aransas Street (Meerscheidt to Walters)
Avenue B (North) Bikelane
Avenue B (South) Bikelane
Bee Street (Walters to Frank)
Belgium (Picardie to Coliseum)
Creswell (Houston to Dead End)
Houston (Pine to Polaris)
Josephine/Grayson Bicycle Transportation
Kono (Gembler to Belgium)
Montana Street Bike Lane (Alamodome to Walters)
Pecan Valley Drive Reconstruction ("J" St. to IH-10)
Ray Bon Drive Sidewalks
Rice Reconstruction (W.W. White to Semlinger)
Walters Bicycle Transportation (Rigsby to Fair Avenue)

IH 35 - Gembler/Widen & Deepen Salado Creek

James Park Development & Holbrook Road Flood Improvements
Wheatley Heights Buyout & Salado Creek Greenway Development

Eastside Service Center Renovation/Expansion
Northside Service Center Renovation/Expansion

Centro de Artes Building
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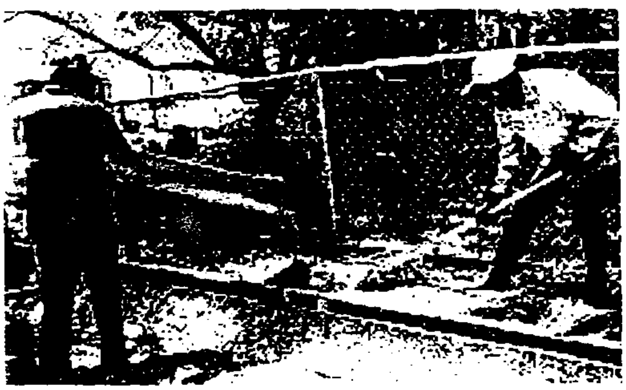

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Flores/Breeden/Beacon Outfall Phase II

District 2

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Eastside Service Center Renovation/Expansion
Northside Service Center Renovation/Expansion

Fay Street/St. Joseph (Creighton to New Laredo Hwy.)
Frio City Road Reconstruction (Brazos to Zarzamora)
Frio City/General Hudnell Access Ramps
Hoover Street (Nogalitos to Charlotte)
Malone Bike Lane (Theo-Quintana to Concepcion Park)
Mockert Street Area (Mockert, Forest, W. Lambert, Kline, Cass)
South Flores Reconstruction (Malone to Octavia)
UTSA to OLLU Corridor Bicycle Transportation (Frio to 24th St.)

Harris Storm Drainage (Alvarez, Glass, Cass, Halstead)
Octavia #63 Phase II

Calderon Boys and Girls Club
Collins Gardens Park Improvements
Las Palmas Walking Trail
Lone Star Brewery Site Park Land Acquisition and Development
Roosevelt Park Improvements

Southside Service Center Renovation/Expansion
Westside Service Center Renovation/Expansion

District 5

36th Street Reconstruction (US 90 to Kelly AFB Entrance)
Monterrey Street Reconstruction (San Joaquin to 36th Street)
Northington (S.W. 36th to S.W. 35th)
S.W. 41st Street Reconstruction (Castroville Rd. to Lawton St.)
Tezel Reconstruction (Ridge Path to Old Tezel)
Tezel Reconstruction (Timberpath to Ridge Path)
Tezel Road Pedestrian Enhancements

39th Street #58M Phase II A
Culebra Drainage Project #58F (Zarzamora Creek)

Gilbert Garza Community Center Crossover Bridge
Lackland Terrace Park and Center Improvements
Park Land Acquisition and Development - District 6

Branch Library (Pinn Road / Military Drive Area)
Great Northwest Branch Library Expansion

Westside Service Center Renovation/Expansion

District 7

Abe Lincoln (Horn to Eckhert)
Callaghan Road Reconstruction (Hemphill to Culebra
Callaghan Road Reconstruction (Old Hwy. 90 to Commerce)
Callaghan Road Reconstruction (W. Horseshoe Bend to Ingram Road)
Cincinnati Bicycle Transportation (St. Mary's University to Navidad)
Deco District - Street & Pedestrian Enhancements
Houston Street Redevelopment
Leon Creek Bike Path Phase I
Tezel Road Pedestrian Enhancements
West Craig (Elmendorf to Josephine Tobin)
Woodlawn Avenue (Bandera to Maiden)
Woodlawn Avenue (San Antonio to Lake)
Woodlawn Area Streets Bike Path Engineering

Culebra Drainage Project #58F (Zarzamora Creek)
Guilbeau Drainage at French Creek

Alderete Park Improvements

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Culebra Drainage Project #58F (Zarzamora Creek)
Guilbeau Drainage at French Creek

Alderete Park Improvements

Northside Service Center Renovation/Expansion
Prue Road Service Center Renovation/Expansion

Bitters Road Reconstruction (Broadway to Nacogdoches)
Danbury Sidewalks (Between Nacogdoches and Broadway)
Henderson Pass Sidewalks (Thousand Oaks to Gold Canyon)
Stahl at O'Connor, Judson, Higgins Reconstruction
Thr Lane Reconstruction (Higgins to Thousand Oaks)
Vandiver Bicycle Transportation (Loop 410 to Sittiman)

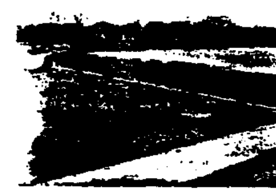
Blossom/Woodbury =1007 Phase II
Lanark Drainage

Comanche Lookout Development Phase II
Friesennahn Park Rehabilitation
Kallison Park
Lady Bird Johnson Park Improvements
Northridge Park
Northwood Park

Branch Library (Comanche Lookout Area)

Northside Service Center Renovation/Expansion

Bicycle Route Street Plan
City-wide ADA Sidewalk Program
City-wide Sidewalks MPO/ADA
Deco District - Street & Pedestrian Enhancements
Houston Street Redevelopment
Medical at Fredericksburg
Nacogdoches (Loop 410 to Danbury)
School Safety Program
Southwest Craft Center Intersection Improvements (Navarro and Augusta)



Leon Creek Recreation Facilities & Detention Pond at Loop 410/Culebra
San Antonio River Improvements
Wheatley Heights Buyout & Salado Creek Greenway Development

Centro de Artes Building
City Nursery Relocation/Brackenridge Surface Parking Lot
Deco District - Travis Building Renovation
Guadalupe Arts & Cultural Facility
Historic Civic Center River Link
Leon Creek Greenway - District 7
Lorence Creek Linear Park & Upper Salado Creek Greenway Development
Olmos Basin Park Rehabilitation & Trail System Development
San Antonio River Visitor Services Station
San Pedro Park Rehabilitation Phase II

Branch Library (Pinn Road/Military Drive Area)

Fire Training Academy
Public Safety Integrated Technology System

City Hall	**100 Military Plaza**

Dates and Times for City Hall

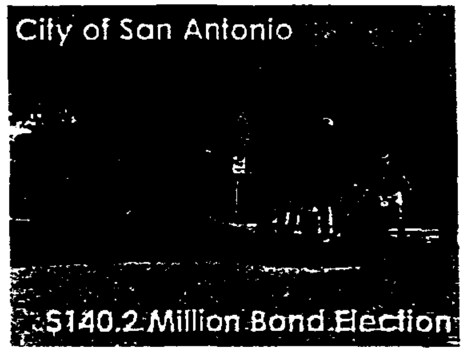
Wednesday - Friday, April 14-16, 1999	*7:45 a.m. -4:30 p.m.*
Saturday, April 17	*Closed*
Sunday, April 18	*Closed*
Monday - Thursday, April 19-22	*7:45 a.m. -4:30 p.m.*
Friday, April 23	*Closed/City Holiday*
Saturday, April 24	*Closed*
Sunday, April 25	*Closed*
Monday - Tuesday, April 26-27	*7:45 a.m. -4:30 p.m.*

Lion's Field	**2809 Broadway**
Claude Black Center	**2805 E. Commerce**
Windsor Park Mall	**7900 IH-35 North**
McCreless Mall	**4100 S. New Braunfels**
K-mart Store	**2902 Goliad**
Johnston Library	**6307 Sun Valley Road**
South Park Mall	**2310 SW Military Drive**
St. James Catholic Church	**907 W. Theo**
Las Palmas Library	**515 Castroville Road**
Handy Andy Supermarket	**8553 Culebra**
Westlakes Mall	**1401 SW Loop 410**
Handy Andy Supermarket	**910 Bandera**
Ingram Park Mall	**6301 NW Loop 410**
Ultramar Diamond Shamrock Corp. Hdqtrs.	**6000 N. Loop 1604 West**
K-mart Store	**7723 Guilbeau**
Central Park Mall	**622 NW Loop 410**
Brook Hollow Library	**530 Heimer Road**
Lou Hamilton Recreation Center	**10700 Nacogdoches**
Rolling Oaks Mall	**6909 N. Loop 1604 East**

Dates and Times for Temporary Locations

Wednesday - Friday, April 14-16, 1999	*9:00 a.m. - 7:00 p.m.*
Saturday, April 17	*10:00 a.m. - 6:00 p.m.*
Sunday, April 18	*Noon - 6:00 p.m.*
Monday - Thursday, April 19-22	*9:00 a.m. - 7:00 p.m.*
Friday, April 23	*Closed/City Holiday*
Saturday, April 24	*10:00 a.m. - 6:00 p.m.*
Sunday, April 25	*Noon - 6:00 p.m.*
Monday - Tuesday, April 26-27	*9:00 a.m. - 7:00 p.m.*

For more information on the 1999 Bond [illegible] call the City's Office of Community Relations [illegible]



Saturday, May 1, 1999

Early Voting: April 14 to April 27

San Antonians will have the opportunity to vote on a $140.2 million bond issue comprised of six individual propositions. These propositions include 206 projects throughout the city for improvements to streets, sidewalks, drainage, flood control, parks, libraries and public safety. See the following links for more information on each of the propositions and district projects.

Propositions

Project Listings by District

Propuestas en Espanol

ista de Proyectos en Espano

Election Information

If you would like a copy of the 1999 Bond Election brochure in English or Spanish, call 207-7235.

For more information on the 1999 Bond Election, call the City's Office of Community Relations.

Esta informacion esta disponible en espanol. Favor de llamar a la Oficina de Relaciones de la Comunidad al 207-7235.

CPM CURRENT ADVERTISE LIST

CouncilDistrict	Project Name	Current Estimate		Date
9	Hildebrand @ 281	$	91,627.00	Aug 99
8	Medical Dr: Babcock to Fredericksburg	$	952,164.00	Aug 99
4	Upper Six Mile Creek Drainage #83F	$	4,662,459.00	Aug 99
5	Baylor: San Pedro Creek to Flores	$	205,998.00	Sept 99
2	Duval/Seguin: Pierce to Walters	$	880,000.00	Sept 99
2	Fairdale: Rittiman to Bloomdale	$	655,740.00	Sept 99
10	Leonhardt Road Improvements	$	809,391.00	Sept 99
2	Lone Oak/Latimer: "F" St to Brice	$	184,361.00	Sept 99
9	Mahncke Area Sts Ph II	$	957,918.00	Sept 99
6	Timber Path Bikeway: Les Harrison to Grissom	$	87,400.00	Sept 99
9	Claremont, Eleanor, Natalen Sts Ph II	$	687,975.00	Oct 99
7	Culebra Area Streets, Phase II	$	887,060.00	Oct 99
3	Escalon Street Drainage #1008	$	963,342.00	Oct 99
3	Hi Lions Drainage #80, Phases III & V (87)	$	5,476,000.00	Oct 99
1	Pecan: Soledad to Broadway	$	191,903.00	Oct 99
1	Mistletoe: IH 10 to Martinez Creek	$	158,518.00	Nov 99
4	Rip Rap #69 Ph IIC, Part 3	$	1,000,000.00	Nov 99
1	Texas / Waverly Streets	$	479,880.00	Nov 99
1	Thorain: Buckeye to Railroad	$	327,750.00	Nov 99
1,9	Blanco & Jackson-Keller Intersection	$	564,000.00	Dec 99
3	Goliad: Pecan Valley to SE Military Dr	$	2,331,176.00	Dec 99
1	Harvard Terrace: Yale to University	$	115,563.00	Dec 99
10	Henderson Pass Sidewalks	$	190,100.00	Dec 99
10	Higgins: Nacogdoches to Stahl	$	2,407,407.00	Dec 99
5	McKay: 400 & 500 Blocks	$	157,550.00	Dec 99
6	Orr / Suzette / Winkle	$	737,594.00	Dec 99
4	S. Flores Drainage #70-70A, Phase II Part 3 (87)	$	2,200,000.00	Dec 99
2	Ackerman: IH 10 to Dietrich	$	475,850.00	Jan 00
1	Capitol: Basse to La Manda	$	143,750.00	Jan 00
CW	Citywide School Safety Program	$	1,000,000.00	Jan 00
10	Danbury Sidewalks	$	117,000.00	Jan 00
7	Dell Street Drainage (100 Block)	$	438,817.00	Jan 00
1	Blanco: Lullwood to Summit	$	406,000.00	Jan 00
1	Cincinnati	$	0.00	Jan 00
1	Elsmere/Gramercy #57	$	1,203,241.00	Jan 00
1	Elsmere: Michigan to Capitol	$	125,441.00	Jan 00
1	Fulton: Blanco to N. Flores	$	938,929.00	Jan 00
3	Gevers Sidewalks: IH 10 to Southcross	$	370,220.00	Jan 00
1	Hildebrand: IH 10 to Breeden	$	1,752,000.00	Jan 00
1	Houston Street Redevelopment	$	1,500,000.00	Jan 00
2	IH 35 at Gembler Drainage	$	660,000.00	Jan 00
1,3	Mission Trails Parkway Pkg 3	$	3,364,900.00	Jan 00
6	Monterrey: 36th St to Old Hwy 90	$	735,641.00	Jan 00
2	Ray Bon Drive Sidewalks	$	107,509.00	Jan 00
1	Southtown Street Improvements	$	250,000.00	Jan 00
1	Southwest Craft Center Intersection Improvements	$	200,000.00	Jan 00
7	Waverly Ph I: Bandera to Emory	$	722,176.00	Jan 00

9	Western #74 Ph IIIA	$	943,993.00	Jan 00
1	Arbor St: Trinity to San Marcos Ph II	$	840,000.00	Feb 00
10	Broadway at Wetmore	$	527,979.00	Feb 00
4	Drury: Escalon East to Deadend	$	144,552.00	Feb 00
4	Hillside Acres Drainage Outfall	$	220,000.00	Feb 00
6	Hobart: Acme Rd to 40th St	$	277,346.00	Feb 00
6	Lawton / SW 41st St	$	658,252.00	Feb 00
4	Strech: Chavaneaux to Malley	$	360,475.00	Feb 00
2	W. W. White Road Ph I: Rigsby to Lord	$	3,030,546.00	Feb 00
6	39th St Drainage, #58 Phase IIA	$	739,108.00	Mar 00
6	39th St Drainage, #58 Phase III	$	600,652.00	Mar 00
1	Alamo: Durango to Cedar	$	1,178,709.00	Mar 00
8	Evers Road & Wurzbach Rd Intersection	$	282,000.00	Mar 00
4	Fleming: Fenfield to New Laredo Hwy	$	160,845.00	Mar 00
2	Gevers: IH 10 to Harding	$	644,645.00	Mar 00
4	King Ph I: Bynum to Crittendon	$	774,000.00	Mar 00
3	Mitchell: Probandt to Roosevelt	$	1,463,764.00	Mar 00
2	New Braunfels: IH 35 to Grayson	$	290,000.00	Mar 00
5	Nogalitos: New Laredo Hwy to Surrey	$	997,000.00	Mar 00
3	Probandt: US 90 to Mitchell	$	285,081.00	Mar 00
8	Prue Rd: Laureate to Fredericksburg	$	731,544.00	Mar 00
10	Rittiman: Austin Hwy to Harry Wurzbach	$	1,018,893.00	Mar 00
5	St Mary's: Pereida to Roosevelt	$	3,280,660.00	Mar 00
1	St. Mary's, South: Alamo to Pereida	$	341,900,.00	Mar 00
5	St. Francis: Dowdy to Probandt	$	443,459.00	Mar 00
7	Wurzbach Rd: Ingram to Leon Valley	$	1,503,500.00	Mar 00
7	24th Street: Commerce to Culebra	$	2,300,000.00	Apr 00
7	Blueridge: General McMullen to 27th St	$	339,509.00	Apr 00
2	Creswell: E. Houston to Deadend	$	253,000.00	Apr 00
7	Culebra Drainage #58F	$	4,394,000.00	Apr 00
1	Indianola: Garfield to Camargo	$	281,699.00	Apr 00
10	Blossom/Woodbury Drainage Ph I & II	$	1,828,338.00	May 00
CW	Citywide Sidewalks	$	1,000,000.00	May 00
2	Houston St: Bowie to Pine	$	1,786,403.00	May 00
4	Hunt Lane: Marbach to US 90	$	2,349,534.00	May 00
8	Lockhill-Selma: George to Wurzbach	$	2,220,171.00	May 00
3	Mission Trails Package 2	$	9,211,938.00	May 00
4	Navajo Area Streets	$	2,167,946.00	May 00
1	S. Flores: Durango to Franciscan	$	1,861,452.00	May 00
9	Thousand Oaks Intersection	$	846,000.00	May 00
10	Bitters Rd: Broadway to Nacogdoches	$	1,953,326.00	June 00
9	Claremont, **Eleanor**, Natalen Ph III	$	800,714.00	June 00
9	Wurzbach Parkway Phase IV	$	6,660,000.00	June 00
2	Holbrook: Eisenhauer to Petroleum	$	1,200,000.00	July 00
10	Lanark Drainage # 92A	$	3,027,480.00	July 00
10	Uhr Lane: Higgins to Thousand Oaks	$	1,926,090.00	July 00
5	Frio City Rd: Brazos to Zarzamora	$	2,086,272.00	Aug 00
9	Starcrest: Stuntman to Jones Maltsberger	$	916,000.00	Aug 00
9	Bitters Rd: West Avenue to Heimer	$	900,000.00	Sept 00
7	Callaghan: Bandera to W. Horseshoe Bend	$	2,900,000.00	Sept 00
7	Callaghan: W. Horseshoe Bend to Ingram	$	1,618,647.00	Sept 00
4	King Ph II: Crittendon to New Laredo Hwy	$	275,000.00	Sept 00

9	Western #74 Ph IIIA	$	943,993.00	Jan 00
1	Arbor St: Trinity to San Marcos Ph II	$	840,000.00	Feb 00
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3	Mitchell: Probandt to Roosevelt	$	1,463,764.00	Mar 00
2	New Braunfels: IH 35 to Grayson	$	290,000.00	Mar 00
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CW	Citywide Sidewalks	$	1,000,000.00	May 00
2	Houston St: Bowie to Pine	$	1,786,403.00	May 00
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7	Callaghan: Bandera to W. Horseshoe Bend	$	2,900,000.00	Sept 00
7	Callaghan: W. Horseshoe Bend to Ingram	$	1,618,647.00	Sept 00
4	King Ph II: Crittendon to New Laredo Hwy	$	275,000.00	Sept 00

3	Emmit St Engineering	$	0.00	Funded
5	Fay Ph I: Quintana to Creighton	$	282,801.00	Unfunded
5	Fay / St Joseph: Creighton to New Laredo Hwy	$	949,000.00	Funded
6	Glider & Landing: Gunsmoke to Loop 410	$	858,805.00	Unfunded
5	Grand Alley St Engineering	$	0.00	Funded
2	Grandview Neighborhood Streets, Phase II	$	1,670,000.00	Unfunded
2	H St: Amanda to Pecan Valley	$	393,068.00	Unfunded
2	Hardiman St Sidewalks: Mesquite to Hardiman	$	22,470.00	Funded
5	Harris Storm Drainage	$	1,731,687.00	Funded
4	Hilton: Clovis to W. Amber	$	318,984.00	Unfunded
7	Hollyhock @ Huebner Creek	$	574,927.00	Funded
5	Hoover St: Nogalitos to Charlotte	$	437,984.00	Funded
9	Howard Drainage: Wildwood to El Monte	$	737,828.00	Funded
2	Hub St Sidewalks (400 Blocks)	$	83,240.00	Funded
3	Jo Marie: W. W. White to Deadend	$	503,000.00	Funded
9	Larhspur: West Ave to Baltic	$	573,000.00	Funded
9	Larkspur Elementary School Sidewalks	$	5,000.00	Funded
1	Las Moras: Travis to Salinas	$	71,376.00	Unfunded
9	Leland Park Terrace Curb Reconstruction	$	200,000.00	Funded
9	Mc Carty Sidewalks & Curbs: Lorene to Blanco	$	50,000.00	Funded
8	Medical: IH 10 to Ewing Halsell	$	7,748,813.00	Funded
4	Military Ditch #65	$	1,657,572.00	Funded
5	Mockert Area Sts	$	1,300,000.00	Funded
3	Monticello: S. Gevers to Hillje	$	157,000.00	Funded
5	Northington: SW 36th St to SW 35th St	$	182,344.00	Unfunded
5	Octavia #63 Phase II	$	6,895,823.00	Unfunded
2	Palmetto St Sidewalks	$	23,500.00	Funded
3	Parker & Monroe St Engineering	$	0.00	Funded
4	Pedestrian Bridge at Hidden Cove Elementary	$	126,219.00	Funded
3	Pleasanton Rd: Gillette to Loop 410	$	2,200,000.00	Funded
2	Potomac / Paso Hondo	$	438,650.00	Unfunded
4	Rip Rap 69-Ph IIC, Part 4	$	2,000,000.00	Funded
4	Rip Rap 69-Ph IID	$	3,000,000.00	Unfunded
2	Robeson: Yucca to Martin Luther King	$	197,385.00	Unfunded
3	Sams: Deadend to Deadend	$	74,000.00	Funded
8	Signal Preemption (Medical Center Area)	$	236,000.00	Funded
8	Signal Preemption and Improvement (Medical Dr)	$	334,000.00	Funded
7	W. Craig: Elmendorf to Josephine Tobin	$	450,000.00	Funded
7	W. French: Zarzamora to Navidad	$	334,391.00	Unfunded
5	Walton: Nogalitos to Zarzamora	$	1,253,397.00	Unfunded
7	Waverly Ph II: Emory to Glenmore	$	445,000.00	Funded
7	Wilson: Woodlawn to Waverly	$	892,537.00	Unfunded
7	Woodlawn Area Streets Engineering	$	35,100.00	Funded
7	Woodlawn: Camino Santa Maria to 36th St	$	1,436,969.00	Unfunded
7	Woodlawn: San Antonio to Lake	$	450,000.00	Funded
2	W. W. White Rd Area Streets Phase II	$	2,740,932.00	Unfunded
1	Yellowstone: Mission Rd to Roosevelt	$	108,822.00	Unfunded
2	Yellow Wood Drainage	$	0.00	Unfunded

served by this page.

Last Update: 08/10/99

APPENDIX Q

1999 City of San Antonio Capital Improvement Program

CITY OF SAN ANTONIO
MEMORANDUM

Date October 14, 1999

To: Distribution List Below

From: Gabriel Perez, Capital Programs Manager, Public Works

Subject: **Capital Improvement Program**

Attached is a revised list of capital improvement projects and the approximate date of advertisement for bids. **This has been revised on occasion to accommodate design issues or utility facility conflicts**

It is the intent of the City to adhere to this schedule as closely as possible. To accomplish this, all involved parties must fully cooperate with land acquisition, utility relocation, design review, etc.

This document for the most part remains unchanged and **provides adequate information for beginning design efforts for utility adjustments.**

Your full cooperation is appreciated.

GP/mv

Distribution: Director of Public Works
Assistant Director of Public Works
Environmental Manager
Streets & Drainage Operations Manager (2)
San Antonio Water Systems (2)
City Public Service Board
Southwestern Bell Telephone Company
Bexar Metropolitan Water District
Paragon Cable TV
Right-of-Way (2)
Utility Coordinator – City of San Antonio
Project Development Manager
Robert Opitz
Fernando DeLeon
Traffic Signal Shop
Traffic Signal Engineer
Legal – Trial Section

Attachments

PRIORITIES ON CAPITAL IMPROVEMENT PROJECTS
ANTICIPATED ADVERTISEMENT FOR BIDS DATE

	District		Project Name	Current Estimate	Date
BD-40	5	*	Baylor: San Pedro Creek to Flores	$ 205,998.00	Oct-99
	7	*	Culebra Area Streets, Ph II	$ 887,060.00	Oct-99
BD-53	2		Duval /Seguin - Pierce to Walters	$ 880,000.00	Oct-99
BD-22	3		Escalon Street Drainage #1008	$ 963,342.00	Oct-99
BD-63	3		Hi Lions Drainage #80, Phases III &IV (87)	$ 5,476,000.00	Oct-99
BD-69	10		Leonhardt Road Improvements	$ 809,391.00	Oct-99
	1	M	Pecan: Soledad to Broadway	$ 191,903.00	Oct-99
				$ 9,413,694.00	
	2	*	Lone Oak/Latimer: "F: St to Brice	$ 184,361.00	Nov-99
BD-72	1	*	Mistletoe Ave. - IH 10 to Martinez Creek	$ 158,518.00	Nov-99
BD-76	1	*	Texas / Waverly Streets	$ 479,880.00	Nov-99
BD-78	1	*	Thorain - Buckeye to Railroad	$ 327,750.00	Nov-99
				$ 1,150,509.00	
BD-62	1	*	Harvard Terrace: Yale to University	$ 115,563.00	Dec-99
BD-71	5	*	McKay - 400 & 500 Blocks	$ 157,550.00	Dec-99
	6	*	Orr/Suzette/Winkle	$ 737,594.00	Dec-99
BD-25	4		S Flores Drainage #70 - 70A, Phase II, Part 3 (87)	$ 2,200,000.00	Dec-99
	6	M	Timber Path Bikeway: Les Harrison to Grissom (Force)	$ 87,400.00	Dec-99
				$ 3,298,107.00	
	2	M	Ackerman - IH 10 to Dietrich	$ 475,850.00	Jan-00
	1,9	M	Blanco Rd & Jackson-Keller Intersection	$ 564,000.00	Jan-00
	1	*	Capitol: Basse to La Manda	$ 143,750.00	Jan-00
	CW	M	Citywide School Safety Program	$ 1,000,000.00	Jan-00
	10		Danbury Sidewalks	$ 117,000.00	Jan-00
BD-21	7	*	Dell Street Drainage (100 Block)	$ 438,817.00	Jan-00
	1		Blanco: Lullwood to Summit	$ 406,000.00	Jan-00
	1		Elsmere/Gramercy #57	$ 1,203,241.00	Jan-00
BD-55	1	*	Elsmere: Michigan to Capitol	$ 125,441.00	Jan-00
	1	*	Fulton: Blanco to N. Flores	$ 938,929.00	Jan-00
	10	M	Henderson Pass Sidewalks	$ 190,100.00	Jan-00
BD-30	10		Higgins: Nacogdoches to Stahl	$ 2,407,407.00	Jan-00
	1	M	Hildebrand: IH 10 to Breeden	$ 1,752,000.00	Jan-00
BD-12	2		IH 35 at Gembler Drainage (In-house)	$ 660,000.00	Jan-00
	1,3	M	Mission Trails Parkway Pkg 3	$ 3,364,900.00	Jan-00
	6	*	Monterrey - 36th Street to San Joaquin	$ 735,641.00	Jan-00
	4	*	Strech - Chavaneaux to Malley	$ 360,475.00	Jan-00
				$ 14,883,551.00	

* Denotes Federally Funded (CDBG)
M Denotes MPO Funded Project

PRIORITIES ON CAPITAL IMPROVEMENT PROJECTS
ANTICIPATED ADVERTISEMENT FOR BIDS DATE

	District		Project Name	Current Estimate	Date
BD-38	1		Arbor St: Trinity to San Marcos Ph II	$ 840,000.00	Feb-00
BD-51	4	•	Drury - Escalon East to Deadend	$ 144,552.00	Feb-00
	3	M	Gevers Sidewalks: IH 10 to Southcross	$ 370,220.00	Feb-00
BD-7	4	•	Hillside Acres Drainage Outfall	$ 220,000.00	Feb-00
	6		Hobart: Acme Rd to 40th St	$ 277,346.00	Feb-00
	6	•	Lawton / SW 41st St	$ 658,252.00	Feb-00
	6		S. W. 41st Street: Castroville to Lawton	$ 293,542.00	Feb-00
	3	M	Mitchell - Probandt to Roosevelt	$ 1,463,764.00	Feb-00
	3	M	Probandt - US 90 to Mitchell	$ 285,081.00	Feb-00
BD-81	2		W. W. White Road Ph I: Rigsby to Lord	$ 3,030,546.00	Feb-00
				$ 7,583,303.00	
BD-1	6	•	39th Street Drainage, #58M, Phase IIA	$ 739,108.00	Mar-00
BD-36	6	•	39th Street Drainage, #58M, Phase III	$ 600,652.00	Mar-00
	10	M	Broadway at Wetmore	$ 527,979.00	Mar-00
	8	M	Evers Road & Wurzbach Road Intersection	$ 282,000.00	Mar-00
	4	•	Fleming: Fenfield to New Laredo Hwy	$ 160,845.00	Mar-00
BD-61	2	•	Gevers: IH 10 to Harding	$ 644,645.00	Mar-00
	5	M	Nogalitos - New Laredo Hwy to Surrey	$ 997,000.00	Mar-00
	8	M	Prue Rd: Laureate to Fredericksburg	$ 731,544.00	Mar-00
BD-16	4	•	Rip Rap #69 Ph IIC, Part 3	$ 1,000,000.00	Mar-00
	10	M	Rittiman: Austin Hwy to Harry Wurzbach	$ 1,018,893.00	Mar-00
	1	M	St. Mary's, South: Alamo to Pereida	$ 341,900.00	Mar-00
	5	•	St. Francis - Dowdy to Probandt	$ 443,459.00	Mar-00
BD-83	7	•	Waverly Ph I: Bandera to Emory	$ 722,176.00	Mar-00
BD-84	7	•	Waverly Ph II: Emory to Glenmore	$ 445,000.00	Mar-00
BD-85	9		Western #74 Ph IIIA	$ 943,993.00	Mar-00
	7	M	Wurzbach Road - Ingram Road to Leon Valley	$ 1,503,500.00	Mar-00
				$ 11,102,694.00	
	1,5,7	M	24th Street: Commerce to Culebra	$ 2,300,000.00	Apr-00
	1	M	Alamo - Durango to Cedar	$ 1,178,709.00	Apr-00
	7	•	Blueridge - General McMullen to 27th Street	$ 339,509.00	Apr-00
BD-48 -49	9	•	Claremont, **Eleanor**, **Natalen** Sts Ph II & III	$ 1,488,689.00	Apr-00
	2	•	Creswell - E Houston to Deadend	$ 253,000.00	Apr-00
BD-6	7		Culebra Drainage #58F	$ 4,394,000.00	Apr-00
	1	•	Indianola - Garfield to Camargo	$ 281,699.00	Apr-00
	2	M	New Braunfels - IH 35 to Grayson	$ 290,000.00	Apr-00
				$ 10,525,606.00	

• Denotes Federally Funded (CDBG)
M Denotes MPO Funded Project

As of: 10/14/98

PRIORITIES ON CAPITAL IMPROVEMENT PROJECTS
ANTICIPATED ADVERTISEMENT FOR BIDS DATE

	District		Project Name	Current Estimate	Date
BD-4	10		Blossom/Woodbury Drainage Ph I & II	$ 1,828,338.00	May-00
	CW	M	Citywide Sidewalks (2000)	$ 1,000,000.00	May-00
	3		Goliad Road - Pecan Valley Dr to SE Military Dr	$ 2,331,176.00	May-00
	1,2	M	Houston St - Bowie to Pine	$ 1,786,403.00	May-00
	4	M	Hunt Lane: Marbach to US 90	$ 2,349,534.00	May-00
BD-23	8	M	Lockhill-Selma Road: George to Wurzbach Rd	$ 2,220,171.00	May-00
	3	M	Mission Trails Package 2	$ 9,211,938.00	May-00
	4		Navajo Area Streets	$ 2,167,946.00	May-00
	2		Ray Bon Drive Sidewalks	$ 107,509.00	May-00
	1,3,5	M	S. Flores - Durango to Franciscan	$ 1,861,452.00	May-00
	9,10	M	Thousand Oaks Intersection	$ 846,000.00	May-00
				$ 25,710,467.00	
	10	M	Bitters Road: Broadway to Nacogdoches	$ 1,953,326.00	Jun-00
	4	*	King Ph I: Bynum to Crittendon	$ 774,000.00	Jun-00
	4	*	King Ph II: Crittendon to New Laredo Hwy	$ 275,000.00	Jun-00
	9	M	Wurzbach Parkway Phase IV	$ 6,660,000.00	Jun-00
				$ 9,662,326.00	
	2		Holbrook Rd: Eisenhauer to Petroleum	$ 1,200,000.00	Jul-00
BD-13	10		Lanark Drainage #92 A	$ 3,027,480.00	Jul-00
	1,3	M	Mission Trails Parkway Pkg 4	$ 2,656,500.00	Jul-00
	10	M	Uhr Lane: Higgins to Thousand Oaks	$ 1,926,090.00	Jul-00
				$ 8,810,070.00	
BD-58	5	M	Frio City Rd: Brazos to Zarzamora	$ 2,086,272.00	Aug-00
	1		Southwest Craft Center Intersection Improvements	$ 200,000.00	Aug-00
	9	M	Starcrest: Stuntman to Jones Maltsberger	$ 916,000.00	Aug-00
				$ 3,202,272.00	
	5	M	24th St: Elmendorf to El Paso	$ 572,724.00	Sep-00
	9	M	Bitters Road: West Avenue to Heimer	$ 900,000.00	Sep-00
BD-45	7	M	Callaghan Road: Bandera to W. Horseshoe Bend	$ 2,900,000.00	Sep-00
BD-46	7	M	Callaghan: W. Horseshoe Bend to Ingram	$ 1,618,647.00	Sep-00
BD-75	4	M	Pleasanton Road - Southcross to Mayfield	$ 1,700,000.00	Sep-00
	3	M	Southcross: New Braunfels to Presa	$ 1,763,670.00	Sep-00
	3	M	Southcross: W. W. White to IH 410	$ 1,492,332.00	Sep-00
	9	M	Sunset - Jones Maltsberger to Broadway	$ 1,342,000.00	Sep-00
	8	M	Wurzbach & Ironsides Intersection	$ 167,232.00	Sep-00

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PRIORITIES ON CAPITAL IMPROVEMENT PROJECTS
ANTICIPATED ADVERTISEMENT FOR BIDS DATE

	District		Project Name	Current Estimate	Date
	8	M	Wurzbach Road & IH 10 Intersection	$ 1,570,000.00	Sep-00
				$ 14,026,605.00	
BD-9	7		Guilbeau Drainage at French Creek	$ 430,000.00	Oct-00
	5	M	St. Mary's: Pereida to Roosevelt	$ 3,280,660.00	Oct-00
				$ 3,710,660.00	
BD-56	2	*	F Street: Pecan Valley to IH 10	$ 186,419.00	Dec-00
BD-60	2	*	G St: Pecan Valley to Deadend	$ 137,042.00	Dec-00
	2	*	J St: Amanda to Pecan Valley	$ 327,909.00	Dec-00
	2	*	Morningview: Pecan Valley to IH 10	$ 97,717.00	Dec-00
	1,3	M	Mission Trails Parkway Pkg 5	$ 1,062,600.00	Dec-00
	2	M	Pecan Valley: "J" St to IH 10	$ 1,200,000.00	Dec-00
				$ 3,011,687.00	
	2		Aransas St: Meerscheit to Walters	$ 310,303.00	Jan-01
BD-42	2		Belgium: Picarde to Coliseum	$ 1,702,566.00	Jan-01
	6	M	Callaghan: Hemphill to Culebra	$ 1,530,705.00	Jan-01
BD-77	7	M	Tezel: Ridge Path to Old Tezel	$ 2,938,463.00	Jan-01
BD-34	6	M	Tezel: Timber Path to Ridge Path	$ 1,958,975.00	Jan-01
				$ 8,441,012.00	
BD-54	1		El Monte St Engineering: Blanco to San Pedro	$ 400,000.00	Jun-01
BD-8	1		Flores/Breeden/Beacon Outfall Phase II	$ 1,051,700.00	Jun-01
				$ 1,451,700.00	
	4	M	Demya: IH 410 to Hunt	$ 910,680.00	Sep-01
	9	M	Isom: Ramsey to US 281	$ 863,970.00	Sep-01
	9	M	Jones-Maltsberger: US 281 to east of UPRR tracks	$ 623,987.00	Sep-01
	2	M	Rice Rd: W. W. White to Semlinger	$ 1,937,880.00	Sep-01
	3,5	M	S. Flores: Malone to Octavia	$ 887,410.00	Sep-01
	9	M	Wurzbach Parkway Phase V	$ -	Sep-01
				$ 5,223,927.00	
BD-35	6	M	36th St: US 90 to Growden	$ 3,505,026.00	Jan-02
	1		Florida: IH 37 to St. Mary's	$ 1,450,300.00	Jan-02
	2		Kono: Gembler to Belgium	$ 737,030.00	Jan-02
	3	M	Pleasanton: Moursund to Gillette	$ 1,436,440.00	Jan-02
	10	M	Stahl Rd Intersections (O'Connor, Judson, Higgins)	$ 1,794,200.00	Jan-02
				$ 8,922,996.00	

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PRIORITIES ON CAPITAL IMPROVEMENT PROJECTS
ANTICIPATED ADVERTISEMENT FOR BIDS DATE

	District	Project Name		Current Estimate	Date
	2	Bee Street: Walters to Frank	$	411,000.00	Jan-04
			$	411,000.00	
	1	Martinez Creek (Design Project)	$	-	Design On
BD-37	7	Abe Lincoln: Horn to Eckhert	$	250,000.00	Unfundec
BD-2	4	Ansley Blvd Drainage #1091	$	2,589,491.00	Funded
BD-39	2	• Aurelia: M. L. King to Yucca Ph II (Lincolnshire)	$	210,242.00	Unfundec
BD-3	9	Ave Maria Drainage	$	2,200,000.00	Funded
	9	Braniff: Turbo to US 281	$	566,590.00	Funded
BD-5	9	Busby and Flamingo Drainage	$	70,000.00	Funded
BD-47	2	• Cardiff - Aransas to Deadend	$	666,392.00	Unfunded
	7	• Culebra Area Streets, Phase III	$	557,759.00	Unfunded
	7	• Culebra Area Streets, Phase IV	$	702,924.00	Unfunded
	1	• Delgado - Navidad to Zarzamora	$	400,000.00	Unfunded
	4	• Dempsey - Farr to Gwenda Lea	$	398,123.00	Unfunded
	9	Dijon Court Drainage	$	22,000.00	Funded
	2	District 2 Sidewalks	$	-	Unfunded
	5	• Durango - San Marcos to Navidad	$	1,556,841.00	Unfunded
	2	• E. Commerce Estates Sewer Lateral	$	-	Unfunded
	8	East-West Huebner Access over RR Track	$	200,000.00	Funded
	2	• Edgar St Sidewalks (600 Blocks)	$	31,282.00	Funded
	3	• Emmit St Engineering	$	-	Funded
	5	• Fay Ph I - Quintana to Crittendon	$	282,801.00	Unfunded
	5	Fay / St Joseph: Creighton to New Laredo Hwy	$	949,000.00	Funded
	6	• Glider & Landing - Gunsmoke to Loop 410	$	858,805.00	Unfunded
	5	• Grand Alley St Engineering	$	-	Funded
	2	• Grandview Neighborhood Streets, Phase IIIB	$	1,670,000.00	Unfunded
	2	• H St: Amanda to Pecan Valley	$	393,068.00	Unfunded
	2	• Hardiman St Sidewalks: Mesquite to Hackberry	$	22,470.00	Funded
BD-10	5	Harris Storm Drainage	$	1,731,687.00	Funded
BD-64	4	• Hilton - Clovis to W. Amber	$	318,984.00	Unfunded
BD-31	7	Hollyhock @ Huebner Creek	$	574,927.00	Funded
	5	Hoover St: Nogalitos to Charlotte	$	437,984.00	Funded
BD-11	9	Howard Drainage: Wildwood to El Monte	$	737,828.00	Funded
	2	• Hub St Sidewalks (400 Blocks)	$	83,240.00	Funded
	3	Jo Marie: W. W. White to Deadend	$	503,000.00	Funded
	9	Larkspur: West Ave to Baltic	$	573,000.00	Funded
	9	Larkspur Elementary School Sidewalks	$	5,000.00	Funded
BD-68	1	• Las Moras - Travis to Salinas	$	71,376.00	Unfunded

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PRIORITIES ON CAPITAL IMPROVEMENT PROJECTS
ANTICIPATED ADVERTISEMENT FOR BIDS DATE

	District	*Project Name*	*Current Estimate*	*Date*
	9	Leland Park Terrace Curb Reconstruction	$ 200,000.00	Funded
	9	Mc Carty Sidewalks & Curbs: Lorene to Blanco	$ 50,000.00	Funded
	8	M Medical: IH 10 to Ewing Halsell	$ 7,748,813.00	Funded
BD-14	4	Military Ditch # 65	$ 1,657,572.00	Funded
BD-74	5	Mockert Area Sts	$ 1,300,000.00	Funded
	3	Monticello: S. Gevers to Hillje	$ 157,000.00	Funded
	6	Northington: SW 36th St to SW 35th St	$ 182,344.00	Funded
BD-65	5	* Octavia #63 Phase II	$ 6,895,823.00	[redacted]funded
	3	* Old Corpus Christi Sewer Laterals	$ -	Funded
	2	* Palmetto St Sidewalks	$ 23,500.00	Funded
	3	* Parker & Monroe St Engineering	$ -	Funded
	4	Pedestrian Bridge at Hidden Cove Elementary	$ 126,219.00	Funded
	3	Pleasanton Rd: Gillette to Loop 410	$ 2,200,000.00	Funded
	2	* Potomac / Paso Hondo	$ 438,650.00	Unfunded
BD-16	4	* Rip Rap 69-PhIIC, Part 4	$ 2,000,000.00	Funded
	4	* Rip Rap 69-PhIID	$ 3,000,000.00	Unfunded
	2	* Robeson - Yucca to Martin Luther King	$ 197,385.00	Unfunded
	3	Sams: Deadend to Deadend	$ 74,000.00	Funded
	8	Signal Preemption (Medical Center Area)	$ 236,000.00	Funded
	8	Signal Preemption and Improvement (Medical Dr)	$ 334,000.00	Funded
	7	W. Craig: Elmendorf to Josephine Tobin	$ 450,000.00	Funded
	7	* W. French - Zarzamora to Navidad	$ 334,391.00	Unfunded
	5	* Walton - Nogalitos to Zarzamora	$ 1,253,397.00	Unfunded
	7	* Wilson - Woodlawn to Waverly	$ 892,537.00	Unfunded
	7	Woodlawn Area Streets Engineering	$ 35,100.00	Funded
	7	* Woodlawn - Camino Santa Maria to 36th	$ 1,436,969.00	Unfunded
BD-87	7	Woodlawn: San Antonio to Lake	$ 450,000.00	Funded
BD-82	2	W. W. White Rd Area Streets Phase II	$ 2,740,932.00	Unfunded
	1	* Yellowstone - Mission Rd to Roosevelt	$ 108,822.00	Unfunded
	2	* Yellow Wood Drainage	$ -	Unfunded
			$ 54,158,268.00	

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As of: 10/14/98

CAPITAL IMP. EMENT PROJECTS
ADVERTISING and CONTRACT AWARD PROCESS

10/14/99

	Council District	Project	Awarded to:	Anticipated Bid Opening	Anticipated Contract Award	Anticipated Start
BD-89	1	Pace: Elmendorf to N. Brazos		September 8, 1999	October 14, 1999	Nov-99
BD-88	2	Carson: Walters to Frank		September 8, 1999	October 14, 1999	Nov-99
	1	Arbor Street Ph I: Trinity to west of N. Colorado	E-Z Bel Co	May 26, 1999	July 22, 1999	Sep-99
	5	Charben: Las Palmas to Gen. McMullen		June 16, 1999	September 16, 1999	Oct-99
BD-15	5	Octavia Drainage #63 Phase I		August 11, 1999	September 16, 1999	Oct-99
	7	Science Park #58 H, I & J Phase III (87)	Service Station	June 23, 1999	September 2, 1999	Oct-99
	6	Acme Rd: Old Hwy 90 to Commerce		July 2, 1999	July 2, 1999	Sep-99
	1,9	Basse Road & San Pedro Intersection		July 2, 1999	July 15, 1999	Sep-99
	8	Medical Dr: Babcock to Fredericksburg	Bay Maintenance		August 27, 1999	Sep-99
	9	Hildebrand @ 281	COSA/Public Works		August 27, 1999	Sep-99
BD-32	4	Upper Six Mile Creek Drainage #83F		September 29, 1999	November 4, 1999	Dec-99
	2	Fairdale: Rittiman to Bloomdale		October 27, 1999	December 2, 1999	Jan-00
BD-70	9	Mahncke Area Streets Ph II		November 3, 1999	December 9, 1999	Jan-00

APPENDIX R

1999 City of San Antonio/MPO Capital Improvement Program

PRIORITIES ON CAPITAL IMPROVEMENT PROJECTS
ANTICIPATED ADVERTISEMENT FOR BIDS DATE

t		Project Name	Current Estimate City Funded	Current Estimate MPO Funded	Totals
5,7	M	24th Street: Commerce to Culebra		$ 2,300,000.00	
6	*	39th Street Drainage, #58M, Phase IIA	$ 739,108.00		
6	*	39th Street Drainage, #58M, Phase III	$ 600,652.00		
2	M	Ackerman - IH 10 to Dietrich		$ 475,850.00	
1	M	Alamo - Durango to Cedar		$ 1,178,709.00	
1		Arbor St: Trinity to San Marcos Ph II	$ 840,000.00		
5	*	Baylor: San Pedro Creek to Flores	$ 205,998.00		
10	M	Bitters Road: Broadway to Nacogdoches		$ 1,953,326.00	
1,9	M	Blanco Rd & Jackson-Keller Intersection		$ 564,000.00	
1		Blanco: Lullwood to Summit	$ 406,000.00		
10		Blossom/Woodbury Drainage Ph I & II	$ 1,828,338.00		
7	*	Blueridge - General McMullen to 27th Street	$ 339,509.00		
10	M	Broadway at Wetmore		$ 527,979.00	
1	*	Capitol: Basse to La Manda	$ 143,750.00		
CW	M	Citywide School Safety Program		$ 1,000,000.00	
CW	M	Citywide Sidewalks (2000)		$ 1,000,000.00	
9	*	Claremont, Eleanor, **Natalen** Sts Ph II	$ 687,975.00		
9	*	Claremont, **Eleanor**, Natalen Ph III	$ 800,714.00		
2	*	Creswell - E Houston to Deadend	$ 253,000.00		
7		Culebra Drainage #58F	$ 4,394,000.00		
	*	Culebra Area Streets, Ph II	$ 887,060.00		
		Danbury Sidewalks	$ 117,000.00		
7	*	Dell Street Drainage (100 Block)	$ 438,817.00		
4	*	Drury - Escalon East to Deadend	$ 144,552.00		
2		Duval /Seguin - Pierce to Walters	$ 880,000.00		
1		Elsmere/Gramercy #57	$ 1,203,241.00		
1	*	Elsmere: Michigan to Capitol	$ 125,441.00		
3		Escalon Street Drainage #1008	$ 963,342.00		
8	M	Evers Road & Wurzbach Road Intersection		$ 282,000.00	
4	*	Fleming: Fenfield to New Laredo Hwy	$ 160,845.00		
1	*	Fulton: Blanco to N. Flores	$ 938,929.00		
5	M	Frio City Rd: Brazos to Zarzamora		$ 2,086,272.00	
2	*	Gevers: IH 10 to Harding	$ 644,645.00		
3	M	Gevers Sidewalks: IH 10 to Southcross		$ 370,220.00	
3		Goliad Road - Pecan Valley Dr to SE Military Dr	$ 2,331,176.00		
1	*	Harvard Terrace: Yale to University	$ 115,563.00		
10	M	Henderson Pass Sidewalks		$ 190,100.00	
10		Higgins: Nacogdoches to Stahl	$ 2,407,407.00		
1	M	Hildebrand: IH 10 to Breeden		$ 1,752,000.00	
3		Hi Lions Drainage #80, Phases III & V (87)	$ 5,476,000.00		
4	*	Hillside Acres Drainage Outfall	$ 220,000.00		
		Hobart: Acme Rd to 40th St	$ 277,346.00		
		Holbrook Rd: Eisenhauer to Petroleum	$ 1,200,000.00		

PRIORITIES ON CAPITAL IMPROVEMENT PROJECTS
ANTICIPATED ADVERTISEMENT FOR BIDS DATE

:t		*Project Name*	*Current Estimate City Funded*	*Current Estimate MPO Funded*	*Tot*
1,2	M	Houston St - Bowie to Pine		$ 1,786,403.00	
1		Houston Street Redevelopment	$ 1,500,000.00		
4	M	Hunt Lane: Marbach to US 90		$ 2,349,534.00	
2		IH 35 at Gembler Drainage	$ 660,000.00		
1	•	Indianola - Garfield to Camargo	$ 281,699.00		
4	•	King Ph I: Bynum to Crittendon	$ 774,000.00		
10		Lanark Drainage #92 A	$ 3,027,480.00		
6	•	Lawton / SW 41st St	$ 658,252.00		
10		Leonhardt Road Improvements	$ 809,391.00		
8	M	Lockhill-Selma Road: George to Wurzbach Rd		$ 2,220,171.00	
2	•	Lone Oak/Latimer: "F: St to Brice	$ 184,361.00		
9	•	Mahncke Area Streets Ph II	$ 957,918.00		
5	•	McKay - 400 & 500 Blocks	$ 157,550.00		
3	M	Mission Trails Package 2		$ 9,211,938.00	
1,3	M	Mission Trails Parkway Pkg 3		$ 3,364,900.00	
1	•	Mistletoe Ave. - IH 10 to Martinez Creek	$ 158,518.00		
3	M	Mitchell - Probandt to Roosevelt		$ 1,463,764.00	
6	•	Monterrey - 36th Street to San Joaquin	$ 735,641.00		
4		Navajo Area Streets	$ 2,167,946.00		
2	M	New Braunfels - IH 35 to Grayson		$ 290,000.00	
	M	Nogalitos - New Laredo Hwy to Surrey		$ 997,000.00	
	•	Orr/Suzette/Winkle	$ 737,594.00		
1	M	Pecan: Soledad to Broadway		$ 191,903.00	
3	M	Probandt - US 90 to Mitchell		$ 285,081.00	
8	M	Prue Rd: Laureate to Fredericksburg		$ 731,544.00	
2		Ray Bon Drive Sidewalks	$ 107,509.00		
4	•	Rip Rap #69 Ph IIC. Part 3	$ 1,000,000.00		
10	M	Rittiman: Austin Hwy to Harry Wurzbach		$ 1,018,893.00	
4		S Flores Drainage #70 - 70A, Phase II, Part 3 (87)	$ 2,200,000.00		
1,3,5	M	S. Flores - Durango to Franciscan		$ 1,861,452.00	
1		Southwest Craft Center Intersection Improvements	$ 200,000.00		
9	M	Starcrest: Stuntman to Jones Maltsberger		$ 916,000.00	
5	•	St. Francis - Dowdy to Probandt	$ 443,459.00		
5	M	St. Mary's: Pereida to Roosevelt		$ 3,280,660.00	
1	M	St. Mary's, South: Alamo to Pereida		$ 341,900.00	
4	•	Strech - Chavaneaux to Malley	$ 360,475.00		
6		S. W. 41st Street: Castroville to Lawton	$ 293,542.00		
1	•	Texas / Waverly Streets	$ 479,880.00		
1	•	Thorain - Buckeye to Railroad	$ 327,750.00		
9,10	M	Thousand Oaks Intersection		$ 846,000.00	
6	M	Timber Path Bikeway: Les Harrison to Grissom		$ 87,400.00	
	M	Uhr Lane: Higgins to Thousand Oaks		$ 1,926,090.00	
	•	Waverly Ph I: Bandera to Emory	$ 722,176.00		
9		Western #74 Ph IIIA	$ 943,993.00		

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As of: 10/14

PRIORITIES ON CAPITAL IMPROVEMENT PROJECTS
ANTICIPATED ADVERTISEMENT FOR BIDS DATE

		Project Name	*Current Estimate City Funded*	*Current Estimate MPO Funded*	*Totals*
2		W. W. White Road Ph I: Rigsby to Lord	$ 3,030,546.00		
7	M	Wurzbach Road - Ingram Road to Leon Valley		$ 1,503,500.00	
3	M	Wurzbach Parkway Phase IV		$ 6,660,000.00	
		Total	$ 52,690,088.00	$ 55,014,589.00	$ 107,704,677.0
		MPO Total			$ 55,014,589.0
		CDBG Total			$ 15,425,831.0
		Bond Total			$ 37,264,257.0
					$ 107,704,677.0

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As of: 10/14/98

HAZARD MITIGATION GRANT PROGRAM

CITY OF SAN ANTONIO

Public Works Department

Development Review and Drainage Section

PRIORITY	DESCRIPTION	WATERSHED	COST
1	Leon Creek Channel Improvements - Timber Creek Estates (90+ Houses)	Leon Creek	$ 4,340,000.00
2	Bietel Creek Channelization	Salado Creek	$ 2,200,000.00
3	Bietel Creek (Perrin Bietel) Channelization (Bridge)	Salado Creek	$ 1,100,000.00
4	Lookout Road	Salado Creek	$ 1,320,000.00
5	Weidner Road Detention Pond on Beitel Creek (5 acres)	Salado Creek	$ 1,100,000.00
6	Culebra Purchase - 7 Structures in Floodplain (3 Structures Out)	Leon Creek	$ 1,155,000.00
7	Floodwater Detention Pond # 15R (18 acres)	Salado Creek	$ 1,500,000.00
8	West Avenue Bridge	Salado Creek	$ 6,750,000.00
	Babcock Detention & Park at Huesta, Maverick & Leon Creek (150 acres)	Leon Creek	$ 6,250,000.00
	Bulverde Road Bridge - Street & Drainage Improvements	Salado Creek	$ 9,870,000.00
	Culebra Creek Bridge - Culebra Road - Les Harrison and Mountain View	Leon Creek	$ 1,525,000.00
	Detention & Park in French Creek Village Area (20 acres)	Leon Creek	$ 1,334,000.00
	Detention, Park & Gravel Pit Reclamation @ Southwest Research Institute (170 acres)	Leon Creek	$ 12,230,000.00
	Fort Sam Houston Detention Pond & Park (40 acres)	Salado Creek	$ 2,000,000.00
	Holbrook Road - Petoleum to Eisenhauer Flood Access Improvements	Salado Creek	$ 1,330,000.00
	Holbrook Road Bridge	Salado Creek	$ 800,000.00
	Huebner Creek Bridge - Hollyhock LWC Add Bridge to Increase Capacity	Leon Creek	$ 625,000.00
	Huebner Creek Bridge - Timberhill LWC Add Bridge to Increase Capacity	Leon Creek	$ 9,130,000.00

Total : $ 64,559,000.00

APPENDIX S

1989 Bexar County Watershed Study By CH2M-Hill

FLOOD PROTECTION PLAN FOR PORTIONS OF SALADO, CIBOLO AND LEON CREEKS

CH2M HILL

San Antonio, Texas

August 1989

EXECUTIVE SUMMARY

INTRODUCTION

Bexar County received a matching grant from the Texas Water Development Board on June 16, 1988, to develop a flood protection plan for segments of several creeks in Bexar County. The study area encompasses Reach 1 of Cibolo Creek (25 miles long) from the Guadalupe County line to the corporate limits of Universal City, Reach 1 of Leon Creek (3 miles long) from the corporate limits of San Antonio to Quintana Road, Reach 3 of Leon Creek (13 miles long) from the corporate limits of San Antonio to the end of the reach, and Reach 1 of Salado Creek (3 miles long) from the San Antonio River to the corporate limits of San Antonio. These creek reaches were identified in the Corps of Engineers Section 22 Study of High Flood Hazard Areas of the unincorporated areas of Bexar County dated September 1986. Bexar County and CH2M HILL entered into a contract on February 1, 1989, for CH2M HILL to develop the flood protection plan. The following report is the result of the study performed by CH2M HILL.

FLOOD PROBLEMS AND DAMAGES

Flood problems in the study area were classified as life-safety hazards or property damage hazards. High life safety hazard locations were defined as those areas on roadways or near structures that met one or both of the following criteria:

- o 100-year flood depths exceed 2 feet
- o The product of the 100-year flood depth and velocity is 4 or greater (for example, water moving at 2 feet per second and 2 feet deep).

High life-safety hazard areas were identified at the following locations:

- Salado Creek Reach 1
  - Residential development upstream of Southton Road
  - Residential development at Old Corpus Christi Highway
  - Portions of Southton Road and Old Corpus Christi Highway
- Cibolo Creek Reach 1
  - Mobile home park upstream of Schaeffer Road
  - Developed area downstream of FM 78
  - Road crossings at Uhlrich, Trainer Hale, Weir, Lower Seguin Roads and FM 78
- Leon Creek Reach 1
  - Houses and mobile home parks near Somerset Road and IH 35
  - Mobile home park and meat packing plant at New Laredo Highway
  - Road crossings at IH 35 mainlanes and frontage roads, Somerset Road and New Laredo Highway
- Leon Creek Reach 3
  - Commercial development at IH 10 and Boerne Stage Road
  - Road crossings at Old Camp Bullis Road, Camp Bullis Road, Louis Drive, Dominion Drive, IH 10 frontage roads, Boerne Stage Road, Huntress Lane and Scenic Loop Road

SELECTED PLAN

The major features of the selected plan include both structural and non-structural components. Structural alternatives were considered on certain segments of the study reaches where non-structural alternatives were recommended. these alternative components were described and costs estimated so if certain economic considerations change, these structural components could be pursued.

Table 1 summarizes the selected plan's proposed improvements, location and total cost. Total costs include easements, construction, acquisition, relocation, administration, engineering and maintenance over a 50-year projected service life.

Table 1
SELECTED PLAN SUMMARY OF IMPROVEMENTS

Location	Improvements	Total Cost
Salado Creek Reach 1 - Lower Segment	Replace Southern Pacific R.R. Bridge	$ 571,000
Salado Creek Reach 1 - Upper Segment	Clear and Reshape Channel	$ 904,000
Cibolo Creek Reach 1 - Lower Segment	Non-Structural Plan	$ 490,000
Cibolo Creek Reach 1 - Upper Segment	Non-Structural Plan	$ 210,000
Leon Creek Reach 1 - Lower Segment	Clear and Reshape Channel	$1,621,000
Leon Creek Reach 1 - Upper Segment	Non-Structural Plan	$1,836,000
Leon Creek Reach 3 - Lower Segment	Non-Structural Plan	$ 25,000
Leon Creek Reach 3 - Middle Segment	Non-Structural Plan	$ 404,000
Leon Creek Reach 3 - Upper/Middle Segment	Non-Structural Plan	$ 654,000

Damages, costs of improvements, and benefit-cost ratios for the selected plan are presented in Table 2. Dollar values in Table 2 are shown as present-worth values. The present-worth value is the amount of money that would have to be on deposit in 1989 to pay for flood damages or capital improvements that would be paid for over a number of years in the future. The present-worth value of baseline damages, therefore, is the money that would have to be in the bank, earning interest, in 1989 to pay for the projected damages for all floods over the next 50 years.

Table 2
SUMMARY OF SELECTED PLAN

Reach Segment	Plan	Present Worth Baseline Damages (Dollars)	Present Worth Cost of Improvements (Dollars)	Benefit-Cost Ratio
Salado Creek Reach 1--Lower Segment	1	$ 81,000	$ 571,000	0.14
Salado Creek Reach 1--Upper Segment	1	70,000	904,000	0.08/0.37[1]
Cibolo Creek Reach 1--Lower Segment	2	332,000	490,000	0.68
Cibolo Creek Reach 1--Upper Segment	2	126,000	210,000	0.60
Leon Creek Reach 1--Lower Segment	1	493,000	1,621,000	0.30/1.46[1]
Leon Creek Reach 1--Upper Segment	2	636,000	1,836,000	0.35
Leon Creek Reach 3--Lower Segment	2	59,000	25,000	2.36
Leon Creek Reach 3--Middle Segment	2	182,000	404,000	0.45
Leon Creek Reach 3--Upper/Middle Segment	2	207,000	654,000	0.32

Note 1--assumes R.O.W. is donated

The present-worth cost of improvements is the cost of building the improvements in 1989 and of providing operation and maintenance over the next 50 years. All dollar values are in 1989 dollars; 8 percent was used as an interest rate to develop present-worth values, and no adjustment has been made for future inflation or deflation.

All costs were converted to present-worth values to provide a common basis for comparing benefits and costs with a benefit/cost ratio. The benefit/cost ratio was calculated by dividing the dollar damages that would be relieved because of plan implementation by the cost of the plan itself. A ratio of 1.0 or more indicates that the benefits of a plan are anticipated to equal or exceed the project cost. Conversely, if a benefit/cost ratio is less than 1.0, benefits attributable to a plan are estimated to be less than project cost.

The improvements included in the benefit/cost ratio calculation also provide health and safety benefits to the general public. For instance, when a new channel is constructed, not only will that channel reduce the flooding of residential houses, it will also improve the health and safety of the neighborhood during and after the flood. By improving the quality of life in the neighborhood, it will generally increase property values and resident well being. Benefits such as these are not given a dollar value, and as such, are not included in the benefit/cost calculation.

Table 3 shows a summary of improvements by implementation priority.

Table 3
SELECTED PLAN SUMMARY OF IMPROVEMENTS
BY IMPLEMENTATION PRIORITY

Priority	Study Reach	Improvement
1	All Study Reaches	Replace low water crossings, add warning signs, install railroad type gates, develop a barricade plan and detour plan
2	All Study Reaches	Plan 2--nonstructural plan
3	Leon Creek Reach 3--Lower Segment	Construct drainage chan nels to carry off-site runoff through or around Mobile City Estates mobile home park between Camp Bullis Road and Raymond Russell Park

Priority	Study Reach	Improvement
4	Leon Creek Reach 1--Lower Segment	LC1-L1--creek shaping
5	Salado Creek Reach 1--Lower Segment	SC1-L1--replace Southern Pacific Railroad bridge
6	Salado Creek Reach 1--Upper Segment	SC1-U1--creek shaping

Section 7
SELECTED PLAN

INTRODUCTION

This section describes the selected plan for each creek segment. Issues such as operation and maintenance, soils, utilities, traffic, environment, and administrative considerations that relate directly to implementing this plan are discussed.

SELECTED PLAN SUMMARY

Plan 1 (structural) was selected for Salado Creek Reach 1 Upper and Lower Segments and Leon Creek Reach 1 Lower Segment. Plan 2 (nonstructural) was selected for Cibolo Creek Upper and Lower Segments, Leon Creek Reach 1 Upper Segment and Leon Creek Reach 3 Upper, Middle and Lower Segments. Plan 2 (nonstructural) will also be implemented on the reach segments of Cibolo Creek Reach 1 and Leon Creek Reach 3 where a hydraulic analysis was not performed.

Damages, costs of improvements and benefit-cost ratios for the selected plan are presented in Table 7-1. The benefit-cost ratio does not include the benefits attributed to decreased life-safety hazards.

SELECTED PLAN DESCRIPTION

The major components of the Selected Plan are summarized below. The structural components of the Selected Plan are listed first, followed by the nonstructural components. Figures 7-1 through 7-12 (at the end of this section) show the plan and profiles of the reach segments where a hydraulic analysis was conducted.

Table 7-1
SUMMARY OF SELECTED PLAN

Reach Segment	Plan	Present Worth Baseline Damages (Dollars)	Present Worth Cost of Improvements (Dollars)	Benefit-Cost Ratio
Salado Creek Reach 1--Lower Segment	1	$ 81,000	$ 571,000	0.14
Salado Creek Reach 1--Upper Segment	1	70,000	904,000	0.08/0.37[1]
Cibolo Creek Reach 1--Lower Segment	2	332,000	490,000	0.68
Cibolo Creek Reach 1--Upper Segment	2	126,000	210,000	0.60
Leon Creek Reach 1--Lower Segment	1	493,000	1,621,000	0.30/1.46[1]
Leon Creek Reach 1--Upper Segment	2	636,000	1,836,000	0.35
Leon Creek Reach 3--Lower Segment	2	59,000	25,000	2.36
Leon Creek Reach 3--Middle Segment	2	182,000	404,000	0.45
Leon Creek Reach 3--Upper/Middle Segment	2	207,000	654,000	0.32

Note 1--assumes R.O.W. is donated

SALADO CREEK REACH 1--LOWER SEGMENT
SC1-L1

Replace the Southern Pacific Railroad bridge with a longer bridge to increase the conveyance of the 100-year flood through the structure. The new bridge will be 280 feet long with a 120 feet bottom width, 2H:1V side slope channel section under the bridge.

SALADO CREEK REACH 1--UPPER SEGMENT
SC1-U1

Clear the underbrush and small trees in the channel and reshape the channel from just upstream of Southton Road to IH 410. The reshaped channel will be root-plowed, raked and sodded with improved grasses. The large trees will remain. Maintenance will be required by mowing twice a year to control brush and saplings.

LEON CREEK REACH 1--LOWER SEGMENT
LC1-L1

Clear the underbrush and small trees in the channel and reshape the channel from the corporate limits of San Antonio near IH 410 to New Laredo Highway. The reshaped channel will be root-plowed, raked and sodded with improved grasses. The large trees will remain. Maintenance will be required by mowing twice a year to control brush and saplings.

Plan 2 is to be implemented on Leon Creek Reach 1--Upper Segment, Cibolo Creek Reach 1--Upper and Lower Segments and Leon Creek Reach 3--Upper, Middle and Lower Segments and the reach segments where no hydraulic analysis was conducted. These nonstructural recommendations could also be implemented on the creek segments where a structural plan is recommended until the structural plan is implemented and the area is removed from the flood plain.

Plan 2 includes the following:

- Broaden the existing flood warning program
  - Coordinate efforts with upstream jurisdictions where possible
  - Coordinate with National Weather Service, Corps of Engineers, City of San Antonio, and other agencies to receive existing warning data
  - Install rain gauges and stream gauges in upstream areas to be checked by volunteers and/or County employees
- Review emergency response program in accordance with State and FEMA guidelines. Special attention should be given to developing a plan to barricade low water crossings and warn people in mobile homes.

- Develop emergency access routes into hazardous areas. The routes would be used by police, fire, and public works and ambulance crews.

- Provide annual notification of flood hazard to floodplain residents. This is especially important for people who rent houses or mobile homes and may not be aware of historic flood events. Permanent residents will benefit by the reminder of things they may have forgotten. The notification would include information on purchasing flood insurance and any county programs to help reduce flood damage. The address of structures in the 100-year flood plain are listed in Appendix D.

- Improve floodplain management to reduce the number of people moving into floodplain areas and reduce dumping and filling in the floodplain. Enforce FEMA requirements including special flood zone tie-downs for mobile homes.

- Provide a voluntary pre-flood proofing program for permanent residential structures with projected 100-year water levels up to a maximum of 3 feet above first floor elevations. Floodproofing will be customized for each house and may include berms, walls, water-tight closures on windows and doors, waterproof walls, and additional techniques as outlined in FEMA floodproofing manuals. Certain types of structures may not lend themselves to floodproofing. Floodproofing is not recommended where the product of the depth and the velocity at adjacent ground levels exceeds 4. For example, a depth of 3 feet and a velocity of 1.3 feet per second would be allowed, but a depth of 2 feet and a velocity of 3 feet per second would not be allowed. Tests conducted for a study by the City of Boulder, Colorado, showed that where the product of the depth and velocity exceed

4, a pedestrian may have difficulty standing in flood water.

- Provide a voluntary pre-flood relocation/acquisition program for permanent residential structures where 100-year flood depths exceed 3 feet above first floor elevations or where the product of the depth and the velocity exceeds 4 on adjacent ground.

- Provide a voluntary pre-flood relocation/acquisition program for mobile homes where the product of the 100-year depth and velocity exceeds 4 at adjacent ground levels.

- Provide a mandatory post flood relocation program for any structure that has been flooded by more than 3 feet or has incurred "substantial damage" as defined by FEMA.

- Provide a mandatory post-flood relocation/acquisition program for any mobile home that has received flood water above the first floor elevation.

- Improve channel maintenance to include more debris pickup and selective clearing of vegetation on a regularly scheduled basis.

PLAN COSTS

Table 7-2 summarizes the Selected Plan cost opinions for each recommended improvement. Plan costs are comprised of construction, engineering, right-of-way, and operation and maintenance costs. Each of these costs categories is described in Section 6.

OPERATION AND MAINTENANCE

The operation and maintenance considerations for the selected plan are summarized in Table 7-3.

Section 9
IMPLEMENTATION PLAN

IMPLEMENTATION PRIORITIES

This subsection summarizes implementation priorities for the Selected Plan. The priorities are needed to establish the precedence of improvements as funding becomes available. The recommended sequencing of drainage improvements depends on several factors. For purposes of this plan, the following criteria were used to decide on priorities:

- Life-safety hazard to vehicles and occupants of structures was considered to be the highest priority.
- High flood damage areas were considered to be the next highest priorities.
- The construction sequencing of adjacent improvements was considered. For example, an upstream channel improvement with a lowered channel bed elevation would depend on a downstream channel improvement to be compatible.
- The effects of drainage improvements on downstream capacities were considered.

Other issues could affect the ultimate sequencing of the priorities. The County should consider the following issues while administering the plan:

- Certain improvements may depend on coordination between different jurisdictions; this coordination may change the priority of improvements.
- Drainage improvements near roadways may be solved simultaneously with street improvements even though they are lower priorities.

Table 9-1 shows a summary of improvements by implementation priority.

Table 9-1
SELECTED PLAN SUMMARY OF IMPROVEMENTS
BY IMPLEMENTATION PRIORITY

Priority	Study Reach	Improvement
1	All Study Reaches	Replace low water crossings, add warning signs, install railroad type gates, develop a barricade plan and detour plan
2	All Study Reaches	Plan 2--nonstructural plan
3	Leon Creek Reach 3--Lower Segment	Construct drainage channels to carry off-site runoff through or around Mobile City Estates mobile home park between Camp Bullis Road and Raymond Russell Park
4	Leon Creek Reach 1--Lower Segment	LC1-L1--creek shaping
5	Salado Creek Reach 1--Lower Segment	SC1-L1--replace Southern Pacific Railroad bridge
6	Salado Creek Reach 1--Upper Segment	SC1-U1--creek shaping

IMPLEMENTATION CONSIDERATIONS

UTILITIES

The selected plan will require surveys of existing utilities to resolve utility conflicts as drainage facilities are designed. Utilities will need to be avoided or relocated when constructing improvements.

TRAFFIC

An additional County concern addressed by this plan is the potential for traffic hazards during the 100-year flood. This potential is high since 26 of 33 existing roadway crossings along the study reaches were overtopped.

RECOMMENDATIONS

This subsection gives some specific recommendations that could be pursued in order to implement the Selected Plan. They are as follows:

- Request a Community Assessment Visit from the Flood Management Unit of the Texas Water Commission (TWC). They will evaluate the administration of the flood damage prevention court order and make suggestions on ways to improve its administration. They can also talk to the Commissioners Court and District Attorney and give a presentation on the importance of enforcement of the court order and prosecution of violators.

- The Flood Management Unit of the TWC also has copies of several FEMA publications on flood plain management and floodproofing which they will provide to the County if requested.

- Meet with representatives of the Corps of Engineers to evaluate the possibility of qualifying parts or all of the Selected Plan for funding under the Section 205 and Section 208 programs.

- Contact FEMA to determine the extent to which Section 1362 could be utilized to fund the relocation portion of the nonstructural part of the Selected Plan.

- Contact Southern Pacific Railroad about the possibility of cost sharing the replacement of the bridges at Southton Road and Leon Springs.

- Contact the Texas Department of Highways and Public Transportation about the possibility of cost sharing the replacement of the IH 10 frontage road bridges at Leon Springs and the New Laredo Highway bridge. If significant cost sharing is negotiated, the benefit-cost ratios for LC1-U1 and LC3-M1 would increase and they could be viable projects.

- Contact the San Antonio River Authority (SARA) about including the Selected Plan in the next amendment to the Bexar County Flood Control Tax contract. Also discuss entering into a maintenance agreement with SARA to maintain the portions of the Selected Plan implemented with funds from the Bexar County Flood Control Tax.

- Any of the structural portions of the Selected Plan that are implemented should have a detailed feasibility analysis conducted. This analysis should include detailed hydrologic analysis, more detailed benefit-cost analysis, an environmental assessment, a detailed determination of required utility relocations and a design memorandum. This would be followed by preparation of plans and specifications once funding has been secured.

- Conduct a more detailed study of the nonstructural portions of the Selected Plan to develop a specific program to address flood plain management, floodproofing, relocation/acquisition, flood warning and emergency access for each specific creek reach.

- Include construction of drainage channels to prevent flooding from off-site drainage of the Mobile City Estates mobile home park in the capital improvements program since the flooding is not considered to be from the 100-year flood in Leon Creek.

- Negotiate with Guadalupe County to replace low water crossings, develop a barricade plan and develop a flood warning system on Cibolo Creek.

- Re-evaluate the Selected Plan for Cibolo Creek when the re-study of Cibolo Creek is completed by FEMA and the Corps of Engineers.

APPENDIX T

1990 SARA/Bexar County Contract and Identified Project List

SECTION 1

DRAFT - 1990 AMENDATORY CONTRACT BETWEEN
BEXAR COUNTY, TEXAS
AND
THE SAN ANTONIO RIVER AUTHORITY

DRAFT 9/17/'

STATE OF TEXAS §

COUNTY OF BEXAR §

1990 AMENDATORY CONTRACT BETWEEN BEXAR COUNTY, TEXAS,
AND
THE SAN ANTONIO RIVER AUTHORITY

WHEREAS, Art. 8 § 1-a of the Texas Constitution as amended November 2, 194 abolished the State ad valorem tax, but provided that the several counties of the Sta could levy an additional ad valorem tax, not exceeding 30¢ on each $100 valuation, exce the first $3,000 value of residential homesteads, for construction and maintenance of Far to Market Roads or for Flood Control; and

WHEREAS, the qualified voters of Bexar County, on April 17, 1951, in an electic held for that purpose, authorized an additional ad valorem levy of 15¢ on each $1(valuation of taxable property for construction and maintenance of Farm to Market Roa(and 15¢ on each $100 valuation of taxable property for Flood Control (the "Flood Contr Taxes"), pursuant to said constitutional provision, as amended, which levy remains in effec and

WHEREAS, Bexar County has a serious flood problem by virtue of the poc drainage of the San Antonio River and its tributaries, within the boundaries of sa County, which has resulted in periodic floods in the past with loss of life, and substanti property damage, which flood threat becomes more serious each year by virtue of th increasing growth of the already heavy population of the County, which is congested an concentrated in large part on or near the banks of said river or of its tributary creeks; an

WHEREAS, the Legislature of the State has heretofore created a government agency and subdivision of the State for the express purpose, among others, of preventir and aiding in preventing damage to persons and property by overflow of the San Antoni River, and of its tributaries, to-wit, the San Antonio River Authority; and

WHEREAS, Bexar County is located within the boundaries of the San Antoni River Authority; and

WHEREAS, Bexar County has not been and is not now prepared and cannc conveniently become prepared, equipped, and organized to engage in or effectuate program of flood control work to any practical extent whatever; and

WHEREAS, the Legislature has anticipated such a situation, and has provided in Section 411.003, Local Government Code (formerly Article 7048b, V.A.T.S., as amended), that the Commissioners Court may enter into contracts for the accomplishment of plans and programs for flood control and soil conservation with, among others, Flood Control Districts, such as the San Antonio River Authority; and

WHEREAS, the Commissioners Court of Bexar County, recognizing the great public need of the County for the accomplishment of plans and programs of flood control, and of soil conservation, which is an imperatively necessary part of a program of flood control, for the protection of persons and property within said County, and recognizing the County's inability to effectuate such plans and programs for the benefit of the County and its residents, and recognizing the clear legislative intent that the San Antonio River Authority constitute the agency of the State for the effectuation of said plans and programs, has realized the desirability of contracting with and engaging the San Antonio River Authority for the purpose of the effectuation of such plans and programs through the construction and maintenance of flood control projects and through soil conservation; and

WHEREAS, the San Antonio River Authority has been and is ready, able, and willing to enter into such contracts with said County, for the purpose of effectuating such plans and programs, pursuant thereto and pursuant to the act of its creation (originally codified as Art. 8280-119, V.A.T.S.), and of Section 411.003, Local Government Code, and in fulfillment of the public purpose of its creation as a governmental agency and subdivision of the State; and

WHEREAS, on November 15, 1967 an "Amendatory Contract between Bexar County, Texas, and San Antonio River Authority" (the "1967 Amendatory Contract") was duly executed to provide for specific flood control and soil conservation programs; and

WHEREAS, as of January 21, 1976, a "1976 Amendatory Contract between Bexar County, Texas, and San Antonio River Authority" (the "1976 Amendatory Contract") was duly executed to increase the scope and term of the 1967 Amendatory Contract and provide for additional specific control programs and projects which were urgently needed; and

WHEREAS, as of December 19, 1979, a "1979 Amendatory Contract between Bexar County, Texas, and San Antonio River Authority" (the "1979 Amendatory Contract") was duly executed to provide for a change in the method of assessing, levying, and collecting the Bexar County ad valorem taxes required to provide the funds to be paid to the San Antonio River Authority pursuant to the 1976 Amendatory Contract; and

WHEREAS, it is necessary and advisable that the 1976 Amendatory Contract b amended to increase the scope and term thereof and provide for additional specific floo control programs and projects which are urgently needed; and

WHEREAS, it is the intention of this "1990 Amendatory Contract between Bexa County, Texas, and the San Antonio River Authority" (this "1990 Amendatory Contract" to state the obligations of the parties with reference to the original flood control and so conservation program undertaken pursuant to the 1967 Amendatory Contract and the 197 Amendatory Contract, and to provide for additional specific flood control programs an projects so that this 1990 Amendatory Contract shall set forth the entire contractua relationship between the parties; ***therefore***

THIS 1990 AMENDATORY CONTRACT, entered into between the County c Bexar, State of Texas, acting by and through its Commissioners Court, hereinafter referre to as the "County" and the San Antonio River Authority, acting through its Board c Directors, hereinafter referred to as the "District", WITNESSETH:

I.

(a) As provided in the "Contract between Bexar County, Texas and San Antoni River Authority", dated September 12, 1955, as amended, and the "Annex" attache thereto and made a part thereof (the "1955 Contract"), and further described and adopte in the 1967 Amendatory Contract, the District contracted and agreed to carry out program of flood control, and soil conservation for flood control purposes, in accordanc with the specific plans set forth in said "Annex", by widening, deepening, straightening, an otherwise improving the San Antonio River and its tributaries, in the County, including th purchase of easements and rights of way on the adjacent bank thereto, and th construction, repair, and extension of retaining walls, bridges, and abutments in connectio therewith, all in accordance with plans approved by the United States Army Corps c Engineers for the District, and the District has contracted and agreed to provide all of th maintenance, repair, and operation required by said program in all of its phase throughout the duration of this Contract, and to build or assist in building, when an where necessary for said flood control program, small dams on the tributaries of the Sa Antonio River within the County, at locations and in accordance with plans an specifications approved by the Engineers for the District or the Regional Office of th United States Soil Conservation Service, or such other federal agency of the United State as may be authorized to prepare or aid in such plans, and to maintain, repair, and operat the same.

In order to clarify the concept of the scope and extent of the flood control prograr described above in this Paragraph I(a), it is hereby acknowledged and agreed that sai flood control program set forth in the aforesaid "Annex" has been completed to th satisfaction of the County pursuant to the 1955 Contract. It is further acknowledged an agreed that the "Salado Creek Project" and the "Berg's Mill Project" described in the 1967 Amendatory Contract have been fully funded and are substantially completed to the satisfaction of the County, pursuant to the 1967 Amendatory Contract, and that by the expenditure of funds now in the hands of the District and available for such purpose the "Salado Creek Project" and the "Berg's Mill Project" will be completed to the satisfaction of the County, and the District agrees to so complete such projects.

(b) In addition to the flood control programs and projects performed and to be performed and completed under Paragraph I(a) hereof, the District contracts and agrees to carry out further and additional flood control programs and projects for the County (no part of which were included in the "Annex" to the 1955 Contract or the 1967 Amendatory Contract), as described in the "1976 Annex" and the "1990 Annex", respectively, which are attached to this 1990 Amendatory Contract as Exhibits A and B, respectively, and made part hereof for all purposes. It is recognized that the "1976 Annex" attached hereto is the same as was attached to the 1976 Amendatory Contract [Except for references to "Plates" which are on file at the central office of the District] which describes programs and projects still under construction, but that the "1990 Annex" describes new and additional programs and projects (such programs and projects hereinafter collectively called the "Active Projects"). The District shall purchase any necessary property and essential rights of way in connection with all of the Active Projects, and provide for the construction, repair, and extension of retaining walls, bridges, and abutments in connection therewith; and shall provide for the maintenance, repair and operations of said programs and projects through the duration of this 1990 Amendatory Contract. It is understood and agreed, however, that this 1990 Amendatory Contract shall not be construed as requiring the District to expend an aggregate amount in excess of the amount received from the County, or from money borrowed by the District pursuant hereto through the issuance of its bonds, or otherwise, in order to finance the payment for such projects, after excluding and deducting the interest paid on any money borrowed by the District pursuant thereto through the issuance of its bonds, or otherwise, in order to finance the payment for said projects.

(c) The Active Projects shall be given priority as follows:

PRIORITY 1 PROJECTS:

- Flood Water Diversion Project, San Antonio River (Tunnel Project)
- San Pedro Creek Project
- Asylum Creek and No Name Creek Channel Rectification Projects, including restoration of the San Juan Acequia associated with both creeks
- 19th Street Dam
- Flood Gate #3 Reconstruction Project
- Complete Olmos & Nueva Street Dams Projects

PRIORITY 2 PROJECTS:

- Channel Dams Project (Brooklyn Avenue Dam)
- Channel Modification Project (Houston Street to 8th Street)

Unless specifically authorized by action of the Commissioners Court of the County, Active Projects in Priority 1 shall be completed before construction commences on proje in Priority 2.

II.

In consideration of the District having effected and having undertaken to eff carry out, and complete the Active Projects, and subject to the other terms and provisi of this 1990 Amendatory Contract, the County agrees and contracts to pay over to District all of the proceeds of the annual ad valorem Flood Control Taxes assessed, levi and collected at the rates and in the amounts as provided in Paragraph VI hereof, for during the term of this 1990 Amendatory Contract as prescribed and set out in Paragr V hereof, or until all of the Active Projects have been completed and fully paid whichever should first occur; and said proceeds or funds, as collected by the County to account of the District in a suitable depository designated by the District.

It is further agreed that the District shall continue to annually submit to Commissioners Court of the County an itemized report of the amount of funds recei and expended pursuant hereto and the purposes for which said funds have been expenc

III.

It is understood and agreed that it is the intention of the District and the Co that the Active Projects shall be completed for and at their actual cost to the Dist particularly in view of the changeability of economic conditions, inflation, and possibility of increased costs of labor, property, and materials. It is provided, howe that the District shall not incur any obligation for capital expenditures or expend mo for capital improvements which would cause the part of such actual costs to be paic the District from money received pursuant to 1976 Amendatory Contract, the 1 Amendatory Contract, or this 1990 Amendatory Contract, or from money borro pursuant thereto, to exceed $70,000,000, unless and until this 1990 Amendatory Cont is further supplemented or amended to confirm and permit such greater actual cost. Districts' costs of operation and maintenance of the programs and projects provi pursuant to the 1967 Amendatory Contract, the 1976 Amendatory Contract, and this 1 Amendatory Contract, and the interest paid on money borrowed by the District thro the issuance of its bonds, or otherwise, to finance the payment of the actual cost of flood control programs and projects shall be excluded, and shall not be deemec constitute a part of their actual cost within the meaning and for the purposes of this Paragraph III.

IV.

The County agrees that the District may issue its bonds and enter into all contracts for the expenditure of all funds derived under the 1967 Amendatory Contract, the 1979 Amendatory Contract, and this 1990 Amendatory Contract, or any part thereof, for the accomplishment of the plans, programs, projects, and purposes described in Paragraph I(a) and I(b), above, including the Active Projects, or incidental or related thereto, and shall have the power to coordinate the expenditure of all funds with the funds of the District and all other Federal or State agencies, districts, and municipal corporations.

V.

The term for which this 1990 Amendatory Contract shall run shall be 50 years from the date of execution hereof, or until the District's bonds issued to provide funds to finance the flood control programs and projects undertaken pursuant to the 1955 Contract, the 1967 Amendatory Contract, the 1979 Amendatory Contract, and this 1990 Amendatory Contract, or any refunding bonds issued in lieu thereof, have been fully paid, as provided by Section 411.003, Local Government Code.

VI.

The County covenants and agrees that it will annually cause to be assessed, levied, and collected the ad valorem Flood Control Taxes, at the rates and in the amounts and manner provided and set forth in this Paragraph VI, for the purpose of providing the funds herein contracted to be paid to the District, and concurrently with the authorization of this Paragraph VI the Commissioners Court of the County has provided for and ordered said taxes to be assessed, levied, and collected.

The Flood Control Taxes shall be as follows:

A. A Capital Component as follows:

The capital component of the tax for the year 1990, scheduled to be payable under normal circumstances as of October 1, 1990, and the tax for each tax year (October 1 of each year through the following September 30) thereafter during the term of this 1990 Amendatory Contract shall be levied at the greater of the following rates (a) or (b):

(a) the rate on each $100 of assessed valuation of taxable property in the County (except the first $3,000 value of residential homesteads and other exemptions required by law) whic assuming current collections at 90% of the rate of taxes levie will produce $1,837,500.00.

(b) the rate on each $100 of assessed valuation of taxable prope in the County (except the first $3,000 value of resident homesteads and other exemptions required by law) whi assuming current collections at 90% of the rate of taxes levi will produce an amount not less than the principal and inter scheduled to mature, be redeemed, be paid, and come d during such tax year (October 1 of such year throu September 30) on all bonds, including refunding bon heretofore or hereafter issued by the District which are payal from the proceeds from the Flood Control Taxes provided i in the 1979 Amendatory Contract and this 1990 Amendatc Contract.

B. An Operation and Maintenance component as follows:

The operation and maintenance component of the Flood Control Tax i each of the above tax years shall be a rate on each $100 of assess valuation of property in the County (except for the first $3,000 value residential homesteads and other exemptions required by law) whi assuming current collections of 90% of the rate of the tax levied, v produce the amount certified by the District to be required for such year operate and maintain the programs and projects provided pursuant to t 1967 Amendatory Contract, the 1976 Amendatory Contract, and this 19 Amendatory Contract; provided that such annual rate shall not exceed 0. per $100 of assessed valuation.

C. The County and the District agree that the annual rate of all taxes levi pursuant to this Paragraph shall never exceed the legally voted maximum ra of 15¢ per $100 of assessed valuation; and it is further understood that t District will timely inform the County of the amounts due annually on bonds and amounts necessary for operation and maintenance hereunder

WITNESS the execution hereof in multiple counterparts, each of which shall constitute an original, as of the _____ day of _______________, 1990, which is the date of this 1990 Amendatory Contract.

ATTEST:

BEXAR COUNTY, TEXAS,
acting by and through
its Commissioners Court

____
County Clerk

By______________________________
County Judge

(SEAL)

ATTEST:

SAN ANTONIO RIVER AUTHORITY

____
Assistant Secretary, Board of Directors

By______________________________
Chairman, Board of Directors

(SEAL)

Approved for financial matters:

____
, County Auditor

Approved as to form:

____

1976 ANNEX

OLMOS DAM MODIFICATION PROJECT

The Olmos Dam Modification Project is a flood prevention project for the S: Antonio River in Bexar County, Texas.

The primary objective of this project is to provide increased flood protection f the portion of San Antonio downstream from Olmos Dam which is subject to flo damage from the San Antonio River. The project, as formulated, meets the objective

The approved plan provides for modification of the existing Olmos Dam such th the relative safety of the structure is increased to an acceptable level and so th floodwaters in excess of the reservoir capacity may be safely routed past the dam. T modification will generally follow the concepts as set forth on the preliminary plans on f at the District, designated Plates 1 and 2, and will be built in accordance with speci construction plans and specifications approved by the United State Army Corps Engineers.

DETENTION DAMS AND RESERVOIRS PROJECT
OR OPTIONAL
FLOODWATER DIVERSION PROJECT, SAN ANTONIO RIVER

To accomplish necessary flood protection along the San Antonio River in tl central business district of Bexar County in conjunction with modification to Olmos Da Detention Dams and Reservoirs or a Floodwater Diversion (Bypass) project must constructed. The Detention Dams and Reservoirs Project and the Floodwater Diversi Project are defined as follows:

<u>The Detention Dams and Reservoirs Project</u> is a flood prevention project for tl San Antonio River in Bexar County, Texas, the primary objective of which is to provi flood protection for the portion of San Antonio which is subject to flood damage from tl San Antonio River. The project as formulated, in conjunction with other flood contı projects, will meet these objectives.

The plan provides for a system of floodwater retarding structures and detenti reservoirs to be constructed in accordance with plans and specifications approved by tl United States Army Corps of Engineers. The general location of these detention da and reservoirs is shown on the project map on file at the District and designated Plate

The optional <u>Floodwater Diversion Project</u> is a project designed to divert exce floodwaters through a bypass conduit for a reach of the San Antonio River in Bex County, Texas.

The primary objective of the project is to provide flood protection for the porti of the City of San Antonio, including the central business district, which is subject to flo damage from the San Antonio River. The project as formulated, in conjunction with other flood control projects, will meet this objective.

The plan provides for a system of floodwater diversion bypass conduits which will carry excess floodwaters past the central business district of San Antonio. The floodwater diversion project will follow generally one of the alignments as set forth on the location map, designated Plate 4 on file with at the District or another alignment which is determined to be more feasible, more acceptable by the public, and/or more advantageous. This project will be built in accordance with specific construction plans and specifications approved by the United States Army Corps of Engineers.

After further engineering feasibility studies and environmental assessments, only the project best suited for overall flood control and environmental acceptability will be constructed.

CHANNEL MODIFICATION PROJECT, SAN ANTONIO RIVER

(Nueva Street to 8th Street)

The Channel Modification Project, San Antonio River, Nueva Street to 8th Street, is a floodway channelization project for a portion of the San Antonio River in Bexar County, Texas.

The primary objective of the project is to provide protection from flooding to the City of San Antonio in the Nueva Street to 8th Street reach of the San Antonio River, which includes the central business district of the City. The project, as formulated, in conjunction with other flood control projects, will meet this objective.

The approved plan for approximately 6,500 feet of improvements, in conjunction with other flood control projects, will provide flood protection adequate to control the design project flood. The improved channel will follow generally the alignment set forth on the location map, designated Plate 5 on file at the District. The project will be built in accordance with the specific construction plans and specifications approved by the United State Army Corps of Engineers.

SAN JUAN DAM RECONSTRUCTION PROJECT

The San Juan Dam Reconstruction Project is a project to reconstruct the existing Dan Juan Dam on the San Antonio River in Bexar County, Texas.

The primary objective of the project is to demolish the existing San Juan Dam which is structurally inadequate, and to reconstruct a new dam structure which will be structurally secure and will have adequate capacity to pass, in a controlled manner, the design project flood. The project, as formulated, meets these objectives.

The general location of the project is shown on the location map, designated Plate 6 on file at the District. The project will be built in accordance with specific construction plans and specifications approved by the United States Army Corps of Engineers.

1990 ANNEX

19TH STREET DAM (ELMENDORF LAKE DAM)

The 19th Street Dam (Elmendorf Lake Dam) is a project to reconstruct the existi dam at 19th Street on Apache Creek in Bexar County, Texas. The primary objective the project is to demolish the existing 19th Street Dam which is structurally a mechanically inadequate and to reconstruct a new dam which will be structurally secu and will have adequate capacity to pass, in a controlled manner, the design project floc

The project will be built in accordance with specific construction plans a specifications approved by the United States Army Corps of Engineers.

FLOOD GATE NUMBER 3 RECONSTRUCTION AND INSTRUMENTATION CONTROLS PRO

Flood gate number 3 is a project to reconstruct the existing flood gate locat between Houston and Commerce Streets on the San Antonio River in Bexar Coun Texas. The existing floodgate number 3 is structurally and mechanically inadequate a the objective of this project is to demolish the existing floodgate and reconstruct a ne gate which will protect the river loop from flooding.

The project will also include installation of instrumentation controls for gates 3, and 5 and in the river loop. The objective of this phase of the project is to monitor a coordinate the operation of gates 3, 4, and 5 to protect property adjacent to the S Antonio River and the river loop from flooding.

ASYLUM CREEK AND NO NAME CREEK CHANNEL RECTIFICATION PROJECTS

The Asylum Creek and No Name Creek rectification projects are floodw channelization projects for two tributaries of the San Antonio River in Bexar Coun Texas.

The primary objective of these projects is to provide protection from flooding fr Asylum Creek and No Name Creek and the restoration of the San Juan Acequ associated with both creeks. The channelization of Asylum Creek will be from Sou Presa Street to the San Antonio River and the channelization of No Name Creek will from and including the Old Corpus Christi Road to the San Antonio River.

This project includes pump stations which are to provide flows for riv maintenance and acequia water rights required as part of the San Antonio River chann improvements constructed by the Corps of Engineers under the 1955 Contract.

SAN PEDRO CREEK DRAINAGE

The San Pedro Creek project described in the 1976 Annex requires expansion add pick-up or drainage collection structures to and including Ashby Street.

Six Mile Creek Project

The Six Mile Creek Project is a floodway channelization project for a portion of Six Mile (Parita) Creek, which is a tributary of the San Antonio River in Bexar County, Texas.

The primary objectives of the project are to provide protection from flooding to the lower reaches of Six Mile Creek and the Espada Aqueduct. The project, as formulated, meets this objective.

The approved plan for approximately 2,250 feet of improvements will provide a flood control channel with sufficient capacity to pass the design project flood from the confluence with the San Antonio River upstream to the project limit. The improved channel will follow generally the alignment set forth on the location map, designated Plate 7 on file at the District, and will be built in accordance with specific construction plans and specifications approved by the United States Army Corps of Engineers.

San Pedro Creek Project

The San Pedro Creek Project is a floodway channelization project for a portion of San Pedro Creek, a tributary of the San Antonio River in Bexar County, Texas.

The primary objective of the project is to provide protection from flooding to the City of San Antonio from the upper reaches of the creek at Myrtle Street downstream to Travis Street. The project, as formulated, meets this objective.

The approved plan for approximately 7,930 feet of improvements will provide a flood control channel with sufficient capacity to pass the design project flood from Travis Street upstream to the project limit. The improved channel will follow generally the alignment set forth on the location maps, designated Plates 8 and 9, on file at the District, and will be built in accordance with specific construction plans and specifications approved by the United States Army Corps of Engineers.

Channel Dams Project

The Channel Dams Project is to install a series of in-channel dams on the San Antonio River in Bexar County, Texas.

The primary objective of the project is to provide environmentally acceptable flood protection for a portion of San Antonio which is subject to flood damages from the San Antonio River. The plan, as formulated, meets this objective.

The approved plan provides for a series of in-channel dams to be constructed in accordance with plans and specifications approved by the United States Army Corps of Engineers. The general location of these structures is shown on the project maps and designated Plates 10 and 11 on file at the District.

1990 SARA / BEXAR COUNTY CONTRACT - PROJECT LIST

ID	DESCRIPTION
S-1	SAN ANTONIO RIVER TUNNEL
S-2	SAN PEDRO CREEK TUNNEL
S-3	ASYLUM CREEK & SAN JUAN ACEQUIA RECTIFICATION
S-4	19TH STREET FLOOD GATES
S-5	BROOKLYN AVENUE DAM
S-6	HOUSTON STREET TO EIGHTH STREET CHANNEL RESTORATION
S-7	FLOOD GATE #3-ISOLATION, NORTH RIVER LOOP
S-8	SAN JUAN DAM RECONSTRUCTION
S-9	GATE #2 BRACKENRIDGE PARK
S-10	BEXAR COUNTY FLOOD STUDY
S-11	SALADO CREEK - SAN ANTONIO RIVER TO 500' US SOUTHTON - R.R. BRIDGE REPLACEMENT
S-12	SALADO CREEK - 500' UPSTREAM OF SOUTHTON RD. TO IH 410 - CHANNEL RECTIFICATION
S-13	SALADO CREEK - RIGSBY TO ROLAND (COMANCHE PARK) - FLOODPLAIN RECTIFICATION
S-14	SALADO CREEK - DOWNSTREAM OF "J" STREET PARK TO RIGSBY - FLOODPLAIN RECTIFICATION
S-15	SALADO CREEK - "J" STREET PARK - CHANNEL RECTIFICATION
S-16	SALADO CREEK - MLK PARK TO UPSTREAM OF "J" STREET PARK - FLOODPLAIN RECTIFICATION
S-17	SALADO CREEK - IH 10 TO MLK PARK - FLOODPLAIN RECTIFICATION
S-18	SALADO CREEK - PLETZ PARK TO IH 10 - FLOODPLAIN RECTIFICATION
S-19	SALADO CREEK - IH 35 TO PLETZ PARK - FLOODPLAIN RECTIFICATION
S-20	SALADO CREEK - EISENHAUER ROAD TO FORT SAM HOUSTON - FLOODPLAIN RECTIFICATION
S-21	LEON CREEK - 2000' DS NEW LAREDO HWY. TO QUINTANA ROAD - RELOCATIONS
S-22	LEON CREEK - S.A. CORPORATE LIMITS TO 2000' DS NEW LAREDO HWY - CHANNEL RECTIFICATION
S-23	LEON CREEK - MORAY ROAD TO S.A. CORPORATE LIMITS - FLOODPLAIN RECTIFICATION
S-24	LEON CREEK - IH 10 TO MORAY ROAD (CAMARGO PARK) - FLOODPLAIN RECTIFICATION
S-25	LEON CREEK - KEITHA TO HWY 90 WEST (RODRIGUEZ PARK) - CHANNELIZATION
S-26	LEON CREEK - OLD CAMP BULLIS ROAD TO S.P.R.R. - RELOC. & FLOODPROOFING
S-27	LEON CREEK - S.P.R.R. TO IH 10 SOUTH BEND FRONTAGE ROAD - RELOC. & FLOODPROOFING
S-28	LEON CREEK - RAYMOND RUSSELL PARK
S-29	LEON CREEK - IH 10 SOUTH BOUND FRONTAGE ROAD TO BOERNE STAGE ROAD - RELOC & FLOODPROOFING
S-30	MARTINEZ CREEK - ALAZAN CREEK TO CULEBRA
S-31	CIBOLO CREEK - 2.3 MI DOWNSTREAM OF SCHAEFFER ROAD TO 1.3 ML UPSTREAM OF SCHAEFFER ROAD - RELOC. & FLOODPROOFING
S-32	CIBOLO CREEK - 1.3 MI UPSTREAM OF SCHAEFFER ROAD TO FM 78 - RELOC. & FLOODPROOFING

SAN ANTONIO AUTHORITY

07-Sep-90
Prepared by: DORIAN FRENCH, P.E.

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

By: D.F. 09/07/90 11:11 AM PROJECT	START DATE	LGTH MOS.	FINISH DATE	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99
1 SAN ANTONIO RIVER TUNNEL												
Design	01-Feb-90	14	02-Apr-91	$1,005,000	-	-	-	-	-	-	-	-
Construction - Unphased	01-Feb-93	36	31-Jan-96	$570,000	$232,683	$2,155,000	$5,505,000	$5,210,000	$3,162,000	-	-	-
Real estate	01-Mar-90	14	30-Apr-91	$249,000	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Feb-90	72	31-Jan-96	$1,824,000	$232,683	$2,155,000	$5,505,000	$5,210,000	$3,162,000	-	-	-
PROJECTED TOTAL COST =	$21,218,112											
2 SAN PEDRO CREEK CHANNEL												
Design	01-Feb-90	12	01-Feb-91	$556,000	-	-	-	-	-	-	-	-
Construction - Unphased	01-Jun-91	18	30-Nov-92	$495,000	$5,444,000	$2,238,000	-	-	-	-	-	-
Real estate	01-Feb-90	16	02-Jun-91	$419,000	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Feb-90	34	30-Nov-92	$1,470,000	$5,444,000	$2,238,000	-	-	-	-	-	-
PROJECTED TOTAL COST =	$10,208,717											
3 ASYLUM CREEK & SAN JUAN ACEQUIA RECTIFICATION												
Design	01-Oct-90	8	01-Jun-91	$474,075	-	-	-	-	-	-	-	-
Construction - Unphased	01-Sep-91	12	31-Aug-92	-	$2,408,000	$511,000	-	-	-	-	-	-
Real estate	29-Jan-91	12	28-Jan-92	$264,000	$383,000	-	-	-	-	-	-	-
SUBTOTAL:	01-Oct-90	23	31-Aug-92	$738,075	$2,791,000	$511,000	-	-	-	-	-	-
PROJECTED TOTAL COST =	$4,041,000											
4 19th STREET FLOOD GATES												
Design	01-Jan-91	18	01-Jul-92	$146,000	$310,000	-	-	-	-	-	-	-
Construction - Unphased	01-Oct-92	18	01-Apr-94	-	-	$2,118,000	$2,244,000	-	-	-	-	-
Real estate	02-May-91	18	30-Oct-92	$13,000	$78,000	$26,000	-	-	-	-	-	-
SUBTOTAL:	01-Jan-91	39	01-Apr-94	$159,000	$388,000	$2,144,000	$2,244,000	-	-	-	-	-
PROJECTED TOTAL COST =	$4,935,000	<= COST REFLECTS $										
5 FLOOD GATE #3 - ISOLATION, NORTH RIVER LOOP												
Design	01-Jan-91	12	31-Dec-91	$104,000	$111,000	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-92	12	30-Mar-93	-	$234,000	$727,000	-	-	-	-	-	-
Real estate	02-Mar-91	6	31-Aug-91	$8,000	$4,000	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-91	27	30-Mar-93	$112,000	$349,000	$727,000	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,188,000											
6 BROOKLYN AVENUE DAM												
Design	01-Jan-93	24	31-Dec-94	-	-	$267,000	$564,000	$297,000	-	-	-	-
Construction - Unphased	02-Apr-95	24	01-Apr-97	-	-	-	-	$886,000	$3,823,000	$3,016,000	-	-
Real estate	01-Mar-93	24	28-Feb-95	-	-	$129,000	$403,000	$281,000	-	-	-	-
SUBTOTAL:	01-Jan-93	51	01-Apr-97	-	-	$396,000	$967,000	$1,464,000	$3,823,000	$3,016,000	-	-
PROJECTED TOTAL COST =	$9,834,000											
7 HOUSTON ST TO EIGHTH ST CHANNEL RESTORATION												
Design	01-Apr-95	36	30-Mar-98	-	-	-	-	$255,000	$1,076,000	$1,126,000	$883,000	-
Construction - Phased	31-Mar-97	48	29-Mar-2001	-	-	-	-	-	-	$1,617,000	$6,733,000	$7,070,000
Real estate	31-Mar-96	36	30-Mar-99	-	-	-	-	-	$42,000	$173,000	$181,000	$141,000
SUBTOTAL:	01-Apr-95	72	29-Mar-2001	-	-	-	-	$255,000	$1,118,000	$2,916,000	$7,797,000	$7,211,000
PROJECTED TOTAL COST =	$32,717,677											

ANTONIO RIVER AUTHORITY

990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90
Prepared by: DORIAN FRENCH, P.E.

By: D.F. 09/07/90 11:11 AM ROJECT	START DATE	LGTH MOS.	FINISH DATE	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
AN ANTONIO RIVER TUNNEL												
Design	01-Feb-90	14	02-Apr-91	-	-	-	-	-	-	-	-	-
Construction - Unphased	01-Feb-93	36	31-Jan-96	-	-	-	-	-	-	-	-	-
Real estate	01-Mar-90	14	30-Apr-91	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Feb-90	72	31-Jan-96	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$21,218,112											
AN PEDRO CREEK CHANNEL												
Design	01-Feb-90	12	01-Feb-91	-	-	-	-	-	-	-	-	-
Construction - Unphased	01-Jun-91	18	30-Nov-92	-	-	-	-	-	-	-	-	-
Real estate	01-Feb-90	16	02-Jun-91	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Feb-90	34	30-Nov-92	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$10,208,717											
SYLUM CREEK & SAN JUAN ACEQUIA RECTIFICATION												
Design	01-Oct-90	8	01-Jun-91	-	-	-	-	-	-	-	-	-
Construction - Unphased	01-Sep-91	12	31-Aug-92	-	-	-	-	-	-	-	-	-
Real estate	29-Jan-91	12	28-Jan-92	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Oct-90	23	31-Aug-92	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$4,041,000											
›th STREET FLOOD GATES												
Design	01-Jan-91	18	01-Jul-92	-	-	-	-	-	-	-	-	-
Construction - Unphased	01-Oct-92	18	01-Apr-94	-	-	-	-	-	-	-	-	-
Real estate	02-May-91	18	30-Oct-92	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-91	39	01-Apr-94	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$4,935,000	<= COST REFLECTS $										
OOD GATE #3 - ISOLATION, NORTH RIVER LOOP												
Design	01-Jan-91	12	31-Dec-91	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-92	12	30-Mar-93	-	-	-	-	-	-	-	-	-
Real estate	02-Mar-91	6	31-Aug-91	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-91	27	30-Mar-93	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,188,000											
OOKLYN AVENUE DAM												
Design	01-Jan-93	24	31-Dec-94	-	-	-	-	-	-	-	-	-
Construction - Unphased	02-Apr-95	24	01-Apr-97	-	-	-	-	-	-	-	-	-
Real estate	01-Mar-93	24	28-Feb-95	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-93	51	01-Apr-97	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$9,834,000											
JSTON ST TO EIGHTH ST CHANNEL RESTORATION												
Design	01-Apr-95	36	30-Mar-98	-	-	-	-	-	-	-	-	-
Construction - Phased	31-Mar-97	48	29-Mar-2001	$7,444,000	$5,806,000	-	-	-	-	-	-	-
Real estate	31-Mar-96	36	30-Mar-99	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Apr-95	72	29-Mar-2001	$7,444,000	$5,806,000	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$32,717,677											

... INFLATION FACTOR APPLIED TO ALL COST PROJECTIONS

N ANTONIO RIVER AUTHORITY

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90 5% = ANNUAL IN
Prepared by: DORIAN FRENCH, P.E.

By: D.F. 09/07/90 PROJECT 11:11 AM	START DATE	LGTH MOS.	FINISH DATE	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
SAN ANTONIO RIVER TUNNEL												
Design	01-Feb-90	14	02-Apr-91	-	-	-	-	-	-	-	-	-
Construction - Unphased	01-Feb-93	36	31-Jan-96	-	-	-	-	-	-	-	-	-
Real estate	01-Mar-90	14	30-Apr-91	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Feb-90	72	31-Jan-96	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$21,218,112											
SAN PEDRO CREEK CHANNEL												
Design	01-Feb-90	12	01-Feb-91	-	-	-	-	-	-	-	-	-
Construction - Unphased	01-Jun-91	18	30-Nov-92	-	-	-	-	-	-	-	-	-
Real estate	01-Feb-90	16	02-Jun-91	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Feb-90	34	30-Nov-92	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$10,208,717											
ASYLUM CREEK & SAN JUAN ACEQUIA RECTIFICATION												
Design	01-Oct-90	8	01-Jun-91	-	-	-	-	-	-	-	-	-
Construction - Unphased	01-Sep-91	12	31-Aug-92	-	-	-	-	-	-	-	-	-
Real estate	29-Jan-91	12	28-Jan-92	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Oct-90	23	31-Aug-92	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$4,041,000											
19th STREET FLOOD GATES												
Design	01-Jan-91	18	01-Jul-92	-	-	-	-	-	-	-	-	-
Construction - Unphased	01-Oct-92	18	01-Apr-94	-	-	-	-	-	-	-	-	-
Real estate	02-May-91	18	30-Oct-92	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-91	39	01-Apr-94	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$4,935,000 <= COST REFLECTS $											
FLOOD GATE #3 - ISOLATION, NORTH RIVER LOOP												
Design	01-Jan-91	12	31-Dec-91	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-92	12	30-Mar-93	-	-	-	-	-	-	-	-	-
Real estate	02-Mar-91	6	31-Aug-91	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-91	27	30-Mar-93	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,188,000											
3ROOKLYN AVENUE DAM												
Design	01-Jan-93	24	31-Dec-94	-	-	-	-	-	-	-	-	-
Construction - Unphased	02-Apr-95	24	01-Apr-97	-	-	-	-	-	-	-	-	-
Real estate	01-Mar-93	24	28-Feb-95	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-93	51	01-Apr-97	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$9,834,000											
1OUSTON ST TO EIGHTH ST CHANNEL RESTORATION												
Design	01-Apr-95	36	30-Mar-98	-	-	-	-	-	-	-	-	-
Construction - Phased	31-Mar-97	48	29-Mar-2001	-	-	-	-	-	-	-	-	-
Real estate	31-Mar-96	36	30-Mar-99	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Apr-95	72	29-Mar-2001	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$32,717,677											

›90 BEXAR COUNTY BOND CONTRACT AMENDMENT FISCAL COST ESTIMATES - SMALL SJD By: D.F. :OJECT	09/07/90 11:11 AM	START DATE	LGTH MOS.	FINISH DATE	FLATION FACTOR APPLIED T FY 18	FY 19
ıN ANTONIO RIVER TUNNEL						
Design		01-Feb-90	14	02-Apr-91	-	-
Construction - Unphased		01-Feb-93	36	31-Jan-96	-	-
Real estate		01-Mar-90	14	30-Apr-91	-	-
SUBTOTAL:		01-Feb-90	72	31-Jan-96	-	-
PROJECTED TOTAL COST =		$21,218,112				
.N PEDRO CREEK CHANNEL						
Design		01-Feb-90	12	01-Feb-91	-	-
Construction - Unphased		01-Jun-91	18	30-Nov-92	-	-
Real estate		01-Feb-90	16	02-Jun-91	-	-
SUBTOTAL:		01-Feb-90	34	30-Nov-92	-	-
PROJECTED TOTAL COST =		$10,208,717				
YLUM CREEK & SAN JUAN ACEQUIA RECTIFICATION						
Design		01-Oct-90	8	01-Jun-91	-	-
Construction - Unphased		01-Sep-91	12	31-Aug-92	-	-
Real estate		29-Jan-91	12	28-Jan-92	-	-
SUBTOTAL:		01-Oct-90	23	31-Aug-92	-	-
PROJECTED TOTAL COST =		$4,041,000				
th STREET FLOOD GATES						
Design		01-Jan-91	18	01-Jul-92	-	-
Construction - Unphased		01-Oct-92	18	01-Apr-94	-	-
Real estate		02-May-91	18	30-Oct-92	-	-
SUBTOTAL:		01-Jan-91	39	01-Apr-94	-	-
PROJECTED TOTAL COST =		$4,935,000	<= COST REFLECTS $			
OOD GATE #3 - ISOLATION, NORTH RIVER LOOP						
Design		01-Jan-91	12	31-Dec-91	-	-
Construction - Unphased		30-Mar-92	12	30-Mar-93	-	-
Real estate		02-Mar-91	6	31-Aug-91	-	-
SUBTOTAL:		01-Jan-91	27	30-Mar-93	-	-
PROJECTED TOTAL COST =		$1,188,000				
OOKLYN AVENUE DAM						
Design		01-Jan-93	24	31-Dec-94	-	-
Construction - Unphased		02-Apr-95	24	01-Apr-97	-	-
Real estate		01-Mar-93	24	28-Feb-95	-	-
SUBTOTAL:		01-Jan-93	51	01-Apr-97	-	-
PROJECTED TOTAL COST =		$9,834,000				
USTON ST TO EIGHTH ST CHANNEL RESTORATION						
Design		01-Apr-95	36	30-Mar-98	-	-
Construction - Phased		31-Mar-97	48	29-Mar-2001	-	-
Real estate		31-Mar-96	36	30-Mar-99	-	-
SUBTOTAL:		01-Apr-95	72	29-Mar-2001	-	-
PROJECTED TOTAL COST =		$32,717,677				

ANNUAL INFLATION FACTOR APPLIED TO ALL COST PROJECTIONS.

SAN ANTONIO AUTHORITY

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90
Prepared by: DORIAN FRENCH, P.E.

By: D.F. 09/07/90 11:11 AM PROJECT	START DATE	LGTH MOS.	FINISH DATE	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99
8 SAN JUAN DAM RECONSTRUCTION												
Design	01-Jan-95	24	30-Dec-96	-	-	-	-	$190,000	$403,000	$210,000	-	-
Construction - Unphased	02-Apr-97	24	02-Apr-99	-	-	-	-	-	-	$1,211,000	$5,212,000	$4,137,000
Real estate	31-Jan-95	12	30-Jan-96	-	-	-	-	$56,000	$82,000	-	-	-
SUBTOTAL:	01-Jan-95	51	02-Apr-99	-	-	-	-	$246,000	$485,000	$1,421,000	$5,212,000	$4,137,000
PROJECTED TOTAL COST =	$12,250,000											
9 GATE #2 BRACKENRIDGE PARK												
Design	01-Jan-92	9	30-Sep-92	-	$62,000	$33,000	-	-	-	-	-	-
Construction - Unphased	29-Dec-92	12	29-Dec-93	-	-	$184,000	$190,000	-	-	-	-	-
Real estate	01-Mar-92	12	28-Feb-93	-	$8,000	$16,000	-	-	-	-	-	-
SUBTOTAL:	01-Jan-92	24	29-Dec-93	-	$70,000	$233,000	$190,000	-	-	-	-	-
PROJECTED TOTAL COST =	$493,000											
10 BEXAR COUNTY FLOOD STUDY												
Public Input & Recon	01-Jan-99	12	31-Dec-99	-	-	-	-	-	-	-	-	$283,000
Hydraulic & C/B Report	31-Dec-99	12	30-Dec-2000	-	-	-	-	-	-	-	-	-
Review & Approval	30-Dec-2000	9	30-Sep-2001	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-99	33	30-Sep-2001	-	-	-	-	-	-	-	-	$283,000
PROJECTED TOTAL COST =	$5,258,000											
11 SALADO CRK - SAN ANTONIO RIVER TO 500' US SOUTHTON - R.R												
Design	01-Jan-2000	12	30-Dec-2000	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-2001	12	30-Mar-2002	-	-	-	-	-	-	-	-	-
Real estate	30-Apr-2000	12	29-Apr-2001	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-2000	27	30-Mar-2002	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,001,000											
12 SALADO CRK - 500' UPSTREAM OF SOUTHTON RD TO IH 410 - CH												
Design	29-Jun-2001	6	28-Dec-2001	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-2002	9	29-Dec-2002	-	-	-	-	-	-	-	-	-
Real estate	27-Oct-2001	9	28-Jul-2002	-	-	-	-	-	-	-	-	-
SUBTOTAL:	29-Jun-2001	18	29-Dec-2002	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,609,000											
3 SALADO CRK - RIGSBY TO ROLAND (COMANCHE PARK) - FLOOD PL												
Design	30-Mar-2001	18	28-Sep-2002	-	-	-	-	-	-	-	-	-
Construction - Unphased	29-Dec-2002	24	28-Dec-2004	-	-	-	-	-	-	-	-	-
Real estate	08-Apr-2001	12	08-Apr-2002	-	-	-	-	-	-	-	-	-
SUBTOTAL:	30-Mar-2001	45	28-Dec-2004	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$6,885,000											
4 SALADO CRK - DOWNSTREAM OF "J" STREET PARK TO RIGSBY - F												
Design	28-Sep-2003	12	27-Sep-2004	-	-	-	-	-	-	-	-	-
Construction - Unphased	28-Dec-2004	18	29-Jun-2006	-	-	-	-	-	-	-	-	-
Real estate	27-Dec-2003	12	26-Dec-2004	-	-	-	-	-	-	-	-	-
SUBTOTAL:	28-Sep-2003	33	29-Jun-2006	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$6,883,000											

ANTONIO RIV AUTHORITY

990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90
Prepared by: DORIAN FRENCH, P.E.

By: D.F. 09/07/90 ROJECT 11:11 AM	START DATE	LGTH MOS.	FINISH DATE	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
AN JUAN DAM RECONSTRUCTION												
Design	01-Jan-95	24	30-Dec-96	-	-	-	-	-	-	-	-	-
Construction - Unphased	02-Apr-97	24	02-Apr-99	-	-	-	-	-	-	-	-	-
Real estate	31-Jan-95	12	30-Jan-96	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-95	51	02-Apr-99	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$12,250,000											
ATE #2 BRACKENRIDGE PARK												
Design	01-Jan-92	9	30-Sep-92	-	-	-	-	-	-	-	-	-
Construction - Unphased	29-Dec-92	12	29-Dec-93	-	-	-	-	-	-	-	-	-
Real estate	01-Mar-92	12	28-Feb-93	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-92	24	29-Dec-93	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$493,000											
EXAR COUNTY FLOOD STUDY												
Public Input & Recon	01-Jan-99	12	31-Dec-99	$302,000	-	-	-	-	-	-	-	-
Hydraulic & C/B Report	31-Dec-99	12	30-Dec-2000	$1,962,000	$2,071,000	-	-	-	-	-	-	-
Review & Approval	30-Dec-2000	9	30-Sep-2001	-	$419,000	$221,000	-	-	-	-	-	-
SUBTOTAL:	01-Jan-99	33	30-Sep-2001	$2,264,000	$2,490,000	$221,000	-	-	-	-	-	-
PROJECTED TOTAL COST =	$5,258,000											
LADO CRK - SAN ANTONIO RIVER TO 500' US SOUTHTON - R.R												
Design	01-Jan-2000	12	30-Dec-2000	$93,000	$99,000	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-2001	12	30-Mar-2002	-	$197,000	$612,000	-	-	-	-	-	-
Real estate	30-Apr-2000	12	29-Apr-2001	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-2000	27	30-Mar-2002	$93,000	$296,000	$612,000	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,001,000											
LADO CRK - 500' UPSTREAM OF SOUTHTON RD TO IH 410 - CH												
Design	29-Jun-2001	6	28-Dec-2001	-	$1,000	$48,000	-	-	-	-	-	-
Construction - Unphased	30-Mar-2002	9	29-Dec-2002	-	-	$66,000	$137,000	-	-	-	-	-
Real estate	27-Oct-2001	9	28-Jul-2002	-	-	$1,216,000	$141,000	-	-	-	-	-
SUBTOTAL:	29-Jun-2001	18	29-Dec-2002	-	$1,000	$1,330,000	$278,000	-	-	-	-	-
PROJECTED TOTAL COST =	$1,609,000											
LADO CRK - RIGSBY TO ROLAND (COMANCHE PARK) - FLOOD PL												
Design	30-Mar-2001	18	28-Sep-2002	-	$92,000	$378,000	$96,000	-	-	-	-	-
Construction - Unphased	29-Dec-2002	24	28-Dec-2004	-	-	-	$1,244,000	$2,606,000	$1,350,000	-	-	-
Real estate	08-Apr-2001	12	08-Apr-2002	-	$248,000	$871,000	-	-	-	-	-	-
SUBTOTAL:	30-Mar-2001	45	28-Dec-2004	-	$340,000	$1,249,000	$1,340,000	$2,606,000	$1,350,000	-	-	-
PROJECTED TOTAL COST =	$6,885,000											
LADO CRK - DOWNSTREAM OF "J" STREET PARK TO RIGSBY - F												
Design	28-Sep-2003	12	27-Sep-2004	-	-	-	-	$378,000	$127,000	-	-	-
Construction - Unphased	28-Dec-2004	18	29-Jun-2006	-	-	-	-	-	$1,177,000	$2,432,000	-	-
Real estate	27-Dec-2003	12	26-Dec-2004	-	-	-	-	$1,380,000	$1,389,000	-	-	-
SUBTOTAL:	28-Sep-2003	33	29-Jun-2006	-	-	-	-	$1,758,000	$2,693,000	$2,432,000	-	-
PROJECTED TOTAL COST =	$6,883,000											

ANNUAL INFLATION FACTOR APPLIED TO ALL COST PROJECTIONS

ANTONIO RIVL.. AUTHORITY

990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90 5% = ANNUAL IN
Prepared by: DORIAN FRENCH, P.E.

By: D.F. 09/07/90 ROJECT 11:11 AM	START DATE	LGTH MOS.	FINISH DATE	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
AN JUAN DAM RECONSTRUCTION												
Design	01-Jan-95	24	30-Dec-96	-	-	-	-	-	-	-	-	-
Construction - Unphased	02-Apr-97	24	02-Apr-99	-	-	-	-	-	-	-	-	-
Real estate	31-Jan-95	12	30-Jan-96	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-95	51	02-Apr-99	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$12,250,000											
#2 BRACKENRIDGE PARK												
Design	01-Jan-92	9	30-Sep-92	-	-	-	-	-	-	-	-	-
Construction - Unphased	29-Dec-92	12	29-Dec-93	-	-	-	-	-	-	-	-	-
Real estate	01-Mar-92	12	28-Feb-93	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-92	24	29-Dec-93	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$493,000											
EXAR COUNTY FLOOD STUDY												
Public Input & Recon	01-Jan-99	12	31-Dec-99	-	-	-	-	-	-	-	-	-
Hydraulic & C/B Report	31-Dec-99	12	30-Dec-2000	-	-	-	-	-	-	-	-	-
Review & Approval	30-Dec-2000	9	30-Sep-2001	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-99	33	30-Sep-2001	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$5,258,000											
ALADO CRK - SAN ANTONIO RIVER TO 500' US SOUTHTON - R.R												
Design	01-Jan-2000	12	30-Dec-2000	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-2001	12	30-Mar-2002	-	-	-	-	-	-	-	-	-
Real estate	30-Apr-2000	12	29-Apr-2001	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-2000	27	30-Mar-2002	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,001,000											
ALADO CRK - 500' UPSTREAM OF SOUTHTON RD TO IH 410 - CH												
Design	29-Jun-2001	6	28-Dec-2001	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-2002	9	29-Dec-2002	-	-	-	-	-	-	-	-	-
Real estate	27-Oct-2001	9	28-Jul-2002	-	-	-	-	-	-	-	-	-
SUBTOTAL:	29-Jun-2001	18	29-Dec-2002	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,609,000											
LADO CRK - RIGSBY TO ROLAND (COMANCHE PARK) - FLOOD PL												
Design	30-Mar-2001	18	28-Sep-2002	-	-	-	-	-	-	-	-	-
Construction - Unphased	29-Dec-2002	24	28-Dec-2004	-	-	-	-	-	-	-	-	-
Real estate	08-Apr-2001	12	08-Apr-2002	-	-	-	-	-	-	-	-	-
SUBTOTAL:	30-Mar-2001	45	28-Dec-2004	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$6,885,000											
LADO CRK - DOWNSTREAM OF "J" STREET PARK TO RIGSBY - F												
Design	28-Sep-2003	12	27-Sep-2004	-	-	-	-	-	-	-	-	-
Construction - Unphased	28-Dec-2004	18	29-Jun-2006	-	-	-	-	-	-	-	-	-
Real estate	27-Dec-2003	12	26-Dec-2004	-	-	-	-	-	-	-	-	-
SUBTOTAL:	28-Sep-2003	33	29-Jun-2006	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$6,883,000											

ANTONIO RIV... AUTHORITY

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

FLATION FACTOR APPLIED T

By: D.F. PROJECT	09/07/90 11:11 AM	START DATE	LGTH MOS.	FINISH DATE	FY 18	FY 19
SAN JUAN DAM RECONSTRUCTION						
Design		01-Jan-95	24	30-Dec-96	-	-
Construction - Unphased		02-Apr-97	24	02-Apr-99	-	-
Real estate		31-Jan-95	12	30-Jan-96	-	-
SUBTOTAL:		01-Jan-95	51	02-Apr-99	-	-
PROJECTED TOTAL COST =		$12,250,000				
GATE #2 BRACKENRIDGE PARK						
Design		01-Jan-92	9	30-Sep-92	-	-
Construction - Unphased		29-Dec-92	12	29-Dec-93	-	-
Real estate		01-Mar-92	12	28-Feb-93	-	-
SUBTOTAL:		01-Jan-92	24	29-Dec-93	-	-
PROJECTED TOTAL COST =		$493,000				
BEXAR COUNTY FLOOD STUDY						
Public Input & Recon		01-Jan-99	12	31-Dec-99	-	-
Hydraulic & C/B Report		31-Dec-99	12	30-Dec-2000	-	-
Review & Approval		30-Dec-2000	9	30-Sep-2001	-	-
SUBTOTAL:		01-Jan-99	33	30-Sep-2001	-	-
PROJECTED TOTAL COST =		$5,258,000				
SALADO CRK - SAN ANTONIO RIVER TO 500' US SOUTHTON - R.R						
Design		01-Jan-2000	12	30-Dec-2000	-	-
Construction - Unphased		30-Mar-2001	12	30-Mar-2002	-	-
Real estate		30-Apr-2000	12	29-Apr-2001	-	-
SUBTOTAL:		01-Jan-2000	27	30-Mar-2002	-	-
PROJECTED TOTAL COST =		$1,001,000				
ALADO CRK - 500' UPSTREAM OF SOUTHTON RD TO IH 410 - CH						
Design		29-Jun-2001	6	28-Dec-2001	-	-
Construction - Unphased		30-Mar-2002	9	29-Dec-2002	-	-
Real estate		27-Oct-2001	9	28-Jul-2002	-	-
SUBTOTAL:		29-Jun-2001	18	29-Dec-2002	-	-
PROJECTED TOTAL COST =		$1,609,000				
ALADO CRK - RIGSBY TO ROLAND (COMANCHE PARK) - FLOOD PL						
Design		30-Mar-2001	18	28-Sep-2002	-	-
Construction - Unphased		29-Dec-2002	24	28-Dec-2004	-	-
Real estate		08-Apr-2001	12	08-Apr-2002	-	-
SUBTOTAL:		30-Mar-2001	45	28-Dec-2004	-	-
PROJECTED TOTAL COST =		$6,885,000				
ALADO CRK - DOWNSTREAM OF "J" STREET PARK TO RIGSBY - F						
Design		28-Sep-2003	12	27-Sep-2004	-	-
Construction - Unphased		28-Dec-2004	18	29-Jun-2006	-	-
Real estate		27-Dec-2003	12	26-Dec-2004	-	-
SUBTOTAL:		28-Sep-2003	33	29-Jun-2006	-	-
PROJECTED TOTAL COST =		$6,883,000				

ANNUAL INFLATION FACTOR APPLIED TO ALL COST PROJECTIONS.

SAN ANTONIO AUTHORITY

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90
Prepared by: DORIAN FRENCH, P.E.

By: D.F. PROJECT	09/07/90 11:11 AM START DATE	LGTH MOS.	FINISH DATE	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99
15 SALADO CRK - "J" STREET PARK - CHANNEL RECTIFICATION												
Design	28-Jun-2005	9	29-Mar-2006	-	-	-	-	-	-	-	-	-
Construction - Unphased	29-Jun-2006	12	29-Jun-2007	-	-	-	-	-	-	-	-	-
Real estate	26-Sep-2005	9	27-Jun-2006	-	-	-	-	-	-	-	-	-
SUBTOTAL:	28-Jun-2005	24	29-Jun-2007	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$2,948,643											
16 SALADO CRK - MLK PARK TO UPSTREAM OF "J" STREET PARK - F												
Design	29-Mar-2005	24	29-Mar-2007	-	-	-	-	-	-	-	-	-
Construction - Unphased	29-Jun-2007	36	28-Jun-2010	-	-	-	-	-	-	-	-	-
Real estate	25-Sep-2005	18	26-Mar-2007	-	-	-	-	-	-	-	-	-
SUBTOTAL:	29-Mar-2005	63	28-Jun-2010	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$32,375,000											
17 SALADO CRK - IH 10 TO MLK PARK - FLOOD PLAIN RECTIFICATI												
Design	28-Mar-2009	12	28-Mar-2010	-	-	-	-	-	-	-	-	-
Construction - Unphased	28-Jun-2010	18	27-Dec-2011	-	-	-	-	-	-	-	-	-
Real estate	26-Jul-2009	12	26-Jul-2010	-	-	-	-	-	-	-	-	-
SUBTOTAL:	28-Mar-2009	33	27-Dec-2011	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$11,083,000											
18 SALADO CRK - PLETZ PARK TO IH 10 - FLOOD PLAIN RECTIFICA												
Design	26-Sep-2010	12	26-Sep-2011	-	-	-	-	-	-	-	-	-
Construction - Unphased	27-Dec-2011	18	26-Jun-2013	-	-	-	-	-	-	-	-	-
Real estate	25-Dec-2010	12	25-Dec-2011	-	-	-	-	-	-	-	-	-
SUBTOTAL:	26-Sep-2010	33	26-Jun-2013	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$22,028,000											
19 SALADO CRK - IH35 TO PLETZ PARK - FLOOD PLAIN RECTIFICAT												
Design	26-Jun-2012	9	26-Mar-2013	-	-	-	-	-	-	-	-	-
Construction - Unphased	26-Jun-2013	15	26-Sep-2014	-	-	-	-	-	-	-	-	-
Real estate	24-Oct-2012	9	24-Jul-2013	-	-	-	-	-	-	-	-	-
SUBTOTAL:	26-Jun-2012	27	26-Sep-2014	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$6,096,000											
20 SALADO CRK - EISENHAUER RD TO FORT SAM HOUSTON - FLOOD P												
Design	26-Jun-2012	24	26-Jun-2014	-	-	-	-	-	-	-	-	-
Construction - Unphased	26-Sep-2014	36	25-Sep-2017	-	-	-	-	-	-	-	-	-
Real estate	26-Jun-2013	18	25-Dec-2014	-	-	-	-	-	-	-	-	-
SUBTOTAL:	26-Jun-2012	63	25-Sep-2017	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$42,484,000											
1 LEON CRK - 2000' DS NEW LAREDO HWY TO QUINTANA RD - RELO												
Design	01-Jan-2000	4	01-May-2000	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Jun-2000	-	30-Jun-2000	-	-	-	-	-	-	-	-	-
Real estate	01-Jan-2000	18	01-Jul-2001	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-2000	18	01-Jul-2001	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$3,247,103											

990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90
Prepared by: DORIAN FRENCH, P.E.

By: D.F. ROJECT	09/07/90 11:11 AM	START DATE	LGTH MOS.	FINISH DATE	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
ALADO CRK - "J" STREET PARK - CHANNEL RECTIFICATION													
Design		28-Jun-2005	9	29-Mar-2006	-	-	-	-	-	$3,000	$318,000	-	-
Construction - Unphased		29-Jun-2006	12	29-Jun-2007	-	-	-	-	-	-	$12,000	$2,226,000	-
Real estate		26-Sep-2005	9	27-Jun-2006	-	-	-	-	-	-	$389,643	-	-
SUBTOTAL:		28-Jun-2005	24	29-Jun-2007	-	-	-	-	-	$3,000	$719,643	$2,226,000	-
PROJECTED TOTAL COST =		$2,948,643											
ALADO CRK - MLK PARK TO UPSTREAM OF "J" STREET PARK - F													
Design		29-Mar-2005	24	29-Mar-2007	-	-	-	-	-	$422,000	$1,720,000	$1,339,000	-
Construction - Unphased		29-Jun-2007	36	28-Jun-2010	-	-	-	-	-	-	-	$43,000	$8,447,000
Real estate		25-Sep-2005	18	26-Mar-2007	-	-	-	-	-	-	$1,168,000	$1,181,000	-
SUBTOTAL:		29-Mar-2005	63	28-Jun-2010	-	-	-	-	-	$422,000	$2,888,000	$2,563,000	$8,447,000
PROJECTED TOTAL COST =		$32,375,000											
ALADO CRK - IH 10 TO MLK PARK - FLOOD PLAIN RECTIFICATI													
Design		28-Mar-2009	12	28-Mar-2010	-	-	-	-	-	-	-	-	-
Construction - Unphased		28-Jun-2010	18	27-Dec-2011	-	-	-	-	-	-	-	-	-
Real estate		26-Jul-2009	12	26-Jul-2010	-	-	-	-	-	-	-	-	-
SUBTOTAL:		28-Mar-2009	33	27-Dec-2011	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =		$11,083,000											
ALADO CRK - PLETZ PARK TO IH 10 - FLOOD PLAIN RECTIFICA													
Design		26-Sep-2010	12	26-Sep-2011	-	-	-	-	-	-	-	-	-
Construction - Unphased		27-Dec-2011	18	26-Jun-2013	-	-	-	-	-	-	-	-	-
Real estate		25-Dec-2010	12	25-Dec-2011	-	-	-	-	-	-	-	-	-
SUBTOTAL:		26-Sep-2010	33	26-Jun-2013	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =		$22,028,000											
ALADO CRK - IH35 TO PLETZ PARK - FLOOD PLAIN RECTIFICAT													
Design		26-Jun-2012	9	26-Mar-2013	-	-	-	-	-	-	-	-	-
Construction - Unphased		26-Jun-2013	15	26-Sep-2014	-	-	-	-	-	-	-	-	-
Real estate		24-Oct-2012	9	24-Jul-2013	-	-	-	-	-	-	-	-	-
SUBTOTAL:		26-Jun-2012	27	26-Sep-2014	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =		$6,096,000											
ALADO CRK - EISENHAUER RD TO FORT SAM HOUSTON - FLOOD P													
Design		26-Jun-2012	24	26-Jun-2014	-	-	-	-	-	-	-	-	-
Construction - Unphased		26-Sep-2014	36	25-Sep-2017	-	-	-	-	-	-	-	-	-
Real estate		26-Jun-2013	18	25-Dec-2014	-	-	-	-	-	-	-	-	-
SUBTOTAL:		26-Jun-2012	63	25-Sep-2017	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =		$42,484,000											
ON CRK - 2000' DS NEW LAREDO HWY TO QUINTANA RD - RELO													
Design		01-Jan-2000	4	01-May-2000	$17,103	-	-	-	-	-	-	-	-
Construction - Unphased		30-Jun-2000	-	30-Jun-2000	-	-	-	-	-	-	-	-	-
Real estate		01-Jan-2000	18	01-Jul-2001	$1,039,000	$2,188,000	$3,000	-	-	-	-	-	-
SUBTOTAL:		01-Jan-2000	18	01-Jul-2001	$1,056,103	$2,188,000	$3,000	-	-	-	-	-	-
PROJECTED TOTAL COST =		$3,247,103											

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90 | 5% = ANNUAL IN
Prepared by: DORIAN FRENCH, P.E.

By: D.F. PROJECT	09/07/90 11:11 AM START DATE	LGTH MOS.	FINISH DATE	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
SALADO CRK - "J" STREET PARK - CHANNEL RECTIFICATION												
Design	28-Jun-2005	9	29-Mar-2006	-	-	-	-	-	-	-	-	-
Construction - Unphased	29-Jun-2006	12	29-Jun-2007	-	-	-	-	-	-	-	-	-
Real estate	26-Sep-2005	9	27-Jun-2006	-	-	-	-	-	-	-	-	-
SUBTOTAL:	28-Jun-2005	24	29-Jun-2007	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$2,948,643											
SALADO CRK - MLK PARK TO UPSTREAM OF "J" STREET PARK - F												
Design	29-Mar-2005	24	29-Mar-2007	-	-	-	-	-	-	-	-	-
Construction - Unphased	29-Jun-2007	36	28-Jun-2010	$8,845,000	$9,210,000	-	-	-	-	-	-	-
Real estate	25-Sep-2005	18	26-Mar-2007	-	-	-	-	-	-	-	-	-
SUBTOTAL:	29-Mar-2005	63	28-Jun-2010	$8,845,000	$9,210,000	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$32,375,000											
SALADO CRK - IH 10 TO MLK PARK - FLOOD PLAIN RECTIFICATI												
Design	28-Mar-2009	12	28-Mar-2010	$228,000	$680,000	-	-	-	-	-	-	-
Construction - Unphased	28-Jun-2010	18	27-Dec-2011	-	$34,000	$4,291,000	$2,215,000	-	-	-	-	-
Real estate	26-Jul-2009	12	26-Jul-2010	-	$3,374,000	$261,000	-	-	-	-	-	-
SUBTOTAL:	28-Mar-2009	33	27-Dec-2011	$228,000	$4,088,000	$4,552,000	$2,215,000	-	-	-	-	-
PROJECTED TOTAL COST =	$11,083,000											
SALADO CRK - PLETZ PARK TO IH 10 - FLOOD PLAIN RECTIFICA												
Design	26-Sep-2010	12	26-Sep-2011	-	-	$1,935,000	$641,000	-	-	-	-	-
Construction - Unphased	27-Dec-2011	18	26-Jun-2013	-	-	-	$6,069,000	$12,334,000	-	-	-	-
Real estate	25-Dec-2010	12	25-Dec-2011	-	-	$526,000	$523,000	-	-	-	-	-
SUBTOTAL:	26-Sep-2010	33	26-Jun-2013	-	-	$2,461,000	$7,233,000	$12,334,000	-	-	-	-
PROJECTED TOTAL COST =	$22,028,000											
SALADO CRK - IH35 TO PLETZ PARK - FLOOD PLAIN RECTIFICAT												
Design	26-Jun-2012	9	26-Mar-2013	-	-	-	$8,000	$476,000	-	-	-	-
Construction - Unphased	26-Jun-2013	15	26-Sep-2014	-	-	-	-	$43,000	$4,064,000	$1,019,000	-	-
Real estate	24-Oct-2012	9	24-Jul-2013	-	-	-	-	$442,000	$44,000	-	-	-
SUBTOTAL:	26-Jun-2012	27	26-Sep-2014	-	-	-	$8,000	$961,000	$4,108,000	$1,019,000	-	-
PROJECTED TOTAL COST =	$6,096,000											
SALADO CRK - EISENHAUER RD TO FORT SAM HOUSTON - FLOOD P												
Design	26-Jun-2012	24	26-Jun-2014	-	-	-	$28,000	$2,210,000	$2,288,000	-	-	-
Construction - Unphased	26-Sep-2014	36	25-Sep-2017	-	-	-	-	-	-	$8,237,000	$11,394,000	$11,931,000
Real estate	26-Jun-2013	18	25-Dec-2014	-	-	-	-	$29,000	$2,258,000	$1,153,000	-	-
SUBTOTAL:	26-Jun-2012	63	25-Sep-2017	-	-	-	$28,000	$2,239,000	$4,546,000	$9,390,000	$11,394,000	$11,931,000
PROJECTED TOTAL COST =	$42,484,000											
LEON CRK - 2000' DS NEW LAREDO HWY TO QUINTANA RD - RELO												
Design	01-Jan-2000	4	01-May-2000	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Jun-2000	-	30-Jun-2000	-	-	-	-	-	-	-	-	-
Real estate	01-Jan-2000	18	01-Jul-2001	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-2000	18	01-Jul-2001	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$3,247,103											

90 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

FLATION FACTOR APPLIED T

By: D.F. OJECT	09/07/90 11:11 AM START DATE	LGTH MOS.	FINISH DATE	FY 18	FY 19
LADO CRK - "J" STREET PARK - CHANNEL RECTIFICATION					
Design	28-Jun-2005	9	29-Mar-2006	-	-
Construction - Unphased	29-Jun-2006	12	29-Jun-2007	-	-
Real estate	26-Sep-2005	9	27-Jun-2006	-	-
SUBTOTAL:	28-Jun-2005	24	29-Jun-2007	-	-
PROJECTED TOTAL COST =	$2,948,643				
LADO CRK - MLK PARK TO UPSTREAM OF "J" STREET PARK - F					
Design	29-Mar-2005	24	29-Mar-2007	-	-
Construction - Unphased	29-Jun-2007	36	28-Jun-2010	-	-
Real estate	25-Sep-2005	18	26-Mar-2007	-	-
SUBTOTAL:	29-Mar-2005	63	28-Jun-2010	-	-
PROJECTED TOTAL COST =	$32,375,000				
LADO CRK - IH 10 TO MLK PARK - FLOOD PLAIN RECTIFICATI					
Design	28-Mar-2009	12	28-Mar-2010	-	-
Construction - Unphased	28-Jun-2010	18	27-Dec-2011	-	-
Real estate	26-Jul-2009	12	26-Jul-2010	-	-
SUBTOTAL:	28-Mar-2009	33	27-Dec-2011	-	-
PROJECTED TOTAL COST =	$11,083,000				
LADO CRK - PLETZ PARK TO IH 10 - FLOOD PLAIN RECTIFICA					
Design	26-Sep-2010	12	26-Sep-2011	-	-
Construction - Unphased	27-Dec-2011	18	26-Jun-2013	-	-
Real estate	25-Dec-2010	12	25-Dec-2011	-	-
SUBTOTAL:	26-Sep-2010	33	26-Jun-2013	-	-
PROJECTED TOTAL COST =	$22,028,000				
LADO CRK - IH35 TO PLETZ PARK - FLOOD PLAIN RECTIFICAT					
Design	26-Jun-2012	9	26-Mar-2013	-	-
Construction - Unphased	26-Jun-2013	15	26-Sep-2014	-	-
Real estate	24-Oct-2012	9	24-Jul-2013	-	-
SUBTOTAL:	26-Jun-2012	27	26-Sep-2014	-	-
PROJECTED TOTAL COST =	$6,096,000				
LADO CRK - EISENHAUER RD TO FORT SAM HOUSTON - FLOOD P					
Design	26-Jun-2012	24	26-Jun-2014	-	-
Construction - Unphased	26-Sep-2014	36	25-Sep-2017	$2,956,000	-
Real estate	26-Jun-2013	18	25-Dec-2014	-	-
SUBTOTAL:	26-Jun-2012	63	25-Sep-2017	$2,956,000	-
PROJECTED TOTAL COST =	$42,484,000				
ON CRK - 2000' DS NEW LAREDO HWY TO QUINTANA RD - RELO					
Design	01-Jan-2000	4	01-May-2000	-	-
Construction - Unphased	30-Jun-2000	-	30-Jun-2000	-	-
Real estate	01-Jan-2000	18	01-Jul-2001	-	-
SUBTOTAL:	01-Jan-2000	18	01-Jul-2001	-	-
PROJECTED TOTAL COST =	$3,247,103				

...FLATION FACTOR APPLIED TO ALL COST PROJECTIONS

07-Sep-90
Prepared by: DORIAN FRENCH, P.E.

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

By: D.F. 09/07/90 11:11 AM PROJECT	START DATE	LGTH MOS.	FINISH DATE	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99
22 LEON CRK - S.A. CORP LIMITS TO 2000' DS NEW LAREDO HWY -												
Design	30-Sep-99	6	30-Mar-2000	-	-	-	-	-	-	-	-	-
Floodproofing	30-Jun-2000	9	31-Mar-2001	-	-	-	-	-	-	-	-	-
Real estate & relocation	29-Nov-99	9	28-Aug-2000	-	-	-	-	-	-	-	-	-
SUBTOTAL:	30-Sep-99	18	31-Mar-2001	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$2,697,358											
23 LEON CRK - MOREY RD TO S.A. CORPORATE LIMITS - FLOOD PLA												
Design	30-Dec-98	24	29-Dec-2000	-	-	-	-	-	-	-	-	$673,000
Construction - Unphased	31-Mar-2001	36	30-Mar-2004	-	-	-	-	-	-	-	-	-
Real estate	30-Dec-99	18	29-Jun-2001	-	-	-	-	-	-	-	-	-
SUBTOTAL:	30-Dec-98	63	30-Mar-2004	-	-	-	-	-	-	-	-	$673,000
PROJECTED TOTAL COST =	$24,891,000											
24 LEON CRK - IH 10 TO MOREY RD (CAMARGO PARK) - FLOOD PLAI												
Design	29-Jun-2002	18	29-Dec-2003	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-2004	24	30-Mar-2006	-	-	-	-	-	-	-	-	-
Real estate	26-Dec-2002	12	26-Dec-2003	-	-	-	-	-	-	-	-	-
SUBTOTAL:	29-Jun-2002	45	30-Mar-2006	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$17,944,000											
25 LEON CRK - KEITHA TO HWY 90 WEST (RODRIGUEZ PARK) - CHAN												
Design	29-Mar-2005	9	28-Dec-2005	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-2006	15	29-Jun-2007	-	-	-	-	-	-	-	-	-
Real estate	27-Jul-2005	9	27-Apr-2006	-	-	-	-	-	-	-	-	-
SUBTOTAL:	29-Mar-2005	27	29-Jun-2007	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$4,745,282											
26 LEON CRK - OLD CAMP BULLIS RD TO S.P.R.R. - RELOC & FLOO												
Design	27-Jan-2007	2	29-Mar-2007	-	-	-	-	-	-	-	-	-
Floodproofing	29-Jun-2007	3	28-Sep-2007	-	-	-	-	-	-	-	-	-
Real estate & relocation	27-Jan-2007	3	28-Apr-2007	-	-	-	-	-	-	-	-	-
SUBTOTAL:	27-Jan-2007	8	28-Sep-2007	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$62,846											
27 LEON CRK - S.P.R.R. TO IH 10 SO BOUND FRONTAGE RD - RELO												
Design	28-Apr-2007	2	28-Jun-2007	-	-	-	-	-	-	-	-	-
Construction - Unphased	28-Sep-2007	4	28-Jan-2008	-	-	-	-	-	-	-	-	-
Real estate	28-Apr-2007	9	27-Jan-2008	-	-	-	-	-	-	-	-	-
SUBTOTAL:	28-Apr-2007	9	28-Jan-2008	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,020,299											
28 LEON CRK - RAYMOND RUSSEL PARK												
Design	27-Jan-2007	9	28-Oct-2007	-	-	-	-	-	-	-	-	-
Construction - Unphased	28-Jan-2008	15	28-Apr-2009	-	-	-	-	-	-	-	-	-
Real estate	27-May-2007	9	25-Feb-2008	-	-	-	-	-	-	-	-	-
SUBTOTAL:	27-Jan-2007	27	28-Apr-2009	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$6,169,000											

ANTONIO RIVER AUTHORITY

990 BEXAR COUNTY BOND CONTRACT AMENDMENT — 07-Sep-90

FISCAL COST ESTIMATES - SMALL SJD — Prepared by: DORIAN FRENCH, P.E.

By: D.F. ROJECT	09/07/90 11:11 AM START DATE	LGTH MOS.	FINISH DATE	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
EON CRK - S.A. CORP LIMITS TO 2000' DS NEW LAREDO HWY -												
Design	30-Sep-99	6	30-Mar-2000	$92,358	-	-	-	-	-	-	-	-
Floodproofing	30-Jun-2000	9	31-Mar-2001	$1,000	$386,000	-	-	-	-	-	-	-
Real estate & relocation	29-Nov-99	9	28-Aug-2000	$1,723,000	$495,000	-	-	-	-	-	-	-
SUBTOTAL:	30-Sep-99	18	31-Mar-2001	$1,816,358	$881,000	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$2,697,358											
EON CRK - MOREY RD TO S.A. CORPORATE LIMITS - FLOOD PLA												
Design	30-Dec-98	24	29-Dec-2000	$1,415,000	$736,000	-	-	-	-	-	-	-
Construction - Unphased	31-Mar-2001	36	30-Mar-2004	-	$1,654,000	$6,915,000	$7,260,000	$5,707,000	-	-	-	-
Real estate	30-Dec-99	18	29-Jun-2001	$173,000	$358,000	-	-	-	-	-	-	-
SUBTOTAL:	30-Dec-98	63	30-Mar-2004	$1,588,000	$2,748,000	$6,915,000	$7,260,000	$5,707,000	-	-	-	-
PROJECTED TOTAL COST =	$24,891,000											
EON CRK - IH 10 TO MOREY RD (CAMARGO PARK) - FLOOD PLAI												
Design	29-Jun-2002	18	29-Dec-2003	-	-	$5,000	$1,367,000	$711,000	-	-	-	-
Construction - Unphased	30-Mar-2004	24	30-Mar-2006	-	-	-	-	$1,822,000	$7,531,000	$5,899,000	-	-
Real estate	26-Dec-2002	12	26-Dec-2003	-	-	-	$303,000	$306,000	-	-	-	-
SUBTOTAL:	29-Jun-2002	45	30-Mar-2006	-	-	$5,000	$1,670,000	$2,839,000	$7,531,000	$5,899,000	-	-
PROJECTED TOTAL COST =	$17,944,000											
EON CRK - KEITHA TO HWY 90 WEST (RODRIGUEZ PARK) - CHAN												
Design	29-Mar-2005	9	28-Dec-2005	-	-	-	-	-	$82,000	$167,000	-	-
Construction - Unphased	30-Mar-2006	15	29-Jun-2007	-	-	-	-	-	-	$839,000	$3,451,000	-
Real estate	27-Jul-2005	9	27-Apr-2006	-	-	-	-	-	-	$206,282	-	-
SUBTOTAL:	29-Mar-2005	27	29-Jun-2007	-	-	-	-	-	$82,000	$1,212,282	$3,451,000	-
PROJECTED TOTAL COST =	$4,745,282											
EON CRK - OLD CAMP BULLIS RD TO S.P.R.R. - RELOC & FLOO												
Design	27-Jan-2007	2	29-Mar-2007	-	-	-	-	-	-	-	$4,813	-
Floodproofing	29-Jun-2007	3	28-Sep-2007	-	-	-	-	-	-	-	$1,000	$45,000
Real estate & relocation	27-Jan-2007	3	28-Apr-2007	-	-	-	-	-	-	-	$12,033	-
SUBTOTAL:	27-Jan-2007	8	28-Sep-2007	-	-	-	-	-	-	-	$17,846	$45,000
PROJECTED TOTAL COST =	$62,846											
EON CRK - S.P.R.R. TO IH 10 SO BOUND FRONTAGE RD - RELO												
Design	28-Apr-2007	2	28-Jun-2007	-	-	-	-	-	-	-	$7,220	-
Construction - Unphased	28-Sep-2007	4	28-Jan-2008	-	-	-	-	-	-	-	-	$945,079
Real estate	28-Apr-2007	9	27-Jan-2008	-	-	-	-	-	-	-	$15,000	$53,000
SUBTOTAL:	28-Apr-2007	9	28-Jan-2008	-	-	-	-	-	-	-	$22,220	$998,079
PROJECTED TOTAL COST =	$1,020,299											
EON CRK - RAYMOND RUSSEL PARK												
Design	27-Jan-2007	9	28-Oct-2007	-	-	-	-	-	-	-	$204,000	$165,000
Construction - Unphased	28-Jan-2008	15	28-Apr-2009	-	-	-	-	-	-	-	-	$1,285,000
Real estate	27-May-2007	9	25-Feb-2008	-	-	-	-	-	-	-	$227,000	$1,657,000
SUBTOTAL:	27-Jan-2007	27	28-Apr-2009	-	-	-	-	-	-	-	$431,000	$3,107,000
PROJECTED TOTAL COST =	$6,169,000											

ANNUAL INFLATION FACTOR APPLIED TO ALL COST PROJECTIONS

N ANTONIO RIVER AUTHORITY

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90 5% = ANNUAL IN
Prepared by: DORIAN FRENCH, P.E.

By: D.F. PROJECT	09/07/90 11:11 AM START DATE	LGTH MOS.	FINISH DATE	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
LEON CRK - S.A. CORP LIMITS TO 2000' DS NEW LAREDO HWY -												
Design	30-Sep-99	6	30-Mar-2000	-	-	-	-	-	-	-	-	-
Floodproofing	30-Jun-2000	9	31-Mar-2001	-	-	-	-	-	-	-	-	-
Real estate & relocation	29-Nov-99	9	28-Aug-2000	-	-	-	-	-	-	-	-	-
SUBTOTAL:	30-Sep-99	18	31-Mar-2001	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$2,697,358											
LEON CRK - MOREY RD TO S.A. CORPORATE LIMITS - FLOOD PLA												
Design	30-Dec-98	24	29-Dec-2000	-	-	-	-	-	-	-	-	-
Construction - Unphased	31-Mar-2001	36	30-Mar-2004	-	-	-	-	-	-	-	-	-
Real estate	30-Dec-99	18	29-Jun-2001	-	-	-	-	-	-	-	-	-
SUBTOTAL:	30-Dec-98	63	30-Mar-2004	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$24,891,000											
LEON CRK - IH 10 TO MOREY RD (CAMARGO PARK) - FLOOD PLAI												
Design	29-Jun-2002	18	29-Dec-2003	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-2004	24	30-Mar-2006	-	-	-	-	-	-	-	-	-
Real estate	26-Dec-2002	12	26-Dec-2003	-	-	-	-	-	-	-	-	-
SUBTOTAL:	29-Jun-2002	45	30-Mar-2006	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$17,944,000											
LEON CRK - KEITHA TO HWY 90 WEST (RODRIGUEZ PARK) - CHAN												
Design	29-Mar-2005	9	28-Dec-2005	-	-	-	-	-	-	-	-	-
Construction - Unphased	30-Mar-2006	15	29-Jun-2007	-	-	-	-	-	-	-	-	-
Real estate	27-Jul-2005	9	27-Apr-2006	-	-	-	-	-	-	-	-	-
SUBTOTAL:	29-Mar-2005	27	29-Jun-2007	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$4,745,282											
LEON CRK - OLD CAMP BULLIS RD TO S.P.R.R. - RELOC & FLOO												
Design	27-Jan-2007	2	29-Mar-2007	-	-	-	-	-	-	-	-	-
Floodproofing	29-Jun-2007	3	28-Sep-2007	-	-	-	-	-	-	-	-	-
Real estate & relocation	27-Jan-2007	3	28-Apr-2007	-	-	-	-	-	-	-	-	-
SUBTOTAL:	27-Jan-2007	8	28-Sep-2007	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$62,846											
LEON CRK - S.P.R.R. TO IH 10 SO BOUND FRONTAGE RD - RELO												
Design	28-Apr-2007	2	28-Jun-2007	-	-	-	-	-	-	-	-	-
Construction - Unphased	28-Sep-2007	4	28-Jan-2008	-	-	-	-	-	-	-	-	-
Real estate	28-Apr-2007	9	27-Jan-2008	-	-	-	-	-	-	-	-	-
SUBTOTAL:	28-Apr-2007	9	28-Jan-2008	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$1,020,299											
.EON CRK - RAYMOND RUSSEL PARK												
Design	27-Jan-2007	9	28-Oct-2007	-	-	-	-	-	-	-	-	-
Construction - Unphased	28-Jan-2008	15	28-Apr-2009	$2,631,000	-	-	-	-	-	-	-	-
Real estate	27-May-2007	9	25-Feb-2008	-	-	-	-	-	-	-	-	-
SUBTOTAL:	27-Jan-2007	27	28-Apr-2009	$2,631,000	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$6,169,000											

ANTONIO RIVER AUTHORITY

990 BEXAR COUNTY BOND CONTRACT AMENDMENT FLATION FACTOR APPLIED T

FISCAL COST ESTIMATES - SMALL SJD

By: D.F. ROJECT	09/07/90 11:11 AM START DATE	LGTH MOS.	FINISH DATE	FY 18	FY 19
EON CRK - S.A. CORP LIMITS TO 2000' DS NEW LAREDO HWY -					
Design	30-Sep-99	6	30-Mar-2000	-	-
Floodproofing	30-Jun-2000	9	31-Mar-2001	-	-
Real estate & relocation	29-Nov-99	9	28-Aug-2000	-	-
SUBTOTAL:	30-Sep-99	18	31-Mar-2001	-	-
PROJECTED TOTAL COST =	$2,697,358				
EON CRK - MOREY RD TO S.A. CORPORATE LIMITS - FLOOD PLA					
Design	30-Dec-98	24	29-Dec-2000	-	-
Construction - Unphased	31-Mar-2001	36	30-Mar-2004	-	-
Real estate	30-Dec-99	18	29-Jun-2001	-	-
SUBTOTAL:	30-Dec-98	63	30-Mar-2004	-	-
PROJECTED TOTAL COST =	$24,891,000				
EON CRK - IH 10 TO MOREY RD (CAMARGO PARK) - FLOOD PLAI					
Design	29-Jun-2002	18	29-Dec-2003	-	-
Construction - Unphased	30-Mar-2004	24	30-Mar-2006	-	-
Real estate	26-Dec-2002	12	26-Dec-2003	-	-
SUBTOTAL:	29-Jun-2002	45	30-Mar-2006	-	-
PROJECTED TOTAL COST =	$17,944,000				
EON CRK - KEITHA TO HWY 90 WEST (RODRIGUEZ PARK) - CHAN					
Design	29-Mar-2005	9	28-Dec-2005	-	-
Construction - Unphased	30-Mar-2006	15	29-Jun-2007	-	-
Real estate	27-Jul-2005	9	27-Apr-2006	-	-
SUBTOTAL:	29-Mar-2005	27	29-Jun-2007	-	-
PROJECTED TOTAL COST =	$4,745,282				
ON CRK - OLD CAMP BULLIS RD TO S.P.R.R. - RELOC & FLOO					
Design	27-Jan-2007	2	29-Mar-2007	-	-
Floodproofing	29-Jun-2007	3	28-Sep-2007	-	-
Real estate & relocation	27-Jan-2007	3	28-Apr-2007	-	-
SUBTOTAL:	27-Jan-2007	8	28-Sep-2007	-	-
PROJECTED TOTAL COST =	$62,846				
ON CRK - S.P.R.R. TO IH 10 SO BOUND FRONTAGE RD - RELO					
Design	28-Apr-2007	2	28-Jun-2007	-	-
Construction - Unphased	28-Sep-2007	4	28-Jan-2008	-	-
Real estate	28-Apr-2007	9	27-Jan-2008	-	-
SUBTOTAL:	28-Apr-2007	9	28-Jan-2008	-	-
PROJECTED TOTAL COST =	$1,020,299				
ON CRK - RAYMOND RUSSEL PARK					
Design	27-Jan-2007	9	28-Oct-2007	-	-
Construction - Unphased	28-Jan-2008	15	28-Apr-2009	-	-
Real estate	27-May-2007	9	25-Feb-2008	-	-
SUBTOTAL:	27-Jan-2007	27	28-Apr-2009	-	-
PROJECTED TOTAL COST =	$6,169,000				

ANNUAL INFLATION FACTOR APPLIED TO ALL COST PROJECTIONS.

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90
Prepared by: DORIAN FRENCH, P.E.

By: D.F. 09/07/90 11:11 AM PROJECT	START DATE	LGTH MOS.	FINISH DATE	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99
29 LEON CRK - IH 10 SO BOUND FRONTAGE RD TO BOERNE STAGE RD												
Design	28-Oct-2007	2	25-Nov-2007	-	-	-	-	-	-	-	-	-
Construction - Unphased	25-Feb-2008	4	25-Jun-2008	-	-	-	-	-	-	-	-	-
Real estate	28-Oct-2007	9	28-Jul-2008	-	-	-	-	-	-	-	-	-
SUBTOTAL:	28-Oct-2007	9	28-Jul-2008	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$635,270											
30 MARTINEZ CRK - ALAZAN CRK TO CULEBRA												
Design	01-Jan-99	18	01-Jul-2000	-	-	-	-	-	-	-	-	$216,000
Construction - Unphased	29-Sep-2000	15	29-Dec-2001	-	-	-	-	-	-	-	-	-
Real estate	01-May-99	15	30-Jul-2000	-	-	-	-	-	-	-	-	$719,000
SUBTOTAL:	01-Jan-99	36	29-Dec-2001	-	-	-	-	-	-	-	-	$935,000
PROJECTED TOTAL COST =	$6,851,000											
31 CIBOLO CRK - 2.3 MI DS OF SCHAEFFER RD TO 1.3 MI US OF S												
Design	01-Jan-2000	2	01-Mar-2000	-	-	-	-	-	-	-	-	-
Floodproofing	30-Apr-2000	4	30-Aug-2000	-	-	-	-	-	-	-	-	-
Real estate & relocation	01-Jan-2000	9	30-Sep-2000	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-2000	9	30-Sep-2000	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$852,131											
32 CIBOLO CRK - 1.3 MI US OF SCHAEFFER RD TO FM 78 - RELOC.												
Design	01-Mar-2000	2	01-May-2000	-	-	-	-	-	-	-	-	-
Floodproofing	29-Jul-2000	4	28-Nov-2000	-	-	-	-	-	-	-	-	-
Real estate & relocation	01-Mar-2000	6	31-Aug-2000	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Mar-2000	9	28-Nov-2000	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$367,788											

COST REMAINING

	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99
$299,744,478 = TOTAL - EXCLUDING OLMOS AND NUEVA	$4,303,075	$9,274,683	$8,404,000	$8,906,000	$7,175,000	$8,588,000	$7,353,000	$13,009,000	$13,239,000
$193,100 = OLMOS DAM & NUEVA ST DAM PROJECTS	$193,100	-	-	-	-	-	-	-	-
$299,937,578 = TOTAL COST OF PROJECTS	$4,496,175	$9,274,683	$8,404,000	$8,906,000	$7,175,000	$8,588,000	$7,353,000	$13,009,000	$13,239,000
$91,610,758 = EXISTING & HIGH PRIORITY PROJECTS	$4,303,075	$9,274,683	$8,404,000	$8,906,000	$7,175,000	$8,588,000	$7,353,000	$13,009,000	$11,348,000
$5,258,000 = BEXAR COUNTY FLOOD STUDY	-	-	-	-	-	-	-	-	$283,000
$124,943,643 = SALADO CREEK PROJECTS	-	-	-	-	-	-	-	-	-
$61,412,158 = LEON CREEK PROJECTS	-	-	-	-	-	-	-	-	$673,000
$6,851,000 = MARTINEZ CREEK PROJECT	-	-	-	-	-	-	-	-	$935,000
$1,219,919 = CIBOLO CREEK PROJECTS	-	-	-	-	-	-	-	-	-

ANTONIO RIVER AUTHORITY

990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90
Prepared by: DORIAN FRENCH, P.E.

By: D.F. ROJECT	09/07/90 11:11 AM START DATE	LGTH MOS.	FINISH DATE	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
EON CRK - IH 10 SO BOUND FRONTAGE RD TO BOERNE STAGE RD												
Design	28-Oct-2007	2	25-Nov-2007	-	-	-	-	-	-	-	-	$5,054
Construction - Unphased	25-Feb-2008	4	25-Jun-2008	-	-	-	-	-	-	-	-	$20,216
Real estate	28-Oct-2007	9	28-Jul-2008	-	-	-	-	-	-	-	-	$547,000
SUBTOTAL:	28-Oct-2007	9	28-Jul-2008	-	-	-	-	-	-	-	-	$572,270
PROJECTED TOTAL COST =	$635,270											
ARTINEZ CRK - ALAZAN CRK TO CULEBRA												
Design	01-Jan-99	18	01-Jul-2000	$458,000	-	-	-	-	-	-	-	-
Construction - Unphased	29-Sep-2000	15	29-Dec-2001	-	$325,000	$225,000	-	-	-	-	-	-
Real estate	01-May-99	15	30-Jul-2000	$4,528,000	$380,000	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-99	36	29-Dec-2001	$4,986,000	$705,000	$225,000	-	-	-	-	-	-
PROJECTED TOTAL COST =	$6,851,000											
IBOLO CRK - 2.3 MI DS OF SCHAEFFER RD TO 1.3 MI US OF S												
Design	01-Jan-2000	2	01-Mar-2000	$5,131	-	-	-	-	-	-	-	-
Floodproofing	30-Apr-2000	4	30-Aug-2000	$11,000	$10,000	-	-	-	-	-	-	-
Real estate & relocation	01-Jan-2000	9	30-Sep-2000	$541,000	$285,000	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-2000	9	30-Sep-2000	$557,131	$295,000	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$852,131											
IBOLO CRK - 1.3 MI US OF SCHAEFFER RD TO FM 78 - RELOC.												
Design	01-Mar-2000	2	01-May-2000	$3,421	-	-	-	-	-	-	-	-
Floodproofing	29-Jul-2000	4	28-Nov-2000	-	$14,367	-	-	-	-	-	-	-
Real estate & relocation	01-Mar-2000	6	31-Aug-2000	$229,000	$121,000	-	-	-	-	-	-	-
SUBTOTAL:	01-Mar-2000	9	28-Nov-2000	$232,421	$135,367	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$367,788											

COST REMAINING

	FY 00	FY 01	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
$299,744,478 = TOTAL - EXCLUDING OLMOS AND NUEVA	$20,037,013	$15,885,367	$10,560,000	$10,548,000	$12,910,000	$12,081,000	$13,150,925	$8,711,066	$13,169,349
$193,100 = OLMOS DAM & NUEVA ST DAM PROJECTS	-	-	-	-	-	-	-	-	-
$299,937,578 = TOTAL COST OF PROJECTS	$20,037,013	$15,885,367	$10,560,000	$10,548,000	$12,910,000	$12,081,000	$13,150,925	$8,711,066	$13,169,349
$91,610,758 = EXISTING & HIGH PRIORITY PROJECTS	$7,444,000	$5,806,000	-	-	-	-	-	-	-
$5,258,000 = BEXAR COUNTY FLOOD STUDY	$2,264,000	$2,490,000	$221,000	-	-	-	-	-	-
$124,943,643 = SALADO CREEK PROJECTS	-	$341,000	$2,579,000	$1,618,000	$4,364,000	$4,468,000	$6,039,643	$4,789,000	$8,447,000
$61,412,158 = LEON CREEK PROJECTS	$4,460,462	$5,817,000	$6,923,000	$8,930,000	$8,546,000	$7,613,000	$7,111,282	$3,922,066	$4,722,349
$6,851,000 = MARTINEZ CREEK PROJECT	$4,986,000	$705,000	$225,000	-	-	-	-	-	-
$1,219,919 = CIBOLO CREEK PROJECTS	$789,552	$430,367	-	-	-	-	-	-	-

AN ANTONIO RIVER AUTHORITY

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

07-Sep-90 5% = ANNUAL IN

Prepared by: DORIAN FRENCH, P.E.

By: D.F. PROJECT	09/07/90 11:11 AM START DATE	LGTH MOS.	FINISH DATE	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
9 LEON CRK - IH 10 SO BOUND FRONTAGE RD TO BOERNE STAGE RD												
Design	28-Oct-2007	2	25-Nov-2007	-	-	-	-	-	-	-	-	-
Construction - Unphased	25-Feb-2008	4	25-Jun-2008	-	-	-	-	-	-	-	-	-
Real estate	28-Oct-2007	9	28-Jul-2008	$63,000	-	-	-	-	-	-	-	-
SUBTOTAL:	28-Oct-2007	9	28-Jul-2008	$63,000	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$635,270											
0 MARTINEZ CRK - ALAZAN CRK TO CULEBRA												
Design	01-Jan-99	18	01-Jul-2000	-	-	-	-	-	-	-	-	-
Construction - Unphased	29-Sep-2000	15	29-Dec-2001	-	-	-	-	-	-	-	-	-
Real estate	01-May-99	15	30-Jul-2000	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-99	36	29-Dec-2001	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$6,851,000											
1 CIBOLO CRK - 2.3 MI DS OF SCHAEFFER RD TO 1.3 MI US OF S												
Design	01-Jan-2000	2	01-Mar-2000	-	-	-	-	-	-	-	-	-
Floodproofing	30-Apr-2000	4	30-Aug-2000	-	-	-	-	-	-	-	-	-
Real estate & relocation	01-Jan-2000	9	30-Sep-2000	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Jan-2000	9	30-Sep-2000	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$852,131											
2 CIBOLO CRK - 1.3 MI US OF SCHAEFFER RD TO FM 78 - RELOC.												
Design	01-Mar-2000	2	01-May-2000	-	-	-	-	-	-	-	-	-
Floodproofing	29-Jul-2000	4	28-Nov-2000	-	-	-	-	-	-	-	-	-
Real estate & relocation	01-Mar-2000	6	31-Aug-2000	-	-	-	-	-	-	-	-	-
SUBTOTAL:	01-Mar-2000	9	28-Nov-2000	-	-	-	-	-	-	-	-	-
PROJECTED TOTAL COST =	$367,788											

COST REMAINING

	FY 09	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 17
$299,744,478 = TOTAL - EXCLUDING OLMOS AND NUEVA	$11,767,000	$13,298,000	$7,013,000	$9,484,000	$15,534,000	$8,654,000	$10,409,000	$11,394,000	$11,931,000
$193,100 = OLMOS DAM & NUEVA ST DAM PROJECTS	-	-	-	-	-	-	-	-	-
$299,937,578 = TOTAL COST OF PROJECTS	$11,767,000	$13,298,000	$7,013,000	$9,484,000	$15,534,000	$8,654,000	$10,409,000	$11,394,000	$11,931,000
$91,610,758 = EXISTING & HIGH PRIORITY PROJECTS	-	-	-	-	-	-	-	-	-
$5,258,000 = BEXAR COUNTY FLOOD STUDY	-	-	-	-	-	-	-	-	-
$124,943,643 = SALADO CREEK PROJECTS	$8,845,000	$12,584,000	$2,722,000	$7,269,000	$15,534,000	$8,654,000	$10,409,000	$11,394,000	$11,931,000
$61,412,158 = LEON CREEK PROJECTS	$2,694,000	-	-	-	-	-	-	-	-
$6,851,000 = MARTINEZ CREEK PROJECT	-	-	-	-	-	-	-	-	-
$1,219,919 = CIBOLO CREEK PROJECTS	-	-	-	-	-	-	-	-	-

N ANTONIO RIVER AUTHORITY

1990 BEXAR COUNTY BOND CONTRACT AMENDMENT
FISCAL COST ESTIMATES - SMALL SJD

By: D.F. / PROJECT	09/07/90 11:11 AM	START DATE	LGTH MOS.	FINISH DATE	FLATION FACTOR APPLIED T FY 18	FY 19
LEON CRK - IH 10 SO BOUND FRONTAGE RD TO BOERNE STAGE RD						
Design		28-Oct-2007	2	25-Nov-2007	-	-
Construction - Unphased		25-Feb-2008	4	25-Jun-2008	-	-
Real estate		28-Oct-2007	9	28-Jul-2008	-	-
SUBTOTAL:		28-Oct-2007	9	28-Jul-2008	-	-
PROJECTED TOTAL COST =		$635,270				
MARTINEZ CRK - ALAZAN CRK TO CULEBRA						
Design		01-Jan-99	18	01-Jul-2000	-	-
Construction - Unphased		29-Sep-2000	15	29-Dec-2001	-	-
Real estate		01-May-99	15	30-Jul-2000	-	-
SUBTOTAL:		01-Jan-99	36	29-Dec-2001	-	-
PROJECTED TOTAL COST =		$6,851,000				
CIBOLO CRK - 2.3 MI DS OF SCHAEFFER RD TO 1.3 MI US OF S						
Design		01-Jan-2000	2	01-Mar-2000	-	-
Floodproofing		30-Apr-2000	4	30-Aug-2000	-	-
Real estate & relocation		01-Jan-2000	9	30-Sep-2000	-	-
SUBTOTAL:		01-Jan-2000	9	30-Sep-2000	-	-
PROJECTED TOTAL COST =		$852,131				
CIBOLO CRK - 1.3 MI US OF SCHAEFFER RD TO FM 78 - RELOC.						
Design		01-Mar-2000	2	01-May-2000	-	-
Floodproofing		29-Jul-2000	4	28-Nov-2000	-	-
Real estate & relocation		01-Mar-2000	6	31-Aug-2000	-	-
SUBTOTAL:		01-Mar-2000	9	28-Nov-2000	-	-
PROJECTED TOTAL COST =		$367,788				

COST REMAINING

		FY 18	FY 19
$299,744,478	= TOTAL - EXCLUDING OLMOS AND NUEVA	$2,956,000	-
$193,100	= OLMOS DAM & NUEVA ST DAM PROJECTS	-	-
$299,937,578	= TOTAL COST OF PROJECTS	$2,956,000	-
$91,610,758	= EXISTING & HIGH PRIORITY PROJECTS	-	-
$5,258,000	= BEXAR COUNTY FLOOD STUDY	-	-
$124,943,643	= SALADO CREEK PROJECTS	$2,956,000	-
$61,412,158	= LEON CREEK PROJECTS	-	-
$6,851,000	= MARTINEZ CREEK PROJECT	-	-
$1,219,919	= CIBOLO CREEK PROJECTS	-	-

% ANNUAL INFLATION FACTOR APPLIED TO ALL COST PROJECTIONS.

APPENDIX U

1996 Bexar County/City of San Antonio/SARA Joint Project

CITY OF SAN ANTONIO

P O BOX 839966
SAN ANTONIO, TEXAS 78283-3966

November 22, 1995

NOV 1995
SARA

Mr. Fred N. Pfeiffer, P. E.
General Manager
San Antonio River Authority
P.O. Box 830027
San Antonio, TX 78283-0027

RE: CITY/COUNTY/SARA COOPERATIVE FLOOD PREVENTION PROGRAM

In recent months, we have discussed with you and the County Engineer ways that the three entities (City/County/SARA) can work together to bring about major flood control and bridge projects throughout Bexar County. We have discussed the use of the existing control tax to achieve these improvements in the short-term. In the longer term, we could use either an expansion of the flood control tax or a county-wide Bond Election to accomplish even more.

There are many vital projects that need the expertise currently available at SARA for implementation. They are located both inside the City and in the County outside of the City. We need your careful consideration of this partnership arrangement, and ask your support for the following projects:

1. Detention facility near Spencer Land and IH-10. Estimated cost, including land, is $4.6 million. This detention facility will eliminate current flooding problems being experienced by the Northwest Center mall and homes along Laddie Place. Detention/release volumes will be controlled to correspond with the flow capacity of the culvert, constructed in 1957 under Kampmann Blvd. The effects of this improvement would also benefit Woodlawn Lake by reducing sediments being delivered to the lake and by reducing erosional discharge velocities currently eroding the banks of the lake.

2. Detention facility on east branch of the Olmos Creek (Elm Creek) in Shavano Park. Construction cost is estimated at $2.8 million on 55-acre donated site. This detention facility would have a capacity of approximately 400 acre-feet and could be expanded to approximately 900 acre-feet if warranted by future growth.

Mr. Fred N. Pfeiffer, P. E.
General Manager
San Antonio River Authority
P.O. Box 830027
San Antonio, TX 78283-0027

3. Channel stabilization along the San Antonio River from Houston Street to Lexington Avenue at an estimated cost of $18.0 million and from Lexington Avenue to Brooklyn Avenue at an estimated cost of $7.7 million. The desperate need for channel improvements in the downtown area was conveyed to SARA by letter dated March 31, 1995. The safety and welfare issues addressed by implementing this project as well as the potential economic benefits to development along the river rank this project as a high priority effort.

4. Major drainage improvements and channel work along the San Antonio River in the areas of the proposed Mission Trails alignment. The San Antonio River is being exposed to more tourist and visitor traffic, and there is a need to make improvements that more appropriately fit into the theme of Mission Trails.

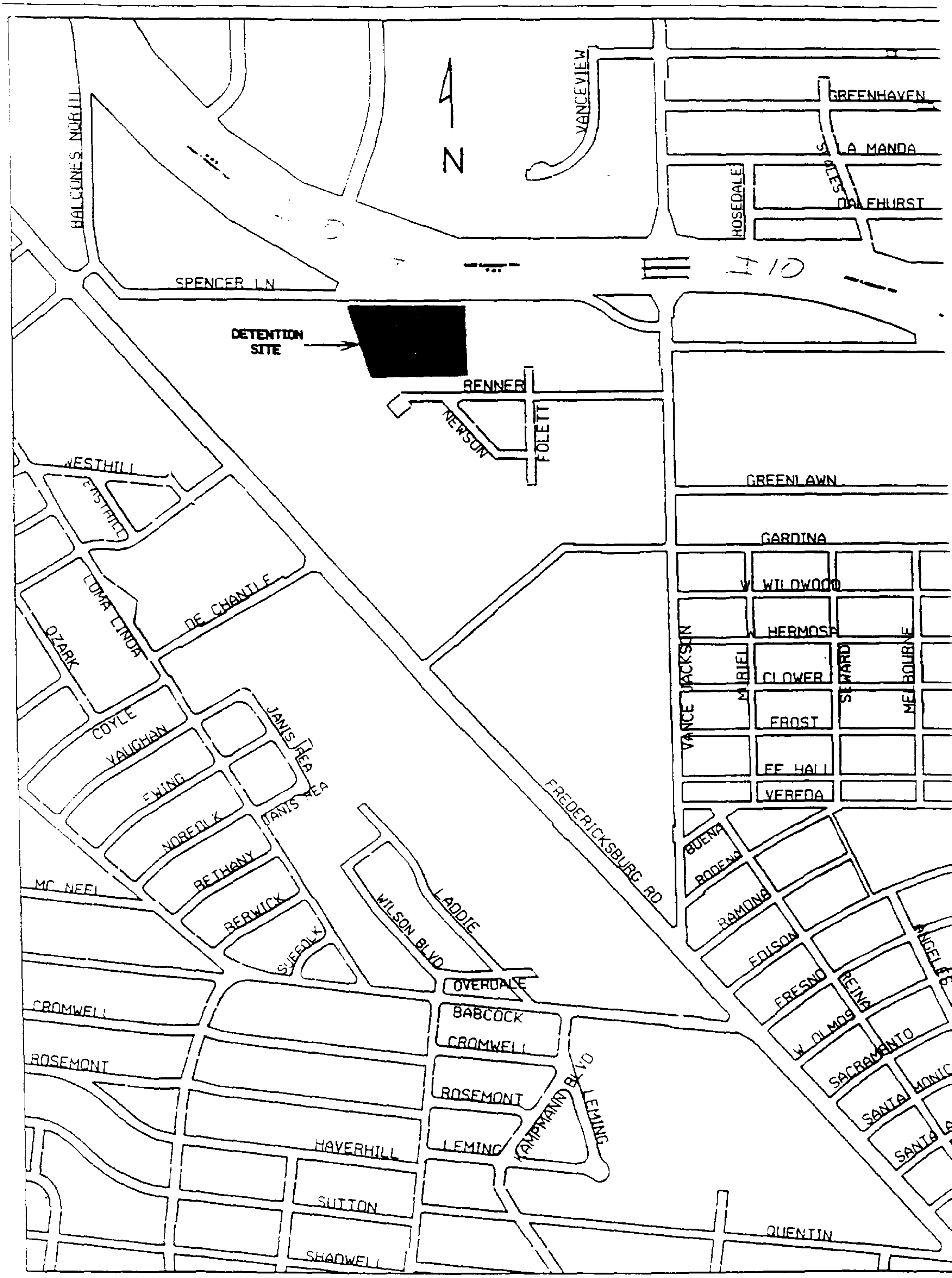
It is my understanding that funding for these listed projects would be eligible for funds derived from the Bexar County Flood Control Tax.

If you have any questions or need additional information, please contact me at 207-8024.

Sincerely,

John L. German, P. E.
DIRECTOR OF PUBLIC WORKS

JLG/kaz
Attachment: Project Location Map



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WESTHILL
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GREENLAWN
GARDINA
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LOMA LINDA
DE CHANTLE
OZARK
VANCE JACKSON
MURIEL
CLOWER
SEWARD
MELBOURNE
FROST
COYLE
VAUGHAN
JANIS REA
EWING
FREDERICKSBURG RD
VEREDA
NORFOLK
BETHANY
BUENA
BODENA
MC NEEL
BERWICK
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WILSON BLVD
RAMONA
EDISON
SUFFOLK
OVERDALE
FRESNO
REINA
ANGELES
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BABCOCK
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ROSEMONT
KAMPMANN BLVD
LEMING
SANTA MONICA
HAVERHILL
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QUENTIN
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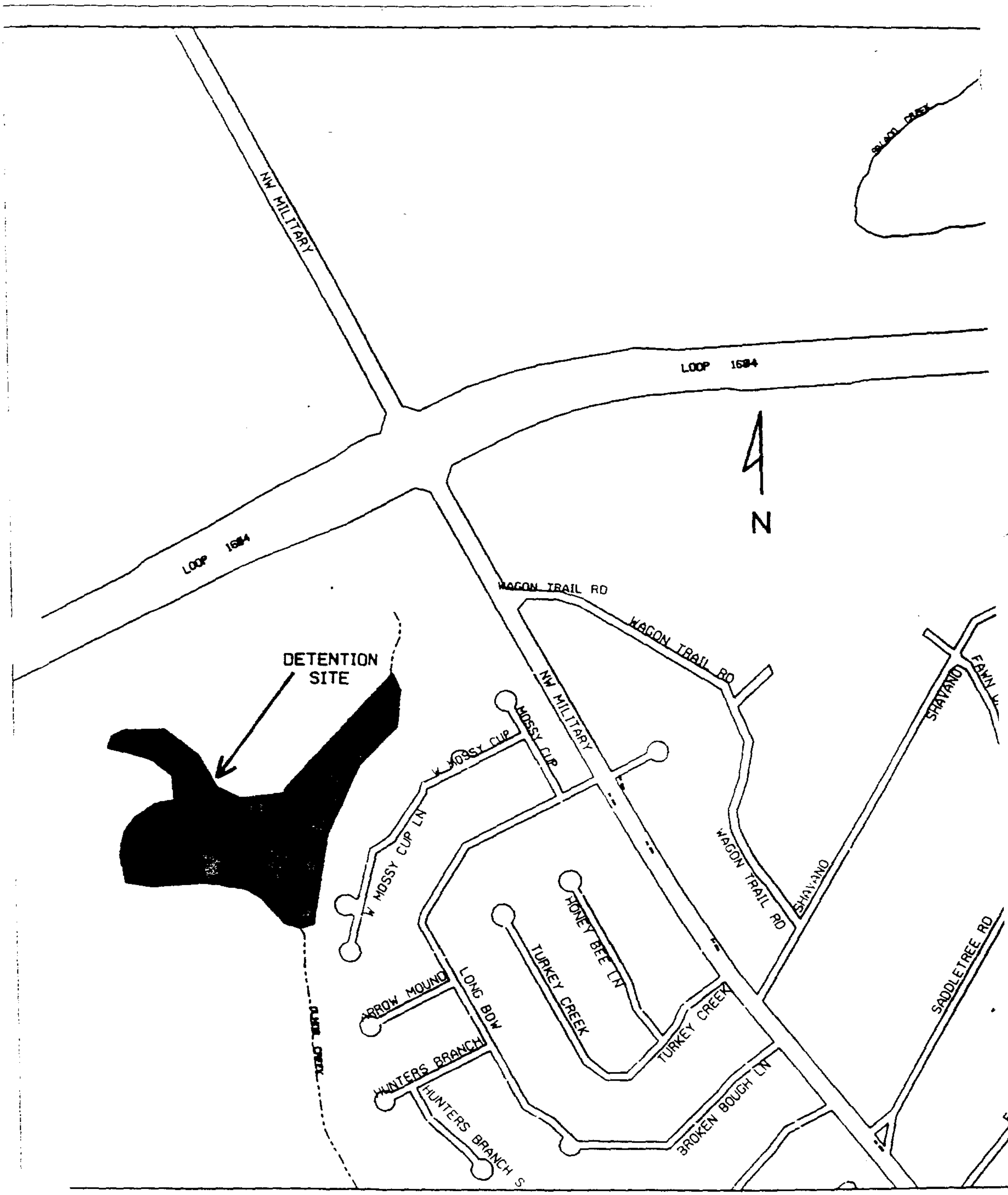
NW MILITARY
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LOOP 1604
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SHAVANO
HONEY BEE LN
TURKEY CREEK
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LONG BOW
ARROW MOUND
HUNTERS BRANCH
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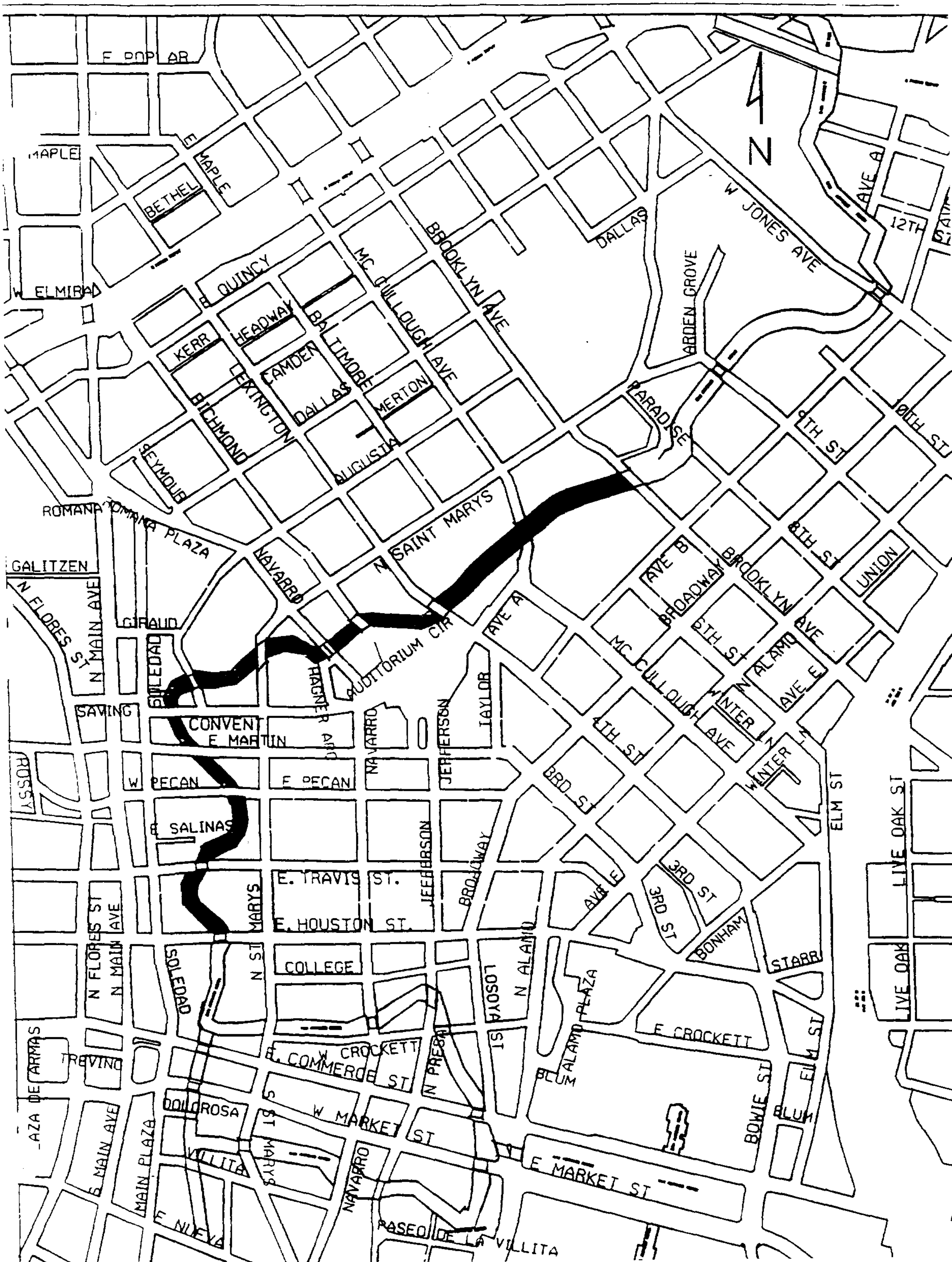
SADDLETREE RD

PROJEC



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LEXINGTON
RICHMOND
DALLAS
MERTON
AUGUSTA
SEYMOUR
ROMANA
ROMANA PLAZA
GALITZEN
N FLORES ST
N MAIN AVE
GIRAUD
SOLEDAD
SAVING
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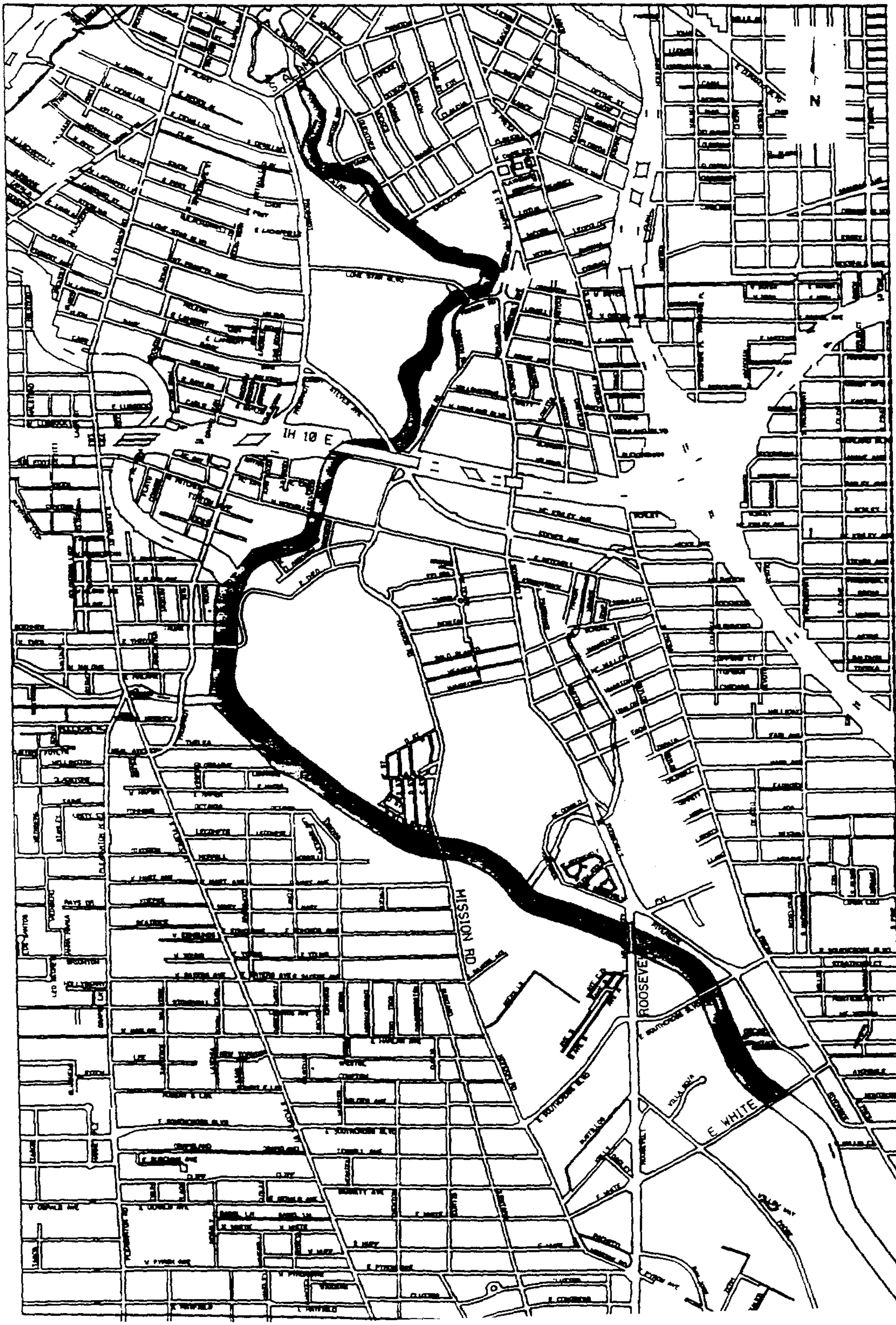
UNION
BROOKLYN AVE
MC CULLOUGH AVE
PARADISE
ARDEN GROVE
W JONES AVE
DALLAS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PRELIMINARY

San Antonio River Authority
San Antonio River Improvement Projects
Cost Projections

FLOOD CONTROL (County)	1998/99	1999/2000	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	Total	Project Total
(1) Lexington to Houston (Downtown)												
Preliminary Design	585,000	-	-	-	-	-	-	-	-	-	585,000	
Design and Other	-	1,823,000 1,365,000	-	-	-	-	-	-	-	-	1,807,000 1,365,000	11,784,000
Construction and Administration	-	2,349,000 4,041,000	4,698,000 4,040,000	2,349,000	-	-	-	-	-	-	9,396,000 8,081,000	10,031,000
(2) Guenther to Eagleland (South) Lone Star												
Preliminary Design	-	59,000 44,000	22,000	-	-	-	-	-	-	-	81,000 44,000	
Design and Other	-	88,000	-	-	-	75,000	-	-	-	-	163,000 88,000	1,874,000
Lone Star Construction and Administration	-	-	878,000	-	-	-	376,000	376,000	-	-	1,630,000 878,000	1,010,000
(6) Eagleland to San Pedro Creek (South)												
Preliminary Design	-	0 46,000	44,000 66,000	-	-	-	-	-	-	-	44,000 112,000	
Design and Other	-	-	-	-	-	151,000 226,000	-	-	-	-	151,000 226,000	1,700,000
Construction and Administration	-	-	-	-	-	-	757,000 1,129,000	752,000 1,128,000	-	-	1,505,000 2,257,000	2,595,000
(9) Espada Dam (South)												
Preliminary Design	-	0 62,000	38,000	-	-	-	-	-	-	-	38,000 100,000	
Design and Other	-	-	-	-	-	1,777,000	-	-	-	-	1,777,000	11,675,000
Construction and Administration	-	-	-	-	-	-	4,930,000	4,930,000	-	-	9,860,000	11,737,000
(5) Brooklyn Street Dam (North)												
Preliminary Design	-	0 41,000	X 41,000	-	-	-	-	-	-	-	41,000	
Design and Other	-	-	0 84,000	43,000	-	-	-	-	-	-	43,000 84,000	
Construction and Administration	-	-	-	0 417,000	416,000 477,000	416,000	-	-	-	-	833,000	917,000 958,000
(4) Josephine to Lexington (North)												
Preliminary Design	39,000	0 247,000	387,000	-	-	-	-	-	-	-	426,000 673,000	
Design and Other	-	-	-	1,347,000	-	-	-	-	-	-	1,347,000	10,644,000
Construction and Administration	-	-	-	-	2,957,000	2,957,000	2,957,000	-	-	-	8,871,000	10,891,000
(7) San Pedro Creek to Espada Dam (South)												
Preliminary Design	39,000	0 93,000	172,000	-	-	-	-	-	-	-	211,000 304,000	
Design and Other	-	-	-	-	-	609,000	-	-	-	-	609,000	6,905,000
Construction and Administration	-	-	-	-	-	-	3,043,000	3,042,000	-	-	6,085,000	6,998,000
(8) Espada Dam to Espada Mission (Far South)												
Preliminary Design	-	0 80,000	107,000	-	-	-	-	-	-	-	107,000 187,000	
Design and Other	-	-	-	-	-	-	-	375,000	-	-	375,000	4,232,000
Construction and Administration	-	-	-	-	-	-	-	-	1,875,000	1,875,000	3,750,000	4,312,000
(3) Hildebrand to Josephine (Far North)												
Preliminary Design	-	0 37,000	51,000	-	-	-	-	-	-	-	51,000 88,000	
Design and Other	-	-	-	-	-	-	-	177,000	-	-	177,000	1,992,000
Construction and Administration	-	-	-	-	-	-	-	-	882,000	882,000	1,764,000	2,029,000
Sub Total — Concept Design		591,000									591,000	
Preliminary Design	663,000	650,000	821,000	-	-	-	-	-	-	-	1,534,000 2,134,000	
Design and Other	-	1,453,000	84,000	1,347,000	-	2,612,000	-	552,000	-	-	6,048,000	6,445,000
Construction and Administration	-	4,041,000	4,918,000	417,000	3,373,000	2,957,000	12,059,000	9,108,000	2,757,000	2,757,000	42,378,000	47,694,000
TOTAL FLOOD CONTROL (County)	663,000	6,144,000	5,823,000	1,764,000	3,373,000	5,569,000	12,059,000	9,652,000	2,757,000	2,757,000		50,561,000 52,314,000
	1998/99	1999/2000	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	Total	Project Total

(10) Hildebrand to Lexington
Lonestar to Espada Mission
Concept Design

591,000

591,000

DIF + 1,753,000

MARCH 1996

BEXAR COUNTY AREA WIDE FLOOD CONTROL PROJECTS
PROJECT COST DATA

	SARA/BEXAR COUNTY COST	OTHER COST	TOTAL COST
• San Antonio River Channel Modifications, Lexington Avenue to 8th Street (PII)	8,223,000	11,217,000	19,440,000
• Brooklyn Street Dam (PII)	10,522,000	0	10,522,000
• San Antonio River Channel Modifications, Houston Street to Lexington Avenue (PII)	19,476,000	5,386,000	24,862,000
• Spencer Lane Floodwater Detention Facility (New)	4,600,000	0	4,600,000
SUBTOTAL	42,821,000	16,603,000	59,424,000
• Shavano Park Floodwater Detention Facility (New)	2,800,000	0	2,800,000
• San Antonio River Channel Rehabilitation, U.S. 281 to Hildebrand Avenue (Including Gate Repairs in Brackenridge Park-New)	1,710,000	7,500,000[1]	9,210,000
• San Antonio River Channel Stabilization, Alamo Street to Espada Dam (Mission Trails Alignment-New)	15,841,000	35,696,000[2]	52,537,000
SUBTOTAL	20,351,000	43,196,000	63,547,000
• West Avenue Flood Control Project (New)	858,000	0	858,000
• San Antonio River Channel Modifications, Nueva Street to Houston Street (PII)	918,000	4,716,000	5,634,000
• San Antonio River Channel Modifications, 8th Street to Josephine Street (PII)	21,295,000	5,970,000	27,265,000
SUBTOTAL	23,071,000	10,686,000	33,757,000

1 City of San Antonio Bond Issue Budget for improvements in Brackenridge Park.

2. Mission Trails project may pick up as much as $3,250,000 in project cost for Hike and Bike and low water crossing improvements.

PUBLIC WORKS DEPARTMENT
233 N. Pecos, Suite 420
San Antonio, Texas 78207
(210) 270 6700 • Fax (210) 270-6713

December 12, 1995

Mr. Steven P. Ramsey, P.E., R.P.L.S.
Chief Engineer
San Antonio River Authority
P.O. Box 830027
San Antonio, Texas 78283-0027

Dear Mr. Ramsey:

Bexar County is pleased to submit a project to the San Antonio River Authority for future consideration and participation. The project we are submitting is located within the City of San Antonio on West Ave. at the Salado and Panther Springs Creeks low water crossings.

This project would entail the construction of a bridge at the Salado Creek, a four (4) barrel 10'x 8' M.B.C. at the Panthers Springs Creek and reconstruction of approximately 1200 feet of West Ave. See the attached cost summary and location map for the project.

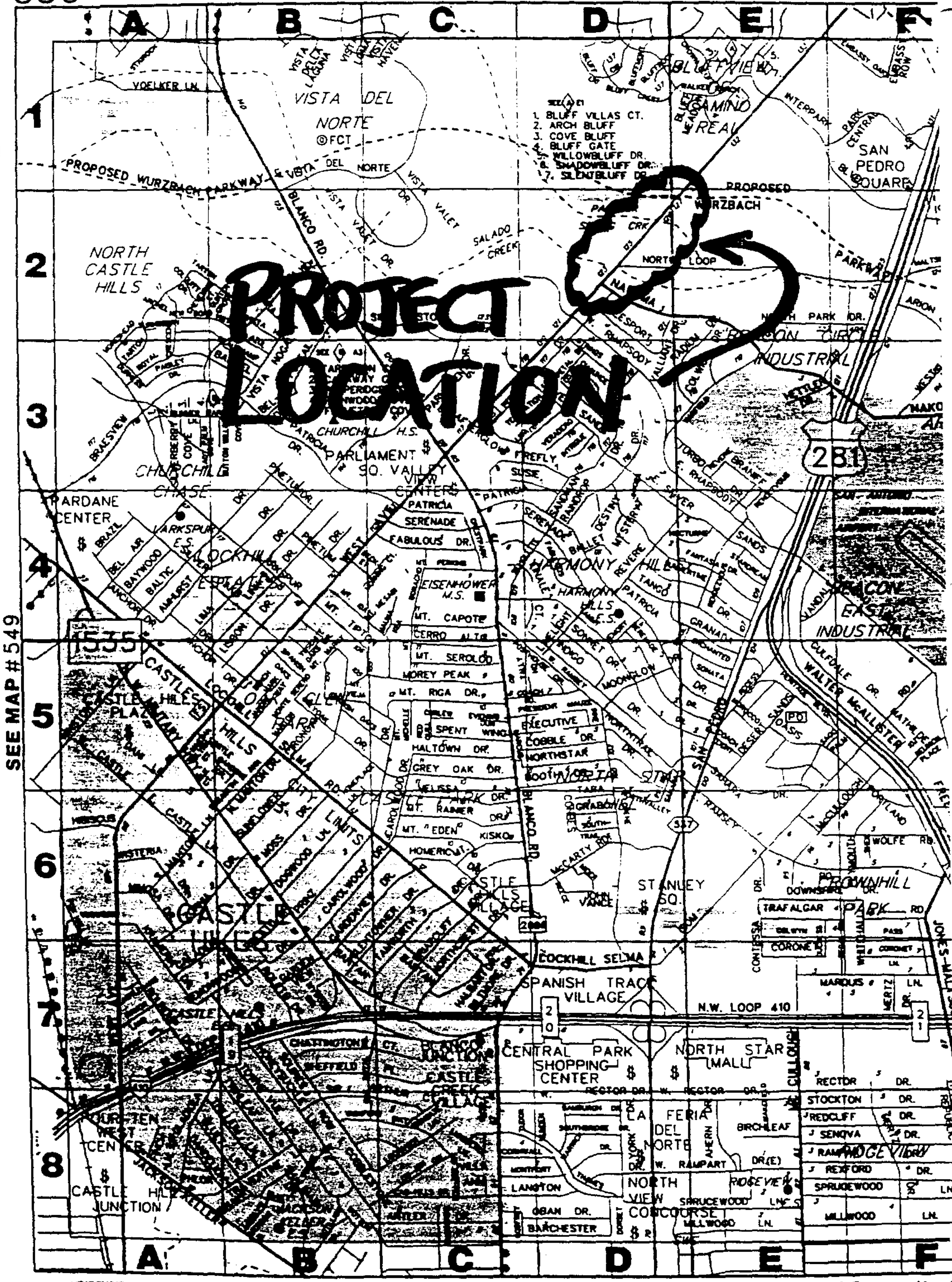
We look forward to working with you and if you have any questions, please do not hesitate to call me at 270-6700.

Sincerely,

Raymundo Rendon Jr.

Raymundo Rendon Jr., P.E.
County Engineer

550 MAP NUMBER SEE MAP # 516 Scale: One inch equals 2200 ft.



SEE MAP # 549

H2150V610 SEE MAP # 582 © Ferguson Map C

COST SUMMARY:

Salado Creek Crossing: 44 driving width 200' span length bridge	$520,000.00
Panther Springs Creek Crossing: 4 barrel - 10'x 8" MBC 44' driving width	$146,000.00
West Ave. Reconstruction: 44' pavement width w/curbs	$192,000.00
Total Estimate Project Cost:	$858,000.00

NOTE: Cost includes 20% for engineering and contingency.

APPENDIX V

1999 Bexar County Flood Control Projects

INFRASTRUCTURE SERVICES DEPARTMENT
PUBLIC WORKS DIVISION

233 N. Pecos - La Trinidad, Suite 420
San Antonio, Texas 78207
210-335-6700 (Voice) • 210-335-6713 (Fax)

PROPOSED CAPITAL ROAD PROJECTS
FOR CONSTRUCTION
in FISCAL YEAR 1999-2000

1. **RAVENFIELD ROAD EXTENSION** - QUIET PLAIN to ELLISON DRIVE
2. **VENTURA SUBDIVISION, PHASE III** - SUNSHINE TRAIL, LEDGEBROOK, FAIRINGTON, LINCOLN VILLAGE and FLOWER TRAIL
3. **FOSTER ROAD STRUCTURE REPLACEMENT** - (3) U.S. 87 to NEW SULPHUR SPRINGS ROAD
4. **KELLER ROAD STRUCTURES** - POLE CAT CREEK & TRIBUTARY
5. **GERONIMO VILLAGE DRAIN** - DRAINAGE CHANNEL REALIGNMENT
6. **OLD CORPUS CHRISTI STRUCTURES REPLACEMENT**- (4) US 181 to COUNTY LINE
7. **TRAFFIC SIGNALS 2000** - COUNTY WIDE
8. **SCHOOL ZONE BEACONS -2000** - COUNTY WIDE
9. **LAMM ROAD REALIGNMENT** - PG&E PROPERTY to SOUTH FLORES
10. **BRAUN ROAD BRIDGE** - at HELOTES CREEK
11. **VENTURA SUBDIVISION, PHASE IV** - BEECH TRAIL and ELM TRAIL
12. **BIG COUNTRY SUBDIVISION, PHASE III** - LONG TRAIL, INDIAN WELLS, SMOKE CREEK, CROWS LODGE, TEHAMA, RABBIT SPRINGS and RED FEATHER
13. **MONTGOMERY ROAD EXTENSION** - HWY. 90 to AIR FORCE VILLAGE
14. **PONDER ROAD EXTENSION** - CAGNON to MONTGOMERY

THE STATE OF TEXAS COUNTY OF BEXAR

FAX TRANSMITTAL

DATE: 11/01/99

COMPANY: SARA

ATTN: Dean Byer / Joe Shannon

FAX NO: 227-4323

RE: County Watershed Flood Control Projects

Infrastructure Services Department
Public Works Division
233 N. Pecos, Suite 420
San Antonio, TX 78207

Telephone: (210) 335-6700
Fax No: (210) 335-6713

No. Of Pages: 3
(Including Cover Sheet)

COMMENTS: Dean/Joe,
This list was to be sent with the maps that you received on Friday. I apologize for the oversight. Call me if you have any questions. David Harris will also be calling you on flooded properties.

FROM: Michael Martin

If you have not received all pages indicated, please call back as soon as possible.

CAPITAL IMPROVEMENTS PROGRAM
PROPOSED DRAINAGE PROJECTS FOR FUNDING WITH FLOOD CONTROL TAX REVENUES

PROJECT LOCATION	DESCRIPTION	WATERSHED	PCT.	TRAFFIC VOLUME	TOTAL COST
Braun Road CT-5	Replacement of Narrow, Flood Prone Bridge 0.7M W.of Loop 1604	Culebra Creek	2	3360	$469,672
Cagnon Road (2-41) CT-6	Replacing a low water crossing at 1.0 mi. N. of Macdona-LaCoste Rd.	Medina River	1	933	$4,350,000
Cagnon Road (2-42) CT-7	Replacing a low water crossing at 0.7 mi. N. of Macdona-LaCoste Rd.	Medina River	1	933	$320,000
Blanco Road (3-17) CT-8	Replacing a low water crossing at Cibolo Creek	Cibolo Creek	3	1249	$565,000
Bulverde Road (3-26) CT-9	Replacing a low water crossing at Cibolo Creek	Cibolo Creek	3	882	$575,000
Smithson Valley (3-24) CT-10	Replacing a low water crossing at Cibolo Creek	Cibolo Creek	3	679	$560,000
City of Elmendorf CT-4	Complete Drainage Improvements within the city	Calaveras Ck.	4	n/a	$450,000
Town of Macdona CT-11	Complete Drainage Improvements within and adjacent to the town	Medina River	1	n/a	$830,000
Applewhite Road (1-57) CT-12	Replacement of Narrow, Flood Prone Bridge 0.1M N.of Jett Road	Medina River	1	724	$840,500
Scenic Loop (2-35) CT-13	Replacing a low water crossing at 0.4mi.N.of Greyforest Drive	Culebra Creek	3	996	$230,000
Trainer Hale Road (4-23) CT-14	Replacing a low water crossing at Cibolo Creek	Cibolo Creek	4	468	$430,000
Hollowell Road (1-49) CT-15	Replacing a low water crossing at 0.2mi.S.of Macdona-LaCoste Road	Medina River	1	551	$550,000
Weir Road (3-18) CT-16	Replacing a low water crossing at Cibolo Creek	Cibolo Creek	4	130	$425,000
Schaeffer Road (3-19) CT-17	Replacing a low water crossing at Cibolo Creek	Cibolo Creek	4	763	$450,000
Talley Road (2-27) CT-18	Constructing Drain and Road crossing at 0.1 M S of Old FM 471	Culebra Creek	1	2178	$1,650,000
Pearsall Road CT-19	Increasing capacity on a drainage culvert at 0.3M W.of Lucky Road	Elm Creek	1	2041	$189,591
Kinney Road (1-53) CT-20	Replacing a low water crossing at 0.3M N.of Pearsall Road	Medina River	1	1069	$424,858
Jungman Road (2-45) CT-21	Replacing a low water crossing at 0.4mi.N.of Macdona-LaCoste Road	Medina River	1	57	$520,000
Gardner Road CT-22	Increasing capacity on a drainage culvert at 0.6M S.of Sulphur Springs Rd.	Calaveras Ck.	4	1852	$68,145
Fischer Road CT-23	Increasing capacity on a drainage culvert at 0.4M W.of Somerset Rd.	Medio Creek	1	1646	$98,419

CAPITAL IMPROVEMENTS PROGRAM
PROPOSED DRAINAGE PROJECTS FOR FUNDING
WITH FLOOD CONTROL TAX REVENUES

PROJECT LOCATION	DESCRIPTION	WATERSHED	PCT.	TRAFFIC VOLUME	TOTAL C
Deer Cross Lane	Replacing a low water crossing at 0.1M W.of Timberline Drive	Upper Salado	3	1074	$186
Gross Lane (2-44)	Replacing a low water crossing at 0.3M E.of Mechler Road	Medina River	1	353	$550
Applewhite Road (1-50)	Replacing a low water crossing at 0.1M N.of Zarzamora Road	Lower Leon Ck.	1	817	$310
Zarzamora Road (1-51)	Replacing a low water crossing at 0.1M E.of Applewhite Road	Lower Leon Ck.	1	1527	$280
Specht Road (3-27)	Replacing a low water crossing at Cibolo Creek	Cibolo Creek	3	314	$450
Old Fredericksburg (2-34)	Replacing a low water crossing at Cibolo Creek	Cibolo Creek	3	784	$460
Old Frio City Road (1-23)	Replacing a low water crossing at 0.4M E.of Wisdom Road	Elm Creek	1	632	$306
Glen Fair	Increasing capacity on a drainage culvert at 0.2M E.of New World Drive	Martinez Creek	4	662	$127
Real Road	Replacing a low water crossing at 0.1M W.of FM 1516	Calaveras Ck.	4	628	$73
O'Brien Road (1-48)	Replacing a low water crossing at 0.1M S.of Macdona-LaCoste Rd.	Medina River	1	501	$54
New Berlin Road (4-20)	Replacing a low water crossing at 0.3M S.of Miller Road	Martinez Creek	4	42	$180
Uhlrich Road (4-21)	Replacing a low water crossing at 0.3M N.of New Berlin Road	Cibolo Creek	4	n/a	$18
Abbott Road (4-17)	Replacing a low water crossing at 0.1M S.of Graytown Road	Martinez Creek	4	355	$145
Menger Road (3-22)	Replacing a low water crossing at 0.5M E.of Bulverde Road	Upper Salado	3	297	$280
Blue Wing Road (4-2)	Replacing a low water crossing at 0.4M N.of I-37	Lower SA River	1	353	$203
Zigmont Road	Replacing a low water crossing at 0.1M S.of Macaway Road	Calaveras Ck.	4	337	$139
Quintana Road (1-8)	Replacing a low water crossing at 0.1M E.of Trawalter	Medina River	1	228	$424
Jackel Road (1-47)	Replacing a low water crossing at 0.3 M S. of Benton City Road	Elm Creek	1	151	$525
			TOTAL PROJECTS		$19,37

APPENDIX W

1998 Bexar County Property Buy Back Program

Once the properties are appraised and a fair market value is established, what if the value of each property is higher than budgeted? The current budget as presented above is based on a four percent contingency which will w for some inflation in the cost to acquire properties. In discussions with the City of San Antonio, it appears eir buy-back program is experiencing a cost to acquire properties at 25 to 40 percent above pre-flood BAD aisals.

Some residents in the affected areas have initiated rebuilding their properties. Staff is determining the impact o those improvements on the value of the property; however, the program as designed is based upon pre-flood value. If property owners are resistant to sell at that rate based on post-flood improvements, then further negotiations may be necessary.

If the County were to budget up to 25% for contingency the budget would be impacted as follows:

Project Cost	$7,681,911
Administration	$ 161,320
SUB-TOTAL	$7,843,231
4% Contingency	$ 307,277
TOTAL	**$8,150,508**
25% Contingency	$1,920,478
TOTAL	**$9,763,709**
Difference	$1,613,201

NG:

directed staff to contact SARA to pursue the use of revenue from the Flood Control Tax to fund the local for the program and to determine SARA's interest in administering the program. Staff met with SARA ls on Friday, March 12th. The initial response from SARA was positive. SARA is interested in administering ogram and is in the process of determining their cost for these services. (SARA officials will be at the March eeting)

it estimates suggest that SARA's requirement for revenue and the actual tax collections will yield a surplus scal year because the County budget reflects a level of funding that is $1.2 million over and above SARA's ements as of July 1998 because it was anticipated that additional funding for the proposed San Antonio River ts would be required this fiscal year. SARA is reviewing their budget to determine what level of funding is tly available for the buy-back program.

iding upon the impact on the tax rate to fund the San Antonio River Projects, staff recommends using the ble flood control tax revenue to fund the buy-back program as well as to pursuing an agreement with SARA to ister the program. SARA has the expertise in acquiring properties in flood plains and can also provide advice he proper uses for the properties acquired. In addition, the use of flood control funds in the Cibolo Creek shed will assist SARA in taking a comprehensive approach toward addressing the impact, and determining priate remediation activities related to the October 1998 flood.

g and Resource Management has also requested the financial advisors to re-run the debt capacity analysis d previously to determine the impact of using this surplus on the buy-back program will have on the cenario for the proposed San Antonio River Projects using the current flood control tax rate. The results of analysis is expected to be available for presentation on Tuesday.

As discussed above, the primary source of funding for the Buy-Back Program is anticipated to come fro FEMA/DEM Hazard Mitigation Grant (up to 75 percent). The Grant requires a local match of at least 25 perc Several sources have been identified to defray this match: TDHCA Disaster Recovery Initiative, Bexar Co Housing Finance Corporation, and Bexar County CDBG:

The *total project's* funds are proposed to come from several sources, based on the *four* percent contingency scen

Federal funding—FEMA		$6,112,881
Flood Tax Revenue		1,408,713
TDHCA		300,000
BC CDBG		178,914
BC HFC		+ 150,000
	TOTAL	**$8,150,508**

RECOMMENDED MOTIONS:

1. Approve the creation of the Bexar County Property Buy-Back Program contingent on funding from FEMA/DEM include properties which sustained substantial damage to their improvements and vacant properties.
2. Approve project priorities based upon the level of damage sustained and in the past flooding occurrence and fu propensity for flooding priorities are as follows:

   Lakewood Acres/ Lost Meadows Project
   1. Lyndon Dr.
   2. Crooked Tree Rd
   3. Lakeview Dr.
   4. Sweetwater Dr.
   5. Crescent Bend Dr.
   6. Bluegill Dr.
   7. Omar Dr-North
   8. Omar Dr.- South
   9. Schaefer Rd.
   10. Lost Meadows Dr.

   6Bl-
   5B 16

   Aztec/Bolton

   11. Aztec Lane

   Southern Bexar County

   12. Goliad-Calaveras

   Aztec Bolton

   13. Bolton

   Southern Bexar County

   14. Southton
   15. Shepard-Atascosa
   16. Hidden Valley

3. Set a maximum cost to acquire properties at Bexar Appraisal District pre-flood appraised values. Neg which result in property costs above the pre-flood rate will be brought to Commissioners Court for inc consideration.

. Approve the submission of the grant application to Federal Emergency Management Agency and the Texa Department of Public Safety Division of Emergency Management's Hazard Mitigation Grant Progra (FEMA/DEM) with the above project priorities and budget.

Approve the attached resolution identifying the following sources for the local match to the FEMA/DEM application: Texas Department of Housing and Community Affairs Disaster Recovery Initiative ($300,000), Bexa County Community Development Block Grant $178,914, Bexar County Housing Finance Corporation ($150,00 d the Flood Control Tax Revenue ($1,408,713).

. Authorize staff to negotiate an agreement with the San Antonio River Authority to administer the buy-back progra and present the agreement to Commissioners Court for approval.

. Approve to proceed with the implementation of the buy-back program only in the project areas approved f funding from FEMA/DEM and to revisit the remainder of the buy-back program upon award of funding fro FEMA/DEM.

. Approval implementing the buy back program as an "all or nothing" program to require 100% participation in t funded project areas.

DJH

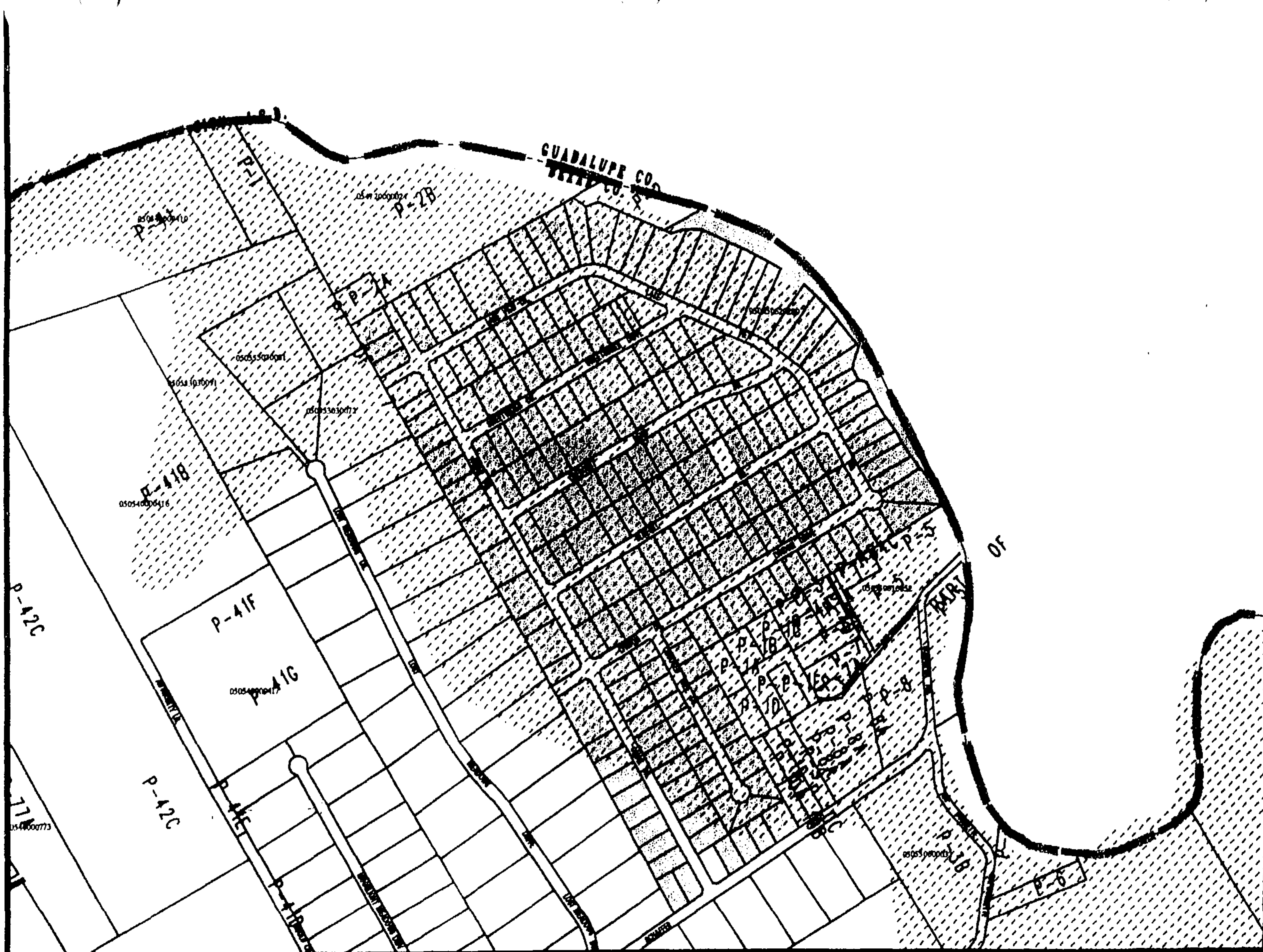
Buy-Back Program ACF.wpd

FISCAL DATA (If County funds to be used) **Budgetary Implications**

d No. ____________ Amt. Expended ____________ Funds/Staffing Budgeted YES ______ NO ______

pt. No. ____________ Account Code ____________ Impact on future Budget ____________

Comments:



Date: March 17, 1999

Scale: 1" = 680"

Neigborhood plot 26320 is produced by: rejth

ALL Projects Summary
Bexar County Property Buy-Back Program (Flood October 1998)

Staff Recommended Priority Ranking-->		[illegible]	2	3	4	[illegible]	6	7	8	9	10
	$ Available/Needed	Lyndon DR Lakewood P.A.	Crooked Tree RD Lakewood P.A.	Lakeview DR Lakewood P.A.	Sweetwater DR Lakewood P.A.	Crescent Bend DR Lakewood P.A.	Bluegill DR Lakewood P.A.	Omar DR-NORTH Lakewood P.A.	Omar DR-SOUTH Lakewood P.A.	Schaefer RD Lakewood P.A.	Lost Meadows DR Lakewood P.A.
Estimated Funding:											
a. Federal	6,112,881	625,375	298,401	745,093	558,888	546,722	563,948	585,643	301,206	393,532	717,690
b. Applicant (Gen'l Fund or other)	1,408,713	133,458	39,467	198,364	107,382	107,241	112,983	140,214	80,402	106,177	199,230
c. State (TDHCA DRI)	300,000	25,000	25,000	25,000	50,000	50,000	50,000	15,000	10,000	-	25,000
d. Local (BC CDBG)	178,914	50,000	-	25,000	28,914	-	-	25,000	-	-	-
e. Other (BC HFC)	150,000	-	35,000	-	-	25,000	25,000	15,000	10,000	25,000	15,000
f. Program Income		-	-	-	-	-	-	-	-	-	-
g. TOTAL	$ 8,150,508	$ 833,834	$ 397,869	$ 993,457	$ 745,184	$ 728,962	$ 751,931	$ 780,857	$ 401,608	$ 524,709	$ 956,920
Property with Improvements		22	11	15	22	17	17	15	11	13	7
Properties without Improvements		11	9	30	6	13	13	15	16	-	2
Damages		297,695	132,539	431,610	266,716	278,877	271,975	304,753	37,661	121,200	250,550
Est. cost to restore property to pre-flood condition (damage + 20%)		357,234	159,047	517,932	320,059	334,852	326,370	365,704	45,193	145,440	300,660
Budget for purchasing all properties (with and without improvements)											
Cost for utility or septic cleanup		99,000	49,500	67,500	99,000	76,500	76,500	67,500	49,500	58,500	31,500
Acquisition Cost (Survey, title search, contract help)		82,500	50,000	112,500	70,000	75,000	75,000	75,000	40,000	32,500	22,500
Property with Improvements		445,719	180,140	560,285	394,941	391,702	410,682	365,531	208,443	299,034	781,452
Properties without Improvements		48,675	40,354	121,055	28,400	58,860	61,518	152,932	25,575	39,508	31,452
Cost for demolition or moving structure		110,000	55,000	75,000	110,000	85,000	85,000	75,000	55,000	65,000	35,000
SUBTOTAL		$ 785,894	$ 374,994	$ 936,340	$ 702,341	$ 687,062	$ 708,700	$ 735,963	$ 378,518	$ 494,542	$ 901,904
Contingencies		31,436	15,000	37,454	28,094	27,482	28,348	29,439	15,141	19,782	36,076
Administration		16,504	7,875	19,663	14,749	14,428	14,883	15,455	7,949	10,385	18,940
TOTAL		$ 833,834	$ 397,869	$ 993,457	$ 745,184	$ 728,962	$ 751,931	$ 780,857	$ 401,608	$ 524,709	$ 956,920

4%

ALL Projects Summary
Bexar County Property Buy-Back Program (Flood October 19

#16

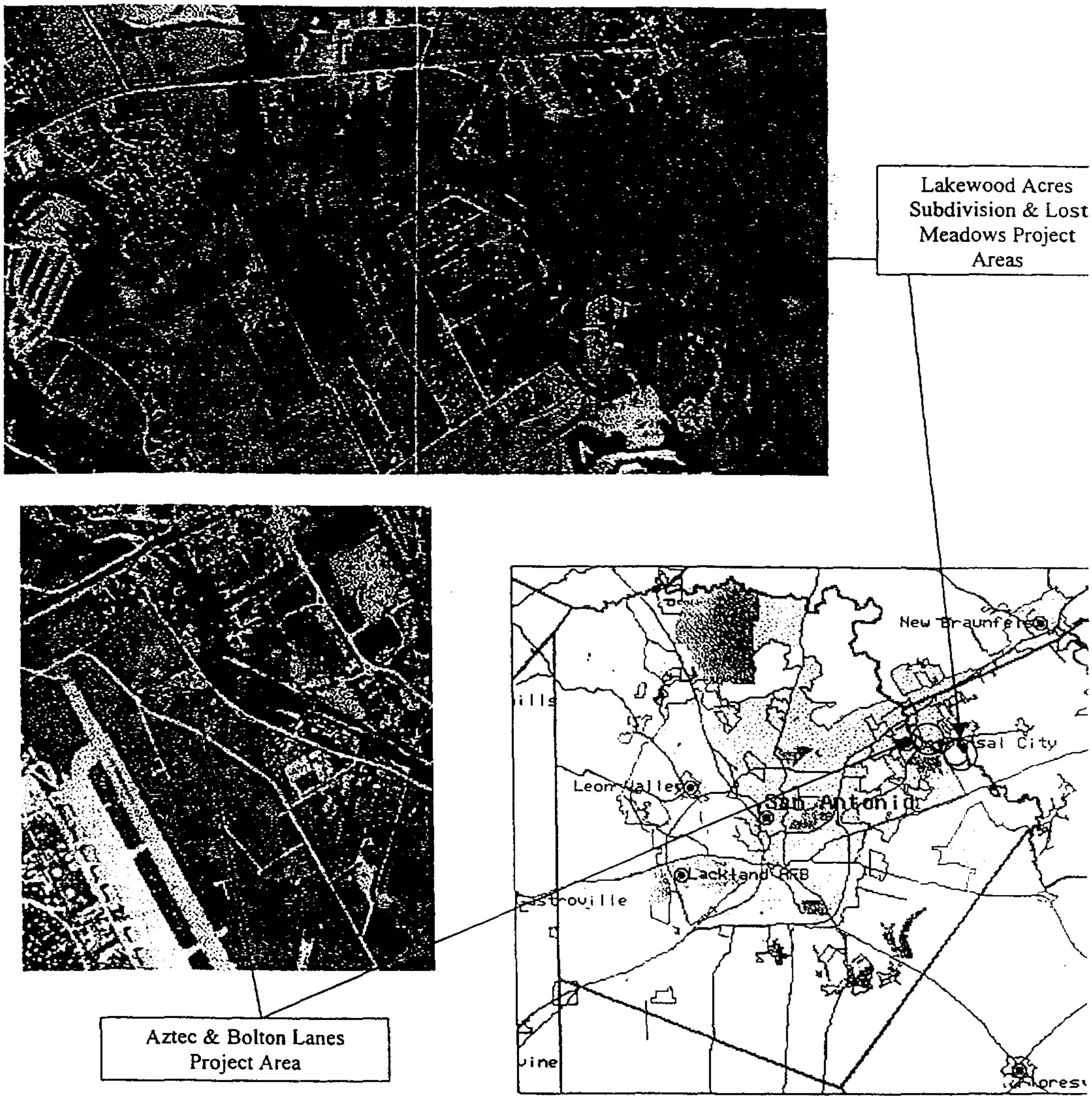
Staff Recommended Priority Ranking		11	12	13	14	15	16	
Estimated Funding:	$ Available/Needed	Aztec LN Aztec-Bolton P.A.	Goliad-Calaveras South BC	Bolton Aztec-Bolton P.A.	Southton South BC	Shepard-Atascosa South BC	Hidden Valley South BC	TOTALS
a. Federal	6,112,881	258,042	37,460	345,923	26,498	44,642	63,819	6,112,881
b. Applicant (Gen'l Fund or other)	1,408,713	11,014	12,487	115,308	8,833	14,881	21,273	1,408,713
c. State (TDHCA DRI)	300,000	25,000	-	-	-	-	-	300,000
d. Local (BC CDBG)	178,914	50,000	-	-	-	-	-	178,914
e. Other (BC HFC)	150,000	-	-	-	-	-	-	150,000
f. Program Income		-	-	-	-	-	-	-
g. TOTAL	$ 8,150,508	$ 344,056	$ 49,947	$ 461,230	$ 35,331	$ 59,522	$ 85,092	$ 8,150,508

Property with Improvements	12	2	11	1	2	2	180
Properties without Improvements	5	-	-	-	-	-	120

Damages	93,975	11,530	77,163	8,100	9,250	11,130	2,604,724
Est. cost to restore property to pre-flood condition (damage + 20%)	112,770	13,836	92,596	9,720	11,100	13,356	3,125,669

Budget for purchasing all properties (with and without Impro							
Cost for utility or septic cleanup	54,000	9,000	49,500	4,500	9,000	9,000	810,000
Acquisition Cost (Survey, title search, contract help)	42,500	5,000	27,500	2,500	5,000	5,000	722,500
Property with Improvements	156,025	23,075	302,713	21,300	32,100	56,200	4,629,342
Properties without Improvements	11,750	-	-	-	-	-	620,069
Cost for demolition or moving structure	60,000	10,000	55,000	5,000	10,000	10,000	900,000
SUBTOTAL	$ 324,275	$ 47,075	$ 434,713	$ 33,300	$ 56,100	$ 80,200	$ 7,681,911
Contingencies	12,971	1,883	17,389	1,332	2,244	3,208	307,276
Administration	6,810	989	9,129	699	1,178	1,684	161,320
TOTAL	$ 344,056	$ 49,947	$ 461,230	$ 35,331	$ 59,522	$ 85,092	$ 8,150,508

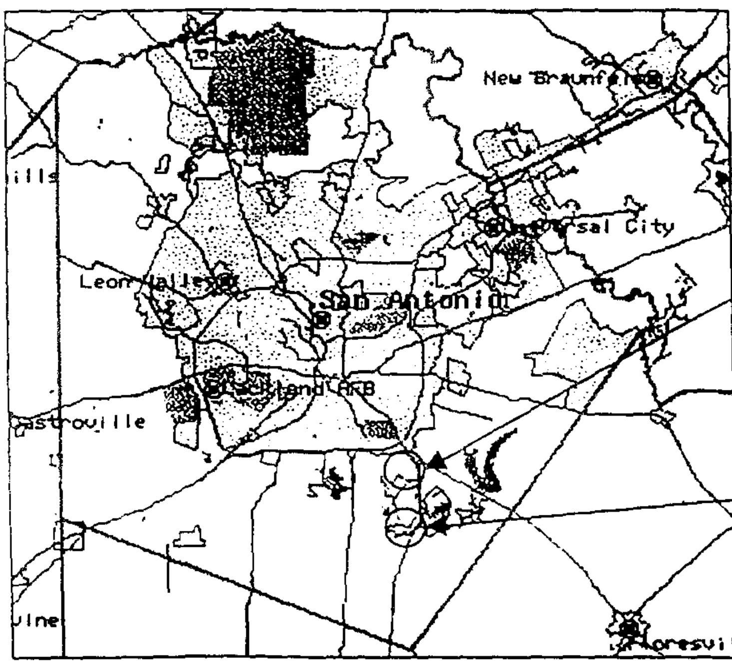
4%



Aztec & Bolton Lanes Project Area
Lakewood Acres Project Area
Lost Meadows Project Area

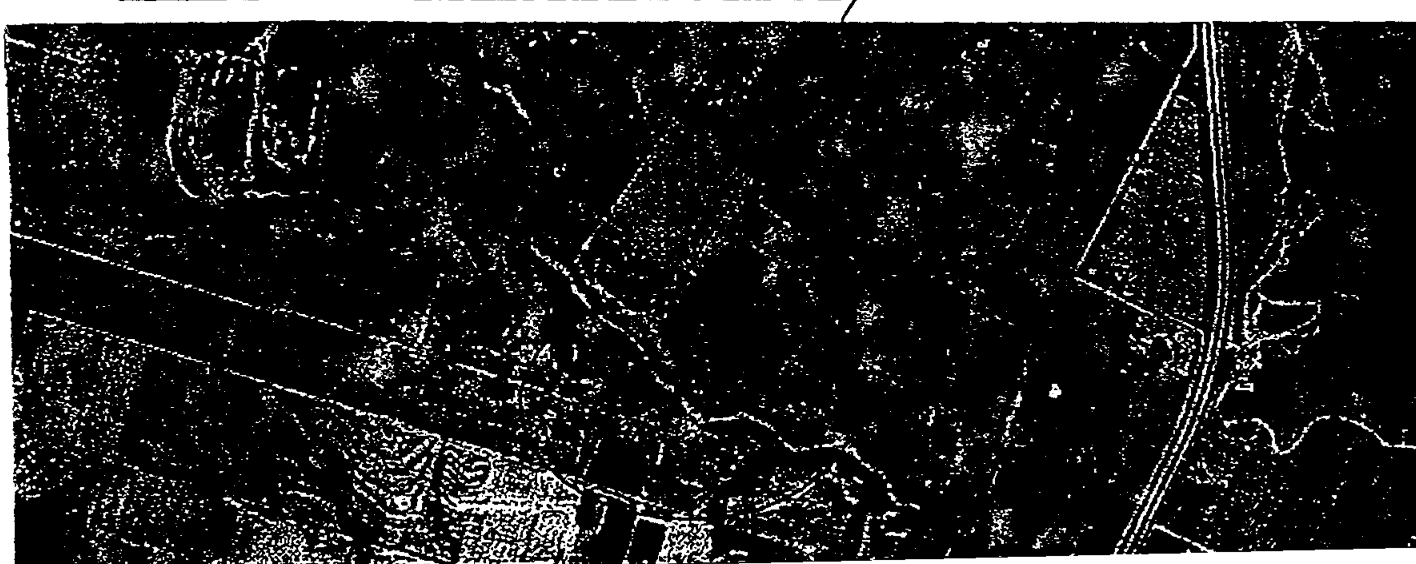
Southton Project Area

Goliad-Calaveras Project Area

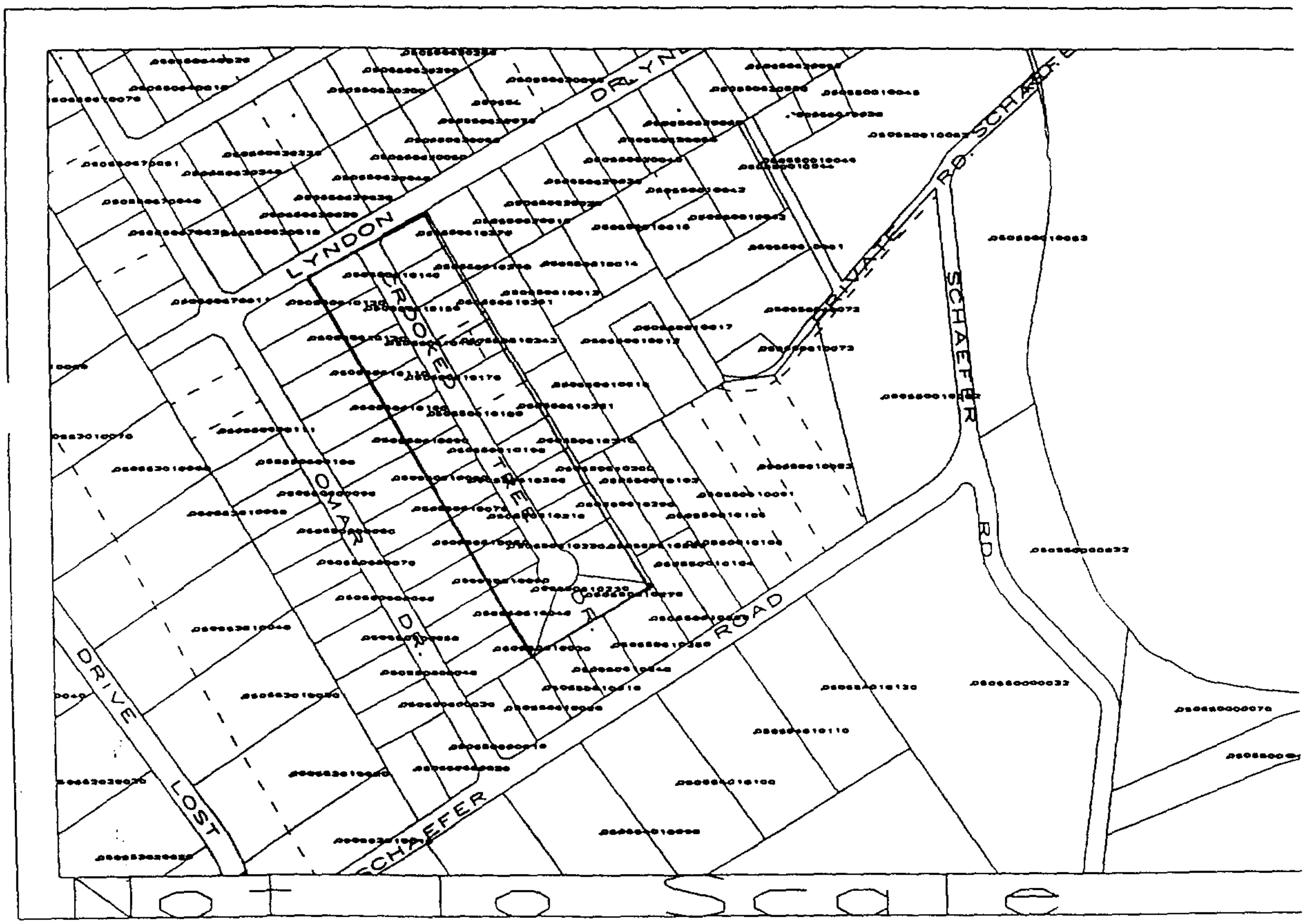


Southton Project Area

Goliad-Calaveras Project Area



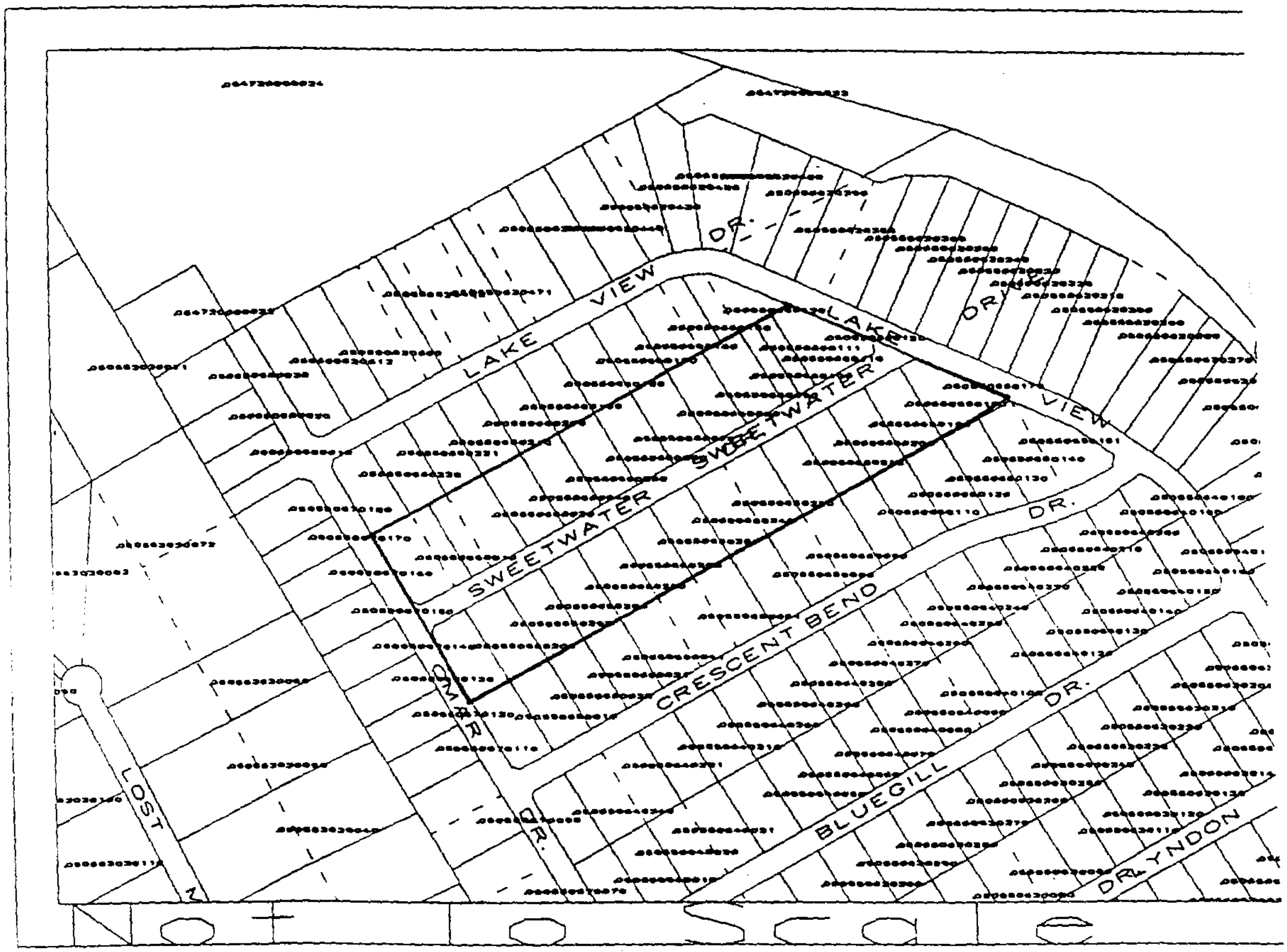
Priority 2



Crooked Tree Rd Section
Lakewood Acres-Lost Meadows Project Area

Bexar County Property Buy-Back Program

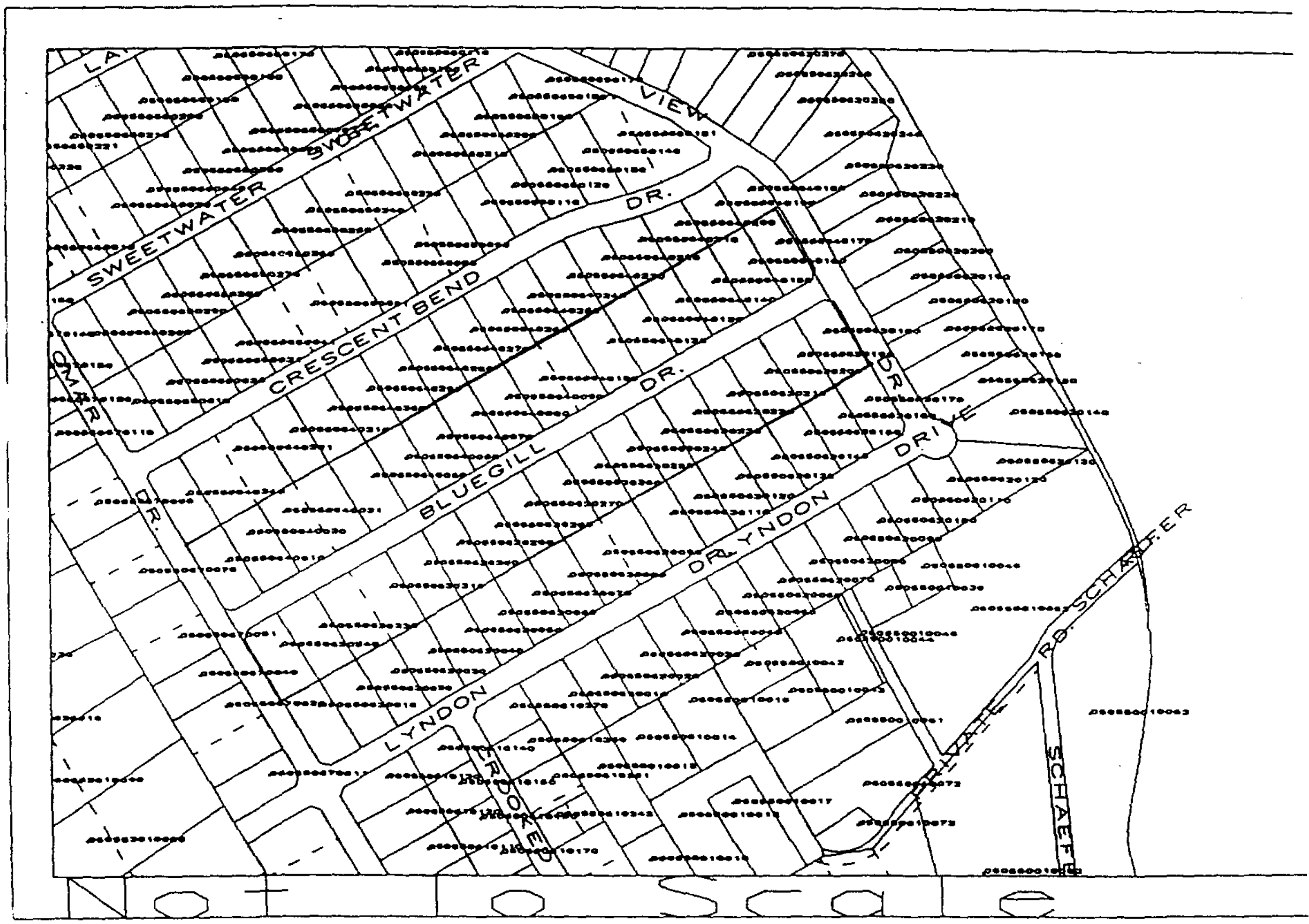
Priority



Sweetwater DR Section
Lakewood Acres-Lost Meadows Project Area

Bexar County Property Buy-Back Program

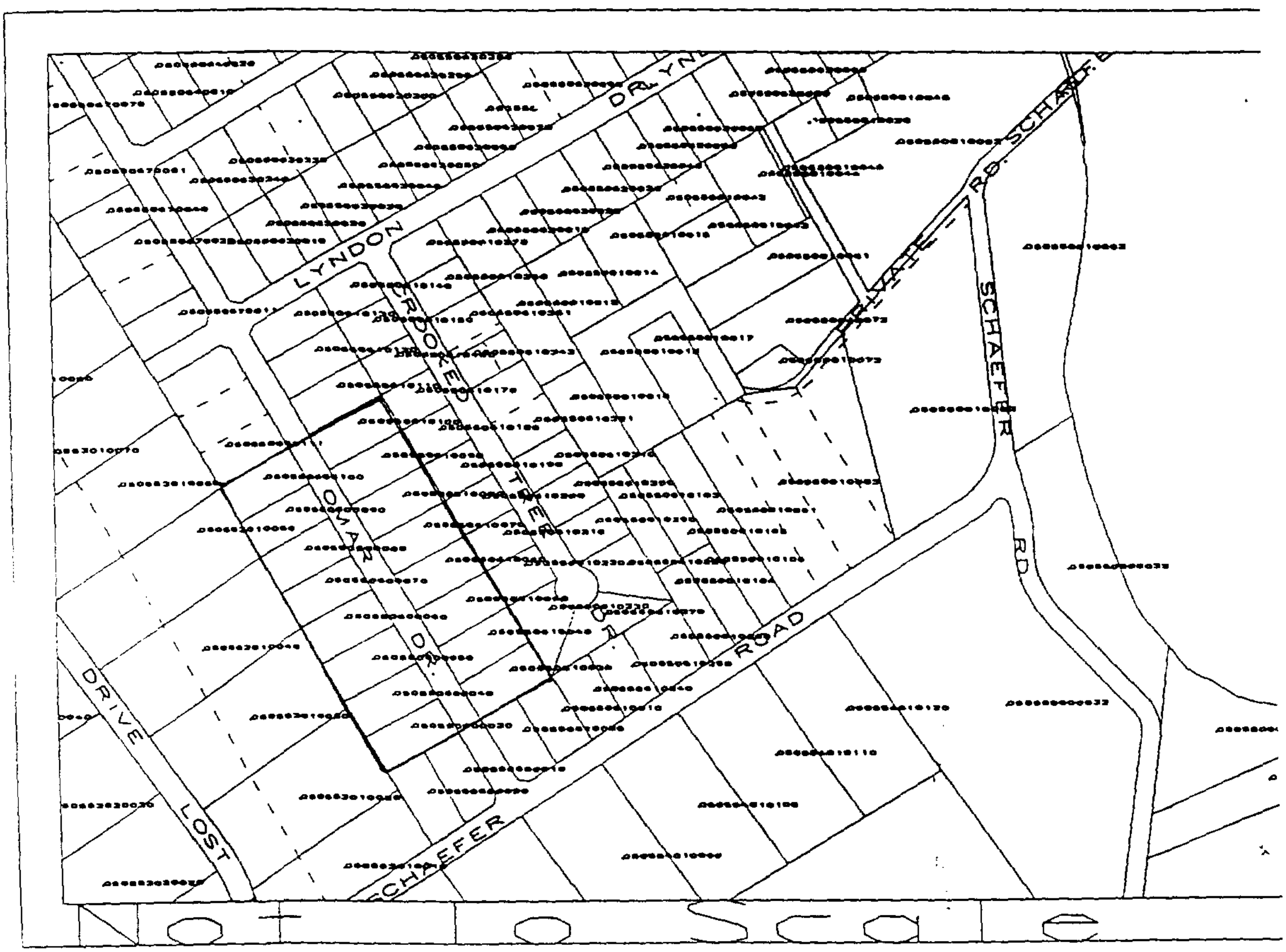
Priority 6



Bluegill DR Section
Lakewood Acres-Lost Meadows Project Area

Bexar County Property Buy-Back Program

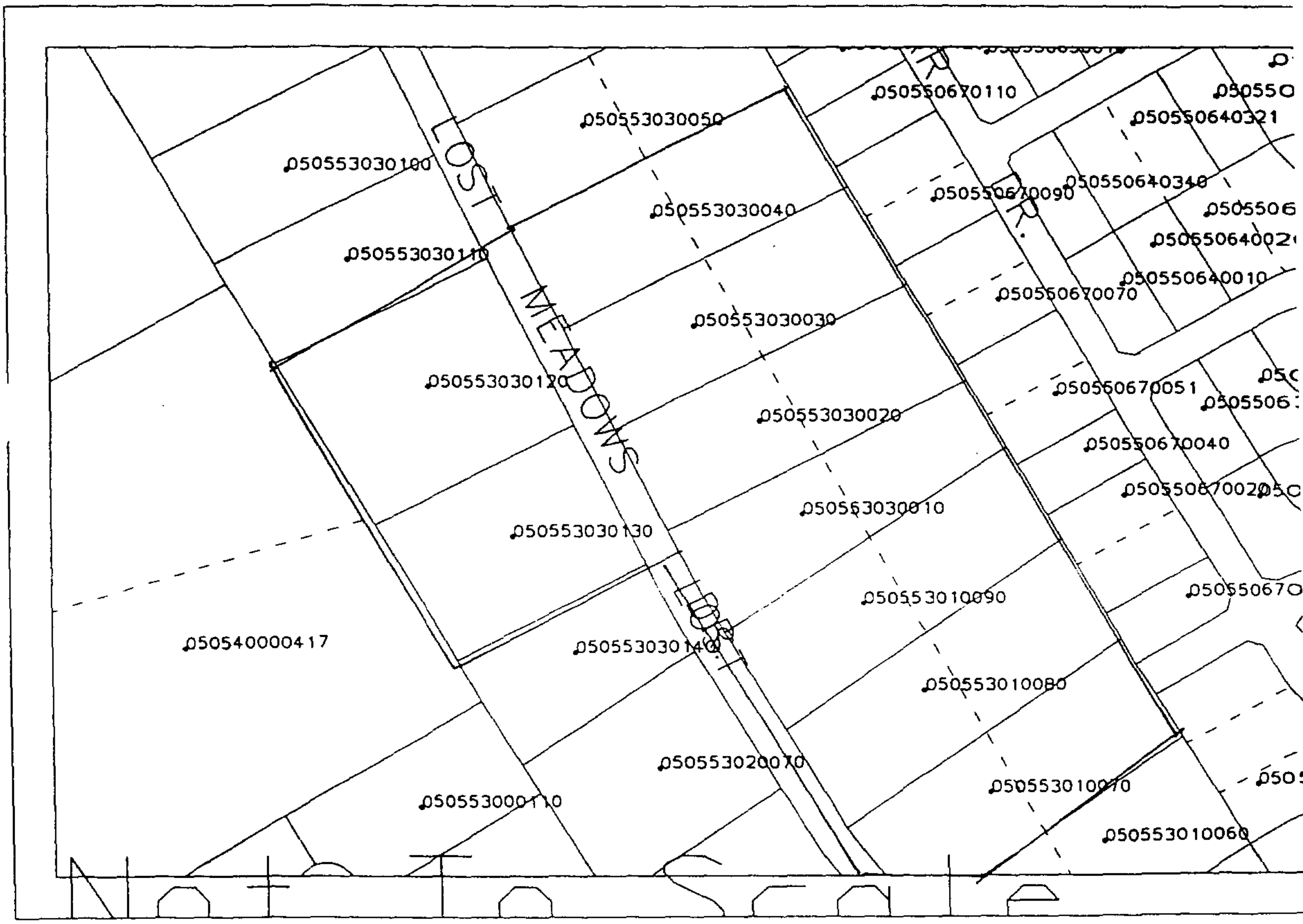
Priority 8



Omar Dr-SOUTH Section
Lakewood Acres-Lost Meadows Project Area

Bexar County Property Buy-Back Program

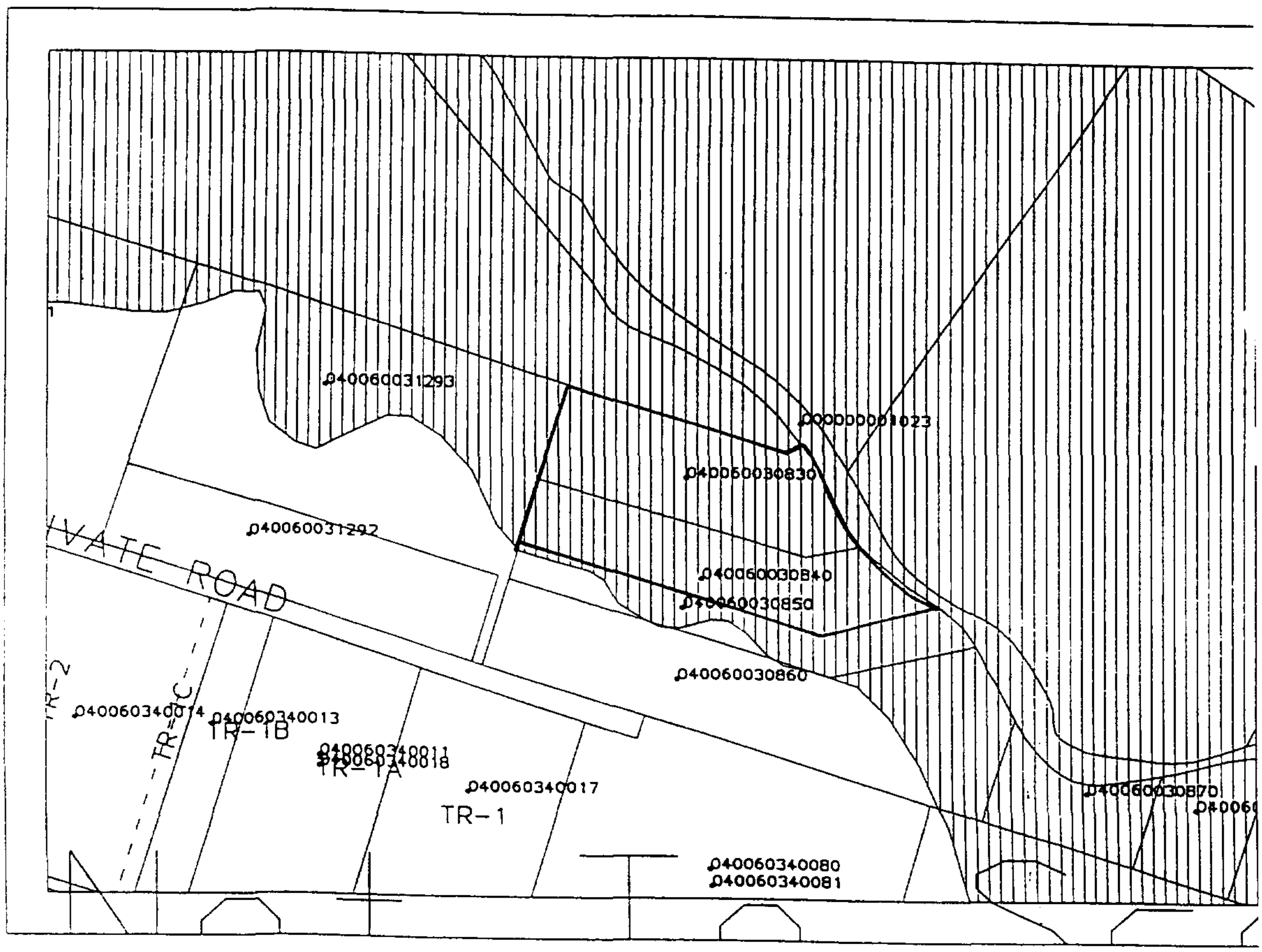
priority 10



Lost Meadows DR Section
Lakewood Acres-Lost Meadows Project Area

Bexar County Property Buy-Back Program

priority 12

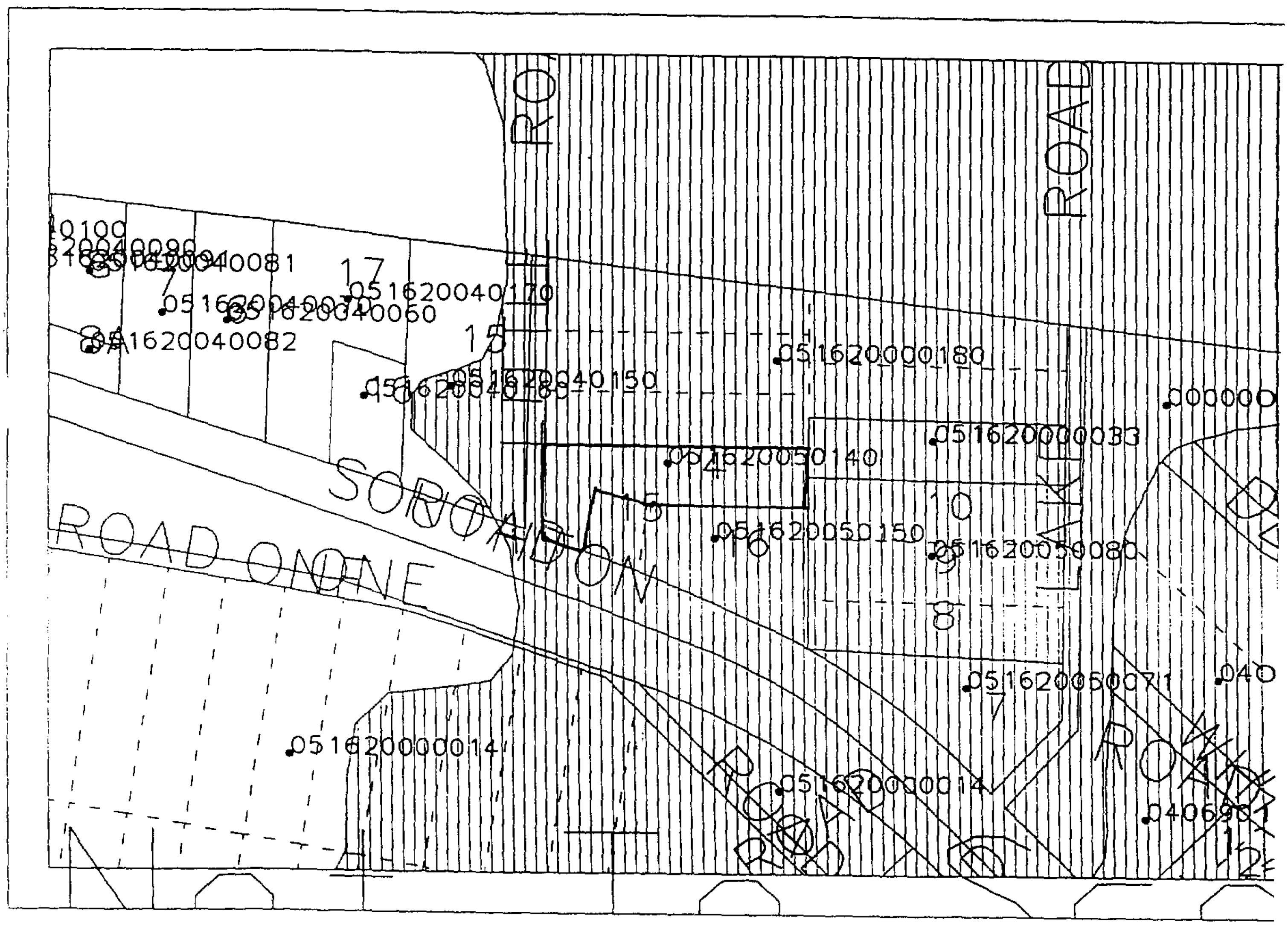


Goliad-Calaveras

Goliad-Calaveras Project Area

Bexar County Property Buy-Back Program

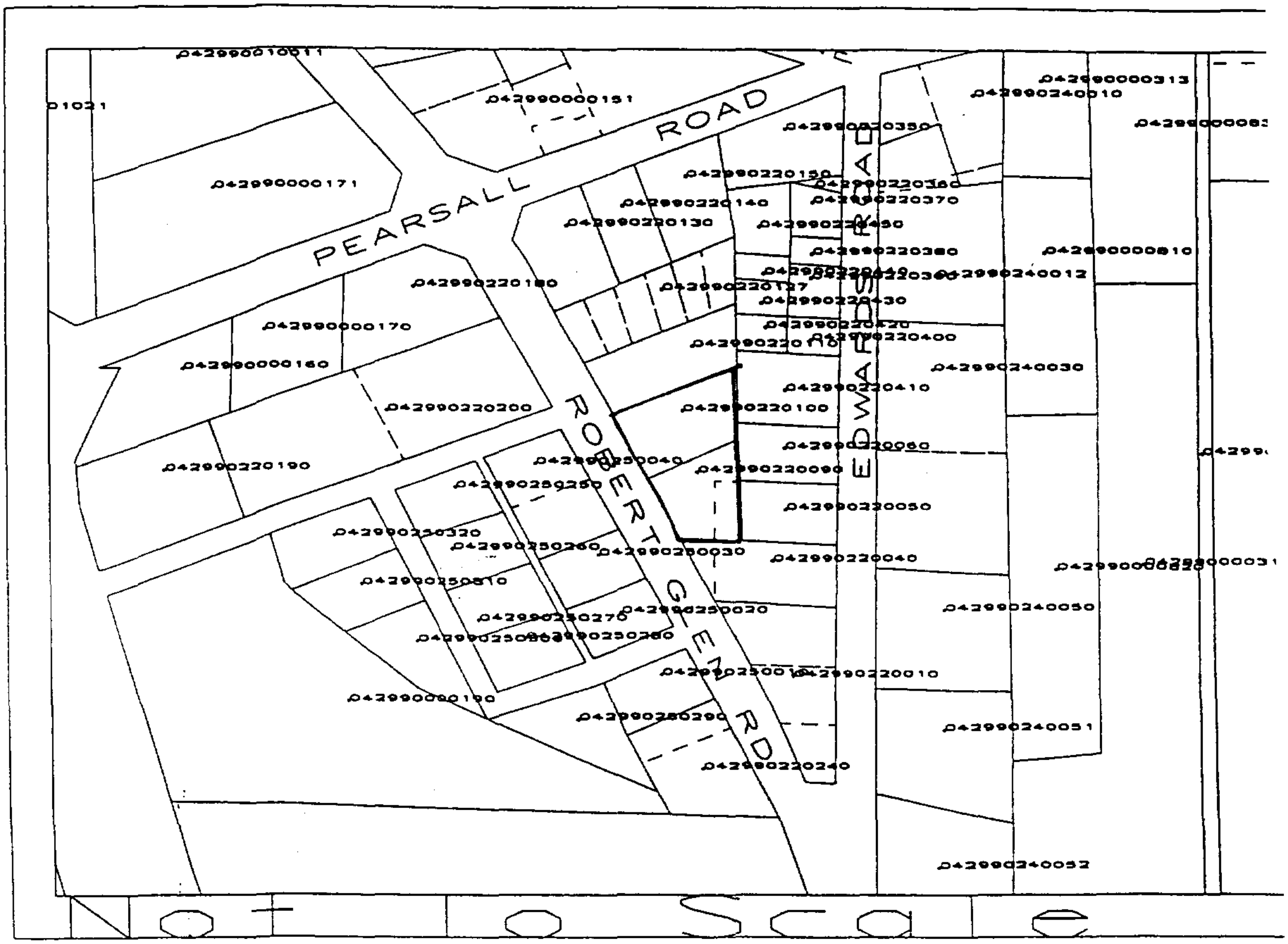
priority 14



Southton
Southton Project Area

Bexar County Property Buy-Back Program

Priorty 16



Hidden Valley
Hidden Valley Project Area

Bexar County Property Buy-Back Program

Memorandum

To: Members of Commissioners Court

From: David J. Harris

Date: 11/08/99

Re: SARA Project Memo

Attached is a list of Proposed Buy-Out project areas with specific properties submitted under the Texas Department of Public Safety Division of Emergency Management's (DEM) **Hazard Mitigation Grant Program.**

Also included is a list of unmet needs submitted by the Infrastructure Services-Public Works Division and San Antonio River Authority that were submitted under DEM's **Disaster Assistance for Unmet Needs Grant Program** this past August.

Additionally, as part of DEM's **Public Assistance Grant Program**, several roadways and parks across the Bexar County were either moderately or severely damaged. We have applied for and have received reimbursement for these items under this program. Parks damaged included Comanche Parks, MacArthur Park, Pletz Park, Mission County Park, Raymond Russell Park, Orsinger Park, and Rodriguez Park. I have a list of the roadways damaged, should you need them.

Flood \nalysis

Hazard Mitigation:

BUY-OUT PROJECT

Project No.	Project	Orig. Request	Revised Request	Est Res Cost	BC Revised Res. Cost	BC Unfunded	BC Request Unfunded
1	Lyndon Dr.	968,813	825,773	553,842	559,194	75,100	414,971
2	Crooked Tree	465,593	378,593	234,601	227,850	85,954	230,992
3	Lakeview Dr.	1,158,708	993,108	584,064	549,694	279,940	574,644
4	Sweetwater Dr.	864,649	700,009	575,371	519,691	32,250	289,278
5	Crescent Bend	847,862	717,662	506,523	500,367	84,650	341,339
6	Bluegill	873,840	754,140	264,859	469,669	76,668	608,981
7	Omar-North	906,556	823,156	433,565	528,489	84,359	472,991
8	Aztec	402,390	298,830	166,344	212,275	43,000	236,046
9	Omar-South	466,702	382,822	193,080	227,568	34,700	273,622
10	Schaefer Rd.	479,776	404,476	209,846	300,242	85,571	269,930
11	Lost Meadows	165,022	155,062	95,603	52,411	-	69,419
12	Goliad-Calaveras	58,050	42,690	35,575	35,575	-	22,475
13	Bolton	530,236	385,756	64,007	115,794	249,419	466,229
14	Southton	40,740	33,060	-	-	21,300	40,740
15	Shepard-Atascosa	68,880	53,520	-	-	44,600	68,880
		8,297,817	6,948,657	3,917,280	4,298,819	1,197,511	$ 4,380,537

Unmet Needs:

INFRASTRUCTURE SERVICES-PUBLIC WORKS

PRIORITY	PROJECT LOCATION	DESCRIPTION	PCT.	TRAFFIC VOLUME	TOTAL COST
1	Braun Road	Replacement of Narrow, Flood Prone Bridge 0.7M W.of Loop 1604	2	3,360	469,672
2	Cagnon Road	Replacing a low water crossing at 0.7 mi. N. of Macdona-LaCoste Rd.	1	729	320,000
3	Applewhite Road	Replacement of Narrow, Flood Prone Bridge 0.1M N.of Jett Road	1	502	308,448
4	Scenic Loop	Replacing a low water crossing at 0.4mi.N.of Greyforest Drive	3	911	230,000
5	Talley Road Riprap	To place concrete armour around drain struct. from Potranco Road to FM 471	1	3,006	198,359
6	Pearsall Road	Increasing capacity on a drainage culvert at 0.3M W.of Lucky Road	1	2,051	189,591
7	Kenney Road	Replacing a low water crossing at 0.3M N.of Pearsall Road	1	1,067	424,858
8	Cagnon Road	Replacing a low water crossing at 1.0 mi. N. of Macdona-LaCoste Rd.	1	729	4,350,000
9	Gardner Road	Increasing capacity on a drainage culvert at 0.6M S.of Sulphur Springs Rd.	4	1,927	68,145

Unmet Needs (cont):

10	Fischer Road	Increasing capacity on a drainage culvert at 0.4M W.of Somerset Rd.	1	1,765	98,419
11	Deer Cross Lane	Replacing a low water crossing at 0.1M W.of Timberline Drive	3	1,074	186,325
12	Old Frio City Road	Replacing a low water crossing at 0.4M E.of Wisdom Road	1	575	306,337
13	Glen Fair	Increasing capacity on a drainage culvert at 0.2M E.of New World Drive	4	662	127,645
14	Real Road	Replacing a low water crossing at 0.1M W.of FM 1516	4	667	73,834
15	O'Brien Road	Replacing a low water crossing at 0.1M S.of Macdona-LaCoste Rd.	1	489	548,400
16	Blue Wing Road	Replacing a low water crossing at 0.4M N.of I-37	1	370	203,559
17	Zigmont Road	Replacing a low water crossing at 0.1M S.of Macaway Road	4	289	139,188
18	Quintana Road	Replacing a low water crossing at 0.1M E.of Trawalter	1	171	424,858
19	Jackel Road	Replacing a low water crossing at 0.3 M S. of Benton City Road	1	n/a	180,000
				TOTAL-Infrastructure Services-Public Works $	**8,847,638**

SAN ANTONIO RIVER AUTHORITY

1	San Juan Lift Station/Tri-Lock Block Repair Erosion Damage	307,121
2	Flood Control Pilot Channel-south of 410 South Repair Erosion Damage	597,336
3	Flood Control Pilot Channel-south of Ashley Road Repair Erosion Damage	9,000
4	Espada Park flood damage repair	25,000
5	Kyle Hendricks and Blalock property on Villamain	230,000
	TOTAL-San Antonio River Authority $	**1,168,457**

GRAND TOTAL $	**14,396,632**

Hazard Mitigation

ACCT R	STREET NUMBE R	STREET NAME	ROL CDE	PROP CLAS	LAND VAL 98	IMP VAL 98	APPRAISED VAL 98	VALUE SOURCE	CNTL IND	FILED APPLIC .	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT S/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05055-062-0090	12636	LYNDON DR	F	RS	4400	53642	58042	COST	CV	FC	lnd fl p/res 4 ft water res 20% shed	1600	13200	14800	43242	64	40,442	75.39%	050550620090	0.46	199411
05055-062-0100	13022	LYNDON DR	F	RS	2500	1700	4200	COST	CV	FC	lnd fl p/res gutted for rpr/snd val $5	1600	500	2100	2100	64	1,200	70.59%	050550620100	0.46	199804
05055-062-0130	12724	LYNDON DR	F	RS	2750	43040	45790	COST	CV	Y	lnd fl f/res off fdn other imps sub d	2100	9500	11600	34190	64	33,540	77.93%	050550620130	0.52	199409
05055-063-0090	12533	LYNDON DR	F	RS	8600	52821	61621	COST	CV	FC	res&1 mh dest. 2nd mh gone. Sv 2	3300	200	3500	58121	64	52,621	99.62%	050550630090	0.92	
05055-063-0170	12709	LYNDON DR	F	RS	4400	38296	42696	COST	CV	FC	lnd fl f/res fld to 20% gd/poor cond	2200	10700	12900	29796	64	27,596	72.06%	050550630170	0.46	
05055-061-0140	12420	LYNDON DR	F	RT	4400	27389	31789	COST	CV	FC	lnd fl p/mh sev. Dam/floated acros	1600	1000	2600	29189	64	26,389	96.35%	050550610140	0.32	
05055-062-0010	12512	LYNDON DR	F	RT	4400	3908	8308	COST	CV	FC	mh off fdn no val & shed dest/ nom	1600	100	1700	6608	64	3,808	97.44%	050550620010	0.46	199606
05055-062-0040	12538	LYNDON DR	F	RT	4400	6245	10645	COST	CV	FC	lnd fl p/mh off fdn & fld and val $10	1600	1000	2600	8045	64	5,245	83.99%	050550620040	0.46	199411
05055-062-0080	12628	LYNDON DR	F	RT	4400	6883	11283	COST	CV	FC	lnd fl p/mh fld and val $1000	1600	1000	2600	8683	64	5,883	85.47%	050550620080	0.46	199411
05055-063-0030	12419	LYNDON DR	F	RT	5500	23534	29034	COST	CV	FC	lnd fl p/no mh on lot	1600	0	1600	27434	64	23,534	100.00%	050550630030	0.46	
05055-063-0060	12509	LYNDON DR	F	RT	4400	11167	15567	COST	CV	Y	lnd fl p/mh dest. Snd val $100	1600	100	1700	13867	64	11,067	99.10%	050550630060	0.46	199802
05055-063-0070	12517	LYNDON DR	F	RT	4400	4527	8927	COST	BD	FC	mh dest.snv $100/mh#2 unk owner	1600	100	1700	7227	64	4,427	97.79%	050550630070	0.46	199802
05055-063-0110	12605	LYNDON DR	F	RT	4400	3587	7987	COST	CV	FC	ldn fl p/mh dest. Sv $100	1600	100	1700	6287	64	3,487	97.21%	050550630110	0.46	199802
05055-063-0140	12629	LYNDON DR	F	RT	4400	10340	14740	COST	CV	Y	lnd fl f/mh sev dam sv1000/del $30	2200	1300	3500	11240	64	9,040	87.43%	050550630140	0.46	
05055-063-0020	12411	LYNDON DR	F	UX	5500	500	6000	COST	CV	FC	ldn fl p/aux $100 sv	1600	100	1700	4300	64	400	80.00%	050550630020	0.46	199802
80100-010-0193	12604	LYNDON DR	M	RT	0	5000	5000	COST	NS	Y	mh flooded/dest nom $100-2nd not	0	100	100	4900	64	4,900	98.00%			
05055-062-0050	12604	LYNDON DR	F	RT	4400	5281	9681	COST	BP	FC	lnd fl p/mh wrong ownr80100-010-	1600	0	1600	8081	64	5,281	100.00%	050550620050	0.46	199411
05055-063-0120	12613	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl f/mh 81500-012-0035 sev de	2200	0	2200	2200	64	-		050550630120	0.46	199606
81500-012-0035	12613	LYNDON DR	M	RT	0	35035	35035	COST	CV	Y	mh fld/sv $100	0	100	100	34935	64	34,935	99.71%			
05055-062-0110	12708	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl p	1600	0	1600	2800	64	-		050550620110	0.46	
80500-014-0314	12708	LYNDON DR			0	21774	21774														
05055-063-0160	12709	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl f/mh 81800-015-1892	2200	0	2200	2200	64	-		050550630160	0.46	199409
81800-015-1892	12709	LYNDON DR	M	RT	0	4400	4400	COST	CV	FC	mh fld/sv $500	0	500	500	3900	64	3,900	88.64%			
	SUBTOTAL PREFLOOD VALUE				86,650	359,069	445,719					NUMBER OF RECORDS WITH IMP				22					
05055-062-0020	12524	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl p	1600	0	1600	2800	64	-		050550620020	0.46	199606
05055-062-0030	10530	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl p	1600	0	1600	2800	64	-		050550620030	0.46	
05055-062-0060	11638	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl p	1600	0	1600	2800	64	-		050550620060	0.46	
05055-062-0070	11972	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl p	1600	0	1600	2800	64	-		050550620070	0.46	199411
05055-062-0120	13744	LYNDON DR	F	VP	4125	0	4125	COST	BV	FC	lnd fl p	1600	0	1600	2525	64	-		050550620120	0.4	199409
05055-063-0010	12403	LYNDON DR	F	VP	4950	0	4950	COST	CV	FC	lnd fl p	1600	0	1600	3350	64	-		050550630010	0.46	199802
05055-063-0040	12427	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl p	1600	0	1600	2800	64	-		050550630040	0.46	199802
05055-063-0050	12501	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl p	1600	0	1600	2800	64	-		050550630050	0.46	199802
05055-063-0080	12525	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl p	1600	0	1600	2800	64	-		050550630080	0.46	
05055-063-0130	12629	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl f	2200	0	2200	2200	64	-		050550630130	0.46	
05055-063-0150	12629	LYNDON DR	F	VP	4400	0	4400	COST	CV	FC	lnd fl f	2200	0	2200	2200	64	-		050550630150	0.46	
	SUBTOTAL PREFLOOD VALUE				48,675	-	48,675					NUMBER OF RECORDS VACANT				11	297,695	Difference from Pre to Post Flood			
	TOTAL PREFLOOD VALUE				135,325	359,069	494,394					TOTAL NUMBER OF RECORDS				33					

Lyndon DR Project

·· NOT TYPE IN THIS SPACE
APPROVAL

D.A. ______ Budget ______
‾tor ______ Persnl ______

COUNTY OF BEXAR

AGENDA COORDINATION FORM

FOR CC USE ONLY
No. 1
Date Considered ______
Consent ______ Individual ______

12, 1999
ourt Consideration Requested
March 16, 1999

Department: Planning and Resource Management

Deadline for Action:
March 16, 1999

Contact Person/Phone#: David J. Harris 335-2654

Official/Dept. Head Signature:

CAPTION:

Discussion and appropriate action regarding the programmatic aspects and budget for the proposed Bexar County Property Buy-Back Program.

BACKGROUND:

300 properties County-wide were substantially damaged during the floods of October 17-18, 1998, representing damages of an estimated $2.5 million. These properties are located in seven neighborhoods (16 project areas) in the proposed Bexar County Property Buy-Back Program. The primary source of the proposed program's funding (up to 75 percent) is anticipated to come from the Federal Emergency Management Agency (FEMA) and the Texas Department of Public Safety Division of Emergency Management (DEM) through a competitive grant process. The FEMA/DEM grant application is due March 19, 1999.

Localities making application have to provide the balance of the funding (25 percent or more). Based upon the project estimate of $8,150,508 presented below, staff is seeking $6,112,881 in the application to FEMA/DEM with a local match of $2,037,627. Several sources have been identified and/or dedicated to off-set this estimated 25 percent match: Texas Department of Housing and Community Affairs Disaster Relief Initiative funds (TDHCA DRI) ($300,000), Bexar County Community Development Block Grant funds (BC CDBG) ($178,914), and Bexar County Housing Finance Corporation (BC HFC) ($150,000). What remains unidentified is the source of funding for the remaining $1,408,713. *Most likely*, these funds will not be needed until FY 1999-2000.

The current estimate for the buy-back program is $8,150,508. The original estimate was $9,377,857 and was based on windshield surveys conducted by Emergency Management staff. A revised estimate presented to the CIP on March 3, 1999 was $7,891,237 and reflected post flood evaluations as well as revised property appraisals from Bexar Appraisal District and the cost of adding manufactured housing units in the buy-back program. Upon direction from the CIP, staff further reviewed the budget to see that no properties were excluded that would result in a "checkerboard" pattern if all properties were acquired. Following this review, five additional properties were added to the program to ensure that, from a budgetary perspective, funding exists to acquire properties which lie adjacent to substantially damaged properties. These addition properties increased the project estimate to the current $8,150,508.

For the purposes of the FEMA/DEM grant application, 16 individual projects, defined around specific streets, were identified. The single largest area continues to be the Lakewood Acres-Lost Meadows Project Area (10 projects) followed by Aztec and Bolton Lanes Project Area (2 projects) and then by areas in Southern Bexar County (4 projects). The Lakewood Acres-Lost Meadows and Aztec and Bolton Lanes were hit by the June 1997 flood in addition to the October 1998 flood. The program budget is summarized as follows and contains a four percent contingency, as recommended by staff:

Budget Summary	Lakewood Acres-Lost Meadows	Aztec-Bolton	Southern Bexar County	TOTALS
Cost for utility or septic cleanup	$675,000	$103,500	$31,500	$810,000
Acquisition Services	635,000	70,000	17,500	722,500
Property with Improvements	4,037,929	458,738	132,675	4,629,342
Properties without improvements	608,319	11,750	0	620,069
Cost for demolition or moving structure	750,000	115,000	35,000	900,000
SUBTOTAL	**$6,706,248**	**$758,988**	**$216,675**	**$7,681,911**
Contingencies (4%)	268,250	30,360	8,667	307,276
Administration	140,831	15,939	4,550	161,320
TOTAL	**$7,115,329**	**$805,286**	**$229,892**	**$8,150,508**

Today's request is to discuss and take appropriate action on several issues, thereby providing direction for the prop Property Buy-Back Program and associated grant applications:

1. What kind of properties should be pursued for acquisition under this program?
   a. Properties that sustained substantial damage to their "improvements" (i.e. greater than 50 percent of value c structures on a property were lost) AND vacant properties.
   b. ONLY properties that sustained substantial damage to their "improvements" (i.e. greater than 50 perce value of the structures on a property were lost) AND NOT vacant properties.
   c. Properties only within the 100-year floodplain or some other floodplain factor.

2. Should the properties be ranked in priority order, if so what is the priority?

   For the purposes of the FEMA/DEM grant application, properties were prioritized based upon the le damage sustained in the October 1998 flood; the occurrence of past flooding; and propensity toward : flooding (properties flooded both in June 1997 and October 1998 are of higher priority). The great damage and higher potential for future flooding, the higher the priority. The ranking informs FEMA/DE the County's priority areas in case FEMA/DEM total funding for the project is not awarded.

3. What if FEMA/DEM only supplies funding for some of the sixteen identified projects: Do we proceed wi those projects funded? What if FEMA/DEM does not fund ANY projects: Do we proceed with certain pr and—possibly—budget more money than the match we are discussing today?

4. Do we go after all properties in this proposed program or scale it back to only the prioritized areas?

5. Will we require 100 percent participation?
   a. Do we offer an "all or nothing" option to the property owners in the defined areas ?
   If all owners do not participate, then a "checkerboard pattern" of property will result and the property will have the potential for future public use as park, or another identified. A "checkerboard pattern" also make securing the property and maintaining properties more difficult.

6. What is to become of these properties once acquired?
   a. What will we do long term: just maintain them? Create linear parks? Create a larger park and offeri program buy-outs to owners who "hold out?"
   b. How are we going to fund the maintenance of these properties and manage our liability for these prop

ACCT	STREET NUMBER	STREET NAME	RO CO	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL 9	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT S/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05055-061-0190	12073	CROOKED TREE	F	RS	4400	15249	19649	COST	CV	Y	Ind fl p/all imps destr. Lot now vac	1600	0	1600	18049	64	15,249	100.00%	05055061	0.32	199409
05055-061-0150	12159	CROOKED TREE	F	RT	4400	1379	5779	COST	CV	FC	Ind fl p/mh gone rmv all imps	1600	0	1600	4179	64	1,379	100.00%	05055061	0.32	
05055-061-0160	12141	CROOKED TREE	F	RT	4400	1473	5873	COST	CV	FC	Ind fl p/mh gone lot vac rmv all imps	1600	0	1600	4273	64	1,473	100.00%	05055061	0.32	
05055-061-0170	12125	CROOKED TREE	F	RT	4400	10661	15061	COST	CV	FC	Ind fl p/mh gone lot vac rmv all imps	1600	0	1600	13461	64	10,661	100.00%	05055061	0.32	
05055-061-0210	12039	CROOKED TREE	F	RT	3575	17875	21450	COST	CV	FC	Ind fl p/mh off fdn/bent frme and $1000	1600	1000	2600	18850	64	16,875	94.41%	05055061	0.32	199409
05055-061-0310	12060	CROOKED TREE	F	RT	4400	5521	9921	COST	CV	FC	Ind fl p-mh dest. Nom val at $100	1600	100	1700	8221	64	5,421	98.19%	05055061	0.32	
05055-061-0321	12110	CROOKED TREE	F	RT	8800	1930	10730	COST	CV	Y	Ind fl p-mh dest. Nom val at $100	3300	100	3400	7330	64	1,830	94.82%	05055061	0.64	
05055-061-0360	12180	CROOKED TREE	F	RT	4400	5925	10325	COST	CV	FC	Ind fl p/mh & shed gone lot vac	1600	0	1600	8725	64	5,925	100.00%	05055061	0.32	
05055-061-0370	12172	CROOKED TREE	F	RT	4400	43705	48105	COST	CV	FC	mh off fdn serious dam and val $1000	1600	1000	2600	45505	64	42,705	97.71%	05055061	0.32	199808
80100-016-6427	12039	CROOKED TREE	M	RT	0	30497	30497	COST	CV	FC	mh 2-3 ft water/rmv fm lot/sv $1000	0	1000	1000	29497	64	29,497	96.72%			
05055-061-0220	12027	CROOKED TREE	F	VP	2750	0	2750	COST	CV	FC	Ind fl p/mh80100-016-6427 sev dam.	1600	0	1600	1150	64	-		05055061	0.32	199409
		SUBTOTAL PREFLOOD VALUE			45,925	134,215	180,140					NUMBER OF RECORDS WITH IMP				11					
05055-061-0180	12109	CROOKED TREE	F	VP	4400	0	4400	COST	CV	FC	Ind fl p no imps	1600	0	1600	2800	64	-		05055061	0.32	
05055-061-0200	12059	CROOKED TREE	F	VP	4400	0	4400	COST	CV	FC	Ind fl p	1600	0	1600	2800	64	-		05055061	0.32	
05055-061-0230	12015	CROOKED TREE	F	VP	4565	0	4565	COST	CV	FC	Ind fl f	2500	0	2500	2065	64	-		05055061	0.37	199804
05055-061-0270	12000	CROOKED TREE	F	VP	4565	0	4565	COST	CV	FC	Ind fl f	2000	0	2000	2565	64	-		05055061	0.43	199808
05055-061-0280	12018	CROOKED TREE	F	VP	4400	0	4400	COST	CV	FC	Ind fl f	1800	0	1800	2600	64	-		05055061	0.49	199808
05055-061-0290	12028	CROOKED TREE	F	VP	2750	0	2750	COST	CV	FC	Ind fl p already- no chg.	2750	0	2750	0	64	-		05055061	0.32	
05055-061-0300	12040	CROOKED TREE	F	VP	4400	1524	5924	COST	CV	FC	Ind fl p - no imps lot vac	1600	0	1600	4324	64	1,524	100.00%	05055061	0.32	
05055-061-0343	12126	CROOKED TREE	F	VP	4950	0	4950	COST	CV	FC	Ind fl p	1300	0	1300	3650	64	-		05055061	0.28	
05055-061-0351	12142	CROOKED TREE	F	VP	4400	0	4400	COST	BE	FC	Ind fl p	1900	0	1900	2500	64	-		05055061	0.39	199808
		SUBTOTAL PREFLOOD VALUE			38,830	1,524	40,354					NUMBER OF RECORDS VACANT				9	132,539	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			84,755	135,739	220,494					TOTAL NUMBER OF RECORDS				20					

Crooked Tree
Project

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL 9	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT B/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05055-082-0512	12311	LAKEVIEW DR	F	RT	5500	31656	37156	COST	CV	FC	ind 8 p/mh off fdn/shed dest/sv $1000	1600	1000	2600	34556	64	30,656	98.84%	050550820512	0.75	199802
05055-082-0500	12318	LAKEVIEW DR	F	RS	5500	56452	61952	COST	CV	FC	ind 8 p/res sev.gutted to studs for rpr	1600	12200	13800	48152	64	44,252	78.39%	050550820500	0.78	199201
05055-088-0218	12324	LAKEVIEW DR	F	RS	5500	38454	41954	COST	CV	Y	ind 8 p/res 2 sts away/no val rmv all imps	1600	0	1600	40354	64	38,454	100.00%	050550880210	0.48	199111
05055-082-0482	12327	LAKEVIEW DR	F	RT	11000	4006	15006	COST	CV	Y	ind 8 p/mh dest. 8nd val $100	2400	100	2500	12506	64	3,906	97.50%	050550820482	1.13	
05055-088-0200	12332	LAKEVIEW DR	F	RS	5500	34847	40347	COST	CV	Y	ind 8 p/res off fdn 4-5 ft water sv $500	1800	500	2100	38247	64	34,347	98.57%	050550880200	0.48	199111
05058-088-0190	12434	LAKEVIEW DR	F	RT	5500	4455	9955	COST	CV	Y	ind 8 p/mh sev dam&no fdn sv $100	1600	100	1700	8255	64	4,355	97.78%	050550880190	0.48	199111
05055-082-0471	12445	LAKEVIEW DR	F	RT	16500	78065	94565	COST	CV	FC	ind 8 p/5 mh-all sev dam 100-1000 sv	3300	3200	6500	88065	64	74,865	95.90%	050550820471	1.61	199009
05055-088-0160	12454	LAKEVIEW DR	F	RT	5500	9818	15316	COST	CV	FC	ind 8 p/mh sev. dam.sv $100/del $100	1600	200	1800	13516	64	9,618	97.98%	050550880160	0.48	
05055-082-0440	12455	LAKEVIEW DR	F	RS	5500	58770	64270	COST	CV	FC	ind 8 p/res off fdn but entact 20% gd	1600	13400	15000	49270	64	45,370	77.20%	050550820440	0.75	
05055-082-0420	12475	LAKEVIEW DR	F	RT	5225	8805	14030	COST	CV	FC	ind 8 p/hm amd tree/gar sev dam.	2500	200	2700	11330	64	8,605	97.73%	050550820420	0.79	199704
05055-082-0390	12505	LAKEVIEW DR	F	RS	2200	41950	44150	COST	CV	Y	ind 8 p-/res dest/gar/ls2 abv sev.dam	1600	400	2000	42150	64	41,550	99.05%	050550820390	0.73	
05055-082-0360	12535	LAKEVIEW DR	F	RS	5500	30821	38321	COST	CV	FC	ind 8 p/res/shed dest. imps$100	2800	100	2700	33821	64	30,721	99.68%	050550820360	1.18	
05055-082-0350	12555	LAKEVIEW DR	F	RS	2750	18244	20994	COST	CV	FC	ind 8 p/res more dam since 97 fld	1300	5000	6300	14694	64	13,244	72.59%	050550820350	0.68	199607
05055-066-0180	12424	LAKEVIEW DR	F	VP	5500	0	5500	COST	CV	FC	ind 8 p/mh 81600-001-0014 damaged	1600	0	1600	3900	64	-		050550660190	0.48	199111
81600-001-0014	12424	LAKEVIEW DR	M	RT	0	58769	58769	COST	CV	FC	mh dem sv $5000	0	5000	5000	53769	64	53,769	91.49%			
		SUBTOTAL PREFLOOD VALUE			87,178	473,110	560,288						NUMBER OF RECORDS WITH IMP			16					
05055-082-0140	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	BV	FC	ind 8 p	2100	0	2100	650	64			050550820140	0.75	199408
05055-082-0150	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820150	0.48	199409
05055-082-0160	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820160	0.48	
05055-082-0170	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	BV	FC	ind 8 p	1300	0	1300	1450	64			050550820170	0.47	199409
05055-082-0180	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820180	0.46	199409
05055-082-0190	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820190	0.46	
05055-082-0200	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820200	0.46	
05055-082-0210	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820210	0.44	
05055-082-0220	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820220	0.43	199409
05055-082-0230	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	idn 8 p	1300	0	1300	1450	64			050550820230	0.5	199409
05055-082-0240	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1700	0	1700	1050	64			050550820240	0.79	199409
05055-082-0250	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1600	0	1600	1150	64			050550820250	0.76	199409
05055-082-0260	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820260	0.84	199409
05055-082-0270	0	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820270	0.66	199409
05055-088-0221	0	LAKEVIEW DR	F	VP	5500	0	5500	COST	CV	FC	ind 8 p	1500	0	1500	4000	64			050550880221	0.41	199111
05055-088-0230	0	LAKEVIEW DR	F	VP	5500	0	5500	COST	CV	FC	ind 8 p	1800	0	1600	3900	64			050550880230	0.44	199111
05055-088-0170	12432	LAKEVIEW DR	F	VP	5500	0	5500	COST	CV	FC	ind 8 p	1600	0	1600	3900	64			050550880170	0.48	199111
05055-082-0430	12448	LAKEVIEW DR	F	VP	5390	0	5390	COST	CV	FC	ind 8 p	1600	0	1600	3790	64			050550820430	0.75	
05055-082-0451	12451	LAKEVIEW DR	F	VP	16500	0	16500	COST	CV	FC	ind 8 p	2400	0	2400	14100	64			050550820451	1.13	
05055-088-0150	12494	LAKEVIEW DR	F	VP	5500	0	5500	COST	CV	FC	ind 8 p	1600	0	1600	3900	64			050550880150	0.48	
05055-082-0410	12481	LAKEVIEW DR	F	VP	5115	0	5115	COST	CV	FC	ind 8 p	1600	0	1600	3515	64			050550820410	0.78	199704
05055-082-0400	12495	LAKEVIEW DR	F	VP	5500	0	5500	COST	CV	FC	ind 8 p/mh but wash away/gar $100	1400	100	1500	4000	64	(100)		050550820400	0.85	199704
05055-088-0130	12508	LAKEVIEW DR	F	VP	6600	0	6600	COST	CV	FC	ind 8 p	2800	0	2800	3800	64			050550880130	0.74	
05055-082-0380	12523	LAKEVIEW DR	F	VP	2200	0	2200	COST	CV	FC	ind 8 p - no imps lot vac	1300	0	1300	900	64			050550820380	0.57	
05055-082-0331	12583	LAKEVIEW DR	F	VP	5500	0	5500	COST	CV	FC	ind 8 p	2600	0	2600	2900	64					
05055-082-0330																					
05055-082-0340																					
05055-082-0320	12595	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820320	0.7	199807
05055-082-0310	12605	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820310	0.71	199807
05055-082-0300	12615	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820300	0.7	199409
05055-082-0290	12627	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820290	0.69	
05472-000-0023					0	0	0														
05055-082-0280	12639	LAKEVIEW DR	F	VP	2750	0	2750	COST	CV	FC	ind 8 p	1300	0	1300	1450	64			050550820280	0.68	199409
		SUBTOTAL PREFLOOD VALUE			121,068	-	121,068						NUMBER OF RECORDS VACANT			30	431,810	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			208,230	473,110	681,340						TOTAL NUMBER OF RECORDS			48					

Lakeview Dr.
Project

ACCT	STREET NUMBER	STREET NAME	RO CO	PRO CLA	LAND VAL 94	IMP VAL 94	APPRAISE VAL 9	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST F	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT B/O	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05055-085-0170	12530	SWEETWATER DR	F	RT	4400	1787	6187	COST	CV	Y	Ind & p/mh sev dam/av $100	1700	100	1800	4387	64	1,687	94.40%	050550850170	0.82	199602
05055-085-0180	12530	SWEETWATER DR	F	UX	8225	18362	24587	COST	CV	Y	Ind & p/gar av$100 other det. Dest.	1600	100	1700	22887	64	18,262	99.46%	050550850180	0.46	
05055-085-0190	12522	SWEETWATER ST	F	RS	5500	21999	27499	COST	CV	FC	Ind & p/res sev dam/av $600/mv $100	1600	600	2200	25299	64	21,399	97.27%	050550850190	0.46	
05055-085-0200	12514	SWEETWATER ST	F	RT	5500	11602	17102	COST	CV	FC	Ind & p/mh & det av 100 each	1600	200	1800	15302	64	11,402	98.28%	050550850200	0.46	199412
05055-085-0210	12506	SWEETWATER ST	F	RT	5500	14238	19738	COST	CV	FC	Ind & t/mh sev dam/det.$100 each	2200	300	2500	17238	64	13,938	97.89%	050550850210	0.46	
05055-085-0220	12500	SWEETWATER DR	F	RT	11000	7078	18078	COST	CV	Y	Ind & tlot vac prev mh swept away	3400	0	3400	14678	64	7,078	100.00%	050550850220	1	199412
05055-085-0240	12450	SWEETWATER DR	F	RT	5500	8931	14431	COST	CV	Y	Ind & p/mh sev dam/av $100	1600	100	1700	12731	64	8,831	98.88%	050550850240	0.46	199412
05055-085-0250	12442	SWEETWATER DR	F	RT	5500	10310	15810	COST	CV	Y	Ind & p/mh sev dam/av 100	1800	100	1700	14110	64	10,210	99.03%	050550850250	0.46	199412
05055-085-0270	12420	SWEETWATER DR	F	RT	5500	8405	13905	COST	CV	FC	Ind & p/mh comp. Dest av $100	1600	100	1700	12205	64	8,305	98.81%	050550850270	0.46	199412
05055-085-0280	12416	SWEETWATER ST	F	RT	5600	5843	11443	COST	CV	FC	Ind & p/mh comp. Dest av $100	1600	100	1700	9743	64	5,643	98.32%	050550850280	0.46	199412
05055-086-0010	12406	SWEETWATER ST	F	RT	8000	37475	45475	COST	CV	FC	Ind & p/mh inter.sev ddr/av2,500	2400	2500	4900	40575	64	34,975	93.33%	050550860010	0.69	199608
05055-086-0040	12420	SWEETWATER ST	F	RT	10800	10757	21557	COST	CV	FC/Y	Ind & p/mh & barn sev dam av$100@	1600	200	1800	19757	64	10,557	98.14%	050550860040	0.46	
05055-086-0080	12450	SWEETWATER ST	F	RT	5500	22528	28028	COST	CV	Y	Ind & p/mh sev dam /neur totalled av 10	1600	100	1700	26328	64	22,428	99.56%	050550860080	0.46	199704
05055-086-0090	12501	SWEETWATER ST	F	RT	5500	13558	19058	COST	CV	FC	Ind & p/major dam inter but repr.av1000	1600	1000	2600	16458	64	12,558	92.62%	050550860090	0.46	199704
05055-086-0100	12507	SWEETWATER DR	F	RT	5600	20830	26330	COST	CV	FC	Ind & p/mh dest. av $100/det pat.$100	1600	200	1800	24530	64	20,630	99.04%	050550860100	0.46	199111
05055-086-0110	12515	SWEETWATER ST	F	RS	8000	25068	33068	COST	CV	FC	Ind & p/res mvd fm hln av $1000	800	1000	1800	31068	64	24,068	96.10%	050550860110	0.23	199111
05055-086-0060	12443	SWEETWATER DR	F	VP	5500	0	5500	COST	CV	FC	Ind & p/mh 81300-001-0729 sev dam	1600	0	1600	3900	64			050550860060	0.46	199706
81300-001-0729	12443	SWEETWATER DR	M	RT	0	12742	12742	COST	CV	FC	mh sev. Dam/in repair av $1000det@10	0	1100	1100	11642	64	11,642	91.37%			
05055-086-0070	12451	SWEETWATER DR	F	VP	5500	0	5500	COST	CV	FC	Ind & p/mh 80700-006-0331 hvy dam.	1600	0	1600	3900	64			050550860070	0.46	199704
80700-006-0331	12451	SWEETWATER DR	M	RT	0	9143	9143	COST	CV	FC	mh hvy dam but under repair/av 2500	0	1500	1600	7643	64	7,643	83.59%			
05055-085-0260	12428	SWEETWATER DR	F	VP	5500	0	5500	COST	CV	FC	Ind & p/mh81200-001-0269 dest.	1600	0	1600	3900	64			050550850260	0.46	199412
80700-010-0489	12428	SWEETWATER DR	M	RT	0	13600	13600	COST	CV	FC	mh completely dest. No value	0	0	0	13000	64	13,600	100.00%			
		SUBTOTAL PREFLOOD VALUE			118,925	278,016	394,941					NUMBER OF RECORDS WITH IMP				22					
05055-085-0290	12412	SWEETWATER DR	F	VP	5500	0	5500	COST	CV	FC	Ind & f	2200	0	2200	3300	64			050550850290	0.46	
05055-085-0300	12404	SWEETWATER ST	F	VP	5500	0	5500	COST	CV	FC	Ind & f	2200	0	2200	3300	64			050550850300	0.46	
05055-086-0020	12418	SWEETWATER ST	F	VP	2500	0	2500	COST	CV	FC/Y	Ind & p	2400	0	2400	100	64			050550860020	0.69	
05055-086-0050	12441	SWEETWATER DR	F	VP	4400	0	4400	COST	CV	FC/Y	Ind & p	1600	0	1600	2800	64			050550860050	0.46	199606
05055-086-0111	0	SWEETWATER ST	F	VP	2600	0	2600	COST	CV	FC	Ind & p	900		900	1700	64			050550860111	0.23	
05055-086-0120	12521	SWEETWATER ST	F	VP	8000	0	8000	COST	BE	FC	Ind & p	1700	0	1700	6300	64			050550860120	0.5	
		SUBTOTAL PREFLOOD VALUE			28,400	-	28,400					NUMBER OF RECORDS VACANT				6	266,710	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			147,325	278,016	423,341					TOTAL NUMBER OF RECORDS				28					

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Sweetwater Dr. Project

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL $	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT S/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05055-083-0220	12622	BLUEGILL DR	F	RS	4400	47696	52096	COST	CV	FC	Ind $ #res. To 20% gd/rprable	2200	10300	12500	39596	64	37,396	78.40%	050550830220	0.46	
05055-083-0230	12614	BLUEGILL DR	F	RS	4400	62666	67066	COST	CV	FC	Ind $ #2ft wat. Res& det under rpr now	2200	24100	26300	40766	64	38,566	61.54%	050550830230	0.46	
05055-083-0330	12412	BLUEGILL DR	F	RS	4400	56925	61325	COST	CV	FC	Ind $ p/res piers out/salvage $1000	1600	1000	2600	58725	64	55,925	98.24%	050550830330	0.46	199603
05055-083-0210	12642	BLUEGILL DR	F	RT	4400	2179	6579	COST	CV	FC	Ind $ p/mh dest. Snd val $100	1600	100	1700	4879	64	2,079	95.41%	050550830210	0.28	
05055-083-0240	12584	BLUEGILL DR	F	RT	4400	5980	10380	COST	CV	FC	Ind $ p/mh dest. Snd val $100	1600	100	1700	8680	64	5,880	98.33%	050550830240	0.46	199206
05055-083-0250	12542	BLUEGILL DR	F	RT	4400	4699	9099	COST	CV	FC	Ind $ p/2 mh dest. Sv $100 each	1600	200	1800	7299	64	4,499	95.74%	050550830250	0.46	199206
05055-083-0260	12534	BLUEGILL DR	F	RT	4400	27857	32257	COST	CV	Y	Ind $ f/mh dest sv$100/det sv 100	2200	200	2400	29857	64	27,657	99.28%	050550830260	0.46	
05055-083-0270	12526	BLUEGILL DR	F	RT	4400	3396	7796	COST	CV	FC	$ f/mh $12000030212combw/thissv$100	2200	100	2300	5496	64	3,296	97.06%	050550830270	0.46	199206
05055-083-0290	12510	BLUEGILL DR	F	RT	4400	12619	17019	COST	CV	FC	$ p/mh& gar dest sv $100	1600	100	1700	15319	64	12,519	99.21%	050550830290	0.46	
05055-083-0310	12420	BLUEGILL DR	F	RT	8800	2000	10800	COST	CV	FC	Ind $ p/mh&det dest. Sv $100	3300	100	3400	7400	64	1,900	95.00%	050550830310	0.92	199603
05055-084-0020	12413	BLUEGILL DR	F	RT	5225	541	5766	COST	CV	FC	Ind $ p/mh comp. Dest-no imps on lot	1600	0	1600	4166	64	541	100.00%	050550840020	0.46	199603
05055-084-0031	12421	BLUEGILL DR	F	RT	8800	24940	33740	COST	CV	FC	Ind $ p/mh dest. Snd val $100det dest.	3300	100	3400	30340	64	24,840	99.60%	050550840031	0.92	
05055-084-0090	12535	BLUEGILL DR	F	RT	4400	27907	32307	COST	CV	FC	Ind $ p/mh 80800-004-1411 dest.	1600	0	1600	30707	64	27,907	100.00%	050550840090	0.46	
05055-084-0100	12543	BLUEGILL DR	F	RT	6600	28481	35081	COST	CV	Y	Ind $ f/dbl wd dam/det dam/sv $15,000	4400	15000	19400	15681	64	13,481	47.33%	050550840100	0.92	
05055-084-0150	12606	BLUEGILL DR	F	RT	4400	9938	14338	COST	CV	FC	Ind $ f/2 mhs dam at 50%	2200	8,300	10500	3838	64	1,638	16.48%	050550840150	0.46	199606
05055-083-0200	12664	BLUEGILL DR	F	VP	4400	0	4400	COST	CV	FC	Ind $ f/mh 80300-015-2222 sev dam.	2200	0	2200	2200	64			050550830200	0.46	199206
80300-015-2222	12636	BLUE GILL DR	M	RT	0	10613	10613	COST	CV	FC	mh sev dam/sv at $1000	0	1000	1000	9613	64	9,613	90.58%			
		SUBTOTAL PREFLOOD VALUE			62,225	328,457	410,682					NUMBER OF RECORDS WITH IMP				17					
05055-083-0180	12221	BLUEGILL DR	F	VP	5500	0	5500	COST	CV	FC	Ind $ f	2200	0	2200	3300	64			050550830180	0.46	199206
05055-083-0190	12682	BLUEGILL DR	F	VP	4400	0	4400	COST	CV	FC	Ind $ f	2200	0	2200	2200	64			050550830190	0.46	199206
05055-083-0280	12518	BLUEGILL DR	F	VP	4400	0	4400	COST	CV	FC	$ p/mh/missing fm rec for 98sev dam.	2200	100	2300	2100	64	(100)		050550830280	0.46	199710
05055-083-0300	12502	BLUEGILL DR	F	VP	4400	4318	8718	COST	CV	FC	Ind $ p/det struct. Dest. No imp val	1600	0	1600	7118	64	4,318		050550830300	0.46	
05055-084-0010	12406	BLUEGILL DR	F	VP	5500	0	5500	COST	CV	FC	Ind $ p	1600	0	1600	3900	64			050550840010	0.46	199603
05055-084-0050	12503	BLUEGILL DR	F	VP	4400	0	4400	COST	CV	FC	Ind $ p	1600	0	1600	2800	64			050550840050	0.46	199603
05055-084-0060	12511	BLUEGILL DR	F	VP	4400	0	4400	COST	CV	FC	Ind $ f	2200	0	2200	2200	64			050550840060	0.46	199606
05055-084-0070	12519	BLUEGILL DR	F	VP	4400	0	4400	COST	CV	FC	Ind $ f	2200	0	2200	2200	64			050550840070	0.46	199606
05055-084-0080	12527	BLUEGILL DR	F	VP	4400	0	4400	COST	CV	FC	Ind $ f	2200	0	2200	2200	64			050550840080	0.46	
05055-084-0130	12221	BLUEGILL DR	F	VP	3300	0	3300	COST	CV	FC	Ind $ f	2200	0	2200	1100	64			050550840130	0.46	199606
05055-084-0140	12505	BLUEGILL DR	F	VP	3300	0	3300	COST	CV	FC	Ind $ a	2750	0	2750	550	64			050550840140	0.46	199606
05055-084-0160	13101	BLUEGILL DR	F	VP	4400	0	4400	COST	CV	FC	Ind $ a	2750	0	2750	1650	64			050550840160	0.46	
05055-084-0170	13347	BLUEGILL DR	F	VP	4400	0	4400	COST	CV	FC	Ind $ a	2750	0	2750	1650	64			050550840170	0.46	
		SUBTOTAL PREFLOOD VALUE			57,200	4,318	61,518					NUMBER OF RECORDS VACANT				13	271,875	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			119,425	332,775	472,200					TOTAL NUMBER OF RECORDS				30					

Bluegill DR
Project

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL 8	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST F	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT S/O	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05055-080-0111	12053	OMAR DR	F	RT	7500	47700	55200	COST	CV	FC	ind $ l/mps and at $100 nom	4800	100	4900	50300	64	47,600	99.79%	050550800111	0	
05055-083-0340	0	OMAR DR	F	RT	5225	1440	6665	COST	CV	FC	ind $ p/det dest. No imp val	1800	0	1800	5065	64	1,440	100.00%	050550830340	0.48	199803
05055-087-0011	12201	OMAR DR	F	RT	5500	32058	37558	COST	BD	Y	ind $ p/mh dest. Bv $100 4 ft water	1500	100	1600	35958	64	31,958	99.69%	050550870011	0.44	199111
05055-087-0020	12217	OMAR DR	F	RS	11000	45908	56908	COST	CV	Y	ind $ p/res on piers sev dam av $1000	3300	1000	4300	52608	64	44,908	97.82%	050550870020	0.92	199111
05055-087-0051	12233	OMAR DR	F	RT	11000	3379	14379	COST	CV	FC	ind $ p/mh dest. Bv 100	3300	100	3400	10979	64	3,279	97.04%	050550870051	0.91	
05055-087-0090	12327	OMAR DR	F	RT	7700	3201	10901	COST	BV	FC	ind $ p/mh dest. Bv $100/del. Cpt	3300	100	3400	7501	64	3,101	96.88%	050550870090	0.91	199801
05055-087-0110	12413	OMAR DR	F	UX	5500	2738	8238	COST	BE	Y	ind $ p/aux destroyed lot vac	800	0	800	7438	64	2,738	100.00%	050550870110	0.23	199801
05055-087-0140	12507	OMAR DR	F	UX	5500	648	6148	COST	CV	FC	ind $ p/no imps prop vac	1600	0	1600	4548	64	648	100.00%	050550870140	0.45	199801
05055-088-0010	12593	OMAR DR	F	RT	5500	59133	64633	COST	CV	FC	ind $ s/mh floor dam. Est $6000	2700	53000	55700	8933	64	6,133	10.37%	050550880010	0.45	
05055-088-0020	12617	OMAR DR	F	RS	5500	17170	22670	COST	CV	FC	ind $ p/res. DestLav $100 det pto $300	1800	400	2000	20670	64	16,770	97.67%	050550880020	0.45	
05472-000-0022	12725	OMAR DR	F	RT	4050	4644	8694	COST	CV	FC	ind $ l/mh dest. Sv 100	2400	100	2500	6194	64	4,544	97.85%	054720000022	1	199602
05055-087-0160	12521	OMAR DR	F	UX	2000	500	2500	COST	CV	Y	ind $ l/mh 82300-009-0843 dest.rmv del.	1600	0	1600	900	64	500	100.00%	050550870160	0.45	
82300-009-0843	12521	OMAR DR	M	RT	0	9451	9451	COST	CV	Y	mh dest. Lot vac/del. Rmv	0	100	100	9351	64	9,351	98.94%			
81200-013-0313	12537	OMAR DR	M	RT	0	53500	53500	COST	VT	FC	mh dest. Snd val $100 pend.Init. Notice8	0	100	100	53400	64	53,400	99.81%			
05055-087-0180	12537	OMAR DR	F	UX	5500	2592	8092	COST	CV	Y	ind $ p/mh 81200-013-0313 des.mh 150	1600	1500	3100	4992	64	1,092	42.13%	050550870180	0.45	
		SUBTOTAL PREFLOOD VALUE			81,478	284,084	365,531					NUMBER OF RECORDS WITH IMP				15					
05055-081-0110	12020	OMAR DR	F	VP	4675	0	4675	COST	CV	Y	2mh808000090404/811000090071	1600	0	1600	3075	64	-		050550810110	0.48	199409
81100-009-0071	12020	OMAR DR	M	RT	0	14233	14233	COST	CV	FC/Y	dest. Nom val $100	0	100	100	14133	64	14,133	99.30%			
80800-009-0404	12020	OMAR DR	M	RT	0	22800	22800	COST	CV	FC	serious dam and val $1000	0	1000	1000	21800	64	21,800	95.61%			
05055-081-0120	12102	OMAR DR	F	VP	4565	0	4565	COST	CV	Y	ind to $ I	2200	0	2200	2365	64	-		050550810120	0.48	199409
80200-001-2998	12102	OMAR DR			0	18280	18280	COST								64					
05055-081-0130	12110	OMAR DR	F	VP	4565	0	4565	COST	CV	FC	ind $ p	1600	0	1600	2965	64	-		050550810130	0.32	199409
05055-087-0040	12225	OMAR DR	F	VP	5500	0	5500	COST	CV	FC	ind $ p	1600	0	1600	3900	64	-		050550870040	0.48	
05055-087-0070	12311	OMAR DR	F	VP	11000	500	11500	COST	CV	FC	ind $ p	1600	0	1600	9900	64	500	100.00%	050550870070	0.48	
80800-018-0807	12423	OMAR DR	M	RT	0	4294	4294	COST	CV	Y	mh dest. Snd val $100 dat dest. also	0	100	100	4194	64	4,194	97.67%			
05055-087-0120	12421	OMAR DR	F	VP	5500	0	5500	COST	CV	Y	ind $ p/mh 80800-018-0807 dest.	1600	0	1600	3900	64	-		050550870120	0.45	199801
05055-087-0130	12429	OMAR DR	F	VP	5500	0	5500	COST	CV	Y	ind $ p	1600	0	1600	3900	64	-		050550870130	0.45	199801
05055-087-0150	12513	OMAR DR	F	VP	5500	0	5500	COST	CV	FC	ind $ p	1600	0	1600	3900	64	-		050550870150	0.45	199801
80300-022-1707	12529	OMAR DR	M	RT	0	36770	36770	COST	CV	FC	mh washed away av at $100	0	100	100	36670	64	36,670	99.73%			
05055-087-0170	12529	OMAR DR	F	VP	5500	0	5500	COST	CV	Y	ind $ p/mh 80300-022-1707 dest.	1700	0	1700	3800	64	-		050550870170	0.38	
05055-088-0030	12641	OMAR DR	F	VP	3750	0	3750	COST	CV	FC	ind $ f	2800	0	2800	950	64	-				
		SUBTOTAL PREFLOOD VALUE			84,088	96,877	182,932					NUMBER OF RECORDS VACANT				18	304,753	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			137,830	380,933	518,463					TOTAL NUMBER OF RECORDS				30					

Omar Dr. North
Project

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL $	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT	S/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05911-000-0050	11980	AZTEC LN	F	RS	2500	26290	28790	COST	CV	Y	Ind $ f/4ft water in res/res l f	1700	3400	5100	23690		64	22,890	87.07%	059110000050	0.13	
05911-000-0080	12086	AZTEC LN	F	RS	2500	11097	13597	COST	CV	Y	Ind $ f/4 ft water in res/res l f	1700	3400	5100	8497		64	7,697	69.36%	059110000080	0.13	
05911-000-0100	12098	AZTEC LN	F	RS	2500	1256	3756	COST	CV	FC	Ind $ f/res dest. Washed away land vac	1700	0	1700	2056		64	1,256	100.00%	059110000100	0.13	
05911-000-0110	12124	AZTEC LN	F	RS	3500	1031	4531	COST	CV	FC	Ind $ f/res on stilts/posts moved sv 100	2600	100	2700	1831		64	931	90.30%	059110000110	0.19	
05911-000-0130	12115	AZTEC LN	F	RS	3500	26801	30301	COST	CV	FC	Ind $ f/res sev dam/sv 1000	2900	1000	3900	26401		64	25,801	96.27%	059110000130	0.21	
05911-000-0160	12045	AZTEC LN	F	RS	5000	12246	17246	COST	CV	FC	Ind $ f/res, 2 ft water/repairable/yr blt f/f	3500	8300	11800	5446		64	3,946	32.22%	059110000160	0.25	
05911-000-0090	12090	AZTEC LN	F	RT	2500	6313	8813	COST	CV	FC	Ind $ f/mh dest./off fdn/sv$100	1700	100	1800	7013		64	6,213	98.42%	059110000090	0.13	
05911-000-0150	12081	AZTEC LN	F	RT	2500	0	2500	COST	CV	FC	Ind $ f/mh mssg fm rec sv 1000****	1700	0	1700	800		64	-		059110000150	0.13	
05911-000-0200	12010	E FM 1518 N	F	RS	2250	15185	17435	COST	CV	FC	Ind $ f/res yr blt f/f no est on fld	1400	7700	9100	8335		64	7,485	49.29%	059110000200	0.07	
05911-000-0220		FM 1518	F	RT	3000	1085	4085	COST	CV	FC	Ind $ f/mh on gcad/not 2 ft water sv 100	1900	100	2000	2085		64	985	90.78%	059110000220	0.14	
05911-000-0230	12038	FM 1518	F	RS	2500	19971	22471	COST	CV	FC	Ind already $ a/impe 3 ft water f/fh/repair	2500	3200	5700	16771		64	16,771	83.98%	059110000230	0.15	
05911-000-0060	12020	AZTEC LN	F	VP	2500	0	2500	COST	CV	FC	Ind $ f/old mh dest.prev$1600-000-1155	1700	0	1700	800		64	-		059110000060	0.13	
		SUBTOTAL PREFLOOD VALUE			34,750	121,275	156,025					NUMBER OF RECORDS WITH IMP					12					
5911-000-0070	12054	AZTEC LN	F	VP	2500	0	2500	COST	CV	FC	Ind $ f	1700	0	1700	800		64	-		059110000070	0.13	
05911-000-0140	12081	AZTEC LN	F	VP	2500	0	2500	COST	CV	FC	Ind $ f vac	1700	0	1700	800		64	-		059110000140	0.13	
05911-000-0180	12027	AZTEC LN	F	VP	2500	0	2500	COST	CV	FC	Ind $ f	1700	0	1700	800		64	-		059110000180	0.13	
05911-000-0190	12009	AZTEC LN	F	VP	2500	0	2500	COST	CV	FC	Ind $ f	1700	0	1700	800		64	-		059110000190	0.12	
05911-000-0210	11877	AZTEC LN	F	VP	1750	0	1750	COST	CV	FC	Ind $ f vac	700	0	700	1050		64	-		059110000210	0.02	
		SUBTOTAL PREFLOOD VALUE			11,750	-	11,750					NUMBER OF RECORDS VACANT					5	93,975	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			46,500	121,275	167,775					TOTAL NUMBER OF RECORDS					17					

Aztec LN
Project

523

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL 9	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT S/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05055-080-0080	11831	OMAR DR	F	RT	5500	2134	7634	COST	CV	FC	Ind & a/mh dam and at $500	2750	500	3250	4384	64	1,634	76.57%	050550800080	0.46	199210
05055-080-0090	12005	OMAR DR	F	RT	5500	17077	22577	COST	CV	FC	Ind & a/mh to $100 nom	1600	100	1700	20877	64	16,977	99.41%	050550800090	0.46	199210
05055-080-0100	12013	OMAR DR	F	RS	5500	44786	50286	COST	CV	Y	res on stilts no dam/del dem+ind	2750	43250	46000	4286	64	1,536	3.43%	050550800100	0.46	199210
05055-081-0090	12004	OMAR DR	F	VP	4840	0	4840	COST	CV	Y	Ind to $ p/mh80200-025-0100 des	1600	0	1600	3240	64	-		050550810090	0.46	199409
80200-025-0100	12004	OMAR DR	M	RT	0	34700	34700	COST	CV	FC	mh dest. Snd val $100	0	100	100	34600	64	34,600	99.71%			
80400-009-0390	11923	OMAR DR	M	RT	0	35970	35970	COST	CV	FC	mh floor dam and at 30,000	0	30000	30000	5970	64	5,970	16.60%			
05055-080-0070	11923	OMAR DR	F	VP	5500	0	5500	COST	CV	Y	Ind & a/mh 80400-009-0390	2750	0	2750	2750	64	-		050550800070	0.47	199210
05055-081-0080	11914	OMAR DR	F	VP	4400	0	4400	COST	CV	FC	Ind to $ f	2000	0	2000	2400	64	-		050550810080	0.46	199807
80800-001-2718	8210	OMAR DR	M	RT	0	26598	26598	COST	CV	FC	MH DESTROYED-SV 100 will not be repl	0	100	100	26498	64	26,498	99.62%			
05055-081-0100	12012	OMAR DR	F	VP	4675	0	4675	COST	CV	Y	Ind to $ p/mh81100-018-0140 des	1600	0	1600	3075	64	-		050550810100	0.46	199409
81100-018-0140	12012	OMAR DR	M	RT	0	11263	11263	COST	CV	Y	mh dest. Snd val $100	0	100	100	11163	64	11,163	99.11%			
		SUBTOTAL PREFLOOD VALUE			35,915	172,528	208,443					NUMBER OF RECORDS WITH IMP				11		0.00%			
05055-081-0030	11818	OMAR DR	F	VP	5500	0	5500	COST	CV	FC	Ind to $ a	2750	0	2750	2750	64	-		050550810030	0.44	
05055-081-0040	11826	OMAR DR	F	VP	5500	0	5500	COST	CV	FC	Ind to $ f	2000	0	2000	3500	64	-		050550810040	0.46	199806
05055-081-0050	11906	OMAR DR	F	VP	5500	0	5500	COST	CV	FC	Ind to $ f	2000	0	2000	3500	64	-		050550810050	0.46	199807
05055-081-0070	11922	OMAR DR	F	VP	4125	0	4125	COST	CV	FC	Ind to $ a	2750	0	2750	1375	64	-		050550810070	0.46	199409
05055-081-0080	11930	OMAR DR	F	VP	4950	0	4950	COST	CV	Y	Ind to $ a	2750	0	2750	2200	64	-		050550810080	0.46	
		SUBTOTAL PREFLOOD VALUE			25,575	-	25,575					NUMBER OF RECORDS VACANT				5	78,231	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			61,490	172,528	234,018					TOTAL NUMBER OF RECORDS				16					

Omar DR-South
Project

577

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL $	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT S/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05055-001-0030	12324	SUAREZ RD.	F	RS	2106	500	2606	COST	CV	FC	res flooded & dest. Snd 100	1100	100	1200	1406	64	400	80.00%	050550010030	0.27	199509
05055-001-0042	12315	SUAREZ RD.	F	RS	3691	11535	16226	COST	CV	FC	res flooded abv roof/no val	2000	100	2100	14126	64	11,435	99.13%	050550010042	0.56	199802
05055-001-0043	12265	SUAREZ RD.	F	RT	5091	10281	15372	COST	CV	FC	mh dest.by flood/rmv imps	1300	0	1300	14072	64	10,281	100.00%	050550010043	0.56	199802
05055-001-0044	12323	SUAREZ RD.	F	RS	5091	10281	15372	COST	CV	FC	res dest.by flood/rmv imps	1700	0	1700	13672	64	10,281	100.00%	050550010044	0.78	199802
05055-001-0061	12253	SUAREZ RD.	F	RS	6400	4844	11244	COST	CV	FC	res 100%dest,no val/rmv imps	2400	0	2400	8844	64	4,844	100.00%	050550010061	1	199807
05055-001-0072	12205	SUAREZ RD.	F	RS	8262	20961	29223	COST	CV	Y	res 100%dest.no val/rmv imps	3000	0	3000	26223	64	20,961	100.00%	050550010072	1.25	199807
05055-001-0073	12185	SUAREZ RD.	F	RS	4659	13548	18207	COST	CV	FC	res 100%dest.no val/rmv imps	900	0	900	17307	64	13,548	100.00%	050550010073	0.23	199807
05055-001-0052		DEL TORO PL	F	RS	13620	66589	80209	COST	SV	FC	2res1mh3R water/est 50%	10400	37700	48100	32109	64	28,889	43.38%			
05055-001-0082	12721	SCHAEFFER RD	F	RS	19568	4631	24199	COST	CV	FC	lnd & imps washed away/no imp value	9600	0	9600	14599	64	4,631	100.00%	050550010082	4.36	199807
05055-001-0103	12667	SCHAEFFER RD	F	RT	6937	14210	21147	COST	CV	FC	mh off fdn/dest. Nom val $100	3400	100	3500	17647	64	14,110	99.30%	050550010103	0.5	199510
		SUBTOTAL PREFLOOD VALUE			76,426	187,380	233,806					NUMBER OF RECORDS WITH IMP				10					
05055-001-0105	12667	SCHAEFFER RD			3937	0	3937														
05055-001-0045	0	SUAREZ RD.			2106	0	2106														
05055-001-0083	12691	SCHAEFFER RD			16568	0	16568														
05055-001-0017	12717	SCHAEFFER RD			2217	0	2217														
05055-001-0012	12179	SUAREZ RD.			5812	0	5812														
05055-001-0018	12717	SCHAEFFER RD			2217	0	2217														
05055-001-0013	12717	SCHAEFFER RD			2217	0	2217														
05055-001-0014	12717	SCHAEFFER RD			2217	0	2217														
05055-001-0016	12717	SCHAEFFER RD			2217	0	2217														
		SUBTOTAL PREFLOOD VALUE			39,508	-	39,508					NUMBER OF RECORDS VACANT				0	119,380	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			114,933	187,380	273,313					TOTAL NUMBER OF RECORDS				10					

Schaefer Rd
Project

ACCT NUMBER	STREET	STREET NAME	RO CD	PRO CLA	LAND VA $	IMP VA $	APPRAISED VA $	VALU SOURC	CNTL IND	FILED APPLIC.	NOTES:
05055-303-0020	122	LOST MEADOWS	F	RS	18598	88210	106808	COST	CV	FC	2 52 ac & p/res 6ft ft 20% left/gar/bm de
		SUBTOTAL PREFLOOD VALUE			18,598	88,210	106,808				
05055-303-0010	3506	LOST MEADOWS	F	VP	14910	0	14910	COST	CV	FC	Ind & a 1.72 ac vac
		SUBTOTAL PREFLOOD VALUE			14,910	-	14,910				
		TOTAL PREFLOOD VALUE			33,808	88,210	121,718				

ACCT NUMBER	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT S/D	E IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05055-303-0020	3800	17100	20900	85908	64	71,110	80.81%	050553030020	2.53	199108
NUMBER OF RECORDS WITH IMP					1					
05055-303-0010	10700	0	10700	4210	64	-		050553030010	2.15	199805
NUMBER OF RECORDS VACANT					1	71,110	Difference from Pre to Post Flood			
TOTAL NUMBER OF RECORDS					2					

Lost Meadows
Project

713

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL 9	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT S/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
04008-003-0630	2900	BLUE WING RD	F	RS	6010	11990	18000	COST	CV	Y	RES WAS UNDER WATER	6010	1000	7010	10990	59	10,990	91.66%	04008003	5.05	
04008-003-0640	2900	BLUE WING RD	F	FR	4435	640	5075	PROD	CV	Y	RES PULLED OFF FOUND	4435	100	4535	540	59	540	84.38%	04008003	9.02	
		SUBTOTAL PREFLOOD VALUE			10,445	12,630	23,075					NUMBER OF RECORDS WITH IMP				2					
		SUBTOTAL PREFLOOD VALUE			-	-	-					NUMBER OF RECORDS VACANT				0	11,530	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			10,445	12,630	23,075					TOTAL NUMBER OF RECORDS				2					

Goliad-Calaveras
Project

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL 9	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT B/O	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05054-003-0020	10666	GLADYS	F	RS	3500	15059	18559	COST	CV	FC	2ft water/lnd to $ a	2500	13300	15800	2759	64	1,759	11.68%	050540030020	0.14	
05054-003-0030	10670	GLADYS	F	RS	3500	19529	23029	COST	CV	FC	3ft water/lnd to $ a	2500	18100	20600	2429	64	1,429	7.32%	050540030030	0.14	
05054-003-0060	10710	GLADYS	F	RS	3500	19101	22601	COST	CV	FC	5ft water/lnd to $ a	2500	16000	18500	4101	64	3,101	16.23%	050540030060	0.14	
05054-003-0070	10720	GLADYS AV	F	RS	3500	42162	45662	COST	CV	Y	4ft water/lnd to $ a	2500	19600	22100	23562	64	22,562	53.51%	050540030070	0.14	
05054-003-0081	12141	E FM 1516 N	F	RS	11250	29907	41157	COST	CV	FC	3ft water/lnd to $ a	5750	21150	26900	14257	64	8,757	29.28%	050540030081	0.4	
05054-003-0130	10718	ELVIRA AV	F	RS	3500	31543	35043	COST	CV	Y	2ft water/lnd to $ a	2500	23400	25900	9143	64	8,143	25.82%	050540030130	0.14	
05054-003-0150	10725	ELVIRA AV	F	RS	3500	14333	17833	COST	CV	FC	4ft water/lnd to $ a	2500	8400	10900	6933	64	5,933	41.39%	050540030150	0.17	
05054-003-0160	10731	ELVIRA AV	F	RS	3500	26448	29948	COST	CV	Y	4ft water/lnd to $ a	2500	17100	19600	10348	64	9,348	35.34%	050540030160	0.16	
05054-003-0170	10741	ELVIRA AV	F	RS	3500	7749	11249	COST	CV	FC	5ft water/lnd to $ a	2500	6000	8500	2749	64	1,749	22.57%	050540030170	0.18	
05054-003-0181	10747	ELVIRA AV	F	RS	3500	48287	51787	COST	CV	FC	2ft water/lnd to $ a	2750	36550	39300	12487	64	11,737	24.31%	050540030181	0.17	
05054-003-0191	10753	ELVIRA AV	F	RS	3200	2645	5845	COST	CV	FC	old res/mh gone/rmv all imps	2200	0	2200	3645	64	2,645	100.00%	050540030191	0.14	

SUBTOTAL PREFLOOD VALUE	45,950	256,763	302,713	NUMBER OF RECORDS WITH IMP	11	
SUBTOTAL PREFLOOD VALUE	-	-	-	NUMBER OF RECORDS VACANT	0	77,163 Difference from Pre to Post Flood
TOTAL PREFLOOD VALUE	45,950	256,763	302,713	TOTAL NUMBER OF RECORDS	11	

Bolton Project

787

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL $	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST FL	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT S/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05162-005-0140	11970	SOUTHTON RD	F	RS	3900	17400	21300	COST	CV	Y	fd 2 ft in res/part. Est rpl $12500	3500	9300	12800	8500	51	8,100	46.55%	05162005	1.09	199208
		SUBTOTAL PREFLOOD VALUE			3,900	17,400	21,300								NUMBER OF RECORDS WITH IMP	1					
		SUBTOTAL PREFLOOD VALUE			-	-	-								NUMBER OF RECORDS VACANT	0	8,100	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			3,900	17,400	21,300								TOTAL NUMBER OF RECORDS	1					

Southton Project

ACCT	STREET NUMBER	STREET NAME	RO CD	PRO CLA	LAND VAL 98	IMP VAL 98	APPRAISE VAL $	VALU SOURC	CNT IN	FILED APPLIC.	NOTES:	LANDVAL POST FL	IMPVAL POST F	TOTALVAL POST FL	VALUE ADJUST	TAX UNIT	S/D	DIFFERENCE IMP PRE-FLOOD AND POST	% VALUE CHANGE	ACCT	ACRE	CP
05486-000-0402	18053	IH 35 S	F	RS	2410	8590	11000	COST	CV	Y	5 ft water sev inter dam/est 20% gd	1200	7800	9000	- 2000	73		790	9.20%	054860000402	0.58	0
05486-000-0403	18053	IH 35 S	F	RS	2570	18530	21100	COST	CV	Y	2 ft water in res/fins est $9000	1030	10070	11100	10000	73		8,460	45.66%	054860000403	0.42	0
		SUBTOTAL PREFLOOD VALUE			4,980	27,120	32,100						NUMBER OF RECORDS WITH IMP			2						
		SUBTOTAL PREFLOOD VALUE			-	-	-						NUMBER OF RECORDS VACANT			0		9,250	Difference from Pre to Post Flood			
		TOTAL PREFLOOD VALUE			4,980	27,120	32,100						TOTAL NUMBER OF RECORDS			2						

Shepard -
Atascosa
Project

871

Public Assistance Program

PW# -V#	Cat.	Proj. #	Elig	Project Amt.	% Compl.	Pkg #	Pct	Project Name	Federal Inspector Name	Project Amount	Due from DEM	001	001-Match	001-Indirect	096	096-Match	096-Indirect
Large Projects																	
3302-0	A	199	Y	$88,515.95	95	25		Debris Removal	NAUMANN, DAMON			$66,386.96	$22,128.99	$1,770.32			
										$88,515.95	$68,157.28	$66,386.96	$22,128.99	$1,770.32	$0.00	$0.00	$0.00
Small Projects																	
3229-0	C	399	Y	$6,092.06	100	16	3	Camp Bullis Rd	BEARD, RAYMOND					$182.76	$4,569.05	$1,523.02	
3230-0	C	399	Y	$7,688.68	100	16	3	Bulverde Rd	BEARD, RAYMOND					$230.66	$5,766.51	$1,922.17	
										$13,780.74	$10,748.98			$413.42	$10,335.56	$3,445.19	$0.00
3233-0	C	399	Y	$1,636.67	100	18	3	Bulverde Rd	BEARD, RAYMOND					$49.10	$1,227.50	$409.17	
3224-0	C	399	Y	$1,331.01	100	18	3	Smithson Valley Rd	BEARD, RAYMOND					$39.93	$998.26	$332.75	
3225-0	C	399	Y	$1,027.15	100	18	4	New Berlin Rd	BEARD, RAYMOND					$30.81	$770.36	$256.79	
3226-0	C	399	Y	$8,491.01	100	18	1	Old Frio City Rd	BEARD, RAYMOND					$254.73	$6,368.26	$2,122.75	
3227-0	C	399	Y	$1,039.22	100	18	4	Foster Rd	BEARD, RAYMOND					$31.18	$779.42	$259.81	
3228-0	C	399	Y	$5,332.27	100	18	4	South Foster Rd	BEARD, RAYMOND					$159.97	$3,999.20	$1,333.07	
3231-0	C	399	Y	$2,971.12	100	18	4	Foster Rd	BEARD, RAYMOND					$89.13	$2,228.34	$742.78	
3232-0	C	399	Y	$1,868.93	100	18	4	Casias Rd	BEARD, RAYMOND					$56.07	$1,401.70	$467.23	
										$23,697.38	$18,483.96			$710.92	$17,773.04	$5,924.35	$0.00
3251-0	C	399	Y	$3,378.00	100	21	4	Green Rd, Freudenborg Rd, Graytown Rd.	BEARD, RAYMOND					$101.34	$2,533.50	$844.50	
3252-0	C	399	Y	$3,105.00	100	21	4	Blue Wing Rd., Southton Rd., Old CC Rd.	BEARD, RAYMOND					$93.15	$2,328.75	$776.25	
3253-0	C	399	Y	$1,595.00	100	21	1, 2	Galm Rd, Grossenbacher Rd, FM 471	BEARD, RAYMOND					$47.85	$1,196.25	$398.75	
3254-0	C	399	Y	$27,074.50	100	21	1	Montgomery Rd.	BEARD, RAYMOND					$812.24	$20,305.88	$6,768.63	
3255-0	C	399	Y	$10,207.00	100	21	4	Weir Rd, Schaefer Rd	BEARD, RAYMOND					$306.21	$7,655.25	$2,551.75	
3256-0	C	399	Y	$2,290.39	100	21	4	New Berlin Rd	BEARD, RAYMOND					$68.71	$1,717.79	$572.60	
3257-0	C	399	Y	$1,268.02	100	21	4	New Berlin Rd	BEARD, RAYMOND					$38.04	$951.02	$317.01	
3258-0	C	399	Y	$4,396.11	100	21	3	Menger Rd.	BEARD, RAYMOND					$131.88	$3,297.08	$1,099.03	
3259-0	C	399	Y	$6,639.39	100	21	1	Gass Rd	BEARD, RAYMOND					$199.18	$4,979.54	$1,659.85	
3260-0	C	399	Y	$1,468.96	100	21	1	Macdona La Coste	BEARD, RAYMOND					$44.07	$1,101.72	$367.24	
3261-0	C	399	Y	$1,175.12	100	21	1	Macdona La Coste	BEARD, RAYMOND					$34.50	$881.34	$293.78	
3262-0	C	399	Y	$2,096.68	100	21	1	Cartwright Trail	BEARD, RAYMOND					$41.93	$1,572.51	$524.17	
3263-0	C	399	Y	$2,325.72	100	21	3	Button Bush, Rock Bend	BEARD, RAYMOND					$46.51	$1,744.29	$581.43	
3264-0	C	399	Y	$1,907.81	100	21	3	Old Blanco	BEARD, RAYMOND					$38.16	$1,430.86	$476.95	
3288-0	C	399	Y	$3,186.59	100	21	1	Gross Rd.	NAUMANN, DAMON					$63.73	$2,389.94	$796.65	
3289-0	C	399	Y	$6,664.41	100	21	3	Boerne Stage Rd.	NAUMANN, DAMON					$133.29	$4,998.31	$1,666.10	
3290-0	C	399	Y	$5,472.21	100	21	3	Babcock Rd.	NAUMANN, DAMON					$109.44	$4,104.16	$1,368.05	
3291-0	C	399	Y	$3,012.55	100	21	3	Bulverde Rd.	NAUMANN, DAMON					$60.25	$2,259.41	$753.14	
3292-0	C	399	Y	$1,127.75	100	21	1	Pearsall Rd.	NAUMANN, DAMON					$22.56	$845.81	$281.94	
3293-0	C	399	Y	$2,701.55	100	21	1	Senior Rd.	NAUMANN, DAMON					$54.03	$2,026.16	$675.39	
3294-0	C	399	Y	$2,028.74	100	21	3	Babcock Rd, Heuermann Rd, S Zarzamora	NAUMANN, DAMON					$40.57	$1,521.56	$507.19	
3295-0	C	399	Y	$7,139.75	0	21	4	Lakeview Dr, Lyndon Dr, Crescent Bend	NAUMANN, DAMON					$142.80	$5,354.81	$1,784.94	
3296-0	C	399	Y	$5,591.85	0	21	3	Chimney Creek Rd.	NAUMANN, DAMON					$111.84	$4,193.89	$1,397.96	
3297-0	C	399	Y	$21,960.00	0	21	3	Scenic Loop Rd.	NAUMANN, DAMON					$439.20	$16,470.00	$5,490.00	
3298-0	C	399	Y	$1,391.19	100	21	3	Huntress Rd	NAUMANN, DAMON					$27.82	$1,043.39	$347.80	
										$129,204.29	$100,112.52			$3,209.31	$96,903.22	$32,301.07	$0.00
3318-0	B	299	Y	$8,483.93	100	25		OT LABOR & EQUIP	NAUMANN, DAMON			$6,362.95	$2,120.98	$169.68			
3280-0	C	399	Y	$2,172.98	100	25	4	Hale Rd.	BEARD, RAYMOND					$43.46	$1,629.74	$543.25	
3281-0	C	399	Y	$2,928.52	100	25	3	Eden Grove Rd.	BEARD, RAYMOND					$58.57	$2,196.39	$732.13	
3282-0	C	399	Y	$8,488.10	100	25	1	Burshard Rd.	BEARD, RAYMOND					$169.76	$6,366.08	$2,122.03	
3283-0	C	399	Y	$5,063.87	100	25	2	Lodi Rd.	BEARD, RAYMOND					$101.28	$3,797.90	$1,265.97	
3284-0	C	399	Y	$1,708.29	100	25	1	Macaway Rd.	BEARD, RAYMOND					$34.17	$1,281.22	$427.07	
3306-0	E	599	N	$0.00	100	25	1	Comm. Pk Office	SMITH III, LYNN			$0.00	$0.00	$0.00			
3307-0	E	599	Y	$750.00	100	25	1	Comm. Pk Pav. & RR	SMITH III, LYNN			$562.50	$187.50	$15.00			
3308-0	E	599	Y	$750.00	100	25	1	Comm. Park RR 2	SMITH III, LYNN			$562.50	$187.50	$15.00			
3309-0	E	599	Y	$750.00	100	25	1	Comm. Park RR	SMITH III, LYNN			$562.50	$187.50	$15.00			
3310-0	E	599	Y	$750.00	100	25	1	Comm. Park Aztec-Tejas Room	SMITH III, LYNN			$562.50	$187.50	$15.00			
3311-0	E	599	Y	$750.00	100	25	1	Comm. Park Pavilion	SMITH III, LYNN			$562.50	$187.50	$15.00			
3312-0	E	599	N	$0.00	100	25	1	Comm. Park Kit. #2	SMITH III, LYNN			$0.00	$0.00	$0.00			

Planning and Resource Management Department
Bexar County Courthouse
100 Dolorosa, Third Floor
San Antonio, TX 78205
Voice: 210-335-2405 ★ Fax: 210-335-2683

March 19, 1999

Mr. David Thompson
Hazard Mitigation Officer
5805 N. Lamar Blvd.
Austin, TX 78773-0220

Dear Mr. Thompson:

Enclosed in this book are Bexar County's fifteen applications for the Hazard Mitigation Grant Program. All application project areas fall within the Notice of Interests supplied to your office in early December 1998.

The proposed Bexar County Property Buy-Back Program contains 288 properties and has been designed to assist property owners who have had substantial damage to their properties following the October 1998 floods and that lie in the 100-year floodplain. 283 of the 288 properties were also hit by the floods of June 1997.

Should the entire program be funded, we anticipate the total budget to be $8,297,815 with the Hazard Mitigation Grant Program supplying 75 percent of the costs, $6,223,361. Bexar County is able to supply the 25 percent match of $2,074,454 should all projects be approved for funding (reference the attached resolution). It is anticipated that funds for the Bexar County match would come from the following sources:

Bexar County Flood Control Tax Revenues	$1,445,540
Texas Department of Housing and Community Affairs	
Disaster Relief Initiative Funds	300,000
Bexar County Community Development Block Grant Funds	178,914
Bexar County Housing Finance Corporation	+ 150,000
TOTAL MATCH	**$2,074,454**

Bexar County realizes that Hazard Mitigation Grant Program funds are limited and cannot fund all projects submitted across the disaster area. Below is a listing of the fifteen projects ranked in priority order by Commissioners Court:

1. Lyndon DR
2. Crooked Tree RD
3. Lakeview DR
4. Sweetwater DR
5. Crescent Bend DR
6. Bluegill DR

7. Omar DR- NORTH
8. Aztec LN
9. Omar DR-SOUTH
10. Schaefer RD
11. Lost Meadows
12. Goliad-Calaveras
13. Bolton
14. Southton
15. Shepard-Atascosa

These projects appear in this book by Commissioners Court priority order. These projects are also listed by priority on the attached all-projects summary spreadsheet.

Once the Hazard Mitigation Grant Program team approves a project, Bexar County is ready to hold community meetings announcing the program, send out independent appraisers, and begin the process of making offers to property owners. The County's experience in acquiring properties has resulted in costs that are approximately twenty percent above the value on file with Bexar Appraisal District, thus the twenty percent contingency factor built into the budget.

Best wishes to your team in reviewing the applications from across the region. If we can clarify any of the information contained in this book, please do not hesitate to call Michael Martin, Bexar County Engineer, at (210) 335-6700 or myself at (210) 335-2654.

Regards,

David J. Harris
Grants Manager

RESOLUTION

A RESOLUTION OF THE COMMISSIONERS COURT OF BEXAR COUNTY, TEXAS, AUTHORIZING THE SUBMISSION OF HAZARD MITIGATION GRANT APPLICATION TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY AND TEXAS DEPARTMENT OF PUBLIC SAFETY DIVISION OF EMERGENCY MANAGEMENT FOR HAZARD MITIGATION GRANT FUNDS, THE AUTHORIZING OF COMMITTMENT TWENTY-FIVE PERCENT OF THE NECESSARY GRANT MATCH, AND THE AUTHORIZING THE COUNTY JUDGE TO ACT AS THE COUNTY'S EXECUTIVE OFFICER AND AUTHORIZED REPRESENTATIVE IN ALL MATTERS PERTAINING TO THE COUNTY'S PARTICIPATION IN THE HAZARD MITIGATION GRANT PROGRAM,

WHEREAS, certain conditions exist which represent a threat to the public health and safety; and

WHEREAS, it is necessary and in the best interests of the Bexar County, Texas to apply for Hazard Mitigation Grant funds from the Federal Emergency Management Agency and Texas Department of Public Safety Division of Emergency Management;

NOW, THEREFORE, BE IT RESOLVED BY THE COMMISSIONERS COURT OF BEXAR COUNTY, TEXAS:

1. That a Hazard Mitigation Grant application is hereby authorized to be filed on behalf of the County with the Federal Emergency Management Agency and Texas Department of Public Safety Division of Emergency Management.

2. That the application be for <u>$6,223,361</u> of grant funds to carry out <u>acquisition (buyout) and associated activities</u>.

3. That the Commissioners Court directs and designates <u>the County Judge</u> as the County's Chief Executive Officer and Authorized Representative to act in all matters in connection with this application and the County's participation in the Hazard Mitigation Grant Program.

4. That it further be stated that the County of Bexar is committing to supplying at least 25 percent of the total program budget as a match <u>($2,074,454)</u> for a program budget of <u>$8,297,815.</u>

Passed and approved this <u>16rd</u> day of March, 1999.

CYNDI TAYLOR KRIER
County Judge

ROBERT TEJEDA
Commissioner, Precinct 1

PAUL ELIZONDO
Commissioner, Precinct 2

LYLE LARSON
Commissioner, Precinct 3

TOMMY ADKISSON
Commissioner, Precinct 4

ALL Projects Summary

Bexar County Property Buy-Back Program (Flood October 1998)

Bexar County Priority Ranking		1	2	3	[illegible]	5	6	7
Estimated Funding:	*$ Available/Needed*	Lyndon DR Lakewood P.A.	Crooked Tree RD Lakewood P.A.	Lakeview DR Lakewood P.A.	Sweetwater DR Lakewood P.A.	Crescent Bend DR Lakewood P.A.	Bluegill DR Lakewood P.A.	Omar DR-NORTH Lakewood P.A.
a. Federal	*6,223,361*	726,610	349,195	869,031	648,487	635,897	655,380	679,917
b. Applicant (Gen'l Fund or other)	*1,445,540*	167,203	56,398	239,677	137,248	136,966	143,460	171,639
c. State (TDHCA DRI)	*300,000*	25,000	25,000	25,000	50,000	50,000	50,000	15,000
d. Local (BC CDBG)	*178,914*	50,000	-	25,000	28,914	-	-	25,000
e. Other (BC HFC)	*150,000*	-	35,000	-	-	25,000	25,000	15,000
f. Program Income		-	-	-	-	-	-	-
g. TOTAL	$ *8,297,815*	$ 968,813	$ 465,593	$ 1,158,708	$ 864,649	$ 847,862	$ 873,840	$ 906,556

Property with improvements	22	11	15	22	17	17	15
Properties without improvements	11	9	30	6	13	13	15

Damages	297,695	132,539	431,610	266,716	278,877	271,975	304,753
Est. cost to restore property to pre-flood condition (damage + 20%)	357,234	159,047	517,932	320,059	334,652	326,370	365,704

Budget for purchasing all properties (with and without improvements)								
Cost for utility or septic cleanup		99,000	49,500	67,500	99,000	76,500	76,500	67,500
Acquisition Cost (Survey, title search, contract help)		103,950	63,000	141,750	88,200	94,500	94,500	94,500
Property with improvements		445,719	180,140	560,285	394,941	391,702	410,682	365,531
Properties without improvements		48,675	40,354	121,055	28,400	58,850	61,518	152,932
Cost for demolition or moving structure		110,000	55,000	75,000	110,000	85,000	85,000	75,000
SUBTOTAL	$	807,344	$ 387,994	$ 965,590	$ 720,541	$ 706,552	$ 728,200	$ 755,463
Contingencies		161,469	77,599	193,118	144,108	141,310	145,640	151,093
Administration		-	-	-	-	-	-	-
TOTAL	$	968,813	$ 465,593	$ 1,158,708	$ 864,649	$ 847,862	$ 873,840	$ 906,556

ALL Projects Summary
Bexar County Property Buy-Back Program (Flood October 19

Bexar County Priority Ranking		8	9	10	11	12	13	14
Estimated Funding:	*$ Available/Needed*	Aztec LN Aztec-Bolton P.A.	Omar DR-SOUT Lakewood P.A.	Schaefer RD Lakewood P.A.	Lost Meadows DR Lakewood P.A.	Goliad-Calaveras South BC	Bolton Aztec-Bolton P.A.	Southton South BC
a. Federal	*6,223,361*	301,793	350,026	359,832	123,766	43,538	397,677	30,555
b. Applicant (Gen'l Fund or other)	*1,445,540*	25,598	96,675	94,944	1,255	14,513	132,559	10,185
c. State (TDHCA DRI)	*300,000*	25,000	10,000	-	25,000	-	-	-
d. Local (BC CDBG)	*178,914*	50,000	-	-	-	-	-	-
e. Other (BC HFC)	*150,000*	-	10,000	25,000	15,000	-	-	-
f. Program Income		-	-	-	-	-	-	-
g. TOTAL	*$ 8,297,815*	$ 402,390	$ 466,702	$ 479,776	$ 165,022	$ 58,050	$ 530,236	$ 40,740
Property with Improvements		12	11	10	1	2	11	1
Properties without Improvements		5	16	-	1	-	-	-
Damages		93,975	78,231	119,380	71,110	11,530	77,163	8,100
Est. cost to restore property to pre-flood condition (damage + 20%)		112,770	93,877	143,256	85,332	13,836	92,596	9,720
Budget for purchasing all properties (with and without impro								
Cost for utility or septic cleanup		54,000	49,500	45,000	4,500	9,000	49,500	4,500
Acquisition Cost (Survey, title search, contract help)		53,550	50,400	31,500	6,300	6,300	34,650	3,150
Property with Improvements		156,025	208,443	233,805	106,808	23,075	302,713	21,300
Properties without Improvements		11,750	25,575	39,508	14,910	-	-	-
Cost for demolition or moving structure		60,000	55,000	50,000	5,000	10,000	55,000	5,000
SUBTOTAL		$ 335,325	$ 388,918	$ 399,813	$ 137,518	$ 48,375	$ 441,863	$ 33,950
Contingencies		67,065	77,784	79,963	27,504	9,675	88,373	6,790
Administration		-	-	-	-	-	-	-
TOTAL		$ 402,390	$ 466,702	$ 479,776	$ 165,022	$ 58,050	$ 530,236	$ 40,740

ALL Projects Summary
Bexar County Property Buy-Back Program (Flood October 19

Bexar County Priority Ranking => 16			
Estimated Funding:	*$ Available/Needed*	Shepard-Atascosa South BC	TOTALS
a. Federal	*6,223,361*	51,660	6,223,361
b. Applicant (Gen'l Fund or other)	*1,445,540*	17,220	1,445,540
c. State (TDHCA DRI)	*300,000*	-	300,000
d. Local (BC CDBG)	*178,914*	-	178,914
e. Other (BC HFC)	*150,000*	-	150,000
f. Program Income		-	-
g. TOTAL	*$ 8,297,815*	$ 68,880	$ 8,297,815

Property with improvements	2	169
Properties without improvements	-	119

Damages	9,250	2,452,904
Est. cost to restore property to pre-flood condition (damage + 20%)	11,100	2,943,485

Budget for purchasing all properties (with and without Impro		
Cost for utility or septic cleanup	9,000	760,500
Acquisition Cost (Survey, title search, contract help)	6,300	872,550
Property with improvements	32,100	3,833,269
Properties without improvements	-	603,527
Cost for demolition or moving structure	10,000	845,000
SUBTOTAL	$ 57,400	$ 6,914,846
Contingencies	11,480	1,382,969
Administration	-	-
TOTAL	$ 68,880	$ 8,297,815

$1,445,540

APPENDIX X

1999 TxDOT Program FY00

HWY	COUNTY	CSJ	PROP LETTING CATEGORY	AREA OFFICE		LIMITS DESCRIPTION	ESTIMATED COST OTHER PART
IH 35	BEXAR	0017-09-078	MAR 2000 2		672	FROM: LP 13 TO: US 90 REPLACE METAL MEDIAN BARRIER	$818,500 $0
IH 35	BEXAR	0017-09-079	MAR 2000 2		672	FROM: LP 13 TO: US 90 REPLACE BRIDGE RAIL	$189,500 $0
IH 10	BEXAR	0072-12-171	DEC 1999 2	BEXAR CENTRAL		FROM: 1.42 MI N OF LP 345 (FRESNO) TO: 0.02 MI N OF LP 345 (WOODLAWN AVE) PLANING & ACP OVERLAY	$1,089,832 $0
IH 37	BEXAR	0073-08-129	DEC 1999 2	BEXAR CENTRAL		FROM: FAIR AVE TO: PEARL PARKWAY PLANING, SEAL COAT & ASPHALTIC OVERLAY	$5,034,414 $4,810
IH 37	BEXAR	0073-09-023	FEB 2000 2		672	FROM: 0.28 MILE NORTH OF LP 1604 TO: ATASCOSA C/L ASPHALTIC CONCRETE PAVEMENT AND PAVEMENT MARKINGS	$1,974,512 $0
IH 410	BEXAR	0521-05-111	APR 2000 2	PLEASANTON		FROM: AT VARIOUS LOCATIONS TO: . SIGNING (MISSION TRAILS)	$500,000 $0
VA	BEXAR	0915-00-060	JAN 2000 2	BEXAR CENTRAL		FROM: DISTRICTWIDE ON IH (2000) TO: . REPLACE GUARD RAIL TERMINAL ANCHOR SECTIONS	$1,690,280 $0
VA	BEXAR	0915-00-913	JAN 2000 2		96	FROM: DISTRICTWIDE TO: . SIGNING,DELINEATION & PAVEMENT MARKINGS (FY 2000)-CAT 2	$500,000 $0
IH 410	BEXAR	0521-04-216	JUN 2000 3A	BEXAR 410		FROM: IN SAN ANTONIO FROM CALLAGHAN RD TO: FREDERICKSBURG RD UPGRADE TO 10 LANE FREEWAY & TRAFFIC MANAGEMENT SYSTEM	$16,840,100 $0
IH 410	BEXAR	0521-04-221	APR 2000 3A	BEXAR 410		FROM: IN SAN ANTONIO FROM JACKSON-KELLER RD TO: HONEYSUCKLE LANE UPGRADE TO 10 LANE FREEWAY & TRAFFIC MANAGEMENT SYSTEM	$29,300,000 $0
NH	BEXAR	8000-15-013	APR 2000 3A	BEXAR 410		FROM: IN SAN ANTONIO ON EXISTING O'CONNOR RD TO: FROM CROSSWINDS TO IH 35 CONSTRUCT 4 LANE DIVIDED ROADWAY	$2,171,000 $559,000
US 87	BEXAR	0143-01-050	DEC 1999 3C	BEXAR CENTRAL		FROM: IH 10 TO: RIGSBY AVE SEAL COAT & ASPHALTIC OVERLAY	$140,797 $0
SH 218	BEXAR	0465-01-049	JAN 2000 3C		96	FROM: VILLAGE OAK DRIVE TO: FM 78 UPGRADE VARIOUS TRAFFIC SIGNALS	$1,411,014 $0
IH 35	BEXAR	0017-10-195	SEPT 1999 3D		96	FROM: 1.77 KM N OF FM 1976 (FRATT INTERCHANGE) TO: FM 1976 (WALZEM RD)	$1,161,258 $0

HWY	COUNTY	CSJ	PROP LETTING CATEGORY	AREA OFFICE		LIMITS DESCRIPTION	ESTIMATED COST OTHER PART
US 90	BEXAR	0024-08-097	NOV 1999 3D		96	FROM: 0.79 MI W OF IH 410 TO: LP 353 (NOGALITOS) TRAFFIC MANAGEMENT SYSTEM	$9,124,035 $0
VA	BEXAR	0915-12-257	JUN 2000 4B	BEXAR CENTRAL		FROM: MISSION TRAILS ('ESPADA' TO THE 'ALAMO') TO: PHASE 2 - LP 13 TO E SOUTHCROSS ENHANCE ROADWAYS,TRAILS,MARKERS THAT LEAD TO THE MISSIONS	$9,366,519 $0
VA	BEXAR	0915-12-258	MAR 2000 4B	BEXAR CENTRAL		FROM: MISSION TRAILS ('ESPADA' TO THE 'ALAMO') TO: PHASE 3 - E SOUTHCROSS TO MITCHELL ST ENHANCE ROADWAYS,TRAILS,MARKERS THAT LEAD TO THE MISSIONS	$3,028,410 $0
LP 368	BEXAR	0016-08-025	APR 2000 4C		96	FROM: BROADWAY TO: WALZEM BICYCLE WARNING SIGNS	$9,600 $0
LP 353	BEXAR	0017-01-021	MAR 2000 4C		672	FROM: ZARZAMORA TO: SURRAY RECONSTRUCT W/DRAINAGE, CURBS, SDWLKS & BICYCLE AMENITIES	$2,391,000 $0
IH 410	BEXAR	0521-04-244	OCT 1999 4C	BEXAR 410		FROM: BERTETTI DR TO: MARBACH RD CONSTRUCT SIDEWALKS ALONG BOTH FRONTAGE ROADS	$258,665 $0
FM 471	BEXAR	0849-01-034	APR 2000 4C		96	FROM: LES HARRISON TO: LP 1604 BICYCLE SIGNAGE	$3,000 $0
4H	BEXAR	0915-12-125	MAR 2000 4C	BEXAR 410		FROM: IN SAN ANTONIO ON EVERS RD AT TO: WURZBACH RD WIDEN TO CONSTRUCT LEFT TURN LANE	$282,000 $56,400
:S	BEXAR	0915-12-150	DEC 1999 4C	BEXAR 410		FROM: IN SAN ANTONIO ON BLANCO RD TO: AT JACKSON-KELLER RD WIDEN INTERSECTION FOR LEFT TURN LANES,UTILITY ADJUST	$982,295 $0
:S	BEXAR	0915-12-161	FEB 2000 4C		672	FROM: IN SAN ANTONIO ON HILDEBRAND FROM IH 10 TO: BREEDEN RECONSTRUCT EXISTING STREET & WIDEN FOR LT TURN LN AT BLANCO	$2,200,000 $0
:S	BEXAR	0915-12-169	APR 2000 4C		672	FROM: IN SAN ANTONIO ON 24TH STREET TO: FROM COMMERCE TO CULEBRA RD RECONSTRUCT EXISTING STREET	$2,300,000 $140,000
:S	BEXAR	0915-12-172	MAY 2000 4C		672	FROM: IN SAN ANTONIO ON HOUSTON ST FROM BOWIE TO: PINE RECONSTRUCT EXISTING STREET	$1,200,000 $240,000
:S	BEXAR	0915-12-193	MAY 2000 4C		672	FROM: IN SAN ANTONIO ON LOCKHILL SELMA RD TO: FROM GEORGE RD TO WHISPER PATH RECONSTRUCT & WIDEN ROADWAY FOR LEFT TURN LANE & DRAINAGE	$3,900,000 $780,000

WY	COUNTY	CSJ	PROP LETTING CATEGORY	AREA OFFICE		LIMITS DESCRIPTION	ESTIMATED COST OTHER PART
H	BEXAR	0915-12-223	JUN 2000 4C	BEXAR 410		FROM: IN SAN ANTONIO ON NEW LOCATION TO: FROM FM 1535 TO FM 2696 CONSTRUCT 4 LANE DIVIDED ROADWAY	$6,821,750 $0
S	BEXAR	0915-12-243	APR 2000 4C		672	FROM: IN SAN ANTONIO ON PROBANDT ST TO: FROM MITCHELL ST TO US 90 RECONSTRUCT ROADWAY WITH DRAINAGE AND SIDEWALKS	$150,908 $43,830
S	BEXAR	0915-12-248	APR 2000 4C		672	FROM: IN SAN ANTONIO ON MITCHELL ST TO: FROM PROBANDT TO SP 536 (ROOSEVELT AVE) RECONSTRUCT ROADWAY W/ DRAINAGE, SDWLKS & CENTER TURN LANE	$1,435,090 $248,400
S	BEXAR	0915-12-251	JAN 2000 4C		672	FROM: IN SAN ANTONIO ON N ST MARY'S TO: FROM HUISACHE ST TO MCCULLOUGH INSTALL BICYCLE LANES AND SIGNAGE	$88,000 $17,600
S	BEXAR	0915-12-252	MAR 2000 4C		672	FROM: IN SAN ANTONIO ON S ST MARY'S TO: FROM ALAMO ST TO PERIDA RECONSTRUCT ROADWAY	$400,900 $80,180
S	BEXAR	0915-12-253	JAN 2000 4C	BEXAR 410		FROM: IN SAN ANTONIO ON TIMBER PATH TO: FROM LES HARRISON TO FM 471 (GRISSOM RD) BASE REPAIR AND RESTRIPE ROADWAY TO PROVIDE_BICYCLE LANES	$153,123 $0
\	BEXAR	0915-12-264	OCT 1999 4C		66	FROM: IN SAN ANTONIO/BEXAR CO AREA TO: . RIDESHARE PROGRAM - FY 1999	$170,000 $0
;	BEXAR	0915-12-267	MAR 2000 4C		672	FROM: ON PRUE RD FROM LAUREATE TO: FREDERICKSBURG RD RECONSTRUCT TO 4 LANES W/CURBS, SIDEWALKS	$731,544 $0
;	BEXAR	0915-12-271	JULY 2000 4C		672	FROM: ON UHR LANE FROM HIGGINS TO: THOUSAND OAKS RECON AND WIDEN TO 2 LNS W/ CTL, BIKE LNS & SIDEWALKS	$1,926,090 $0
;	BEXAR	0915-12-272	OCT 1999 4C		672	FROM: ON PECAN ST FROM SOLEDAD TO: BROADWAY PLANING & ASPHALTIC OVERLAY	$499,070 $406,411
;	BEXAR	0915-12-273	JAN 2000 4C	BEXAR 410		FROM: ON HILDEBRAND AT US 281 TO: . CONSTRUCT WESTBOUND RIGHT TURN LANE ONTO NB US 281	$94,813 $18,325
;	BEXAR	0915-12-274	JAN 2000 4C	BEXAR CENTRAL		FROM: SCHOOL SAFETY PROGRAM TO: CITY WIDE SCHOOL SAFETY PROGRAM ON FUNCT CLASS ROADWAYS	$1,000,000 $0
;	BEXAR	0915-12-275	MAY 2000 4C		672	FROM: ON THOUSAND OAKS AT FIVE INTERSECTIONS TO: BETWEEN US 281 & JONES-MALTSBERGER CONSTRUCT TURN LNS AT 5 INTERSECT (US 281/JONES-MALTSBERGER)	$846,000 $0
;	BEXAR	0915-12-276	MAY 2000 4C		672	FROM: ON HUNT LN FROM MARBACH RD TO: US 90 RECONS & WDN RDWY W/CTL:MARBACH-DEMYA & RECON REMDR W/SWDKS	$2,349,534 $0

WY	COUNTY	CSJ	PROP LETTING CATEGORY	AREA OFFICE		LIMITS DESCRIPTION	ESTIMATED COST OTHER PART
S	BEXAR	0915-12-277	FEB 2000 4C		672	FROM: IN OLMOS PARK ON MCCULLOUGH FROM S CITY TO: LIMITS TO N OF OLMOS DR & EL PRADO CONSTRUCT CONTINUOUS LEFT TURN LANE & ROUNDABOUT	$91,959 $0
S	BEXAR	0915-12-278	JUN 2000 4C		672	FROM: ON BITTERS RD FROM BROADWAY TO: NACOGDOCHES RECONSTRUCT & WIDEN W/2-BICYCLE LANES, SIGNAL IMPROVEMENTS	$1,953,326 $0
S	BEXAR	0915-12-279	APR 2000 4C		672	FROM: ON OLD CIMARRON TRAIL (PH 1) FROM TO: KITTY HAWK TO GUILFORD FORGE RECONSTR & WIDEN W/CONT LT LN, BIKE LNS & SCHOOL SAFETY LGTS	$907,177 $0
S	BEXAR	0915-12-280	AUG 2000 4C		672	FROM: ON STARCREST FROM STUNTMAN TO: JONES MALTSBERGER RECONSTRUCT & WIDEN W/CONT LT TN LANE,CURBS,SDWLKS,SIGNALS	$916,000 $0
S	BEXAR	0915-12-282	JAN 2000 4C		672	FROM: ON AVE B (NORTH) FROM TULETA TO: MULBERRY CONSTRUCT 10 FT BICYCLE PATH OF WEST SIDE OF PARKWAY	$91,613 $0
S	BEXAR	0915-12-283	JAN 2000 4C		672	FROM: ON AVE B (SOUTH)/JOSEPHINE FROM TO: LIONS FIELDS/ALAMO TO JOSEPHINE/ST MARYS CONSTRUCT 10 FT BICYCLE PATH ON WEST SIDE OF AVE B	$262,825 $0
S	BEXAR	0915-12-284	MAR 2000 4C	BEXAR CENTRAL		FROM: BOTANICAL GARDENS ROUTE FROM BOTANICAL TO: GARDENS TO AVE B MARKINGS & SIGNAGE FOR 10 FT BICYCLE PATH ON NORTH SIDE	$118,322 $0
S	BEXAR	0915-12-285	JAN 2000 4C		672	FROM: ON MONTANA ST FROM ALAMO DOME (CBD) TO: WALTERS ST (ST PHILIPS) BICYCLE SIGNAGE AND MARKINGS (WIDEN CURB LNS)	$39,000 $0
S	BEXAR	0915-12-286	JAN 2000 4C		672	FROM: ON CALLAGHAN RD FROM OLD HWY 90 TO: CASTROVILLE RD CONSTRUCT 10 FT BICYCLE PATH ON WEST SIDE OF PARKWAY	$75,195 $0
S	BEXAR	0915-12-287	JAN 2000 4C		672	FROM: UTSA TO OLLU FROM HOUSTON ST TO: 24TH ST BICYCLE SIGNAGE	$295,200 $0
S	BEXAR	0915-12-288	JAN 2000 4C		672	FROM: CBD/SAC ROUTE ON ALAMO, 4TH, LEXINGTON & TO: HOWARD BICYCLE SIGNAGE AND MARKINGS (SHARED LN)	$43,680 $0
S	BEXAR	0915-12-289	JAN 2000 4C		672	FROM: ON CINCINNATI FROM ST MARY'S UNIVERSITY TO: NAVIDAD BICYCLE SIGNAGE AND MARKINGS (SHARED LN)	$25,200 $0
S	BEXAR	0915-12-290	JAN 2000 4C		672	FROM: ON CINCINNATI/ASHBY FROM NAVIDAD TO: NORTH ST MARY'S ST BICYCLE SIGNAGE AND MARKINGS (SHARED LN)	$25,200 $0

WY	COUNTY	CSJ	PROP LETTING CATEGORY	AREA OFFICE		LIMITS DESCRIPTION	ESTIMATED COST OTHER PART
S	BEXAR	0915-12-292	MAY 2000 4C		672	FROM: CITY OF SAN ANTONIO SIDEWALKS TO: . ADA SIDEWALK IMPROVEMENTS	$1,000,000 $0
A	BEXAR	0915-12-293	OCT 1999 4C		66	FROM: IN SAN ANTONIO/BEXAR CO AREA TO: . RIDESHARE PROGRAM - FY 2000	$170,000 $34,000
S	BEXAR	0915-12-296	APR 2000 4C		672	FROM: ON OLD CIMARRON TRAIL (PH 2) FROM TO: GUILFORD FORGE TO FM 1976 RECONSTRUCT & WIDEN W/CONT LEFT TURN AND BICYCLE LANES	$1,316,808 $0
S	BEXAR	0915-12-306	FEB 2000 4C		672	FROM: ON GEVERS ST FROM IH 10 TO: IH 37 CONSTRUCT SIDEWALKS	$696,800 $0
	BEXAR	0915-12-307	JAN 2000 4C		672	FROM: ON HENDERSON PASS FROM THOUSAND OAKS TO: GOLD CANYON CONSTRUCT SIDEWALKS AND UTILITY ADJUSTMENTS	$437,624 $91,325
1 2536	BEXAR	2440-01-018	APR 2000 4C		96	FROM: IH 410 TO: COVEL BICYCLE WARNING SIGNS	$4,200 $0
1604	BEXAR	2452-02-060	APR 2000 4C		96	FROM: IH 10 TO: US 281 BICYCLE WARNING SIGNS	$4,500 $0
1604	BEXAR	2452-03-085	APR 2000 4C		96	FROM: US 281 TO: FM 2252 (NACOGDOCHES) BICYCLE WARNING SIGNS	$4,500 $0
1604	BEXAR	2452-04-008	SEPT 1999 4E	PLEASANTON		FROM: IH 10 TO: FM 1518 ADD SHOULDERS	$3,423,792 $0
122	BEXAR	0100-02-054	FEB 2000 7	BEXAR CENTRAL		FROM: LOOP 13 TO: US 181 ACP OVERLAY & PAVEMENT MARKINGS	$786,900 $0
87	BEXAR	0143-02-020	FEB 2000 7	BEXAR CENTRAL		FROM: LP 1604 TO: WILSON C/L ACP OVERLAY & PAVEMENT MARKINGS	$740,300 $0
281	BEXAR	0253-04-115	FEB 2000 7	BEXAR 410		FROM: BITTER ROAD TO: NAKOMA DRIVE SEAL COAT,ASPHALTIC OVERLAY & PAVEMENT MARKINGS	$452,113 $0
1518	BEXAR	0465-02-019	FEB 2000 7	BEXAR CENTRAL		FROM: LOOP 1604 TO: FM 1346 ACP OVERLAY & PAVEMENT MARKINGS	$241,600 $0
410	BEXAR	0521-06-089	MAR 2000 7	NEW BRAUNFELS		FROM: FM 78 TO: 0.038 MI N OF FM 1346	$166,400 $0

IWY	COUNTY	CSJ	PROP LETTING CATEGORY	AREA OFFICE		LIMITS DESCRIPTION	ESTIMATED COST OTHER PART
FM 1516	BEXAR	1477-01-031	MAR 2000 7	NEW BRAUNFELS		FROM: FM 3502 TO: FM 78 OVERLAY,SEAL COAT & BASE REPAIR	$231,900 $0
FM 1976	BEXAR	1890-01-041	MAR 2000 7	NEW BRAUNFELS		FROM: TOEPPERWEIN RD TO: LOOP 1604 SEAL COAT	$50,800 $0
LP 1604	BEXAR	2452-02-064	FEB 2000 7	BEXAR 410		FROM: TRADESMAN DRIVE TO: US 281 PLANING,SEAL COAT,ACP OVERLAY & PAVEMENT MARKINGS	$1,682,993 $0
/A	BEXAR	0915-00-916	JAN 2000 10A		96	FROM: DISTRICTWIDE TRAFFIC SIGNAL (2000) TO: . TRAFFIC SIGNALS	$336,000 $0
/A	BEXAR	0915-00-076	JAN 2000 10B		96	FROM: DISTRICTWIDE TRAF MANAGEMENT SYS REHAB TO: (2000) TRAFFIC MANAGEMENT SYSTEM REHABILITATION (2000)	$950,000 $0
H 10	BEXAR	0025-02-158	JAN 2000 11		96	FROM: AT ACKERMAN RD TO: . INSTALL TRAFFIC SIGNAL	$146,304 $0
H 410	BEXAR	0521-06-087	APR 2000 11	PLEASANTON		FROM: US 281 (S) TO: SAN ANTONIO RIVER RAMP REVERSAL AND RAMP ADDITIONS	$1,000,000 $0
M 471	BEXAR	0849-01-035	JUN 2000 11	BEXAR 410		FROM: 0.99 KM SW OF SH 16 TO: 0.57 KM SW OF SH 16 DRAINAGE REVISIONS	$176,100 $0
S	BEXAR	0915-12-234	MAR 2000 13D		672	FROM: IN SAN ANTONIO ON ALAMO FROM CEDAR TO: DURANGO RECONSTRUCT ROADWAY WITH CURBS, SIDEWALKS & TRAFFIC SIGNALS	$1,178,709 $431,303
S	BEXAR	0915-12-237	MAY 2000 13D	BEXAR CENTRAL		FROM: IN SAN ANTONIO ON S FLORES TO: FROM DURANGO TO ALAMO RECONSTRUCT ROADWAY WITH WATER,SEWER AND GAS UTILITY WORK	$2,573,648 $1,945,365
S	BEXAR	0915-12-238	MAY 2000 13D	BEXAR CENTRAL		FROM: IN SAN ANTONIO ON S FLORES TO: FROM ALAMO ST TO SAN PEDRO CREEK RECONSTRUCT ROADWAY WITH WATER, SEWER AND GAS UTILITY WORK	$1,703,627 $1,127,745
S	BEXAR	0915-12-239	MAY 2000 13D	BEXAR CENTRAL		FROM: IN SAN ANTONIO ON S FLORES TO: FROM SAN PEDRO CREEK TO FRANCISCAN RECONSTRUCT ROADWAY WITH WATER,SEWER AND GAS UTILITY WORK	$2,436,131 $2,041,468
S	BEXAR	0915-12-242	MAR 2000 13D	BEXAR 410		FROM: IN SAN ANTONIO ON N NEW BRAUNFELS TO: FROM IH 35 TO GRAYSON ST RECONSTRUCT ROADWAY	$308,865 $72,500

’Y	COUNTY	CSJ	PROP LETTING CATEGORY	AREA OFFICE		LIMITS DESCRIPTION	ESTIMATED COST OTHER PART
;	BEXAR	0915-12-262	MAR 2000 13D		672	FROM: ON RITTIMAN RD FROM LP 368 (AUSTIN HWY) TO: HARRY WURZBACH BASE REPAIR, ASPHALTIC OVERLAY & SIDEWALKS	$1,881,077 $0
;	BEXAR	0915-12-320	NOV 1999 13D	BEXAR 410		FROM: ON EVERS RD FROM HUEBNER RD TO: FOREST MEADOW RECONSTRUCT ROADWAY	$586,793 $146,172
;	BEXAR	0915-12-321	NOV 1999 13D	BEXAR 410		FROM: ON HUEBNER RD FROM EVERS RD TO: REDBIRD LN (E OF LEON VALLEY CITY LIMIT) RECONSTRUCT ROADWAY AND ADD TURNING LANES	$770,706 $275,845
;	BEXAR	0915-12-346	JUN 2000 13D		672	FROM: ON S. NEW BRAUNFELS FROM FAIR AVE TO: STEVES AVE RECONSTRUCT STREET	$468,235 $93,647
I 35	BEXAR	0016-07-115	APR 2000 16C	NEW BRAUNFELS		FROM: ON FRONT RD FROM OLYMPIA PKWY TO: PHOENIX AVE RECONSTR FRONT RD	$357,800 $357,800
P 345	BEXAR	0072-08-105	FEB 2000 16C	BEXAR 410		FROM: AT CINNAMON CREEK & AT USAA BOULEVARD TO: . ADD DUAL LEFT TURN LANES AT USAA ENTRANCES	$175,600 $0
I 410	BEXAR	0521-04-237	SEPT 1999 16C	BEXAR CENTRAL		FROM: INTERCHANGE AT US 281 (PHASE 1C) TO: FROM US 281 TO AIRPORT BLVD CONSTR NB US281 CONN TO AIRPORT	$7,678,963 $7,678,962
\	BEXAR	0915-00-912	JAN 2000 16C	TRANS PLAN		FROM: DISTRICTWIDE LANDSCAPE (2000) TO: . LANDSCAPE	$365,400 $0
I 35	BEXAR	0017-10-214	APR 2000 16F	PLEASANTON		FROM: WEST FRONTAGE ROAD FROM HOLBROOK DR TO: WALZEM RD OCT 98 FLOOD - REPAIR RIPRAP AND CLEAN OUT WASH-OFF	$1,177,900 $0
I 10	BEXAR	0025-02-156	FEB 2000 16F	NEW BRAUNFELS		FROM: ON SO FR RD AT WOMAN HOLLERING CREEK TO: . OCT 98 FLOOD - REMOVE AND REGRADE CHANNEL	$14,159 $0
I 10	BEXAR	0025-02-157	FEB 2000 16F	NEW BRAUNFELS		FROM: ON SOUTH FRONTAGE ROAD AT 0.4 MILES TO: PFEIL ROAD OCT 98 FLOOD - REPAIR RIPRAP CHANNEL	$7,774 $0
S 281	BEXAR	0073-08-136	FEB 2000 16F	BEXAR 410		FROM: AT JONES-MALTSBERGER TO: . OCT 98 FLOOD - REPAIR RIPRAP	$30,000 $0
I 410	BEXAR	0521-04-250	FEB 2000 16F	NEW BRAUNFELS		FROM: AT PERRIN BEITEL CREEK TO: . OCT 98 FLOOD - REPAIR EROSION AND REMOVE DEBRIS	$78,171 $0
I 471	BEXAR	0849-01-037	FEB 2000 16F	BEXAR 410		FROM: AT LEON CREEK TO: . OCT 98 FLOOD - REMOVE GRAVEL WASH-OFF	$180,000 $0

HWY	COUNTY	CSJ	PROP LETTING CATEGORY	AREA OFFICE	LIMITS DESCRIPTION	ESTIMATED COST OTHER PART
FM 1516	BEXAR	1477-01-030	FEB 2000 16F	NEW BRAUNFELS	FROM: AT WEST SALTRILLO CREEK TO: IN CONVERSE OCT 98 FLOOD - REPAIR EROSION AND CLEAN CULVERTS	$23,527 $0
FM 2696	BEXAR	2708-01-026	FEB 2000 16F	BEXAR 410	FROM: WILDERNESS OAK STREET TO: SOUTH OF CIBOLO CREEK OCT 98 FLOOD - ROADBED,EROSION & GUARDRAIL REPAIR	$201,067 $0

TOTAL EST COST & OTHER PARTICIPATION COST FOR COUNTY OF BEXAR $173,663,791

APPENDIX Y

TxDOT Road Closure List - October 17-18, 1998 Flood

11/10/98 (Rev. 11/17/98)

Map Location of TxDOT Roads and Bridges in Bexar County Inundated by October, 1998 Flood

HIGHWAY	LOCATION	FLOOD CONDITIONS AND DESCRIPTION
IH-35	1 - Cibolo Creek	Northbound and southbound frontage road bridges closed at 1:00 pm on Oct. 17, due to 3 feet of water over the bridges; reopened at 10:00 am on Oct. 18; these structures are "susceptible" to flooding if heavy rains occur upstream; width of watercourse at its highest level was 200'.
IH-35	2 - Retama Park	Southbound mainlanes and frontage road closed at 1:00 pm on Oct. 17, due to 18" of water over the roadway; reopened at 4:00 pm on the same day; width of watercourse at the highest peak was 250'; first time this has occurred.
IH-35	3 - At Ramps, North of Starlight Terrace	Southbound mainlanes and frontage road had several inches of water; at its highest level the water was 12" deep and approximately 300' wide; road was never closed; traffic using the inside shoulder; flooding occurs occasionally. (Inlets may be "slotted drain" type.)
IH-35	4 - Fratt Interchange Connector to LP-410 West (SB to WB)	Connector closed at 2:00 pm on Oct. 17, due to 4' of water over the road; reopened at 8:00 am on Oct. 18; approximately 250' of roadway was under water; this is the first time this section of road had to be closed.
IH-35	5 - Walzem to Eisenhauer	Mainlanes were covered with approximately 16" of water for a length of 400'; traffic using the inside shoulder; this is the first time where water covered these roads.
IH-35	6 - South of Binz-Engleman	Southbound mainlanes were covered with about 12" of water although still passable with traffic using the inside shoulder; first time occurrence.
IH-35	7 - Salado Creek	North and South frontage roads closed at 11:00 am on Oct. 17, due to water over the roads; reopened on Oct. 19, at 11:00 am; at its highest point water was 12'-15' deep; it usually takes an 8-10" rain to cause problems at this location.
IH-35	8 - North of Coliseum Rd.	Northbound and southbound mainlanes and frontage roads were under 12" of water for a short period of time although still passable; first time occurrence.
IH-35	9 - Pine St.	Northbound and southbound mainlanes and frontage roads were under 12"-15" of water at various times during the storm period; roadways still passable; first time occurrence.
IH-35	10 - Exit Ramp to IH-37 So.	Roadway at the bottom of the ramp under 12"-15" of water at various times although still passable; first time occurrence.
IH-35	11 - Lower Level So. Flores to St. Mary's St.	Depth of water anywhere from 8'-10' depending on rate of rainfall; pumps did function as required and ran at full capacity; closed from Oct. 17, noon, to Oct. 19 at 3:00 am; this location has been closed quite frequently.

HIGHWAY	LOCATION	FLOOD CONDITIONS AND DESCRIPTION
IH-35	12 - Exit Ramps to U.S. 90	Roads had to be closed due to approximately 3' of water at bottom of the ramps; pumps did function as required and ran at capacity; ramps were closed on Oct. 17 at 3:15 pm and reopene Oct. 17 at 6:00 pm; first time occurrence.
IH-35	13 - Theo Ave.	Southbound frontage road due to 3' of water over the roadv width of watercourse was 600'; first time occurrence.
IH-35	14 - Keats Ave.	Northbound and southbound mainlanes under 12" of water; widt watercourse was approximately 400'; all lanes closed for a s period of time on Oct. 17 from 3:15 to 4:00 pm; first t occurrence.
IH-35	15 - Leon Creek	Mainlanes and frontage roads were closed at 8:00 am on Oct. due to water over the roadway; water was approximately 4' over mainlanes and 300' wide; mainlanes were reopened at 4:00 pm the same day; frontage roads remained closed until 9:00 am on 22. Mainlanes had to be closed again on Oct. 18, from 8:00 ar 4:00 pm; first time occurrence.
IH-35	16 - Elm Creek	Only frontage roads closed due to high water; both roads v closed at 10:00 am on Oct. 17; watercourse was approximately 2 across; northbound frontage road was opened at 11:00 pm on same date; southbound frontage road was not opened until 4:00 on Oct. 19 due to pavement damage; first time occurrence.
IH-10	1 - Cibolo Creek	All lanes closed at 5:00 pm on Oct. 17 due to 24" of water ove mainlanes; width of watercourse was approximately 2000' acr all lanes were opened to traffic at 1:00 pm on Oct 18; first water this deep over the lanes; first time mainlanes closed.
IH-10	2 - Woman Hollering Creek	Eastbound frontage road only affected; road closed at 1:00 pm Oct. 17 due to 5' of water over the road; width of water was a 300'; reopened at 1:00 pm on Oct. 30 after extensive repairs to road; road is closed during periods of heavy rain upstream.
IH-10	3 - Graytown Road	Westbound mainlane closed for a short period of time; water deep enough to move sand-filled traffic crash cush approximately 500'; first time occurrence.
IH-10	4 - Probandt Ave.	Water covered the entire intersection several times during storms.
IH-10	5 - Cincinnati to Colorado	Lower level closed at 3:00 pm on Oct. 17 due to water over the r depth of water was 3' and covered about 300' of the mainlanes lanes were opened at 7:00 pm on Oct. 18; this was a first occurrence.
IH-10	6 - Leon Creek	All lanes closed at 1:00 pm on Oct. 17 due to approximately water over the mainlanes; width of watercourse was 1000'; never has been this deep or has covered such a wide area; opened at 6:00 pm on the same date; first time occurrence.

HIGHWAY	LOCATION	FLOOD CONDITIONS AND DESCRIPTION
US-90	7 - Leon Creek	Mainlanes and frontage roads closed at 9:00 am on Oct. 17 due to water over the road; at its highest point the water was 5' deep and 500' wide; the mainlanes were opened at 10:00 am on Oct. 18; the frontage roads stayed closed until 8:00 am on Oct. 21; first time mainlanes had to be closed.
LP-410	1 - Fratt Interchange	Both connectors to IH-35 So. and IH-35 No. closed at 1:00 pm on Oct. 17 due to water over the road; opened at 10:00 am on Oct. 18; water was 10' deep and 800' across; this was the first time these lanes had to be closed.
LP-410	2 - Perrin-Beitel	Westbound frontage road closed for the first time; water was approximately 6' deep and 300' wide.
LP-410	3 - Salado Creek	All lanes closed at 6:00 pm on Oct. 17 due to 3' of water over the roads; first time occurrence for the mainlanes at this location; width of watercourse was 1500'; mainlanes opened to traffic at 9:00 pm on the same day.
LP-410	4 - Nacogdoches to Broadway	All lanes between Nacogdoches Rd. and Broadway Ave. were closed for several hours during the afternoon of Oct. 17 due to water over the roads; water was 3' deep and 300' wide at its peak; water has been over the roads before but still passable.
LP-410	5 - West Ave. at Olmos Creek	Intersection completely inundated by storm waters; location closed at 8:00 am on Oct. 17; water was running 5' deep and 1500' wide; opened up to traffic at 7:00 pm on the same day.
LP-410	6 - Zarzamora Creek	Water did cover the frontage roads at various times but road was still passable.
LP-410	7 - Salado Creek	On SE LP-410, 1000' north of this location all lanes were closed for several hours at various times on Oct. 17 and Oct. 18; mainlanes closed for the first time on Oct. 17 for 3 hours (6:00 pm to 9:00 pm).
US-281	1 - North of Evans Rd.	Mainlanes at this location under approximately 5 feet of water at various times on Oct. 17 and Oct. 18; first time occurrence.
US-281	2 - Salado Creek	All lanes closed from 2:00-3:00 pm on Oct. 17 due to water over the roads; first time occurrence.
US-281	3—4 - No. of Basse Rd. to 1 Mile So.	These two locations are for the mainlanes of US-281 and the intersection of Basse Rd.; Mainlanes closed at 3:00 pm on Oct. 17 due to water over the lanes; high water marks indicate 13'-5" of water over the road near the Olmos Dam; lanes and intersection opened to traffic at 2:00 am on Oct. 20; high water has never completely closed the mainlanes; first time occurrence.
US 281	4A - Josephine St. Intersection	Closed by City of San Antonio Public Works and Police on Oct. 17; first time occurrence.
IH-37	5 - LP-410	Westbound access road closed at 7:00 pm on Oct. 17 due to water over the road; opened at 6:00 pm on Oct. 18; first time occurrence.

HIGHWAY	LOCATION	FLOOD CONDITIONS AND DESCRIPTION
IH-37	6 - San Antonio	Frontage roads and turnaround north of the river had to be clo. due to 4' of water over the roads; roads closed on Oct. 17 a opened at 1:00 pm on Oct. 18; first time occurrence.
LP-1604	1 - West of IH-35	1000' west of IH-35; eastbound mainlanes closed for 3 hours (2: pm to 5:00 pm) during the afternoon on Oct. 18 due to water o the road; first occurrence at this location; water was approximat 4' deep and 300' wide.
LP-1604	2 - Look Out Rd.	First time occurrence at this location; affected only the intersecti water was approximately 2' deep and 200' wide.
LP-1604	3 - Bulverde Rd.	Water covered only the intersection; depth of water was 12" in directions for 200' but passable; first time occurrence at t location.
FM-78	1 - Cibolo Creek	Closed at 1:00 pm on Oct. 17 due to water over the bridge; t location is very susceptible to flooding as past experience l shown; depth of water approximated at 25' over the bridge a 1200' wide across; opened to traffic at 9:00 pm on Oct. 18. B: will be taken in April 1999 to reconstruct with new bridge.
FM-2252	1 - Cibolo Creek	Road closed at 11:00 am on Oct. 17 due to water 3' over the brid width of watercourse at its peak was 600'; first time ever this rc had to be closed; road opened at 8:00 am on Oct. 18.
FM-2252	2 - 1.5 miles No. of LP-1604	Road closed for four hours on Oct. 17 due to water over the r water approximately 18" deep and 1200' across. this road susceptible to flooding but still passable.
FM-1976	A - Walzem Rd.	Closed for three hours (12:00 pm to 3:00 pm) on Oct 18 due to 2 of water over the roadway; first time this road had to be closed.
SPUR 368 (Austin Hwy.)	B - Salado Creek	All lanes had to be closed due to 3' of water over the road; width watercourse was 1000'; first time this road had to be closed.
SPUR 536 (Roosevelt Ave.)	C - Six Mile Creek	Road closed for four hours on Oct. 17 due to 24" of water over road.
SPUR-371 (Gen. Hudnell)	D - Frio City Rd.	Road closed due to 6' of water from north of Frio City Rd. to 5 south of Cupples Rd.; pump house at this location; closed on Oct. from 8:00 am to 9:00 pm.; first time occurrence.
SH-16	E - Huebner Creek	Road closed at 8:00 am on Oct. 17 due to 3' of water over the roa first time occurrence; width of watercourse was 800'; roads ope at 3:00 pm on the same day.
SH-16	F - Leon Creek	Outside lanes only closed as a precaution due to severe scourin the bridge abutments.
FM-2696 (Blanco Rd.)	G - Bitters Rd.	Road closed at 7:00 am on Oct. 17 due to 3+' of water over the rc width of watercourse 2000'; road opened at 10:00 pm on the sa day; first time occurrence.

APPENDIX Z

Flood Damage Project Identification by City of San Antonio to Corps of Engineers - October 17-18, 1998

CITY OF SAN ANTONIO

P.O. BOX 839966
SAN ANTONIO, TEXAS 78283-3966

November 16, 1998

Mr. Jesus Rangel
U.S. Army Corps of Engineers
CESWF-EM
819 Taylor Street
Fort Worth, Texas 76102-0300

RE: October 17, 1998 Flood Damage Project Identification

This serves as an initial notification to the Corps of Engineers of projects that may be submitted resulting from damage caused by the October 1998 flood in San Antonio, Texas.

We request federal assistance to repair these facilities to pre-event condition, or better. Detailed project worksheets can be generated and forwarded to your office in a timely manner, should you desire us to do so.

If your require additional information, please contact Armando (Rocky) Aranda, Jr., Streets and Drainage Operations Manager. You may reach Mr. Aranda at (210) 359-3105.

Sincerely yours,

JOHN L. GERMAN, P.E.
Director of Public Works

xc: Armando "Rocky" Aranda, Jr.
Nancy Ann Beward
File

October 1998 Flood Damage
Corps of Engineer Projects

	ID	PROJECT	DESCRIPTION
FL-19	108	S. A. River Tunnel	Repair structural damage and replace damaged equipment; damage includes but is not limited to: structural damage to the trash rakes; spreader wall; structural inspection of the tunnel; forklift; ventilation system; security syst.; pumps; gate operators.
FL-20	101	San Antonio River Tunnel Inlet	Replace footing, headwall and the washout by sidewalk; approx. 170 sy
	601	High Water Detection System	Repair damaged components; damage includes but is not limited to: light poles; electric boxes; amber lights; batteries; chargers; ultra sensors and flood gauges

October 1998 Flood Damage
Corps of Engineer Projects

	ID	PROJECT	DESCRIPTION
	1		
FL-21	543	Rock Creek	Reconstruct 200 ft concrete bottom and approx. 100 ft of wall at Rock Creek and Jackson-Keller, approx. 11500 sf
FL-22	100	Loop 1604	Reconstruct rip rap, walls and footings on Panther Springs Creek; approx. 500 sq yds
FL-23	605	San Antonio River	Repair damaged retaining wall in the main channel of the S. A. river at Pecan Street; approx. 40 lf

October 1998 Flood Damage
Corps of Engineer Projects

2

	ID	PROJECT	DESCRIPTION
FL-24	545	Sherman	Reconstruct concrete wall and concrete floor in drainage channel at Sherman and North Walters; approx. 5800 sf
FL-25	546	Larry	Reconstruct drainage bank on west side of bridge; approx. 50 ft.
FL-26	544	Sherman	Reconstruct concrete wall at Sherman, north of Walter; approx. 2400 sf
FL-27	553	Crestway	Reconstruct damaged culvert wash-out at Crestway and Randolph; approx. 2400 sf

October 1998 Flood Damage
Corps of Engineer Projects

	ID	PROJECT	DESCRIPTION
	3		
FL-28	557	Espada Park	Repair damaged washed-out channel; approx. 15000 sf
FL 29	602	Ashley Road	Repair damaged area @ Six Mile Creek, extend headwall and repair wash-outs; approx. 3200 sf
FL-30	555	Amanda	Reconstruct damaged channel walls; approx. 3200 sf

October 1998 Flood Damage
Corps of Engineer Projects

CD 7

	ID	PROJECT	DESCRIPTION
FL-31	98	St. Cloud	Repair damaged channel walls, floor and wash-outs from Huisache to Wilson; approx. 7777 sy
FL-32	559	Postwood Spillway	Repair damaged concrete spillway at Callaghan, approx. 2400 sf
FL-33	556	Woodlawn Lake Dam	Repair damaged spillway; approx. 60,000 sf
FL-34	102	Laddie Laddie	Reconstruct channel floor and walls at Babcock; approx. 2800 sf

October 1998 Flood Damage
Corps of Engineer Projects

CD 9

	ID	PROJECT	DESCRIPTION
FL-35	548	Thames	Reconstruct channel wall at Thames and Warwick; approx. 960 sf
FL-36	551	Springwood	Reconstruct channel walls at Springwood and McCullough; approx 10500 sf
FL-37	558	Cherry Blossom	Repair damaged drainage channel walls and floor at Cherry Blossom and Orchid Blossom; approx. 600 sf
FL-38	550	Shadywood	Reconstruct channel walls and floor; approx. 9000 sf
FL-39	549	Thames	Reconstruct channel floor at Thames and Langton; approx. 4800 sf
FL-40	98	Stone Oak Parkway	Reconstruct curb, inlet, headwall and channel between Evans Road and Hwy 281; approx. 12455 sf

October 1998 Flood Damage
Corps of Engineer Projects

10

	ID	PROJECT	DESCRIPTION
FL-41	554	Webbles	Reconstruct damaged channel floor and walls at Webbles and Walzem; approx. 9000 sf
42	562	Cavewood	Reconstruct damaged retaining wall; approx. 400sf
43	603	E. Country Circle	Reconstruct damaged drainage channel floor and walls; approx. 3000 sf
44	176	Old O'Connor	Reconstruct bar ditch at Old O'Connor and Lookout Road; approx. 8000 sf
45	106	Perrin Beitel	Reconstruct concrete channel at Loop 410 (n/s); approx. 4500 sf
46	104	Weidner Road	Reconstruct concrete bar ditch at 4 sites at Randolph; approx. 1600 sf
47	103	Bromley Place	Repair damaged channel walls and drainage floor at Bromley Place and Higgins; approx. 3000sf
48	99	Ira Lee	Repair damaged guard posts and railing at Ira Lee and Austin Hwy
49	97	Perrin Beitel	Repair channel walls, wash-outs and erosion from Loop 410 to Salado Creek; approx. 6000 sf

4.2-1-65-HO29-GC

November 16, 1998

Mr. Jesus Rangel
CESWF-EM
U.S. Army Corps of Engineers (COE)
P.O. Box 17300
Fort Worth, Texas 76102-0300

RE: FEDERAL EMERGENCY FUNDING AVAILABLE UNDER PUBLIC LAW 84-99

Dear Mr. Rangel:

The San Antonio River Authority (SARA) understands that Federal Emergency Funding is available under Public Law 84-99 for damages incurred to existing flood control structures.that are beyond the normal Operation and Maintenance of COE projects. SARA hereby requests federal assistance to rehabilitate the following itemized areas of the San Antonio Channel Improvement Project (SACIP). Brief descriptions of the damages are presented at this time. The areas listed were damaged during the October 16, 17 and 18 1998 flood event. SARA is responsible for the Operation and Maintenance for this portion of the SACIP.

FL-14 1. An area on the San Antonio River pilot channel south of 410 South is eroded: 2400 feet by 30 feet wide of the east bank is eroded approximately 12 feet deep. 2400 feet by 40 feet wide of the west bank is eroded approximately 5 feet deep. Also two oxbows in the non-SACIP river channel downstream have been removed. An analysis of their effect on the SACIP should be investigated.

FL-15 2. An area on the San Antonio River 100 feet long by 25 feet is eroded approximately 3 feet to 8 feet deep downstream of Ashley Road at the confluence of the original San Antonio River loop return from Mission San Juan.

FL-16 3. A 36 inch rock riprap apron for the Six Mile drop structure at the confluence of Six Mile Creek on the San Antonio River approximately 50 feet by 50 foot is eroded about 3 feet to 6 feet deep.

FL-17 4. An area approximately 30 feet by 15 feet by 2 feet deep of the San Antonio River is eroded on the east bank at the overflow of the San Juan Ditch upstream of the old San Juan Dam.

FL-18 5. Approximately 7000 square feet on the west bank and 3000 square feet of Tri-Lock block on the east bank is removed from the San Juan Lift Station dam one-fourth mile upstream of the old San Juan Dam on the San Antonio River.

SAR will follow-up with letters detailing damages of the above listed areas. The point of contact with reference to this request for federal assistance is Julius F. Okruhlik, P.E., at 227-1373. It should be noted that the City of San Antonio by separate letter is also submitting a request for Federal Emergency Funding for damages to structures in San Antonio for which Operations and Maintenance is the cities responsibility.

Sincerely,

STEVE RAMSEY, P.E.
Chief Engineer

FRED N. PFEIFFER
General Manager

SR/JFO/jfo

cc: Tom Vogt, COE

P:\JFO\WPDATA\coemerg.wpd

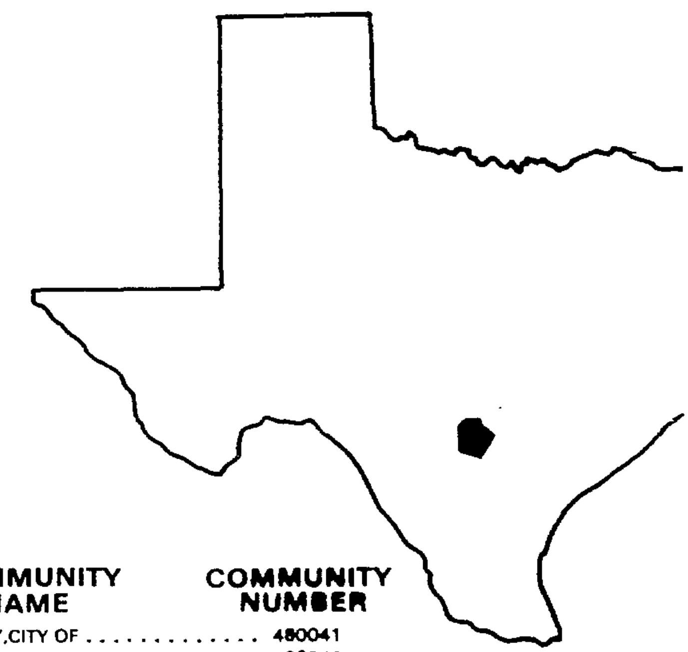
APPENDIX AA

FEMA Flood Insurance Study (FIS) February 16, 1996

FLOOD INSURANCE STUDY

BEXAR COUNTY, TEXAS AND INCORPORATED AREAS

VOLUME 1 OF 4



COMMUNITY NAME	COMMUNITY NUMBER
ALAMO HEIGHTS, CITY OF	480036
BALCONES HEIGHTS, CITY OF	481094
BEXAR COUNTY, UNINCORPORATED AREAS	480035
CASTLE HILLS, CITY OF	480037
CHINA GROVE, CITY OF	481141
CONVERSE, CITY OF	480038
ELMENDORF, CITY OF	480710
FAIR OAKS RANCH, CITY OF	481644
GREY FOREST, CITY OF	480039
HELOTES, CITY OF	481643
HILL COUNTRY VILLAGE, CITY OF	481106
HOLLYWOOD PARK, TOWN OF	480040
KIRBY, CITY OF	480041
LEON VALLEY, CITY OF	480042
LIVE OAK, CITY OF	480043
OLMOS PARK, CITY OF	481540
SAN ANTONIO, CITY OF	480045
SELMA, CITY OF	480046
SHAVANO PARK, CITY OF	480047
SOMERSET, CITY OF	481264
ST. HEDWIG, CITY OF	481132
TERRELL HILLS, CITY OF	480048
UNIVERSAL CITY, CITY OF	480049
WINDCREST, CITY OF	480689

FEBRUARY 16, 1996

Federal Emergency Management Agency

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Exhibit 1 - Flood Profiles (Cont'd)

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Volume 4 (Cont'd)

EXHIBITS (Cont'd)

Exhibit 1 - Flood Profiles (Cont'd)

PUBLISHED SEPARATELY

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this Flood Insurance Study may be revised and republished at any time. In addition, part of this Flood Insurance Study may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the Flood Insurance Study. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current Flood Insurance Study components.

FLOOD INSURANCE STUDY
BEXAR COUNTY AND INCORPORATED AREAS, TEXAS

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide-format Flood Insurance Study investigates the existence and severity of flood hazards in, or revises previous Flood Insurance Studies/Flood Insurance Rate Maps for, the geographic area of Bexar County and Incorporated Areas, Texas, including: the Cities of Alamo Heights, Balcones Heights, Castle Hills, China Grove, Converse, Elmendorf, Fair Oaks Ranch, Grey Forest, Helotes, Hill Country Village, Kirby, Leon Valley, Live Oak, Olmos Park, San Antonio, Selma, Shavano Park, Somerset, St. Hedwig, Terrell Hills, Universal City, and Windcrest; the Town of Hollywood Park; and the unincorporated areas of Bexar County (hereinafter referred to collectively as Bexar County). The City of Olmos Park is non-floodprone. Please note the Cities of Fair Oaks Ranch and Selma are located in more than one county, but are included in their entirety in the Bexar County Flood Insurance Study. The Flood Insurance Study and Flood Insurance Rate Map for Bexar County will also show portions of the Cities of Schertz, Lytle, and Cibolo that lie within Bexar County. These communities have been shown on the Bexar County Flood Insurance Rate Map for informational purposes only. Refer to the separately printed Flood Insurance Studies/Flood Insurance Rate Maps for these communities for flood insurance purposes. This Flood Insurance Study aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates. This information will also be used by Bexar County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

The mapping for the countywide conversion has been prepared using digital data. Previously published Flood Insurance Rate Map data produced manually have been converted to vector digital data by a digitization process. These vector digital data were fit to raster digital images of the U.S. Department of the Interior, Geological Survey (USGS) quadrangle maps of the county area to provide horizontal positioning.

Road and highway name and centerline data have been obtained from the Texas State Department of Transportation. The centerline data were computer-plotted with the digitized floodplain data to produce the countywide Flood Insurance Rate Map.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

This revision was prepared to include incorporated communities within Bexar County into a countywide Flood Insurance Study. Information on the authority and acknowledgments for each jurisdiction shown on this countywide Flood Insurance Study, as compiled from their previously printed Flood Insurance Study reports, is shown on the following pages.

City of Alamo Heights:

The hydrologic and hydraulic analyses for the original study effective August 15, 1978, were prepared by the USGS, Water Resources Division, Austin, Texas, for the Federal Emergency Management Agency (FEMA), under Interagency Agreement No. IAA-H-17-75, Project Order No. 9. The work for the original study was completed in May 1977. The hydrologic and hydraulic analyses in the July 5, 1984, revision were prepared by the USGS, Water Resources Division, Austin, Texas, for FEMA, under Interagency Agreement No. IAA-H-9-77, Project Order No. 13. That work was completed in June 1983.

City of Balcones Heights:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated October 1979 and the Flood Insurance Rate Map dated April 15, 1980, were prepared by the USGS, Water Resources Division, Austin, Texas, for FEMA, under Interagency Agreement No. IAA-H-9-77, Project Order No. 13. That work was completed in August 1977.

City of Castle Hills:

The hydrologic and hydraulic analyses for the original study effective September 30, 1980, were prepared by the USGS, Water Resources Division, Austin, Texas, for FEMA, under Interagency Agreement No. IAA-H-9-77, Project Order No. B. The work for the original study was completed in December 1978. The hydrologic and hydraulic analyses in the September 28, 1984, revision were prepared by Dewberry & Davis, under agreement with FEMA. That work was completed in July 1983.

City of China Grove:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated December 15, 1983, and the Flood Insurance Rate Map dated June 15, 1984, were prepared by the USGS, Water Resources Division, Austin, Texas, for FEMA.

City of Converse:

The hydrologic and hydraulic analyses for the original study effective June 15, 1981, were prepared by the USGS, Water Resources Division, Austin, Texas, for FEMA, under Interagency Agreement No. IAA-H-9-77, Project Order No. 13. The work for the original study was completed in October 1979. The hydrologic and hydraulic analyses in the November 15, 1985, revision were prepared by the USGS, under Interagency Agreement No. IAA-H-20-74, Project Order No. 16. That work was completed in February 1985.

City of Elmendorf:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated March 1980 and the Flood Insurance Rate Map dated September 3, 1980, were prepared by the USGS, Water Resources Division, for the Federal Insurance Administration (FIA), under Interagency Agreement No. IAA-H-17-75, Project Order No. 4. That work was completed in July 1978.

City of Grey Forest:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated January 1980 and the Flood Insurance Rate Map dated September 3, 1980, were prepared by the USGS, Water Resources Division, Austin, Texas, for the FIA, under Interagency Agreement No. IAA-H-9-77, Project Order No. 13. That work was completed in August 16, 1978.

City of Kirby:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated February 1980 and the Flood Insurance Rate Map dated July 16, 1980, were prepared by the USGS, Water Resources Division, Austin, Texas, for the FIA, under Interagency Agreement No. IAA-H-9-77, Project Order No. 13. That work was completed in February 1979.

City of Leon Valley:

The hydrologic and hydraulic analyses for the original study effective June 1, 1977, were prepared by Black & Veatch, Consulting Engineers, of Kansas City, Missouri, for FEMA, under Contract No. H-3814. The hydrologic and hydraulic analyses for the November 15, 1989, revision were prepared by Dewberry & Davis, under agreement with FEMA, in order to incorporate a channel modification. That work was completed in March 1988.

City of Live Oak:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated November 1976 and the Flood Insurance Rate Map dated May 16, 1977, were prepared by Black & Veatch, Consulting Engineers, of Kansas City, Missouri, for the FIA, under Contract No. H-3814.

City of San Antonio:

The hydrologic and hydraulic analyses for the original study effective December 15, 1983, were prepared by the USGS, Water Resources Division, Austin, Texas, for FEMA, under Interagency Agreement No. IAA-H-9-77, Project Order No. 13. That work was completed in July 1979. The hydrologic and hydraulic analyses for the January 3, 1986, revision were prepared by Bernard Johnson, Inc., in order to incorporate changes requested by the City of San Antonio. That work was completed in March 1982. The hydrologic and hydraulic analyses for the April 2, 1986, revision were prepared by Pape-Dawson Consulting Engineers, Inc., for FEMA. That work was completed in November 1984. The hydraulic and hydrologic analyses for Salado Creek in the April 2, 1986, revision were prepared by the U.S. Department of Agriculture, Soil Conservation Service (SCS), for FEMA. That work was completed in January 1985. The hydraulic and hydrologic analyses for the January 5, 1989, revision were prepared by the following study contractors for FEMA: Pape-Dawson Consulting Engineers, Inc.; Ozuna & Associates, Inc.; Civil Engineering Consultants; W. F. Castella & Associates, Inc.; and Vickrey and Associates. These works were completed from September 9, 1985, through January 15, 1988. The hydraulic and hydrologic analyses for the August 2, 1990, revision were prepared by Pape-Dawson Consulting Engineers, Inc., for FEMA. These works were completed on March 25, 1988, and April 11, 1988. The hydraulic and hydrologic analyses for the July 2, 1991, revision were prepared by Brown Engineering and C. A. Bolner & Associates, Inc., Consulting Engineers, of San Antonio. These works were completed in February 1990 and April 1990, respectively. The hydrologic and hydraulic analyses for Leon Creek Overflow were performed by Michael Baker Jr., Inc., for FEMA. These works were completed in October 1994. The hydrologic analysis is based on an analysis of the Leon Creek Overflow basin, which demonstrated that base (100-year) flood elevations (BFEs) are controlled by local runoff, not from Leon Creek. The new hydraulic analysis also accounts for improvements to the channel adjacent to the Regency Meadow Subdivision.

City of Selma:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated January 1980 and the Flood Insurance Rate Map dated July 2, 1980, were prepared by the USGS, Water Resources Division, Austin, Texas, for the FIA, under Interagency Agreement No. IAA-H-17-75, Project Order No. 4. That work was completed in July 1978.

City of Shavano Park:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated March 1980 and the Flood Insurance Rate Map dated September 3, 1980, were prepared by the USGS, Water Resources Division, Austin, Texas, for the FIA, under Interagency Agreement No. IAA-H-17-75, Project Order No. 12. That work was completed in February 1978.

City of Terrell Hills:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated July 16, 1980, and the Flood Insurance Rate Map dated January 16, 1981, were prepared by the USGS, Water Resources Division, Austin, Texas, for the FIA, under Interagency Agreement No. IAA-H-8-76, Project Order No. 1. That work was completed in April 1977.

City of Universal City:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated November 1976 and the Flood Insurance Rate Map dated May 16, 1977, were prepared by Black & Veatch, Consulting Engineers, for the FIA, under Contract No. H-3814.

Town of Hollywood Park:

The hydrologic and hydraulic analyses for the Flood Insurance Study dated March 1980 and the Flood Insurance Rate Map dated September 3, 1980, were prepared by the USGS, Water Resources Division, Austin, Texas, for the FIA, under Interagency Agreement No. IAA-H-9-77, Project Order No. 13. That work was completed in June 1978.

Unincorporated Areas:

The hydrologic and hydraulic analyses for the original study effective October 16, 1984, were prepared by the USGS, Water Resources Division, Austin, Texas, for FEMA, under Interagency Agreement No. IAA-H-20-74, Project Order No. 16. That work was completed in July 1977. A flood hazard analysis for the Helotes Creek watershed was published in March 1975 by the SCS (Reference 1). The data and results from the original analysis were used in the July 17, 1989, revision. Portions of eight U.S. Army Corps of Engineers (USACE) reports on flooding sources in Bexar County were used where they covered areas that were being prepared in the July 17, 1989, revision (References 2, 3, 4, 5, 6, 7, 8, and 9). The following study contractors prepared the hydraulic and hydrologic analyses for the April 2, 1990, revision: Civil Engineering Consultants; Pape-Dawson Consulting Engineers, Inc.; Vickrey and Associates; M. W. Cude and Associates, Inc.; W. F. Castella & Associates, Inc.; Macina, Bose, Copeland, and Associates, Inc.; Camarillo & Associates, Inc.; C. A. Bolner & Associates, Inc.; Dewberry & Davis; the USACE, Fort Worth District; and K. M. Ng & Associates, Inc. These works were completed from January 22, 1986, through November 1988. In the October 16, 1991, revision the hydraulic and hydrologic analyses were prepared by Ford Engineering, Inc., and the SCS. These works were completed in May 1991 and September 12, 1991, respectively.

In this countywide study, the hydrologic and hydraulic analyses for Salado Creek (Lower Reach) were prepared by the SCS. These works were completed in September 12, 1991. The hydrologic and hydraulic analyses for Cibolo Creek were performed by Dewberry & Davis and the USACE, Fort Worth District, respectively. These works were completed in January 1993. The hydrologic and hydraulic analyses for the Cities of Live Oak and Converse were prepared by the SCS and the USACE, Fort Worth District, respectively. These works were completed in September 1992 and June 1993, respectively.

1.3 Coordination

The dates of the initial and final Consultation Coordination Officer (CCO) meetings held for Bexar County and the incorporated communities within its boundaries are shown in the following table.

Community Name	Initial CCO Date	Final CCO Date
City of Alamo Heights	September 11, 1975	June 22, 1977
City of Balcones Heights	April 1976	March 1, 1979
City of Castle Hills	December 10, 1975	August 21, 1979
City of China Grove	--[1]	July 11, 1983
City of Converse	December 11, 1975	March 5, 1980
City of Elmendorf	April 23, 1976	June 20, 1979
City of Grey Forest	April 22, 1976	June 20, 1979
City of Kirby	December 1975	August 22, 1979
City of Leon Valley	December 1, 1975	--[1]
City of Live Oak	March 20, 1975 July 9, 1975	May 5, 1976
City of San Antonio	January 30, 1976	December 9, 1980
City of Selma	December 10, 1975	June 21, 1979
City of Shavano Park	September 1975	March 1, 1979
City of Terrell Hills	September 11, 1975	June 19, 1979
City of Universal City	March 20, 1975 July 9, 1975	May 5, 1976
City of Windcrest	--[1]	--[1]
Town of Hollywood Park	April 1976	August 22, 1979
Unincorporated Areas	April 1974	--[1]

[1]Data not available

The initial CCO meetings were held with representatives of FEMA or the FIA, the communities, and the study contractors to explain the nature and purpose of the Flood Insurance Study and identify the streams to be studied by detailed methods. The final CCO meetings were held with representatives of FEMA or the FIA, the communities, and the study contractors in order to review the results of the studies.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the geographic area of Bexar County, Texas. The area of study is shown on the Vicinity Map (Figure 1).

All or portions of the flooding sources listed in Table 1, "Detailed Study Streams," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the Flood Insurance Rate Map.

The following tabulation lists streams that have names in this countywide study other than those used in the previously printed Flood Insurance Studies for the communities in which they are located.

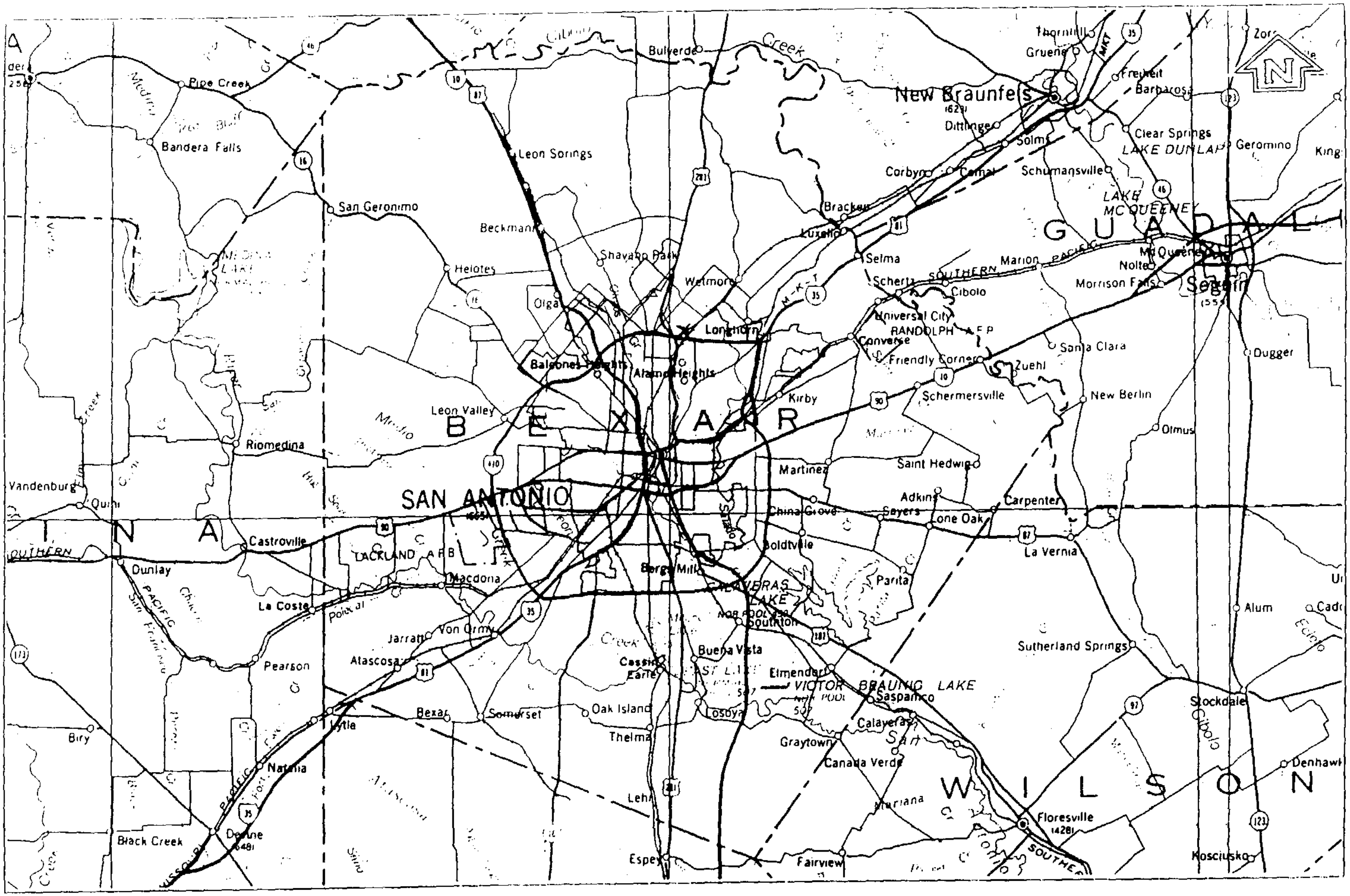

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX
AND INCORPORATED AREAS

APPROXIMATE SCALE

8 0 8 16 24 MILES

VICINITY MAP

Table 1. Detailed Study Streams

Airport Tributary
Alazan Creek
Apache Creek
Babcock Tributary - Leon Creek
Balcones Creek
Bandera Branch
Beitel Creek
Beitel Creek Tributary A
Blackjack Creek
Calavares Creek
Caracol Creek
Cibolo Creek
Cibolo Tributary
Commercial Tributary (Sixmile Creek)
Crestwood Drive Ditch
Culebra Creek
Drain 1 - Huebner Creek
Drain 1A - Huebner Creek
Drain 2 - Huebner Creek
Drain 3 - Huebner Creek
Drain 4 - Zarzamora Creek
Drain No. 1
Drain No. 2
Drain No. 3
Drain No. 4
Drain No. 5
Drain No. 6
Drain No. 7
Drain No. 8
Drain No. 9
Drain No. 10
Drain No. 12
East Branch of Salitrillo Creek
East Fork Blackjack Creek
East Fork of East Branch of Salitrillo Creek
East Fork of Salitrillo Creek
East Salitrillo Creek
East Woodland Ditch
Fort Sam Houston Tributary to Salado Creek (Middle Reach)
French Creek
French Creek - Tributary A
French Creek - Tributary B
Gage Tributary
Helotes Creek
Huebner Creek
Huebner Creek - Tributary A
Huebner Creek - Tributary B
Huesta Creek
Indian Creek
Lee Creek
Leon Creek
Leon Creek Overflow
Lorence Creek (Lower Reach)
Lorence Creek (Upper Reach)
Los Reyes Creek
Martinez Creek A
Martinez Creek B
Medina River
Medio Creek
Mossey Cup Tributary
Mud Creek
New Braunfels, Austin Highway, Broadway Drain
North-East Tributary
Olmos Creek
Olmos Creek (East Channel)
Olmos Creek Tributary
Polecat Creek
Postoak Creek
Quail Creek
Rock Creek
Rosillo Creek (Lower Reach)
Rosillo Creek (Upper Reach)
Salado Creek (Lower Reach)
Salado Creek (Middle Reach)
Salado Creek (Upper Reach)
Salitrillo Creek
San Antonio River
San Pedro Creek
Selma Creek
Sixmile Creek
Slick Ranch Creek
South Branch of Selma Creek
South Flores Tributary (Sixmile Creek)
South Fork of South Branch of Selma Creek
State Hospital Creek
Tributary A of Airport Tributary
Tributary A of Culebra Creek
Tributary A to Salado Creek (Middle Reach)
Tributary B to Salado Creek (Middle Reach)
Tributary C to Salado Creek (Middle Reach)
Tributary D to Salado Creek (Middle Reach)
Tributary E to Salado Creek (Middle Reach)
Tributary F to Salado Creek (Middle Reach)
Tributary A to Zarzamora Creek
Turkey Creek Tributary
Tuttle Road Ditch
Unnamed Tributary of Cibolo Creek
Upper Apache Creek
U.S. 281 Tributary to Salado Creek (Middle Creek)
U.T.S.A. Tributary - Leon Creek
Walzem Creek (Lower Reach)
Walzem Creek (Upper Reach)
West Fork Blackjack Creek
West Fork Olmos
West Salitrillo Creek
West Tributary Rosillo Creek
Westwood Village Creek
Zarzamora Creek

Community	Old Name	New Name
City of Alamo Heights	Olmos Creek (downstream of Olmos Dam)	San Antonio River
City of Castle Hills	Olmos Creek	Olmos Creek (East Channel)
City of Live Oak	Salitrillo Creek	East Salitrillo Creek
City of San Antonio	Southwest Research Creek	Slick Ranch Creek
	Martinez Creek	Martinez Creek A
	Martinez Creek-Bexar County	Martinez Creek B
	Lorence Creek	Lorence Creek (Lower and Upper Reaches)
	Salado Creek	Salado Creek (Lower, Middle, and Upper Reaches)
City of Shavano Park	East Fork Olmos Creek	Olmos Creek
City of Universal City	Salitrillo Creek	East Salitrillo Creek
City of Windcrest	East Branch of Beitel Creek	Beitel Creek Tributary A
	Walzem Creek	Walzem Creek (Upper Reach)
	Rosillo Creek	Rosillo Creek (Upper Reach)
Town of Hollywood Park	Salado Creek Tributary	Lorence Creek (Upper Reach)
Unincorporated Areas	Martinez Creek	Martinez Creek B

For continuity, the San Antonio River is based from its mouth upstream to the Olmos Dam; upstream of the Olmos Dam to the limit of detailed study is Olmos Creek.

This revision was carried out in order to include flood hazard information for incorporated communities within Bexar County into a countywide Flood Insurance Study. As part of this revision, updated analyses were included for the flooding sources shown in Table 2, "Scope of 1995 Revision."

As part of the Cibolo Creek restudy, flooding information along Balcones Creek and Postoak Creek was revised to reflect the new backwater effects from Cibolo Creek. Also, as part of the East Branch of Salitrillo Creek restudy, flooding information along the East Fork of the East Branch of Salitrillo Creek was revised to reflect the new backwater effects from East Branch of Salitrillo Creek.

A previous revision for East Salitrillo Creek, prepared and completed by Ford Engineering, Inc., in May 1991, from approximately 350 feet downstream of Schaefer Road to approximately 120 feet downstream of Farm to Market Road (FM) 78, has been superseded by the USACE, Fort Worth District, restudy for the City of Converse.

The effects of the construction of the Rivera Subdivision, Unit No. 1, along French Creek in the City of San Antonio, for which FEMA issued a letter of intent on August 1, 1991, to revise the Flood Insurance Rate Map, was also incorporated into this revised study. The revision along East Salitrillo Creek, due to the completion of the Converse Business Park/Shadow Creek Subdivision, for which FEMA issued a letter of intent on October 25, 1991, to revise the Flood Insurance Rate Map, has been superseded by the USACE, Fort Worth District, restudy for the City of Converse.

Table 2. Scope of 1995 Revision

Stream	Limits of Revised or New Detailed Study
Salado Creek (Lower Reach)	From 2,500 feet upstream of the confluence with the San Antonio River to immediately downstream of South Presa Street
Cibolo Creek	From confluence of Martinez Creek to approximately 9,900 feet upstream of confluence of Balcones Creek
Salitrillo Creek	From Martinez Creek Dam No. 6-A to confluence of East and West Salitrillo Creeks
East Salitrillo Creek	From confluence with Salitrillo Creek to approximately 4,100 feet upstream of State Highway 218
East Branch of Salitrillo Creek	From confluence with East Salitrillo Creek to approximately 900 feet upstream of confluence of East Fork of East Branch of Salitrillo Creek
West Salitrillo Creek	From confluence with Salitrillo Creek to approximately 200 feet upstream of Avery Road
Drain No. 1	From confluence with East Salitrillo Creek to just upstream of Cherrywood Lane
Drain No. 2	From confluence with East Salitrillo Creek to approximately 280 feet upstream of Greycliff Drive
Drain No. 3	From confluence with East Salitrillo Creek to approximately 750 feet upstream of Toepperwein Road
Drain No. 4	From confluence with East Salitrillo Creek to approximately 350 feet upstream of Village Oak Drive
Drain No. 5	From confluence with Drain No. 4 to approximately 1,100 feet upstream of Enchanted Oaks Drive
Drain No. 6	From confluence with East Salitrillo Creek to approximately 1,250 feet upstream of Lone Shadow Trail
Drain No. 7	From Martinez Creek Drain No. 5 to approximately 1,000 feet upstream of Lone Shadow Trail
Drain No. 8	From confluence with Drain No. 7 to approximately 1,030 feet upstream
Drain No. 9	From just downstream of Miller Road to approximately 2,300 feet upstream
Drain No. 10	From confluence with West Salitrillo Creek to approximately 870 feet upstream of Forrest Bluff

Table 2. Scope of 1995 Revision (Cont'd)

Stream	Limits of Revised or New Detailed Study
Drain No. 12	From confluence with West Salitrillo Creek to approximately 200 feet upstream of Avery Road
Unnamed Tributary of Cibolo Creek	From approximately 350 feet downstream of the breached Dam to approximately 1,900 feet upstream
Leon Creek Overflow	From confluence with Leon Creek to just downstream of West Hausman Road

The initial study for Leon Creek and Leon Creek Overflow showed that the Leon Creek Overflow flooding was controlled by Leon Creek and, therefore, it was modeled as one reach. However, more detailed topographic information revealed that the 100-year floodway along Leon Creek Overflow is controlled by local runoff in the Leon Creek Overflow basin rather than from Leon Creek.

This revision incorporates the determination of Letters of Map Revision and Letters of Map Amendment issued by FEMA, for the projects listed by community in Table 3, "Letters of Map Change."

At Huebner Creek, a BFE discrepancy exists at the downstream and upstream corporate limits for the Cities of Leon Valley and San Antonio. The BFEs and floodplain at this point have been graphically tied-in.

For Beitel Creek Tributary A, at the downstream corporate limits between the Cities of San Antonio and Windcrest, a floodplain discrepancy exists. The flooding area and the streets of the City of Windcrest have been shifted to match the flooding and streets within the City of San Antonio.

The detailed flooding for Medina River and Polecat Creek in the unincorporated areas of Bexar County were added to reflect updated information obtained for the unincorporated areas of Medina County.

A profile base line along Leon Creek was utilized to represent channel distances in the Flood Insurance Study for the unincorporated areas of Bexar County, dated October 16, 1991. The streamline for a reach of Leon Creek previously served as the corporate limits between the City of San Antonio and Bexar County. However, two separate analyses of Leon Creek existed for this reach. For this portion of the reach, the City of San Antonio's analysis was utilized in this countywide Flood Insurance Study. For that portion of this Leon Creek reach, the profile base line was deleted. For the remaining portion of the reach, the Bexar County analysis and the profile base line were utilized in this countywide study.

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development and proposed construction.

Numerous flooding sources in this countywide study were studied in their entirety or in part by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon, by FEMA and Bexar County.

Table 3. Letters of Map Change

Project	Stream	Date
CITY OF BALCONES HEIGHTS		
Cross Roads Park and Ride	East Woodlawn Ditch	December 27, 1988
CITY OF FAIR OAKS RANCH		
More detailed analyses and topography	Blackjack Creek, East Fork Blackjack Creek, and West Fork Blackjack Creek	September 13, 1995
CITY OF LIVE OAK		
Construction of a drainage structure	Unnamed Stream	August 6, 1987
CITY OF SAN ANTONIO		
Wildwood Subdivision	French Creek	March 10, 1988
River bend of Camino Real Subdivision	Unnamed Tributary to Panther Springs Creek	June 2, 1988
Hidden Forest Subdivision	Panther Springs Creek	October 25, 1989
Encino Bluff, Unit 1	Unnamed Tributary to Elm Creek	December 28, 1989
Dublin Square Apartments	Sea Creek	May 15, 1991
Channelization and fill placement	Lorence Creek	March 25, 1992
Fortuna Street to West Commerce Street	Zarzamora Creek	April 29, 1992
Channel improvements from the confluence with Airport Tributary upstream to Barbara Drive	Tributary A of Airport Tributary	May 8, 1992
Braun Station, Unit 20A	Unnamed Tributary to French Creek	October 12, 1992
Westlakes Villas	Unnamed Tributary to Medio Creek	October 12, 1992
West Braun Station, Unit 15A	Unnamed Tributary to French Creek	October 22, 1992
Channelization and four drop structures	Slick Ranch Creek and the North and South Laterals to Slick Ranch Creek	November 30, 1992
Braun Station, Unit 20B	Unnamed Tributary to French Creek	May 26, 1993
French Creek Quail Creek Subdivision, Unit 4A	French Creek	May 27, 1993
Enclave Within Santerra North	Panther Springs Creek	June 9, 1993
Seven Oaks Subdivision	Mud Creek	July 22, 1993
Westlakes Villas	Unnamed Tributary to Medio Creek	October 12, 1993
Channelization and new bridge at Apple Green Drive	Huebner Creek and Huebner Creek Tributary A	October 21, 1993
Channelization and Grading	Mud Creek	February 2, 1994

Table 3. Letters of Map Change (Cont'd)

Project	Stream	Date
CITY OF SAN ANTONIO (Cont'd)		
Vista del Norte Subdivision	Salado Creek	February 2, 1994
Revised analyses and updated topography adjacent to Blanco Road	Unnamed Tributary to Panther Springs Creek	February 22, 1994
Addition of box culvert	Tributary A to Zarzamora Creek	March 11, 1994
Northwest Business Park	French Creek Tributary A and an unnamed tributary	April 21, 1994
Churchill Estates	Salado Creek	May 18, 1994
Deerwood Unit 3 Subdivision	Unnamed Tributary to Panther Springs Creek	May 19, 1994
Fall Creek Unit 1 Subdivision	Mud Creek	June 7, 1994
Hume's Farm Subdivision	Airport Tributary	June 28, 1994
Redland Heights	Mud Creek	August 18, 1994
8838 Timberwilde Drive	Tributary A of Culebra Creek	August 25, 1994
Pace Foods	Salado Creek	September 9, 1994
Midlands/Vistas	Panther Springs Creek	September 15, 1994
Braun Station, Unit 20B	Unnamed Tributary to French Creek	December 12, 1994
Regent Care Center	Panther Springs Creek	January 17, 1995
Dos Rios Wastewater Treatment Plant	San Antonio River, Medina River, and an unnamed tributary to Medina River	February 10, 1995
Redland Oaks Subdivision	Elm Creek and Elm Waterhole Creek	March 30, 1995
Encino Forest Unit 2	East Elm Creek	August 9, 1995
Boulevard Apartments	Quail Creek	August 14, 1995
CITY OF SELMA		
Retama Park	Selma Creek	July 12, 1995
CITY OF SHAVANO PARK		
Inwood Subdivision	Salado Creek	July 18, 1991
Shavano Park Subdivision	East Fork Olmos Creek	March 13, 1995
UNINCORPORATED AREAS		
Foster Meadow Subdivision	Unnamed Tributary to Calaveras Creek	August 9, 1988
Leon Spring Station	Unnamed Tributary to Leon Creek	December 1, 1988
Woods of Westcreek	Caracol Creek	May 30, 1989
Hidden Forest Subdivision	Panther Springs Creek	October 25, 1989
Clear Springs Park Subdivision	Clear Fork	September 5, 1990
Vicinity of Heverman Road	Unnamed Tributary to Leon Creek	October 30, 1990
Covel Road Landfill	Medio Creek	October 31, 1990
Redland Oak Subdivision	Elm Creek and Elm Waterhole Creek	March 20, 1991

Table 3. Letters of Map Change (Cont'd)

Project	Stream	Date
UNINCORPORATED AREAS (Cont'd)		
Twin Lakes	Two Unnamed Tributaries for the San Antonio River	August 15, 1991
D&D Travel Center	Unnamed Tributary to the San Antonio River	May 28, 1993
Camino Bandera Subdivision	Unnamed Tributary to French Creek	July 30, 1993
Finesilver Subdivision	Unnamed Tributary to Leon Creek	December 17, 1993
Preston Hollow Unit 1	Mud Creek	February 2, 1994
Village in the Woods Subdivision	Tributary to French Creek	March 2, 1994
More detailed analyses and topography	Medio Creek	April 7, 1994
Northwest Business Park	Unnamed Tributary to French Creek Tributary A	April 21, 1994
Woodlake Park Subdivision	Unnamed Tributary to Martinez Creek	May 31, 1994
Fall Creek Unit 1 Subdivision	Mud Creek	June 7, 1994
Redland Heights	Mud Creek	August 18, 1994
Hidden Heights Subdivision	Unnamed Tributary to Panther Springs Creek	February 8, 1995
Dos Rios Wastewater Treatment Plant	San Antonio River and Medina River	February 10, 1995
Channelization project	Unnamed Tributary to Leon Creek	February 17, 1995
Shavano Park Unit 16	East Fork Olmos Creek	March 13, 1995
Heritage Park Subdivision	Medio Creek	April 11, 1995
The Bluffs of Westcreek, Units 1 and 2	Caracol Creek	April 27, 1995
Stone Valley	Panther Springs Creek	August 1, 1995

2.2 Community Description

Bexar County is located in south-central Texas. The county, with its major city, San Antonio, has been a cultural and economic center since the early 1700s. It is conveniently located near Austin (75 miles), Houston (190 miles), Dallas (255 miles), the Rio Grande Valley, and the International border with Mexico. It is also crossed by major interstate transportation routes, which include the Southern Pacific, Missouri Pacific, and Missouri-Kansas-Texas Railroads; U.S. Routes 81, 87, 90, 181, and 281; and Interstate Routes 35 and 10. Besides the City of San Antonio, the county contained 20 other smaller incorporated areas in 1974.

Even though the civil administration was organized in 1837, the county achieved its present outline in 1860. It covers an area of 1,248 square miles. Today, the urban area contains mostly residential developments grouped around industrial and military complexes. The rural areas of the county consist mostly of farms, with an average size of 296 acres (Reference 10). More than half of the acreage of these farms is rangeland. Livestock, mainly beef cattle, and grain crops of corn and sorghum provide the major source of agricultural income.

Development in the floodplains of Bexar County is proceeding rapidly as the population grows and farms and ranches are being converted into suburban commuter areas. This land-use change is accelerating rapidly, with the potential for both loss of life and large-scale property increasing. There is little awareness of this region's flooding potential among either the home-buying public or the developer/builder.

All streams flowing through Bexar County drain into the San Antonio River basin. Major streams in the county are the San Antonio and Medina Rivers and Cibolo Creek. Secondary streams in the county include Elm, Leon, Salado, Martinez, and Calaveras Creeks. Flow patterns are dependent on the stream's location to the fault system. Those south of the fault system have relatively mild slopes, wide, flat floodplains, and flow northwest to southeast. Those north of or crossing the fault have steep slopes, narrow or no floodplains, losing reaches (meaning sections of some streams flowing through limestone areas of Bexar County where discharges decrease as drainage areas increase), and flow generally north to south. The loss of surface water provides a significant source of recharge to ground-water aquifers that supply many springs and wells.

Bexar County has a modified subtropical climate, predominantly continental during the winter months and marine during the summer months. Normal mean temperatures range from 50.7 degrees Fahrenheit (°F) in January to 84.7°F in July, with a yearly mean of 69°F (Reference 11). While the summer is hot, with daily maximum temperatures of approximately 90°F over 80 percent of the time, extremely high temperatures are rare, with a record high of 107°F. Mild weather prevails during much of the winter months, with below-freezing temperatures occurring on an average of approximately 20 days each year. The normal annual precipitation is 27.54 inches. Precipitation is fairly well distributed throughout the year, with the heaviest amounts occurring during May and September. Precipitation from April to September usually occurs as thunderstorms with fairly large amounts of precipitation falling in short periods of time. Most of the winter precipitation occurs as light rain or drizzle. However, thunderstorms may occur any time of the year. During the winter northerly winds prevail, but become southeasterly from the Gulf of Mexico during the summer.

The Balcones Fault Zone cuts across the northern third of the county in a northeast-southwest trend. This zone forms a transitional boundary, separating the hill country of the Edwards Plateau to the north from the Blackland Prairie to the south. The Edwards Plateau is a rugged, hilly area that ranges from 1,100 to 1,900 feet in elevation. The topography is characterized by steeply sloping, stair-stepped, rocky valley walls and deeply incised stream channels. Hill slopes vary from 5 to 12 percent. Soils in this area are shallow, limey clay soils of the Tarrant-Brackett and Crawford-Bexar Associations (Reference 12). These soils overlay the limestones and marls of the Glen Rose Formation and Edwards Limestone. The Blackland Prairie is a gently undulating terrain with hill slopes of 1 to 5 percent. Elevations range from 450 to 1,000 feet, with a general slope to the south. The soils are deep clays, clay loams, and sandy loams, which overlay the Taylor and Navarro Group (Reference 12).

2.3 Principal Flood Problems

Bexar County lies in the center of a special climatic zone influenced by the Balcones Fault scarp. Humid southerly winds off the Gulf of Mexico strike the 500- to 800-foot face of the scarp and are lifted orographically to produce intense localized rainfall. This process is aided by frequent cold fronts (northers) and occasional tropical cyclones (hurricanes), especially in the months of August and September. This combination of climatic and physiographic factors has produced some of the most intense rainstorms ever recorded in the conterminous United States (Reference 13). Some of these intense rainstorms include 36.4 inches measured in 18 hours at Thrall in September 1921, and 22.0 inches in 2 hours and 45 minutes at D'Hanis in May 1935 (Reference 13). A 15-inch rainfall is no longer considered rare, and it is not unheard of to have a 20-inch rainfall.

The City of San Antonio, developed longer and with better records than rural Bexar County, has recorded disastrous floods in 1921, 1946, and 1965 (References 13, 14, and 15). Other major storms occurred in 1819, 1865, 1880, 1893, 1899, 1913, 1919, 1923, 1935, 1957, 1958, and 1972. All of the storms had effects on rural Bexar County, as exhibited in 1946 when Calaveras Creek in southeast Bexar County had a record flood.

In the City of Alamo Heights, the storm drain under Austin Highway adequately conveys runoff from short-duration rainfall of 1 to 4 inches, but it is not large enough to convey runoff from heavier rainfall. The overflow from this drain, which goes under ground at Grandview Place, flows down Broadway and combines with the runoff from side streams to form a stream several feet from Grandview Place to Mary D. Avenue, is subject to inundation by 1 to 4 feet of water.

Flooding in the City of Converse occurs along West Salitrillo and East Salitrillo Creeks. Some backwater is caused by the road crossing on West Salitrillo Creek at Schaefer Road and FM 78. Most of the flooding is confined to the undeveloped areas along these streams.

Most of the flooding in the City of Elmendorf is the result of rainfall runoff from a low topographic ridge located west and north of the city. The faces of this ridge, which are cultivated and have no definite drainage channels, slope approximately 70 feet per mile in the direction of the city. Intense thunderstorms occasionally produce shallow flow down the slope of the ridge and across the cultivated fields. In the developed areas of the city, this flow may temporarily pond upstream from roadways, railroad embankments, and other structures. The areas of most severe shallow flooding in the City of Elmendorf are northeast of the Southern Pacific Railroad between Third and Sixth Streets and northwest of FM 1518 at the intersection of Schulz Road.

The City of Grey Forest is affected by riverine flooding resulting from the overflow and ponding of water from Helotes and Lee Creeks. Most of the discharge, however, is confined to the channels of the streams.

In the City of Selma, three bridges on Cibolo Creek at the Interstate Highway 35 crossing cause only a small amount of backwater because two service road bridges are designed to be quickly overtopped as the flow in the creek increases. Any significant backwater from these two bridges will be confined within the natural low-water channel. The main Interstate Highway 35 bridge has a stream opening adequate to carry all of the selected discharges except the 500-year flood, which will overtop the main highway.

The culvert on Selma Creek at the Interstate Highway 35 crossing will cause some backwater for a short distance upstream at all of the selected discharges in the City of Selma. The area affected by backwater will be almost entirely within an area of gravel quarries where only minor damage and inconvenience is expected. A few of the roads in the study area, where only low-water crossings exist on the streams, will become impassable during times of floods.

Overflow from Huebner and Zarzamora Creeks is the primary flood problem in Leon Valley, although normally both are dry throughout most of the year. Most of the flood-producing storms that occur over the Huebner Creek watershed are experienced in the spring and fall.

2.4 Flood Protection Measures

The SCS has constructed 13 flood-control dams in the Salado Creek watershed, controlling a drainage area of 85.4 square miles with a total detention capacity of 30,363 acre-feet. Their effects have been incorporated into this countywide Flood Insurance Study. These dams were constructed from 1972 to 1991 as part of the Salado Creek watershed work plan (Reference 16). They are designed to temporarily detain the 100-year flood and slowly release the runoff through principal spillways.

All existing structures and improvements were considered when the hydrologic and hydraulic analyses were made.

The San Antonio River Authority flood-control structure, Martinez Creek Dam No. 5, greatly reduces flood peaks on East Salitrillo Creek for the Cities of Converse, Live Oak, and Universal City.

A storm drain was installed in the vicinity of the City of Alamo Heights by the Work Projects Administration in 1938 to channel the runoff from New Braunfels Avenue down to Austin Highway. A concrete storm drain extends from Grandview Place to Patterson, however, the facility was designed to carry only a small portion of the local runoff.

The consulting engineering firm for the City of Castle Hills, Farmer and Shipman, has developed drainage plans for lowering streets and raising curbs in several areas of the city to eliminate local flooding problems. The implementation of this plan has been completed.

In the City of Converse, two reservoirs, Martinez Creek Dam Nos. 4 and 5, and a land-treatment program provide protection from flooding in the study area.

Two reservoirs located in southern Bexar County that were constructed primarily for cooling of electric power generating plants have limited storage capacity for floodwaters. Victor Brauning Lake is located on Arroyo Seco and has a normal storage of 26,500 acre-feet and 9.4 square miles of drainage area above the dam, which has 3,500 acre-feet of flood storage. Calaveras Lake is located on Calaveras Creek and has a normal capacity of 62,800 acre-feet and 65 square miles of drainage area above the dam, which has 18,900 acre-feet for flood storage.

Within the City of San Antonio, many miles of natural channel have been rectified, and Olmos Dam, on the headwaters of the San Antonio River, has been constructed. Olmos Dam has storage of 15,500 acre-feet, all of which is for floodwaters. Figures 2, 3, 4, and 5 show flood photographs on the San Antonio River during the flood of September 9, 1921.

In the City of Leon Valley, channel construction to straighten and improve Huebner Creek, from Evers Road upstream to the corporate limits, and from Bandera Road downstream to the corporate limits, and Zarzamora Creek, from Bandera Road upstream to Interstate Route 410, and from the downstream corporate limits to a point approximately 1,300 feet upstream, have been completed. These channel improvements provide a high degree of protection for adjacent areas. Additional channel improvements have been made on all drains feeding Huebner and Zarzamora Creeks, thus producing a more rapid runoff for stormwater.

The Leon Creek drainage basin is almost entirely in its natural state with little or no known flood-protection measures at this time.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10) and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

Figure 2. San Antonio River at St. Mary's Street

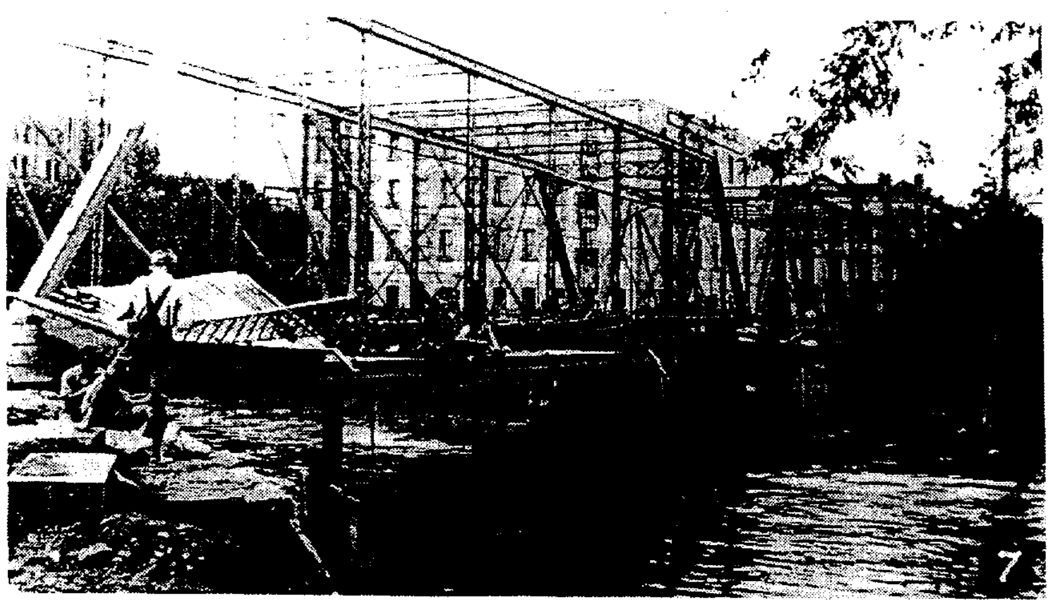

Figure 3. San Antonio River at Navarro Street

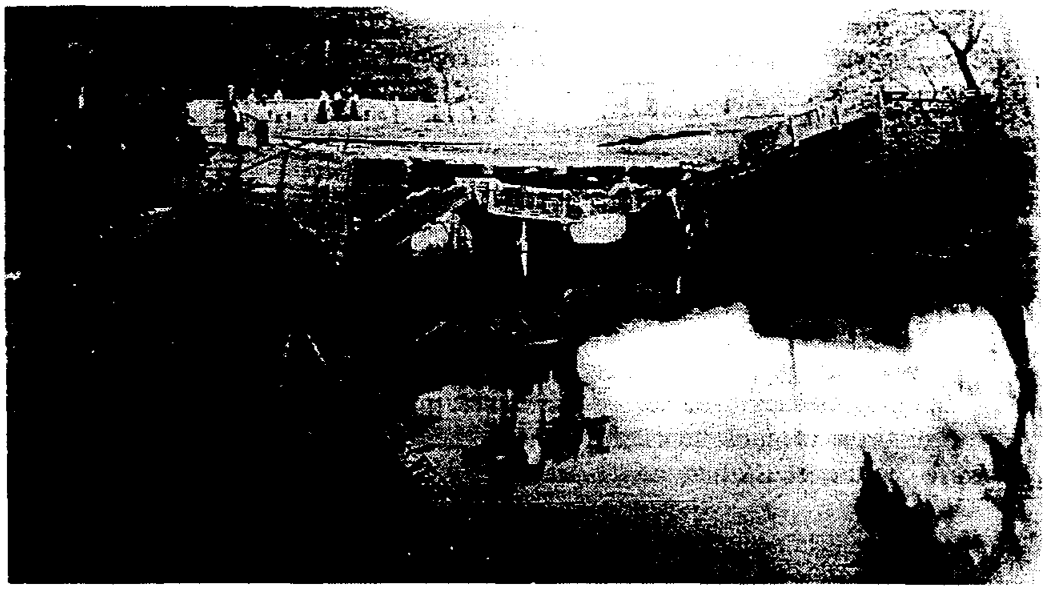

Figure 4. San Antonio River at South Alamo Street

Figure 5. Alazan Creek at Missouri Pacific Railroad

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding source studied in detail affecting the community.

In this countywide Flood Insurance Study, rainfall-frequency data for Salado Creek (Lower Reach) were obtained from Weather Bureau Technical Paper No. 40 (Reference 17). The peak discharges were determined by routing various storm frequencies with a 24-hour rainfall duration using SCS Technical Release No. 20 (TR-20) (Reference 18). Average-condition-runoff curve numbers were used to model the upper reaches of the watershed located within the Edwards Aquifer Recharge Area.

In this countywide Flood Insurance Study, the hydrologic analysis for the revision of Cibolo Creek involved selecting a transformation procedure that would convert rainfall to runoff in the most efficient manner. The HEC-1 computer model (Reference 118) was used as the transformation device, with the following options:

- Kinematic wave approach (above Selma)
- Unit hydrograph approach (below Selma)
- Holtan loss rate functions
- Muskingum-Cunge channel routing

Physical features of the watersheds were used to obtain the initial values of parameters in the model. These features included topography, soils and geology, and roughness. Information on historical floods (rainfall and runoff) were then used to calibrate and verify the model. Rainfall data on exceedence probability for various durations were obtained from Weather Bureau Technical Paper No. 40 (Reference 17) and Technical Memorandum NWS HYDRO-35 (Reference 119). Application of the rainfall values was in accordance with the triangular distribution contained in the HEC-1 computer model (Reference 118). The findings were presented in the report entitled "Hydrologic Analysis of the Cibolo Creek Watershed," FEMA, March 1992.

It should be noted that discharges on Cibolo Creek increase with a decreasing drainage area. This phenomenon is caused by a loss of water starting just below Boerne in Kendall County and continuing downstream to Interstate Route 10. This area has outcrops of massive cavernous limestone of the Cretaceous Period. The water is, in effect, stored in caverns underground and never reaches downstream points as flood flows.

In this countywide Flood Insurance Study, updated hydrologic analyses for Salitrillo, East Salitrillo, West Salitrillo, and East Branch of East Salitrillo Creeks, in the City of Converse, were performed. Rainfall data for the 10-, 50-, and 100-year frequency storms were obtained from Weather Bureau Technical Paper No. 40 (Reference 17) and NWS HYDRO-35 (Reference 119). The 500-year frequency storm was computed by extrapolation of these data. Individual subarea unit-hydrograph lag times were determined using the Southwest Fort Worth Hydrology (SWFHYD) model (Reference 120). The HEC-1 computer model (Reference 118) was used to compute the synthetic rainfall and flood hydrographs. Flood hydrographs were combined as appropriate and then routed downstream using the modified Puls method. Routing through the SCS Floodwater Retarding Structures (Martinez Creek Dam Nos. 4, 5, and 6-A) was based on reservoir storage capacities and on computed hydraulic rating curves for the principal and emergency spillways.

In this countywide Flood Insurance Study, updated hydrologic analyses for East Salitrillo and West Salitrillo Creeks, Drain Nos. 1 through 10, Drain No. 12, and an Unnamed Tributary of Cibolo Creek, in the City of Live Oak, were performed. Peak discharges for floods of the 10-, 50-, 100-, and 500-year recurrence intervals were computed using Weather Bureau rainfall-frequency-duration data (Reference 17) and the rainfall-runoff relationships developed by the SCS (Reference 18). A 24-hour rainfall duration was used.

In this countywide Flood Insurance Study, a hydrologic analyses for Leon Creek Overflow was performed. Peak discharges for floods of the 100-year recurrence interval were computed using the USGS 100-year frequency discharge-drainage area relationship for San Antonio (Reference 123).

Each community within Bexar County, with the exception of the Cities of Helotes, Hill Country Village, Fair Oaks Ranch, Olmos Park, Somerset, and St. Hedwig, has a previously printed Flood Insurance Study report. The hydrologic analyses described in those narratives have been compiled and are summarized below. For streams that flow through two or more communities, each methodology described applies only to that portion of the stream studied by detailed methods within that particular community.

For detailed streams in the unincorporated areas of Bexar County and the Cities of China Grove, Kirby, and Selma, a search of the Flood Plain Information reports prepared by the USACE and the Flood Hazard Analyses report prepared by the SCS yielded a pair of flood-frequency, discharge-drainage area curves ranging from 1 to 70 square miles of drainage area (References 1, 2, 3, 4, 5, 6, 7, 8, 9, and 19). For the detailed streams in the Cities of Kirby and Selma, information was also obtained from another FIA report in that area (Reference 20). Flood frequencies are published as the Intermediate Regional Flood, which is defined as one that has a 1-percent chance of occurring in a given year, and the Standard Project Flood, which is defined as a flood of such magnitude that is expected to be a reasonable upper limit of meteorologic and hydrologic conditions.

All available peak-flood discharges in the area of the Balcones Fault Zone were plotted along with three other work curves for comparison (References 21, 22, 23, 24, 25, 26, and 27). The Jarvis-Meyer 100-percent runoff curve is a theoretical maximum possible runoff per square mile of drainage (Reference 28). This has been exceeded in the Bexar County area. The provisional Texas maximum runoff curve is empirically derived from observed peak flows.

Based on the frequency that floods greatly exceed the USACE Standard Project Flood, a 500-year frequency curve was drawn higher than the USACE curve, and the lower end of the USACE 100-year curve (from 1 to approximately 7 square miles) was raised to reflect the peak flows.

The 10- and 50-year curves used in the unincorporated areas of Bexar County were then established parallel to the 100- and 500-year curves. The discharges used on the San Antonio River and Leon, Salado (Middle Reach), and Culebra Creeks were based on the 100-year frequency discharge-drainage area design curve recommended by the City of San Antonio and developed by the USGS.

A comparison was made between the peak discharges produced by the above method and the subsequently published Schroeder-Massey technique report (Reference 29). Results of this comparison showed a high level of compatibility between the two methods.

The hydrologic analysis for Tributary to Panther Springs Creek, Tributary to French Creek, portions of Leon Creek and Tributary of Culebra Creek, and Huebner Creek were updated using the Rational Formula for computing flood discharges. Flood discharges for Unnamed Tributary used Weather Bureau Technical Paper No. 40 (Reference 17).

The 10-, 50-, and 100-year discharges for revising Balcones Creek were determined using discharge-frequency curves for the Texas State Department of Highways and Public Transportation Hydraulic Manual (Reference 33); the 500-year flood profile was determined using the SCS Technical Release No. 55 graph method (Reference 34).

Hydrologic data obtained from the Flood Insurance Study for the unincorporated areas of Comal County (Reference 31) indicate that peak discharges for Postoak Creek were determined using discharge-frequency curves taken from the Texas State Department of Highways and Public Transportation's Hydraulic Manual (Reference 33). Also, peak discharges for Cibolo Tributary were determined using USGS Water Resources Investigations Open-File Report No. 77-110 (Reference 29).

For the City of Alamo Heights, the regional discharge-frequency relationships for New Braunfels, Austin Highway, and Broadway Drain in the city were analyzed by a comparison of discharge data from studies conducted by the USACE, measurements made by the USGS on Through, Bleiders, Cottonwood, Purgatory, Salado, and Cibolo Creeks and the Guadalupe River, and calculations made using the log-Pearson Type III probability distribution for 10 USGS gaging stations (References 1, 2, 3, 4, 5, 6, 7, 8, 9, 18, 35, and 36). The 10 USGS gaging stations have periods of record ranging from one to six years, and have hydrologic characteristics similar to those of the streams in the City of Alamo Heights.

In the revision for the City of Alamo Heights, the hydrologic analysis for Olmos Creek was updated using information from the Flood Insurance Study for the City of San Antonio (Reference 37). In that Flood Insurance Study, a discharge-drainage area design curve was furnished for the 100-year frequency for the San Antonio River. Flood-frequency curves prepared by using the results of multiple-regression analysis for the region were utilized (Reference 18).

For the detailed streams in the Cities of Balcones Heights, Castle Hills, Shavano Park, and Terrell Hills and the Town of Hollywood Park, flood-flow frequency calculations were also made by 10 USGS stream gaging stations in the vicinity of Balcones Heights. The calculations were made using the log-Pearson Type III probability distribution with a generalized skew coefficient (Reference 18). Three of the following stations: Alazan Creek at St. Cloud Street in the City of San Antonio (drainage area = 3.26 square miles).

Olmos Creek Tributary at FM 1535 in the City of Shavano Park (drainage area = 0.33 square mile), and Salado Creek Tributary at Bitters Road in the City of San Antonio (drainage area = 0.26 square mile) are located in areas that have hydrologic characteristics similar to those of Balcones Heights and Castle Hills. They are located in developed areas with gently rolling terrain. Data from these three sites were used to construct the frequency-discharge and drainage-area relationships for the studies.

For East Fork Olmos Creek, Turkey Creek Tributary, Messey Cup Tributary, Gage Tributary, and Salado Creek, listed below in the City of Shavano Park, the regional-discharge relationships were also analyzed by a comparison of discharge data from the USACE and the USGS (References 1, 2, 3, 4, 5, 6, 7, 8, 9, 18, 36, and 37).

For shallow flooding (areas 1 through 4) within the City of Elmendorf, rainfall-intensity-duration and frequency relationships for the City of Elmendorf area were developed from Weather Bureau Technical Paper No. 40 and U.S. Study Commission data (References 17 and 38).

For Helotes Creek and Lee Creek within the City of Grey Forest, rainfall-frequency data were also developed from Weather Bureau Technical Paper No. 40 (Reference 17). Values greater than those for the 100-year frequency were determined by extrapolation of the rainfall-frequency graph. Peak-discharge values were determined by using the flood-routing method described in the SCS TR-20 (Reference 18).

A regional flood-frequency analysis was applied to the Helotes Creek drainage area by using the procedure outlined in Texas Water Commission Bulletin No. 6311 (Reference 39), and peak discharges obtained from this analysis were lower than those obtained from the SCS computer program. Peak discharge-drainage area frequency curves for the City of San Antonio area have been developed by the USGS, and these curves give peak discharges that are comparable to those obtained from the computer program.

A USGS stream gaging station (No. 08181400) is located on Helotes Creek at Helotes, approximately 3.5 miles downstream from Grey Forest, but because the period of record (1968-74) at this station is very short, a frequency analysis of the recorded peak discharges was not considered applicable to that Flood Insurance Study.

For the City of Leon Valley, peak discharges for floods of the 10-, 50-, and 100-year recurrence intervals were computed for Huebner Creek by using Snyder coefficients developed by the USACE during the preparation of the "Huebner Creek, Flood Plain Study, Hydrology" (Reference 40). Synthetic unit hydrographs were developed with consideration given to the percentage of watershed development and using loss rates developed in the Huebner Creek study. Appropriate watershed sizes and shape characteristics were determined from published documents, engineering documents, and field reconnaissance. Rainfall-frequency-duration data were utilized in the peak discharge computational process (Reference 17). Discharges for the 500-year floods were determined by straight-line extrapolation of log-probability graphs of flood discharges computed for frequencies up to 100 years.

For the City of Universal City, peak discharges for floods of the 10-, 50-, and 100-year recurrence intervals were also computed using Snyder coefficients developed by the USACE 1973 study of Cibolo Creek (Reference 8). Peak discharges for Selma Creek and its tributaries were computed using synthetic unit hydrographs developed using the Snyder method with consideration given to percentage of watershed development. Because of the proximity and similarity, Snyder coefficients developed by the USACE in their hydrologic studies of Cibolo and Huebner Creeks (References 40 and 41) were used. Appropriate watershed sizes and shape characteristics were determined from published documents, engineering documents, and field reconnaissance. Rainfall-frequency-duration data (Reference 17) were used in the development of the design storms for each recurrence interval. Storm hydrographs for each recurrence interval were developed using the USACE critical arrangement of rainfall and loss rates from their 1973 report on Cibolo Creek. Peak discharges at interior watershed locations were computed by the ratio-of-areas technique.

Discharges for Drains 1, 1A, 2, and 3 - Huebner Creek, and 4 - Zarzamora Creek, and interior watershed locations were computed by the ratio-of-areas technique.

Peak discharges for the selected recurrence intervals for Zarzamora Creek and Tributary A to Zarzamora Creek were obtained from the Flood Insurance Study for the City of San Antonio (Reference 37).

The City of San Antonio furnished discharge-drainage area design curves for the 100-year-frequency flood for the San Antonio River and Salado, Leon, and Culebra Creeks. The 10-, 50-, and 500-year frequency curves were plotted parallel to the 100-year frequency curve. The remainder of the streams in the City of San Antonio utilized flood-frequency curves prepared by using the results of the multiple-regression analysis for Region V to flood characteristics in the San Antonio area (Reference 30), discharge data for area streams (References 13, 35, 36), data from SCS Flood Hazard Analyses and USACE Flood Plain Information studies of area streams (References 1, 2, 3, 4, 5, 6, 7, 8, 9, 46, and 47), SCS work plans (References 19 and 12), Flood Hazard Analyses for Helotes Creek (Reference 48), and a soil survey for Bexar County (Reference 49).

The City of San Antonio Flood Insurance Study report incorporates an updated hydrologic analysis for Salado Creek (Middle Reach). That analysis was based on the flood-retention effects of 11 dams recently constructed by the SCS in the Salado Creek watershed. Discharges were obtained from application of unit-hydrograph methodologies to analyze runoff from uncontrolled portions of the Salado Creek watershed. An adjustment was then made to account for principal spillway discharges at the dam sites. The hydrologic analysis reflects the effects of four SCS flood-control dams that have been constructed in the upper portion of the Mud Creek watershed. The analysis, based on a revised drainage area, consists of the development of a unit hydrograph and dam outflows for the watershed. The hydrologic analysis for Airport Tributary was hand-calculated using the SCS TR-20 methodology (Reference 18).

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 4, "Summary of Discharges."

The stillwater elevations for the 10-, 50-, 100-, 500-year floods have been determined for the streams listed below and are summarized in Table 5, "Summary of Stillwater Elevations."

Table 4. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
AIRPORT TRIBUTARY					
Approximately 125 feet upstream of the mouth	6.50	2,150	6,100	8,900	18,800
Downstream of Jones Maltzberger Road	3.00	1,180	3,700	5,150	10,800
Downstream of Sunset Road	2.30	970	2,800	4,150	8,800
ALAZAN CREEK					
Downstream of Tampico Street	18.10	4,200	11,300	17,000	34,500
Downstream of Poplar Street	8.56	2,650	7,600	10,800	22,500
Downstream of St. Cloud	3.30	1,270	3,680	5,500	11,600
APACHE CREEK					
Downstream of Missouri Pacific Railroad	20.90	4,460	12,100	18,200	27,100
Downstream of South Zarzamora Street	19.60	4,320	13,300	17,600	36,000
Downstream of Elmendorf Dam	18.40	4,200	11,400	17,000	34,600
BABCOCK TRIBUTARY - LEON CREEK					
Approximately 300 feet downstream of Babcock Road	4.86	1,700	4,900	7,400	15,500
BALCONES CREEK					
Upstream of confluence with Cibolo Creek	24.44	6,250	13,500	18,000	22,800
BANDERA BRANCH					
Upstream of Southwest 26th Street	1.30	630	1,820	2,670	5,600
Downstream of Ruiz Street	1.07	540	1,550	2,280	4,750
BEITEL CREEK					
Approximately 550 feet downstream of Perrin Beitel Road	14.9	3,800	10,300	15,200	31,000
Approximately 1,000 feet upstream of confluence of Beitel Creek Tributary A	1.3	3,220	9,000	13,000	26,500
BEITEL CREEK TRIBUTARY A					
Approximately 450 feet upstream of confluence with Beitel Creek	1.20	590	1,700	2,500	5,200
BLACKJACK CREEK					
At confluence with Cibolo Creek	0.89	1,240	1,680	1,790	2,230
At Raintree Woods Drive	0.38	580	770	830	1,020

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
CALAVERAS CREEK					
At U. S. Route 87	3.25	1,250	3,650	5,300	11,200
At Cross Section D	1.50	700	2,080	2,950	6,150
At FM 1516	0.76	420	1,400	1,720	3,610
CARACOL CREEK					
At confluence with Medio Creek	7.20	1,850	5,400	7,900	16,500
CIBOLO CREEK					
Upstream of Martinez Creek	386.30	27,810[1]	50,730[1]	56,960[1]	80,360[1]
Downstream of Santa Clara Creek	379.80	28,930	51,450	58,300	84,520
Upstream of Santa Clara Creek	317.00	28,740[1]	51,060[1]	58,020[1]	84,040[1]
Downstream of Interstate Highway 10	307.40	33,550[1]	61,640[1]	70,970[1]	107,340[1]
Downstream of FM 78	286.60	35,430[1]	68,050[1]	80,620[1]	122,120[1]
At USGS Gage at Selma	274.00	36,700[1]	78,450[1]	93,940[1]	147,380
Approximately 16,100 feet upstream of Missouri Pacific Railroad	258.82	37,120[1]	78,790[1]	94,800[1]	146,660[1]
Downstream of Clear Springs Fork	249.22	37,920[1]	80,260[1]	95,790[1]	148,720[1]
Downstream of FM 1863 (Upstream Crossing)	234.60	39,140[1]	82,170[1]	98,740[1]	149,660[1]
Downstream of Lewis Creek	229.11	39,470	82,970	98,800	152,740
Upstream of Lewis Creek	207.85	28,540	65,520	78,600	125,650
At USGS Gage near Bulverde	198.00	27,590	63,710	76,770	122,000
Downstream of Meusebach Creek	177.92	24,910	58,820	72,230	112,650
Downstream of Pleasant Valley Creek	153.40	24,040	57,260	70,410	101,940
Upstream of Pleasant Valley Creek	124.92	20,270	50,360	62,160	86,230
Downstream of Postoak Creek	109.78	20,010	48,950	59,480	80,870
Downstream of Balcones Creek	101.02	17,090	44,200	53,270	71,590
Upstream of Balcones Creek	76.92	15,410	39,900	47,550	61,250

[1]Decrease in discharge due to the effects of Muskingum-Cunge routing and/or channel losses

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
CIBOLO TRIBUTARY					
Upstream of confluence with Cibolo Creek	3.10	4,262	5,894	6,773	8,669
COMMERCIAL TRIBUTARY (SIXMILE CREEK)					
Downstream of Ansley Street	2.40	1,000	2,900	4,300	9,100
Downstream of Huchins Street	1.80	1,000	2,900	4,300	9,100
CRESTWOOD DRIVE DITCH					
At the corporate limits (Harry Wurzbach Highway)	1.10	1,130	1,820	2,440	4,330
CULEBRA CREEK					
At FM 1957	81.00	11,500	31,000	46,000	99,000
At Cross Section L	77.00	7,720	21,400	31,800	66,500
At FM 1604	41.00	6,000	16,600	24,500	50,500
At FM 1560	26.00	4,900	13,700	20,000	41,400
At Galm Road	3.50	1,320	3,860	5,590	13,800
DRAIN 1 - HUEBNER CREEK					
At confluence with Huebner Creek	0.15	188	313	371	535
DRAIN 1A - HUEBNER CREEK					
At confluence with Huebner Creek	0.36	71	118	140	202
DRAIN 2 - HUEBNER CREEK					
At confluence with Huebner Creek	0.28	302	501	595	858
DRAIN 3 - HUEBNER CREEK					
At confluence with Huebner Creek	0.20	238	395	469	677
DRAIN 4 - ZARZAMORA CREEK					
At confluence with Zarzamora Creek	0.27	357	561	646	1,003
DRAIN NO. 1					
Shin Oak Drive	0.10	293	445	527	708
DRAIN NO. 2					
Welcome Drive	.091	407	561	642	819
Greycliff Drive	.078	353	486	556	708

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
DRAIN NO. 3					
Welcome Drive	0.58	1,596	2,337	2,736	3,604
Lone Shadow Thail	0.53	1,470	2,157	2,528	3,333
Northledge Drive	0.45	1,264	1,864	2,188	2,893
Wilderness Trail	0.37	1,056	1,566	1,842	2,442
Toepperwein Road	0.32	924	1,376	1,621	2,154
DRAIN NO. 4					
Shin Oak Drive	0.42	1,361	1,974	2,304	3,167
Village Oak Drive	0.10	271	420	502	684
DRAIN NO. 5					
Enchanted Oaks Drive	0.14	562	802	930	1,207
DRAIN NO. 6					
Welcome Drive	0.10	342	483	560	728
Lone Shadow Trail	0.06	218	308	357	463
DRAIN NO. 7					
Lone Shadow Trail	0.09	343	489	567	736
DRAIN NO. 8					
Cross Section A	0.07	241	343	397	515
DRAIN NO. 9					
Miller Road	0.08	206	311	368	493
DRAIN NO. 10					
Miller Road	0.18	376	543	637	881
Forest Bluff	0.07	281	400	464	601
DRAIN NO. 12					
Forest Bluff	0.19	589	887	1,049	1,463
Avery Road	0.08	252	386	459	626
EAST BRANCH OF SALITRILLO CREEK					
At confluence with East Salitrillo Creek	2.26	2,650	3,620	4,090	5,260
Upstream of small left bank tributary located approximately 950 feet upstream of confluence with East Salitrillo Creek	1.91	2,430	3,110	3,430	4,590
Approximately 350 feet upstream of Kneupper Road	1.77	2,310	2,870	3,125	4,470
At Southern Pacific Railroad	1.48	2,100	2,530	2,750	4,290
EAST FORK BLACKJACK CREEK					
Approximately 100 feet upstream of confluence with Blackjack Creek	0.23	380	510	560	670

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
EAST FORK OF EAST BRANCH OF SALITRILLO CREEK	0.7	600	900	1,100	1,450
EAST FORK OF SALITRILLO CREEK	--*	--*	--*	--*	--*
EAST SALITRILLO CREEK					
At confluence with Salitrillo Creek (also West Salitrillo Creek)	8.83	6,670	9,370	10,740	14,320
Downstream of Left Bank Tributary located approximately 40 feet downstream of Schaefer Road	8.14	6,270	8,550	9,690	12,950
Downstream of East Branch of Salitrillo Creek	7.33	6,100	8,160	9,210	12,370
Upstream of East Branch of Salitrillo Creek	5.07	3,690	5,110	5,820	7,800
Downstream of Southern Pacific Railroad	4.89	3,850	5,330	6,070	8,240
Upstream of Southern Pacific Railroad	4.89	3,350[2]	4,675[2]	5,350[2]	7,240
Approximately 2,100 feet upstream of Southern Pacific Railroad	4.42	3,550	4,770	5,400	7,080
Downstream of East Fork of Salitrillo Creek	4.09	3,250	4,310	4,840	6,370
Upstream of East Fork of Salitrillo Creek	3.50	1,850	2,420	2,710	3,600
Approximately 8,300 feet upstream of FM 1976	3.21	1,340	1,700	1,900	2,730
At Martinez Creek Dam No. 5 (outflow)	2.81	110	120	320	2,560
At Old Spanish Trail	1.98	4,807	7,096	8,361	12,081
At Village Oak Drive	0.85	1,843	2,620	3,126	4,945
At Greycliff Drive	0.73	1,624	2,390	2,851	4,226
At State Highway 218	0.59	1,364	2,104	2,508	3,397
EAST WOODLAWN DITCH					
At Cross Section A	1.22	1,160	2,660	2,800	2,900
At Cross Section C	1.12	983	2,256	2,942	4,900

*Data not available

[2]Downstream discharge decreases due to storage routing effects

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
FORT SAM HOUSTON TRIBUTARY TO SALADO CREEK (MIDDLE REACH)					
Approximately 50 feet upstream of W. White Road	2.40	1,000	2,900	4,300	9,000
FRENCH CREEK					
Approximately 1,000 feet downstream of South Hausman Road	5.6	1,920	5,400	8,200	17,250
Approximately 350 feet downstream of FM 1604	2.23	950	3,750	4,100	8,600
FRENCH CREEK - TRIBUTARY A					
Just upstream of FM 1604	1.07	1,560	2,090	2,330	4,840
FRENCH CREEK-TRIBUTARY B					
Approximately 350 feet downstream of FM 1604	1.20	590	1,700	2,500	5,200
GAGE TRIBUTARY					
Approximately 50 feet upstream of the southeastern corporate limits	0.33	220	640	900	1,850
HELOTES CREEK					
At FM 1604	31.1	14,600[3]	23,200[3]	27,500[3]	37,400[3]
At Braun Road	29.4	15,000	24,100	28,700	38,900
At State Route 16	15.0	8,400	13,200	15,500	20,800
Cross Section Q	6.20	4,200	6,600	7,800	10,800
Cross Section R	3.16	2,480	3,850	4,550	6,300
Cross Section S	2.97	2,350	3,650	4,350	5,900
Cross Section T	2.64	2,150	3,350	3,950	5,400
Cross Section U	2.51	2,060	3,200	3,770	5,200
HUEBNER CREEK					
Approximately 900 feet upstream of Ingram Road	12.0	3,200	9,100	12,000	27,500
Approximately 200 feet downstream of Bandera Road	8.98	2,750	7,900	11,200	23,000
At Apple Green Road	7.91	2,480	7,200	10,200	21,500

[3]Peak discharges attenuated due to losing reaches

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
HUEBNER CREEK (Cont'd)					
Approximately 650 feet upstream of Huebner Road	4.21	1,550	4,440	6,600	14,000
Immediately upstream of confluence of Drain No. 2	3.25	3,550	5,900	7,000	10,100
At Prue Road	2.50	1,030	3,000	4,450	9,000
HUEBNER CREEK - TRIBUTARY A					
At confluence with Huebner Creek	3.76	1,400	4,050	6,100	12,800
HUEBNER CREEK - TRIBUTARY B					
Approximately 800 feet above the mouth	1.25	620	1,750	2,600	5,500
HUESTA CREEK					
Approximately 250 feet downstream of Babcock Road	5.83	1,950	5,700	8,300	17,500
INDIAN CREEK					
At the mouth	9.90	2,930	8,300	12,100	25,000
At Interstate Route 410	5.90	1,975	5,750	8,400	17,500
LEE CREEK					
At Cross Section A	2.78	2,230	3,500	4,100	5,600
At Cross Section B	2.04	1,740	2,680	3,180	4,350
LEON CREEK					
Approximately 3,600 feet upstream of Castroville Highway	198.0	20,500	56,000	80,000	172,000
Approximately 900 feet upstream of confluence of Culebra Creek	77.0	11,000	31,000	46,000	96,500
Approximately 650 feet downstream of Hausman Road	44.0	7,600	21,000	32,000	66,000
LEON CREEK OVERFLOW					
At confluence with Leon Creek	2.0	--*	--*	3,580	--*

*Data not available

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
LEON CREEK OVERFLOW (Cont'd)					
Approximately 800 feet downstream of Babcock Road	1.1	--*	--*	2,300	--*
Approximately 1,600 feet upstream of Babcock Road	0.7	--*	--*	1,500	--*
Approximately 2,600 feet downstream of West Hausman Road	0.6	--*	--*	1,320	--*
Approximately 2,200 feet downstream of West Hausman Road	0.5	--*	--*	1,120	--*
LORENCE CREEK (LOWER REACH)					
At Buckhorn Road	7.60	2,400	7,000	10,000	21,000
At Shadow Road	4.60	1,640	4,700	7,000	14,800
Approximately 150 feet upstream of San Pedro-U. S. Route 281	3.30	1,270	3,700	5,550	11,600
LORENCE CREEK (UPPER REACH)					
At U. S. Highway 281	2.34	3,000	4,050	4,750	5,800
At Cross Section B	2.14	2,800	3,800	4,500	5,500
At Donella Drive	1.80	2,450	3,400	4,000	4,900
At Cross Section F	1.67	2,300	3,200	3,750	4,600
At Cross Section G	1.26	1,850	2,600	3,050	3,800
At Sagecrest Drive	1.19	860	1,250	1,550	2,000
LOS REYES CREEK					
At State Route 16 at B	5.4	3,500[3]	5,690	6,780	9,260
At State Route 16 at D	4.6	3,530	5,600	6,600	8,870
MARTINEZ CREEK A					
At the confluence with Alazan Creek	7.70	2,430	7,000	10,000	21,000
Upstream of Fredricksburg Road	6.40	2,100	6,100	8,800	18,700
Downstream of Fresno Drive	2.80	1,120	3,220	4,820	11,200

*Data not available

[3]Peak discharges attenuated due to losing reaches

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
MARTINEZ CREEK B					
At Schuwinth Road	14.30	2,000	5,900	8,400	18,000
Approximately 3,300 feet downstream of Interstate Highway 10	9.60	1,183	1,800	2,600	5,500
Approximately 1,000 feet upstream of Interstate Highway 10	8.90	713	1,100	1,279	1,730
At Martinez Creek Dam No. 1	6.30	61	250	319	480
MEDINA RIVER	--*	--*	--*	--*	--*
MEDIO CREEK					
At U. S. Route 90	36.90	5,750	15,900	26,700	48,300
At Cross Section B	32.30	5,430	15,100	22,600	47,000
At FM 1604	22.30	4,580	12,800	18,500	38,200
At Talley Road	16.90	3,990	11,200	16,200	33,300
MOSSEY CUP TRIBUTARY					
Approximately 310 feet above the mouth	0.80	430	1,200	1,800	3,600
MUD CREEK					
At Starcrest Drive	57.2	6,800	19,200	28,300	60,000
Approximately 250 feet downstream of Jones-Maltzburger Road	17.2	4,100	11,000	16,500	33,500
NEW BRAUNFELS AVENUE, AUSTIN HIGHWAY, AND BROADWAY DRAIN					
At Mary D. Avenue	1.89	1,990	3,150	4,080	7,390
At Poco Street	1.42	1,580	2,540	3,320	5,880
At Chichester Avenue	1.25	1,420	2,300	3,000	5,340
At Routt Street	1.13	1,310	2,110	2,760	4,960
At Rittman Road	0.99	1,170	1,890	2,490	4,490
At Wildrose Avenue	0.88	1,050	1,680	2,250	4,020
At Primrose Place	0.74	890	1,420	1,940	3,460
At Halcyon Place	0.62	750	1,220	1,650	2,980
At East Elm View Place	0.53	650	1,050	1,430	2,620
At East Oak View Place	0.44	550	890	1,210	2,210

*Data not available

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
NORTH-EAST TRIBUTARY					
At Live Oak Boulevard	2.16	1,800	2,700	3,250	4,200
Approximately 200 feet downstream of Interstate Highway 35	1.90	1,600	2,350	2,900	3,700
OLMOS CREEK AND OLMOS CREEK EAST CHANNEL					
Upstream of Missouri-Pacific Railroad	31.00	5,300	14,500	21,600	45,000
At Jackson-Keller Road	17.60	4,100	11,500	17,975	37,100
Upstream of Dreamland Drive	13.40	3,560	9,870	14,310	29,650
Upstream of George Road	7.40	2,350	6,870	9,800	20,500
At George Road	6.90	5,840	8,400	9,580	12,400
Approximately 3,620 feet downstream of De Zavala Road	4.90	2,432	5,813	7,702	10,300
At Cross Section D, approximately 3,125 feet downstream of De Zavala Road	4.20	2,163	5,166	6,840	8,080
At De Zavala Road	3.85	2,018	4,819	6,379	8,080
At Cross Section I	2.70	3,450	4,660	5,260	6,320
OLMOS CREEK TRIBUTARY					
At Cross Section A	1.0	510	1,480	2,150	4,500
POLECAT CREEK					
Above confluence with South Polecat Creek	3.5	1,210	1,960	2,440	3,400
POSTOAK CREEK					
At confluence with Cibolo Creek	8.2	2,600	5,300	7,300	10,237
QUAIL CREEK					
Approximately 1,200 feet upstream of Interstate Route 410	0.96	500	1,450	2,100	6,900
ROCK CREEK					
Downstream of Vance-Jackson Road	3.23	1,250	3,620	5,450	11,500
Upstream of Callaghan Road	2.46	1,020	2,950	4,400	9,300

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
ROSILLO CREEK (LOWER REACH)					
At Cross Section A	7.90	4,872	8,745	10,943	18,305
At Cross Section F	3.38	2,689	4,860	6,860	10,601
At Cross Section J	3.23	2,541	4,596	5,767	9,850
ROSILLO CREEK (UPPER REACH)					
Location not available	0.70	400	600	750	950
SALADO CREEK (LOWER REACH)					
Approximately 2,500 feet upstream of confluence with the San Antonio River	224.9	19,335	30,714	38,748	59,490
Upstream of Southton Road	224.2	19,306	30,675	38,687	59,432
Downstream of Spur 122 (South Presa Road)	222.6	19,270	30,651	38,785	59,488
SALADO CREEK (MIDDLE REACH)					
Upstream of Loop 13	190.4/115.6[4]	36.900	54,300	61,000	170,000
Upstream of confluence of Beitel Creek	145.0/70.2[4]	31,700	46,500	52,000	140,000
Upstream of Nacogdoches Road	131.5/56.7[4]	28,600	41,600	46,600	130,000
Upstream of confluence of Mud Creek	66.8/30.6[4]	16,700	24,000	27,000	81,000
Downstream of West Avenue	35.5/18.5[4]	12,200	17,300	19,300	58,000
SALADO CREEK (UPPER REACH)					
Cross Section A (approximately 357 miles above mouth)	31.2	13,797	22,546	27,067	46,904
Cross section C (At FM 1604)	29.0	11,562	18,662	22,000	37,805
SALITRILLO CREEK					
At Martinez Creek Dam No. 6A (outflow)	16.37	220	2,540	6,010	17,120
At Martinez Creek Dam No. 6A (inflow)	16.37	12,280	17,410	20,080	26,900

[4]Drainage area reflects areas uncontrolled by flood retention structures

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs)			
		10-Year	50-Year	100-Year	500-Year
SALITRILLO CREEK (Cont'd)					
Downstream of confluence of East and West Salitrillo Creek	14.67	10,850	15,250	17,480	23,470
SAN ANTONIO RIVER					
Upstream of Ashley Road	75.6	11,000	30,000	45,000	96,000
Downstream of East Theo Street	52.6	8,400	23,500	36,000	73,000
Downstream of Missouri-Pacific Railroad	10.1	2,860	8,200	14,300	25,000
Downstream of Villita Street	9.7	2,800	8,000	14,200	24,300
Upstream of Newell Street	7.6	2,400	6,900	10,400	21,300
Downstream of Hildebrand Avenue	3.4	1,300	3,750	6,100	11,600
SAN PEDRO CREEK					
Downstream of Pobandt Street	42.6	6,020	16,800	25,000	52,500
Downstream of South Alamo Street	2.70	1,100	3,150	4,700	10,000
Upstream of ~~Arbor~~ W. Commerce Street	2.10	900	2,600	3,850	8,200
Upstream of Arbor Street	1.60	730	2,120	3,120	6,600
At Evergreen Street	1.00	540	1,550	2,270	4,720
SELMA CREEK					
Location not available	6.0	3,600	5,500	6,500	8,600
Approximately 2,000 feet downstream of Interstate Highway 35	4.80	3,700	5,500	6,700	8,700
Approximately 200 feet downstream of Interstate Highway 35	3.80	3,000	4,450	5,450	7,050
Just downstream of Arcadia Street	3.12	2,500	3,600	4,550	5,900
SIXMILE CREEK					
Downstream of Espada Road extended	15.20	3,800	10,500	15,400	31,300
Downstream of Bascum Boulevard	10.40	3,050	8,600	12,300	25,300
Downstream of Commercial Avenue	6.00	2,000	5,820	8,500	18,000
Downstream of Zarzamore Street	3.30	1,270	3,580	5,380	11,300

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
SLICK RANCH CREEK					
Approximately 1,300 feet above the mouth	11.3	3,220	9,000	13,000	26,500
At Interstate Route 410	8.60	2,800	8,000	11,400	23,600
SOUTH BRANCH OF SELMA CREEK	--*	--*	--*	--*	--*
SOUTH FLORES TRIBUTARY (SIXMILE CREEK)					
Upstream of mouth	3.40	1,300	3,750	5,650	11,900
SOUTH FORK OF SOUTH BRANCH OF SELMA CREEK	--*	--*	--*	--*	--*
STATE HOSPITAL CREEK					
Upstream of mouth	2.06	900	2,600	3,820	8,100
Downstream of South New Braunfels Street	1.29	630	1,820	2,660	5,550
TRIBUTARY A OF AIRPORT TRIBUTARY					
Approximately 700 feet upstream of mouth	2.82	1,130	3,260	4,900	10,400
TRIBUTARY A OF CULEBRA CREEK					
Just upstream of Timberwilde Drive	2.6	1,050	3,000	4,400	9,200
TRIBUTARY A TO SALADO CREEK (MIDDLE REACH)					
Approximately 1,575 feet upstream of mouth	1.30	630	1,820	2,650	5,550
TRIBUTARY B TO SALADO CREEK (MIDDLE REACH)					
Approximately 1,890 feet downstream of Artesia Avenue	2.10	910	2,620	3,900	8,200
Downstream of Interstate Route 35	1.64	750	2,170	3,200	6,700

*Data not available

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
TRIBUTARY C TO SALADO CREEK (MIDDLE REACH)					
Approximately 500 feet downstream of Coliseum Road	3.20	1,250	3,600	5,400	11,300
Approximately 800 feet downstream of Monson Road	2.00	870	2,520	3,750	7,900
TRIBUTARY D TO SALADO CREEK (MIDDLE REACH)					
At Vandiver Road	2.92	1,260	3,380	5,050	10,600
TRIBUTARY E TO SALADO CREEK (MIDDLE REACH)					
At Missouri-Kansas-Texas Railroad	1.28	620	1,800	2,620	5,500
TRIBUTARY F TO SALADO CREEK (MIDDLE REACH)					
At Nacogdoches Road	5.20	1,800	5,200	7,700	16,200
TRIBUTARY A TO ZARZAMORA CREEK					
Downstream of Majestic Road	2.84	1,130	3,300	4,900	10,300
Downstream of Evers Road	2.32	980	2,850	4,200	4,820
TURKEY CREEK TRIBUTARY					
At Cross Section A (approximately 320 feet downstream at Broken Bough Street)	0.34	240	660	930	1,900
TUTTLE ROAD DITCH					
At the corporate limits (Harry Wurzbach Highway)	1.1	1,130	1,820	2,440	4,330
UNNAMED TRIBUTARY OF CIBOLO CREEK					
State Highway 1604	0.52	1,188	1,844	2,205	2,993
UPPER APACHE CREEK					
Upstream of Martin Street	2.40	1,000	2,900	4,300	9,000
Upstream of Cornelia Avenue	1.80	800	2,320	3,420	7,220

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
U. S. 281 TRIBUTARY TO SALADO CREEK (MIDDLE REACH)					
Approximately 100 feet downstream of Maltzburger Road	1.80	800	2,320	3,450	7,220
U.T.S.A. TRIBUTARY - LEON CREEK					
Approximately 100 feet downstream of U.T.S.A. Boulevard	1.20	590	1,700	2,500	5,200
WALZEM CREEK (LOWER REACH)					
At Bikini Drive	2.22	950	2,750	4,050	8,600
At Dell Oak	1.84	820	2,360	3,500	7,300
Approximately 1,300 feet upstream of Overland	1.00	520	1,500	2,160	4,500
WALZEM CREEK (UPPER REACH)					
Location not available	1.0	950	1,450	1,700	2,300
WEST FORK BLACKJACK CREEK					
Approximately 100 feet upstream of confluence with Blackjack Creek	0.17	310	400	440	530
WEST FORK OLMOS CREEK					
Upstream of Wurzbach Road	4.62	1,650	4,700	7,100	14,800
Downstream of Southern Pacific Railroad	4.33	1,570	4,500	6,750	14,200
Upstream of Huebner Road	2.94	1,170	3,380	5,050	10,600
At Huebner Road	2.70	3,000	4,050	4,700	5,800
At De Zavala Road	1.30	1,100	2,880	3,300	4,040
WEST SALITRILLO CREEK					
At confluence with Salitrillo Creek (also East Salitrillo Creek)	5.84	4,590	6,370	7,280	9,990
At FM 1516	5.35	4,430	6,060	6,880	9,490
Downstream of right bank tributary near FM 78	5.09	4,890	6,430	7,200	9,930
Upstream of right bank tributary near FM 78	4.81	4,600	6,010	6,720	9,460
Approximately 2,100 feet downstream of Southern Pacific Railroad	4.33	4,030	5,290	5,950	8,570
At Southern Pacific Railroad (downstream of right bank tributary)	3.77	2,900	3,790	4,250	6,420

Table 4. Summary of Discharges (Cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	10-Year	Peak Discharges (cfs) 50-Year	100-Year	500-Year
WEST SALITRILLO CREEK (Cont'd)					
Upstream of right bank tributary located approximately 500 feet upstream of Southern Pacific Railroad	2.97	900	1,200	1,580	4,330
At Martinez Creek Dam No. 4 (outflow)	2.59	27	810	1,490	4,310
At Martinez Creek Dam No. 4 (inflow)	2.59	5,950	7,930	8,930	11,680
Upstream of major right bank tributary located upstream of Martinez Creek Dam No. 4	1.53	3,340	4,500	5,080	6,670
Downstream of Drain No. 9	1.13	2,540	3,390	3,820	5,040
Downstream of Drain No. 10	0.96	2,080	2,810	3,180	4,190
Upstream of Drain No. 10	0.79	1,800	2,420	2,730	3,610
At Forrest Bluff	0.20	392	761	921	1,277
At Avery Road	0.16	375	661	795	1,094
WEST TRIBUTARY OF ROSILLO CREEK					
At Cross Section A	1.86	820	2,400	3,550	7,200
At Cross Section E	1.10	550	1,600	2,340	4,850
WESTWOOD VILLAGE CREEK					
Approximately 200 feet downstream of U. S. Route 90	1.65	760	2,150	3,200	6,800
ZARZAMORA CREEK					
Downstream of North San Joaquin Street	13.00	3,500	9,700	14,100	28,600
Upstream of confluence of Azucena Stream	12.10	3,350	9,300	13,500	27,500
At approximately 800 feet downstream of Bandera Road	3.51	1,270	3,680	5,500	11,600
Upstream of Babcock Road	1.10	560	1,600	2,320	4,820

Table 5. Summary of Stillwater Elevations

Flooding Source and Location	Elevation in Feet (NGVD[1]) (100-Year)
Flood Storage Area 1A	1,005
Flooding Storage Area 1B	1,003
Flooding Storage Area 2	991
Flooding Storage Area 3	992
Martinez Creek Dam No. 6A on Salitrillo Creek	628.5
Martinez Creek Dam No. 5 on East Salitrillo Creek	792.3
Martinez Creek Dam No. 4 on West Salitrillo Creek	740.2

[1]National Geodetic Vertical Datum of 1929

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

In this countywide Flood Insurance Study, cross sections for Salado Creek (Lower Reach) were field surveyed at selected locations. Water-surface elevations of floods of selected recurrence intervals were computed using the SCS WSP-2 computer program (Reference 50). All elevations were checked by field survey and hand calculations. Starting water-surface elevations were obtained from a San Antonio River Flood Plain Information report (Reference 47). Flood profiles were drawn showing computed water-surface elevations for floods of selected recurrence intervals.

In this countywide Flood Insurance Study, cross sections for Cibolo Creek were obtained from field surveys, existing topographic information, aerial maps, and USGS quad maps. Water-surface elevations of floods of selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (Reference 52). Starting water-surface elevations were determined using the slope-area method. Flood profiles were drawn showing computed water-surface elevations for floods of selected recurrence intervals.

In this countywide Flood Insurance Study, portions of Salitrillo, East Salitrillo, West Salitrillo, and East Branch of East Salitrillo Creeks that are located in the City of Converse were studied. Cross sections were obtained from field surveys and existing topographic information. Water-surface elevations of floods of selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (Reference 52). Starting water-surface elevations were determined using the slope-area method. Flood profiles were drawn showing computed water-surface elevations for floods of selected recurrence intervals.

In this countywide Flood Insurance Study, portions of East Salitrillo and West Salitrillo Creeks that are located in the City of Live Oak were studied. Also as part of this study, Drain Nos. 1 through 10, Drain No. 12, and an Unnamed Tributary of Cibolo Creek were studied. Cross-section information for the streams was obtained from field surveys. Water-surface elevations of floods of selected recurrence intervals were computed using the SCS WSP-2 step-backwater computer program (Reference 50). Starting water-surface elevations were determined using the slope-area method, except for East Salitrillo Creek and Drain No. 7. For these two streams, the pool elevations behind the Martinez Creek Dam No. 5 were used. Flood profiles were drawn showing computed water-surface elevations for floods of selected recurrence intervals.

Cross sections for Leon Creek Overflow were obtained from the initial study for Leon Creek and Leon Creek Overflow for the reach between the confluence with Leon Creek and 3,800 feet downstream of West Hausman Road, from field surveys for the reach between 3,800 feet and 1,000 feet downstream of West Hausman Road (channel adjacent to the Regency Meadow Subdivision), and from a topographic map with 4-foot contour intervals for the City of San Antonio, used for the initial study, from the reach between West Hausman Road and 1,000 feet downstream. BFEs for Leon Creek Overflow were computed using the USACE HEC-2 step-backwater computer program (Reference 52). The starting 100-year water-surface elevation was determined using the slope-area method. The 100-year flood profile was drawn showing the computed BFEs.

BFE discrepancies exist for Huebner Creek at the downstream corporate limits of the Cities of Leon Valley and San Antonio. The BFEs and the floodplain area at this point have been graphically tied-in; the profile has a straight line tie-in.

Each community within Bexar County, with the exception of the Cities of Helotes, Hill Country Village, Fair Oaks Ranch, Olmos Park, Somerset, and St. Hedwig, has a previously printed Flood Insurance Study report. The hydraulic analyses in those reports have been compiled and are summarized below. For streams that flow through two or more communities, each methodology described applies only to that portion of the stream studied by detailed methods within that particular community.

For detailed streams in the unincorporated areas of Bexar County, cross sections for the backwater analyses for the streams studied by detailed methods were field surveyed. Cross sections were located at close intervals above bridges and culverts in order to compute the backwater effects of those structures. All surveying was done by the USGS, except for Olmos Creek, which was done by the USACE, and Martinez and Helotes Creeks with its tributaries, which was performed by the SCS.

Water-surface elevations of floods of the selected recurrence intervals were computed using the USGS step-backwater computer program (Reference 121). However, portions of several streams were revised using the USACE HEC-2 step-backwater computer program (Reference 52). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Starting water-surface elevations for all streams except West Fork Olmos Creek were determined by the slope-area method. The starting elevations for West Fork Olmos Creek were taken at the upper limit of a USACE Flood Plain Information report.

For detailed streams in the City of San Antonio, base maps and cross-section data were obtained from aerial photographs (Reference 122). All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

Water-surface elevations of floods of selected recurrence intervals were computed using the USGS step-backwater computer program (Reference 121). However, portions of several streams were revised using the USACE HEC-2 step-backwater computer program (Reference 52). Starting water-surface elevations for the streams studied by detailed method were determined by the slope-area method. Flood profiles were drawn showing computed water-surface elevations for floods of selected recurrence intervals.

For detailed streams in the Cities of Alamo Heights, Balcones Heights, Castle Hills, China Grove, Grey Forest, Kirby, Leon Valley, Selma, Shavano Park, Terrell Hills, Universal City, and Windcrest, and the Town of Hollywood Park, cross-section information was obtained from field surveys. All bridges and culverts were field surveyed to obtain elevation data and structural geometry. Cross sections were located at close intervals upstream and downstream of bridges and culverts in order to compute significant backwater effects of these structures.

Water-surface elevations of floods of selected recurrence intervals were computed using the USGS step-backwater computer program (Reference 121), except for the Cities of Leon Valley, Universal City, and Windcrest where the USACE HEC-2 step-backwater computer program (Reference 52) was used, and the City of Grey Forest where the SCS WSP-2 step-backwater computer program (Reference 50) was used. Starting water-surface elevations for the streams studied by detailed method were determined by the slope-area method. Flood profiles were drawn showing computed water-surface elevations for floods of selected recurrence intervals.

In the City of Elmendorf, the elevations and water depths were obtained for high-water marks left by the flood of May 7, 1976, at 14 points throughout the flooded areas of the city. City officials and local residents stated that the flood that occurred in 1942 was comparable to the May 7, 1976, flood, which was the result of a 24-hour, 8-inch rainfall. By using these data with the Weather Bureau rainfall-duration-frequency studies (Reference 17), an area rainfall-duration-frequency curve was prepared. This curve indicates that the 1976 and 1942 floods have a recurrence interval of 25 years.

The 100-year flood elevations were determined to be approximately 0.5 foot higher than the referenced flood (May 7, 1976). This difference was decided upon after full consideration was given to the relatively small drainage areas that are upstream from the controlling sections for the ponded conditions. The drainage area above the Southern Pacific Railroad is 0.64 square mile and the drainage area above FM 1518 is 1.20 square miles. The increased volume of runoff between the 25-year storm (8-inch, 24-hour) and the 100-year storm (10-inch, 24-hour) could not increase flood depths significantly above the 0.5-foot difference. The accuracy required for this type of sheetflow and ponding is 1 foot. Floods in the City of Elmendorf were compared with a log-Pearson Type III analysis of discharge into a SCS lake located nine miles north of the City of Elmendorf, but the resultant frequencies were not comparable with those determined by use of the Weather Bureau data.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map.

Channel roughness factors (Manning's "n") for backwater analyses were chosen by engineering judgement and based on field observations of the stream and floodplain areas (Reference 51).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD. Elevation reference marks and their descriptions are shown on the maps.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps.

Table 6, "Topographic Mapping," lists the topographic maps used to delineate the floodplain boundaries for each community's previously printed Flood Insurance Study as well as the revised floodplain mapping for this countywide Flood Insurance Study (References 43 and 53 through 92).

For the streams studied by approximate methods, the 100-year floodplain boundaries were delineated using the previously printed Flood Insurance Studies for the following communities: the City of San Antonio, the unincorporated areas of Bexar County, the Cities of Alamo Heights, Balcones Heights, Castle Hills, China Grove, Converse, Elmendorf, Grey Forest, Hill Country Village, Kirby, Leon Valley, Live Oak, Selma, Shavano Park, Somerset, Terrell Hills, Universal City, and Windcrest, and the Town of Hollywood Park (References 37 and 93 through 111).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundaries correspond to the boundaries of the areas of special flood hazard (Zones A, AE, AO, and AH), and the 500-year floodplain boundaries correspond to the boundaries of areas of moderate flood hazard. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundaries have been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

Table 6. Topographic Mapping

Community/Topographic Mapping Source	Scale	Contour Interval
City of Alamo Heights		
Map of the City of Alamo Heights, Springer and Foeller, Urban Planners	1:6,000	10 feet
City of Balcones Heights		
7.5-Minute Series Topographic Maps, USGS	1:16,000	10 feet
City of Castle Hills		
Aerial Mapping, United Aerial Mapping Company, Inc.	1:4,800	4 feet
7.5-Minute Series Topographic Maps, USGS	1:24,000	10 feet
City of China Grove		
7.5-Minute Series Topographic Maps, USGS	1:24,000	10 feet
City of Converse		
7.5-Minute Series Topographic Maps, USGS	1:24,000	10 feet
Topographic Maps, Salitrillo Creek, Martinez Dam No. 5 to State Highway 78, Ford Engineering, Inc.	1:2,400	2 feet
City of Elmendorf		
7.5-Minute Series Topographic Maps, USGS	1:4,800	10 feet
City of Grey Forest		
7.5-Minute Series Topographic Maps, USGS	1:24,000	10 feet
City of Kirby		
7.5-Minute Series Topographic Maps, USGS	1:24,000	10 feet
City of Leon Valley		
7.5-Minute Series Topographic Maps, USGS	1:24,000	10 feet
Northwest Industrial Park Unit - 2 FEMA Submittal, Pape-Dawson Consulting Engineers, Inc.	1:1,200	2 feet
Aerial Contour Maps, United Aerial Mapping Company, Inc.	1:4,800	4 feet
City of Live Oak		
No. 13 Development Plan, R. Marvin Shipman & Co., Consulting Engineers	1:2,400	2 feet

Table 6. Topographic Mapping (Cont'd)

Community/Topographic Mapping Source	Scale	Contour Interval
City of San Antonio		
Aerial Contour Maps,		
United Aerial Mapping Company, Inc.	1:4,800	4 feet
Lost Oaks Subdivision P.U.D. Backwater Drainage Plan,		
Pape-Dawson Consulting Engineers, Inc.	1:1,200	2 feet
Improved Conditions FEMA Babcock - Huebner 197 Acre Tract,		
Pape-Dawson Consulting Engineers, Inc.	1:1,200	2 feet
Cinnamon Hill Subdivision, Improved Conditions, FEMA Study,		
Pape-Dawson Consulting Engineers, Inc.	1:2,400	5 feet
Mission Towers Subdivision - 1, Detail Plan, Flood Plain Study,		
Ozuna & Associates, Inc.	1:600	1 foot
Perrin Creek Subdivision Drainage Study,		
Pape-Dawson Consulting Engineers, Inc.	1:1,200	1 foot
Park 410 West - Downstream Tailwater Sections,		
Civil Engineering Consultants	1:2,400	2 feet
Ingram West Subdivision, As-Built FEMA Study,		
Pape-Dawson Consulting Engineers, Inc.	1:1,200	2 feet
FEMA Flood Plain Exhibit for Leon Creek,		
W. F. Castella & Associates, Inc.	1:6,000	--[1]
Stout Built Subdivision Drainage Study,		
Vickrey and Associates	1:2,400	2 feet
Drainage Study on Rosillo Creek for Camelot Apartment Subdivision,		
W. F. Castella & Associates, Inc.	1:2,400	2 feet
Woods of Shavano, Unit 20,		
Pape-Dawson Consulting Engineers, Inc.	1:1,200	2 feet
100-Year and 500-Year Flood Boundaries,		
Pape-Dawson Consulting Engineers, Inc.	1:1,200	2 feet
Lincoln Park Subdivision - Unit 2, Leon Creek Drainage Study, Master Drainage Plan,		
Pape-Dawson Consulting Engineers, Inc.	1:100	1 foot
City of San Antonio Drainage Project No. 74 - Western Avenue, Drainage Area Maps 1 and 3,		
C. A. Bolner & Associates, Inc.	1" = 100'	2 feet
City of Selma		
7.5-Minute Series Topographic Maps,		
USGS	1:6,000	10 feet
City of Shavano Park		
7.5-Minute Series Topographic Maps,		
USGS	1:24,000	10 feet

[1]Data not available

Table 6. Topographic Mapping (Cont'd)

Community/Topographic Mapping Source	Scale	Contour Interval
City of Terrell Hills		
7.5-Minute Series Topographic Maps, USGS	1:6,000	10 feet
City of Universal City		
7.5-Minute Series Topographic Maps, USGS	1:6,000	10 feet
Town of Hollywood Park		
7.5-Minute Series Topographic Maps, USGS	1:6,000	10 feet
Unincorporated Areas		
7.5-Minute Series Topographic Maps, USGS	1:24,000	10 feet
Park 410 West-Downstream Tailwater Sections, Civil Engineering Consultants	1:2,400	2 feet
Slick Ranch Creek-Richland Hills FEMA Submittal, Pape-Dawson Consulting Engineers, Inc.	1:2,400	2 feet
Panther Springs Creek Drainage Study, Pape-Dawson Consulting Engineers, Inc.	1:2,400	2 feet
Hidden Forest Subdivision, Unit 12-Plan, FEMA Submittal, Vickrey and Associates	1:600	2 feet
Vista Del Norte Master Drainage Plan, Pape-Dawson Consulting Engineers, Inc.	1:2,400	2 feet
Candlewood Park, Cross Section Location Ackerman Creek, Civil Engineering Consultants	1:1,200	1 foot
Master Drainage Plan - Bandera Landing, M. W. Cude and Associates, Inc.	1:2,400	2 feet
Drainage Master Plan - Quail Creek, M. W. Cude and Associates, Inc.	1:2,400	2 feet
Ingram West Subdivision, As-Built FEMA Study, Pape-Dawson Consulting Engineers, Inc.	1:1,200	2 feet
FEMA Flood Plain Exhibit for Leon Creek, W. F. Castella & Associates, Inc.	1:6,000	--[1]
Leon Creek Drainage Study: Bandera Landing, M. W. Cude and Associates, Inc.	1:2,400	1 foot
Northwest Crossing Unit - 10A, Street & Drainage Layout, Macina, Bose, Copeland, and Associates, Inc.,	1:1,200	2 feet
Drainage Plan and Profile, Great Northwest Unit - 55, M. W. Cude and Associates, Inc.	1:600	1 foot

[1]Data not available

Table 6. Topographic Mapping (Cont'd)

Community/Topographic Mapping Source	Scale	Contour Interval
Unincorporated Areas (Cont'd)		
Grading Plan and On-Site Drainage Plan, Camarillo & Associates, Inc.,	1:1,200	2 feet
Point Northeast Flood Study, International Aerial Mapping	1:1,200	--[1]
FEMA Flood Study for Medio Creek Upstream of U.S. 90, W. F. Castella & Associates, Inc.,	1:12,000	--[1]
Topographic Survey, Fair Oaks Ranch, C. A. Bolner & Associates, Inc.	1:4,800	2 feet
Flooded Areas, Cibolo Creek, USACE, Fort Worth District	1:12,000	10 feet
Flood Boundary and Floodway Map Cibolo Creek, K. M. Ng & Associates, Inc.	1:12,000	4 feet
Castle Hills Forest Unit 8 - Salado Creek FEMA Submittal, Pape-Dawson Consulting Engineers, Inc.	1:2,400	2 feet
San Antonio, Texas, United Aerial Mapping Company, Inc.	1:4,800	4 feet
Woods of Shavano, Unit 20, Pape-Dawson Consulting Engineers, Inc.	1:1,200	2 feet
Topographic Map of Easterling Road Tract, M. W. Cude and Associates, Inc.	1:720	2 feet
Annotated Flood Plain Panel Worksheet with Study Sections Shown - Panel Numbers 480045 0004B, 480045 0010C, and 480035 0225C, Brown Engineering	--[1]	--[1]

[1]Data not available

For the streams studied by approximate methods, only the 100-year floodplain boundaries are shown on the Flood Insurance Rate Map.

For Beitel Creek Tributary A at the downstream corporate limits between the City of San Antonio and the City of Windcrest, a floodplain discrepancy exists. The flooding area and the streets in the City of Windcrest have been shifted to match the flooding areas and streets within the City of San Antonio.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study, except for a portion of Salado Creek, were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. The floodway for a portion of Salado Creek was computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain using the SCS floodway computer program (Reference 112). Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 7). The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. For all streams studied in detail in the Cities of San Antonio and Alamo Heights, the floodways were computed using a zero-encroachment method. This method developed a floodway where the floodway boundaries are coincident with the 100-year floodplain boundary, therefore, floodways were not shown in the City of San Antonio. However, the Flood Boundary and Floodway Map delineated the zero-encroachment floodways. These floodways are shown on the Bexar County Flood Insurance Rate Map. The floodways were deleted in areas where the City of San Antonio has annexations. The cross sections were removed for clarity purposes. The floodways for the Medina River and Polecat Creek were added from the USGS topographic maps (Reference 43).

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 7, "Floodway Data." In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Beitel Creek Tributary A								
A	0.036[1]	105	401	5.6	777.5	777.5	778.0	0.5
B	0.047[1]	80	251	9.0	779.8	779.8	780.0	0.2
C	0.053[1]	81	266	8.4	781.6	781.6	781.6	0.0
D	0.056[1]	80	254	8.8	783.0	783.0	783.3	0.3
E	0.065[1]	82	320	7.0	786.3	786.3	786.3	0.0
Calaveras Creek								
A	50[2]	100	753	7.04	597.1	593.1[4]	594.1	0.0
B	2,850[2]	160	580	6.44	611.3	611.3	611.4	0.1
C	5,250[2]	350	1,340	2.77	616.3	616.3	617.2	0.9
D	7,400[2]	220	570	5.2	621.8	621.8	622.5	0.7
E	9,650[2]	200	680	3.1	632.3	632.3	632.9	0.6
F	11,300[2]	200	400	4.2	641.4	641.4	642.2	0.8
Caracol Creek								
A	1,100[3]	103	973	8.1	772.3	772.3	773.3	1.0
B	6,550[3]	188	1,097	7.2	799.1	799.1	800.1	1.0

[1]Miles Above Randolph Boulevard (rounded to the nearest hundredth of a mile)
[2]Feet Above U.S. Highway 87
[3]Feet Above Mouth
[4]Elevation Computed Without Consideration of Flooding by Calaveras Creek Dam #3

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[2]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Cibolo Creek								
A[1]	265,730	1,609	11,419	4.9	482.7	482.7	483.6	0.9
B[1]	270,200	501	8,189	6.8	489.2	489.2	489.9	0.7
C[1]	278,900	1,788	10,822	5.2	499.9	499.9	500.7	0.8
D[1]	285,120	1,899	16,218	3.5	507.0	507.0	507.9	0.9
E[1]	290,850	2,536	19,045	3.5	512.6	512.6	513.6	1.0
F[1]	294,180	1,822	15,653	4.3	517.2	517.2	518.2	1.0
G[1]	298,600	1,673	18,441	3.7	522.2	522.2	523.2	1.0
H	304,700	1,135/900[3]	13,096	4.3	529.9	529.9	530.9	1.0
I	310,600	776/201[3]	9,119	6.2	537.2	537.2	538.1	0.9
J	315,980	1,986/1,800[3]	19,718	2.9	545.5	545.5	546.5	1.0
K	319,180	1,553/210[3]	15,994	3.6	548.6	548.6	549.5	0.9
L	322,560	1,720/100[3]	27,465	2.1	551.0	551.0	552.0	1.0
M	325,830	844/550[3]	10,042	5.8	554.7	554.7	555.6	0.9
N	330,900	1,272/260[3]	11,841	4.9	561.9	561.9	562.7	0.8
O	337,600	2,054/990[3]	24,408	2.4	567.1	567.1	568.0	0.9
P	341,650	2,130/135[3]	17,746	3.3	569.8	569.8	570.5	0.7
Q	348,300	2,942/200[3]	15,710	4.5	578.6	578.6	579.4	0.8
R	353,500	3,359/100[3]	22,892	3.1	586.0	586.0	587.0	1.0
S	357,080	466/125[3]	9,436	7.5	591.2	591.2	591.5	0.3
T	362,150	1,574/1,274[3]	24,191	2.9	596.6	596.6	597.4	0.8
U	372,840	2,072/50[3]	17,484	4.1	607.7	607.7	608.2	0.5
V	376,880	840/60[3]	11,222	6.3	613.3	613.3	614.1	0.8
W	379,700	1,012/625[3]	8,406	8.4	618.6	618.6	619.5	0.9
X	382,240	1,081/681[3]	11,444	6.2	624.5	624.5	625.3	0.8
Y	383,800	549/410[3]	12,637	5.6	626.0	626.0	626.6	0.6
Z	387,370	522/72[3]	9,380	7.6	629.9	629.9	630.6	0.7

[1]Cross Section Lies Outside County Limits
[2]Feet Above Confluence With San Antonio River
[3]Width/Width Within County

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX
AND INCORPORATED AREAS

FLOODWAY DATA

CIBOLO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[2]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Cibolo Creek (Cont'd)								
AA	390,550	1,233/550[3]	18,329	3.9	634.2	634.2	635.1	0.9
AB	392,050	386/86[3]	7,976	8.9	635.6	635.6	636.5	0.9
AC	394,130	400/325[3]	8,015	8.9	638.8	638.8	639.7	0.9
AD	396,200	291/191[3]	6,667	10.6	641.8	641.8	642.8	1.0
AE	397,230	338/80[3]	8,545	8.3	644.6	644.6	645.4	0.8
AF	399,690	590/70[3]	14,321	5.0	647.8	647.8	648.7	0.9
AG	401,650	583/250[3]	9,927	7.1	649.5	649.5	650.3	0.8
AH	403,130	537/57[3]	10,037	7.1	651.1	651.1	652.1	1.0
AI	404,660	533/75[3]	9,666	8.3	652.5	652.5	653.4	0.9
AJ	407,310	325/190[3]	7,403	10.9	656.7	656.7	657.6	0.9
AK	413,160	1,741/1,235[3]	14,040	5.7	667.2	667.2	667.8	0.6
AL	417,210	1,172/250[3]	15,751	5.1	671.1	671.1	671.8	0.7
AM	418,560	2,217/2,100[3]	19,930	4.0	672.0	672.0	672.7	0.7
AN	422,850	1,874/1,599[3]	13,083	6.2	681.7	681.7	682.5	0.8
AO[1]	427,570	571	12,363	6.5	693.2	693.2	694.0	0.8
AP[1]	433,120	1,756	18,329	4.4	698.8	698.8	699.7	0.9
AQ[1]	440,600	2,910	19,674	4.1	705.1	705.1	705.8	0.7
AR[1]	442,000	1,920	17,786	4.5	709.6	709.6	710.4	0.8
AS	444,000	1,000/200[3]	17,402	4.6	711.0	711.0	711.8	0.8
AT	445,530	341/215[3]	7,718	10.4	712.6	712.6	713.3	0.7
AU	446,950	485/95[4]	8,507	9.5	715.8	715.8	716.3	0.5
AV	448,370	753/45[4]	18,729	4.3	718.5	718.5	719.2	0.7
AW	449,580	706/80[4]	15,158	5.3	718.7	718.7	719.4	0.7
AX	451,550	679/600[4]	12,119	6.7	720.8	720.8	721.5	0.7
AY	452,550	457/340[4]	7,222	11.2	721.1	721.1	722.0	0.9
AZ	453,250	372/250[4]	6,572	12.3	723.0	723.0	723.5	0.5

[1]Cross Section Lies Outside County Limits
[2]Feet Above Confluence With San Antonio River
[3]Width/Width Within County
[4]Width/Width Within City of Universal City

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Cibolo Creek (Cont'd)								
BA	454,180	360/210[2]	7,693	10.5	726.1	726.1	727.0	0.9
BB	455,130	333/83[2]	7,524	10.7	727.2	727.2	728.2	1.0
BC	457,300	343/250[2]	6,596	12.2	731.1	731.1	731.9	0.8
BD	458,210	373/123[2]	7,833	10.3	735.7	735.7	736.3	0.6
BE	459,960	358/150[3]	8,722	10.8	740.1	740.1	740.8	0.7
BF	461,330	379	9,443	9.9	743.7	743.7	744.3	0.6
BG	463,330	481	11,534	8.1	748.0	748.0	748.7	0.7
BH	465,000	412	10,246	9.2	750.4	750.4	751.3	0.9
BI	465,590	432	10,809	8.7	752.9	752.9	753.7	0.8
BJ	467,120	477	10,716	8.8	755.2	755.2	756.0	0.8
BK	468,770	535	13,486	7.0	758.1	758.1	758.9	0.8
BL	469,970	1,809	27,460	3.4	760.1	760.1	760.8	0.7
BM	471,190	1,543	23,247	4.0	761.0	761.0	761.8	0.8
BN	471,770	817	15,137	6.2	761.6	761.6	762.4	0.8
BO	473,130	510	7,814	12.0	764.0	764.0	764.8	0.8
BP	474,800	871/171[3]	24,432	3.8	772.3	772.3	772.7	0.4
BQ	477,400	493/100[3]	11,255	8.3	774.5	774.5	775.0	0.5
BR	478,410	587/370[3]	10,935	8.6	778.9	778.9	779.7	0.8
BS	479,120	850/550[3]	12,484	7.5	781.3	781.3	782.1	0.8
BT	479,950	1,059/1,000[4]	29,905	3.1	786.2	786.2	786.7	0.5
BU	482,020	514/264[4]	12,389	7.6	788.2	788.2	788.8	0.6
BV	483,240	461/136[4]	11,303	8.3	791.7	791.7	792.4	0.7
BW	484,770	403/200[4]	9,640	9.7	794.6	794.6	795.3	0.7
BX	486,820	432/250[4]	9,954	9.4	799.9	799.9	800.8	0.9
BY	488,260	1,087/1,000[4]	17,539	5.4	805.7	805.7	806.4	0.7
BZ	489,400	703/350[4]	12,695	7.5	808.8	808.8	809.5	0.7

[1]Feet Above Confluence With San Antonio River
[2]Width/Width Within City of Universal City
[3]Width/Width Within City of Selma
[4]Width/Width Within County

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX AND INCORPORATED AREAS

FLOODWAY DATA

CIBOLO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Cibolo Creek (Cont'd)								
CA	490,320	552/430	10,224	9.3	811.7	811.7	812.3	0.6
CB	492,000	355/275	8,903	10.6	816.6	816.6	817.3	0.7
CC	493,490	341/250	8,682	10.9	820.7	820.7	821.5	0.8
CD	494,390	352/175	8,228	11.5	823.9	823.9	824.7	0.8
CE	495,350	398/78	10,819	8.8	827.3	827.3	828.1	0.8
CF	496,330	442/50	11,336	8.4	829.7	829.7	830.6	0.9
CG	497,240	508/108	12,068	7.9	831.6	831.6	832.4	0.8
CH	498,500	416/280	10,055	9.4	834.4	834.4	835.2	0.8
CI	499,260	336/250	8,266	11.5	836.0	836.0	837.0	1.0
CJ	500,250	377/300	10,032	9.4	840.0	840.0	840.6	0.6
CK	501,400	399/249	9,276	10.2	843.2	843.2	843.8	0.6
CL	502,220	377/200	10,076	9.4	846.5	846.5	847.1	0.6
CM	503,180	365/115	10,449	9.1	848.8	848.8	849.6	0.8
CN	504,250	396/96	10,636	8.9	851.2	851.2	852.0	0.8
CO	505,370	377/107	9,876	9.6	853.5	853.5	854.4	0.9
CP	506,000	385/185	10,014	9.5	855.5	855.5	856.3	0.8
CQ	506,840	299/200	8,578	11.2	857.4	857.4	858.3	0.9
CR	507,560	317/217	8,188	11.7	859.7	859.7	860.6	0.9
CS	509,120	437/387	11,231	8.5	866.4	866.4	867.1	0.7
CT	510,110	428/250	10,643	9.0	868.4	868.4	869.3	0.9
CU	511,130	367/100	9,754	9.8	870.8	870.8	871.7	0.9
CV	511,900	402/100	10,208	9.4	873.3	873.3	874.1	0.8
CW	512,910	410/135	10,551	9.1	875.9	875.9	876.8	0.9
CX	513,970	426/50	10,124	9.5	878.7	878.7	879.5	0.8
CY	515,190	417/217	10,564	9.1	882.1	882.1	882.7	0.6
CZ	516,580	416/291	10,774	8.9	885.8	885.8	886.4	0.6

[1]Feet Above Confluence With San Antonio River
[2]Width/Width Within County

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Cibolo Creek (Cont'd)								
DA	518,100	490/465	12,055	7.9	889.2	889.2	889.9	0.7
DB	519,330	696/75	12,682	7.6	891.7	891.7	892.5	0.8
DC	520,020	883/50	18,374	5.2	893.6	893.6	894.5	0.9
DD	521,310	1,083/600	17,632	5.4	894.8	894.8	895.7	0.9
DE	522,400	822/622	14,607	6.6	896.3	896.3	897.3	1.0
DF	523,450	577/527	12,831	7.5	898.6	898.6	899.5	0.9
DG	524,750	680/150	13,309	7.2	901.5	901.5	902.3	0.8
DH	526,460	921/196	16,166	5.9	905.3	905.3	906.2	0.9
DI	528,150	915/90	16,099	5.9	908.2	908.2	909.2	1.0
DJ	529,420	799/174	14,469	6.6	910.6	910.6	911.6	1.0
DK	530,310	789/100	14,334	6.7	912.6	912.6	913.4	0.8
DL	531,540	1,075/75	15,210	6.3	915.5	915.5	916.1	0.6
DM	532,810	1,173/173	17,641	5.4	917.9	917.9	918.8	0.9
DN	534,910	815/350	15,143	6.3	921.5	921.5	922.5	1.0
DO	536,650	1,196/80	15,356	6.2	924.8	924.8	925.6	0.8
DP	537,730	984/125	15,031	6.4	926.9	926.9	927.8	0.9
DQ	540,000	596/525	11,427	8.4	930.9	930.9	931.8	0.9
DR	541,170	506/300	12,872	7.7	934.6	934.6	935.4	0.8
DS	542,930	484/150	12,994	7.6	939.1	939.1	940.0	0.9
DT	544,200	469/425	11,812	8.4	941.8	941.8	942.7	0.9
DU	545,070	502/427	13,343	7.4	943.7	943.7	944.6	0.9
DV	545,910	522/300	12,873	7.7	944.9	944.9	945.8	0.9
DW	547,190	672/100	19,380	5.1	947.6	947.6	948.5	0.9
DX	549,150	420/380	10,894	9.1	950.1	950.1	950.9	0.8
DY	551,320	471/200	11,703	8.4	954.4	954.4	955.1	0.7
DZ	552,500	724/450	17,731	5.6	957.6	957.6	958.4	0.8

[1]Feet Above Confluence With San Antonio River
[2]Width/Width Within County

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX AND INCORPORATED AREAS

FLOODWAY DATA

CIBOLO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Cibolo Creek (Cont'd)								
EA	553,640	831/300	18,312	5.4	959.0	959.0	959.7	0.7
EB	554,490	903/753	16,536	6.0	960.0	960.0	960.8	0.8
EC	555,820	1,201/1,101	17,144	5.8	962.6	962.6	963.5	0.9
ED	559,090	938/200	13,818	7.1	966.2	966.2	967.1	0.9
EE	560,460	921/121	14,870	6.6	969.4	969.4	970.0	0.6
EF	561,440	915/115	16,300	6.1	971.6	971.6	972.2	0.6
EG	562,880	1,086/86	15,697	6.3	974.4	974.4	975.1	0.7
EH	563,690	1,242/20	14,869	6.6	976.2	976.2	977.0	0.8
EI	565,740	2,037/30	23,167	4.3	981.9	981.9	982.8	0.9
EJ	568,320	2,510/2,260	26,011	3.8	984.7	984.7	985.7	1.0
EK	571,590	2,712/2,587	16,841	5.9	989.4	989.4	990.3	0.9
EL	573,100	2,119/2,039	14,977	6.6	993.2	993.2	994.2	1.0
EM	575,120	1,194/769	11,303	7.0	997.7	997.7	998.4	0.7
EN	576,330	632/532	12,643	6.2	1,000.8	1,000.8	1,001.3	0.5
EO	579,250	1,730/120	17,314	4.5	1,006.2	1,006.2	1,007.2	1.0
EP	581,730	1,848/1,298	12,599	6.2	1,009.6	1,009.6	1,010.5	0.9
EQ	585,480	3,798/2,748	19,497	4.0	1,016.8	1,016.8	1,017.7	0.9
ER	586,860	2,594/1,675	26,327	2.9	1,018.4	1,018.4	1,019.4	1.0
ES	589,630	1,477/1,200	16,418	4.7	1,022.5	1,022.5	1,023.1	0.6
ET	591,750	1,806/1,750	15,755	4.9	1,025.7	1,025.7	1,026.3	0.6
EU	593,070	2,256/2,150	12,859	6.0	1,028.5	1,028.5	1,029.3	0.8
EV	595,110	1,655/875	14,461	5.3	1,033.8	1,033.8	1,034.5	0.7
EW	597,300	1,276/900	16,963	4.5	1,038.9	1,038.9	1,039.9	1.0
EX	599,200	1,361/900	14,494	5.3	1,042.1	1,042.1	1,042.9	0.8
EY	600,370	1,334/1,234	19,852	3.9	1,044.0	1,044.0	1,045.0	1.0
EZ	603,880	1,744/175	17,422	4.4	1,050.5	1,050.5	1,051.3	0.8

[1]Feet Above Confluence With San Antonio River
[2]Width/Width Within County

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Cibolo Creek (Cont'd)								
FA	605,730	1,000/100[2]	12,044	6.4	1,053.6	1,053.6	1,054.6	1.0
FB	607,640	1,200/150[2]	11,663	6.6	1,058.2	1,058.2	1,058.8	0.6
FC	610,610	1,425/380[2]	14,382	5.3	1,066.4	1,066.4	1,067.2	0.8
FD	612,930	1,081/581[2]	14,959	5.1	1,070.4	1,070.4	1,071.3	0.9
FE	615,330	1,660/500[2]	18,716	4.1	1,075.6	1,075.6	1,076.2	0.6
FF	616,860	2,240/240[2]	21,544	3.6	1,078.9	1,078.9	1,079.6	0.7
FG	618,370	3,070/50[2]	21,364	3.6	1,082.3	1,082.3	1,082.9	0.6
FH	620,190	4,373/50[2]	27,723	2.8	1,085.5	1,085.5	1,085.9	0.4
FI	621,440	3,780/50[3]	18,443	4.2	1,087.5	1,087.5	1,087.8	0.3
FJ	623,620	2,570/1,270[3]	15,410	5.0	1,092.7	1,092.7	1,093.6	0.9
FK	625,300	1,790/975[2]	18,559	3.9	1,097.2	1,097.2	1,098.0	0.8
FL	627,230	2,020/680[2]	18,868	3.8	1,099.6	1,099.6	1,100.5	0.9
FM	629,180	1,827/1,577[2]	12,902	5.6	1,102.7	1,102.7	1,103.5	0.8
FN	631,700	820/120[2]	13,456	5.4	1,108.1	1,108.1	1,108.8	0.7
FO	633,120	728/250[2]	14,820	4.9	1,110.2	1,110.2	1,110.9	0.7
FP	634,760	481/231[2]	9,778	7.4	1,113.1	1,113.1	1,113.9	0.8
FQ	636,930	474/200[2]	9,840	7.2	1,118.2	1,118.2	1,119.0	0.8
FR	639,270	568/400[2]	9,043	7.8	1,124.9	1,124.9	1,125.8	0.9
FS	641,030	638/175[2]	11,203	6.3	1,131.6	1,131.6	1,132.5	0.9
FT	643,160	588/413[2]	9,323	7.6	1,138.3	1,138.3	1,139.1	0.8
FU	646,370	1,154/50[2]	15,451	4.6	1,146.2	1,146.2	1,146.9	0.7
FV	648,550	688/488[2]	10,607	6.6	1,150.3	1,150.3	1,151.1	0.8
FW	649,800	660/130[2]	9,828	7.2	1,152.6	1,152.6	1,153.4	0.8
FX	652,180	470/370[2]	9,883	7.1	1,157.6	1,157.6	1,158.1	0.5
FY	655,580	932/50[2]	9,140	6.8	1,166.3	1,166.3	1,166.3	0.0
FZ	657,400	1,121/100[2]	17,652	3.5	1,168.7	1,168.7	1,169.5	0.8

[1]Feet Above Confluence With San Antonio River
[2]Width/Width Within County
[3]Width/Width Within Indian Creek/Within County

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX AND INCORPORATED AREAS

FLOODWAY DATA

CIBOLO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Cibolo Creek (Cont'd)								
GA	660,330	908/808	10,935	5.7	1,172.4	1,172.4	1,173.1	0.7
GB	662,310	589/489	11,594	5.4	1,175.1	1,175.1	1,176.0	0.9
GC	665,690	406/76	9,664	6.4	1,185.5	1,185.5	1,186.3	0.8
GD	670,380	314/130	8,841	7.0	1,198.7	1,198.7	1,199.6	0.9
GE	673,260	465/340	11,587	5.4	1,203.5	1,203.5	1,204.4	0.9
GF	675,500	727/500	13,183	4.7	1,206.6	1,206.6	1,207.3	0.7
GG	678,540	587/400	11,235	5.5	1,211.5	1,211.5	1,212.4	0.9
GH	681,960	638/100	11,298	5.3	1,217.7	1,217.7	1,218.5	0.8
GI	683,570	375/75	9,058	6.6	1,220.5	1,220.5	1,221.3	0.8
GJ	686,130	625/575	14,034	4.2	1,226.4	1,226.4	1,227.3	0.9
GK	690,350	865/65	11,411	5.2	1,233.9	1,233.9	1,234.5	0.6
GL	692,860	754/500	12,938	4.6	1,240.3	1,240.3	1,241.2	0.9
GM	695,430	713/180	12,781	4.7	1,245.8	1,245.8	1,246.4	0.6
GN	697,140	773/200[2]	8,937	6.7	1,249.2	1,249.2	1,250.0	0.8
GO	699,250	854/200[2]	11,736	5.1	1,254.8	1,254.8	1,255.7	0.9
GP	701,370	810/350[3]	10,870	5.5	1,258.7	1,258.7	1,259.3	0.6
GQ	704,350	1,580/180[3]	9,344	5.7	1,265.5	1,265.5	1,266.0	0.5
GR	705,760	1,518/100[3]	10,047	5.3	1,268.7	1,268.7	1,269.7	1.0
GS	708,530	968/275[3]	15,698	3.4	1,273.9	1,273.9	1,274.8	0.9

[1]Feet Above Confluence With San Antonio River
[2]Width/Width Within County
[3]Width/Width Within City of Fair Oaks Ranch

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Cibolo Tributary								
A	4,290[1]	181	1,084	6.3	1,265.0	1,265.0	1,265.9	0.9
B	5,230[1]	330	1,218	5.6	1,268.7	1,268.7	1,269.1	0.4
Culebra Creek								
A	7,370[2]	110[3]	6,923	6.9	801.4	801.4	802.3	0.9
B	7,910[2]	135[3]	6,366	7.5	802.6	802.6	803.5	0.9
C	9,260[2]	572	3,468	13.8	806.8	806.8	807.5	0.7
D	10,220[2]	826	6,361	7.6	811.6	811.6	812.6	1.0
E	11,250[2]	635	10,649	4.5	815.4	815.4	816.2	0.8
F	12,630[2]	296	3,903	12.3	816.5	816.5	817.3	0.8
G	13,210[2]	335	5,289	9.1	819.2	819.2	820.0	0.8
H	14,340[2]	359	5,106	9.4	822.2	822.2	823.0	0.8
I	15,470[2]	326	4,638	10.4	825.6	825.6	826.4	0.8
J	16,640[2]	299	4,308	11.1	830.1	830.1	830.9	0.8
K	18,180[2]	337	5,571	7.5	835.1	835.1	836.0	0.9
L	21,410[2]	100[3]	3,807	8.4	845.4	845.4	846.3	0.9
M	28,300[2]	300[3]	5,019	4.9	867.2	867.2	868.2	1.0
N	30,750[2]	670	3,317	7.4	872.9	872.9	873.8	0.9
O	33,020[2]	374	3,287	7.4	883.9	883.9	884.9	1.0
P	33,950[2]	369	3,131	6.4	887.3	887.3	888.3	1.0
Q	35,950[2]	149	1,984	10.1	893.6	893.6	894.4	0.8
R	38,930[2]	218	2437	8.2	905.5	905.5	906.5	1.0
S	42,360[2]	326	2,874	7.2	919.8	919.8	920.7	0.9
T	50,050[2]	290	1,546	3.6	951.3	951.3	952.3	1.0

[1]Feet Above Confluence With Cibolo Creek
[2]Feet Above Mouth

[3]Total Floodway Width at this Cross Section is not Mapped or Shown in this Table; Floodways are not Mapped in the City of San Antonio (See Section 4.2 of this report)

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

CIBOLO TRIBUTARY - CULEBRA CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Drain 1 - Huebner Creek								
A	514	22	91	4.1	805.6	805.6	806.2	0.6
B	1,615	22	106	2.6	829.4	829.4	829.7	0.3
C	2,160	16	42	6.6	840.7	840.7	841.0	0.3
Drain 1A - Huebner Creek								
A	115	40	191	0.7	805.0	804.4[3]	805.3	1.0
B	983	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
C	1,397	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
Drain 2 - Huebner Creek								
A	580	77	482	1.2	812.3	811.5[3]	812.5	1.0
B	1,080	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
C	1,399	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
Drain 3 - Huebner Creek								
A	95	164	700	0.7	822.1	822.1	823.1	1.0
B	485	30	69	6.8	822.5	822.5	822.9	0.4
C	1,830	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
D	2,185	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
E	3,065	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]

[1] Feet Above Confluence With Huebner Creek
[2] Information Not Computed - Floodway Contained Within Channel Banks
[3] Elevation Computed Without Consideration of Backwater Effects from Huebner Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

AND INCORPORATED AREAS

FLOODWAY DATA

DRAIN 1 - HUEBNER CREEK - DRAIN 1A - HUEBNER CREEK -

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Drain 4 - Zarzamora Creek								
A	1,030	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
B	2,113	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
C	2,691	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
D	3,631	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]

[1]Feet Above Confluence With Zarzamora Creek
[2]Information Not Computed - Floodway Contained Within Channel Banks

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX
AND INCORPORATED AREAS

TABLE

FLOODWAY DATA

DRAIN 4 - ZARZAMORA CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Drain No. 1								
A	223	20	73	7.20	835.2	835.2	836.1	0.9
B	388	20	56	9.49	837.7	837.7	837.7	0.0
C	524	20	56	9.75	841.0	841.0	841.0	0.0
Drain No. 2								
A	107	18	61	10.51	828.1	828.1	828.7	0.6
B	209	22	65	11.05	829.2	829.2	830.2	1.0
C	396	16	54	10.39	834.5	835.5	835.4	0.9
D	494	15	52	10.89	839.9	839.9	840.9	1.0
E	747	14	45	10.23	848.4	848.4	849.1	0.7
Drain No. 3								
A	123	40	210	13.04	813.3	813.3	813.3	0.0
B	235	48	232	8.54	814.3	814.3	814.3	0.0
C	864	34	189	13.40	822.7	822.7	822.7	0.0
D	1,000	30	181	13.98	826.0	826.0	827.0	1.0
E	1,841	30	164	13.32	833.7	833.7	833.8	0.1
F	1,958	36	207	10.60	836.1	836.1	836.2	0.1
G	2,722	32	150	12.33	847.4	847.4	847.6	0.2
H	2,843	32	150	12.32	850.1	850.1	851.1	1.0
I	3,576	65	174	9.31	864.1	864.1	864.1	0.0
J	3,723	64	328	4.95	868.5	868.5	868.5	0.0
K	4,423	18	70	11.26	878.4	878.4	878.4	0.0

[1]Feet Above Confluence With East Salitrillo Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Drain No. 4								
A	183[1]	36	181	13.63	810.2	810.2	810.2	0.0
B	299[1]	50	207	13.76	811.8	811.8	812.1	0.3
C	658[1]	26	116	12.01	814.9	814.9	814.9	0.0
D	1,648[1]	26	103	14.18	828.5	828.5	829.5	1.0
E	2,115[1]	16	50	10.08	839.9	839.9	839.9	0.0
F	2,233[1]	14	48	11.35	844.1	844.1	845.1	1.0
G	2,550[1]	12	42	10.67	848.1	848.1	849.0	0.9
Drain No. 5								
A	450[2]	18	78	11.90	822.6	822.6	822.6	0.0
B	553[2]	21	82	11.97	823.7	823.7	824.7	1.0
C	1,598[2]	20	62	10.13	833.8	833.8	833.8	0.0
Drain No. 6								
A	180[1]	16	59	9.55	798.3	798.3	798.6	0.3
B	288[1]	16	77	7.26	800.4	800.4	800.4	0.0
C	987[1]	12	36	9.90	816.2	816.2	816.3	0.1
D	1,138[1]	12	54	6.58	819.0	819.0	819.1	0.1
E	1,819[1]	8	21	9.22	848.8	848.8	849.1	0.3
F	2,319[1]	8	17	8.22	868.4	868.4	868.4	0.0

[1]Feet Above Confluence With East Salitrillo Creek
[2]Feet Above Confluence With Drain No. 4

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX
AND INCORPORATED AREAS

FLOODWAY DATA

DRAIN NO. 4 - DRAIN NO. 5 - DRAIN NO. 6

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NGVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Drain No. 7								
A	1,512[1]	100	1,059	1.04	792.3	792.3	793.3	1.0
B	1,652[1]	77	595	2.23	792.3	792.3	793.2	0.9
C	2,612[1]	18	56	10.06	811.1	811.1	811.6	0.5
D	2,754[1]	22	60	9.44	815.8	815.8	815.8	0.0
E	2,867[1]	22	79	7.18	817.0	817.0	817.0	0.0
F	3,216[1]	18	53	9.77	827.9	827.9	828.2	0.3
G	3,807[1]	18	45	9.01	839.3	839.3	839.3	0.0
Drain No. 8								
A	294[2]	16	43	9.33	795.4	795.4	795.4	0.0
B	1,032[2]	16	34	8.22	809.0	809.0	809.0	0.0
Drain No. 9								
A	760[3]	40	64	5.74	799.3	799.3	799.3	0.0
B	1,870[3]	16	32	8.09	828.2	828.2	828.2	0.0
C	2,955[3]	12	19	7.27	864.9	864.9	864.9	0.0
Drain No. 10								
A	412[3]	24	66	12.12	802.9	802.9	803.9	1.0
B	1,214[3]	34	170	3.46	821.5	821.5	822.2	0.7
C	1,334[3]	34	157	3.64	821.5	821.5	822.2	0.7
D	1,719[3]	32	73	7.39	828.5	828.5	828.5	0.0
E	2,318[3]	32	58	8.02	845.0	845.0	845.0	0.0
F	2,380[3]	24	87	5.33	847.5	847.5	847.5	0.0
G	2,814[3]	24	49	8.10	859.9	859.9	859.9	0.0
H	3,225[3]	6	23	11.13	875.5	875.5	876.2	0.7

[1]Feet Above Martinez Creek Dam No. 5
[2]Feet Above Confluence With Drain No. 7
[3]Feet Above Confluence With West Salitrillo Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Drain No. 12								
A	932	36	139	7.54	854.2	854.2	854.7	0.5
B	1,036	28	99	10.66	855.8	855.8	856.0	0.2
C	1,229	34	77	7.34	856.7	856.7	857.2	0.5
D	2,192	22	52	8.82	889.4	889.4	889.4	0.0
E	2,308	18	49	9.41	894.3	894.3	894.4	0.1
F	2,459	18	41	8.59	895.8	895.8	895.8	0.0

[1]Feet Above Confluence With West Salitrillo Creek

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX
AND INCORPORATED AREAS

FLOODWAY DATA

DRAIN NO. 12

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
East Branch of Salitrillo Creek								
A	1,380[1]	171	815	4.2	677.7	677.7	678.6	0.9
B	2,085[1]	209	1,164	2.9	680.8	680.8	681.8	1.0
C	2,855[1]	155	642	5.3	687.6	687.6	688.5	0.9
D	3,685[1]	221	1,118	3.1	692.0	692.0	693.0	1.0
E	4,295[1]	140	672	4.7	701.6	701.6	702.5	0.9
F	4,970[1]	171	934	3.3	705.2	705.2	706.1	0.9
G	5,550[1]	125	511	6.1	709.4	709.4	710.2	0.8
H	7,180[1]	201	477	2.4	726.3	726.3	726.7	0.4
I	9,882[1]	40	165	5.2	759.3	759.3	760.0	0.7
J	10,780[1]	75	195	4.4	771.2	771.2	771.3	0.1
K	13,030[1]	35	108	4.3	804.9	804.9	805.3	0.4
L	13,305[1]	122	241	2.0	811.5	811.5	811.5	0.0
M	14,980[1]	38	88	5.3	846.8	846.8	847.1	0.3
East Fork of East Branch of Salitrillo Creek								
A	1,275[2]	75	330	3.4	725.8	725.8	725.9	0.1
B	5,400[2]	100	344	2.4	762.0	762.0	762.4	0.4
C	7,480[2]	143	262	3.1	782.5	782.5	782.7	0.2
D	10,000[2]	100	130	6.3	831.9	831.9	832.1	0.2

[1]Feet Above Confluence With East Salitrillo Creek
[2]Feet Above Confluence With East Branch of Salitrillo Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
East Fork of Salitrillo Creek								
A	2,085[1]	37	191	5.3	745.4	745.4	745.8	0.4
B	3,150[1]	88	140	7.2	757.7	757.7	757.7	0.0
C	4,200[1]	225	498	2.0	776.3	776.3	776.3	0.0
East Salitrillo Creek								
A	3,085[2]	479	2,944	3.6	630.8	630.8	631.8	1.0
B	4,120[2]	362	2,151	5.0	634.7	634.7	635.5	0.8
C	5,480[2]	376	2,580	4.2	640.4	640.4	641.0	0.6
D	6,935[2]	403	2,460	3.9	644.7	644.7	645.6	0.9
E	7,370[2]	409	1,921	5.0	646.4	646.4	647.4	1.0
F	7,855[2]	360	1,938	5.0	649.1	649.1	650.1	1.0
G	8,490[2]	399	2,113	4.6	651.7	651.7	652.7	1.0
H	9,795[2]	340	2,004	4.7	657.4	657.4	658.2	0.8
I	10,375[2]	238	1,755	5.2	658.7	658.7	659.5	0.8
J	10,745[2]	200	1,185	7.8	659.5	659.5	660.0	0.5
K	11,090[2]	188	1,011	9.1	661.3	661.3	661.9	0.6
L	11,625[2]	301	1,551	5.9	666.4	666.4	667.0	0.6
M	11,955[2]	380	1,856	5.0	668.8	668.8	669.2	0.4
N	12,990[2]	377	1,626	3.6	673.6	673.6	674.5	0.9
O	14,085[2]	261	858	6.8	680.2	680.2	680.7	0.5
P	14,815[2]	236	1,292	4.5	685.3	685.3	686.0	0.7
Q	15,500[2]	208	1,379	4.4	687.6	687.6	688.5	0.9
R	16,715[2]	305	1,631	3.3	696.1	696.1	696.7	0.6
S	17,350[2]	243	1,408	3.8	699.3	699.3	700.1	0.8
T	17,750[2]	254	907	6.0	702.1	702.1	702.3	0.2
U	18,645[2]	281	987	5.5	707.4	707.4	707.8	0.4
V	19,310[2]	223	1,158	4.7	711.3	711.3	712.1	0.8

[1]Feet Above Confluence With East Salitrillo Creek
[2]Feet Above Confluence With Salitrillo Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX
AND INCORPORATED AREAS

FLOODWAY DATA

EAST FORK OF SALITRILLO CREEK - EAST SALITRILLO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
East Salitrillo Creek (Cont'd)								
W	20,285	144	979	4.9	716.7	716.7	717.6	0.9
X	21,500	133	692	3.9	721.8	721.8	722.5	0.7
Y	22,310	147	635	4.3	726.5	726.5	727.5	1.0
Z	23,200	144	532	5.1	734.4	734.4	735.3	0.9
AA	23,905	233	947	2.9	738.5	738.5	738.9	0.4
AB	24,460	164	536	3.5	739.8	739.8	739.9	0.1
AC	25,200	149	367	5.2	743.3	743.3	743.3	0.0
AD	25,690	150	337	5.6	747.2	747.2	747.2	0.0
AE	26,200	157	331	5.7	750.9	750.9	750.9	0.0
AF	26,415	65	307	6.2	757.3	757.3	757.8	0.5
AG	26,830	61	209	0.5	759.7	759.7	759.7	0.0
AH	30,530	170	1,512	5.8	792.2	792.2	793.2	1.0
AI	31,030	170	1,363	6.4	792.4	792.4	793.4	1.0
AJ	32,333	112	625	13.5	802.4	802.4	802.5	0.1
AK	32,864	96	593	14.1	807.5	807.5	807.5	0.0
AL	33,055	96	602	13.9	809.6	809.6	809.6	0.0
AM	33,808	80	386	8.3	812.2	812.2	812.4	0.2
AN	34,594	75	284	11.0	818.5	818.5	818.5	0.0
AO	34,742	44	243	12.9	821.7	821.7	821.7	0.0
AP	36,080	26	187	15.3	834.8	834.8	835.6	0.8
AQ	36,243	38	239	10.9	835.9	835.9	836.1	0.2
AR	36,616	38	198	13.0	839.3	839.3	839.3	0.0
AS	37,160	58	405	6.2	850.4	850.4	850.4	0.0
AT	37,460	230	1,378	3.2	856.3	856.3	856.3	0.0
AU	37,956	181	708	3.0	857.3	857.3	858.3	1.0
AV	38,781	61	287	5.6	868.1	868.1	869.1	1.0
AW	40,016	42	189	6.8	888.7	888.7	889.7	1.0
AX	41,456	50	89	4.1	919.1	919.1	919.4	0.3

[1]Feet Above Confluence With Salitrillo Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NGVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
East Woodlawn Ditch								
A	0[1]	70	345	8.11	794.8	794.8	795.8	1.0
B	400[1]	60	300	9.46	800.0	800.0	801.0	1.0
C	1,400[1]	150	550	5.33	810.8	810.8	811.8	1.0
D	2,050[1]	70	305	9.65	815.8	815.8	816.8	1.0
Gage Tributary								
A	40[2]	40	145	6.21	908.2	908.2	909.2	1.0
B	240[2]	40	120	7.49	912.2	912.2	912.6	0.4
C	375[2]	75	660	1.36	918.8	918.8	919.8	1.0
D	970[2]	60	170	5.29	924.0	924.0	925.0	1.0
E	1,130[2]	70	240	3.75	929.4	929.4	930.4	1.0
F	2,575[2]	60	117	7.70	942.0	942.0	942.1	0.1
Helotes Creek								
A	13,550[3]	300	3,829	7.2	903.6	903.6	904.6	1.0
B	14,100[3]	351	3,511	7.8	906.1	906.1	907.1	1.0
C	14,200[3]	695	10,072	2.7	913.7	913.7	914.7	1.0
D	17,800[3]	346	3,886	7.3	925.4	925.4	926.4	1.0
E	21,000[3]	282	4,038	7.1	942.2	942.2	943.2	1.0
F	21,700[3]	178	3,067	9.4	943.5	943.5	944.5	1.0
G	21,800[3]	234	3,616	7.9	945.0	945.0	946.0	1.0
H	30,450[3]	241	2,851	9.0	976.9	976.9	977.9	1.0
I	36,750[3]	430	4,560	5.6	1,001.3	1,001.3	1,002.3	1.0
J	38,600[3]	364	3,479	7.4	1,008.8	1,008.8	1,009.8	1.0
K	42,050[3]	179	1,601	9.7	1,027.8	1,027.8	1,028.3	0.5

[1]Feet Above City of Balcones Heights Corporate Limits
[2]Feet Above City of Shavano Park Corporate Limits
[3]Feet Above Mouth

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TEXAS
AND UNINCORPORATED AREAS

FLOODWAY DATA

EAST WOODLAWN DITCH - GAGE TRIBUTARY - HELOTES CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Helotes Creek (Cont'd)								
L	42,150[1]	191	2,463	6.3	1,032.3	1,032.3	1,033.3	1.0
M	44,800[1]	172	1,810	8.6	1,043.2	1,043.2	1,044.2	1.0
N	46,100[1]	142	1,628	9.5	1,048.8	1,048.8	1,049.8	1.0
O	50,950[1]	128	1,544	10.0	1,071.0	1,071.0	1,072.0	1.0
P	52,850[1]	163	1,773	8.6	1,083.7	1,083.7	1,084.7	1.0
Q	55,150[1]	120	1,256	6.21	1,096.2	1,096.2	1,096.2	0.0
R	57,000[1]	270	519	8.77	1,119.1	1,119.1	1,119.1	0.0
S	58,900[1]	137	605	7.19	1,134.6	1,134.6	1,134.6	0.0
T	60,200[1]	270	729	5.42	1,146.7	1,146.7	1,146.7	0.0
U	61,900[1]	128	596	6.33	1,158.7	1,158.7	1,158.7	0.0
Huebner Creek								
A	2.06[2]	684	2,412	2.9	794.6	794.6	795.6	1.0
B	2.34[2]	680	2,796	2.5	800.9	800.9	801.9	1.0
C	2.62[2]	373	1,402	5.0	807.8	807.8	808.8	1.0
D	2.94[2]	433	2,367	3.0	812.7	812.7	813.7	1.0
E	3.29[1]	302	1,490	4.7	818.1	818.1	819.1	1.0
F	3.45[2]	286	1,659	4.2	821.4	821.4	822.3	0.9
G	3.58[2]	207	1,779	3.9	822.4	822.4	823.3	0.9
H	37.32[2]	162	1,265	5.5	822.8	822.8	823.6	0.8

[1]Feet Above Mouth
[2]Miles Above Confluence With Leon Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TEXAS

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Indian Creek								
A	3,800[1]	180	2,060	5.9	561.4	561.4	562.3	0.9
B	5,700[1]	130	1,370	8.9	565.3	565.3	566.1	0.8
C	9,350[1]	310	2,910	4.2	575.6	575.6	576.6	1.0
D	15,750[1]	890	10,070	1.2	585.7	585.7	595.8	1.0
E	18,900[1]	310	1,940	6.2	594.9	594.9	594.8	0.9
F	27,020[1]	500	4,510	1.9	623.5	623.5	624.5	1.0
G	27,180[1]	600	4,620	1.8	624.3	624.3	625.1	0.8
H	28,300[1]	400	1,920	4.4	625.5	625.5	626.2	0.7
Lee Creek								
A	1,700[1]	108	715	5.73	1,109.8	1,109.8	1,109.8	0.0
B	3,900[1]	70	409	7.78	1,127.6	1,127.6	1,127.6	0.0
Lorence Creek (Upper Reach)								
A	0[2]	94	1,085	4.38	872.2	872.2	873.2	1.0
B	900[2]	97	830	5.42	874.0	874.0	875.0	1.0
C	1,400[2]	--[3]	--[3]	--[3]	--[3]	--[3]	--[3]	--[3]
D	2,750[2]	110	820	4.88	885.2	885.2	886.2	1.0
E	2,900[2]	147	1,169	3.42	886.6	886.6	887.6	1.0
F	3,300[2]	93	636	5.90	888.1	888.1	889.1	1.0
G	4,850[2]	80	498	6.13	898.7	898.7	899.7	1.0
H	5,040[2]	75	465	6.56	900.7	900.7	901.3	0.6
I	5,200[2]	60	377	7.81	902.0	902.0	902.9	0.9

[1]Feet Above Mouth
[2]Feet Above Town of Hollywood Park Corporate Limits
[3]Cross Section Across Crest of Dam, Floodway Not Computed

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TEXAS
AND UNINCORPORATED AREAS

FLOODWAY DATA

INDIAN CREEK - LEE CREEK - LORENCE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Los Reyes Creek								
A	3,000	134	1,051	9.3	1,041.4	1,041.4	1,042.4	1.0
B	9,400	98	734	9.2	1,092.0	1,092.0	1,093.0	1.0
C	9,600	168	1,520	4.5	1,096.0	1,096.0	1,097.0	1.0
D	13,850	117	940	7.0	1,128.1	1,128.1	1,129.1	1.0
E	13,950	115	945	6.9	1,134.0	1,134.0	1,135.0	1.0
F	16,250	227	1,312	5.2	1,149.1	1,149.1	1,150.1	1.0
G	16,350	155	933	7.2	1,151.8	1,151.8	1,152.8	1.0
H	17,900	147	925	6.9	1,164.0	1,164.0	1,165.0	1.0
I	18,000	133	814	8.3	1,165.7	1,165.7	1,166.2	0.5
J	24,350	121	498	6.8	1,236.9	1,236.9	1,237.9	1.0
Martinez Creek B								
A	69,150	577	3,141	2.7	601.2	601.2	602.2	1.0
B	74,298	370	2,412	3.5	608.6	608.6	609.6	1.0
C	79,050	594	2,556	2.1	616.7	616.7	617.7	1.0
D	91,177	110	332	3.9	634.1	634.1	634.5	0.4
E	91,877	122	432	3.0	635.7	635.7	636.2	0.5
F	93,677	519	925	1.4	637.8	637.8	638.5	0.7
G	94,612	430	1,723	0.7	640.1	640.1	640.7	0.6
H	96,212	100	217	2.8	641.6	641.6	641.9	0.3
I	97,012	47	124	4.9	646.5	646.5	646.7	0.2

[1]Feet Above Mouth

TABL

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TEXAS

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Medio Creek								
A	200[1]	1,472	14,989	1.8	703.3	703.3	704.3	1.0
B	7,590[1]	1,261	7,082	3.2	715.1	715.1	715.6	0.5
C	11,660[1]	700	2,530	8.9	724.9	724.9	725.2	0.3
D	18,891[1]	330	3,273	6.9	750.3	750.3	750.5	0.2
E	23,091[1]	370	3,158	7.2	763.1	763.1	764.1	1.0
F	26,291[1]	253	2,525	7.3	778.2	778.2	779.2	1.0
G	30,800[1]	426	3,414	5.4	796.9	796.9	797.9	1.0
H	33,200[1]	380	2,227	8.3	805.4	805.4	806.3	0.9
I	36,150[1]	347	2,969	6.2	820.2	820.2	821.2	1.0
J	42,150[1]	450	3,120	5.2	839.6	839.6	840.6	1.0
K	48,300[1]	204	1,876	8.6	859.3	859.3	860.2	0.9
L	53,100[1]	369	2,495	6.5	876.8	876.8	877.6	1.0
Mossey Cup Tributary								
A	455[2]	80	380	4.75	944.3	944.3[4]	945.3	1.0
B	1,880[2]	80	345	5.21	961.0	961.0	961.6	0.6
C	3,060[2]	140	394	4.57	977.6	977.6	978.4	0.8
North-East Tributary								
A	1,800[3]	270	1,300	2.5	750.2	750.2	750.5	0.3
B	3,280[3]	200	610	4.7	753.2	753.2	754.2	1.0

[1]Feet Above U.S. Highway 90
[2]Feet Above Mouth
[3]Feet Above Power Pole

[4]Elevation Computed Without Consideration of Backwater Effects from Olmos Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TEXAS
AND UNINCORPORATED AREAS

FLOODWAY DATA

MEDIO CREEK - MOSSEY CUP TRIBUTARY - NORTH-EAST TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Olmos Creek								
A	30,575[1]	522	2,516	7.1	777.5	777.5	778.5	1.0
B	31,950[1]	219	2,800	6.4	780.9	780.9	781.8	0.9
C	54,750[1]	171	840	9.8	881.7	881.7	881.7	0.0
D	60,000[1]	125	1,075	6.4	913.0	913.0	913.7	0.7
E	62,200[1]	113	1,033	6.6	923.1	923.1	923.9	0.8
F	62,550[1]	104	1,106	5.8	925.6	925.6	926.5	0.9
G	62,720[1]	144	1,477	4.3	928.4	928.4	929.3	0.9
H	66,480[1]	82	645	8.2	943.3	943.3	943.9	0.6
I	67,900[1]	126	798	6.6	951.3	951.3	952.3	1.0
J	69,110[1]	75	222	6.6	961.2	961.2	962.1	0.9
Olmos Creek (East Channel)								
A	1,200[2]	143	1,162	6.7	785.6	785.6	786.5	0.9
B	5,000[2]	340[4]	2,855	5.2	806.1	806.1	806.6	0.5
Olmos Creek Tributary								
A	200[3]	39	269	8.0	800.5	800.5	801.5	1.0
B	730[3]	53	372	5.8	804.6	804.6	805.4	0.8
C	1,270[3]	60	340	6.3	806.9	806.9	807.7	0.8
D	1,800[3]	78	406	5.3	811.0	811.0	811.8	0.8

[1]Feet Above Olmos Dam
[2]Feet Above Confluence With Olmos Creek
[3]Feet Above Limit of Detailed Study (located at the point approximately 200 feet upstream of Blanco Road)

[4]Total Floodway Width at this Cross Section is not Mapped or Shown in this Table; Floodways are not Mapped in the City of San Antonio (See Section 4.2 of this report)

TABL

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Rosillo Creek (Lower Reach)								
A	74,606[1]	300	1,637	6.7	667.4	667.4	668.4	1.0
B	75,082[1]	300	1,548	7.1	669.1	669.1	669.6	0.5
C	75,187[1]	300	1,439	7.6	669.3	669.3	669.8	0.5
D	76,887[1]	300	1,854	5.9	675.7	675.7	676.5	0.8
E	78,617[1]	250	1,588	6.9	683.6	683.6	683.6	0.0
F	80,987[1]	250	1,760	3.5	687.3	687.3	687.3	0.0
G	81,092[1]	250	1,637	3.7	687.4	687.4	687.4	0.0
H	81,672[1]	250	1,642	3.7	687.8	687.8	688.5	0.7
I	81,777[1]	20[3]	1,551	3.9	690.8	690.8	690.8	0.0
J	82,877[1]	50[3]	1,298	4.7	690.8	690.8	690.8	0.0
Rosillo Creek (Upper Reach)								
A	0[2]	45	218	3.4	780.9	780.9	781.6	0.7
B	0.07[2]	49	138	5.4	787.0	787.0	787.9	0.9
C	0.16[2]	168	492	1.5	793.6	793.6	794.1	0.5
D	0.38[2]	68	156	4.8	810.5	810.5	811.3	0.8
E	0.49[2]	80	117	2.3	822.5	822.5	822.5	0.0

[1]Feet Above Mouth
[2]Miles Above Montgomery Road
[3]Total Floodway Width at this Cross Section is not Mapped or Shown in this Table; Floodways are not Mapped in the City of San Antonio (See Section 4.2 of this report)

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX AND INCORPORATED AREAS

FLOODWAY DATA

ROSILLO CREEK (LOWER REACH) - ROSILLO CREEK (UPPER REACH)

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Salado Creek (Lower Reach)								
A	2,510[1]	601	7,524	5.70	497.2	497.2	498.2	1.0
B	5,760[1]	664	7,284	5.73	504.5	504.5	505.5	1.0
C	8,360[1]	1,161	10,674	4.01	508.8	508.8	509.8	1.0
D	8,490[1]	307	4,882	8.29	509.8	509.8	510.3	0.5
E	8,610[1]	1,097	12,773	3.28	510.4	510.4	511.4	1.0
F	12,960[1]	1,050	11,793	3.41	517.3	517.3	518.2	0.9
G	17,250[1]	12,277[3]	13,395	3.08	523.5	523.5	523.9	0.4
Selma Creek								
A	400[2]	420	2,513	2.6	737.7	737.7[4]	738.7	1.0
B	1,120[2]	305	4,259	1.5	738.1	738.1[4]	739.0	0.9
C	1,895[2]	149	1,516	3.0	738.1	738.1[4]	739.0	0.9
D	4,500[2]	295	2,128	3.1	748.7	748.7	749.7	1.0
E	6,300[2]	218	1,200	4.5	751.7	751.7	752.3	0.6
F	6,700[2]	224	1,273	4.3	754.1	754.1	754.5	0.4
G	8,820[2]	215	1,019	4.5	757.6	757.6	757.7	0.1
H	10,250[2]	186	868	5.2	760.3	760.3	760.3	0.0
I	13,836[2]	618	777	3.9	777.6	777.6	777.6	0.0

1Feet Above Confluence With San Antonio River

2Feet Above Confluence With Cibolo Creek

3Total Floodway Width at this Cross Section is not Mapped or Shown in this Table; Floodways are not Mapped in the City of San Antonio (See Section 4.2 of this report)

4Elevations on Flood Profile Reflect Cibolo Creek Backwater

TABL

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TEXAS

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Slick Ranch Creek								
A	21,620[1]	260	1,323	5.6	790.8	790.8	791.7	0.9
B	23,620[1]	115	741	7.5	799.5	799.5	800.3	0.8
C	26,420[1]	215	1,120	5.0	812.8	812.8	813.8	1.0
South Branch of Selma Creek								
A	145[2]	202	2,737	0.7	738.1	738.1	739.1	1.0
B	3,560[2]	150	817	1.9	776.0	776.0	776.1	0.1
C	6,180[2]	60	148	6.2	819.4	819.4	819.5	0.1
South Fork of South Branch of Selma Creek								
A	200[3]	32	92	6.8	775.6	775.6	775.9	0.3
B	2,600[3]	60	89	7.0	811.0	811.0	811.0	0.0
C	3,600[3]	60	89	7.0	841.0	841.0	841.0	0.0
Turkey Creek Tributary								
A	755[1]	80	165	5.63	945.0	945.0	946.0	1.0
B	1,630[1]	60	137	6.78	954.0	954.0	954.8	0.8
C	2,335[1]	60	131	7.08	964.4	964.4	965.2	0.8
D	2,860[1]	60	158	5.88	973.3	973.3	973.5	0.2

[1]Feet Above Mouth
[2]Feet Above Confluence With Selma Creek
[3]Feet Above Confluence With South Branch of Selma Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TEXAS AND UNINCORPORATED AREAS

FLOODWAY DATA

SLICK RANCH CREEK - SOUTH BRANCH OF SELMA CREEK - SOUTH FORK OF SOUTH BRANCH OF SELMA CREEK - TURKEY CREEK TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Unnamed Tributary of Cibolo Creek								
A	19,150[1]	51	271	8.23	825.4	825.4	826.3	0.9
B	19,485[1]	39	174	9.11	834.2	834.2	834.5	0.3
C	21,035[1]	50	160	3.73	845.2	845.2	845.6	0.4
Walzem Creek (Upper Reach)								
A	0.03[2]	57	285	5.1	740.2	740.2	740.2	0.0
B	0.23[2]	63	239	6.1	744.7	744.7	744.7	0.0
C	0.53[2]	69	256	5.7	757.2	757.2	757.2	0.0
D	0.80[2]	148	647	2.0	774.8	774.8	775.8	1.0
E	1.07[2]	66	177	7.3	786.2	786.2	786.3	0.1
F	1.22[2]	72	132	6.0	796.1	796.1	796.4	0.3
G	1.48[2]	44	164	4.8	813.5	813.5	814.0	0.5
H	1.70[2]	43	111	3.8	842.4	842.4	842.4	0.0
I	1.86[2]	144	285	1.5	846.7	846.7	847.7	1.0

[1] Feet Above Confluence With Cibolo Creek

[2] Miles Above Walzem Road (rounded to the nearest hundredth of a mile)

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TEXAS

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
West Salitrillo Creek								
A	2,100	231	1,581	4.6	629.6	629.6	630.5	0.9
B	3,710	255	1,982	3.7	634.7	634.7	635.7	1.0
C	5,980	197	1,471	4.7	642.1	642.1	643.1	1.0
D	7,145	267	1,545	4.5	649.0	649.0	649.9	0.9
E	7,780	300	1,047	6.6	651.6	651.6	651.6	0.0
F	8,510	341	2,402	3.0	655.5	655.5	655.9	0.4
G	9,190	176	1,125	6.4	659.4	659.4	660.4	1.0
H	9,785	394	3,042	2.2	664.0	664.0	664.4	0.4
I	10,855	354	1,724	3.9	665.4	665.4	666.1	0.7
J	11,640	207	1,177	5.7	668.4	668.4	669.2	0.8
K	12,700	131	758	8.9	675.4	675.4	675.4	0.0
L	13,530	136	756	7.9	680.4	680.4	680.5	0.1
M	14,215	129	741	8.0	685.5	685.5	685.6	0.1
N	15,430	210	1,049	5.7	698.8	698.8	699.7	0.9
O	16,945	339	1,669	2.5	702.0	702.0	702.5	0.5
P	17,740	189	705	2.2	705.0	705.0	705.9	0.9
Q	18,090	123	296	5.0	706.2	706.2	706.8	0.6
R	22,620	158	944	5.4	747.8	747.8	748.2	0.4
S	23,310	160	632	8.0	751.4	751.4	751.4	0.0
T	24,195	109	498	10.2	761.2	761.2	761.4	0.2
U	25,225	193	809	6.3	769.9	769.9	770.9	1.0
V	25,950	122	497	7.7	773.9	773.9	774.1	0.2
W	26,270	121	482	7.9	780.4	780.4	780.5	0.1
X	26,980	121	486	7.9	784.4	784.4	784.4	0.0
Y	27,625	141	385	8.3	791.6	791.6	791.6	0.0
Z	28,445	142	488	5.6	805.8	805.8	806.6	0.8

[1]Feet Above Confluence With Salitrillo Creek

TABLE	FEDERAL EMERGENCY MANAGEMENT AGENCY BEXAR COUNTY, TEXAS AND UNINCORPORATED AREAS	FLOODWAY DATA WEST SALITRILLO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
West Salitrillo Creek (Cont'd)								
AA	29,559	96	374	7.3	817.2	817.2	818.2	1.0
AB	30,804	95	326	6.7	837.4	837.4	838.3	0.9
AC	32,069	40	209	4.4	857.2	857.2	857.3	0.1
AD	32,217	40	147	6.3	857.4	857.4	857.7	0.3
AE	32,371	40	99	9.0	860.9	860.9	860.9	0.0
AF	32,696	40	97	8.9	868.1	868.1	868.1	0.0
AG	33,429	40	92	8.6	880.5	880.5	880.5	0.0
AH	33,529	20	73	10.9	885.4	885.4	886.0	0.6
AI	33,671	20	65	10.2	888.6	888.6	888.9	0.3

[1]Feet Above Confluence With Salitrillo Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TEXAS

FLOODWAY DATA

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
West Tributary Rosillo Creek								
A	1,700[1]	75	374	9.50	674.3	674.3	675.3	1.0
B	1,800[1]	75	1,326	10.89	676.2	676.2	676.3	0.1
C	2,450[1]	75	519	6.84	680.5	680.5	680.6	0.1
D	2,550[1]	75	413	8.59	682.6	682.6	683.0	0.4
E	3,800[1]	75	468	7.58	684.7	684.7	685.3	0.6
Zarzamora Creek								
A	39,047[2]	156	883	6.8	802.1	802.1	802.1	0.0
B	40,015[2]	79	432	12.7	806.8	806.8	806.8	0.0
C	41,216[2]	133	908	5.2	812.6	812.6	813.0	0.4

[1]Feet Above Mouth
[2]Feet Above Confluence With Apache Creek

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX
AND INCORPORATED AREAS

FLOODWAY DATA

WEST TRIBUTARY ROSILLO CREEK - ZARZAMORA CREEK

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 6.

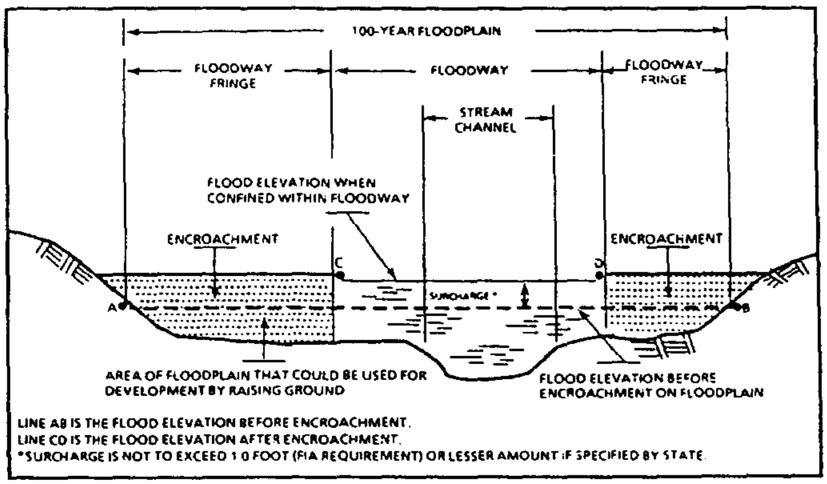

Figure 6. Floodway Schematic

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheetflow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

The current Flood Insurance Rate Map presents flooding information for the entire geographic area of Bexar County. Previously, separate Flood Hazard Boundary Maps and/or Flood Insurance Rate Maps were prepared for each identified floodprone incorporated community and the unincorporated areas of the county. This countywide Flood Insurance Rate Map also includes flood hazard information that was presented separately on Flood Boundary and Floodway Maps, where applicable. Historical data relating to the maps prepared for each community prior to their inclusion in this countywide Flood Insurance Study are presented in Table 8, "Community Map History."

7.0 OTHER STUDIES

Flood Insurance Studies have been prepared for the unincorporated areas of Bandera, Medina, Atascosa, Wilson, and Kendall Counties (References 113, 114, 115, 116, and 117).

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FIRM EFFECTIVE DATE	FIRM REVISION DATE(S)
Bexar County, TX	January 31, 1978	--	October 16, 1984	July 17, 1989 April 2, 1990 September 28, 1990 October 16, 1991
Alamo Heights, (C)	May 10, 1974	--	August 15, 1978	July 5, 1984
Balcones Heights, (C)	August 15, 1975	--	April 15, 1980	--
Castle Hills, (C)	May 24, 1974	June 18, 1976	September 30, 1980	September 28, 1984
China Grove, (C)	April 25, 1975	--	June 15, 1984	--
Converse, (C)	February 1, 1974	December 13, 1974	June 15, 1981	November 15, 1985
Elmendorf, (C)	June 11, 1976	--	September 3, 1980	--
Fair Oaks Ranch, (C)	December 20, 1993	--	February 16, 1996	--
Grey Forest, (C)	November 1, 1974	--	July 16, 1980	--
Helotes, (C)	Not Participating	--	February 16, 1996	--
Hill Country Village, (C)	August 23, 1977	--	February 16, 1996	--
Hollywood Park, (T)	April 12, 1974	June 11, 1976	November 19, 1980	December 21, 1982
Kirby, (C)	January 23, 1974	March 26, 1976	August 15, 1980	--

TABL

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FIRM EFFECTIVE DATE	FIRM REVISION DATE(S)
Leon Valley, (C)	October 12, 1973	--	June 1, 1977	November 15, 1989
Live Oak, (C)	May 24, 1974 March 12, 1976	--	May 16, 1977	--
Olmos Park, (C)	Not Participating	--	February 16, 1996	--
San Antonio, (C)	April 5, 1974	June 27, 1978	December 15, 1983	July 2, 1991
Selma, (C)	December 6, 1974	--	July 2, 1980	--
Shavano Park, (C)	March 1, 1974	April 16, 1976	September 3, 1980	--
Somerset, (C)	August 9, 1977	--	February 16, 1996	--
St. Hedwig, (C)	Not Participating	--	February 16, 1996	--
Terrell Hills, (C)	May 17, 1974	January 9, 1976	January 16, 1981	--
Universal City, (C)	March 8, 1974 April 2, 1976	--	May 16, 1977	
Windcrest, (C)	May 17, 1974	--	August 15, 1977	--

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

Because it is based on more up-to-date analyses, this Flood Insurance Study supersedes the previously printed Flood Insurance Studies for the City of San Antonio, the unincorporated areas of Bexar County, the Cities Alamo Heights, Balcones Heights, Castle Hills, China Grove, Converse, Elmendorf, Grey Forest, Hill Country Village, Kirby, Leon Valley, Live Oak, Selma, Shavano Park, Somerset, Terrell Hills, Universal City, and Windcrest, and the Town of Hollywood Park (Reference 37 and 93 through 111).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, Mitigation Division, Federal Regional Center, 800 North Loop 288, Denton, Texas 76201-3698.

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APPENDIX BB

Response Letters To SARA from Area Utilities and Municipalities regarding Flood Control Needs

SAN ANTONIO RIVER AUTHORITY

4.2-0-50

October 22, 1999

The Honorable Howard Peak
Mayor, City of San Antonio
P.O. Box 839966
San Antonio, Texas 78283-3966

RE: BEXAR COUNTY AREA WIDE FLOOD CONTROL ANALYSIS REPORT - REQUEST FOR INFORMATION

Dear Mayor Peak:

The October 1998 flood brought devastation to South Central Texas and the Bexar County community. In some areas projects were in place to control flooding and protect life and property. However, many areas suffered the ravages of the flood. Over the last year efforts have been made by various entities to evaluate the flood and to identify flood prone areas.

As a result of the flood, the San Antonio River Authority is working with Bexar County to prepare a County Area Wide Flood Control Analysis Report. The purpose of the report is to identify potential future flood control projects. A compilation of information from numerous sources relating to the October 1998 flood including previous studies is being assembled. Potential projects will be identified for further investigation by Bexar County and the San Antonio River Authority.

We request that you provide us with a list of the areas that you are aware of where streams and drainage channels are prone to major and repetitive flooding. For the most part, local street drainage problems not associated with streams and drainage channels are not within the scope of this study. Along with this list of flood prone areas, please provide any documentation and damage estimates that you may have. List, if known, areas in which people have applied for assistance for relocation or rebuilding. Also list any ideas for future projects including estimates of project benefit. To be considered in our study please furnish this information by November 5, 1999. Please send the information to:

Steve Ramsey, P.E.
Chief Engineer
San Antonio River Authority
P.O. Box 839980
San Antonio, Texas 78283-9980

Your cooperation will benefit the citizens of Bexar County and will be greatly appreciated.

Should you have any questions please call me at (210) 227-1373.

Sincerely,

STEVE RAMSEY, P.E.
Chief Engineer

SR/FDB/msb

cc: John L. German, P.E.
Tom Wendorf, P.E.
Robert Opitz, P.E.
David Beales, P.E.
Keith Strimple, P.E.

P:\MSB\WPDATA\COUNTY\AREAWIDE\LETTERS

The Honorable Howard Peak
Mayor, City of San Antonio
P.O. Box 839966
San Antonio, Texas 78283-3966

cc: John L. German, P.E., Tom Wendorf P.E., Robert Opitz, P.E., David Beales, P.E., Keith Strimple, P.E.

The Honorable Robert Biechlin
Mayor, City of Alamo Heights
6116 Broadway
San Antonio, Texas 78209

The Honorable Lucille Wohlfarth
Mayor, City of Balcones Heights
123 Altgelt Avenue
San Antonio, Texas 78201

The Honorable Martin Rubin
Mayor, City of Castle Hills
6915 West Avenue
Castle Hills, Texas 78213

The Honorable John Vrzalik, Sr.
Mayor, City of China Grove
2456 FM 1516
China Grove, Texas 78263

The Honorable John Steinberg
Mayor, City of Converse
P.O. Box 36
Converse, Texas 78109-0036

The Honorable Mary Jane Nunez
Mayor, City of Elmendorf
P.O. Box 247
Elmendorf, Texas 78112

The Honorable E.L. Boots Gaubatz
Mayor, City of Fair Oaks Ranch
7286 Dietz Elkhorn
Fair Oaks Ranch, Texas 78015

The Honorable Edwin Faust
Mayor, City of Grey Forest
18502 Scenic Loop Road
Helotes, Texas 78023

The Honorable Steven Hodges
Mayor, City of Helotes
P.O. Box 507
Helotes, Texas 78023-0507

The Honorable Bill Ford
Mayor, City of Hill Country Village
116 Aspen Lane
San Antonio, Texas 78232

The Honorable Gary Mercer
Mayor, City of Hollywood Park
#2 Mecca Drive
San Antonio, Texas 78232

The Honorable Johnny Duffeck, Jr.
Mayor, City of Kirby
112 Baumann Street
Kirby, Texas 78219

The Honorable Marcy Meffert
Mayor, City of Leon Valley
6400 El Verde Road
Leon Valley, Texas 78238

The Honorable Paula Stakes
Mayor, City of Live Oak
8001 Shin Oak Drive
Live Oak, Texas 78233

The Honorable Gerald Dubinski, Sr.
Mayor, City of Olmos Park
119 W. El Prado Drive
San Antonio, Texas 78212

The Honorable Albert Strzelcyzk
Mayor, City of Saint Hedwig
P.O. Box 40
Saint Hedwig, Texas 78152-0040

The Honorable Harold Friesenhahn
Mayor, City of Selma
9375 Corporate Drive
Selma, Texas 78154

The Honorable Tommy Peyton
Mayor, City of Shavano Park
99 Saddletree Road
San Antonio, Texas 78231

The Honorable Paul Cuellar
Mayor, City of Somerset
P.O. Box 356
Somerset, Texas 78069

The Honorable Barbara Christian
Mayor, City of Terrell Hills
5100 N. New Braunfels
San Antonio, Texas 78209

The Honorable Wesley Becken
Mayor, City of Universal City
P.O. Box 3008
Universal City, Texas 78148-3008

The Honorable Joe Cochran
Mayor, City of Windcrest
8601 Midcrown
San Antonio, Texas 78239

The Honorable Cyndi Krier — cc: Suzanne Scott, Michael Martin
Bexar County Judge
100 Dolorosa Street
Suite 101
San Antonio, Texas 78205-3036

Commissioner Robert Tejeda — cc: Suzanne Scott, Michael Martin
Bexar County Commissioner Precinct 1
100 Dolorosa Street
Suite 101
San Antonio, Texas 78205-3036

Commissioner Paul Elizondo — cc: Suzanne Scott, Michael Martin
Bexar County Commissioner Precinct 2
100 Dolorosa Street
Suite 101
San Antonio, Texas 78205-3036

Commissioner Lyle Larson — cc: Suzanne Scott, Michael Martin
Bexar County Commissioner Precinct 3
100 Dolorosa Street
Suite 101
San Antonio, Texas 78205-3036

Commissioner Tommy Adkisson
Bexar County Commissioner Precinct 4
100 Dolorosa Street
Suite 101
San Antonio, Texas 78205-3036

cc: Suzanne Scott, Michael Martin

Mr. Fernando Garza
Natural Resources Conservation Service, U.S.D.A.
727 E. Durango, Suite A507
San Antonio, Texas 78206-1204

Mr. Mike Thuss
President & CEO
San Antonio Water System
P.O. Box 2449
San Antonio, Texas 78298-2449

Mr. Thomas Moreno
General Manager
Bexar Metropolitan Water District
P.O. Box 3577
San Antonio, Texas 78211-0577

CITY OF ALAMO HEIGHTS
6116 BROADWAY
SAN ANTONIO, TEXAS 78209
210-822-3331

November 3, 1999

Mr. Steve Ramsey, P.E.
Chief Engineer
San Antonio River Authority
P.O. Box 839980
San Antonio, TX 78283-9980

Dear Mr. Ramsey:

Pursuant to your letter of October 22, 1999, our staff has compiled information in response to the requests contained therein.

The areas in Alamo Heights and the surrounding vicinity where streams and drainage channels are prone to major and repetitive flooding, including only street drainage problems associated with streams and drainage channels, are as follows:

1. The street drainage channel north of Austin Highway on North New Braunfels, north of Brightwood
2. The underground channel inlet at North New Braunfels and Redwood, across Austin Highway
3. The street drainage channel from North New Braunfels to Broadway, running down Austin Highway
4. The drainage channel picking up water from Terrell Hills, which flows into Alamo Heights at North New Braunfels south of Arcadia
5. The street drainage channel running through Alamo Heights down Broadway south to Patterson Avenue

The significant accumulations of water in terms of volume from floods in Alamo Heights concentrates at Austin Highway and North New Braunfels, and at the southern portion of Broadway within the city limits.

We are enclosing pictures of the areas in question, without the rainwater, to clarify exactly where the problem areas are. Damage estimates for the October 1998 range from $3-4 million upwards to $15 million, depending on the damage to Alamo Heights Imaging Center at 5000 Broadway, who closed their doors after the flood and did not reopen. Each piece of equipment was worth $2 million. They had imaging equipment, worth a total of approximately $10 million.

In addition, in the last 20 plus years, there have been two persons drown at the intersection of Austin Highway and Chichester Place, one in May 1993, and the other in the mid 1970s.

After the flood in October 1998, there were several homes just off of Austin Highway that had significant damage. While none of them asked the City of Alamo Heights for monetary assistance, some were unable to live in their homes for a long period of time while they attempted to find resources to rebuild.

Future projects include that mentioned in our letter of August 20, 1999, a copy of which is enclosed. Benefits we expect to derive from this project include saving lives, freeing up police and fire personnel during rains (currently all available personnel are dispatched to the area between North New Braunfels down Austin Highway and Broadway to Patterson Avenue, in an attempt to save lives by keeping drivers from driving through flooded areas), and a sense of security for our downtown business owners that their property will not be flooded during our twice annual flooding.

Thank you for your assistance in this matter. If there is any other information you require, please do not hesitate to contact my office.

Sincerely,

Susan Rash

Susan Rash
City Administrator

Enclosures

October 1998

Alamo Heights Fire Department
Survey of Flood Damage
Flash Floods October 17-18, 1998

This is not a comprehensive, all inclusive listing of businesses and residences that received flood damage. Due to time constraints required by the Division of Emergency Management and the Governor's Office, it was hurriedly constructed within days of the flood from interviews with the owners and occupants. It's purpose was to provide a primary estimate of the size of the areas impacted, and the amount of damage that could be expected.

Business Occupancies (amount of water identified is the amount in the building)

1. 110 Austin Hwy. - Frost Bank (1 ft. water)
2. 214 Austin Hwy.- "no name" (2 to 3 ft. water) **closed**
3. 401 & 402 Austin Hwy. - Frost Bank (½" water)
4. 518 Austin Hwy. - Rhonda's (6' to 1 ft. water)

5. 4600 Broadway - Southwest Texas Building (½" to 1" water)
6. 4901 Broadway - McDougal's Cleaners (1 ft. water)
7. 4940 Broadway - Norwest Bank (3 to 4" water)
8. 5000 Broadway - Alamo Heights Imaging (roof collapse due to water build-up, severe water damage) **Out of Business Due To Damage**
9. 5001 Broadway - Big Red Nature Store (2 to 3" water)
10. 5005-5009 Broadway - Twig Bookstore and Red Balloon Bookstore (2 to 3" water)
11. 5011 Broadway - Cappy's Restaurant (4" water)
12. 5021 Broadway - Kathy Scholl Designs (2" water)
13. 5024 Broadway - Fox Photo (3" water)
14. 5029 Broadway - Bank of America (3 ft. water)
15. 5046 Broadway - Marcell's (1 ft. water)
16. 5050 Broadway - 50/50 Club (4 ½ ft. water)
17. 5111 Broadway - Cloister's Partners Limited (3 ft. water)
18. 5158 Broadway - Dr. Adolph Guido (4" water)
19. 5160 Broadway - Broadway Optical (4" water)
20. 5201 Broadway - Nation's Bank (2 ft. water)
21. 5307 Broadway - NIX's Medical Center (3 to 4 ft. water)
22. 5311 Broadway - Burton, Rose & Gonzales (4 to 4 ½ ft. water) **Out of Business Due To Damage**
23. 5321 Broadway - Starbuck's (1 ft. water)
24. 5400 Broadway - Nancy Hawkins Stationers (2 to 3" water)
25. 5402 Broadway - Schlotzsky's (6" to 1 ft. water) **closed**
26. 5408 Broadway - Mr. Gatti's (1 ft. water)

27. 5410 Broadway - Wolf Camera (1 to 2 ft. water) **closed**
28. 5424 Broadway - Harold's (2 ft. water) **closed**

29. 110 Chichester - Alamo Heights Garage (3 to 4 ft. water)

<u>Residences</u> (amount of water identified is the amount **<u>in</u>** the building, unless otherwise noted)

1. 131 Patterson - 6 to 7" water
2. 135 Patterson - 6 to 7" water
3. 140 Patterson (apts.) - 1 to 2 ft. water (parking lot only)
4. 141 Patterson - 7 to 8" water
5. 200 Patterson (condos) - 4 ft. water
6. 302 Patterson - 3 ft. water
7. 214 Crescent - 3 to 3 ½ ft. water
8. 306 Eaton - 2 ft. water
9. 312 Eaton - 6" water
10. 321 Eaton - 1 ft. water
11. 325 Eaton - 6" water
12. 100 Grandview - 1 to 2 Ft. water
13. 216 Arcadia (apts.) - 4 to 5 ft. water
14. 209 Grove (apts.) - 2" water
15. 201 Grove (apts.) - 4" water
16. 136 Grove (condos) - 4" water
17. 4707 Broadway - Incarnate Word Mother House - 3" water
18. 102 Alamo Heights Blvd. - 8 to 10 ft. water
19. 104 Alamo Heights Blvd. - 6 to 8 ft. water
20. 50 Alamo Heights Blvd. - 4 to 5 ft. water
21. 141 W. Fairoaks - 2" water
22. 366 Bluebonnet - 6" water
23. 370 Bluebonnet - 1 to 3 ft. water
24. 372 Bluebonnet - 3 to 5 ft. water
25. 378 Bluebonnet - 3 to 5 Ft. water
26. 353 Bluebonnet - 2" water
27. 353 Redwood - 1 to 2 ft. water
28. 355 Redwood - 6" water
29. 5715 New Braunfels (duplex) - 18" water
30. 5715 New Braunfels (garage apt.) - 3 ft. water
31. 5701 New Braunfels - 6" water
32. 328 & 329 Montclair (duplex) - 6" water
33. 340 Montclair (apts. 10 units) - 2 to 3 ft. water

34. 210 Routt - 3 ft. water
35. 211 Routt (apts. 8 units) - 6" water
36. 215 Routt - 3 ft. water
37. 216 Routt - 3 ft. water
38. 217 Routt - 2 ft. water
39. 220 Routt - 2 ft. water

Federal Emergency Management Agency

Washington, D.C. 20472

SEP 10 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 98-06-229P

The Honorable Robert Biechlin
Mayor, City of Alamo Heights
6116 Broadway
San Antonio, Texas 78209

Community: City of Alamo Heights, Texas
Community No.: 480036
Panel Affected: 48029C0452 E
Effective Date of This Revision: **JAN 13 1999**

102-I-A-C

Dear Mayor Biechlin:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Bexar County, Texas and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated October 31, 1997, Mr. L. David Givler, M.S.C.E., P.E., Senior Project Engineer, HDR/Simpson, requested that FEMA revise the FIRM and FIS report to show the effects of more detailed topographic information along New Braunfels, Austin Highway, Broadway Drain from the confluence with the San Antonio River to Chichester Place. This request also included the effects of existing culverts under Broadway and Cleveland Court and a hydraulic model to analyze split-flow conditions through the underground parking area of the H.E.B. grocery store at Patterson Avenue.

All data required to complete our review of this request were submitted with letters from Mr. Paul D. Sontag, P.E., City Engineer, City of Alamo Heights, and Mr. Givler.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and FIS report. We have revised the FIRM and FIS report to modify the elevations and floodplain and floodway boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along New Braunfels, Austin Highway, Broadway Drain from the confluence with the San Antonio River to Chichester Place. As a result of the modifications, the base flood elevations (BFEs) for New Braunfels, Austin Highway, Broadway Drain increased in some areas and decreased in other areas; the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, increased in some areas and decreased in other areas; and the width of the regulatory floodway increased in some areas and decreased in other areas. All increases in BFE and SFHA and floodway widths are a result of more detailed topographic information. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 48029C0452 E, Profile Panel(s) 187P and 188P, and affected portions of the Summary of Discharges Table. A Floodway Data Table was created for New Braunfels, Austin Highway, Broadway Drain, and cross sections were labeled on the FIRM from the confluence with the San Antonio River to approximately 1,300 feet upstream. The flooding source New Braunfels, Austin Highway, Broadway Drain Split Flow was added to the Summary of Discharges Table, and Profile Panel 191Pa was created. This Letter of Map Revision (LOMR) hereby revises the above-referenced panel(s) of the effective FIRM and the affected portions of the FIS report, both dated February 16, 1996.

The modifications are effective as of the date shown above. The map panel(s) as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

The following table is a partial listing of existing and modified BFEs:

Location	Existing BFE (feet)*	Modified BFE (feet)*
New Braunfels, Austin Highway, Broadway Drain:		
Approximately 600 feet upstream of confluence with San Antonio River	682	684
Approximately 80 feet downstream of Mary D Avenue	702	699
Just downstream of Grandview Place	714	713
New Braunfels, Austin Highway, Broadway Drain Split Flow:		
Approximately 350 feet upstream of convergence with New Braunfels, Austin Highway, Broadway Drain	696	692

*Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot

Public notification of the proposed modified BFEs will be given in the *North San Antonio Times* on or about October 8 and October 15, 1998. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *North San Antonio Times*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

The floodway is provided to your community as a tool to regulate floodplain development. Therefore, the floodway modifications described in this LOMR, while acceptable to FEMA, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

The basis of this LOMR is, in whole or in part, a culvert project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the culvert rests with your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed minimum NFIP criteria. These criteria are the minimum and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

A Consultation Coordination Officer (CCO) has been designated to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. James LeGrotte
Director, Mitigation Division
Federal Emergency Management Agency, Region VI
Federal Regional Center, Room 206
800 North Loop 288
Denton, Texas 76201-3698
(940) 898-5127

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Our Project Impact initiative, developed by FEMA Director James Lee Witt, seeks to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a Project Impact Fact Sheet. For additional information on Project Impact, please visit our Web site at **www.fema.gov**.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have any technical questions regarding this LOMR, please contact Mr. Alan Johnson of our staff in Washington, DC, either by telephone at (202) 646-3403 or by facsimile at (202) 646-4596.

Sincerely,

Alan Johnson

Alan A. Johnson, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosure(s)

cc: Mr. Paul D. Sontag, P.E.
City Engineer
City of Alamo Heights

Mr. L. David Givler, M.S.C.E., P.E.
Senior Project Engineer
HDR/Simpson

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITY OF ALAMO HEIGHTS, BEXAR COUNTY, TEXAS, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On February 16, 1996, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Alamo Heights, Bexar County, Texas, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A hydraulic analysis was performed to incorporate more detailed topographic information along New Braunfels, Austin Highway, Broadway Drain from the confluence with the San Antonio River to Chichester Place and the effect of existing culverts along Broadway and Cleveland Court. This analysis also included split-flow conditions through the underground parking area of the H.E.B. grocery store at Patterson Avenue. The modifications have resulted in a revised delineation of the regulatory floodway, an increase and decrease in SFHA width, and increased and decreased BFEs for New Braunfels, Austin Highway, Broadway Drain from the confluence with the San Antonio River to Chichester Place. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Along New Braunfels, Austin Highway, Broadway Drain:		
Approximately 600 feet upstream of confluence with San Antonio River	682	684
Approximately 80 feet downstream of Mary D Avenue	702	699
Just downstream of Grandview Place	714	713
Along New Braunfels, Austin Highway, Broadway Drain Split Flow:		
Approximately 350 feet upstream of convergence with New Braunfels, Austin Highway, Broadway Drain	696	692

*National Geodetic Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Directorate must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Directorate reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Directorate's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Robert Biechlin
Mayor, City of Alamo Heights
6116 Broadway
San Antonio, Texas 78209

Federal Emergency Management Agency
Washington, D.C. 20472

August 3, 1998

Mr. L. David Givler, M.S.C.E., P.E.
Senior Project Engineer
HDR/Simpson
1100 Northeast Loop 410, Suite 200
San Antonio, Texas 78209

IN REPLY REFER TO:
Case No.: 98-06-229P
Community: City of Alamo Heights, Texas
Community No.: 480036

316-AD/ACK

Dear Mr. Givler:

This acknowledges receipt of additional data in support of your request for a Letter of Map Revision for the above-referenced community. Pertinent information about the request is listed below.

Identifier:	H. E. B. Grocery Store
Flooding Source:	New Braunfels, Austin Highway, Broadway Drain
FIRM Panel(s) Affected:	48029C0452 E

Our review of the data submitted indicates we have the minimum data needed to continue our evaluation. If we need additional data to complete our evaluation, or if delays are encountered, we will notify you in writing within 30 days of the date of this letter.

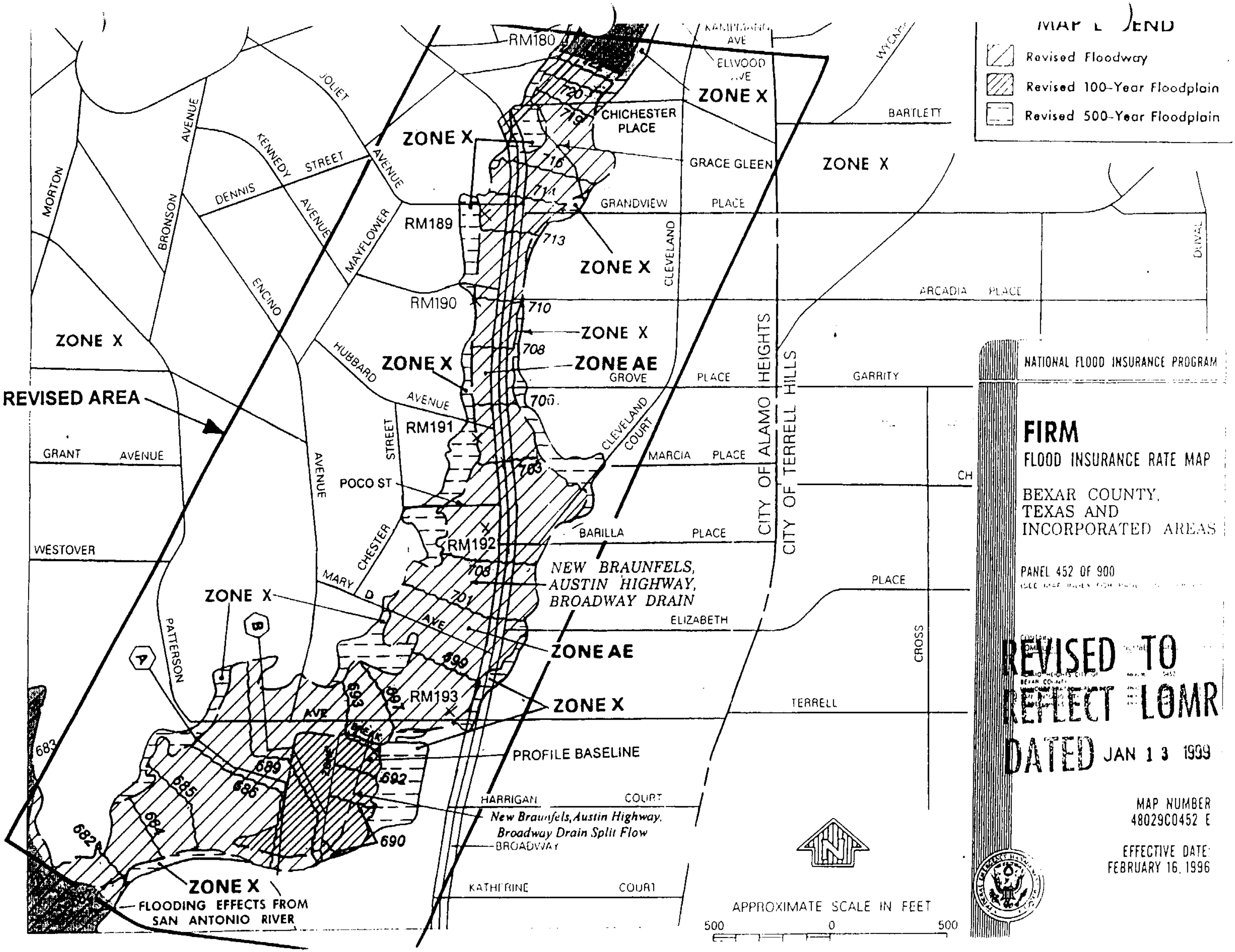
If you write to us about your request, please include the case number shown above in your letter. If you have any questions about the status of your request, please call our Technical Evaluation Contractor, Michael Baker Jr., Inc. The Revisions Coordinator for your state, Mr. Monther S. Madanat, may be reached at (703) 317-6250.

Sincerely,

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

cc: Mr. Paul D. Sontag, P.E.
City Engineer
City of Alamo Heights


MAP LEGEND
Revised Floodway
Revised 100-Year Floodplain
Revised 500-Year Floodplain
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
BEXAR COUNTY, TEXAS AND INCORPORATED AREAS
PANEL 452 OF 900
REVISED TO REFLECT LOMR DATED JAN 13 1999
MAP NUMBER 48029C0452 E
EFFECTIVE DATE: FEBRUARY 16, 1996
APPROXIMATE SCALE IN FEET
500 0 500
REVISED AREA
ZONE X
ZONE AE
ZONE X FLOODING EFFECTS FROM SAN ANTONIO RIVER
NEW BRAUNFELS, AUSTIN HIGHWAY, BROADWAY DRAIN
New Braunfels, Austin Highway, Broadway Drain Split Flow
PROFILE BASELINE
RM180
RM189
RM190
RM191
RM192
RM193
CITY OF ALAMO HEIGHTS
CITY OF TERRELL HILLS
CHICHESTER PLACE
GRACE GLEEN
GRANDVIEW PLACE
ARCADIA PLACE
GROVE PLACE
GARRITY
MARCIA PLACE
BARILLA PLACE
ELIZABETH
TERRELL
HARRIGAN COURT
KATHERINE COURT
BROADWAY
CLEVELAND
CLEVELAND COURT
BARTLETT
ELLWOOD AVE
JOLIET
KENNEDY AVENUE
DENNIS STREET
AVENUE
MAYFLOWER
MORTON
BRONSON
ENCINO
HUBBARD AVENUE
STREET
POCO ST
CHESTER
MARY D AVE
PATTERSON
GRANT AVENUE
WESTOVER
CROSS
DUVAL
683
682
684
685
686
689
690
692
693
699
701
703
706
708
710
713
714
716
719
720

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
MARTINEZ CREEK B					
At Schuwirth Road	14.30	2,000	5,900	8,400	18,000
Approximately 3,300 feet downstream of Interstate Highway 10	9.60	1,183	1,800	2,600	5,500
Approximately 1,000 feet upstream of Interstate Highway 10	8.90	713	1,100	1,279	1,730
At Martinez Creek Dam No. 1	6.30	61	250	319	480
MEDINA RIVER	--*	--*	--*	--*	--*
MEDIO CREEK					
At U. S. Route 90	36.90	5,750	15,900	26,700	48,300
At Cross Section B	32.30	5,430	15,100	22,600	47,000
At FM 1604	22.30	4,580	12,800	18,500	38,200
At Talley Road	16.90	3,990	11,200	16,200	33,300
MOSSEY CUP TRIBUTARY					
Approximately 310 feet above the mouth	0.80	430	1,200	1,800	3,600
MUD CREEK					
At Starcrest Drive	57.2	6,800	19,200	28,300	60,000
Approximately 250 feet downstream of Jones-Maltzburger Road	17.2	4,100	11,000	16,500	33,500
NEW BRAUNFELS AVENUE, AUSTIN HIGHWAY, AND BROADWAY DRAIN					
At Mary D. Avenue	1.89	1,175	2,270	3,130	6,190
At Poco Street	1.42	1,185	2,120	2,880	5,400
At Chichester Avenue	1.25	1,420	2,300	3,000	5,340
At Routt Street	1.13	1,310	2,110	2,760	4,960
At Rittman Road	0.99	1,170	1,890	2,490	4,490
At Wildrose Avenue	0.88	1,050	1,680	2,250	4,020
At Primrose Place	0.74	890	1,420	1,940	3,460
At Halcyon Place	0.62	750	1,220	1,650	2,980
At East Elm View Place	0.53	650	1,050	1,430	2,620
At East Oak View Place	0.44	550	890	1,210	2,210
NEW BRAUNFELS AVENUE, AUSTIN HIGHWAY AND BROADWAY DRAIN SPLIT FLOW					
Approximately 180 feet upstream of convergence with New Braunfels, Austin Highway, and Broadway Drain	N/A	1,225	1,620	1,740	2,290
At divergence from New Braunfels, Austin Highway, Broadway Drain	N/A	520	870	960	1,540

*Data not available

REVISED TO REFLECT LOMR

REVISED D

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
New Braunfels, Austin Highway, Broadway Drain								
A	1053	575	461	9.4	685.7	685.7	685.7	0.0
B	1294	329	330	7.4	689.5	689.5	689.5	0.0

REVISED TO REFLECT LOMR DATED JAN 13 1999

[1]Distance in feet above mouth

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BEXAR COUNTY, TX
AND INCORPORATED AREAS

FLOODWAY DATA

NEW BRAUNFELS, AUSTIN HIGHWAY, BROADWAY DRAIN

CITY OF ALAMO HEIGHTS
6116 BROADWAY
SAN ANTONIO, TEXAS 78209
210-822-3331

August 20, 1999

Division of Emergency Management
Texas Department of Public Safety
5805 N. Lamar Blvd.
P O Box 4087
Austin, TX 78773-0220

RE: FEMA-1257-DR NOI/HMGP-3.2

Fax: (512) 424-7160 / (512) 424-2444

To Whom It May Concern:

In the flood of October 1998, the City of Alamo Heights sustained considerable damage, which we repaired at a total cost of $72,025.49. The majority of the damage was incurred as a result of substantial flooding of our downtown business district.

There is a culvert / storm sewer running beneath the business district that is 1,800 to 2,000 feet long, which helps to move water from the Austin Highway / Broadway area downstream. The entrance to this culvert / storm sewer is too small for the amount of water that accumulated in that area during the flood. We will need to widen that culvert, and are interested in adding an additional opening to the culvert and widening the storm sewer under the business district to prevent or at least substantially reduce flood waters in that area, which caused significant damage, as noted above, and to prevent loss of life (one person drowned in May 1993 at this site). An engineering study is pending to ascertain exactly what the optimal size will be for the additional culvert and storm sewer. The cost for the entire project, including the study, is estimated by our consulting engineers at between $1.5 and $2.0 million.

The city will be able to meet the 25% city share required through the use of a combination of reserve funds and future tax revenues. We would sincerely appreciate your consideration of funds to assist the city in mitigating this disaster area.

Sincerely,

Robert Biechlin
Mayor

Joe Shannon

'rom: Huff, Roy <rhuff@co.bexar.tx.us>
Го: SARA-Joe Shannon <wjshannon@sara-tx.org>
Cc: Mixon, Carl <cmixon@co.bexar.tx.us>; Harris , David <dharris@co.bexar.tx.us>
Sent: Wednesday, November 10, 1999 2:57 PM
Subject: FLOOD INFORMATION

Our records show floods in BC on the following dates:
6/85, 6/4/86, 6/18/86, 5/29-6/13/87, 7/15-7/18/90. 4/4-4/5/91, 5/3/91, 5/12/92, 5/27/92, 5/5/93, 6/21-6/22/97, 10/17-10/18/98.

Details which we have:

7/15/90:
Addresses with probs/flooding: 2575 Haral & Demina, 12000 Somerset Rd, 12701 River Road, 10305 Moursund Ave, Hwy 16 at Applewhite and Zarzamora, 12515 Fischer Rd, Plumnear Rd Trailer Park, Bulverde Rd between Jones-Maltsberger and Rittiman, 8015 Lake Forest, FM 78 and Foster Rd

Crossings at 1937 and the Medina, Cassen Rd and 25, Somerset and 410, Applewhite and the Medina, Cagnon-Jungman-Grossenbacher-Potranco and the Medina

4/4-5/91:
Addresses with problems: Huebner at NW Military, 1604 N and Judson, 1604 S and IH 10E, 1518 and St Hedwig Rd, 8355 Pearsall Rd

5/3/91:
Addresses with problems: 16251 Bandera

5/12/92 and 5/27/92: Those are the ones I spoke to you about. One was along the Medina, and one was in the SE part of the County, in the area from 410 to 1604 along IH 37.

5/5/93: This was flooding along the Medio from the west County line southeast to US 90. Eighteen houses, incl manufactured ones, along the creek sustained heavy damage.

6/21/97:

The flooding was almost a one-area flood, Lakewood Acres east of Randolph AFB. There are roughly 190 homes in the area, and one report at the time showed 143 of them affected. The final estimate had about 30 homes destroyed.

Other addresses affected: 19226 Scenic Loop Rd and 16851 Oak Country in Helotes, 19602 and 19215 Scenic Loop in Grey Forest, 7995 Heuerman Rd, 4357 Wind Valley, 5896 Old Camp Bullis Road, 8617 Flintrock with a Boerne mailing address, and 6780 FM 1863.

10/17/98:

This was an all-quadrants flood. Lakewood Acres was again the hardest hit, with this time perhaps 130 ending up with major damage.

It is my understanding that you have our maps, including copies of 11 different Ferguson map book pages, that give the clearest picture of the number and location of the affected areas. If you need more info on that, or more than that, please let me know.

Roy Huff

CITY OF GREY FOREST
18502 SCENIC LOOP ROAD
HELOTES, TEXAS 78023-9208
(210) 695-3261

November 2, 1999

Mr. Steve Ramsey
Chief Engineer
San Antonio River Authority
P.O. Box 839980
San Antonio, TX 78283-9980

Re: Flood Control Analysis Report-Request for Information

Dear Steve,

Regarding your request received late Monday, October 25, 1999 I am enclosing a copy of a letter I wrote in June, 1999, on this same subject, as we feel it gives a comprehensive overview of flood concerns in our City.

Also enclosed is a copy of Fema Funding we received for damage to our Infrastructure in the October 1998 flood, as well as the amount our City spent over and above Fema funds to repair all the damage. There was one home rendered uninhabitable from the flood although several had some water damage. The owners of the ruined home applied for Fema funds and loans to rebuild. It is our understanding that they did not receive a lot of funding to help them rebuild, but are now in the process of building a new home on higher ground.

Unfortunately, the location of our City includes 6 low water crossings inside our City limits plus several outside our City on Scenic Loop Road. This is the County road that serves as the main thoroughfare through our City and serves as a connecting route between Helotes and Leon Springs and terminates at IH-10 in Kendall County. As the attached letter says, our major problem is flash flooding from Leon Springs and the water sheds above us that come down the creeks through our City.

I hope this information is appropriate and adequate. Please note, our small City has only one employee and when mailing time each direction is deducted, you only allowed us 6 working days to complete this task and comply with your request. Therefore, this may not be all you need. Since we are given 10 working days after a formal request is received under the Open Information Act to respond, we would appreciate a longer response time from you in the future. Please feel free to let us know if further information will help you.

Sincerely,

Edwin L. Faust
Mayor

CITY OF GREY FOREST
18502 SCENIC LOOP ROAD
HELOTES, TEXAS 78023-9208
(210) 695-3281

June 3, 1999

Mr. Craig D. Pedersen
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

Dear Mr. Pedersen,

We were notified by the City of San Antonio regarding their application for a grant that would be used to assist them in the development of a Flood Mitigation Plan. We are a small City of 425 people that is encircled by San Antonio's ETJ.

We encourage you to approve a grant to San Antonio, as we are below a water shed area in their ETJ and have flash floods come through our City via the two creeks that are fed from this water shed above us. The flood in June of 1997 damaged a bridge, two homes and covered our streets and the main arterial through our City with water causing our citizens to be trapped for several hours because of the high water and flash flood danger. Then, during the flood in October of 1999, flash flooding caused by water from above us, took out the same bridge that was damaged in 1997, damaged two other bridges in our City and destroyed one home. Again, our citizens were trapped for several hours due to the high water and flash flooding danger in the creek areas.

Also, we are in the path of development that the City of San Antonio controls. This grant is needed since any studies and planning that results in preventing over development that will create even more flooding problems in this area of Northwestern Bexar County, is going to be advantageous to our City and surrounding areas, as well as the City of San Antonio.

We thank you in advance for considering our comments in your decision making process.

Sincerely,

Edwin L. Faust

Edwin L. Faust
Mayor
City of Grey Forest

cc Thomas G. Wendorf, P.E.
City of San Antonio

TOTAL OBLIGATED REPORT (P.5)

FEMA ______ DR TX: 1257 APPLICANT: GREY FOREST

PKG #	PW #	CAT	PA ID	OBLIGATED	PROJECT AMOUNT	FEDERAL SHARE	SUB-GRANTEE ADMIN	TOTAL OBLIGATED
0	53	C	029-31100-00	18-DEC-1998	6,205.30	4,653.98	186.16	4,840.14
	54	C	029-31100-00	18-DEC-1998	7,004.94	5,253.71	210.15	5,463.86
SUB TOTAL					$13,210.24	$9,907.68	$396.31	$10,303.99
13	3025	C	029-31100-00	25-JAN-1999	4,260.00	3,195.00	127.80	3,322.80
	3026	C	029-31100-00	25-JAN-1999	1,082.00	811.50	32.46	843.96
	3176	F	029-31100-00	25-JAN-1999	2,397.49	1,798.12	71.92	1,870.04
SUB TOTAL					$7,739.49	$5,804.62	$232.18	$6,036.80
16	3177	F	029-31100-00	05-FEB-1999	9,531.72	7,148.79	285.95	7,434.74
19	3178	F	029-31100-00	17-FEB-1999	7,951.60	5,963.70	238.55	6,202.25
GRAND TOTAL					$38,433.05	$28,824.79	$1,152.99	$29,977.78
Grand Count PW #	7							

City Projects

Utility FEMA Funds for Areas outside City

Required Grey Forest Bridge

Park Bridge

Hilltop Bridge

Water lines at GF & Hilltop Bridge

FEMA Funds Recieved For Oct, 98 Flood 16,340.79

City Contribution to Match FEMA Funds 25% 4,522.56

Total 20,863.35

City expense to Replace A Bridge FEMA only Contributed $5,463.86 that was rendered unsafe By flood $77,086.14 (Grey Forest Bridge)

Debris Cleanup FEMA did Not Contribute to & Added Engineer Fees 352.00

Approximate Cost of Flood to City $98,151.49

* Note - All Bridges on Helotes Creek that the water was very high & then

CITY OF LEON VALLEY

6400 EL VERDE ROAD • LEON VALLEY, TEXAS 78238

TELEPHONE 210-684-1391

Date: 11/5/99

San Antonio River Authority
100 East Guenther Street
San Antonio, Texas 78283-9980
Attn: Steve Ramsey, P.E., Chief Engineer

Ref: Bexar County Area Wide Flood Control Analysis Report
Request For Information

Dear Mr. Ramsey,

Enclosed per your request of October 22, 1999, is a drawing showing the areas in Leon Valley which are prone to major and repetitive flooding along with the list of damage estimates as determined by our Development Office after the October, 98 flood.

Also included is our claim to FEMA for recovery of cost for public improvements damaged by the flood.

The major improvement needed to reduce this flooding in Leon Valley would be:

1. Increased capacity of the Huebner Creek below Bandera Road.

2. Increased capacity of the Huebner Creek crossing under Bandera Road from 4450 cfs to 17,000 cfs. Estimated cost $615,000. Benefit- 40,000 persons.

3. Increased capacity of Huebner Creek between Bandera Road and Evers Road- Reduces flooding of City Park, Poss Road, and some housing in this area, allows for Evers Road Culvert to be constructed- Estimated cost - $7,546,000.

4. Replace the Evers Road Culvert to accommodate a 100 year storm- Estimated cost- $766,000 (included in item 3 above).

The City Council has not identified funding for any of these projects.

If you need further information on these items, please call me at 681-1232.

Sincerely Yours,

Patrick L. Wright

Patrick L. Wright, P.E.
Director of Public Works

SITE ASSESSMENT - BUSINESS LOSSES

(1) COUNTY: Bexar

(2) CITY: Leon Valley

(3) INCIDENT: Flood

(4) DAMAGE ASSESSMENT TEAM

Glen A. Roach - Bldg Inspector

Brian Skelly - Deputy Fire Marshal

(5) INCIDENT PERIOD: 10/17/98

(6) DATE OF SURVEY:

(7) PAGE 1 OF

REF NO. (8)	NAME OF BUSINESS / NAME OF TENANT/OWNER / TYPE OF BUSINESS / STREET ADDRESS / PHONE NO. (9)	ESTIMATED DAYS OUT OF OPERATION (10)	EMPLOYEES NO. (11)	EMPLOYEES UI (12)	FAIR REPLACEMENT VALUE (13)	ESTIMATED DOLLAR LOSS (14)	AMOUNT OF ANTICIPATED INSURANCE (15)	% UNINSURED LOSS (16)	IF COL 16 IS: < 40% MIN (17)	IF COL 16 IS: > 40% MAJ (18)
B/PO	PILGRIM CLEANERS .5' 6600 BANDERA 647-1125	1	20		CONTENTS:$ 10,000. STRUCTURE:$ -0- LAND:$ -0-	$ 7,000 $ $	$? $ $			
B- PO-	HAIR TECH 2000 / DIANA DIAZ DE LEON 4' ERNESTO PANICCIOLI 6528 BANDERA RD 681-2000	4	8		CONTENTS:$ 40,000 STRUCTURE:$ 15,000 LAND:$ 20,000	$ 3,500 $ $	$ 0 $ $	100%		✓
B- PO-	DULUX PAINT - GARY RILEY .5' PAPE CONST. CO 6520 BANDERA 681 6950	1	4		CONTENTS:$ 0 STRUCTURE:$ 0 LAND:$ 0	$ 1000.00 $ $	$ $ $		✓	
B- O-	MR. MATTRESS FURN. BULL PROPERTIES 6516 BANDERA .5' 647-7283	4	6		CONTENTS:$ 4000 STRUCTURE:$ -0- LAND:$ -0-	$ $ 14,000.00 $	$ $ $			✓
B- PO-	CHA-CHAS REST. RICARDO RUIZ GENE COOPER 5616 BANDERA 3' 681 2066	1	20		CONTENTS:$ 15,000. STRUCTURE:$ 3,000. LAND:$ 20,000.	$ $ 38,000 $	$ $ 0 $	100%		✓
B P/O	DARRYL'S CARS DARRYL LOCKHART 5900 NW INDUSTRIAL .5 680-7222	1	2		CONTENTS:$ 3000.00 STRUCTURE:$ 500.00 LAND:$	$ $ 3,500. $	$ $ $			
					CONTENTS:$ STRUCTURE:$ LAND:$	$ $ $	$? $ $			

Jim - 366-0033 for mr. mattress

no permit required - flow thru building - no damage to structure

(1) COUNTY Bexar

(2) MUNICIPALITY Leon Valley

(3) TYPE OF INCIDENT: Flood

(4) DAMAGE ASSESSMENT TEAM:

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(5) INCIDENT PERIOD: 10/17/98

(6) DATE OF SURVEY: 10 [illegible]

(7) PAGE 1 OF ___

(8) REF NO	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
✓	HOWARD SCHENCK 6401 EL VERDE 684 0492	SF	MIN	1½	MID	Y	O	P	0 STRUCTURE $10,000 CONTENTS		[illegible]		100%
✓	YOLANDA LOPEZ 6317 EL VERDE [illegible]1-1811	SF	MIN	1½	MID	Y	O	P	[illegible] STRUCTURE $2,000 CONTENTS		[illegible]		[illegible]
✓	EARNEST W. LIECK 6312 EL VERDE 684 2070	SF	MIN	3'	MID	Y	O	P	[illegible] STRUCTURE $10,000 CONTENTS		[illegible]		[illegible]
✓	GUS GERFERS 6305 EL VERDE 684 [illegible]	SF	MIN	0	MID	Y	O	P	[illegible] STRUCTURE [illegible] CONTENTS		[illegible]		100
✓	JOHN SMITH 6304 EL VERDE 684 1149	SF	MIN	0	MID	Y	O	P	[illegible] STRUCTURE 0 CONTENTS		[illegible]		100%
✓	GEORGE DAUGHERTY 6300 EL VERDE 684 1904	SF	MIN	.5	MID	Y	O	P	0 STRUCTURE $500 CONTENTS		[illegible]		[illegible]
	TOTALS	SF___ MF___ MH___	DEST___ MAJ___ MIN___		H___ M___ L___	Y___ N___	O___ R___	P___ S___	STRUCTURE CONTENTS	$	$	$	

1-31 INSTRU[CTION]S ON REVERSE

(1) COUNTY Bexar

(2) MUNICIPALITY Leon Valley

(3) TYPE OF INCIDENT: Flood

(4) DAMAGE ASSESSMENT TEAM:

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(5) INCIDENT PERIOD: [illegible]

(6) DATE OF SURVEY: 12-[illegible]-98

(7) PAGE 2 OF ___

	(8) REF NO.	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
	✓	JOHN LYDIA ESSARY 6301 EL VERDE 684 0863	SF	MIN	0	M	Y	O	P	0 STRUCTURE 0 CONTENTS		0		[illegible]
	✓	JEAN FOX 6217 EL VERDE 647 1273	SF	MIN	0	M	Y	O	P	0 STRUCTURE 0 CONTENTS				
X	✓	CARL RAYBORN 6208 EL VERDE 684 1570	SF	MAJ	1½	M	Y	O	P	$45,000 STRUCTURE $35,000 CONTENTS	$80,000	CONTENTS ONLY $15,000	$65,000	75%
	✓	SAM VALENTI 6209 EL VERDE 684 2530	SF	MIN	1	M	Y	O	P	0 STRUCTURE 7,500 CONTENTS	$7,500	0	7,500	100%
5		MIGUEL CONCHAS 6205 EL VERDE 684 8345	SF	MIN	2	M	Y	O	P	$20,000 STRUCTURE 30,000 CONTENTS	$50,000		$50,000	100%
	✓	WILBER HENNIG 6201 EL VERDE 684 1969	SF	MIN	.5	M	Y	O	P	— STRUCTURE 10,000 CONTENTS	$10,000	[illegible]		
		TOTALS	SF___ MF___ MH___	DEST___ MAJ___ MIN___		H___ M___ L___	Y___ N___	O___ R___	P___ S___	___ STRUCTURE ___ CONTENTS	$	$	$	

1-31 INSTRUCTIONS ON REVERSE

(1) COUNTY Bexar

(2) MUNICIPALITY Leon Valley

(3) TYPE OF INCIDENT: Flood

(4) DAMAGE ASSESSMENT TEAM:

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(5) INCIDENT PERIOD: 10/17/98

(6) DATE OF SURVEY: [illegible]

(7) PAGE 3 OF [illegible]

(8) REF NO	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
✓	BILL OTTERBUHL 6109 EL VERDE 684 0769	SF	MIN	Ø	M	Y	O	P	Ø STRUCTURE Ø CONTENTS	Ø	[illegible]	[illegible]	[illegible]
	DOLORES ESTRADA 6008 EL VERDE 680 7881	SF	MIN	.5	M	Y	O	P	Ø STRUCTURE 5,000 CONTENTS	5000	90%	$750	10%
✓	ARTHUR TSCHIRHART 6009 EL VERDE	SF	MIN	Ø	M	Y	O	P	Ø STRUCTURE Ø CONTENTS	[illegible]	[illegible]	[illegible]	
4	JIM HENNIG 6005 EL VERDE 684 5761	SF	MIN	2	M	Y	O	P	5000 STRUCTURE 8500 CONTENTS	13,500	[illegible]	$13,500	[illegible]
✓	ANDRE BERRERA 6004 EL VERDE 521 6950	SF	M	Ø	M	Y	R	P	STRUCTURE CONTENTS	[illegible]	[illegible]	[illegible]	[illegible]
7 ✓	JOE ANTU 6001 EL VERDE 681 8025	SF	M	1.5'	M	Y	O	P	30,000 STRUCTURE 17,500 CONTENTS	$17,500	[illegible]	[illegible]	10%
	TOTALS	SF ___ MF ___ MH ___	DEST ___ MAJ ___ MIN ___		H ___ M ___ L ___	Y ___ N ___	O ___ R ___	P ___ S ___	STRUCTURE CONTENTS	$	$	$	

1-31 INSTRUCTIONS ON REVERSE

(1) COUNTY Bexar

(2) MUNICIPALITY Leon Valley

(3) TYPE OF INCIDENT: Flood

(4) DAMAGE ASSESSMENT TEAM:

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(5) INCIDENT PERIOD: 10/17/98

(6) DATE OF SURVEY: 10-22-98

(7) PAGE 4 OF ___

(8) REF NO.	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
✓	Jesse Barrera 5908 El Verde 684 3611	SF	m	.5'	M	Y	O	P	Ø STRUCTURE 5000 CONTENTS	$5000		500	10%
✓	Joe Avelar 6200 El Verde 684 8661	SF	m	Ø	m	Y	O	P	Ø STRUCTURE Ø CONTENTS	Ø			
8	Rosaline Carter 5813 El Verde 684 2790	SF	m	1.5'	m	Y	O	P	12,500 STRUCTURE 5000 CONTENTS	17,500	Ø	[illegible]	100%
9	Bill Hardin 5805 El Verde 684 2982	SF	m	2.5'	m	Y	O	P	15000 STRUCTURE 12000 CONTENTS	$17,000	Ø	$1700	100%
10	Matthew Hodde 5804 El Verde 543 0365	SF	m	Ø	m	Y	O	P	750 STRUCTURE 250 CONTENTS	$1000	Ø	$1000	100%
11	Bob Haase 5800 El Verde 681 7948	SF	m	1.5'	M	Y	O	P	15,000 STRUCTURE 15000 CONTENTS	$30,000	[illegible]	[illegible]	50%
	TOTALS	SF ___ MF ___ MH ___	DEST ___ MAJ ___ MIN ___		H ___ M ___ L ___	Y ___ N ___	O ___ R ___	P ___ S ___	STRUCTURE CONTENTS	$	$	$	

1-31 INSTRUCTIONS ON REVERSE

(1) COUNTY: Bexar

(2) MUNICIPALITY: Leon Valley

(3) TYPE OF INCIDENT: Flood

(4) DAMAGE ASSESSMENT TEAM:

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(5) INCIDENT PERIOD: 10/17/98

(6) DATE OF SURVEY: 10-[illegible]-98

(7) PAGE 5 OF ___

	(8) REF NO	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
12		LAKE ANDREWS 5801 EL VERDE 684 8474	SF	MAJ	3'	M	Y	O	P	$20,000 STRUCTURE $20,000 CONTENTS	$40,000	35,000	$5,000	15%
13 Turned in		JONATHAN HENLEY 5713 EL VERDE 520 5211	SF	MAJ	1.5'	M	Y	O	P	$17,500. STRUCTURE 8,500. CONTENTS	$26,000	Ø	$26,000	100%
14 Turned in		CECIL COX 5712 EL VERDE 520 3355	SF	MAJ	1.5'	M	Y	O	P	$15,000 STRUCTURE 30,000 CONTENTS	$45,000	44,000	DEDUC 1000.	[illegible]
16		CARL RICHARDSON 5709 EL VERDE 521-4824	SF	MAJ	3'	M	Y	O	P	20,[illegible] STRUCTURE $10,000 CONTENTS	$[illegible]	Ø	$30,000.	100%
16		JESSE MARTINEZ 5708 EL VERDE 681 0845	SF	MIN	1'	M	Y	O	P	$15,000 STRUCTURE 10,000. CONTENTS	$25,000	Ø	$25,000	100%
17		EDWARD OLNICK 5705 EL VERDE 684 7210	SF	MIN	1.5	M	Y	O	P	$15,000. STRUCTURE $15,000 CONTENTS	$30,000	$30,000	Ø	Ø
		TOTALS	SF ___ MF ___ MH ___	DEST ___ MAJ ___ MIN ___		H ___ M ___ L ___	Y ___ N ___	O ___ R ___	P ___ S ___	___ STRUCTURE ___ CONTENTS	$	$	$	

1-31 INSTRUCTIONS ON REVERSE

(1) CO[illegible]Y Bexar

(2) MUNICIPALITY Leon Valley

(3) TYPE OF INCIDENT: Flood

(4) DAMAGE ASSES[illegible]ENT TEAM:

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(5) INCIDENT PERIOD: 10/17/98

(6)DATE OF SURVEY: [illegible]

(7) PAGE 6 OF ___

(8) REF NO	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
✓	HOMER MIRELES 6104 JEFF LOOP 647 4702	SF	M	[illegible]	L	Y	O	P	STRUCTURE CONTENTS	[illegible]			
✓	JOANNE PETERSON 6113 JEFF LOOP 684 [illegible]	SF	M	[illegible]	M	Y	O	P	STRUCTURE CONTENTS	[illegible]			
✓	JOSEPH L. [illegible] 6209 JEFF LOOP 684 [illegible]	SF	M	.5	M	Y	O	P	STRUCTURE [illegible] CONTENTS	[illegible]			
✓	JAMES SCHEFFLER 6205 JEFF LOOP 684 2386	SF	M	.5	M	Y	O	P	STRUCTURE [illegible] CONTENTS	[illegible]			
✓	MARCELLA ZUNIGA 6204 JEFF LOOP 681 6052	SF	M	[illegible]	M	Y	O	P	[illegible] STRUCTURE CONTENTS	[illegible]			
✓	MELVIN BURKER 6212 JEFF LOOP 684 [illegible]	SF	M	[illegible]	M	Y	O	P	STRUCTURE CONTENTS	[illegible]			
	TOTALS	SF ___ MF ___ MH ___	DEST ___ MAJ ___ MIN ___		H ___ M ___ L ___	Y ___ N ___	O ___ R ___	P ___ S ___	STRUCTURE CONTENTS	$	$	$	

1-31 INSTR[illegible] [illegible]S ON REVERSE

(1) CO[illegible]Y Bexar | (4) DAMAGE ASSESSMENT TEAM: Glen A. Roach - Bldg Inspector, Brian Skelly, Deputy Fire Marshall | (5) INCIDENT PERIOD: 10/17/98

(2) MUNICIPALITY Leon Valley

(3) TYPE OF INCIDENT: Flood

(6) DATE OF SURVEY:

(7) PAGE 7 OF

(8) REF NO	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
✓	KAYVON SARKAEDEH 6213 Jeff Loop 684 2208	SF	M	[illegible]	M	Y	[illegible]	P	[illegible] STRUCTURE CONTENTS	2000			
✓	[illegible] COCKRELL 6304 Jeff Loop 684 1274	SF	M	[illegible]	M	[illegible]	O		10,000 STRUCTURE CONTENTS	[illegible]			
18	FAYE FRANKS 6328 Jeff Loop 684 2930	SF	M	1	M	Y	O	P	2,000 STRUCTURE 5,000 CONTENTS	7,000			
19 ✓	DWIGHT JONES 6324 [illegible] 684 50[illegible]	SF	M	1	M	Y	O	P	15,000 STRUCTURE 10,000 CONTENTS	25,000		1700	
EST.	~~HARRISON 6308 EL VERDE~~	~~SF~~	~~M~~	~~.5~~	~~M~~	~~Y~~	~~O~~	~~P~~	10,000 STRUCTURE 5,000 CONTENTS	~~15,000~~	PAGE 10		
20 EST.	DRBISS 6216 EL VERDE	SF	M	.5	M	Y	O	P	6,000 STRUCTURE 4,000 CONTENTS	10,000			
	TOTALS	SF MF MH	DEST MAJ MIN		H M L	Y N	O R	P S	STRUCTURE CONTENTS	$	$	$	

1-31 INSTRU[illegible] IS ON REVERSE

(1) CC Y Bexar

(2) MUNICIPALITY Leon Valley

(3) TYPE OF INCIDENT: Flood

(4) DAMAGE ASSES ENT TEAM:

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(5) INCIDENT PERIOD: 10/17/98

(6) DATE OF SURVEY:

(7) PAGE 2 OF

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	REF NO.	NAME ADDRESS PHONE	TYPE OF STRUCTURE SF MF MH	DAMAGE CATEGORY DESTROYED MAJOR MINOR	WATER LEVEL IN STRUCTURE (IN FEET)	ESTIMATED INCOME HIGH MIDDLE LOW	IS STRUCTURE OCCUPIED Y/N	STATUS OWN RENT	RESIDENCE PRIMARY OR SECONDARY	FAIR REPLACEMENT VALUE	ESTIMATED LOSS $	ANTICIPATED INSURANCE $	AMOUNT OF UNINSURED LOSS $	PERCENT OF UNINSURED LOSS
21	EST	6213 EL VERDE	SF	M	.5	M	Y	O	P	5000. STRUCTURE 5000. CONTENTS	10,000			
	EST	SCHULZE 6204 EL VERDE	SF	M	.5	M	Y	O	P	0 STRUCTURE $5000. CONTENTS	$5,000			
		JAMES PAULING 6101 EL VERDE 684-8281	SF	M	0	M	Y	O	P	0 STRUCTURE 0 CONTENTS	0	0	0	
22		PAUL WEISS 5608 EL VERDE 684 0586	SF	M	2'	M	Y	O	P	15,000 STRUCTURE 15,000 CONTENTS	$30,000	0	$30,000	100%
	EST	NEILL 5905 EL VERDE	SF	M	0	M	Y	O	P	-- STRUCTURE -- CONTENTS	0	0	0	0
23	EST	S. QUIPP 5901 EL VERDE	SF	M	1.5	M	Y	O	P	12,500. STRUCTURE 5000. CONTENTS	17,500.			
		TOTALS	SF___ MF___ MH___	DEST___ MAJ___ MIN___		H___ M___ L___	Y___ N___	O___ R___	P___ S___	STRUCTURE ___ CONTENTS	$	$	$	

1-31 INSTRU IS ON REVERSE

(1) CO), Bexar (4) DAMAGE ASSES)NT TEAM: (5) INCIDENT PERIOD: 10/17/98)

(2) MUNICIPALITY Leon Valley

Glen A. Roach - Bldg Inspector

(6)DATE OF SURVEY:

(3) TYPE OF INCIDENT: Flood

Brian Skelly , Deputy Fire Marshall

(7) PAGE 9 OF

(8) REF NO.	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
24	Rick Rangel 5900 El Verde	SF	m	.5	m	Y	O	P	5000. STRUCTURE 5,000 CONTENTS	$10,000			
25	Paul Farrar 58~~12~~ El Verde	SF	m	Conv. Garage 2'	m	Y	O	P	1500. STRUCTURE 2500. CONTENTS	4,000	[illegible]	[illegible]	[illegible]
26	Vicki Campos 5704 El Verde 521 2302	SF	m	1'	m	Y	O	P	7000 STRUCTURE 3000.00 CONTENTS	$10,000.00	$9000	1000.	10%
27	Schwenke 5617 El Verde	SF	m	3'	m	Y	O	P	25,000 STRUCTURE 15,000 CONTENTS	40,000			
	5616 El Verde	SF	m	-0-	m	Y	O	P	-0- STRUCTURE -0- CONTENTS	-0-	-0-	-0-	-0-
28	Griffin 5612 El Verde	SF	m	1'	m	Y	O	P	5,000 STRUCTURE 5,000 CONTENTS	$10,000			
	TOTALS	SF___ MF___ MH___	DEST___ MAJ___ MIN___		H___ M___ L___	Y___ N___	O___ R___	P___ S___	STRUCTURE ___ CONTENTS ___	$	$	$	

1-31 INSTRU[CTION]S ON REVERSE

(1) C...): Bexar | (4) DAMAGE ASSESSMENT TEAM: | (5) INCIDENT PERIOD: 10/17/98

(2) MUNICIPALITY Leon Valley

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(6) DATE OF SURVEY: 10-22-98

(3) TYPE OF INCIDENT: Flood

(7) PAGE 10 OF ___

(8) REF NO	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME NON MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
29 ✓	ART PETERSON 5603 EL VERDE 522-9423	SF	M	1.5'	M	Y	O	P	$30,000. STRUCTURE $10,000. CONTENTS	$40,000	[illegible]	11,000	40%
30	CECIL DOWELL 5600 EL VERDE 684 2649	SF	M	3'	M	Y	O	P	$50,000 STRUCTURE 40,000 CONTENTS	$90,000	$88,500	$1,500	[illegible]
31 ✓	WILLIAM BORGMAN 6200 JEFF LOOP 684 1866	SF	M	.5	M	Y	O	P	3000.00 STRUCTURE 5000.00 CONTENTS	$8000	∅	8000	[illegible]
32 EST.	6116 JEFF LOOP Rebecca Ray	SF	M	1'	M	Y	O	P	$3000. STRUCTURE $7000. CONTENTS	10,000			
33 ✓	E.W. ANGLIN 6112 JEFF LOOP 6841812	SF	M	2'	M	Y	O	P	$20,000 STRUCTURE $7,000 CONTENTS	[illegible] $27,000	∅	$27,000	100%
34 ✓	ROBERT HARRISON 6308 EL VERDE 684 7317	SF	M	1'	M	Y	O	P	$25,000 STRUCTURE $15,000 CONTENTS	BOWED IN C... ... 40,000	∅	$40,000	100%
TOTALS		SF___ MF___ MH___	DEST___ MAJ___ MIN___		H___ M___ L___	Y___ N___	O___ R___	P___ S___	STRUCTURE CONTENTS	$	$	$	

1-31 INSTRUCTIONS ON REVERSE

(2) **MUNICIPALITY** Leon Valley

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(6) **DATE OF SURVEY:**

(3) **TYPE OF INCIDENT:** Flood

(7) **PAGE** 11 **OF**

(8) REF NO.	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
35 ✓	MARK + SUSAN LIBBY 6101 JEFF LOOP	SF	M	.5	M	Y	O	P	25,000 STRUCTURE 5000.00 CONTENTS	$30,00	$25,000	$5,000	15%
36 ✓	LARRY + LINDA GRIFFIN 5612 EL VERDE	SF	MAJ	3'	M	Y	O	P	25,000 STRUCTURE 15,000 CONTENTS	$40,000	25,000	15,00	40%
✓	DAVID COOPER 6603 CHERRYLEAF 684 8208	SF	M	2.5'	M	Y	R	P	STRUCTURE 2500.00 CONTENTS				
✓	OSCAR GUARDIAN 6605 CHERRYLEAF 521 6198	SF	M	2.5'	M	Y	R	P	STRUCTURE 6000.00 CONTENTS				
✓	FRANK LUNA 6602 PEACHTREE 521-9875	SF	M	.5	M	Y	O	P	Ø STRUCTURE 1000.00 CONTENTS	1000.00	Ø	$1,000	Ø
✓	HOWARD COLYER 6100 ~~[illegible]~~ El Verde 681 7744	SF	M	.5	M	Y	O	P	Ø STRUCTURE 3000.00 CONTENTS	$3,000.00	Ø	$3,000	
	TOTALS	SF ___ MF ___ MH ___	DEST ___ MAJ ___ MIN ___		H ___ M ___ L ___	Y ___ N ___	O ___ R ___	P ___ S ___	STRUCTURE CONTENTS	$	$	$	

1-31 INSTRU[illegible]S ON REVERSE

(2) MUNICIPALITY Leon Valley

Glen A. Roach - Bldg Inspector

Brian Skelly , Deputy Fire Marshall

(6) DATE OF SURVEY:

(3) TYPE OF INCIDENT: Flood

(7) PAGE 12 OF

(8) REF NO.	(9) NAME ADDRESS PHONE	(10) TYPE OF STRUCTURE SF MF MH	(11) DAMAGE CATEGORY DESTROYED MAJOR MINOR	(12) WATER LEVEL IN STRUCTURE (IN FEET)	(13) ESTIMATED INCOME HIGH MIDDLE LOW	(14) IS STRUCTURE OCCUPIED Y/N	(15) STATUS OWN RENT	(16) RESIDENCE PRIMARY OR SECONDARY	(17) FAIR REPLACEMENT VALUE	(18) ESTIMATED LOSS $	(19) ANTICIPATED INSURANCE $	(20) AMOUNT OF UNINSURED LOSS $	(21) PERCENT OF UNINSURED LOSS
37 p. 3 coming	ROLAND ALLBRKAMP 6213 EL VERDE 523 0606	SF	MAJ	.5	m	Y	O	P	$35,000 STRUCTURE 2,000 CONTENTS	$37,000	35,000	$2,000	10%
								STRUCTURE CONTENTS					
								STRUCTURE CONTENTS					
								STRUCTURE CONTENTS					
								STRUCTURE CONTENTS					
								STRUCTURE CONTENTS					
	TOTALS	SF MF MH	DEST MAJ MIN		H M L	Y N	O R	P S	STRUCTURE CONTENTS	$	$	$	

1-31 INSTRUCTIONS ON REVERSE

FEDERAL EMERGENCY MANAGEMENT AGENCY
PROJECT WORKSHEET

O.M.B. No. 3067-0151
Expires April 30, 2001

PAPERWORK BURDEN DISCLOSURE NOTICE

DECLARATION NO FEMA-1257-DR-TX | PROJECT NO. 4 | FIPS NO. 29-42388-00 | DATE 10-17 | CATEGORY G

APPLICANT: City of Leon Valley | COUNTY: Bexar

DAMAGED FACILITY: City Park | WORK COMPLETE AS OF: 12-7-98 : 60 %

LOCATION: 6440 Evers | LATITUDE | LONGITUDE

DAMAGE DESCRIPTION & DIMENSIONS
Repair Fence at Baseball diamond and Fence at Community Garden Located at The Sowest Part of Park, Additionaly will Repair Fence Locate at The Extream Sowest Corner damage by Flood. will Procure and Replace Picnic Table That was wash away From the [illegible] Corner of Park

SCOPE OF WORK
Will Salvage Fence Posts and Fabric From Chain Link Fence Break off Concrete From post, Redig holes, and Install posts with Concrete After Concrete Sets will be Install Fence Fabric, at The Extream Sowest Corner will Salvage what is Possible of Wood Fence Sections Re Install Posts with concrete and Re Install Slats will Assemble Picnic Table after Being received, and Install on Existing Formation Located at The So. (eastern) Part of The Park Located near The main Path way

Does the Scope of Work change the pre-disaster conditions at the site? ☐ Yes ☒ No

Special Considerations issues included? ☒ Yes ☐ No Hazard Mitigation proposal included? ☐ Yes ☒ No

Is there insurance coverage on this facility? ☐ Yes ☒ No

PROJECT COST

ITEM	CODE	NARRATIVE	QUANTITY/UNIT	UNIT PRICE	COST
1	9007	Replace Park Fence at			
		Baseball Diamond and Community	100-320-520.03		
		Garden Labor Summary, spread Sand	LS	LS	4,512.5
2	9999	Concrete For Fence 100-320-520.03	LS	LS	450.0
3	9009	Miss. Supplies, wood screws 100-320-520.03	LS	LS	128.0
4	9999	Picnic TABLE 100-320-540.51	LS	LS	439
5	9999	Sand for play Ground 100-320-510.01	LS	LS	671
6	7008	Force Account Equipment Summary 100-300-520.03	LS	LS	2737.20
7	9999	Equipment Rental 100-300-520.03	LS		112.00
				TOTAL COST	9,049.74

PREPARED BY: E HORTON, EWALD BLASCHKE [signature] Em. Mgt Coor.

FEMA Form 90-91, SEP 98 REPLACES ALL PREVIOUS EDITIONS

FEDERAL EMERGENCY MANAGEMENT AGENCY
PROJECT WORKSHEET

O.M.B. No. 3067-0151
Expires April 30, 2001

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 30 minutes. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing an submitting the forms. You are not required to respond to this collection of information unless a valid OMB control number is displayed in the upper right corner of the forms. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing the burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472, Paperwork Reduction Project (3067-0151). NOTE: Do not send your completed form to this address.

DECLARATION NO	PROJECT NO.	FIPS NO.	DATE	CATEGORY
FEMA-1257-DR-TX	13	29-43288-00	10-17-98	B

APPLICANT: City of Leon Valley

COUNTY: Bexar

DAMAGED FACILITY: City Hall, Library annex, and Public Streets

WORK COMPLETE AS OF: 12-8 : 100 %

LOCATION: 6400 Eluerde Rd, 6500 Evers, and Eluerde + Jeff Loop

LATITUDE

LONGITUDE

DAMAGE DESCRIPTION & DIMENSIONS

Temporary Repair at Drive ways as needed, Air Condition Repair at Library annex, water extraction of flooded carpet at city Hall, and Replacement of one carpet in city Hall

SCOPE OF WORK

Added Road base to Drive ways and Roadway washouts on Eluerde and Jeff Loop which had Base and asphalt washed away during flooding. Repair Air Conditioning condensing unit which was under water at Library annex at 6500 Evers Road.
Contractor was hired to extract and Dry carpet in city hall that was under water due to flood one carpet did not dry completely, mildewed and had to be replaced.

Does the Scope of Work change the pre-disaster conditions at the site? ☐ Yes ☒ No

Special Considerations issues included? ☒ Yes ☐ No Hazard Mitigation proposal included? ☐ Yes ☒ No

Is there insurance coverage on this facility? ☐ Yes ☒ No

PROJECT COST

ITEM	CODE	NARRATIVE	QUANTITY/UNIT	UNIT PRICE	COST
1	3088	Road Base 100-320-520.03	60.18 Tons	2.45 Ton	147.44
2	9999	water Extraction city hall 100-300-530	01 L.S	L.S	2383.70
3	9999	Carpet Replacment city Hall 100-300-53[illegible]	01 L.S	L.S	351.00
4	5281	Air Conditioning Repair Library annex	L.S	L.S	144.66
5	9007	Force account Labor 100-300-510.01	L.S.	L.S.	347.34
6	9008	Force account Equipment 100-300-520.02	L.S.	L.S.	98.00
				TOTAL COST	3472.14

PREPARED BY: E Horton, EWALD BLASCHKE [signature] Em. Mgt. Coc

FEMA Form 90-91, SEP 98 REPLACES ALL PREVIOUS EDITIONS

FEDERAL EMERGENCY MANAGEMENT AGENCY
PROJECT WORKSHEET

O.M.B. No. 3067-0151
Expires April 30, 2001

PAPERWORK BURDEN DISCLOSURE NOTICE

DECLARATION NO	PROJECT NO.	FIPS NO.	DATE	CATEGORY
FEMA-1257-DR-TX	2	29-42388-00	10-17-98	A

APPLICANT: City of Leon Valley
COUNTY: Bexar

DAMAGED FACILITY: Public Streets and Right of ways
WORK COMPLETE AS OF: 12-9-98 : 100 %

LOCATION: Eldridge Rd From Bandera Rd To End cul de sac From [illegible] from 6400 Eldridge To 6105 Eldridge
LATITUDE:
LONGITUDE:

DAMAGE DESCRIPTION & DIMENSIONS

Remove flood Debris from public Rights of way, easments, and Drainage ways

SCOPE OF WORK

Remove Debris such as Brush, Asphalt, Rocks mud That were deposited By The floods. Additionally Debris placed at The Curbline by Residents That was Damaged By flooding was removed

Does the Scope of Work change the pre-disaster conditions at the site? ☐ Yes ☒ No

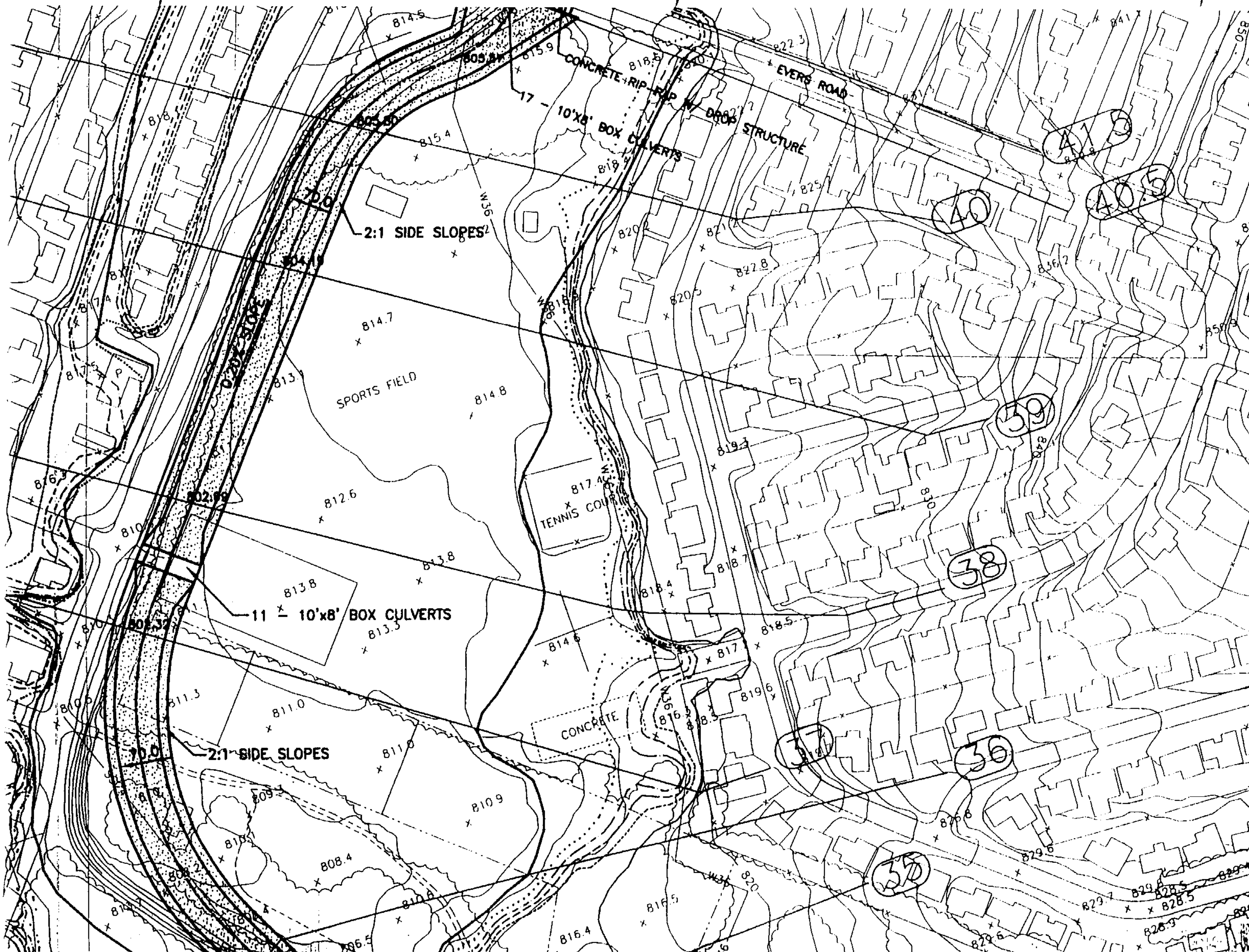
Special Considerations issues included? ☒ Yes ☐ No Hazard Mitigation proposal included? ☐ Yes ☒ No

Is there insurance coverage on this facility? ☐ Yes ☒ No

PROJECT COST

ITEM	CODE	NARRATIVE	QUANTITY/UNIT	UNIT PRICE	COST
		100-600 530.02			
1	9999	Debris Removal (Contract Work)	LS	LS	1,387.25
	9007	Force account Labor 100-600 510.01	L.S	L.S	1,392.52
	9004	Force account Equipment 100-600 520.02	L.S	L.S	1,034.70
				TOTAL COST	3,814.47

PREPARED BY: E Horton, EWALD BLASCHKE [signature] Em. Mgt Coor.


EVERS ROAD
CONCRETE RIP-RAP W/ DROP STRUCTURE
17 - 10'x8' BOX CULVERTS
2:1 SIDE SLOPES
SPORTS FIELD
TENNIS COURT
11 - 10'x8' BOX CULVERTS
CONCRETE
2:1 SIDE SLOPES
41
40.5
40
39
38
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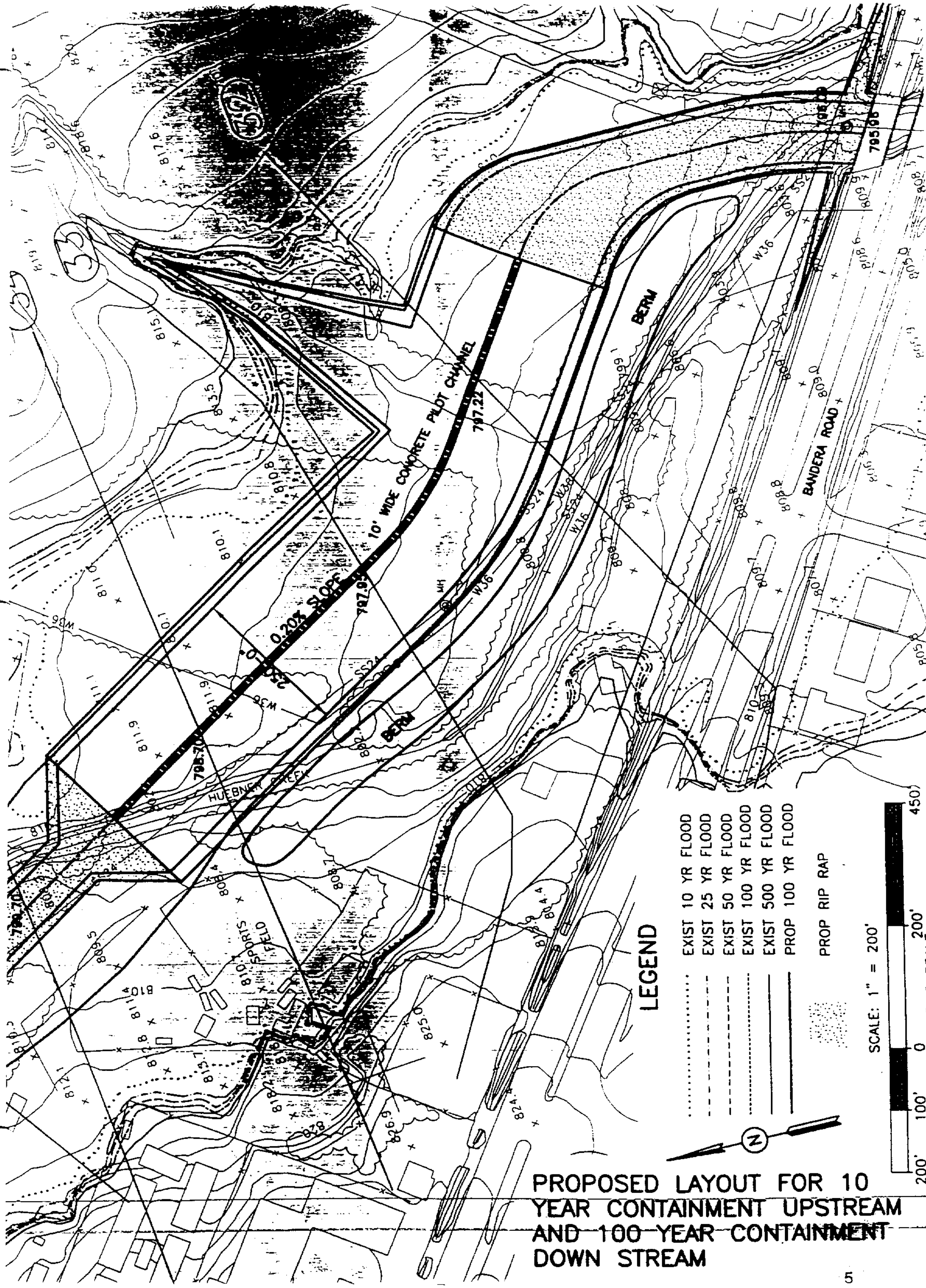
35



PROPOSED LAYOUT FOR 10 YEAR CONTAINMENT UPSTREAM AND 100 YEAR CONTAINMENT DOWN STREAM

MAYOR
ERALD Z DUBINSKI, SR

COUNCIL
JOHN F LEFLORE
ARRIET S OPPENHEIMER
ROBERT B PRICE
JOHN T STILES
RONALD G TEFTELLER

CITY OF OLMOS PARK
119 WEST EL PRADO DRIVE
SAN ANTONIO, TEXAS 78212-2095
(210) 824-3281
FAX (210) 826-5008

BARBARA JOSEPH
CITY MANAGER
WENDY JIMENEZ
CITY SECRETARY
NANCY HUNTER
COURT ADMINISTRATOR
MICHAEL K. ULLEVIG
CHIEF OF POLICE
HOWARD L. DALROS
CHIEF OF FIRE DEPARTMENT
OSCAR GARCIA
CHIEF OF STREET & SANITATION

October 27, 1999

Steve Ramsey, P.E.
Chief Engineer
San Antonio River Authority
P.O. Box 839980
San Antonio, Texas 78283-9980

RE: FLOOD CONTROL ANALYSIS REPORT

Dear Mr. Ramsey:

One area of Olmos Park that is subject to major and repetitive flooding is Shook Ave., particularly the condominium complex located at 1045 Shook at our south city limits. During heavy rains, water rushes north on Shook, causing a real problem for our residents. During the October, 1998 flood, several of the condominiums were damaged. We do not have any damage estimates and do not know if any residents applied for assistance.

The situation has worsened in recent years because of development in the City of San Antonio, just south of this property. The drainage channel is not adequate to divert water during heavy rains. During the last 10 years, we have expressed our concerns to the City of San Antonio and have asked for their help several times. They have always said they do not have money in their budget to make the necessary drainage modifications.

We have a major infrastructure project scheduled for this fiscal year that will include enhancements to our drainage system on Shook Ave. We have asked our city engineer to appeal to the City of San Antonio for their participation. Any help you could give would be appreciated.

Yours truly,
THE CITY OF OLMOS PARK

Gerald Z. Dubinski
Mayor

NOV 1999
RA

CITY OF SAN ANTONIO

P.O. BOX 839966
SAN ANTONIO, TEXAS 78283 - 3966

November 16, 1999

Mr. Steve Ramsey, P.E.
Chief Engineer
San Antonio River Authority
P.O. Box 839980
San Antonio, TX 78283-9980

Dear Mr. Ramsey:

Your request to Mayor Howard W. Peak requesting necessary information toward the preparation of the Bexar County Master Drainage Report was forwarded to me for a response. It is my understanding that David Beales, P.E., Senior Drainage Engineer met with Dean Bayer and Joe Shannon and provided them with the necessary information. Attached is a copy of the facsimiles forwarded to your staff.

Thank you for bringing this matter to our attention. As always, we look forward to working with you in the future. Should you need any further information, please contact David Beales, P.E., at 207-8084.

Sincerely,

John L. German, P.E.
DIRECTOR OF PUBLIC WORKS

cc: Mayor Howard W. Peak
Chris Brady, Assistant to the City Manager

JLG/DB/mdv
pw912.99

CITY OF UNIVERSAL CITY

The Gateway to Randolph Air Force Base

P.O. BOX 3008 • 2150 UNIVERSAL CITY BLVD.
UNIVERSAL CITY, TEXAS 78148-2108
(210) 659-0333 • FAX (210) 659-7062

October 27, 1999

Steve Ramsey, P.E.
Chief Engineer
San Antonio River Authority
P.O. Box 839980
San Antonio, Texas 78283-9980

Dear Mr. Ramsey

In reference to your letter dated October 22, 1999, the only area that the City of Universal City may have a problem with flooding is the area downstream of the City of Live Oak's community lake. The lake did overflow the dam into Saltillo Creek during the October floods of 1998. The bridge on Kitty Hawk Road spanning Saltillo Creek was completely covered with water and all the area immediately downstream was flooded. In addition Universal City does not know how structurally sound this dam is nor the effects that flooding would have downstream

This is only area on the San Antonio River Authority's side of the City that may be effected by major flooding.

If you have any questions please feel free to contact me (210) 658-5364 or cellular (210) 827-9054.

Sincerely,

Tony Rivas
Director of Public Works

CITY OF WINDCREST

8601 MIDCROWN
WINDCREST, TEXAS 78239-2598
CITY HALL 210-655-0022
POLICE 210-655-2666
FAX 210-655-8776

October 27, 1999

Steve Ramsey, P.E.
San Antonio River Authority
P.O. box 839980
San Antonio, Texas 78283-9980

RE: INFORMATION FOR FLOOD CONTROL ANALYSIS REPORT

Dear Mr. Ramsey:

In answer to your letter dated October 22, 1999, here is a list of drainage channels within the City of Windcrest that are prone to flooding during heavy rains. I would only add that the term "major" flooding is relative. We did not have as much damage as others on major creeks and rivers, but still experienced damage to our infrastructure as a result of high and fast flowing waters. The areas affected are as follows:

1) Perrin Beitel Creek/Drainage Channel in the northern part of the city by our ballfields, civic center, playground, and R.V. storage facility. This area can be accessed from Jim Seal Drive.
2) Drainage Channel that runs from the 700 Block of Crestway Dr. to the 4800 Block of Walzem Road. This channel runs from the northeast part of the city diagonally to the southwest corner of the city near Jim's Restaurant. It continues on into the City of San Antonio. It crosses through the Windcrest Golf Course, as well as crossing under Winfield Drive, Midcrown Drive, Windway Drive, Windsor Hill Drive, Windsor Cross, Crosswind Drive, and Walzem Road. The water does rise over the roads at times.
3) Drainage that runs under ground and above ground from the intersection of Crestway Drive and Eaglecresrt Blvd. to Montgomery Road. This channel crosses under Brook Falls St. During the flood of 98, the asphalt roadway was washed away. Downstream, an underground drain pipe system was destroyed due to large volumes of water.

In all cases erosion is a constant problem. We have been and still are addressing this in our capital improvement projects. If I can be of any more assistance, please call me at 655-0022.

Sincerely,

Jeff Wisenbaker
Director of Public Works

UNITED HOMEOWNERS IMPROVEMENT ASSOCIATION, INC.
(UHIA)
P.O. Box 201721
San Antonio, TX 78220-8721

October 19, 1999

Commissioner Tommy Adkisson
100 Dolorosa Suite, 101
Sand Antonio, TX 78205-3036

Dear Commissioner Adkisson:

The Services Committee of UHIA met with you and Manager Gregory Rothe (SARA) and the Park Director on October 13 and discussed our proposals; you made the following commitments:

1. Entrance to Pletz Park – make an entrance from Gembler Road along Salado Creek to park and close the Picardie Drive entrance, which is through the neighborhood.
   A. Justification:
      (1) Reduce traffic congestion and jams in the neighborhood
      (2) Reduce speeding vehicles in the neighborhood
      (3) Reduce vulgar and offensive loud music in the neighborhood
      (4) Reduce burglary
      (5) Reduce potential violent acts
      (6) Reduce residential flooding
      (7) 1999 bond passage provided funding for property acquisition
   B. Authority: Commissioner Adkisson Phone: 335-2614 Fax: 335-2644
   C. Probability: Yes
   D. When: Pending dirt removal - Note: "Joint project by County, City and SARA"

2. Addition – Pletz Park (7.5 + 13.5 acres)
   A. Justification:
      (1) Additional family picnic areas
      (2) Enhance the natural scenery
      (3) Promote walking along the creek
      (4) Promote fishing (when water is purified)
      (5) Reduce residential flooding
      (6) Will add park prestige
   B. Authority: Commissioner Adkisson
   C. Favorable: Yes
   D. Probability: Yes
   E. When: Pending city acquisition of land
   F. Participation: Yes

OCT 199
SARA

3. 6th Mitigation Project – Salado Creek Watershed Study and Drainage Master Plan states in part, "The project limits are the bridge structures at S.E. Loop 410 to N.E. Loop 410. The total length of the project is approximately 20 miles. This project does not include modification of creek sections. The project involves only the removal of grass, weeds, brush, small trees, and the small lower branches of trees up to a height of five or six feet. The project would leave significant trees that are larger than 3 inches in diameter in place. Existing dense vegetation along with the broad section of

Salado Creek currently provide significant linear storage. Clearing of the underbrush will have the detrimental effect of decreasing the linear storage and increasing flood elevations downstream by a substantial amount."

The position of UHIA – We vehemently oppose the 6th Mitigation Project because 35 years plus of neglect has allowed Salado Creek to grow into a 'jungle" in this area, which caused many homes to be flooded as a result. Plus, there is no such project in the Upper Salado Creek Watershed to keep us from getting flooded. Since the Lower Salado Creek Watershed is in Precinct 4, we want to know what is your position on the following:

A. Authority: Commissioner Adkisson
B. Opposition: Yes
C. Will work with city to change: Yes
D. Will commit county funds: Yes
E. Problem area: S.E. Loop 410 to N.E. Loop 410

4. County Fair and Rodeo Coordinator: Judge Krier
   A. We request the land sight at Gembler Road and Kono Road adjacent to our resident not be used for the Trail Riders staging area for the following reasons:
      (1) Animals urinating and defecating
      (2) The empting and cleaning of trailers
      (3) The stench in the community
      (4) The tracking of mud onto the streets and roads
      (5) The loud music
      (6) There may be a city code against it
   B. If contractual restraints prevent complying with our request above in February 2000, we request the following and trust other plans will be made for future rodeos.
      (1) Staging buffer zone south of Belgium Lane: 100 feet
      (2) Staging entrance and exit: Gembler Road to Kono Road to Gembler Road
      (3) Trail riders do not use: Belgium Lane
   C. Residents traffic consideration at: Belgium Lane/Gembler Road at Coliseum Road

Commissioner Adkisson, we appreciate you granting the Services Committee the October 13th meeting with you to present our Association's concerns to help make this a better community in which to live. Due to unanticipated discussions of our presentation, the time consumed was far more than expected, for which we regret. We thank you for inviting Judge Cyndi Krier to join the meeting; she provided great interest in following through with our County Fair and Rodeo concerns. After the close of the meeting you told me you wanted to meet with me again. That, we can do after things settle down a little and we find out the final actions of the Public Works Director.

Again, we need your leadership and support to help pull the East Side out of a state of neglect.

Sincerely,

Leon Thomas

Leon Thomas, 2nd Vice President
Chair, Services Committee
1206 Picardie Drive
San Antonio, TX 78219-2518

Cc: Judge Cyndi Taylor Krier
Manager Gregory E. Rothe

APPENDIX CC

Medina River Flood Control Plan and Greenbelt Corridor

PROPOSAL

FOR

MEDINA RIVER

FLOOD CONTROL PLAN AND GREENBELT CORRIDOR

STATE OF TEXAS
PATRICK A. LACKEY
56363
REGISTERED
PROFESSIONAL ENGINEER

Prepared for:

Bexar Metropolitan Water District
2047 West Molone
San Antonio, Texas 78225

Prepared by:

River City Engineering, Inc.

3801 South First Street
Austin, Texas 78704
Phone (512) 442-3008
Fax (512) 442-6522

111 Soledad, Suite 300
San Antonio, Texas 78205
Phone (210) 527-9772
Fax (210) 229-9742

MEDIO CREEK/MEDINA RIVER

WATER IMPROVEMENTS SYSTEM

GENERAL

Bexar Metropolitan Water District (BMWD) retained River City Engineering, Inc. in the Spring of 1999 to complete field investigations for the preliminary design of channel improvements of the Medio Creek and off line storage improvements for O.R. Mitchell Reservoir. These improvements were required in order to control flood flows along Medio Creek and divert the effluent dominated low flows from O.R. Mitchell Reservoir. With this diversion, O.R. Mitchell Reservoir could be developed into off-line storage facilities to store raw water for treatment at the BMWD's potable water treatment facility located on the adjacent property.

The development of the off-line storage facilities will allow for dependable feed supply during low flow periods along the Medina River or during periods of flow when water quality is less than desirable. In developing these options, considerations were given to the environmental issues, geotechnical issues, construction cost, permitting and phasing of the proposed project.

O.R. Mitchell Reservoir is a widely known recreational facility featuring a wide diversity of aquatic wildlife. Construction of these facilities has taken into account permitting issues involved with the dredging and deepening of the lake in order to minimize adverse impact to the site. Project construction, along with the phasing alternatives, was also given heavy consideration. The sheer volume of spoil material to be generated will require careful control for spoil regrading and site restoration of the adjacent properties to maintain their use for future public facilities.

The project team consisted of River City Engineering, Inc., Taylor and Mullins, Landata Geo Services, Agra Environmental, Longaro and Clarke, Inc., and DLS Associates. River City Engineering, Inc. served as the overall project managers of the team. Taylor and Mullins provided survey control and site civil coordination. Landata Geo Services provided a topographic survey of the property. Agra Environmental performed soil borings and provided a geotechnical report of the site conditions. Longaro and Clarke, Inc. analyzed Medio Creek with hydraulic modeling and provided recommendations based on their modeling efforts. DLS Associates provided environmental reporting and permitting services during the course of the project. The results are included as appendices to the overall project plan. The recommended alternative is attached as Figure 2 and Map Figure 3. The proposed plan involves filling and berming of the O.R. Mitchell Reservoir to increase its water height approximately 8 feet. This alternative provided the best results of balancing environmental concerns and maintaining existing site quality. This, along with excavation of the Medio Creek to provide channelized flows, will provide a suitable corridor for flood by-pass from the lake, pending approval .

OPTION NO. 2C – WATER SURFACE ELEV. 96.00
(Storage Volume = 2478 ac-ft)

Item.	Description	Unit	Quantity	Unit Cost	Amount
1	Bonds & Insurance	LS	3%	$14,511,846	$ 435,355
2	Site Cleaning	AC	300	$ 500.00	$ 150,000
3	Strip/Spread 6" Topsoil	CY	300	$ 1,600.00	$ 480,000
4	Excavate/Embank Sediment (Loader)	CY	150,000	$ 3.50	$ 525,000
5	Excavate/Embank (Scraper)	CY	3,865,052	$ 1.80	$ 6,957,094
6	Haul Material Offsite	CY	1,562,938	$ 4.00	$ 6,251,752
7	Erosion Control	LS	1	$ 40,000.00	$ 40,000
8	Hydromulching	SY	100,000	$ 0.40	$ 40,000
9	Seeding	SY	400,000	$ 0.10	$ 40,000
10	Concrete Spillway	SY	800	$ 35.00	$ 28,000
	SUBTOTAL				$ 14,947,201
	Contingency		8%		$ 1,195,776
	TOTAL				$ 16,142,977

O. R. MITCHELL/MEDIO CREEK

PROJECT DISTRIBUTION

OPTION NO. 2C – WATER SURFACE ELEV. 596.00
(Storage Volume = 2478 ac-ft)

Item	Description	Unit	Quantity	Unit Cost	Amount	Medio Creek Channelization	O.R. Mitchell Storage
1	Bonds & Insurance	LS	3%	$14,511,846	$ 435,355	108,839	326,516
2	Site Cleaning	AC	300	$ 500.00	$ 150,000	150,000	-
3	Strip/Spread 6" Topsoil	CY	300	$ 1,600.00	$ 480,000	480,000	-
4	Excavate/Embank Sediment (Loader)	CY	150,000	$ 3.50	$ 525,000	-	525,000
5	Excavate/Embank (Scraper)	CY	3,865,052	$ 1.80	$ 6,957,094	918,000	6,039,094
6	Haul Material Offsite	CY	1,562,938	$ 4.00	$ 6,251,752	2,040,000	4,211,752
7	Erosion Control	LS	1	$ 40,000.00	$ 40,000	40,000	-
8	Hydromulching	SY	100,000	$ 0.40	$ 40,000	40,000	-
9	Seeding	SY	400,000	$ 0.10	$ 40,000	40,000	-
10	Concrete Spillway	SY	800	$ 35.00	$ 28,000	28,000	-
	SUBTOTAL				$ 14,947,201	3,844,639	11,102,362
	Contingency		8%		$ 1,195,776	307,587	888,189
	TOTAL				$ 16,142,977	4,152,426	11,990,551

BexarMet

PROPOSAL

FOR

MEDINA RIVER
FLOOD CONTROL PLAN AND
GREENBELT CORRIDOR

RIVER CITY ENGINEERING, INC.
CONSULTING CIVIL ENGINEERS

3801 SOUTH 1st STREET
AUSTIN, TEXAS 78704
PHONE-(512) 442-3008

111 SOLEDAD, SUITE 300
SAN ANTONIO, TEXAS 78205
PHONE-(210) 527-9772

EXECUTIVE SUMMARY

MEDINA RIVER FLOOD CONTROL PLAN

AND GREENBELT CORRIDOR

Bexar Metropolitan Water District (BMWD) has completed a preliminary design on channel improvements for the Medio Creek Watershed. Additionally, a conceptual plan has been developed for drainage and greenbelt improvements to the Medina Rivershed between IH35 and Montgomery Road.

Presently, this riverfront property is privately owned and does not provide public access to the waterways. Some of these areas along the river are abandoned aggregate sites that not only have damaged the river banks in the area, but also continue to wash sediments into the river reducing water quality. The basis of these plans and designs represents an overall vision for the watershed, including environmental, recreational, and flood control benefits for southwestern Bexar County.

This plan will provide the opportunity to improve water quality in the waterways by reducing siltation. Flood control facilities will be incorporated to better protect adjacent developed areas. Restoration of the environmental sensitive features along the waterways will allow for the return of wildlife and native vegetation. Consequently, these areas will provide scenic recreation areas for public enjoyment. Furthermore, development of off-channel water storage will serve the drinking water needs of the citizens of greater San Antonio.

Environmental Benefits

To improve water quality and reestablish native vegetation, the project calls for removal of fallen trees and underbrush material along the river banks. This will promote growth of native vegetation and grasses along the river banks. These natural grasses will act as a filter, holding back silt and sediment from running into the river. Additionally, revegetation of the abandoned aggregate sites will decrease the remaining sediments left from these activities from reaching the river. Off-river creek flows will also be controlled in order to prevent siltation buildup in the river. This revegetation and increase in water quality, will promote restoration of the entire watershed for fish, birds and other wildlife.

Recreational Benefits

The proposed plan will involve the establishment of a greenbelt corridor along the river and major creeks. Along this greenbelt area, nature trails, open space parks and river access will be provided. The public will be able to access the river from designated sites within the project area, allowing for controlled access to the river banks. The open space parks will provide opportunities for enjoyment of the restored riverbanks, and access to the greenbelt trails. The greenbelt areas will provide a system of nature trails for hiking and biking. From these trails, the public will enjoy the return of birds and wildlife as a result of the restoration efforts.

Flood Control

Through the clearing of non-native vegetation and underbrush, the channel flows will not be restricted providing better flow within the existing waterways. Off-river channelization, particularly of Medio Creek will prevent reoccurring flood conditions and provide flow management opportunities along the waterways. These plans will lead to better flood management for the Medina River and its tributaries.

Project Costs

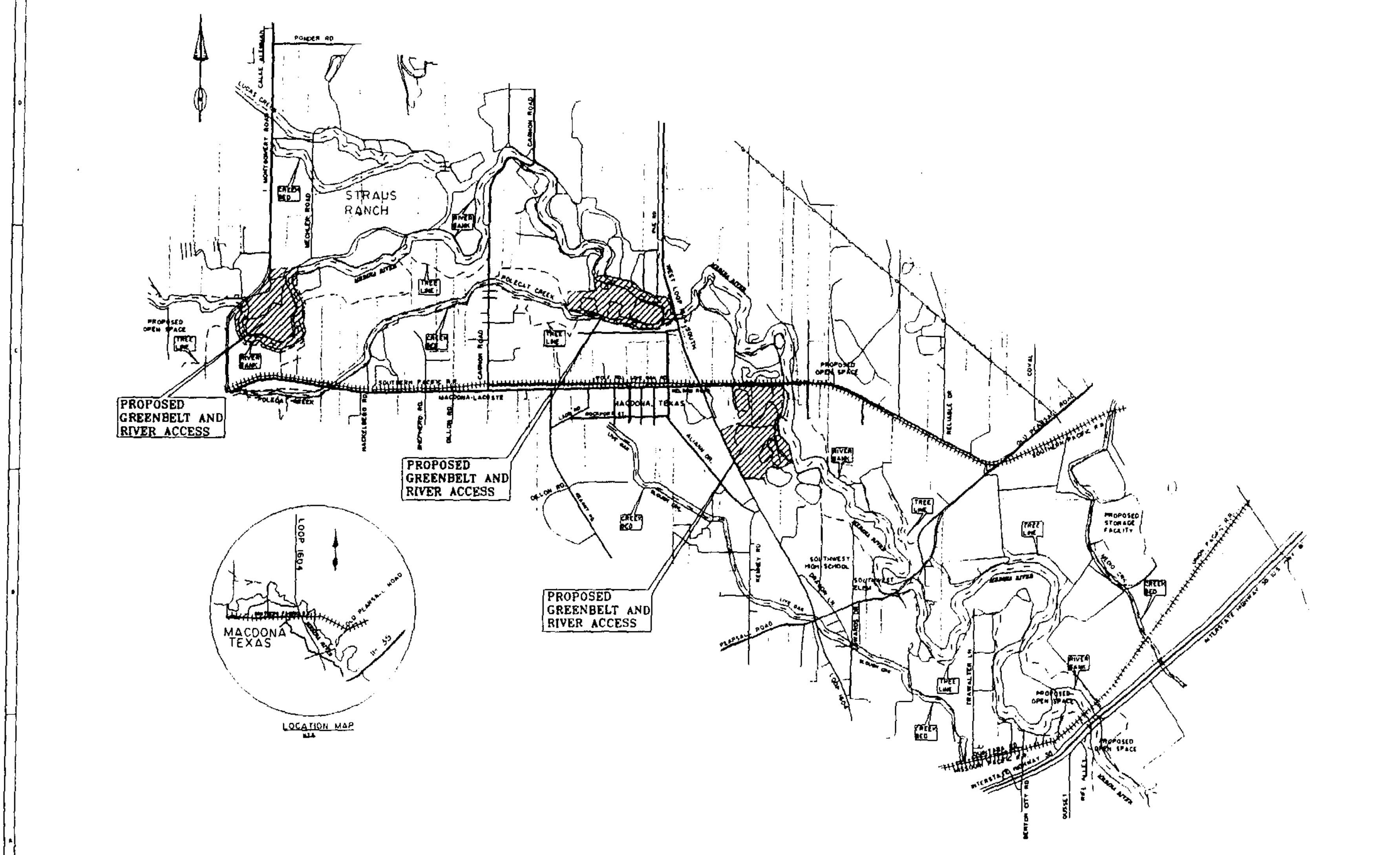
While the most work has been done on the Medio Creek and O.R. Mitchell sites, various other projects are also included. The projected budget for the previously discussed Medio Creek Channelization Project is currently $4,152,426. In addition to that tract, various other improvements are proposed to include Medina River clean up, nature trails, construction, site restoration of existing quarry and aggregate production sites, pocket park developments along major roadway intersections, construction of water quality controls at major creek inflows, development of wetlands and both aquatic and wildlife habitats along the river area. Total project costs for the Medina River project are approximately $11,179,630. These costs are outlined in the following table.

Medina River Flood Control and Greenbelt Corridor

Project Cost Estimate

◆ Medio Creek Channelization	$ 4,152,426.00
◆ Medina River Cleanup 388 acres x $10.00/acre	$ 387.90.00
◆ Nature Trail Development 16 miles @ $10.00/LF	$ 844,800.00
◆ Site Restoration 200 acres x $2,000/acre	$ 400,000.00
◆ Pocket Park Development 20 each $10,000/each	$ 200,000.00
◆ Water Quality Controls 10 sites @ $100,000/each	$ 1,000,000.00
◆ Wetland Development 200 acres @ $5000/acre	$ 1,000,000.00
Subtotal	$ 7,985,125.00
25% Contingency, Permitting, Engineering	$ 3,194,504.00
Project Budget	$11,179,630.00

MEDINA RIVER
GREENBELT CORRIDOR
RIVER ACCESS



RIVER CITY ENGINEERING, INC.
CONSULTING CIVIL ENGINEERS

REVISIONS			
NO.	REVISION	APPR.	DATE

DRAWING INFORMATION	
DESIGNED BY	SCALE
DRAWN BY	DATE
CHECKED BY	PROJECT NO.
APPROVED BY	PLOT DATE
FILE NAME	PLOT SCALE
REMARKS	

MEDINA RIVER

GREENBELT PROPOSAL

SHEET 1 OF 1

APPENDIX DD

Response Letter from the City of Grey Forest

CITY OF GREY FOREST
18502 SCENIC LOOP ROAD
HELOTES, TEXAS 78023-9208
(210) 695-3261

June 19, 2000

Mr. Ken Kolacny, P.E.
Project Manager
Pape-Dawson Engineers, Inc.
555 E. Ramsey
San Antonio, TX 78216

Re: City of San Antonio Regional Flood Mitigation Plan
Request for Input

Dear Mr. Kolacny,

This letter is to comment on your draft of the Regional Flood Mitigation Plan. Needless to say, we are thrilled that you are proposing four projects for our City based on the May 2000 project map.

The four projects you have listed were the low water crossings that Fema gave us funds to repair/replace. The low water crossing at Grey Forest Drive @ Helotes Creek has been totally replaced with City/Fema funds. This can be eliminated from your list. The low water crossing at Park was repaired with City/Fema funds and even though it needs to be replaced in the future, it does not have the population/traffic density that these other locations have. Therefore, we feel this low water crossing is not a top priority at this time. Our most crucial locations are: (1) Scenic Loop Road at Blue Hill Pass, the only thoroughfare through our City and a secondary route from Helotes to Boerne (2) Sherwood Trail low water crossing (behind City Hall) on the main street into the City off of Scenic Loop Road, (3) Hilltop Drive low water crossing had temporary repairs with City/Fema funds, but needs to be replaced and enlarged as it is still inadequate. (4) Hillside Drive low water crossing behind Grey Moss Inn because of the way it is built, acts as a dam and backs up water to where it damages fences and surrounding property and needs to be replaced.

Sincerely,

Ann Mabry

Ann Mabry
Mayor