HOGAN & RASOR, Inc.

Engineers • Planners • Consultants

June 11, 1990

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JUL 11 1990

City of Del Rio
109 West Broadway
P.O. Box 4239
Del Rio, Texas 78841

Re: Val Verde County
Regional Waterworks and Wastewater Systems Study

Gentlemen:

We herewith submit this final report prepared in accordance with the Scope of Services outlined in our Work Order No. Del-5, dated May 12, 1989.

The cooperation and assistance provided to us by the City Staff was most appreciated, and we offer a special thanks to all of those individuals that helped us with collecting the necessary information and basic data for this planning study.

It has indeed been our pleasure to perform these engineering and planning services for the City, and we are prepared to assist with the implementation of the recommendations presented herein, at your direction.

Respectfully submitted,

HOGAN & RASOR, INC.

C. F. Rasor, P.E.

C. F. Rasor, P.E.
Executive Vice President

STATE OF TEXAS
C. F. RASOR
28168
REGISTERED PROFESSIONAL ENGINEER

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DEL RIO, TEXAS
CITY OFFICIALS
==========

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Jeffrey A. Pomeranz

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COMMISSIONERS' COURT

COUNTY JUDGE

Sergio Gonzalez, Jr.

COMMISSIONERS

Precinct 1 - Richardo Padilla
Precinct 2 - Bob Rodriguez
Precinct 3 - John M. Cody
Precinct 4 - Martin Wardlaw

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EXECUTIVE SUMMARY

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The principal purposes for this study of the water and wastewater systems in Val Verde County is to establish standards of design and develop feasible plan(s) for regionalizing the services, to provide a safe and adequate supply of water for existing and future developments, and to provide treatment of the wastewaters sufficient to protect the health and welfare of the people and the surrounding environment.

The planning area proposed within this study includes the unincorporated areas of Val Verde County and the incorporated limits of the City of Del Rio and its extraterritorial jurisdiction (ETJ).

Val Verde County covers an area of 3,259 square miles (2,085,760 acres), and, of this area, 36,990 acres is water-inundated areas larger than 40 acres.

As the county seat of Val Verde, and the only incorporated city in the County, Del Rio comprises approximately 90% of the estimated 40,000 County population. Other communities in the County identified for review in this study included Comstock, Langtry, Loma Alta, and Pandale.

The geographic location of Del Rio and the other communities in the County span distances across fairly rugged terrain of 20 to 60 miles, and, therefore, the communities within the drainage basins currently function under the guidance of a variety of agencies. Because of the sparse population and long distances between the communities, the utility systems now operate with no over-riding goal of providing services on a regional basis.

Since the unincorporated communities and rural areas of Val Verde County are not anticipated to be in or near a growth center, the needs for major water and wastewater improvements for these areas outside the jurisdiction of Del Rio were not considered to be eminent, and, therefore, their needs were not addressed in detail. Nonetheless, these rural areas will need to continue to operate within the guidelines of the appropriate governing and regulatory State and federal agencies.

In contrast to the rural areas of the County, the City of Del Rio and its ETJ area is a growth center, with projections of population for the next fifty (50) years to increase an average annual rate of 1.72%. The rural areas of the County are anticipated to remain virtually static with respect to any growth potential.

For purposes of this study, the following projections of the TWDB for the City of Del Rio and Val Verde County were used for planning the future water supply and wastewater systems needs.

Year	City of Del Rio	Val Verde County
1990	38,302	43,763
2000	47,896	53,357
2010	59,849	65,310
2020	72,344	77,805
2030	85,406	90,867
2040	92,767	98,228

* Includes the projected population of Del Rio

The incorporated limits of the City of Del Rio covers an area of approximately 14.96 square miles, and with the area of their ETJ which extends five miles beyond the existing City Limits, an additional 146.89 square miles is included under development control by the City (excludes the Laughlin AFB).

The City of Del Rio provides both water and sanitary sewerage services to the public.

The communities of Comstock and Langry and some developments around Lake Amistad have small water systems that -serve the public, however, sewerage service is provided by the individual with on-site disposal systems.

The water supply for the balance of the rural areas in Val Verde County is developed from the groundwater resources, and septic tanks with absorption fields appear to be the most prevalent means of sewage disposal.

For the rural areas and developments having one acre or larger tracts, septic tanks and absorportion fields, for sewage disposal, are acceptable, however, the characteristics of the soils in the Val Verde County are not generally conducive to this type of sewage disposal system, according to the U. S. Soil Conservation Service. Therefore developments with small lots presently developed with septic tank systems are high risks to the health and welfare of the public from the potential failure and pollution of the area. Hence, septic tank and absorption field disposal system should not be allowed in urban areas and developments that have lots less than one acre.

The principal aquifer in Val Verde County is the Edwards and Associate Limestones. From the aquifer, water is produced from wells developed at varying depths and yield small to large quantities of fresh to slightly saline water.

Based on the report of the TWDB, the spring flow and base flow within Val Verde County measured approximately 500,000 acre-feet/year, prior to the construction of Lake Amistad. According to the projection of the TWDB of water supply needs for Val Verde County through the year 2040, a total of 26.94 M.G.D. (29,949 acre-feet/year) of water supply will be required. Therefore, it appears that, from the standpoint of groundwater resources, enough water will be available to adequately serve the needs of the County.

The consideration for regionalization in providing water and sewerage services are limited, for the most part, to the areas around the City of Del Rio. Several major developments outside the City Limits, but within the ETJ of Del Rio, are considered to be economically distressed areas and, at best, the water and sewerage services to these areas are only fair to grossly inadequate.

The areas of development that are outside the City limits of Del Rio which eminently need improvements to upgrade the quality of water and sewerage service include the Cienegas Terrace Addition and the Val Verde Park Estates.

Alternatives for providing adequate water and sewerage services to these areas included developing a water supply and wastewater treatment facilities to serve only the development. This alternative was not considered to be prudent inasmuch as the City already furnishes the supply of water to both, and the proximity of the developments to the City's sewerage system will provide reasonable access for service and treatment in either the Silver Lake or the San Felipe Wastewater Treatment Plants. Therefore, the capital improvements planning for the new water and wastewater facilities was developed in a five-phased schedule based on water supply and wastewater treatment services being furnished from the City of Del Rio. Likewise, the capital improvements program previously developed by others for the City of Del Rio is included which provides additional capacity to serve the future growth and covers a variety of other projects that will enhance the overall operation of the city's utility systems.

A summary of the projected capital improvements and the cost projections for the City of Del Rio and the outlying developments of Cienegas Terrace Addition and Val Verde Park Estates is included on the following page.

It is recommended that the program for developing the capital improvements also consider two important elements -- Water Conservation and Environmental Assessments. Each project should undergo a detailed review for determining what effects can be incorporated to provide a more efficient use of water and what environmental concerns and impacts need to be addressed in order to prevent or, at least, mitigate the potential adverse affects. The review for methods of water conservation and addressing the environmental concerns are equally important in the rural areas of the County.

The financing for the capital improvements currently appear to be available from several sources. The improvements proposed within the water and wastewater systems of Del Rio are planned to be funded as follows:

Silver Lake Wastewater Treatment Additions - SRF Program

San Felipe Wastewater Treatment Additions - Revenue Bonds

Water Distribution System Improvements - Revenue Bonds and TDOC Funds

Wastewater Collection Improvements - Revenue Bonds and TDOC Funds

SUMMARY TABLE
OF
RECOMMENDED CAPITAL IMPROVEMENTS
FIVE-PHASE PROGRAM

PHASE	PROJECT LOCATION	DESCRIPTION OF IMPROVEMENTS	PROJECTION OF CAPITAL COSTS	CAPACITY ADDITIONS
1	Del Rio	Silver Lake W.W.T.P. Additions	$1,736,000	1.0 M.G.D.
	Del Rio	San Felipe W.W.T.P. Additions	4,500,000	1.2 M.G.D.
	Del Rio	Waterworks System Improvements	650,000	System Update
	Del Rio	Wastewater System Improvements	90,000	System Update
	Cienegas Terrace Addition	Water and Wastewater System Improvements	1,742,600	989 population
	Val Verde Park Estates	Water and Wastewater System Improvements	609,000	794 population
TOTAL PHASE 1			$9,327,600	
2	Del Rio	Waterworks System Improvements	$ 700,000	System Update
	Del Rio	Wastewater System Improvements	587,000	System Update
	Cienegas Terrace Addition	Water and Wastewater System Improvements	1,384,000	928 Population
	Val Verde Park Estates	Water and Wastewater System Improvements	986,000	1,333 Population
TOTAL PHASE 2			$3,657,000	
3	Del Rio	Waterworks System Improvements	$ 246,000	System Update
	Del Rio	Wastewater System Improvements	1,069,000	System Update
	Cienegas Terrace Addition	Water and Wastewater System Improvements	428,450	253 Population
	Val Verde Park Estates	Water and Wastewater System Improvements	1,079,000	1,248 Population
TOTAL PHASE 3			$2,822,450	
4	Del Rio	Waterworks System System Improvements	$ 366,000	System Update
	Del Rio	Wastewater System Improvements	1,238,000	System Update
	Cienegas Terrace Addition	Water and Wastewater System Improvements	535,700	288 Population
	Val Verde Park Estates	Water and Wastewater System Improvements	583,000	643 Population
TOTAL PHASE 4			$2,722,700	
5	Del Rio	Waterworks System Improvements	$1,151,000	System Update
	Del Rio	Wastewater System Improvements	808,000	System Update
	Cienegas Terrace Addition	Water and Wastewater System Improvements	416,250	234 Population
	Val Verde Park Estates	Water and Wastewater System Improvements	720,800	125 Population
TOTAL PHASE 5			$3,096,050	

The improvements proposed to be extended to and within the economically distressed areas (Cienegas Terrace Addition and Val Verde Park Estates) will likely be eligible for financial assistance through the provisions of Senate Bill No. 2, referred to as the "Economically Distressed Area Program (EDAP)". Last fall of 1989, the voters approved $100 million for purposes of providing loans to the economically distressed areas for qualifying projects. To qualify for assistance under this program, the project must be in an area with an unemployment 25% higher and the per capita income 25% lower than the statewide averages. The legislation for this program was prompted by the plight of residents in unincorporated "colonias" concentrated in counties along the Texas-Mexico border.

During the performance of this study, numerous telephone conversations, personal contacts, and meetings were held with the City Officials and Staff, State and Federal Agencies, County Officials, and other local authorities. Four (4) scheduled public meetings were conducted during the progress of the work which were held at the City Hall in Del Rio on the following dates.

June 13, 1989 - Pre-Work Conference
August 3, 1989 - Preliminary
August 30, 1989 - Preliminary Final
February 13, 1990 - Final Draft

The minutes and attendance register for each of the public meetings are included in the APPENDIX of this report.

PART I
INTRODUCTION

PART I

INTRODUCTION

A. AUTHORIZATION OF REPORT AND PRELUDE

The Texas Water Development Board (TWDB), on February 16, 1989, approved the application for financial assistance to the City of Del Rio, Texas, to develop a regional water supply and wastewater plan for Val Verde County. Subsequently, the City of Del Rio entered into an agreement with Hogan & Rasor, Inc., a Dallas-based consulting engineering firm, to perform such studies and planning for Val Verde County. The agreement was executed by the City of Del Rio on May 12, 1989.

For the preparation of this regional water supply and wastewater plan, a review was initially made of available data concerning the existing waterworks and wastewater system facilities currently operating within the County of Val Verde. This review, coupled with the anticipated projections, the future planning for water supplies, the projected demands for water, and the discharges of sewage wastes, provides a foundation and basis for the conclusions and recommendations that are presented herein.

B. STUDY OBJECTIVES

The objectives of the proposed planning study for Val Verde County are as follows:

1. To document service needs in the planning area;
2. To identify feasible alternatives to meet these needs;
3. To present cost projections associated with these alternatives;
4. To evaluate various institutional arrangements to deliver water and wastewater service to these areas; and,
5. To develop a plan of implementation with priorities assigned to the recommended program of improvements.

The planning area proposed within this study includes the unincorporated areas of Val Verde County and the incorporated limits of the City of Del Rio and its extraterritorial jurisdiction (ETJ).

As the county seat of Val Verde, Del Rio comprises approximately 90% of the estimated 40,000 County population. There are four (4) other unincorporated communities in Val Verde County, as noted in the following list:

Community	Approximate Population	Distance from Del Rio (miles)
Comstock	800	25
Langtry	52	50
Loma Alta	21	34
Pandale	10	71

The primary emphasis of the proposed planning project was developed around a regionalization concept of Del Rio's existing systems by extending adequate water and sanitary sewer facilities to the existing subdivisions developed immediately adjacent to the City Limits of Del Rio. The study, however, was performed county-wide, and recommendations have been made for the operating water and wastewater systems located therein.

In addition to the unincorporated communities listed above, the subdivisions specifically of concern are Val Verde Park Estates, Payne Village, Cienegas Terrace, Chapparel Hills, Los Campos, Escondido Estates, Rio Verde, Rio Vista, Comalia (Sarafini), and the Rough Canyon Recreational Area.

These particular areas were noted by the City for study and planning because of their continued growth and development. Their utilization of substandard water and sewer systems not only exacerbates potential health hazards but also inhibits continued growth and development of the City of Del Rio.

A map (FIGURE NO. I-1) of the planning area (Val Verde County) is included following this page and shows the relative location of the various communities and geographic features.

The scope of the planning services of Hogan & Rasor, Inc., as authorized by the City of Del Rio, was divided into eight (8) tasks outlined as follows:

- Task I - Facility Inventory and Data Collection
- Task II - Mapping and Data Assimilation
- Task III - Data Analysis and Planning Concepts
- Task IV - Planning for Waterworks and Wastewater Systems
- Task V - Environmental Concerns
- Task VI - Financial Plan
- Task VII - Water Conservation Plan
- Task VIII - Report Presentation and Printing

The City of Del Rio's agreement with the TWDB proposed to complete regional water and wastewater systems plan within following tasks.

- Task I - Evaluate Water Supply, Treatment, and Distribution Needs for Val Verde County

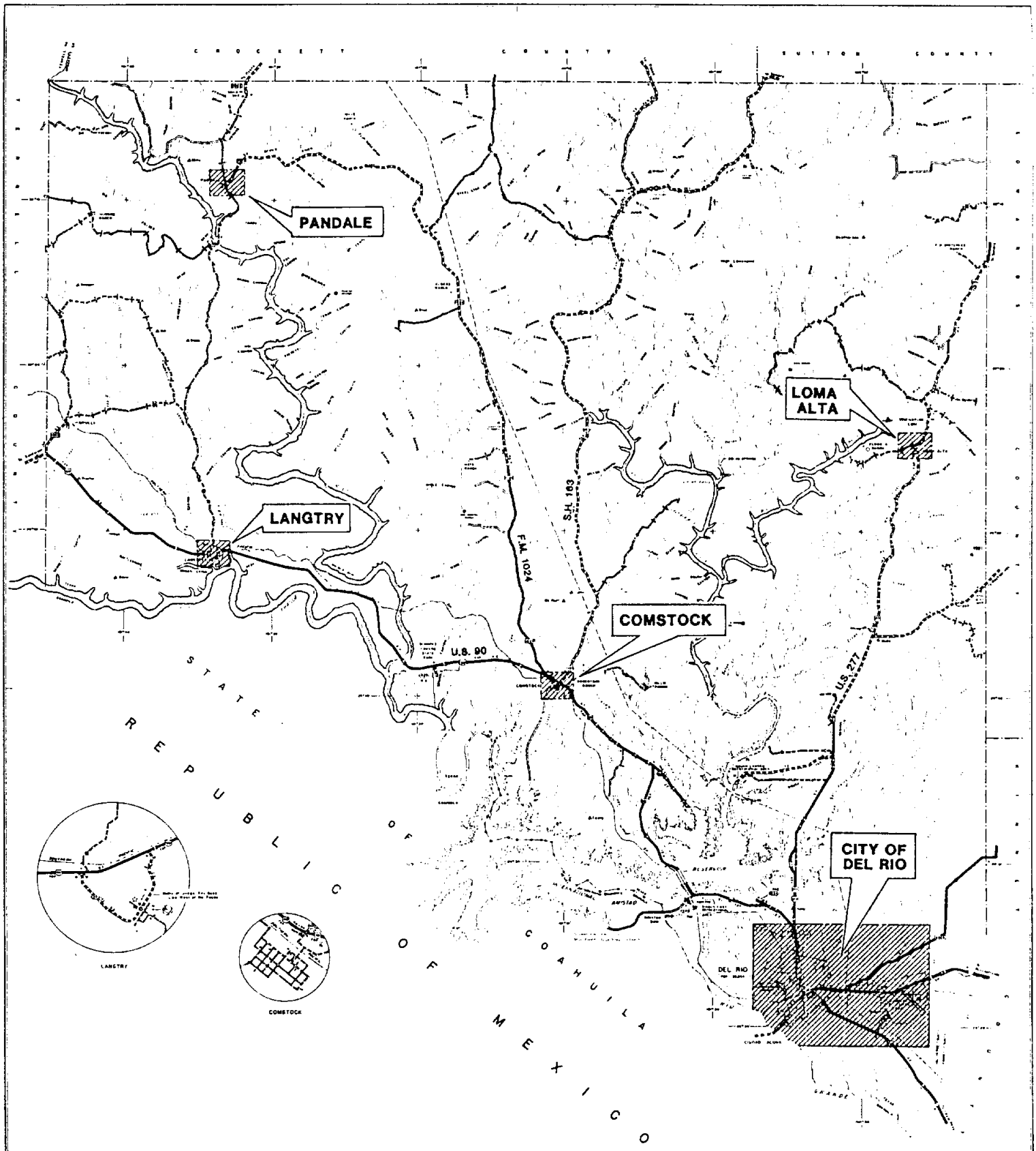

FIGURE NO. I-1

CITY OF DEL RIO, TEXAS

LOCATION MAP
FOR
VAL VERDE COUNTY
REGIONAL
WATER AND WASTEWATER
SYSTEMS PLANNING

HOGAN & RASOR, Inc.
Engineers - Planners - Consultants

Task II - Evaluate Wastewater Collection and Treatment
Task III - Evaluate Environmental Concerns
Task IV - Determine Appropriate Financial Plans and Institutional Organizations to Implement Recommended Alternatives
Task V - Develop Water Conservation Plan
Task VI - Prepare a Final Report on the Proposed Regional Water Supply and Wastewater Facilities Plan
Task VII - Conduct Public Meetings

This report has been prepared to address those concerns as outlined in the seven (7) tasks of the agreement between the City of Del Rio and TWDB, executed on February 16, 1989.

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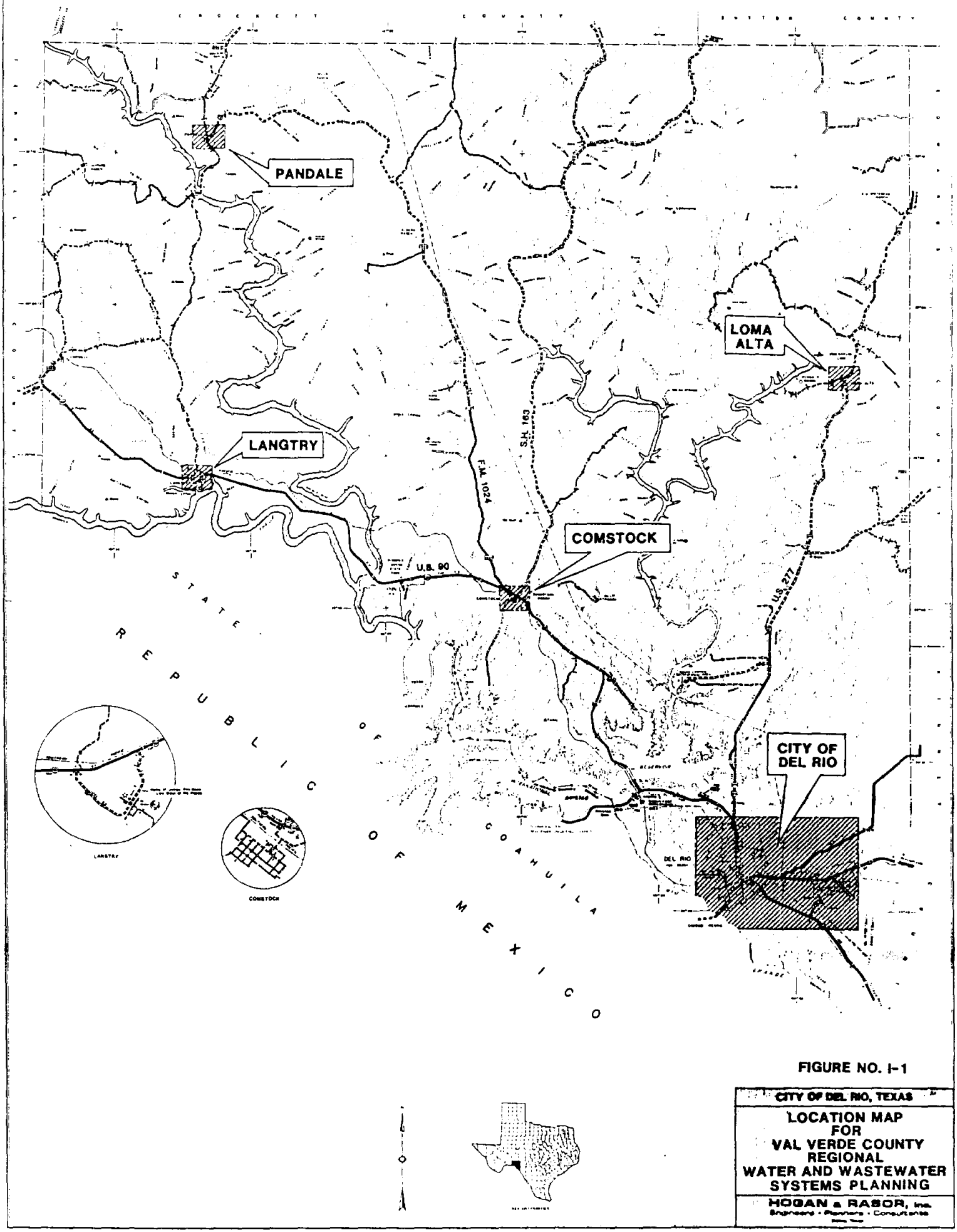


FIGURE NO. I-1

CITY OF DEL RIO, TEXAS

LOCATION MAP
FOR
VAL VERDE COUNTY
REGIONAL
WATER AND WASTEWATER
SYSTEMS PLANNING

HOGAN & RASOR, Inc.
Engineers · Planners · Consultants

PART II
CRITERIA AND PLANNING STANDARDS

PART II

CRITERIA AND PLANNING STANDARDS

A. GENERAL

A review of the adequacy of any waterworks or sanitary sewerage system is generally measured according to several factors and sources of information. These items used as a basis for studying the utility systems are often first implemented in the form of questions when a review such as this is made. The initial review may begin with questions in the following manner.

Does the system:

- provide for adequate service in all respects to the existing development and for the purposes for which the system is intended?
- conform with the applicable federal and State requirements?
- conform with the local ordinances and regulations?
- conform with good engineering design and practices?
- conform to an overall local and regional plan for the proposed and future improvements?

It is felt that each of the five (5) questions hold equal importance for reviewing a system, because, from these questions, answers may be collectively determined which would directly affect the safety, health and economics of any area. From this aspect, it would be strongly recommended that the City of Del Rio, unincorporated communities, and other entities which serve the public, review, analyze, update and plan their own systems with these questions in mind. Once each question is thoroughly answered, the systems can then be evaluated with respect to what the needs will be for the existing development and what anticipated improvements may be required for future growth.

Other studies have been made for determining the appropriate financing mechanisms to construct infrastructure which will support trade and industrial growth between Texas and Mexico. A final report (Texas/Mexico Authority Infrastructure Finance Summit), produced by the Office of International Trade, Texas Department of Commerce, Austin, Texas, was completed in early November of 1988, presents objects to:

1. Provide the U.S. and Mexican border governors with specific proposals for industrial infrastructure projects and, equally important, possible finance mechanisms for these projects. The next meeting of the border governors will take place in February, 1989.

2. Provide Mexican and U.S. executive transition teams with a common overview of infrastructure development issues for joint consideration and action by the new administrations.

3. Provide state and local governing entities in the U.S. and Mexico with recommendations for projects and policies for support/action where appropriate.

The study heavily considers the transportation aspect for access, including highways, bridges, airports, and sea ports, however, the development of adequate utility systems (water, wastewater, gas, electric, communications) will also be of significant importance to the success of the program.

Future projects that are planned by the City of Del Rio, the County, or other communities along the Texas/Mexico border should consider if the projects would provide some benefit toward achieving the objectives of the Texas/Mexico Authority Infrastructure Finance Summit.

For purposes in preparing this report, the reviews, conclusions, and recommendations for future planning have been based on the following sources of information.

Federal

- U. S. Environmental Projection Agency
- U. S. Department of Army, Corps of Engineers
- U. S. Department of Agriculture, Soil Conservation Service
- U. S. Department of Agriculture, Farmers Home Administration
- U. S. Department of Housing and Urban Development
- U. S. Section - International Boundary and Water Commission
- U. S. Geological Surveys
- U. S. Department of Commerce, Economic Development Administration
- U. S. Department of Interior - National Park Service

State

- Texas State Department of Health
- Texas Water Development Board
- Texas Water Commission
- State Board of Insurance
- Texas Department of Commerce
- Fire Prevention and Engineering Bureau of Texas
- State Department of Highways and Public Transportation
- Texas Parks and Wildlife Department

Local

- City of Del Rio
- Community of Comstock

- Community of Langtry
- County of Val Verde
- Middle Rio Grande Development Council
- Rio Bravo, Inc. - Developer
- David Trent - Surveyor

B. WATERWORKS SYSTEMS

1. General

The studies of the existing waterworks systems included within the designated planning area afford a basis for presenting a general plan and layout that will be desirable in furnishing local and regional service to the customer. Although the nature of this planning for the future waterworks system is a general plan, there are a number of factors which must be initially employed to arrive at an acceptable plan and layout.

For the purpose of clarification of the terms used in this study, the following definitions are established:

a. Waterworks System

All facilities related to the collection, transporting, pumping, treatment, storage and distribution of water, supply works, dams and impounding reservoirs, intake structures, pumping stations, wells, and any other construction developed for purposes of water supply.

b. Supply and Transmission Mains

Pipelines from the source of supply to the treatment works or the distribution system.

c. Distribution System

The pipeline grid throughout the developed area, including storage tanks, pumping stations, fire hydrants, gate valves, and other appurtenances used to supply water for domestic and fire fighting purposes.

d. Feeder or Arterial Mains

The principal pipelines (8 inches in diameter and larger) of the distribution system. Used primarily to transport large volumes of water throughout the distribution system, these mains are also referred to as transmission mains within the distribution system.

e. Distribution Mains

The pipelines (6 inches in diameter and larger) will comprise the distribution system.

f. Service Mains

Small pipes (1-inch through 4 inches in diameter) which provide service for several houses.

g. Service Lines or Service Laterals

Pipelines which are connected to the individual customer's meter from the feeder or distribution main. These service lines may be large or small depending upon the water demand of the customer.

2. Water Demands

A review of the past water production and metered water records must be made to properly evaluate the adequacy of the service to the existing development as well as to project the trend for future demands and requirements. The adequacy of a water system in service to the existing development is commonly described in terms of good, fair or poor, depending upon the number of calls received regarding low pressures, insufficient quantities or rationing of water, offensive odors or color in the water, frequent maintenance of water mains or other similar complaints.

There is found, in most cases, a difference in the amount of water that is produced and pumped into a water distribution system from the water treatment facilities as related to the actual metered water sold to the customers. Water losses are evident in all distribution systems. This "lost" or unaccounted for water may be attributed to various causes. Some of these are for fires, flushing fire hydrants, backwashing in testing, water main breaks, leaks, inaccurate meters, and treating and sterilization of new mains. In a system 100 percent metered and moderately well maintained, the unaccountable water is normally from approximately 15 percent to 20 percent of the total water produced. The efficiency of a system can be greatly enhanced through a detailed study and systematic program of improvements to correct those evident problems that are found contributing to excessive losses of water.

It is only through planning and study that many problems in a water system can be found and be eliminated and not become a burden to a community. Therefore, accurate and complete historical data is extremely important in the planning and designing the facilities for the future growth and development in any community.

The estimation of the future water demands are linked with the projections in population or population equivalents and the land-use

of the proposed area of development. Population equivalents are often projected for determining the future water demands where there is anticipated consumption by industries, commercial establishments and other similar customers as well as domestic consumption. Water is one of the prime factors that is considered by industries when location in a community, and a sufficient supply with adequate pressure should be readily available at all times. Many industries use large quantities of water in their production processes and often require many gallons for cooling. Since most cities are unable to serve a large number of water users in a sparsely or partially developed area, it is desirable to design the water system with reserve capacities included therein.

These anticipated demands for water become very significant in that they reveal, in the planning, the necessity for larger mains and the possible need for rearrangement of the existing grid system. The results of this planning then can be incorporated in a program from which priorities can be assigned to the construction of the new improvements. For this reason, the importance of maintaining accurate and complete records of the water usages and demands cannot be emphasized enough.

Water demands are generally referred to in the following terminology:

a. Average Daily Demand

This is expressed in million gallons per day (M.G.D.) for the entire water system and represents the daily demand averaged over a period of one year.

b. Per Capita Demand

This is expressed in gallons per capita per day (G.P.C.D.) and represents the daily water demand per person averaged over a period of one year.

c. Maximum Daily Demand

This is expressed in M.G.D. and represents the maximum amount of water used in the system in one 24-hour period in a given year.

d. Peak Hourly Demand

This is expressed in M.G.D. and represents the rate at which water is used during the hours of maximum usage in a given year.

e. Minimum Hourly Demand

This is expressed in M.G.D. and represents a condition at which the demands in consumption are the lowest and the period of time at which the pressures may be the greatest and at which the elevated tanks are being refilled after periods of maximum usage.

The available water usage records for each of the waterworks systems within the planning area were reviewed separately. The records of water demands for the water systems of Langtry and Comstock were limited; however, the projections for their future water demands were based on the per capita water usages of other communities comparable in size and development.

The demands that are determined from the water usage records of existing water systems may vary quite widely. The per capita use (G.P.C.D.) normally falls within a range of from 50 to 200 gallons per day, depending upon the type of development and the efficiency in the operation of the system. In review of the available records of the water systems within the planning area, the trend for increases in water demands normally found in a public water system was evident for most of the systems. The wide variance in the per capita usage and the increases in water demand is largely attributable to a greater public acceptance and use of water consuming devices, such as automatic dishwashers, clothes washers, garbage disposals, lawn sprinkler systems, and because of increased commercial and industrial use of water. People also tend to use more water as greater quantities and pressures become available with improvements made to the system.

In further study of the records that were available, the maximum amount of water pumped into the distribution system in one day was determined. These maximum daily demands are very important inasmuch as the future projections are utilized in determining the criteria in a ratio to the average daily demand, which is derived from studies of past water usage records. Many times the records are found to be incomplete, and a comparison of the average daily demand to the maximum daily demand cannot be made; however, from previous studies in other systems, it has been found that the maximum daily demand may be within a range of 1.50 to 3.00 times the average daily demand.

Usually, the greatest draft upon a water distribution system will occur in the late afternoon hours of July and August and will frequently result in a peak or a maximum hourly water requirement of 300 to 400 percent of the average daily demand. The distribution system must be capable of delivering water at the peak hourly rate or at the maximum daily demand rate plus fire flow, whichever is greater. These critical peak demand periods of 4-hour to 10-hour durations must be met by the elevated storage and the high service pumps at the ground storage reservoirs. For purposes of projecting the future peak hourly demands a multiplier of approximately 2.0 times the maximum daily demand is often used.

The demands for fire-flow are normally incorporated with the overall design and detailed planning of a water distribution system, especially in municipal systems. These demands for fighting fires are largely determined by the value of the development in an area. It would be logical that a major business sector of a city be considered as a high-value district and would thereby require a greater water demand for fire protection than that required in a residential area. From this method of allocating the rate of demand for a fire-flow, it becomes significant that Del Rio and other communities plan the future land-use and enforce their applicable zoning ordinances. This will allow the City of Del Rio and other communities to furnish the desirable fire-flows where they will match the type of development. Standards have been developed on both the State and National level, whereby municipal water systems are graded according to their fire defenses and physical conditions. All aspects relative to fire protection are considered in these standards, among which recommendations are given for the water demands that are desirable for fire-flow. These standards are provided by one or more of the following agencies.

- State Board of Insurance
- Fire Prevention and Engineering Bureau of Texas
- Insurance Services Office

In determining the desirable demands for a fire-flow, several variables become significant. The Insurance Services Office considers the requirements for fire-flow, in all cases, on the basis of structural conditions and congestion of the buildings. They state that in residential areas where about one-third of the lots in a developed block having buildings of small area and are of low height, at least 500 gallons per minute (gpm) is required; however, if the buildings are of a larger area or higher, up to 1,000 gpm is required. Further, they require a fire-flow of 1,500 to 3,000 gpm where a development is more closely built or the structures consist of high-value residences, apartments, tenements, dormitories, or similar development. Where densely constructed development occurs with three-story and higher buildings, up to 6,000 gpm may be required. As a guide for determining the require fire-flow, the following formula is used by the Insurance Service Office.

$$F = 18\ C\ (A)^{0.5}$$

where,

F = the required fire-flow in gallons per minute (gpm)
C = coefficient related to the type of construction
  C = 1.5 for wood frame construction
  = 1.0 for ordinary construction
  = 0.9 for heavy timber-type buildings
  = 0.8 for noncombustible construction
  = 0.6 for fire-resistive construction

Note: For types of construction and/or materials that do not fall within the categories given, use a coefficient reflecting the difference. Coefficients shall not be greater than 1.5 nor less than 0.6 and may be determined by interpolation. Such interpolation shall be between consecutive types of construction as listed above.

A = the total floor area (including all stores, but excluding basements) in the building being considered.

The fire-flow as determined by the above shall not exceed:

8,000 gpm for wood frame construction
8,000 gpm for ordinary and heavy timber construction
6,000 gpm for noncombustible construction
6,000 gpm for fire-resistive construction

except that for a normal 1-story building of any type of construction, the fire-flow shall not exceed 6,000 gpm.

The fire-flow shall not be less than 500 gpm.

The State Board of Insurance in Texas outlines their requirements of demands based on the following minimum fire-flows:

Type of Development	Minimum Fire-Flow (gpm)
Principal Mercantile and Industrial Areas	3,000
Light Mercantile	1,500
Congested Residential Areas	750
Scattered Residential Areas	500

There are many factors set forth by the fire rating agencies other than the quantity of flow which enters in the consideration of a system's ability to furnish adequate fire protection. Some of these factors which involve water pressures, sizes of water mains, fire hydrants, gate valves, and other similar physical features of a water distribution system are discussed later in this report.

Again, compliance with the applicable standards and requirements of the respective agencies is very important for all municipalities. Providing for adequate fire protection is a vital function for the city or community, and a detailed study and understanding of the current standards are necessary. From the incorporation of these fire protective measures with future capital improvement programs, the municipalities and the public can realize a saving in their insurance rates for fire protection.

It is extremely difficult to predict the added amount of water, both raw and treated, which would be required by new industries and any of the other unforeseeable factors in a growing economy during the planning period covered by this report. Therefore, the discussion of water demands here is offered more as a general guide for future planning under normal or average circumstances of foreseeable development and growth. Sometimes abnormal spurts of growth, very large industries or other unusual events that unpredictably occur, impose much greater demands than were ever anticipated. These events immediately create a need for new improvements, often times at a considerable expense. It behooves the cities, the towns, and the communities all to frequently review their respective trends of growth and constantly strive to balance an adequate service with the existing development. When this balance is maintained, the cities are not suddenly burdened with constructing major improvements that should have been provided in the past years.

3. Water Supply and Treatment

Water supplies are principally obtained from surface sources such as lakes, streams and springs and from ground or subsurface sources developed by wells. In any case, succ factors as the cost, quantity or volume available, and the quality are very important considerations that must be given when selecting the most desirable source for a reliable water supply. The planning and estimated quantities derived for water supplies are made for a period of time in the future which would be considered as realistic and practical based on past records and history. This usually is for a period of from twenty-five (25) to fifty (50) years hence depending upon the reliability of the past records and the type and trend of the anticipated development. The reservation of as much capacity for a future water supply as economically feasible is recommended so that the optional or additional reserves will possibly be able to offset any unexpected development or any unpredicted rise in the water demands.

The water supply for a system should be based on the projected average daily demand; however, the capacity of the well pump or the raw water pumping and transmission facilities should be sized to handle the rate which would furnish the supply to meet the maximum daily demand condition of the system.

The principal aquifer in Val Verde County is the Edwards and associated limestones.

The recharge to the Edwards and associated limestones occurs from direct infiltration of precipitation and stream flow on the outcrop areas within the County and the adjacent Counties.

The water moves from the recharge zones at or near the surface to within these formation through faults and fractures. The wells that are developed in these formations in the County vary in depth from

150 to 1,200 feet and yield small to large quantities of fresh to slightly saline water. According to the report of the Texas Water Development Board, the quality of the water occurring in the Edwards and associated limestones in the extreme southeastern part of Val Verde County is very poor due to the lack of circulation of the groundwater.

As reported by the Texas Water Development Board, prior to construction of Amistad Reservoir, spring flow and base flow within Val Verde County measured approximately 500,000 acre-feet/year. This amount of water represents a rough approximation of the total annual recharge and could potentially be developed without affecting the water level within the Edwards and associated limestones. Later in the repoot, the total water supply requirements for the 50-year planning period for Val Verde County is projected to be 26.74 M.G.D. or 29,949 acre-feet/year. Thus, it appears that more than enough groundwater resources are available to meet these demands for this planning period.

The type of water treatment facilities depends on the quality of the source of supply and the quality desired in the finished product. Treating facilities vary widely from a complex and sophisticated treating system to very little or no treatment at all. The qualities of the raw water and the ultimate use determine, to a large extent, the degree and expense to which the water must be purified for distributing to the consumer.

Adequate information on the raw water sources is a prerequisite to design. This includes an analysis of the water and, where the supply is not uniform, the ranges in the various characteristics of the raw water should be determined. The information that is available on the quality of the water may be obtained from the surface water branch of the U. S. Geological Survey, the Texas Water Commission, and the Texas Department of Health.

Surface water tends to be variable in quality and usually contains lower concentration of minerals from ground water, is more highly colored, is turbid at times, and contains taste and odor producing substances. Surface water supplies receive greater exposure to waste, including accidental spills of a variety of substances.

Water quality is an important factor in the design of a raw water intake structure in a surface water reservoir. Multiple intakes from different elevations below the water surface offer the flexibility in selecting water from various depths in deep reservoirs, thus overcoming poorer water quality which can result from seasonal changes.

As a guide, the following table shows some general standards recommended for evaluating the quality of raw water sources for domestic water supply.

Ranges of Standards for Raw Water Sources for Domestic Water Supply

Constituent	Excellent Source	Good Source	Poor Source
BOD (5-day) - mg/l --			
Monthly average	0.75 - 1.5	1.5 - 2.5	> 2.5
Maximum day, or grab sample	1.0 - 3.0	3.0 - 4.0	> 4.0
Coliform MPN per 100 ml --			
Monthly average	50 - 100	50 - 5,000	> 5,000
Maximum day, or grab sample	less than 5% over 100	less than 20% over 5,000	less than 5% over 20,000
Dissolved Oxygen --			
Average - mg/l	4.0 - 7.5	4.0 - 6.5	4.0
Saturation - percent	75 or better	60 or better	
pH Average	6.0 - 8.5	5.0 - 9.0	3.8 - 10.5
Chlorides (max.) mg/l	<50	50 - 250	> 250
Fluorides mg/l	<1.5	1.5 - 3.0	> 3.0
Phenolic Compounds --			
(max.) mg/l	none	.005	> .005
Color-Units	0 - 20	20 - 150	> 150
Turbidity-Units	0 - 10	10 - 250	> 250

The water taken from an excellent source may require only limited treatment, usually microscreening and disinfection. Water taken from a good source will require normal treatment found in a typical rapid sand filtration-type plant. Water from a poor source of supply will require other special treatment facilities.

Turbidity is a measure of the resistance of water to the passage of light through it. Turbidity is caused by suspended and colloidal matter in water.

Color, if present, is an undesirable aesthetic characteristic of water. Color is usually due to organic matter in colloidal suspension but may also be due to mineral or organic matter in solution.

The specific conductance of the water is used to measure the pollutional quality of water. In general, inland fresh waters support good fish families between 150 and 500 mhos at 55^{o} C and indicates water relatively free of pollution.

Iron and manganese are objectionable in public water supplies because they cause stains on plumbing fixtures and on clothing and textiles in the laundry. The total content of iron and manganese taken together should be limited to 0.3 mg/l.

The primary purpose for water treatment is to eliminate any of the impurities that would cause disease or otherwise be harmful to public health. As a secondary purpose, treatment is provided to remove undesirable odors, tastes, color, turbidity and minerals and finally provide a palatable water for the consumer.

A water treatment plant is designed to serve the needs of the system adequately for a number of years. Expansion is indicated when the maximum daily demands of the system approach the rated capacity of the existing facilities. As a general rule, steps to provide additional capacity should be taken at least five (5) years before the present capacity is reached to allow sufficient time for engineering investigation and design, financing, and construction.

Generally, there are three (3) main functions of a water treating plant when the design of the facilities is considered. These may be summarized as follows:

a. To effectively remove the impurities and produce a safe water for purposes for which the water is intended;

b. To produce the desired quality and quantity of water at the lowest possible cost; and,

c. To provide for, in the design of the facilities, preventive measures to make the production of unsafe water as difficult as possible.

As previously mentioned, the degree of treatment and the qualities of water desired vary with the intended use. Process waters for industries often require only a minimum of treatment to remove one or more physical or chemical characteristics of the raw water which would adversely affect the end result of the industry's project. There are others that require considerably more treatment for their process water.

Water quality criteria based on present day standards and guides are presented here to assist in establishment of water system performance goals for the water treatment plant. Quality criteria will change as new information on the nature and behavior of water is revealed. The general trend is toward the production of water of higher quality. The quality of the water is expected to improve substantially but, indeed, may worsen as development increases around lakes and in drainage basins if standards for development are not strictly enforced. Currently, at the federal and State level of governments, programs are being initiated to more adequately protect the water resources.

Based on recent discussions with the staff of the Environmental Protection Agency - Region VI, in Dallas, Texas, the following information was furnished to show a partial list of the current and proposed maximum contaminant levels (MCL) of the National Primary Drinking Water Standards.

Contaminant	Primary MCL Standards (mg/l)	Proposed MCL (mg/l)
Asbestos		7 million fibers/liter
Arsenic	0.05	0.03
Barium	1	5
Cadmium	0.010	0.005
Chromium	0.05	0.1
Lead	0.05	0.005
Mercury	0.002	0.002
Nitrate (as N)	10	10.0 and Nitrite at 1.0 (as N)
Selenium	0.01	0.05
Silver	0.05	Delete add Copper 1.3
Fluoride	4.0	
Endrin	0.0002	
Lindane	0.004	0.0002
Methoxychlor	0.1	0.4
Toxaphene	0.005	0.005
2, 4-D	0.1	0.07
2, 4, 5-TP	0.01	0.05
Total Trihalomethanes	0.10	
Benzene	0.005	
Vinyl Chloride	0.002	
Carbon Tetrachloride	0.005	
1, 2-Dichloroethane	0.005	
Trichloroethylene	0.005	
1, 1-Dichloroethylene	0.007	
1, 1, 1-Trichloroethane	0.20	
para-Dichlorobenzene	0.075	
Combined radium 226 & radium-228	5pCi/l	

Gross alpha (including radium-226 but excluding radon and uranium)	15 pCi/l
Beta Particle and Photon Radioactivity	Average annual concentration shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year
Tritium	20,000 pCi/l
Tritium	20,000 pCi/l
Strontium-90	8 pCi/l
Turbidity	1 NTU

	Proposed MCL (mg/l)
Acrtlamide	Treatment Technique
Alachlor	0.002
Aldicarb	0.01
Aldicarb sulfoxide	0.01
Aldicarb Sulfone	0.04
Atrazine	0.002
Carbofuran	0.04
Chlordane	0.002
Dibromochloropropane	0.0002
o-Dibromochloropropane	0.6
cis-1, 2-Dichloroethylene	0.07
trans-1, 2-Dichloroethylene	0.07
1, 2-Dichloropropane	0.005
Epichlorohydrin	Treatment Technique
Ethylbenzene	0.7
Ethylene dibromide	0.00005
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Monochlorobenzene	0.1
PCBs	0.0005
Pentachlorophenol	0.2
Styrene	0.005
Tetrachloroethylene	0.005
Toluene	2
Xylene	10

It should be noted that the Environmental Protection Agency is continuing to develop new and modify the current regulations for drinking water standards. The State of Texas, likewise, will be revising their standards to conform to the federal regulations as they are promulgated by the Environmental Protection Agency, under the authority granted by Public Law 93-523.

A copy of the Texas Department of Health's current drinking water standards is included in the APPENDIX and is noted as APPENDIX "A".

Inasmuch as it is the purpose and responsibility of the Texas Department of Health and the Environmental Protection Agency to safeguard the health of the public, their advice should be obtained where there are problems or questions related to the qualities of water supplies and the acceptance for domestic uses.

4. Storage Facilities

a. Ground Storage

Sufficient ground storage capacity is very important in a water distribution system. Ground storage provides three (3) main functions which are as follows:

(1) Provides storage space for filtered water so the treatment plant can operate at a continuous rate for an extended period of time instead of starting and stopping to adjust the output to the rate of consumption;

(2) Provides storage space for water needed to meet the consumer demand that is in excess of the quantity that the treatment plant or wells can safely produce; and,

(3) Provides storage space for water needed instantly, in large quantities, for fighting fires.

According to the standards for Texas cities in obtaining a maximum Key Rate Credit, the State Board of Insurance prescribes that a city or town must have ground storage capacity equal to 130 gallons per capita based on a 24-hour supply. A storage capacity equal to this will satisfy all three functions, (1), (2), and (3) above.

The Insurance Services Office states that for determining the credit that can be allowed for storage it is necessary to calculate the rate of delivery that must be sufficient to produce a minimum residual pressure of 20 pounds per square inch (psi) at the point of use. From this requirement, only that amount of storage capacity available to meet this rate of delivery requirement is considered. Even though the capacity of the storage tank may be very large, the carrying capacity of the mains extending from the storage facilities must also be sized to meet the rate of delivery requirement.

b. Elevated Storage

The main functions of elevated storage are to provide water under pressure to meet the demands of hourly fluctuations of

consumer usage and to meet the demand imposed for fire protection. Here again, the requirements set forth for Texas cities and towns by the State Board of Insurance should be complied with in an effort to obtain a maximum Key Rate Credit. These requirements call for elevated storage capacity equivalent to a 10-hour supply, based upon the consumption rate of 130 gallons per capita per day. The bottom of the elevated tank must be elevated at least 100 feet above the mercantile district ground elevation in order to receive recognition for credit.

In the case of standpipes, only that portion of the storage capacity which is elevated 75 feet or more above the mercantile district is considered for credit; that is, unless the fire department has a sufficient number of pumpers. If adequate fire department pumpers are available, that part of the capacity elevated 25 feet or more above the mercantile district may be considered.

5. High Service Pumping Facilities

The capacity needed for pumping treated water into the distribution system depends upon the amount of ground storage, the amount of elevated storage, the capacity of the treatment plant and the maximum demands of the water system. With all of these variables to contend with, some determinations and assumptions have to be made to select the proper units that will provide sufficient pressure for satisfactory operation under any condition that may arise.

Through experience, it has been ascertained that high service pumping capacity should be equivalent to approximately 125 percent of the maximum daily demand with the largest pump out of service. Mechanical failure is a possibility at any time, and the largest unit can fail as easily as the smallest one. This criteria is dependent upon the elevated storage capacity being sufficient to meet the peak hourly demand, which may easily be 200 percent of the maximum daily demand. It is also advisable to have sufficient capacity to take care of fire-flow in addition to the other consumer demands.

6. Distribution Facilities

a. Distribution Mains

The water mains provide the means of conveyance or transmission of the treated water to the consumer. The water pressure desired and the quantity of water to be made available are the two (2) most significant factors for planning the sizes of the pipes required. Prior to any planning work, it is necessary to obtain fundamental information with respect to the existing facilities. With projections of the population, the future land-use, and the anticipated water demands, a logical approach

can be made in determining where the major mains should be located.

There are many ways of arranging the network of the mains in a distribution system so that all areas are served. Most commonly, water mains follow dedicated rights-of-way and easements which have been established over the past years. In any case, the most desirable water systems are arranged in a network forming a gridiron pattern; that is, the ends of the mains are interconnected with other mains forming the system. "Deadend mains", or water lines which terminate without looping back into the system, are undesirable because water cannot circulate continually through the system, and the water supply cannot flow from another direction in the event of a pipeline failure. Stagnation, discoloring of the water and accumulation of sediments in deadend mains are commonly encountered, and the water must be cleaned through hydrants or specially constructed blow-offs. Most systems, however large or small, have deadend mains which require this periodic maintenance. Where it is convenient and economically feasible, all deadend mains should be looped back in the distribution system.

From a general review of the future needs of water distribution systems, a more thorough analysis must be given to the proper arrangement and sizes of water mains that will provide an adequate water supply when needed. Water distribution systems are analyzed by the Hardy Cross method, which is the system most commonly used today for more detailed studies. The Hardy Cross procedure used in sizing and evaluating water systems is a method which balances flows in a multiple loop water system having many input-output points and a variety of pipe sizes. Briefly, the method consists of:

(1) Assuming a balanced flow distribution;

(2) Computing unbalanced flows for each loop due to errors in the initial flow assumption; and,

(3) Applying the unbalanced flows for each pipe and repeating the procedure until the head loss between two points of any flow path is balanced.

The Hardy Cross method is readily adapted to solution on electronic computers because of the many assumed flow conditions to be investigated and the number of computations and the iterations required to balance the system.

Three (3) different conditions are commonly investigated for water distribution systems. These conditions are at such times when the demands are the most critical either in consumption or refilling the storage reservoirs. These critical conditions are briefly explained as follows:

(1) Minimum Hourly Demand

Condition at which the demands in consumption are the lowest and the period of time when the pressures may be the greatest and at the time when the elevated tank(s) is (are) being refilled after periods of maximum usage.

(2) Maximum Daily Demand plus Fire-Flow

Condition at which a recommended demand for fire-flow for a given population and development as given by the fire rating bureau is assumed to be required at the same time as the day of greatest maximum demand of the system. At this condition, it is usually assumed the pressures will be the lowest.

(3) Peak Hourly Demand

Condition at which the greatest demand in water consumption occurs in any given hour during a 24-hour period.

Whichever one of the conditions impose the greatest demand upon the system is the one that governs the planning and ultimate design of the water mains. Although it is beyond the scope of this report to analyze in detail each individual system by this method, there are several general and basic recommendations which will help guide in properly planning a water distribution system.

The gridiron of the small distribution mains which supply residential districts are recommended to be at least 6 inches in diameter and looped. In mercantile or high-value districts, the minimum size of the water mains should be eight (8) inches in diameter.

In connection with the distribution mains, large feeder or arterial mains are necessary to supply a sufficient quantity of water at an adequate pressure to the distribution and service mains. According to the recommendations of the State Board of Insurance and the Insurance Services Office, these large mains shall be of a size that fire-flow and consumption demands are delivered to all areas, considering their length and type of development that is to be served. Further, their recommendations state that these large arterial mains be properly spaced approximately every 3,000 feet and looped. The deficiency of the layout of the water mains, their sizes, and their ability to furnish the proper service is based on an analysis of the results of fire-flow tests and other general

considerations required by the State Board of Insurance and Insurance Services Office.

Where this information is available, these test reports are very helpful in determining where a particular area needs additional improvements.

b. Gate Valves

The gate valves are generally located on the water mains so that isolation of any one section of pipe for service connections, maintenance, or repairs may be accomplished without service interruption to an adjacent area. The proper locations of gate valves in a water distribution system is certainly an important factor for any system to be operated and maintained in an efficient manner. Although the valve control in a system may appear on paper to be fair, many of the valves often are covered with asphalt or earth. The locating and recording of all of the existing gate valves in the system for future reference is recommended. Each valve should be easily accessible and should be operated from time-to-time to determine its ability to shut the water off from another area. This information is important for planning a program for replacing inoperable gate valves which could be included with the overall schedule of the other improvements to the water system. A continuous program for location and periodic operation of the valves should be scheduled as part of the normal work of the water department.

c. Fire Hydrants

It may be noted throughout this report that there are many comments and standards recommended in the design and construction of water systems which are related in some aspect to fire-flow and fire protection. Where fire protection equipment and facilities are provided for the public protection, each integral part of the water system should function with as high a degree of performance as possible. An undersized main or a deadend main would considerably reduce the efficiency in fire protection; likewise, fire hydrants that may be inoperable or otherwise substandard in some respect would be of little benefit when fire protection is needed.

The following paragraph, concerning fire hydrants, is copied from the "Key Rate Schedule for Grading Cities and Towns with reference to Their Fire Defenses and Physical Conditions", published by the State Board of Insurance, at Austin, Texas:

> "Standard three-way hydrants to have six-inch or larger connection to mains with a minimum of five-inch valve opening. Hydrants to be properly located so there will be a fire hydrant every 300 feet in the mercantile and

industrial areas, and every 600 feet in residential areas, so that every building in the city limits will be within 500 feet of a standard city fire hydrant. Hydrants must be equipped with the National Standard Hose Threads. Hydrants to be maintained in good operating condition are to be inspected, oiled, greased and flushed every three months and painted a distinctive color at least once each year."

Programs implemented for replacing substandard fire hydrants with new standard fire hydrants and periodic inspections and operation of each fire hydrant in the system at regular intervals are vitally important to the operation of an efficient fire department.

7. Water Service Rate

A continuous effort is necessary to maintain, repair, replace, and construct additional improvements to any water distribution system. The cost for this service increases daily, and an equitable revenue for these services from the customer must be established to offset the expense. The water rates must be adequate to maintain and operate a system efficiently and economically, whereby the customer is afforded the best possible service. As labor and material costs increase, likewise interest rates have accelerated during the past years. It is recommended that the operating entity of each water system periodically should evaluate its present operation and the anticipated future needs so that if it appears to be evident that the rate structure is now deficient, or will become deficient in the near future, a revision can be made before it becomes an urgent matter.

8. Summary

There are many aspects to consider when a detailed design is made for an efficient water system or in any of the components thereof. Since the scope of this plan is of a general nature and is to be used only as a basic guide for ultimately developing water systems, detailed studies in design must be further employed so that improvements will comply with the requirements of water demands and with the standards of the various regulatory agencies. Prior to construction, a review of any proposed additions and improvements to a water system should be made by the Texas Department of Health. This agency performs reviews and gives approval of the proposed waterworks improvements according to their "Rules and Regulations for Public Water Systems."

In addition to the reviews by the Department of Health, the detailed design and layout of proposed water improvements may require further review by various other agencies concerned with the final development and construction.

Every entity operating a water system should have copies on file of the current rules, regulation, requirements or other such standards as set forth by the regulatory agencies, and the operators should be familiar with this information.

Often, a very important item is overlooked by many cities, towns, and communities. Immediately after water improvements are completed, copies of the plans of the project as it was actually constructed in the field should be submitted again to the Texas Department of Health, State Board of Insurance, and other appropriate agencies concerned. This will provide the appropriate agency the data necessary so that the water system additions will receive proper credit from the standpoint of public health and fire protection.

C. WASTEWATER SYSTEMS

1. General

The modern wastewater or sanitary sewerage system is one of the vital public utilities which permits the present way of life and without which modern community development would be impossible. All communities produce waterborne wastes, and an adequate means of collection and disposal of these wastes is absolutely necessary to the health and welfare of the community.

Surveys and investigations of the existing sewerage systems in Val Verde County have provided information for planning the future needs. The data produced by these surveys and investigations have been assimilated and analyzed to arrive at a technical engineering evaluation. This, then, forms the basis from which recommendations with regard to sewerage system improvements are made consistent with the facts of each individual case.

The Regional Topographic Map, FIGURE NO. II-1, on the following page shows the overall system of creeks, streams and rivers that convey the region's surface water resources. The network of streams which comprises an individual basin of surface water resources is referred to as the "river system".

The communities within the drainage basins currently function under the guidance of a variety of agencies. Because of the sparse population and distance between the communities in Val Verde County, the systems are presently operated in a "piece-meal", unintergrated, limited objective-type of development, in that there has been no over-riding goal of providing systems that will function in harmony with each other on a regional basis.

2. Definition of Terms

For the purpose of clarification of the terms used in this study, the following definitions are established.

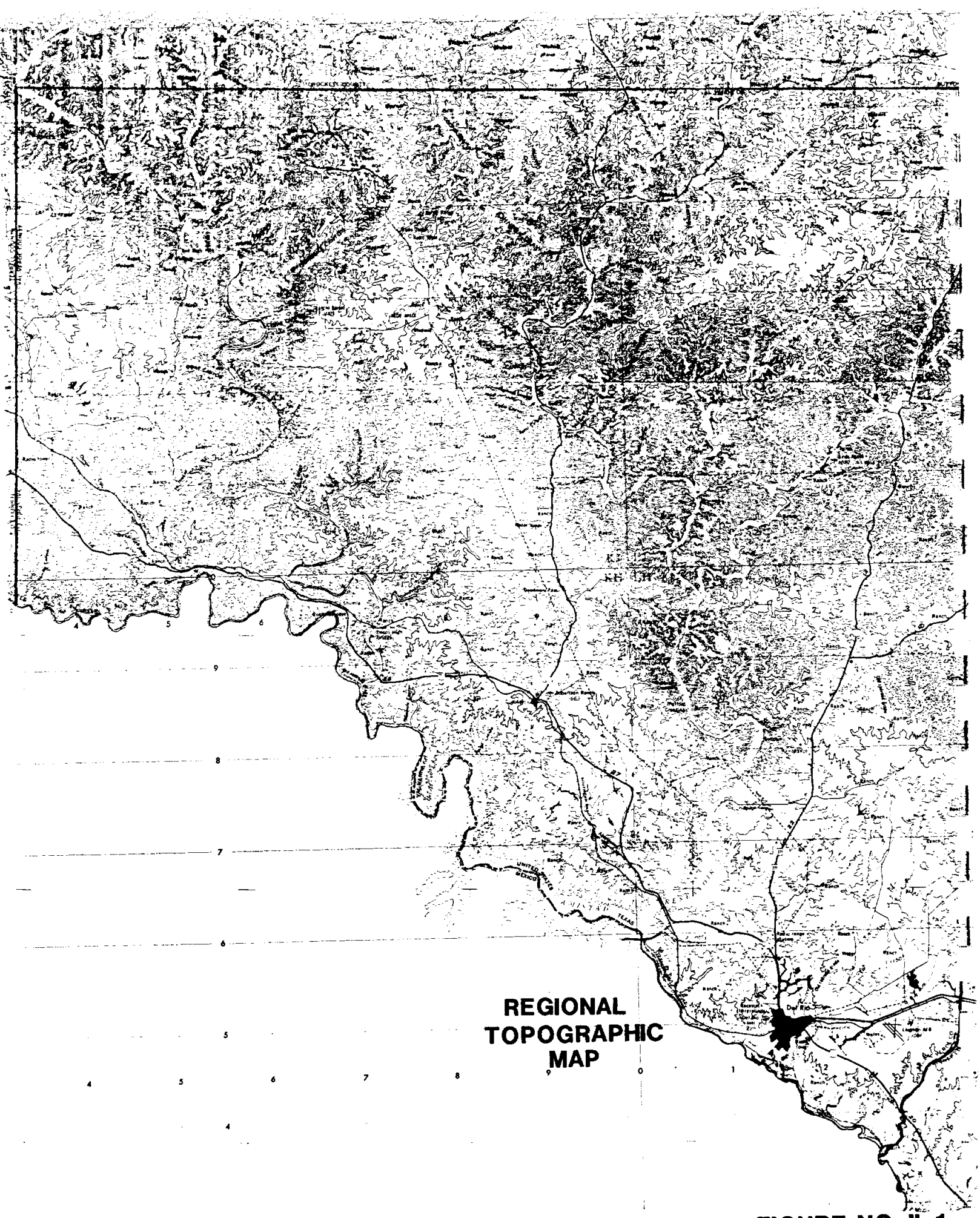


FIGURE NO. II-1

a. Sanitary Sewage is defined as the water-carried wastes which originate in the sanitary conveniences of a dwelling, business establishment, factory, or institution. Also referred to as wastewater.

b. Storm Sewage is defined as the water-carried wastes flowing in the sewers, diluted by rain water during or after a period of rainfall.

c. Infiltration is the ground water which gains entrance into the sewers through joints, improper connections, broken pipe, etc., as differentiated from surface run-off.

d. A Sewer is a pipe or conduit used for the purpose of conveying sewage.

There are three (3) general classifications of sewers:

1) A Sanitary Sewer is one designed to carry sanitary sewage only. In many cases, it will carry industrial wastes produced in the area it serves.

2) A Storm Sewer carries storm run-off and similar wastes not including sanitary sewage.

3) A Combined Sewer is designed to carry domestic sewage, industrial wastes, and storm water run-off in a single conduit.

e. Sewerage System is a term used to designate a system of sewers and appurtenances for the collection, transportation, and pumping of sewage and industrial wastes. Also referred to as wastewater system.

f. Sewage Treatment Plant is a comprehensive term encompassing the arrangement of devices and structures for treating sewage and industrial wastes and sludge. Also referred to as wastewater treatment plant.

g. An Interceptor Sewer is a sewer which receives dry weather flow from a number of transverse sewer outlets for the transmission to a point for treatment or disposal.

h. An Outfall Sewer is a sewer which receives the sewage from a collecting system and carries it to a point of treatment or final discharge.

i. Sewage Treatment refers to any artificial process to which sewage is subjected in order to remove or alter its objectionable constituents so as to render the sewage less dangerous or offensive.

j. Sewage Disposal applies to the act of disposing of sewage by any method. It may be done with or without previous treatment of the sewage.

k. The pH or Hydrogen Ion Concentration is the weight of hydrogen ions in grams per liter of solution. It is commonly expressed as the pH value that represents the logarithm of the reciprocal of the hydrogen ion concentration, and expresses the alkalinity or acidity of water, sewage or sludge.

l. Biochemical Oxygen Demand (B.O.D.) is the quantity of oxygen utilized in the biochemical oxidation of organic matter in a specified time and at a specified temperature. It is not related to the oxygen requirements in chemical combustion, being determined entirely by the availability of the material as a biological food and by the amount of oxygen utilized by the micro-organisms during oxidation.

m. Population Equivalent The strength of sewage is often expressed as its "population equivalent". The population equivalent of sewage is the expression of some characteristic of the per capita flow of the sewage in terms of the same characteristic of the per capita flow of some "standard sewage". The "standard sewage" is a "normal domestic sewage" which is defined as a sewage from which industrial wastes of all kinds are largely absent.

n. Solids The solid content of sewage consists of those in the settleable, suspended, dissolved and total form. The total solids represent the sum of the suspended and dissolved contents. The total solids and suspended solids are further divided into volatile and non-volatile for the purpose of differentiating between the organic and inorganic content. Settleable solids are those readily amenable to settling irrespective of their size.

o. Average Daily Flow The average amount of flow received and/or treated at the sewage treatment facilities during a 24-hour period without consideration of hourly fluctuations.

p. Design Rate Flow An established rate of flow which treatment facilities must be capable of handling.

3. Sewage Characteristics

The domestic wastewater is that sewage usually expressed as a certain percentage of water usage. Domestic sewage is usually of medium strength and presents no special problems in collection or treatment.

treatment before it can be safely discharged into a stream. When this type of waste is put into a sewerage system at full strength and in appreciable quantities, the pipelines and equipment can suffer considerable damage, and the chemical-biological composition of the sewage entering the plant often necessitates changes in the treatment operations. Unlike domestic sewage, which usually has fairly constant characteristics, industrial wastes will vary according to the type of industrial process, time of day, day of the week, season of the year, volume of business and numerous other conditions.

Infiltration/inflow is that part of the sewage flow that comes from storm water run-off and ground water. This water enters the sewage collection system by leakage through faulty pipe joints, manholes, cracked pipe and any connections that may not be watertight. All sewage collection systems have some infiltration because it has not been found economically feasible to build and maintain a watertight sewerage system, except in areas where the sewer mains are below the ground water table.

As a wastewater collection system ages, the potential for excessive infiltration/inflow can increase significantly, particularly if the flows in the system are not routinely monitored and steps are not immediately taken to repair or replace deteriorated manholes and pipelines.

Three (3) terms are used to describe sewage generally. They are condition, concentration, and composition.

a. Condition refers to the age of sewage and is defined as follows:

   (1) Fresh - Sewage in which the dissolved oxygen concentration is not materially less than that of the municipal water supply which went into it.

   (2) Stale - Sewage in which the dissolved oxygen content has been depleted to near zero by biological degradation.

   (3) Septic - Sewage in which biodegradation has set in and population of organisms in scale with the food supply has been established.

b. Concentration refers to the strength of sewage, usually measured by its 5-day, 20^{0} C., B.O.D.

   (1) Weak - Sewage in which the B.O.D. is below 180 milligrams per liter (mg/l).

   (2) Average or Medium - Sewage in which the B.O.D. is in the range of from 200 to 250 mg/l.

   (3) Strong - Sewage which has a B.O.D. above 280 to 300 mg/l.

c. Composition of sewage refers to its content of various waste-contributed quality factors, solids, oxygen demand potential, products of biodegradation, etc.

The typical composition of domestic sewage is as follows (all values are in mg/l):

Constituent	Strong	Medium	Weak
Total Solids	1,000	500	200
Volatile	700	350	120
Fixed	300	150	80
Suspended Solids	500	300	100
Volatile	400	250	70
Fixed	100	50	30
Dissolved Solids	500	200	100
Volatile	300	100	50
Fixed	200	100	50
Oxygen Consumed	150	75	30
Total Nitrogen	86	50	25
Organic	35	20	10
Free Ammonia	50	30	15
Nitrites	0.10	0.05	0
Nitrates	0.40	0.20	0.10
Chlorides	175	100	15
Alkalinity	200	100	50
Fats	40	20	0

The per capita oxygen demand for a strictly domestic sewage will probably not exceed 0.17 to 0.18 pounds per day, while that of sewage containing large amounts of industrial wastes may exceed 0.4 to 0.5 pounds per day. The mixture of industrial wastes with municipal sewage often provides an economical and mutually beneficial treatment procedure. This is provided that proper and complete pretreatment facilities are maintained by the industry to prevent toxicity and abnormally high suspended matter, biodegradable matter, turbidity, corrosive substance, odor or mineral constituents. Generally, if proper treatment by the industry is not accomplished, the effect is to materially worsen the quality of the treated return water to the receiving stream, unless the entire sewage treatment plant is specifically designed to affect treatment on a sewage that contains these abnormal characteristics. This, however, is seldom the case.

4. Sewage Collecting System and Flows

Sewage waste must be transported from the point of collection to the treatment or disposal area as quickly as possible to prevent development of septic conditions. The flows are highly variable and contain coarse solids which may be floating or suspended. A

sanitary sewer has two main functions - namely, (a) to carry the peak discharge for which it is designed, and (b) to transport suspended solids so that deposits in the sewer are left to a minimum.

The design of municipal sewerage systems must be based on a knowledge of the expected sewage flows. The time variation of these flows is also important, since sewers, which normally are gravity systems, must be capable of handling the peak loads and must also be able to transport the minimum loads at velocities sufficient to assure cleaning action. The maximum hourly quantity of domestic sewage, wastes from industrial plants, and ground water infiltration should all be considered in determining the capacity of sanitary sewers.

It is convenient to estimate the tributary population and the probable future average per capita flows of sanitary sewage in determining the sanitary sewage part of the average daily flow. An estimate of the present and future population is necessary to determine the design period or length of time the sewerage facilities will adequately serve the community. These projections are then utilized as the basis for determining the future flows.

Experience has shown that the amount of water used by the customer which normally finds its way back into the sewerage system is approximately 75 percent of the average daily per capita metered water consumption.

From records maintained by the cities and communities, it is found that the average daily per capita metered water consumption rate varies from 80 to 150 gallons. This included the water used by the commercial establishments and industries. However, because of the anticipated increase in water consumption, the past and present day flows would not be representative of the future sewage flows. The projected average daily per capita metered water consumption rate is estimated to be approximately 150 to 165 gallons. It is expected that approximately 112 to 124 gallons per capita per day will be returned as sewage. For purposes of this study, this amount of sewage flow will be used as the estimated average sewage flow, excluding any allowances for infiltration, for the planning period outlined herein.

The quantity of infiltration to be found in an existing sanitary sewerage system is difficult to determine without extensive tests and measurements of the flows at various intervals of time. In fact, it has been found that the average quantities of infiltration are so difficult to measure that it becomes impractical, in most cases, to attempt to do so. It would be logical to assume that during periods of heavy rainfall, the infiltration would be the greatest, thereby increasing the sewage flows. From the tests that have been performed in many systems, the average rates of infiltration were found to be in a range of approximately 750 to

1,500 gallons per acre per day (GPAD). It is important that all future plans and specifications for sewer improvements contain a clause limiting the amount of infiltration which will be tolerated and that all subdividers and persons charged with the inspection and acceptance of house sewer connections enforce the requirements of this clause.

A determination of the infiltration/inflow (I/I) condition for the service area of the Silver Lake Wastewater Treatment Plant was presented in a report prepared by Gutierrez, Smouse, Wilmut & Assoc., Inc., Dallas, Texas, on July 28, 1988.

The purpose for this report was to evaluate the infiltration/inflow conditions with the following specific objectives:

a. Identify the presence and quantity of infiltration/inflow entering the Silver Lake Basin.

b. Determine if "possible excessive" infiltration/inflow conditions exist in the sewer system as per EPA manual CG-85, July, 1984.

c. Formulate, if "possibly excessive" infiltration/inflow exists, a plan to include recommendations to correct the problem.

Historical flow data was selected from two different time periods. For dry weather flows, data was analyzed from February 3, 1988 to February 15, 1988. For wet weather flows, the selected time period was from May 31, 1987 to June 30, 1987. The period from June 22, 1987 to June 30, 1987, was considered as high groundwater period for analyzing the potential dry weather infiltration.

The results and considerations from the I/I investigations were as follows:

a. The dry weather average daily flow during the high groundwater period for the Silver Lake Basin is 1.892 million gallons/day (M.G.D.) or 128 gallons/capita/day (gpcd).

b. The wet weather maximum daily flow is 3.284 M.G.D. (222 gpcd), and the potential two-hour wet weather peak flow rate is 3,060 M.G.D. (2,819 gallons per minute).

c. Peak wet weather flows do not impact the plant performance significantly based on a review of the self-reporting data.

d. The only known bypass is upstream from the metering station at the treatment plant. This bypass was not active during the study period in May and June of 1987, based on conversation with plant personnel.

e. The dry weather average daily flow is 128 gpcd which is not significantly above the "possibly excessive" limit of 120 gpcd for dry weather infiltration.

f. Increased flows were experienced during the rainfall episodes indicating inflow and wet weather infiltration. However, the daily maximum wet weather flow is 222 gpcd which is below the "possibly excessive" limit of 275 gpcd for wet weather infiltration and inflow.

g. The Silver Lake Basin in Del Rio is not subject to "possibly excessive" infiltration/inflow as defined by CG-85 guidelines. No further study of this nature is recommended at this time.

According to the comments from the City of Del Rio staff, the characteristics of the current sewage flows to the Silver Lake Plant have not changed since the first of the I/I studies were conducted in 1987.

Studies to determine the I/I for the service area of the San Felipe Wastewater Treatment Plant have not yet been completed; however, the City of Del Rio will be required to perform such studies as part of the application for the State Revolving Fund (TWDB) assistance for expanding the San Felipe Plant.

In the analysis of a system of sanitary sewer mains, the average flows do not, however, represent the flows which the mains should be expected or designed to carry. Sewer mains should be designed to handle the estimated peak flows which would occur in the drainage area being served.

The peak domestic sewage flows for the mains have been determined by establishing a ratio between the peak and the average flows, depending upon the size of the drainage area and the population served by the sewer main. This ratio has been calculated from studies made in other areas at a maximum of five (5) times the average flow for small areas. As the size of the area to be served increases, this ratio gradually decreases to a minimum of 1.5 times the average flow for very large areas. For purposes of this study, peak flows are based on the Babbit Formula for a peak to average relationship. Babbit Formula is:

$$M = 5/P^{0.2}$$

where: M = ratio of maximum to average rate of flow; and,

P = contributing population in 1,000's

This relationship is graphically shown by FIGURE NO. II-2 on the following page.

Population densities may vary from 3.5 to as many as 15 persons per acre. The 3.5 is usually based on one (1) acre plots while the 15 people per acre is based on 1/3 to 1/4 acre plots, all built on, with 3 to 5 persons per family.

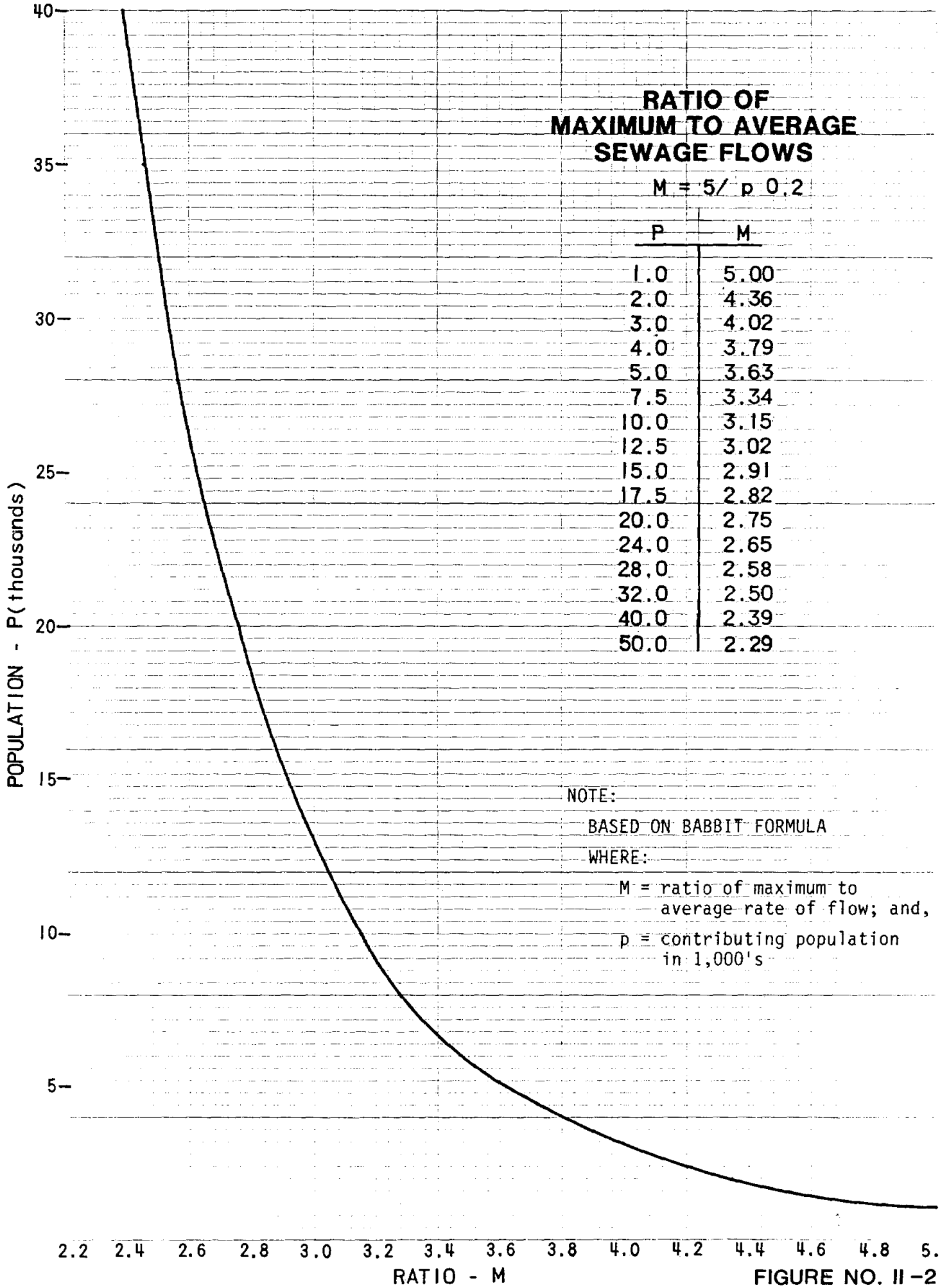


FIGURE NO. II-2

There will be two (2) categories of wastes from industrial plants. One will be that due to plant-process operations; the other will be the domestic sewage produced by the employees. Industrial waste volume is highly variable. The cities and communities cannot foresee where or when new industrial development will occur, nor can the cities and communities estimate how much flow these industries will contribute to the sewage flow. Unfortunately, these are unknown problems that, often times, have to be resolved as they occur. For this reason, no flows have been included within the per capita flows developed for domestic sewage.

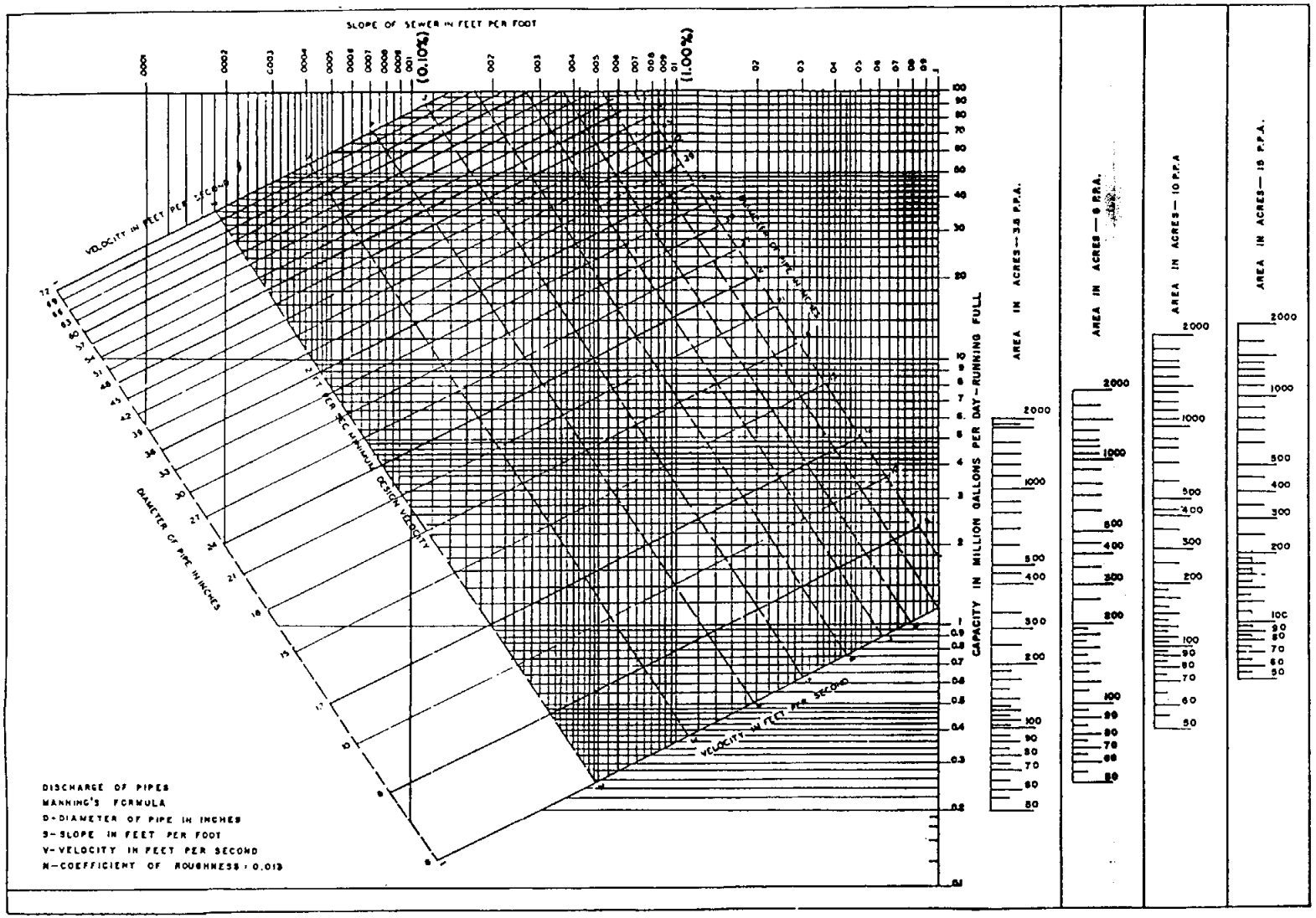
In analyzing the sewers in a sanitary sewerage system, estimated peak flows can be routed through the system using Manning's Formula for flow of water by gravity through a closed conduit or pipe.

Manning's Formula is $V = \frac{1.486}{n} \times R^{2/3} \times S^{1/2}$, in which "S" is the slope ratio and "R" the hydraulic radius. The coefficient of roughness "n" is usually assumed to be 0.013, which is believed to be an average, typical of an entire system, although some of the older sewers may have a higher coefficient of roughness. Manning's equation was used to develop the nomograph shown on the following page (FIGURE NO. II-3).

The accepted practice has been that no sewer mains other that house laterals shall be less that six inches (6") in diameter; however, it is recommended that all new sewer mains constructed in the future be not less that eight inches (8") in diameter. All sewers are recommended to be designed and constructed with hydraulic slopes sufficient to give a mean velocity when flowing full or half full of not less than 2.0 feet per second. Also, grades that produce velocities in excess of 5.0 feet per second should be considered as unacceptable.

In general, combined sewers (storm and sanitary sewage) are not considered good modern practice. Requirements for treatment frequently entail pumping, often making the adequate disposal of sewage from such a system costly and complicated. It is usually not feasible to construct treatment facilities adequate to care for the entire flow of combined system. It would be necessary to bypass a major part of the peak flows, resulting in considerable sanitary sewage in the part of the flow bypassed to the receiving stream. It is recommended that the cities operate the sanitary sewage collection system separate from the storm sewer system.

Pipe considered for sanitary sewers should be smooth on the inside to permit flow to the least loss of head and to reduce stranding of solids and consequent stoppage of flow, impervious on the inside and outside, and resistent to acids and chemical. Also, such pipe should have a very long life. Vitrified-clay pipe and some conduits composed of polyester resin and siliceous sand reinforced with continuous roving glass fibers all meet the above requirements. Concrete pipe is subject to severe corrosion by acids which are



CITY OF DEL RIO, TEXAS

NOMOGRAPH
PEAK SANITARY SEWAGE FLOWS

FIGURE NO. II-3

formed from decomposing sewage. The decomposing sewage gives off hydrogen sulfide and is then converted to sulfurous acid which attacks the concrete.

In flat areas, parts of the sewer lines are likely to be very deep, and construction at great depths is costly. In these instances, a pump station may be desirable to lift the sewage to higher elevations to avoid the deep construction. A pumping installation may be needed also where a sewer line must cross a ridge or drainage area divide to reach a main sewer or the treatment plant. Good engineering practice limits the use of lift stations to a minimum for reasons of economy and reliability in the operation of the sewerage system. Where lift stations are used, the pumps should operate without clogging. As an added precaution, the interior of the pump should be easily accessible for cleaning or for the removal of obstructions. The station capacity must be adequate to meet the maximum rate of flow, with the station capacity not exceeding the capacity of the receiving sewer. Two or more pumps, each with a capacity to handle the expected maximum flow and set to operate alternately, should be included in the lift station design.

5. Sewage Treatment

Methods of treating municipal wastewater are commonly classified as primary, secondary and tertiary or advanced waste treatment. Primary and secondary treatment are considered conventional treatment systems. These systems are applicable to prepare water for beneficial use and to upgrade the quality of return flows required by water resource quality objectives. Primary treatment generally consists of removal of floating and suspended material by mechanical and chemical processes. Primary treatment removes on the average of 25 to 40 percent of the B.O.D. and about 40 to 70 percent of the suspended solids. Primary treatment consists of two (2) general units for grit removal and plant sedimentation.

Secondary treatment generally provides some means of satisfying the oxygen demand of the wastewater prior to discharge, usually by controlled biological oxidation. This is usually preceded by primary treatment and often followed by chlorination to reduce bacterial populations and possible virus. Conventional secondary treatment removes an average of about 80 to 95 percent of the B.O.D., although the relative efficiency of the plant operation may substantially reduce or increase this percentage.

There are two (2) basic types of secondary treatment, namely, trickling filter plus plain sedimentation and activated sludge plus plain sedimentation. It is generally accepted that activated sludge is capable of producing a very high quality effluent. On the other hand, trickling filters can produce a very high quality effluent under wide variations in filter loading and usually requires less skilled personnel for operation. Wastewaters that are provided secondary treatment are generally considered to be satisfactorily

treated at the present, although primary and secondary treatment do not reduce chloride, sulfate, phosphorous, nitrogen and soluble non-biodegradable organic material. Both nitrogen and phosphorous are nutrients for algae growth in reservoirs. If the concentration of algae becomes too great, this condition causes an odor, taste, nuisance, and depletion of oxygen in water used for domestic supplies. Due to the ultimate oxidation of nitrogenous material to nitrate, the presence of nitrogen compounds may impose an additional oxygen demand on the receiving stream after the waste is discharged. Studies involving innovations in routine operation of conventional secondary treatment plants have indicated that in some cases nitrogen and phosphorous removal can be increased.

Tertiary or advanced waste treatment may include a wide variety of techniques designed for a general high degree of pollution control or for the removal of a specified pollutant or pollutants. Except where severe conditions of stream pollution might exist below the effluent from conventional waste treatment facilities, tertiary treatment is not generally applied to municipal waste waters. Such techniques are usually restricted to wastewater reclamation projects. The need and requirement for tertiary treatment will greatly increase in the future, particularly to provide adequate removal of heavy metals and toxicants.

The term sludge is used to designate the solids that settle when sewage is passed through a settling tank. Sludge disposal is very important since provisions to care for it represent from 25 to 40 percent of the total cost of a sewage treatment plant. A common method of sludge disposal is digestion in a heated or unheated tank with subsequent dewatering by air-drying on sand drying beds. Other methods include vacuum filtration with or without digestion, lagooning which is usually preceded by digestion, sludge conditioning and vacuum or pressure filtration. Normally, sludge is buried in a sanitary landfill following drying or filtration.

Wastes from food and other kindred products from industries are commonly high in organic matter. These are generally treated for B.O.D. removal by conventional biological oxidation methods similar to those employed in municipal waste treatment plants. Wastes from the dairies and meat packing industries are also similar to municipal wastes, although the B.O.D. of these wastes is generally much higher. Pulp and paper mill waste also have relatively high B.O.D. loads and are commonly treated by biological process. Most paper mill effluent are also highly colored, and some paper production processes result in relatively high chloride concentrations in the effluents. Methods of industrial wastewater treatment very widely as do the wastewaters themselves. Some of the wastes are amenable to conventional treatment found in municipal treatment plant. However, many industrial wastes require special pretreatment by the industry prior to their discharge to the city's treatment plant. Conventional waste treatment techniques may not be adequate to maintain acceptable stream quality for many industries.

The city should only accept industrial wastes for treatment which it can adequately treat and maintain effluent standards with its conventional waste pretreatment equipment and techniques.

Conventional waste treatment techniques generally available to small cities may be inadequate in some areas in order to maintain acceptable stream quality in the future. Centralization of municipal waste systems in large urban areas and consolidation of the systems of several smaller cities, where feasible, offer promise on a regional basis to provide the type treatment that is required at the most economical scale.

6. Sewage Treatment Plant Effluent

The goals in water pollution control is to secure, and maintain, water of a quality suitable for specific uses. These uses are primarily geared to man's well-being and economic good. The demand for water is rapidly approaching the available supply. This has caused a profound expansion of the goals of the water quality control agencies.

The water quality in the County of Val Verde lies within the jurisdiction of the Texas Water Commission (TWC) and the U. S. Environmental Protection Agency, with the waters in the Rio Grande also supervised under the International Boundary and Water Commission (IBWC). Although the IBWC does some monitoring of stream flows for water quality, they primarily rely on the TWC for water quality information in the streams of the County.

The policies of the federal and State control agencies are to maintain the quality of the water consistent with public health and public enjoyment, the propagation and protection of fish and wildlife, including birds, mammals, and other terrestrial and aquatic life, the operation of existing industries and the economic development of the state.

The State and federal regulatory agencies have classified water sources and have developed water quality standards in all drainage areas. When quality standards are agreed upon, they take the form of effluent standards which state precisely what is allowed in the wastewater discharged from a municipality or industrial treatment plant. The Texas Water Commission actually sets stream quality standards, and through its permit procedure, they control the volume, the location and the quality of wastes discharged into the streams throughout the State.

Some of the narrative quality requirements as specified in a wastewater discharge permit are listed as follows:

a. The effluent shall be essentially free of floating debris and settleable suspended solids conducive to the production of putrescible sludge deposits;

b. The effluent shall be essentially free of settleable suspended solids;

c. The surface waters shall be maintained in an aesthetically attractive condition;

d. There shall be no substantial visible contrast to the natural appearance of the receiving waters;

e. There shall be no substantial increase in turbidity due to waste discharges.

The Texas Water Commission effects the quality goals listed above by regulating the treated water effluent within the streams of Texas.

Water is a resource system, and waterborne waste is a subsystem to the water resource system itself. Planning the future development of the total water resources of the area must include a program for properly managed water quality to assure that water to supply projected needs will be a suitable quality for the intended use. Stream quality is influenced by many complex and interrelated factors which include geology, climate, natural vegetation, land-use, population density and industrial development, wastewater treatment and disposal practices, construction of reservoirs, and methods of operation. Concentration of population and industry in urban areas will continue to augment the waste problem, and inrreased development will result in attendant increases in volume and complexity of waste by-products. The water resource protection becomes a matter of public policy which must be managed in a coordinated and integrated fashion to achieve the overall water resource policy objectives.

7. Other Treatment Systems

In the rural areas and communities of the County, around Lake Amistad, and in many of the existing developments near Del Rio, the treatment and disposal of sewage is provided by on-site facilities. The on-site facilities include such varying degrees of treatment provided by septic tanks, grease traps, pit privies, portable chemical toilets, sewage holding lagoons, aerobic units, soil absorption beds, evapotranspiration beds, and others. Basically, the on-site treatment facilities cover the various types of treatment processes that do not have any open discharges to the surface of the ground.

Standards for the construction of on-site sewerage facilities are provided through the Water Hygiene Division of the Texas Department of Health.

These types of facilities can provide an adequate means for sewage treatment; however, the applicability of the on-site treatment facilities must be carefully analyzed to be certain that the soils and existing site conditions for their installation are conducive for an effective operation.

A geeeral soil map is included in Section IV and was issued in January 1982, by the U.S. Department of Agriculture-Soil Conservation Service, as part of the Soil Survey for Val Verde County, Texas. Although the general soil map included herein describes the eight (8) major soil classifications in Val Verde County, further discussion of the soil types are shown in more detail on soil map units (aerial photographs) which are available with the 1982 Soil Survey of Val Verde County, Texas. Each of the soil types are further described to indicate the various features and characteristics that may affect construction of sanitary facilities.

In December of 1987, the "San Felipe Springs Area Protection Study and Comprehessive Plan" was completed for the City of Del Rio. The purpose of this study was to determine the appropriate level and pattern of development for the planning area while protecting a sensitive environmental area (the San Felipe Creek and Springs) from urban pollution. In Section VI - WASTEWATER SYSTEMS, of the San Felipe Plan, on-site wastewater treatment systems were addressed and recommended guidelines were presented for developing the wastewater systems. These guidelines have been modified slightly so that they would be applicable to other areas of the City of Del Rio as well as the other communities and rural areas of the County. Therefore, the following guidelines are recommended to direct the development of on-site wastewater treatment and disposal facilities.

a. All non-residential land uses within the City Limits of Del Rio should be required to connect to City wastewater mains. All new non-residential land uses in the ETJ but within one thousand (1,000) linear feet of any existing City wastewater main should also be required to connect to said mains. Extensions of these mains should be in accordance with this Plan and the City's Subdivision Regulations;

b. Any new residential subdivision (whether a plat or replat) that is further than one thousand (1,000) linear feet from any existing City of Del Rio wastewater main and located in the ETJ may be allowed to operate an approved on-site treatment system provided all of the five (5) following conditions are met:

   (1) The density of development must be no greater than one (1) dwelling unit per two (2) acres.

   (2) Each dwelling unit must be served by a separate approved on-site treatment system, and no two (2) such systems may be closer than two hundred (200) linear feet from one another;

   (3) All land uses served by proposed on-site treatment systems must be low-density single-family residential;

(4) The design of all proposed on-site treatment systems in the City or County must be submitted to the appropriate reviewing entity for approval prior to construction. Issuance of a building permit for areas within the City Limits of Del Rio shall be contingent upon this submittal and approval; and,

(5) The design, construction, and operation of the on-site treatment systems must be in compliance with all existing and proposed guidelines from the City of Del Rio, Val Verde County, the State of Texas, or the USEPA, whichever is more stringent;

c. All proposed on-site treatment systems operating within the County/City limits should be subject to periodic unannounced inspections by City/County personnel/representatives to assure compliance and proper operation;

d. If the extension of a wastewater main brings service to within one thousand (1,000) linear feet of existing subdivisions which are served by on-site treatment systems, each subdivision may be required to extend the City wastewater main(s) in accordance with the Future Wastewater System Plan within fifty-four (54) months of City notification;

e. For those communities and/or subdivisiins with on-site treatment systems which are to be served by wastewater mains, the entity may choose to assess each property owner for their pro-rated extension costs or fund such installations through State grants/loans or bond sales;

f. The City of Del Rio should install monitor wells throughout the drainage basin that feeds directly into the San Felipe Creek. These monitor wells should be checked at lease once every six (6) months to assure thtt the quality of the groundwater has not diminished. The quality of the water at the Springs should be evaluated periodically, as well. It may be possible to use ongoing data from some of the existing wells in this area to accomplish this review of the groundwater quality;

g. The location of every on-site treatment system in the County should be kept current on a map maintained by the County;

h. All proposed subdivisions (whether a plat or a replat) should contain either a wastewater service plan or a detailed on-site treatment system plan (as appropriate) submitted for County/City and reviewed/revised once every six (6) months;

i. All contractors who install and/or service proposed on-site treatment systems in the County must possess the appropriate State licenses and qualifications. A list of approved local contractors should be maintained by the City/County and reviewed/revised once every six (6) months; and,

j. In those cases where residences are served by both an individual on-site treatment system and an on-site water well, the treatment system must be located downgradient from the on-site water well and must be no closer than three hundred (300) linear feet from any water well on any adjacent tract.

It is strongly recommended that the City of Del Rio and County annually review the development situation in those portions of the planning area currently served and to be served by on-site treatment systems. Factors such as density, monitor well reports, and water quality evaluation from the Springs should be taken into consideration. The City of Del Rio may, at their discretion, revise the future wastewater system plan to require wastewater collection mains throughout the incorporated planning area, or as they see fit. The City Council may grant waivers to these requirements, but they are advised to do so only after a joint workshop session with the Planning and Zoning Commission and City staff.

8. Sewer Service Rate

The sewerage service rate structure is determined by the character of the sewerage system itself. The rate structure should generate sufficient revenue to defray a wide range of costs over a specified period of time. These include operating and maintenance expenses, interest and amortization requirements of all accrued debts, accumulation of an adequate depreciation reserve to provide for periodic overhaul and parts replacements, and sufficient amounts of pay for minor extensions of lines from current revenues.

There are several methods used in calculating sewer service rates for domestic, commercial and industrial customers. These methods are as follows:

a. Water Consumption is based on the assumption that most of the water used by the majority of the users ultimately finds its way into the sewerage system. This basis is, however, generally applicable only where practically all water services are metered and the water supply and sewerage systems are municipally-owned (or it is possible to arrange with a private water company to make meter readings available to the City).

b. Number of Fixtures is predicated on the assumption that the use of sewerage systems can be deduced from the knowledge of the number of plumbing fixtures located in a given area.

c. Flat Rate is predicated on the basis that all customers are billed on a fixed amount at periodic intervals, and no attempt is made to base the amount of the charge on the extent of use of the sewerage system. The flat rate is often particularly appropriate in smaller cities and communities, where the majority of the residents and businesses use the sewerage system to approximately the same extent.

d. Type of Property Served assumes that the size and type of business or industry determines its use of the sewerage system.

e. Number of Employees assumes a charge for each person employed or engaged on the premises of a given business. The primary purpose of such a rate is to equalize the burden among businesses and industries of different sizes.

f. Actual Sewage Measurement is the equitable method of measuring the use of the sewerage system. This, however, is impractical for domestic customers because of the great expense involved in installing and maintaining costly sewage meters. This, however, is a practical method for determining the use of the sewerage system by industrial customers.

g. Number of Sewer Connections is based on the number of sewer connections, or taps, and is similar to the uniform or flat rates.

It is generally recommended that domestic and normal commercial customers' rates be established on the basis of a percentage of water consumption billing. It is also generally recommended that the industrial customer's rates be established on the basis of flow and quality of the wastewater (if the waste is amenable to treatment in the City's treatment plant following the prescribed pretreatment). The 5-day B.O.D. and suspended solids must be measured to determine the quality for the industries that deliver high concentrations of B.O.D. and suspended solids to the sewer.

A quantity and quality formula can be developed to establish the service charges to be paid by industrial customers. This is often handled through the preparation and adoption of an Industrial Wastewater Pretreatment Program, whereby, several factors are considered, such as the quality and quantity of wastewater discharges, the development of local limits for pretreatment programs, treatment capacity, etc.

D. HISTORICAL GROWTH TRENDS AND POPULATION PROJECTIONS

1. General

The foundation of any Comprehensive Plan is the analysis of the existing land-use and the projection of future land-use. Only by knowing where people will be located and in what activities they will be engaged is it possible to reasonably determine what future water and wastewater facilities will be needed to serve the various developments. Using the available information furnished by the City of Del Rio and from the review of the other communities and developments in Val Verde County, the proposed planning areas of wastewater and water utility services were established. These future planning areas, coupled with the population densities for each, then, provided the basic criteria for developing the future needs for the waterworks and wastewater systems.

FIGURE NO. I-1 was presented in Part I as a general location map illustrating the service areas of Del Rio and the proximity of other communities in Val Verde County.

2. Population

The determination of population growth trends and estimates of the future growth patterns of a city or community are some of the most important considerations for the proper planning of a utilities system. These studies are based on the history of growth and the current trend of development in the general area. It is not only important to determine the number of people served but also to locate areas of high density population and large water consumers, such as industries, schools, apartment complexes, and shopping centers. The number of people to be served, their per capita consumption of water, and discharge of wastewater are the three (3) basic considerations in waterworks and wastewater system planning. Each community has its own particular characteristics which will govern its growth, but, despite the limitations, estimates of future growth must be made for planning and expanding the waterworks and wastewater systems.

It is generally advisable to make conservative estimates of growth in order to assure that there will be no unwarranted expenditures of capital funds and to plan facilities to permit economical expansion of the system in the event that growth is in excess of that anticipated.

The following TABLE NO. II-1 presents a tabulation of the historical growth of the City of Del Rio and Val Verde County, according to the information obtained from the U.S. Bureau of Census.

TABLE NO. II-1

HISTORICAL GROWTH TRENDS
CITY OF DEL RIO AND VAL VERDE COUNTY

Year	City of Del Rio *	Val Verde County *
1880	50	-
1890	1,980	2,874
1900	-	5,263
1910	-	8,613
1920	10,589	12,706
1930	11,693	14,924
1940	13,343	15,453
1950	14,211	16,635
1960	18,612	24,461
1970	21,330	27,471
1980	30,034	35,910
1989	36,625 **	-

* U.S. Bureau of Census
** Interpolation between 1980 Census and Projected 1990 Population of TWDB.

Based on the analysis of the historical growth trends of the City of Del Rio and Val Verde County for the past fifty (50) years, the average annual rate of increase in population has been at a rate of about 1.90% and 1.77%, respectively. Within the last decade, the growth trend has increased to about 3.48% and 2.72%, respectively.

The future population of Del Rio and Val Verde County, as prepared by the Texas Water Development Board, project high and low figures that are slightly more conservative than the indicated past trends. These population projections of the Texas Water Development Board are as follows:

TABLE NO. II-2

POPULATION PROJECTIONS *
CITY OF DEL RIO AND VAL VERDE COUNTY

Year	City of Del Rio		Val Verde County	
	High	Low	High	Low
1990	38,302	37,355	43,763	42,681
2000	47,896	46,039	53,357	51,289
2010	59,849	57,338	65,310	62,570

2020	72,344	68,975	77,805	74,182
2030	85,406	81,044	90,867	86,227
2040	92,767	87,820	98,228	92,990

* Source: Texas Water Development Board, September 1988

The average annual growth rate of Del Rio and Val Verde County for the next fifty (50) years, as projected from low populations by the Texas Water Development Board, is 1.72% and 1.57%, respectively. For the next ten (10) years, the Texas Water Development Board's projections indicate an increase in population for Del Rio and Val Verde County at an average annual rate of about 2.11% and 1.85%, respectively.

For purposes of this study, the projections of population for Del Rio will consider the major subdivisions currently developed outside the City Limits but within the planning jurisdiction of the City.

While there are differences in the historical growth trends and the projected trends presented by the Texas Water Development Board, the differences are relatively small. It is, therefore, recommended that the population projections of the Texas Water Development Board be adopted as guidelines for planning the future water and wastewater system facilities.

Through time, the assumptions made herein regarding growth and/or future populations may change. It is highly recommended that the entire Planning Area be reviewed periodically to consider revisions to this Plan. These revisions should be considered whenever there is a proposed major development, land-use change, or once every three (3) to five (5) years, as may be appropriate. The Plan should also be monitored by City and County staff on a much shorter time-frame (once every six (6) months) in order to maintain a close check on the progress of types of development and growth trends.

Population projections for the individual rural communities and developments in the County have not been prepared inasmuch as the future growth is not anticipated to be significant, according to the information furnished by the Texas Water Development Board. The basic premise for the studies performed and the results presented herein is the City of Del Rio and its area of jurisdiction will be the major growth center of Val Verde County.

On the following page, FIGURE NO. II-4 was prepared to graphically illustrate the historical growth trends and the population projections for the City of Del Rio and the County of Val Verde.

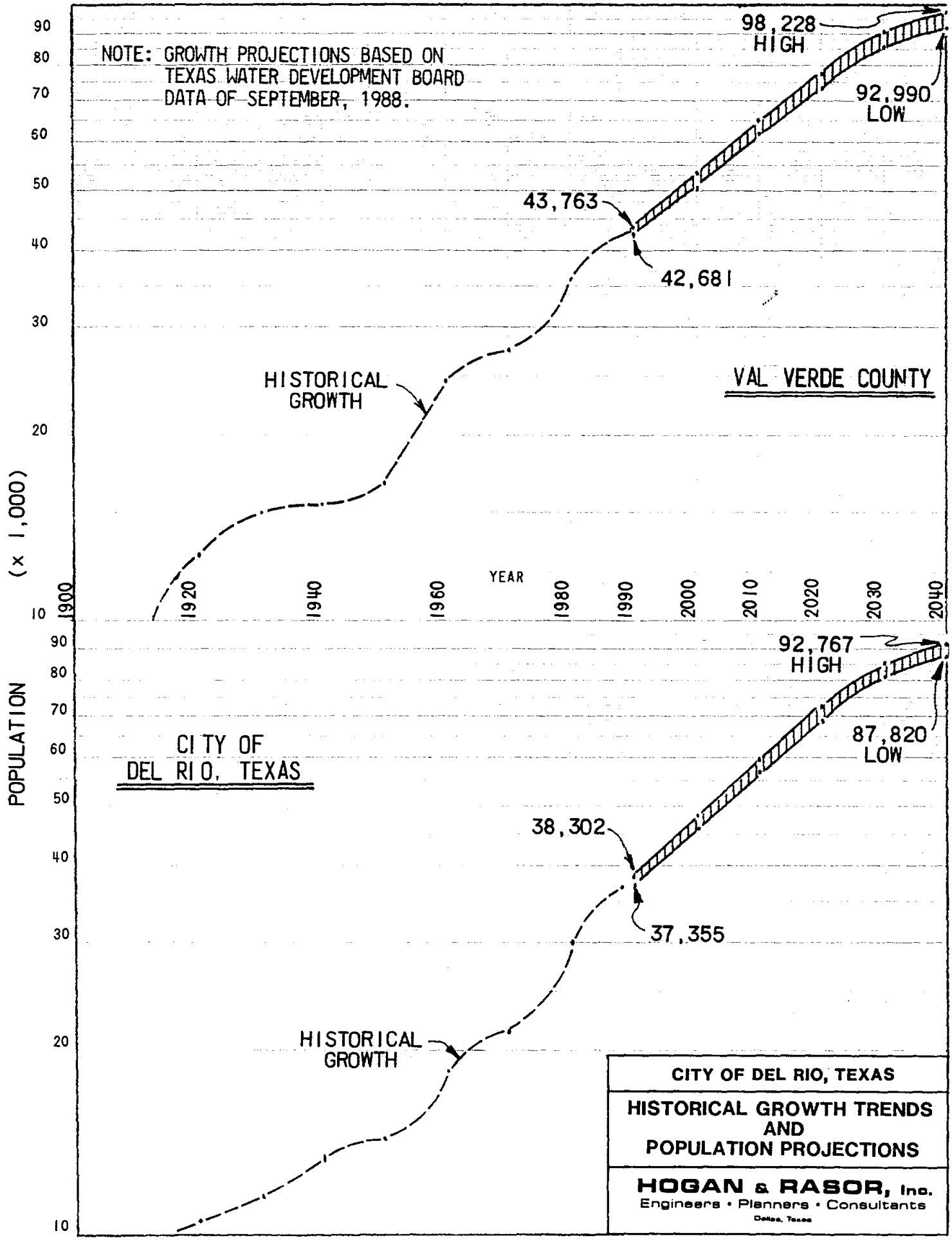


FIGURE NO. II-4

PART III
WATER CONSERVATION PLAN

PART III

WATER CONSERVATION PLAN

A. INTRODUCTION

The planning area of concern for the purposes of this particular section covers the entire County of Val Verde.

Within the County, there are three (3) principal water systems that provide a treated water supply to the general public. These systems and the approximate number of customers presently served are as follows:

Del Rio	-	10,184 customers (residential)
	-	597 customers (commercial)
Comstock	-	152 customers
Langtry	-	25 customers

In other areas of the County, water service is provided by smaller private water systems which are supplied with ground water from well(s).

According to recent records, the City of Del Rio currently maintains water service to an approximate total of 10,781 customers, plus the Laughlin Air Force Base area. In so doing, nearly 14 million gallons per day (M.G.D.) of water is produced from the San Felipe Springs and five (5) groundwater wells. In 1988, approximately 60%, or 8 M.G.D., of this water was metered and sold, which is considered to be a relatively high loss rate or unaccounted for water and results in a high per capita demand for water supplies.

In an effort to lower the overall per capita demand for water from the system, the City of Del Rio has initiated efforts to locate sources of this water loss and take whatever actions that are necessary to reduce water consumption and to efficiently meter all users in order to document actual water usage. The first step taken in this program was the completion of a comprehensive water audit completed by The Pitometer Associates, in March 1988.

The Pitometer study was authorized to, primarily, investigate and analyze the existing water-use conditions in the Del Rio system, and determine the accountable water produced versus the water actually sold. It was found that, from the monthly water-use records of the City, the ratio between water sold and the water pumped varied widely, being from a low 35% to a high 80%. This wide range was largely due to the lag time in meter readings between the production meters and the consumption meters. Averaged over an annual basis, the ratio of water sold to water produced varied from 42% to 57%.

The results from testing the five (5) master meters with the Pitometer showed that only two (2) were registering within the allowable limits of accuracy. Two (2) were over-registering and two (2) were under registering. The recommendations were to eliminate the West Meter (at the San Felipe Spring Pump Station) and provide a different method of measuring the water leaving the complex.

Plans are currently being prepared to change the piping and pumping arrangement for the water delivered to Laughlin Air Force Base. This, in itself, should eliminate some of the inaccuracies of water metering and account for, more closely, where water is being used.

Forty-two (42) large meters (2" and larger) were reviewed, and the overall accuracy of all types of the large meters was found to be approximately 82%.

The Pitometer study indicated that some of the "unaccounted-for losses" in the water-use were from inaccuracies in the residential meters with several found to be stopped. Of the 199 residential meters randomly picked for testing in the Del Rio water system, the overall residential meter accuracy was found to be 93%.

In the summary of water-use per day from the Pitometer Water Audit, the following table was presented to show the percent of where the water was being used.

TABLE III-1

SUMMARY OF WATER-USE *

Water-use	Gallons Per Day	Percent
Water Sold - City of Del Rio	6,392,110	51.3
Residential Meter Under - Registration	342,920	2.8
Commercial and Industrial Meter Under - Registration (Estimated)	194,123	1.6
Leakage	436,750	3.5
Unavoidable Leakage at 3,000 gpd/mile for 150.4 miles	451,200	3.6
Public - Use	124,663	1.0
Water Sold - Laughlin AFB	1,236,000	9.9
Miscellaneous Losses - due to master meter error, un-metered parkway sprinkling, reservoir leaks, Air Force use, etc.	3,276,789	26.3
Totals	12,466,268	100.0

* SOURCE: Preliminary Report on Water Audit, The Pitometer Associates, March 1988.

In an effort to reduce the amount of unaccounted-for water use in the system, it is recommended that a residential meter replacement program be implemented along with a routine annual or semi-annual review and calibration of all large (2" or larger) master meters.

The records of the total water produced and the total water metered or sold to the customers were not available for the Comstock and Langtry water systems. However, the intent of this plan for water conservation, as presented herein, would be applicable for any of the water systems in Val Verde County.

Additional steps to be taken, and thereby the intent of this plan, will be the submittal of a Water Conservation Plan, to the Texas Water Development Board (TWDB), from all of the water system operators in Val Verde County. Once accepted, the City of Del Rio and other communities should implement this Water Conservation Plan in order to reduce overall water consumption and the corresponding wastewater flows.

B. NEED FOR AND GOALS OF THE PROGRAM

As described earlier in this document, the City of Del Rio, having the largest water system in the County, is currently having to produce a rather large volume of water in order to supply water to each consumer due to unmetered water-use practices, storage reservoir leaks, inaccurate metering, etc. In order to curtail the further increase in this already large per capita water-use, the City should adopt and implement a Water Conservation Program, as directed and approved by the Texas Water Development Board.

As part of the requirements for State funding to construct additions to the Silver Lake Wastewater Treatment Plant at Del Rio, a Water Conservation and Drought Contingency Plan was completed by Hogan & Rasor, Inc., in July 1989 and is now under review by the Texas Water Development Board. It is the City's intent to adopt this plan when all reviews have been completed.

If the smaller community systems are operating without knowing the percentage of unaccounted for water, records need to be kept to determine how well the system is being operated.

The approved plan for the County should have as its goal, as a minimum, the reduction in the overall water-use by a figure of ten to fifteen percent (10%-15%) and also to significantly reduce unaccounted for water-use, water-waste due to leaks, and other distribution system problems.

In addition, through the use of data collected for the Water Audit report for Del Rio, performed as a precursor to this plan, the City of Del Rio hopes to maintain better records of the actual production and use of water produced for consumption.

The Senate Bill No. 2 (SB-2), passed in the regular session of the Legislature, provides for $100 million in assistance to economically distressed areas, with that funding dependent upon passage by public vote on November 7, 1989, of a proposed constitutional amendment. The SB-2 will have water conservation plan requirements and each applicant will need to be in compliance with the plan.

The major benefits for implementating a water conversation plan are:

1. Provides a savings of energy and related power costs for pumping.
2. Provides a savings of chemical costs for treatment.
3. Extends the life of water supply resources.
4. Extends service life of equipment.
5. Maintains higher availability of water for emergency uses.
6. Maintains higher pressure for longer durations.
7. Maintains lower water rates for the customers.
8. Complies with many financial assistance programs administered through the State and federal agencies.

C. WATER CONSERVATION PLAN

1. Education and Information

One of the most important ways to aggressively promote water conservation and efficient usage is by educating the consumers about the importance of conservation and exactly how to accomplish a noticeable reduction in water-use.

Particular emphasis should be placed on the education program during the first year. This effort will serve to introduce the new plan to the citizenry and, therefore, stress its importance.

It is suggested that the education process be implemented by utilizing the following methods:

a. Bi-monthly articles should be carried in the local newspapers emphasizing the need for water conservation, specific actions to be taken by the consumer, and how conservation can benefit the water-use;
b. A pamphlet on efficient water-use should be distributed to new customers when applying for service and periodically to those who pay bills in person;
c. Pamphlets should be mailed directly to all of the water customers once a year including information on emergency procedures and water rationing;
d. During the summer months or other periods of unusually high demand, periodic radio announcements should be made stressing the importance of being conservative in water-use practices.
e. A newsletter should be prepared and distributed to the users explaining the new program and clearly outlining the direct benefits to them. This can include, as an option, additional

water conservation literature available from the TWDB and can be distributed via direct mail or door-to-door delivery; and,

f. The water system operators should make available a knowledgeable individual to speak to local, civic, professional, and educational groups about the need for and benefits of water conservation.

The basis for the above outlined education program will be the water conservation information in the pre-printed materials that are available from the Water Conservation Division of the Texas Water Development Board, P.O. Box 13231 - Capitol Station, Austin, Texas 78711-3231.

2. Plumbing Codes

The City of Del Rio currently uses the Standard Plumbing Code/1988, which, in Appendix J-Water Conservation, identifies certain equipment and fixtures that are to be used to conserve the use of water. These include the installation of water conserving fixtures such as urinals, shower heads, faucets, lavatories, and toilets. Additionally, the Code should require that all new swimming pools be fitted with recirculating filtration equipment. These Codes will be reviewed annually by the Utilities Commission to ensure currency and applicability. Any changes in the Code that are adopted by the Utilities Commission will be forwarded to the Texas Water Development Board.

Where it is applicable and can be appropriately enforced, plumbing codes should be adopted by other entities, including Laughlin AFB, to include conservation oriented construction methods similar to the City of Del Rio.

National Standards, as they become available, should be reviewed and considered for adopting the water conservation methods.

3. Retrofit Program

Water customers that occupy existing facilities without water conserving fixtures should be encouraged, through the above outlined Education Program, to replace their old fixtures with newer, more efficient equipment. The program will also help acquaint them with the advantages of doing this.

Information should also be made available on water saving devices to modify existing fixtures. Local plumbing supply companies should be encouraged to advertise and to stock these products.

4. Water Rate Structure

The present water rate structures, shown below, were devised and adopted with conservation as a fundamental premise.

Del Rio -
$ 7.26 minimum base - 0 to 10,000 gallons
$ 0.53 each 1,000 gallons - 10,001 to 30,000 gallons
$ 0.84 each 1,000 gallons - 30,001 to 50,000 gallons
$ 0.89 each 1,000 gallons - over 50,000 gallons

Comstock -

$15.00 minimum base - 0 to 4,000 gallons (For up to 9,000 gallons)
$ 0.60 each 1,000 gallons - 4,000 to 9,000 gallons
$18.00 minimum base - 9,001 gallons
$ 0.50 each 1,000 gallons over 9,000 gallons
(these are for 3/4" size meter)

Langtry -
$15.00 minimum base - 0 to 4,000 gallons
$ 0.60 each 1,000 gallons for next 5,000 gallons
$ 0.50 each 1,000 gallons over 9,000 gallons

Over the years, the declining block rate structure, as currently used by Langtry and Comstock, has not proven to be effective in conserving water-use since the cost per gallon water becomes cheaper as more water is used.

It is , therefore, recommended that the water utilities of Langtry and Comstock consider a revision in their respective water rate structure which would provide for an increasing cost per unit gallon as water consumption increases. Other utility systems in the County should also eliminate declining-block rate structures.

5. Universal Metering

The operating entity of the water system should maintain a master meter at each high service pumping location in the system. Additionally, all paying customers should be metered. The majority of the unmetered water-use is for maintenance in nature, i.e., irrigation for parks, medians, flushing dead-end mains, testing, washing streets, etc., and the operating entity should install meters on all of these facilities, where it is practical to do so.

This ability to meter essentially all water consumption will allow the operating entity to more closely record the actual monthly water-use and, therefore, make any adjustments necessary. The comprehensive Water Audit, completed in March of 1988 for Del Rio, outlines the sizes, locations, and efficiencies of selected meters within the system.

A meter check, repair, and replacement program should be followed using the following schedule.

Master Meters -- Yearly
Meters larger than 1 inch -- Yearly
Meters 1 inch and smaller -- Every 10 Years

6. Water Conserving Landscaping

A brochure should be developed showing the names, typical sizes, and characteristics of many of the water saving plants and trees adaptable to the region of Val Verde County. A brochure that will assist in preparing such a list of the water saving plants for Val Verde County is available from the Water Conservation Section of the Texas Water Development Board (TWDB), A Directory of Water Saving Plants & Trees for Texas, February 1988. Other publications in outdoor water-use that are available from the Texas Water Development Board include:

- A Homeowners Guide to Water-Use and Water Conservation
- Drip Irrigation
- Efficient Use of Water in the Garden and Landscape (Texas Agricultural Extension Service Bulletin-1496)
- How to Save Water Outside the Home
- How to Xeriscape
- Lawn Watering Guide
- Texas Sesquicentennial Native Plant Landscape

These brochures should be distributed directly to customers applying for building permits and to developers. It should also be made available at the Department of Agriculture Building.

Regulations should be developed for new subdivisions requiring homeowners, contractors, and developers to use native, low water using grasses and plants for new home landscaping. These regulations should be submitted to the TWDB for comment prior to adoption.

Information from the TWDB concerning drip irrigation systems, timers on sprinklers, and other efficient irrigation methods should also be made available to all water users throughout the County.

7. Water Leak Detection and Repair

A leak detection program should include, as a minimum, the following elements.

a. Monitoring storage tank levels to help identify major breaks;
b. Meter readers to constantly watch for possible leaks on service lines. If abnormal consumption appears after a reading, the readers should return to the facility and check the meter and lines for leaks; and,
c. Water department employees watch for leaks or signs thereof and report them as soon as possible. Other City or community employees, such as street crews, etc., watch for leaks while on

their daily rounds throughout the service area. Citizens should also be encouraged to report any apparent mis-use of water or signs of water leakage.

The purchase of water leak detection equipment should be considered by the system operators to aid in leak detection and location.

8. Recycling and Reuse

The City of Del Rio maintains three (3) wastewater treatment plants that have effluent available for use in irrigation. Currently, effluent from only one of these plants is being used by any area farmer.

Other than this particular type of agricultural application, there are no major industries requiring large amounts of water for manufacturing that could use recycled water.

The other communities in Val Verde County do not have sewage collection and treatment facilities. However, if wastewater systems are developed in the future, consideration needs to be made for the potential of recycling and reusing the water for irrigation.

9. Implementation and Enforcement

The Del Rio Utilities Commission should, as a minimum, be responsible for enforcing the water conservation program within the City's total area of jurisdiction. For assistance to the Commissioners in this effort, a monthly report on water consumption should be provided for every Utilities Commission meeting. This report shall cover a breakdown of the total water pumped, sold, and used for other purposes (recreation, construction, maintenance, etc.). It should also cover the number of leaks repaired and the number of new connections made.

Each of the operating entities for the other water systems in the County should be responsible for enforcing their adopted water conservation programs. Again, a monthly report on water consumption should be prepared to document the profile of how the water was used in the system.

Annual reports should be filed with TWDB to document the program's effectiveness and the public response.

It is especially important for the County to adopt such appropriate subdivision regulations and plumbing codes that include water conservation requirements if it is contemplated that an application will be submitted for funding the capital improvements to serve economically distressed areas through the SB-2 loan program.

It is recommended that any regional supplier of water or wastewater services, such as the City of Del Rio, pass through all conservation requirements to the political subdivisions receiving such services. This can best be accomplished by including the provisions in the contract for services.

10. Water Conservation Methods

a. In the Bathroom, Customers Should be Encouraged to:

- Take a shower instead of filling the tub and taking a bath. Showers usually use less water than tub baths.

- Install a low-flow shower head which restricts the quantity of flow at 60 psi to no more than 3.0 gallons per minute.

- Take short showers and install a cutoff valve or turn the water off while soaping and back on again only to rinse.

- Not use hot water when cold will do. Water and energy can be saved by washing hands with soap and cold water; hot water should only be added when hands are especially dirty.

- Reduce the level of the water being used in a bath tub by one or two inches if a shower is not available.

- Turn water off when brushing teeth until it is time to rinse.

- Not let the water run when washing hands. Instead, hands should be wet, and water should be turned off while soaping and scrubbing and turned on again to rinse. A cutoff valve may also be installed on the faucet.

- Shampoo hair in the shower. Shampooing in the shower takes only a little more water than is used to shampoo hair during a bath and much less than shampooing and bathing separately.

- Hold hot water in the basin when shaving instead of letting the faucet continue to run.

- Test toilets for leaks. To test for a leak, a few drops of food coloring can be added to water in the tank. The toilet should not be flushed. The customer can then watch to see if the coloring appears in the bowl within a few minutes. If it does, the fixture needs adjustment or repair.

- Use a toilet tank displacement devise. A one-gallon plastic milk bottle can be filled with stones or with water, recapped, and placed in the toilet tank. This will reduce the amount of water in the tank but still provide enough for flushing. (Bricks which some people use for this purpose are not recommended since they crumble eventually and could damage the working mechanism, necessitating a call to the plumber). Displacement devices should never be used with new low-volume flush toilets.

- Install faucet aerators to reduce water consumption.

- Never use the toilet to dispose of cleansing tissues, cigarette butts or other trash. This can waste a great deal of water and also places an unnecessary load on the sewage treatment plant or septic tank.

- Install a new low-volume flush toilet that uses 3.5 gallons or less per flush when building a new home or remodeling a bathroom.

b. In the Kitchen, Customers Should be Encouraged to:

- Use a pan of water (or place a stopper in the sink) for rinsing pots and pans and cooking implements when cooking rather than turning on the water faucet each time a rinse is needed.

- Never run the dishwasher without a full load. In addition to saving water, expensive detergent will last longer and a significant energy saving will appear on the utility bill.

- Use the sink disposal sparingly, and never use it for just a few scraps.

- Keep a container of drinking water in the refrigerator. Running water from the tap until it is cool is wasteful. Better still, both water and energy can be saved by keeping cold water in a picnic jug on a kitchen counter to avoid opening the refrigerator door frequently.

- Use a small pan of cold water when cleaning vegetables rather than letting the faucet run.

- Use only a little water in the pot and put a lid on it for cooking most food. Not only does this method save water, but food is more nutritious since vitamins and minerals are not poured down the drain with the extra water.

- Use a pan of water for rinsing when hand washing dishes rather than a running faucet.

- Always keep water conservation in mind, and think of other ways to save in the kitchen. Small kitchen savings from not making too much coffee or letting ice cubes melt in a sink can add up in a year's time.

c. In the Laundry, Customers Should be Encouraged to:

- Wash only a full load when using an automatic washing machine (32 to 59 gallons are required per load).

- Use the lowest water level setting on the washing machine for light loads whenever possible.

- Use cold water as often as possible to save energy and to conserve the hot water for uses which cold water cannot serve. (This is also better for clothing made of today's synthetic fabrics.)

d. For Appliances and Plumbing, the Customer Should be Encouraged to:

- Check water requirements of various models and brands when considering purchasing any new appliance that uses water. Some use less water than others.

- Check all water line connections and faucets for leaks. If the cost of water is $1.00 per 1,000 gallons, one could be paying a large bill for water that simply goes down the drain because of leakage. A slow drip can waste as much as 170 gallons of water EACH DAY, or 5,000 gallons per month, and can add as much as $5.00 per month to the water bill.

- Learn to replace faucet washers so that drips can be corrected promptly. It is easy to do, costs very little, and can represent a substantial amount saved in plumbing and water bills.

- Check for water leakage that the customer may be entirely unaware of such as a leak between the water meter and the house. To check, all indoor and outdoor faucets should be inspected periodically. If the meter continues to run or turn, a leak probably exists and needs to be located.

- Insulate all hot water pipes to avoid the delays (and wasted water) experienced while waiting for the water to "run hot".

- Be sure the hot water heater thermostat is not set too high. Extremely hot settings waste water and energy because the water often has to be cooled with cold water before it can be used.

- Use a moisture meter to determine when house plants need water. More plants die from over-watering than from being on the dry side.

e. For Out-of-Door Use, Customers Should be Encouraged to:

- Water lawns early in the morning during the hotter summer months. Much of the water used on the lawn can simply evaporate between the sprinkler and the grass.

- Use a sprinkler that produces large drops of water, rather than a fine mist, to avoid excessive evaporation.

- Turn soaker hoses so the holes are on the bottom to avoid evaporation.

- Water slowly for better absorption, and never water on windy days.

- Forget about watering the streets or walks or driveways. They will never grow a thing.

- Condition the soil with compost before planting grass or flower beds so that water will soak in rather than run off.

- Fertilize lawns at least twice a year for root stimulation. Grass with a good root system makes better use of less water.

- Learn to know when grass needs watering. If it has turned to a dull grey-green or if footprints remain visible, it is time to water.

- Not water too frequently. Too much water can overload the soil so that air cannot get to the roots and can encourage plant diseases.

- Not over-water. Soil can absorb only so much moisture and the rest simply runs off. A timer will help, and either a kitchen timer or an alarm clock will do. An inch and one-half of water applied once a week will keep most Texas grasses alive and healthy.

- Operate automatic sprinkler systems only when the demand on the water supply is lowest. Set the system to operate between four and six a.m.

- Not scalp lawns when mowing during hot weather. Taller grass holds moisture better. Rather, grass should be cut fairly often, so that only 1/2 to 3/4 inch is trimmed off. A better looking lawn will result.

- Use a watering can or hand water with the hose in small areas of the lawn that need more frequent watering (those near walks or driveways or in especially hot, sunny spots).

- Learn what types of grass, shrubbery, and plants do best in the area and in which parts of the lawn, and then plant accordingly. If one has a heavily shaded yard, no amount of water will make roses bloom. Attractive arrangements of plants that are adapted to arid or semi-arid climates should be chosen.

- Consider decorating areas of the lawn with rocks, gravel, wood chips, or other materials now available that require no water at all.

- Not "sweep" walks and driveways with hose. Use a broom or rake instead.

- Use a bucket of soapy water, and use the hose only for rinsing when washing the car.

PART IV
ENVIRONMENTAL CONCERNS

PART IV

ENVIRONMENTAL CONCERNS

A. PURPOSE AND SCOPE OF THE ENVIRONMENTAL ASSESSMENT

The principal purpose for this study of the water and wastewater systems in Val Verde County is to develop a feasible plan for providing a safe and adequate supply of water for existing and projected developments and to provide treatment of the wastewaters sufficient to protect the health and welfare of the people as well as the environment.

This part of the study will generally address those environmental concerns related to the development of the proposed water and wastewater system improvements which will be implemented from time-to-time throughout the County as the growth occurs and funds are made available.

Notwithstanding the concerns that may be expressed herein, the updating and planning for the water and wastewater systems will always be a continuing effort, and other factors that affect the environment may be found in the future which must be considered. The quality of life for the inhabitants (both domestic and wildlife) of Val Verde County are solely dependent upon how well the laws, regulations, and ordinances are enforced that control the developments. The proper servicing and upgrading of the facilities, once in place, must, also, have a high priority in order to minimize, and hopefully eliminate, any adverse effects on the environment.

The resources for much of the technical data and background information included in this part were taken from prior investigations and reports prepared by:

- U.S. Geological Survey
- U.S. Department of Agriculture, Soil Conservation Service
- Texas Parks and Wildlife Department
- U.S. Housing and Urban Development
- International Boundary and Water Commission
- U.S. Department of Interior - Fish and Wildlife Service
- U.S. Department of Interior - National Park Service
- Texas Antiquities Committee
- Middle Rio Grande Development Council

B. VAL VERDE COUNTY ENVIRONMENTAL SETTINGS

1. Geological Elements

Val Verde County is irregularly shaped and has an area of 3,259 square miles, or 2,085,760 acres. Of this area, approximately 36,990 acres is water inundated areas larger than 40 acres. These

areas are mainly Lake Amistad, the Rio Grande, and Pecos and Devils Rivers.

Most of the County is in the Edwards Plateau major land resource area, but the southeastern part is in the Rio Grande Plain.

The southern part of Val Verde County is nearly level to undulating. In the northern and northwestern parts, the topography ranges from nearly level to very steep.

The altitude ranges from about 900 feet in the south to 2,350 feet in the north.

According to studies of the U.S. Department of Agriculture Soil Conservation Service, there are three (3) distinct broad areas of soils in Val Verde County. The dominant soils in each unit are briefly described as follows:

a. Soils That Formed in Material Weathered From Limestone -

This group makes up about 88 percent of Val Verde County and includes the following major components.

(1) Ector - Rock Outcrop
(2) Langtry - Rock Outcrop - Zorra
(3) Lozier - Mariscal - Shumla
(4) Tarrant - Ector-Rock Outcrop

b. Soils That Formed in Old Alluvium Over Caliche and Limy Earth-

This group makes up about 8 percent of the County and includes the following major components.

(1) Olmos - Acuna - Coahuila
(2) Jimenez - Quemado

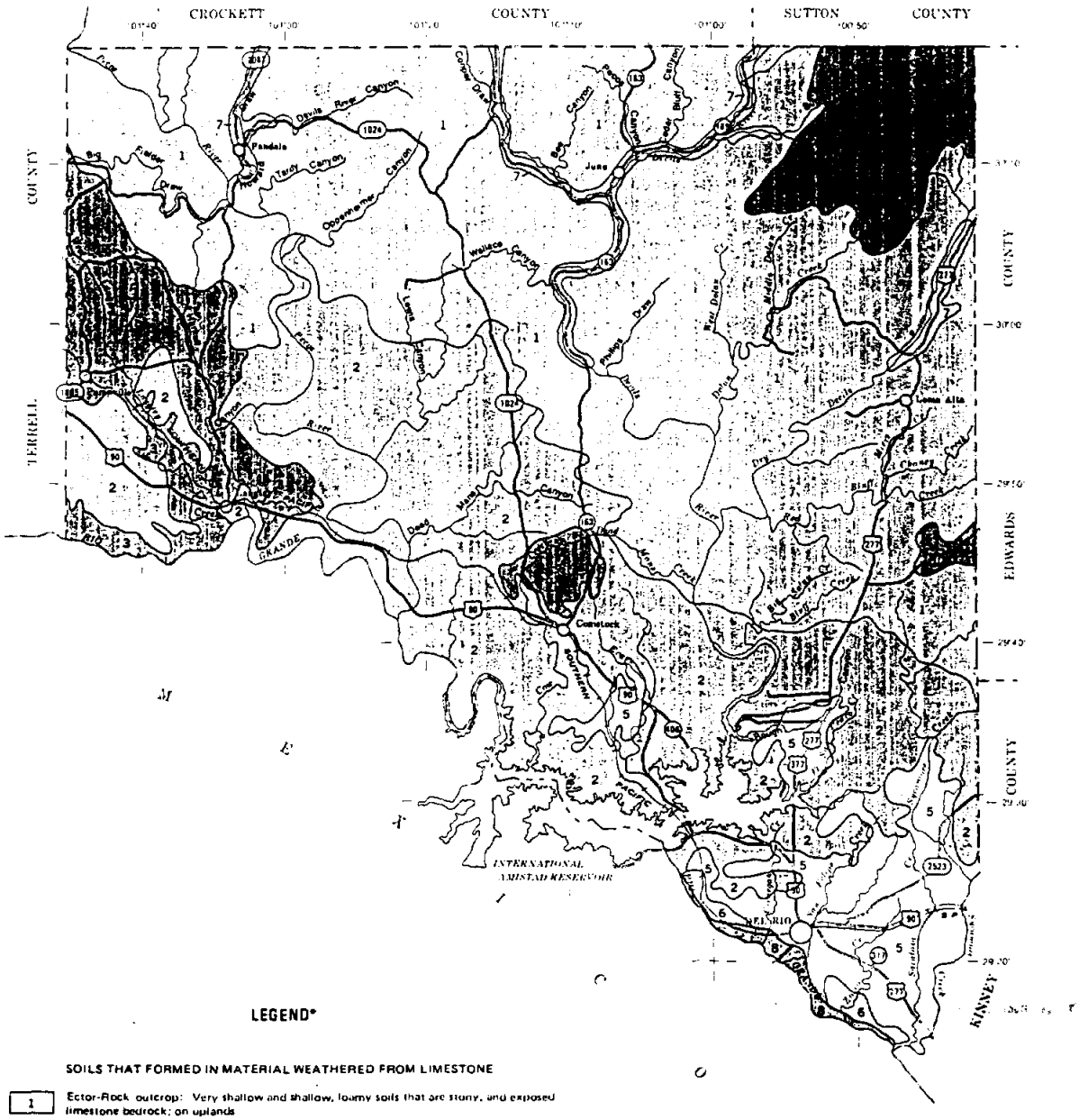
c. Soils That Formed in Recent Alluvium -

This group makes up about 2 percent of Val Verde County and includes the following major components.

(1) Dev - Rio Diablo
(2) Rio Grande - Reynosa - Lagloria

A General Soil Map of Val Verde County, Texas (FIGURE NO. IV-1), is included on the following page which shows the approximate location of the major soil classifications.

Immediately beneath the surface, the geologic formations of importance in Val Verde County are composed chiefly of limestones and dolomites that range in age from Early Cretaceous to Holocene. The geologic map and formation correlation maps (FIGURES NO. IV-2, NO. IV-3, NO. IV-4, and NO. IV-5), included on the following pages, were prepared by the U.S. Geological Survey and show that the Edwards and associated limestones are exposed (recharge zones) in



LEGEND*

SOILS THAT FORMED IN MATERIAL WEATHERED FROM LIMESTONE

1 — Ector-Rock outcrop: Very shallow and shallow, loamy soils that are stony, and exposed limestone bedrock; on uplands

2 — Langtry-Rock outcrop-Zorro: Very shallow and shallow, loamy soils that are cobbly and stony, and exposed limestone bedrock; on uplands

3 — Lozier-Mariscal-Shumla: Very shallow and shallow, loamy soils that are gravelly, flaggy, and cobbly; on uplands

4 — Tarrant-Ector-Rock outcrop: Very shallow and shallow, clayey and loamy soils that are stony, and exposed limestone bedrock, on uplands

SOILS THAT FORMED IN OLD ALLUVIUM OVER CALICHE AND LIMY EARTH

5 — Olmos-Acuna-Coahuila: Very shallow, shallow, and deep, clayey and loamy soils that are gravelly, on terraces and uplands

6 — Jimenez-Quemado: Very shallow and shallow, loamy soils that are gravelly; on uplands

SOILS THAT FORMED IN RECENT ALLUVIUM

7 — Dev-Rio Diablo: Deep, loamy and clayey soils that are gravelly, on bottom lands and terraces

8 — Rio Grande-Reynosa-Lagloria: Deep, loamy soils, on bottom lands and terraces

*Texture terms refer to the surface layer of the major soils.

N

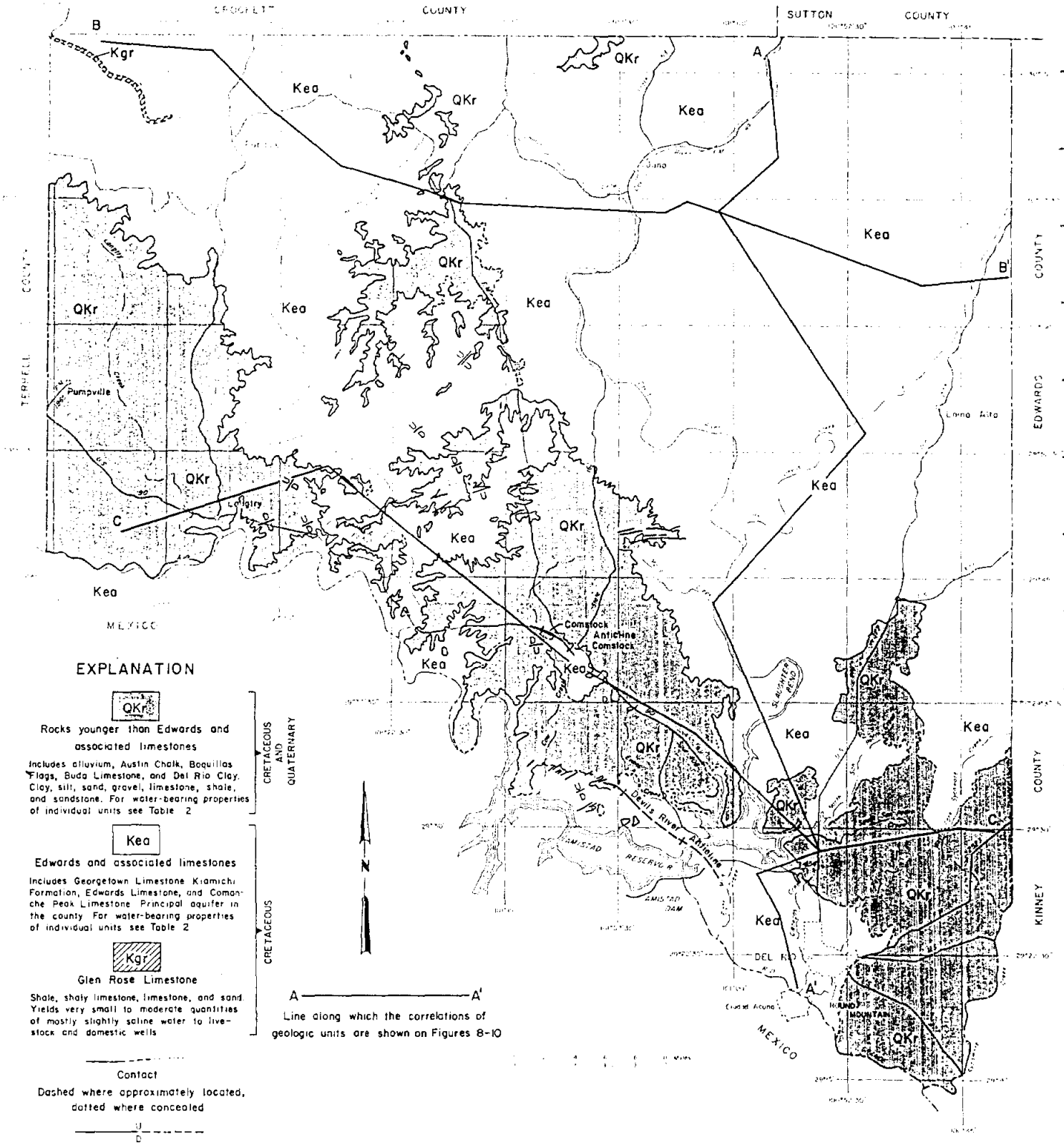
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEXAS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
VAL VERDE COUNTY, TEXAS

Scale 1:506,880
2 0 2 4 6 8 Miles
2 0 4 8 12 16 Km

FIGURE NO. IV-1

SOURCE: Ground-Water Resources of Val Verde County, T ...
June 1973



EXPLANATION

QKr — Rocks younger than Edwards and associated limestones (CRETACEOUS AND QUATERNARY)

Includes alluvium, Austin Chalk, Boquillas Flags, Buda Limestone, and Del Rio Clay. Clay, silt, sand, gravel, limestone, shale, and sandstone. For water-bearing properties of individual units see Table 2

Kea — Edwards and associated limestones (CRETACEOUS)

Includes Georgetown Limestone Kiamichi Formation, Edwards Limestone, and Comanche Peak Limestone Principal aquifer in the county For water-bearing properties of individual units see Table 2

Kgr — Glen Rose Limestone

Shale, shaly limestone, limestone, and sand Yields very small to moderate quantities of mostly slightly saline water to livestock and domestic wells

A ——— A' Line along which the correlations of geologic units are shown on Figures 8-10

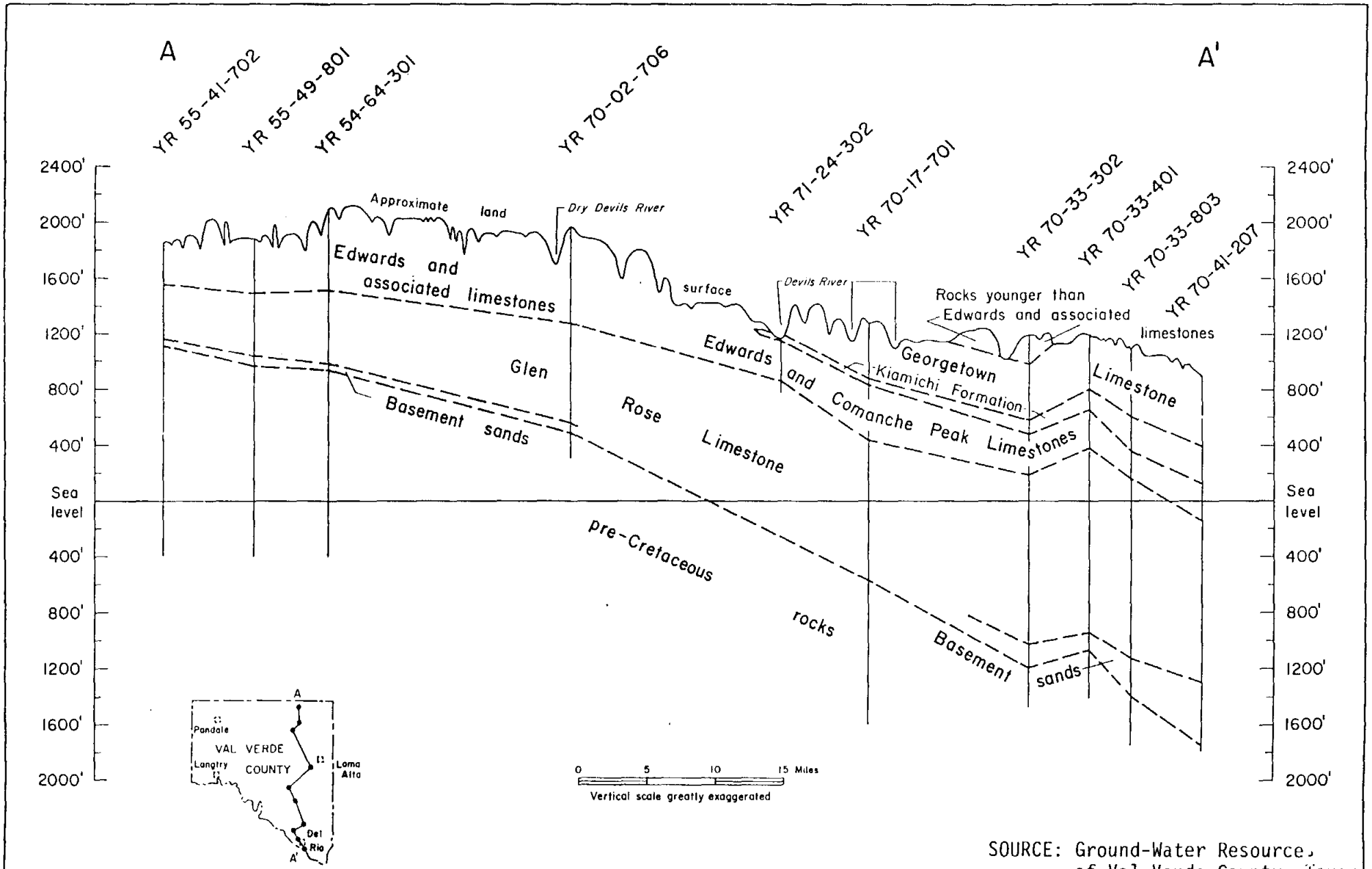
Contact
Dashed where approximately located, dotted where concealed

U / D
Fault
U, upthrown side; D, downthrown side
Dashed where approximately located

Geologic Map

FIGURE NO. IV-2

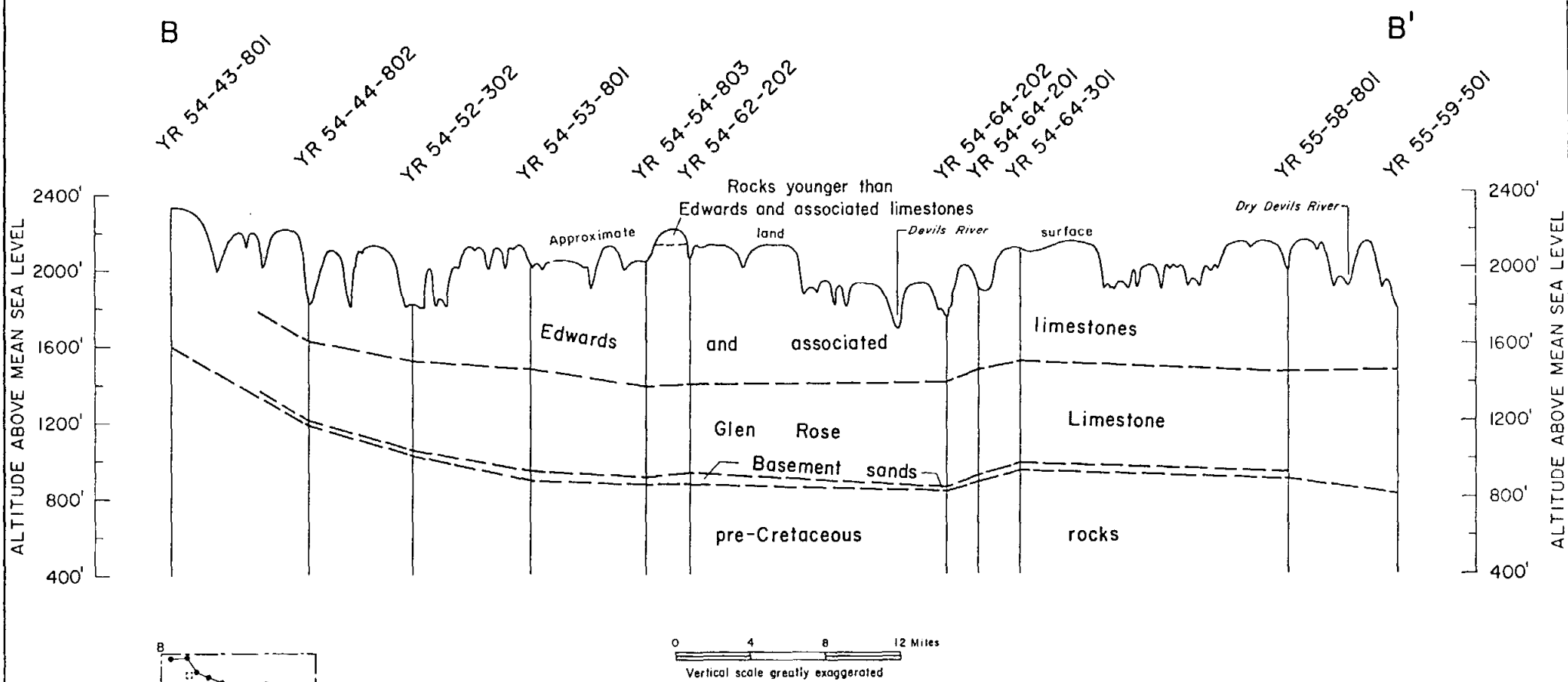
Geology adapted from International Boundary and Water Commission (1950-51), Freeman and Sharps (1957-64), and field notes

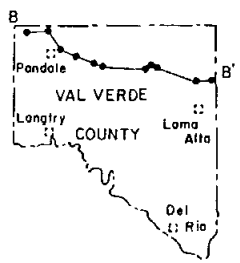


SOURCE: Ground-Water Resources of Val Verde County, Texas, June 1973

Correlation of Formations Between Wells Along Line A-A'

FIGURE NO. IV-3

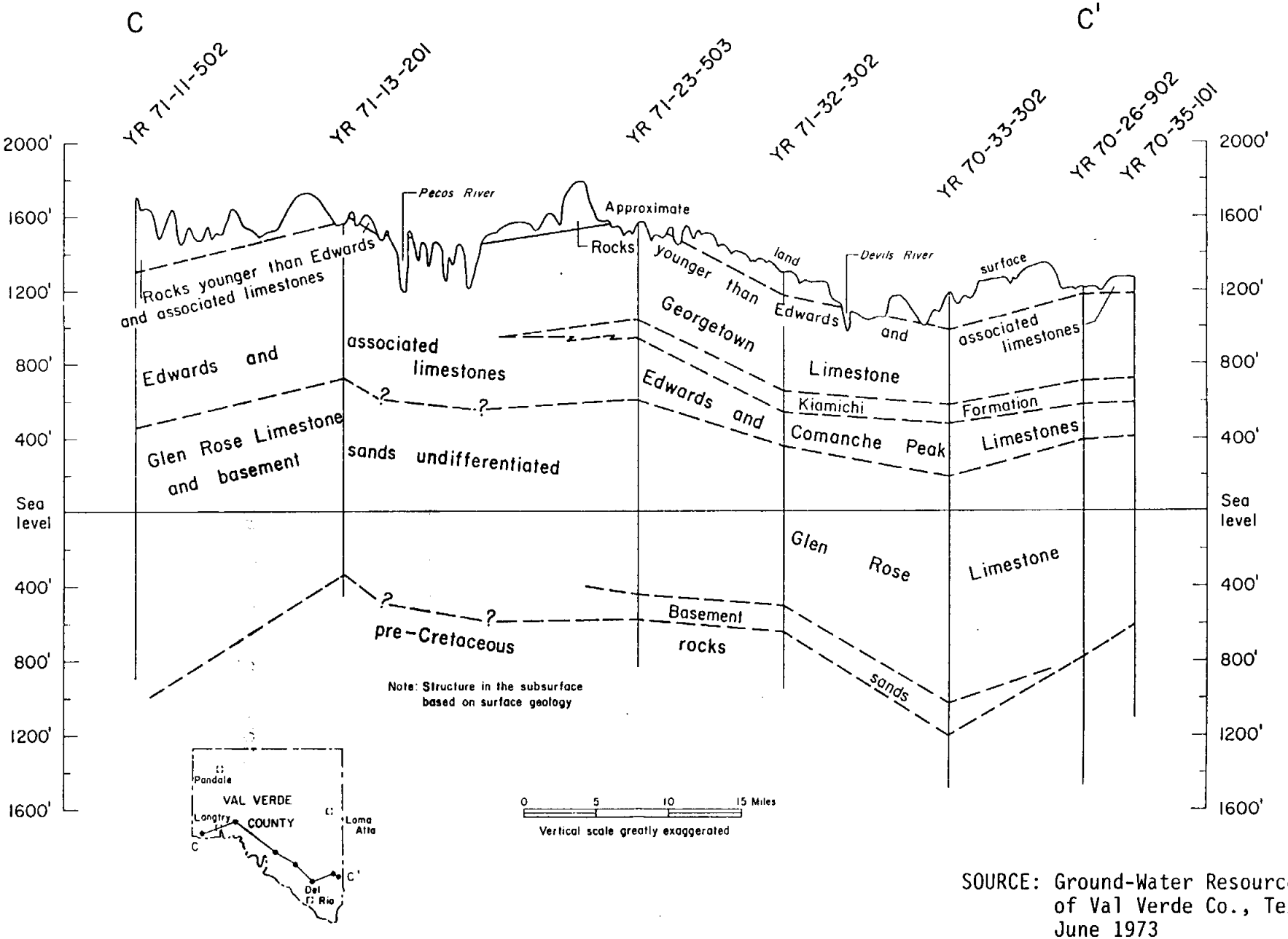




SOURCE: Ground-Water Resources of Val Verde County, Texas June 1973

Correlation of Formations Between Wells Along Line B-B'

FIGURE NO. IV-4



Correlation of Formations Between Wells Along Line C-C'

SOURCE: Ground-Water Resources of Val Verde Co., Texas June 1973

FIGURE NO. IV-5

approximately two-thirds of Val Verde County. The principal water-bearing unit in Val Verde County is the Edwards and associated limestones.

These units dip to the south and southwest, and in most places in the southern and western parts of the County, they are covered by younger formations. The Glen Rose Limestone is exposed in the extreme northwestern part of the County where the Pecos River has cut through the Edwards and associated limestones.

The significant structural feature affecting the occurrence of ground water is the dip of the rock units towards the south and southwest at 40 to 70 feet per mile. Much of the ground water enters the County as underflow from adjacent counties north and east of Val Verde County and moves down dip toward areas of discharge in the southern part of the County.

Small normal faults and joints are common in the southern part of the County. The downward percolation of rainfall through these fractures has enlarged the opening by solution resulting in a system of interconnecting cavities. The depths at which these solution-widened bedding planes or fractures may be encountered by a well bore can vary widely within a short distance, and many of the springs in the County issue from the northeast-trending faults and joints.

2. Hydraulic Elements

Val Verde County is drained by the Rio Grande, which forms the border between the United States and Mexico. The two (2) principal tributaries to the Rio Grande in the County are the Pecos River, which enters the County in the northwest corner, and the Devils River, which originates in the north-central part of the County near Juno.

The discharge of the streams and rivers in Val Verde County are measured at approximately fourteen (14) stream-gaging stations or by seepage investigations which are maintained by the U.S. Geological Survey and the International Boundary and Water Commission (IBWC).

The historical stream flow information is compiled by the IBWC in their Water Bulletin No. 56, "Flow of the Rio Grande and Related Data".

3. Floodplains and Wetlands

The U.S. Department of Housing and Urban Development, through the Federal Insurance Administration, have prepared Flood Insurance Rate Maps (FIRMs) for the City of Del Rio and the unincorporated areas of Val Verde County.

These flood hazard boundary maps have been compiled to generally show the flood plains of all the tributaries in Val Verde County where studies were completed.

4. Climatological Elements

Val Verde County has a semiarid, continental climate with dry winters and hot summers.

The prevailing winds are southwesterly from April through October. From November through March, northeasterly winds prevail, bringing more abrupt day-to-day changes in temperature. The average wind speed is highest at 11.6 miles per hour in July.

In winter, the average temperature is 53° F., and the average daily minimum temperature is 40° F. The lowest temperature on record at Del Rio occurred in February 1951, and was 11° F. In summer, the average daily maximum temperature is 98° F. The highest recorded temperature was 111° F. in July 1960.

Cold periods in winter have strong, dry, dusty, northerly and northeasterly winds that may cause temperatures to drop as much as 25° F. in a few hours. Cold periods usually do not last more than 2 or 3 days. Hot weather is rather persistent from late May to mid-September, and temperatures above 100° F. have been recorded as early as March and as late as October.

Temperatures below freezing occur on an average of 19 days each year. Temperatures as low as 32° F. have been recorded as early as October and as late as March, but the average date of the earliest freezing temperature in autumn is December 9, and the average latest freezing date in winter is February 12. The average growing season in Del Rio is 300 days.

The average annual rainfall in Del Rio is 18.38 inches. Of this, 12.22 inches usually falls April through October. There is not enough rainfall throughout the County for dry land farming; however, irrigation wells, San Felipe Springs, and the major rivers provide water for irrigating farmland.

The heaviest one-day rainfall during the period of record was 8.8 inches in June 1935. Thunderstorms occur on about 34 days each year and have occurred in all months of the years. Yearly rainfall has ranged from 37.75 inches in 1914 to 4.34 inches in 1956. The largest monthly rainfall, 13.71 inches occurred in June 1935. Each month of the year has been dry (precipitation of 0.03 inches or less) in one or more years. Rainfall comes chiefly in showers, which are frequently associated with local thunderstorms and characterized by heavy downpours.

Hail occurs in Val Verde County about once a year and reaches severe proportions about once in 5 years. Sleet or snow falls on an average of once a year but frequently melts as it falls, and only about once in 4 or 5 years does a snow fall heavy enough to blanket the ground occur. The heaviest one-day snowfall on record was 4.7 inches in March 1962.

The average relative humidity in mid-afternoon is about 54 percent. Humidity is higher at night, and the average at dawn is about 79 percent. The proportion of possible sunshine is 80 percent in summer and 53 percent in winter.

The above was compiled from the **"SOIL SURVEY VAL VERDE COUNTY, TEXAS"** by the **United State Department of Agriculture, Soil Conservation Service.**

5. Air Quality Element

There is presently no air quality testing in Val Verde County according to the Texas Air Control Board. The air quality exceeds the standards set for in the **"Federal Ambient Air Quality Standards"**, and the construction of the proposed water and wastewater facilities are not expected to affect the air quality.

The attainment status of Val Verde County, with regard to air quality for air contaminants that have National Ambient Air Quality Standards (NAAQS), is:

Sulfur Dioxide (SO_2) -- Attainment (meets or is better than NAAQS)
Carbon Monoxide (CO) -- Attainment
Nitrogen Dioxide (NO_2) -- Attainment
Total Suspended Particulate (TSP) -- Attainment
Ozone (O_3) -- Unclassifiable

6. Biological Elements

Val Verde County provides permanent and temporary habitat for many wildlife species. The major wildlife includes white-tailed and desert mule deer, turkey, javelina, bob white and scaled quail, and white-winged and mourning dove. Other wildlife include bob cat, coyote, puma, gray and red fox, raccoon, opossum, ringtail, porcupine, armadillo, cotton tail and jack rabbit, skunk, beaver, bat, and badger.

Evergreen and deciduous trees grow around Del Rio and in areas along rivers, creeks, streams, draws, and tributaries in other parts of the County. Examples of evergreen plant are pinyon pine, junipers, evergreen sumac, and live oak. Examples of deciduous plants are chisos, red Vasey, and shin oaks, sycamore, mesquite, hackberry, pecan, and greenbriar.

Wild herbaceous, grasses and legumes, and herbs grow around Del Rio. Examples of wild herbaceous plants are blue stem, Texas wintergrass, perennial croton, bush sunflower, orange zexmenia, plains bristlegrass, green sprangletrap, Engelmann-daisy, and sideoats grama. Examples of grasses and legumes are kleingrass, blue panicum johnson grass, sorghum almum, and alfalfa. Examples of shrubs are Texas kidneywood, shin oak, guajillo, ephedra, desert yaupon, feather dalea, and Texas false-mesquite.

Requests were made to the Texas Parks and Wildlife Department and the United States Department of the Interior-Fish and Wildlife Service for information regarding the State and federally listed threatened and endangered fish and wildlife of Val Verde County. A copy of their response is included on the following pages noted as EXHIBIT IV-A and EXHIBIT IV-B, respectively.

7. Cultural Resources

The Val Verde County Historical Commission lists forty-six (46) markers within the County which identify specific sites or areas of historical significance. These sites include:

- Site of Chihuahua Road
- Military Aviation in Val Verde County
- San Felipe Springs
- Blue Star Memorial Highway
- Canal System of Del Rio
- Val Verde County
- Site of Camp Del Rio
- Val Verde County Courthouse Square
- Val Verde County Courthouse
- Date Stones and Bench Mark, Val Verde County
- Camp Hudson, C.S.A.
- Sacred Heart Catholic Church
- Brown Plaza
- Cassenilli Gin House
- Taylor - Rivers House
- Mason - Foster House
- Val Verde Winery
- Gordon Memorial Park
- Old Perry Building
- Roy Bean, C.S.A. (1824-1903)
- Seminole - Negro Scouts
- Cemeterio Loma De La Cruz
- Memorial to American Soldiers of 1918
- Glenn - Dowe House
- In Memory of Fred W. Clark, Jr.
- Star Park Memorial
- Memorial to Servicemen of Val Verde County Who Sacrificed Their Lives for Their Country
- T-33A, City of Del Rio, Static Display
- Kaplan Automatic Adjustable Blade for Turbine Water Wheel

EXHIBIT IV-A

TEXAS
PARKS AND WILDLIFE DEPARTMENT
4200 Smith School Road Austin, Texas 78744

COMMISSIONERS

CHUCK NASH
Chairman, San Marcos

GEORGE C. "TIM" HIXON
Vice-Chairman
San Antonio

BOB ARMSTRONG
Austin

LEE M. BASS
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JOHN WILSON KELSEY
Houston

BEATRICE CARR PICKENS
Amarillo

A.R. (TONY) SANCHEZ, JR.
Laredo

CHARLES D. TRAVIS
Executive Director

August 22, 1989

RECEIVED
AUG 29
HOGAN & RASOR, INC.

C.F. Rasor, P.E.
Hogan & Rasor, Inc.
North Dallas Bank Tower, Suite 620
12900 Preston Road at LBJ
Dallas, Texas 75230

RE: H & R Project No. 134-06.11

Dear Mr. Rasor:

In response to your August 8, 1989 request for information on sensitive species and natural communities within or near the Del Rio, Val Verde County project area, we offer the following comments. A search of the Texas Natural Heritage Program Information System revealed occurrences of special species in the general vicinity of the project. Species occu[illegible] from the Del Rio area include: Dionda diaboli (D[illegible] Minnow), Etheostoma grahami (Rio Grande Darter), [illegible] proserpinus (Proserpine Shiner), Cyprinodon exim[illegible] (Conchos

[illegible]

[illegible] correct. (Correct is the dragon[illegible] area.

[illegible]

The Heritage Program information included here is based on the best data currently available to the state regarding threatened, endangered, or otherwise sensitive species. However, these data do not provide a definite statement as to the presence or absence of special species or natural communities within your project area, nor can these data substitute for an evaluation by qualified biologists. This information is intended to assist you in avoiding harm to species that occur on your site.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: DIONDA DIABOLI
COMMMON NAME: DEVIL'S RIVER MINNOW
FEDERAL STATUS: C2 STATE STATUS: T
GLOBAL RANK: G2 STATE RANK: S1
IDENTIFIED: Y SENSITIVITY: N
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO SE
TOPO CODE: 2910037
ELEMENT OCCURRENCE NUMBER: 004
MAP MARGIN NUMBER: 1 PRECISION: M
DATE LAST OBSERVED: 1975-00-00 DATE FIRST OBSERVED: 1975
OCCURRENCE RANK: A? DATE SURVEYED:
SURVEY COMMENTS: NEEDS RECENT VERIFICATION
DIRECTIONS:
SYCAMORE CREEK; EAST OF LAUGHLIN AFB; DEL RIO, TX.

DESCRIPTION OF HABITAT:
A CLEAR, THERMALLY STABLE, SPRING-FED STREAM IN LIMESTONE BEDROCK.

QUALITATIVE/QUANTITATIVE DATA:
FOUND IN CLEAR, THERMALLY STABLE, LIMESTONE SPRING-FED RIVERS, USUALLY NEAR HEADWATERS. OFTEN FOUND WITH D. EPISCOPA IN THE SAME WATERS.

MANAGEMENT COMMENTS:
MAINTAIN WATER QUALITY AND FLOW
PROTECTION COMMENTS:
END. SP. ACT ONLY PROTECTS AGAINST GOV'T ACTION, NOT PRIVATE
OTHER COMMENTS:
REPORTED IN AN UNPUBLISHED M.S. THESIS, CITATION SOUGHT.
LOCATION NEEDS REFINEMENT.
SOURCE OF INFORMATION:
HUBBS, CLARK. DEPT OF ZOOLOGY, UT AUSTIN.

This letter does not constitute an assessment of fish and wildlife impacts that might result from the activity for which this information is provided. Should you need an impact assessment from the Texas Parks and Wildlife Department, contact the Environmental Assessment Branch of the Resource Protection Division, attention Mr. Bob Spain, or contact him at 512/389-4725. All requests for assessments must be in writing.

Please contact the Texas Parks and Wildlife Department's Heritage Program before publishing or otherwise disseminating any specific locality information. Thank you for contacting us. Please feel free to call me at 512/389-4533 if you have questions.

Sincerely,

Dorinda Sullivan

Dorinda Sullivan, Data Manager
Texas Natural Heritage Program
Resource Protection Division

Enclosures

DLS/ds

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: ETHEOSTOMA GRAHAMI
COMMMON NAME: RIO GRANDE DARTER
FEDERAL STATUS: C2 STATE STATUS: T
GLOBAL RANK: G3 STATE RANK: S2
IDENTIFIED: Y SENSITIVITY: N
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO NW, DEL RIO NE, DEL RIO SW
TOPO CODE: 2910048 2910047 2910038
ELEMENT OCCURRENCE NUMBER: 001
MAP MARGIN NUMBER: 1 PRECISION: SC
DATE LAST OBSERVED: 1979-03-11 DATE FIRST OBSERVED: 1967
OCCURRENCE RANK: A DATE SURVEYED: 1979-03-00
SURVEY COMMENTS: FREQUENTLY ENCOUNTERED IN RIFFLES

DIRECTIONS:
SAN FELIPE CREEK, HEADSPRINGS ON HINDS RANCH, AND AT GOLF COURSE IN DEL RIO

DESCRIPTION OF HABITAT:
A CLEAR FREE-FLOWING LIMESTONE STREAM, SPRINGFED BY LARGE VOLUME SPRINGS

QUALITATIVE/QUANTITATIVE DATA:
A NUMBER OF INDIVIDUALS CAUGHT IN RIFFLES. FAIRLY COMMON IN THIS RIVER. ASSOCIATED WITH DIONDA DIABOLI, GAMBUSIA SPP., D. EPISCOPA, ASTYANAX MEXICANUS

MANAGEMENT COMMENTS:
PROTECT WATER FLOW, QUALITY AND CHARACTER

PROTECTION COMMENTS:
RECOMMEND AS CRITICAL HABITAT

OTHER COMMENTS:
OVERLOOKED (UNDER SAMPLED) BY SOME RESEARCHERS. SITES J-P IN HUBB'S LETTER 1979.

SOURCE OF INFORMATION:
HUBBS, CLARK, PH. D., CHAIRMAN, DEPARTMENT OF ZOOLOGY, UNIVERSITY OF TEXAS AT AUSTIN.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: NOTROPIS PROSERPINUS
COMMON NAME: PROSERPINE SHINER
FEDERAL STATUS: C2 STATE STATUS: T
GLOBAL RANK: G3 STATE RANK: S2
IDENTIFIED: Y SENSITIVITY: N
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO NW
TOPO CODE: 2910048
ELEMENT OCCURRENCE NUMBER: 002
MAP MARGIN NUMBER: 3 PRECISION: SC
DATE LAST OBSERVED: 1979 DATE FIRST OBSERVED:
OCCURRENCE RANK: A DATE SURVEYED: 1984
SURVEY COMMENTS: 200 INDIVIDUALS CAUGHT IN RECENT SURVEY

DIRECTIONS:
SAN FELIPE CREEK ON LOWE RANCH. SAN FELIPE CREEK, EASTERN TRIBUTARY ON LOWE RANCH.

DESCRIPTION OF HABITAT:
MEDIUM TO LARGE DESERT STREAMS, SELOW SPRINGS. CLEAR COOL WATER, TO SOME TURBIDITY.

QUALITATIVE/QUANTITATIVE DATA:
COMMON IN THIS STREAM. NOT FOUND IN SPRINGS. ASSOCIATED WITH DIONDA DIABOLI, CYPRINODON EXIMIUS, GAMBUSIA AFFINIS, DIONDA EPISCOPA, AND NOTROPIS VENUSTUS. NUMBERS DECREASE DOWNSTREAM.

MANAGEMENT COMMENTS:
ASSURE WATER FLOW AND QUALITY.

PROTECTION COMMENTS:
CONSULT DR. HUBBS

OTHER COMMENTS:
ALMOST 200 FISH OF THIS SPECIES SEINED HERE IN 1979.

SOURCE OF INFORMATION:
HUBBS, C. L. & R. R. MILLER. 1978. NOTROPIS SPP., CYPRINID FISHES OF S.S. CYPRINELLA ... . COPEIA (4):582-592.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: CYPRINODON EXIMIUS
COMMMON NAME: CONCHOS PUPFISH
FEDERAL STATUS: C2 STATE STATUS: T
GLOBAL RANK: G4 STATE RANK: S1
IDENTIFIED: Y SENSITIVITY: N
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO NW, DEL RIO NE
TOPO CODE: 2910048 2910047
ELEMENT OCCURRENCE NUMBER: 004
MAP MARGIN NUMBER: 4 PRECISION: SC
DATE LAST OBSERVED: 1984 DATE FIRST OBSERVED: 1979
OCCURRENCE RANK: A DATE SURVEYED: 1984
SURVEY COMMENTS: RECENT FIELD CHECK, COOPERATIVE OWNER

DIRECTIONS:
SAN FELIPE CREEK ON LOWE RANCH. SAN FELIPE CREEK, EASTERN TRIBUTARY ON LOWE RANCH

DESCRIPTION OF HABITAT:
MEDIUM SIZE DESERT STREAM; CLEAR COOL WATER, SOME TURBIDITY, SPRING FED

QUALITATIVE/QUANTITATIVE DATA:
ASSOCIATED WITH NOTROPIS PROSERPINUS, DIONDA DIABOLI, DIONDA EPISCOPA, NOTROPIS VENUSTUS.

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
A REGIONALLY ENDEMIC FISH FAUNA. SEE NOTROPIS PROSERPINUS AND DIONDA DIABOLI RECORDS FOR THIS SITE.

SOURCE OF INFORMATION:
HUBBS, CLARK. ND. UNIVERSITY OF TEXAS, BIOLOGY DEPARTMENT.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: PSORALEA RYDBERGII
COMMMON NAME: RYDBERG SCURFPEA
FEDERAL STATUS: C2 STATE STATUS:
GLOBAL RANK: G2 STATE RANK: S1
IDENTIFIED: Y SENSITIVITY:
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO SW
TOPO CODE: 2910038
ELEMENT OCCURRENCE NUMBER: 004
MAP MARGIN NUMBER: 3 PRECISION: S
DATE LAST OBSERVED: 1944-03-20 DATE FIRST OBSERVED: 1851
OCCURRENCE RANK: DATE SURVEYED: -
SURVEY ELEMENTS:
DIRECTIONS:
SAN FELIPE SPRINGS, SAN FELIPE COUNTRY CLUB, DEL RIO

DESCRIPTION OF HABITAT:

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
OCKENDON, D.J. 1965. A TAXONOMIC STUDY OF PSORALEA SUB-GENUS PEDIOMELUM (LEGUMINOSAE). S. W. NAT. 10:81-124.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: ACLEISANTHES CRASSIFOLIA
COMMMON NAME: TEXAS TRUMPETS
FEDERAL STATUS: C2 STATE STATUS:
GLOBAL RANK: G2 STATE RANK: S2
IDENTIFIED: Y SENSITIVITY:
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO NE
TOPO CODE: 2910047
ELEMENT OCCURRENCE NUMBER: 003
MAP MARGIN NUMBER: 1 PRECISION: G
DATE LAST OBSERVED: 1849-07-17 DATE FIRST OBSERVED: 1849
OCCURRENCE RANK: DATE SURVEYED:
SURVEY COMMENTS:
DIRECTIONS:
HIGH PRAIRIES OF SAN FELIPE CREEK, NORTH OF DEL RIO.

DESCRIPTION OF HABITAT:

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
TYPE LOCALITY

SOURCE OF INFORMATION:
MAHLER, W. F. FEDERAL SHORT REPORT.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: ERIGERON MIMEGLETES
COMMMON NAME: SONORA FLEABANE
FEDERAL STATUS: C2 STATE STATUS:
GLOBAL RANK: G2 STATE RANK: S2
IDENTIFIED: Y SENSITIVITY:
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO SW, DEL RIO SE, DEL RIO NE,
TOPO CODE: 2910038 2910037 2910047 2910048
ELEMENT OCCURRENCE NUMBER: 009
MAP MARGIN NUMBER: 6 PRECISION: G
DATE LAST OBSERVED: - DATE FIRST OBSERVED:
OCCURRENCE RANK: DATE SURVEYED: -
SURVEY COMMENTS:
DIRECTIONS:
DEL RIO

DESCRIPTION OF HABITAT:

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
ALSO QUADNAME: DEL RIO NW. FORMERLY SITE NAME=DEL RIO

SOURCE OF INFORMATION:
SHINNERS, L.H. 1947. TWO ANOMALOUS NEW SPECIES OF ERIGERON L. FROM TEXAS. WRIGHTIA 1:183-186.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

03/22/89

ID: JUSTICIA WRIGHTII
COMMON NAME: WRIGHT'S WATER-WILLOW

FEDERAL STATUS: C2
GLOBAL RANK: G2
IDENTIFIED: Y
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO SW
TOPO CODE: 2910032
ELEMENT OCCURRENCE NUMBER: 007
MAP TRACT NUMBER: 7
DATE LAST OBSERVED: 1903-04-03
[illegible]
[illegible]
[illegible]
[illegible] MILES WEST OF DEL RIO

STATE STATUS:
STATE RANK: S2
SENSITIVITY:
PRECISION: M
DATE FIRST OBSERVED: 1903
DATE SURVEYED:

GENERAL DESCRIPTION OF HABITAT:
LIMESTONE SOIL

QUALITATIVE/QUANTITATIVE DATA:
[illegible]

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
[redacted]

SOURCE OF INFORMATION:
WAESHAUSEN, D.C. 1966. ACANTHACEAE IN LUNDELL, C.L. & COLLABORATORS. FLORA OF TX, VOL.I. TX RESEARCH FD., RENNER.

[redacted]

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: JUSTICIA WRIGHTII
COMMMON NAME: WRIGHT'S WATER-WILLOW
FEDERAL STATUS: C2 STATE STATUS:
GLOBAL RANK: G2 STATE RANK: S2
IDENTIFIED: Y SENSITIVITY:
COUNTY: TX
USGS TOPO MAPS:
TOPO CODE:
ELEMENT OCCURRENCE NUMBER: 006
MAP MARGIN NUMBER: 0 PRECISION: U
DATE LAST OBSERVED: 1849-10 DATE FIRST OBSERVED: 1849
OCCURRENCE RANK: DATE SURVEYED:
SURVEY COMMENTS:
DIRECTIONS:
ALONG THE SAN FELIPE

DESCRIPTION OF HABITAT:
CALCAREOUS HILLS

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
WRIGHT 445

SOURCE OF INFORMATION:
WASSHAUSEN, D.C. 1966. ACANTHACEAE IN LUNDELL, C.L. & COL-
LABORATORS. FLORA OF TX, VOL. 1, TX RESEARCH FOUNDATION RENNER

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: PHYSOSTEGIA CORRELLII
COMMMON NAME: CORRELL'S FALSE DRAGON-HEAD
FEDERAL STATUS: C2 STATE STATUS:
GLOBAL RANK: G2 STATE RANK: S2
IDENTIFIED: Y SENSITIVITY:
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO SW
TOPO CODE: 2910038
ELEMENT OCCURRENCE NUMBER: 001
MAP MARGIN NUMBER: 4 PRECISION: M
DATE LAST OBSERVED: 1958-07-08 DATE FIRST OBSERVED: 1958
OCCURRENCE RANK: DATE SURVEYED: -
SURVEY COMMENTS:
DIRECTIONS:
ALONG IRRIGATION CANAL 2 MILES SOUTH OF DEL RIO

DESCRIPTION OF HABITAT:

QUALITATIVE/QUANTITATIVE DATA:
3 COLONIES SEEN

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
IRVING, R.S. 1980. STATUS REPORT ON PHYSOSTEGIA CORRELLII.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: PHYSOSTEGIA CORRELLII
COMMMON NAME: CORRELL'S FALSE DRAGON-HEAD
FEDERAL STATUS: C2 STATE STATUS:
GLOBAL RANK: G2 STATE RANK: S2
IDENTIFIED: Y SENSITIVITY:
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO SW
TOPO CODE: 2910038
ELEMENT OCCURRENCE NUMBER: 004
MAP MARGIN NUMBER: 5 PRECISION: M
DATE LAST OBSERVED: 1957-07-18 DATE FIRST OBSERVED: 1946
OCCURRENCE RANK: DATE SURVEYED: -
SURVEY COMMENTS:
DIRECTIONS:
ONE MILE NORTH OF THE INTERNATIONAL BRIDGE, DEL RIO

DESCRIPTION OF HABITAT:
ALONG SMALL STREAM OR DITCH

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
TYPE LOCALITY

SOURCE OF INFORMATION:
IRVING, R.S. 1980. STATUS REPORT ON PHYSOSTEGIA CORRELLII.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: EURYCEA NEOTENES
COMMMON NAME: TEXAS SALAMANDER
FEDERAL STATUS: C2 STATE STATUS:
GLOBAL RANK: G3 STATE RANK: S3
IDENTIFIED: Y SENSITIVITY:
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO SW
TOPO CODE: 2910038
ELEMENT OCCURRENCE NUMBER: 098
MAP MARGIN NUMBER: 8 PRECISION: S
DATE LAST OBSERVED: DATE FIRST OBSERVED:
OCCURRENCE RANK: DATE SURVEYED:
SURVEY COMMENTS:
DIRECTIONS:
SAN FELIPE SPRINGS, 1.4 KILOMETERS EAST-NORTHEAST OF DEL RIO

DESCRIPTION OF HABITAT:

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
MVZ 122791-2, TWO SPECIMENS

SOURCE OF INFORMATION:
SWEET, S.S. 1982. DISTRIBUTIONAL ANALYSIS OF EPIGEAN POPS.
OF E.NEOTENES IN CENTRAL TX ... HERPETOLOGICA 38(3):430-444.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/21/89

NAME: TANTILLA RUBRA
COMMON NAME: BIG BEND BLACKHEAD SNAKE
FEDERAL STATUS: STATE STATUS: T
GLOBAL RANK: G4 STATE RANK: S2
IDENTIFIED: Y SENSITIVITY:
COUNTY: [illegible]
USGS TOPO MAPS: DEL RIO NW
QUAD CODE: [illegible]
ELEMENT OCCURRENCE NUMBER: 006
MAP NUMBER: 1 PRECISION: S
DATE LAST OBSERVED: 19[illegible] DATE FIRST OBSERVED:
[illegible] DATE SURVEYED:
[illegible]
LOCATION:
[illegible]

DESCRIPTION OF HABITAT:

[illegible]

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
COLLECTED 11 APRIL

SOURCE OF INFORMATION:
[illegible] 19[illegible]. TANTILLA DIABOLA
FROM VAL VERDE COUNTY, TEXAS. [illegible] 21:261-262.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT

08/14/89

NAME: ACLEISANTHES WRIGHTII
COMMMON NAME: WRIGHT'S TRUMPETS
FEDERAL STATUS:
GLOBAL RANK: G2
IDENTIFIED: Y
COUNTY: TXVALV
USGS TOPO MAPS: DEL RIO SE
TOPO CODE: 2910037
ELEMENT OCCURRENCE NUMBER: 006
MAP MARGIN NUMBER: 2
DATE LAST OBSERVED: 1958-07-08
OCCURRENCE RANK:
SURVEY COMMENTS:
STATE STATUS:
STATE RANK: S2
SENSITIVITY:
PRECISION: M
DATE FIRST OBSERVED: 1958
DATE SURVEYED:

DIRECTIONS:
ON LIMESTONE HILLS 2 MILES SOUTHEAST OF DEL RIO

DESCRIPTION OF HABITAT:

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
CORRELL, D. S. (15433). 1958. SPECIMEN # NONE TX.

CODE KEY

FEDERAL STATUS

LE - Listed Endangered
LT - Listed Threatened
LELT - Listed Endangered in part of range, Threatened in a different part
PE - Proposed to be listed Endangered
PT - Proposed to be listed Threatened
PEPT - Proposed Endangered, Threatened
S - Synonyms
C1 - Candidate, Category 1. USFWS has substantial information on biological vulnerability and threats to support proposing to list as endangered or threatened. Data are being gathered on habitat needs and/or critical habitat designations.
C1* - C1, but lacking known occurrences
C1** - C1, but lacking known occurrences, except in captivity/cultivation
C2 - Candidate, Category 2. Information indicates that proposing to list as endangered or threatened is possibly appropriate, but substantial data on biological vulnerability and threats are not currently known to support the immediate preparation of rules. Further biological research and field study will be necessary to ascertain the status and/or taxonomic validity of the taxa in Category 2.
C2* - C2, but lacking known occurrences
C2** - C2, but lacking known occurrences, except in captivity/cultivation
3 - Taxa no longer being considered for listing as threatened or endangered. Three subcategories indicate the reasons for removal from consideration.
3A - Former Candidate, rejected because presumed extinct and/or habitats destroyed
3B - Former Candidate, rejected because not a recognized taxon; i.e. synonym or hybrid
3C - Former Candidate, rejected because more common, widespread, or adequately protected
blank - Not currently listed

STATE STATUS

E - Listed as Endangered in the State of Texas
T - Listed as Threatened in the State of Texas
blank - Not currently listed

TEXAS PARKS & WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
AUGUST 1989
COMPUTERIZED SPECIAL SPECIES & NATURAL COMMUNITY OCCURRENCES
VAL VERDE COUNTY

SCIENTIFIC/COMMON NAME QUADRANGLE/COUNTY NAME	GLOBAL/STATE RANK	FEDERAL/STATE STATUS	
GAMBUSIA AMISTADENSIS			001
AMISTAD GAMBUSIA			N
ZUBERBUELER BEND		TXVALV	
	GX SX	3A	
DIONDA DIABOLI			001
DEVIL'S RIVER MINNOW			N
BAKER'S CROSSING, SYCAMORE CANYON, 2 MORE		TXVALV	
	G2 S1	C2	T
DIONDA DIABOLI			002
DEVIL'S RIVER MINNOW			N
DEL RIO SW, DEL RIO NW, DEL RIO NE		TXVALV	
	G2 S1	C2	T
DIONDA DIABOLI			004
DEVIL'S RIVER MINNOW			N
DEL RIO SE		TXVALV	
	G2 S1	C2	T
CYPRINODON EXIMIUS			001
CONCHOS PUPFISH			N
DOLAN SPRINGS		TXVALV	
	G4 S1	C2	T
CYPRINODON EXIMIUS			002
CONCHOS PUPFISH			N
GILLIS RANCH		TXVALV	
	G4 S1	C2	T
GALIUM CORRELLII			001
CLIFF BEDSTRAW			
LANGTRY		TXVALV	
	G2 S1	C2	
ACLEISANTHES CRASSIFOLIA			003
TEXAS TRUMPETS			
DEL RIO NE		TXVALV	
	G2 S2	C2	
BRICKELLIA SHINERI			001
SHINER'S BRICKE[illegible]			
PANDE[illegible]			
	G2 S2	3C	
ETHEOSTOMA GRAHAMI			001
RIO GRANDE DARTER			N
DEL RIO NW, DEL RIO NE, DEL RIO SW		TXVALV	
	G3 S2	C2	T
ETHEOSTOMA GRAHAMI			002
RIO GRANDE DARTER			N
GILLIS RANCH		TXVALV	
	G3 S2	C2	T

TEXAS PARKS & WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
AUGUST 1989
COMPUTERIZED SPECIAL SPECIES & NATURAL COMMUNITY OCCURRENCES
VAL VERDE COUNTY

SCIENTIFIC/COMMON NAME QUADRANGLE/COUNTY NAME	GLOBAL/STATE RANK	FEDERAL/STATE STATUS	
PERITYLE WARNOCKII			001
RIVER ROCK-DAISY			
PANDALE, HACKBERRY CROSSING		TXVALV	
	G1 S1	C2	
NOTROPIS PROSERPINUS			003
PROSERPINE SHINER			N
GILLIS RANCH		TXVALV	
	G3 S2	C2	T
BRICKELLIA SHINERI			011
SHINER'S BRICKELL-BUSH			
SEMINOLE CANYON		TXVALV	
	G2 S2	3C	
BRICKELLIA SHINERI			009
SHINER'S BRICKELL-BUSH			
LANGTRY		TXVALV	
	G2 S2	3C	
ETHEOSTOMA GRAHAMI			003
RIO GRANDE DARTER			N
PANDALE		TXVALV	
	G3 S2	C2	T
BRICKELLIA SHINERI			010
SHINER'S BRICKELL-BUSH			
LANGTRY		TXVALV	
	G2 S2	3C	
NOTROPIS PROSERPINUS			002
PROSERPINE SHINER			N
DEL RIO NW		TXVALV	
	G3 S2	C2	T
ACLEISANTHES WRIGHTII			006
WRIGHT'S TRUMPETS			
DEL RIO SE		TXVALV	
	G2 S2		
STYRAX TEXANA			008
TEXAS SNOWBELLS			
DOLAN SPRINGS		TXVALV	
	G1 S1	LE	E
CYPRINODON EXIMIUS			004
CONCHOS PUPFISH			N
DEL RIO NW, DEL RIO NE		TXVALV	
	G4 S1	C2	T
ACLEISANTHES WRIGHTII			009
WRIGHT'S TRUMPETS			
		TXVALV	
	G2 S2		

TEXAS PARKS & WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
AUGUST 1989
COMPUTERIZED SPECIAL SPECIES & NATURAL COMMUNITY OCCURRENCES
VAL VERDE COUNTY

SCIENTIFIC/COMMON NAME QUADRANGLE/COUNTY NAME	GLOBAL/STATE RANK		FEDERAL/STATE STATUS	
KALLSTROEMIA PERENNANS				003
PERENNIAL CALTROP				
LANGTRY			TXVALV	
	G1	S1	C2	
KALLSTROEMIA PERENNANS				001
PERENNIAL CALTROP				
SHUMLA			TXVALV	
	G1	S1	C2	
DIPHYLLA ECAUDATA				001
HAIRY-LEGGED VAMPIRE				N
SEMINOLE CANYON			TXVALV	
	G5	S1		
BAT CAVE				011
				N
ZUBERBUELER BEND NW			TXVALV	
BAT CAVE				010
				N
SEMINOLE CANYON			TXVALV	
DALEA SABINALIS				001
SABINAL PRAIRIE-CLOVER				
CARRUTHERS DRAW			TXVALV	
	G1	S1	C2	
DALEA SABINALIS				003
SABINAL PRAIRIE-CLOVER				
[illegible]			TXVALV	
	G1	S1	C2	
TETRAMERIUM PLATYSTEGIUM				007
MONTELL FOURWORT				
CARRUTHERS DRAW			TXVALV	
	G3	S3		
PSORALEA RYDBERGII				002
[illegible]				
	G2	S1	C2	
PSORALEA RYDBERGII				001
RYDBERG SCURFPEA				
ROUGH CANYON			TXVALV	
	G2	S1	C2	
PSORALEA RYDBERGII				003
RYDBERG SCURFPEA				
			TXVALV	
	G2	S1	C2	

TEXAS PARKS & WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
AUGUST 1989
COMPUTERIZED SPECIAL SPECIES & NATURAL COMMUNITY OCCURRENCES
VAL VERDE COUNTY

SCIENTIFIC/COMMON NAME QUADRANGLE/COUNTY NAME	GLOBAL/STATE RANK	FEDERAL/STATE STATUS	
PSORALEA RYDBERGII			004
RYDBERG SCURFPEA			
DEL RIO SW		TXVALV	
	G2 S1	C2	
FORSELLESIA TEXENSIS			002
TEXAS GREASE BUSH			
		TXVALV	
	G1 S1	C2	
PHYSOSTEGIA CORRELLII			004
CORRELL'S FALSE DRAGON-HEAD			
DEL RIO SW		TXVALV	
	G2 S2	C2	
PHYSOSTEGIA CORRELLII			001
CORRELL'S FALSE DRAGON-HEAD			
DEL RIO SW		TXVALV	
	G2 S2	C2	
ERIGERON MIMEGLETES			009
SONORA FLEABANE			
DEL RIO SW, DEL RIO SE, DEL RIO NE,		TXVALV	
	G2 S2	C2	
TRACHEMYS GAIGEAE			002
BIG BEND SLIDER			
LITTLE FIELDER DRAW		TXVALV	
	G3 S2	3C	
ETHEOSTOMA GRAHAMI			004
RIO GRANDE DARTER			
LITTLE FIELDER DRAW		TXVALV	
	G3 S2	C2	T
TANTILLA RUBRA			005
BIG BEND BLACKHEAD SNAKE			
LITTLE FIELDER DRAW		TXVALV	
	G4 S2		T
TANTILLA RUBRA			007
BIG BEND BLACKHEAD SNAKE			
DOLAN SPRINGS		TXVALV	
	G4 S2		T
JUSTICIA WRIGHTII			003
WRIGHT'S WATER-WILLOW			
		TXVALV	
	G2 S2	C2	
EURYCEA NEOTENES			098
TEXAS SALAMANDER			
DEL RIO SW		TXVALV	
	G1 S3	C2	

TEXAS PARKS & WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
AUGUST 1989
COMPUTERIZED SPECIAL SPECIES & NATURAL COMMUNITY OCCURRENCES
VAL VERDE COUNTY

SCIENTIFIC/COMMON NAME QUADRANGLE/COUNTY NAME	GLOBAL/STATE RANK		FEDERAL/STATE STATUS	
TANTILLA RUBRA				009
BIG BEND BLACKHEAD SNAKE				
BAKER'S CROSSING			TXVALV	
	G4	S2		T
TANTILLA RUBRA				013
BIG BEND BLACKHEAD SNAKE				
LANGTRY			TXVALV	
	G4	S2		T
BAT CAVE				014
FERN CAVE				N
BAKER'S CROSSING			TXVALV	
NOTROPIS PROSERPINUS				006
PROSERPINE SHINER				
SYCAMORE CANYON			TXVALV	
	G3	S2	C2	T

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS & WILDLIFE DEPARTMENT

NAME: DEVIL'S RIVER STATE NATURAL AREA
COUNTY NAME(S): TXVALV
ESTABLISHED: 1988- - SIZE(ACRES): 19989
DESCRIPTION: DOLAN CREEK AND SPRINGS, ONE MILE RIVER FRONTAGE ON DEVIL'S RIVER
COMMENTS:

MANAGEMENT:

MANAGER: TPWD PK SUPT-BILL ARMSTRONG

ADDRESS: HCR 1, BOX 13, DEL RIO, TEXAS 78840
512/395-2133

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS & WILDLIFE DEPARTMENT

NAME: SEMINOLE CANYON STATE HISTORIC PARK
COUNTY NAME(S): TXVALV
ESTABLISHED: 1973- SIZE(ACRES): 2182
DESCRIPTION: BACKWATER CANYONS OF AMISTAD RESERVOIR; ROLLING UPLANDS OF DESERT SCRUB CUT BY STEEP-SIDED CANYONS W/OAK-WOODLANDS.
COMMENTS: INDIAN PICTOGRAPH SITES

MANAGEMENT:

MANAGER: TPWD PK SUPT-EMMITT BROTHERTON

ADDRESS: PO BOX 806, COMSTOCK, TX 78837 PH-915/292-4464

COUNTY: **Val Verde**

ENDANGERED SPECIES

***OCELOT (*Felis pardalis*)
***BEAR, BLACK (*Ursus americanus*)
**COATI (*Nasua nasua*)
***EAGLE, BALD (*Haliaeetus leucocephalus*)
***TERN, LEAST, INTERIOR (*Sterna antillarum athalassos*)
***VIREO, BLACK-CAPPED (*Vireo atricapillus*)
***BLOTCHED GAMBUSIA (*Gambusia senilis*)
*PHANTOM SHINER (*Notropis orca*)
***TEXAS SNOWBELLS (*Styrax texana*)

THREATENED SPECIES

***HAWK, ZONE-TAILED (*Buteo albonotatus*)
***FALCON, PEREGRINE, ARCTIC (*Falco peregrinus tundrius*)
***STORK, WOOD (*Mycteria americana*)
**HAWK, BLACK-, COMMON (*Buteogallus anthracinus*)
**HAWK, GRAY (*Buteo nitidus*)
*IBIS, WHITE-FACED (*Plegadis chihi*)
*WARBLER, GOLDEN-CHEEKED (*Dendroica chrysoparia*)
***TORTOISE, TEXAS (*Gopherus berlandieri*)
***SNAKE, INDIGO, TEXAS (*Drymarchon corais erebennus*)
***LIZARD, HORNED, TEXAS (*Phrynosoma cornutum*)
***SNAKE, BLACKHEAD, BIG BEND (*Tantilla rubra*)
***RIO GRANDE DARTER (*Etheostoma grahami*)
***DEVILS RIVER MINNOW (*Dionda diaboli*)
***CONCHOS PUPFISH (*Cyprinodon eximius*)
***PROSERPINE SHINER (*Notropis proserpinus*)
***BLUE SUCKER (*Cycleptus elongatus*)
*PECOS PUPFISH (*Cyprinodon pecosensis*)

***Confirmed species - verified recent occurrence
**Probable species - unconfirmed, but within general distribution pattern of the species
*Possible species - unconfirmed, but at periphery of known distribution of the species

TEXAS SNOWBELLS (E) - Styrax texana

Occupies crevices in limestone cliffs along stream channels in juniper-oak savanna and creosote bush shrub. Primary threats are overgrazing, flooding and erosion, and possibly, groundwater alteration. Edwards, Real, Uvalde, Val Verde and possibly Kimble Counties.

TOBUSCH FISHHOOK CACTUS (E) - Ancistrocactus tobuschii

Grows in a juniper-oak association on limestone of the Edwards Plateau region. Population declines have resulted from overcollection and flooding. Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde Counties.

- International Boundary Monument
- Site of Camp Hudson
- Seminole Canyon State Historical Park
- Highway Directional Marker - Pecos River Bridge
- Pecos High Bridge
- Early Military Trail
- Memorial to McClaud B. Hodges
- Near Site, Southern Pacfic Ceremony of Silver Spike
- Welcome to Texas - Land of Contrast
- Low West of the Pecos
- Jersey Lily Saloon
- Lockheed U-2, 56-6707
- In Memory of Jack Thomas Laughlin
- Belgium Plaque of Appreciation
- Tribute to P.O.W. of M.I.A.'s
- XL Anniversary Commemoration
- Dedicated to the Memory of CMSGT Daniel P. Jarvis

It is not anticipated that any of the proposed projects will adversely disrupt these historical or archeological sites.

In response to a request made to the Texas Antiquities Committee, they have furnished a copy of the Antiquities Code (EXHIBIT IV-C) which explains, among several items, the County's responsibilities in the notification and preservation of prehistoric and archeological sites in Texas. Also included with their submittal is a statistical report of the recorded prehistoric and historic sites in Val Verde County.

The National Park Service, a division of the United States Department of Interior, has expressed their concerns in letter included on the following pages (EXHIBIT IV-D).

8. Economic Conditions

The medial household effective buying power for the Val Verde County area is $17,806.00. The County breakdown by race is:

White - 34.94%
Black - 1.62%
Asian - 0.47%
Spanish Origin - 62.97%
Total Population - 35,910

The figures used in this portion were taken from **"Community and Economic Profile - Val Verde County"** by the Middle Rio Grande Development Council.

9. Land-Use

A wide range of land uses currently exists in the Del Rio area, including single-family residential, multi-family, commercial,

EXHIBIT IV-C

TEXAS ANTIQUITIES COMMITTEE

P.O. Box 12276 Austin, Texas 78711 (512) 463-6098

September 6, 1989

RECEIVED
SEP 11
HOGAN &

C. F. Rasor
Hogan & Rasor, Inc.
North Dallas Bank Tower, Suite 620
12900 Preston Road at LBJ
Dallas, TX 75230

RE: Information Request

Dear Mr. Rasor:

I regret to inform you that it is impossible for me to supply you with the voluminous and detailed information you request in your letter dated August 22, 1989. Exact site locational information is restricted by law and I believe you would find it is certainly more detailed information than you probably need. If you truly need more detailed data, then I would suggest that you contract with a professional archeologist to perform an archival and reconnaissance level investigation. --- What I can provide for you I have enclosed.

Please keep in mind that only very limited portions of Val Verde County have ever been professionally surveyed; therefore, lack of recorded sites in any area does not necessarily mean there are no sites there. Any specific water development project that Val Verde County has planned should be plotted on a 7.5 min. USGS Quadrangle Map and mailed to the Committee for project specific review.

I have also enclosed a copy of the Antiquities Code which explains the county's responsibilities. Please contact me if you have any questions.

Sincerely yours,

Mark H. Denton
Staff Archeologist

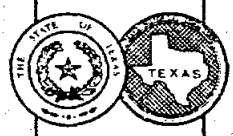
MHD:dml

enclosures

Prehistoric Archeological Sites in Texas

A Statistical Overview

Compiled by
Lynne A. Biesaart, Wayne R. Roberson, and Lisa Clinton Spotts



Office of the State Archeologist Special Report 28
TEXAS HISTORICAL COMMISSION

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CONTENTS

UPTON County (Continued)	No. of Sites	% of County
Sites with significant features		
Architectural		
Natural feature	2	25.00
Subsistence-related features		
Burned rock midden	1	12.50
Burned rock feature (not specified)	1	12.50
Stone work	2	25.00
Social/Ceremonial-related features		
Rock art	1	12.50
Technology-related features	0	

UVALDE

Middle Rio Grande Development Council
Nueces River Basin
Edwards Plateau and South Texas Plain geographic regions
Juniper-Oak-Mesquite Savanna and Mesquite-Chaparral Savanna vegetation regions

	No. of Sites	% of County
Total prehistoric sites recorded	73	100.00
Paleo-Indian	7	9.59
Early Archaic	11	15.07
Middle Archaic	15	20.55
Late Archaic	17	23.29
General Archaic	32	43.84
Late Prehistoric	15	20.55
Sites with special registrations		
National Register	4	5.48
State Archeological Landmark	5	6.85

	No. of occurrences
Condition of sites	
Erosion disturbance	31
Construction disturbance	16
Dispersed	16
Potholed/surface collected	37

	No. of Sites	% of County
Status of sites		
Excavated	7	9.59
Tested by hand	16	21.92
Tested by machine	1	1.37
Surface collected	66	90.41
Sites with significant features		
Architectural		
Trench	1	1.37
Posthole	1	1.37
Postmold	1	1.37
Floor	2	2.74
Natural feature	6	8.22
Other	5	6.85
Subsistence-related features		
Hearth	10	13.70
Burned rock midden	28	38.36
Burned rock feature (not specified)	29	39.73
Shell midden	1	1.37
Midden soil	11	15.07
Natural feature	1	1.37
Other	32	43.84
Social/Ceremonial-related features		
Burial	2	2.74
Rock art	1	1.37
Natural feature	2	2.74
Technology-related features		
Stone quarry	8	10.96
Stone tool manufacturing area	2	2.74

VAL VERDE

Middle Rio Grande Development Council
Rio Grande Basin
Edwards Plateau geographic region
Desert Shrub Savanna and Juniper-Oak-Mesquite Savanna vegetation regions

	No. of Sites	% of County
Total prehistoric sites recorded	399	100.00
Paleo-Indian	9	2.26
Early Archaic	53	13.28
Middle Archaic	74	18.55
Late Archaic	108	27.07
General Archaic	27	6.77
Late Prehistoric	50	12.53
Sites with special registrations		
National Register	143	35.84
State Archeological Landmark	32	8.02

	No. of occurrences
Condition of sites	
Erosion disturbance	399
Construction disturbance	50
Undisturbed naturally capped	15
Undisturbed artificially capped	1
Disturbed and artificially capped	91
Deflated	19
Dispersed	49
Potholed/surface collected	107
Destroyed	16

	No. of Sites	% of County
Status of sites		
Excavated	32	8.02
Tested by hand	52	13.03
Tested by machine	9	2.26
Surface collected	256	64.16
Sites with significant features		
Architectural		
Postmold	1	.25
Stone work	5	1.25
Wood work	2	.50
Natural feature	229	57.39
Other	16	4.01
Subsistence-related features		
Hearth	41	10.28
Burned rock midden	90	22.56
Burned rock feature (not specified)	37	9.27
Midden soil	247	61.90
Pit	12	3.01
Bone bed	1	.25
Stone work	87	21.80

County Total Update (Continued)

County	Sites in THCP Data Base					
	Prehistoric		Historic (1985)		Insuf-ficient Data 1985	TOTAL Sites April 1985
	No. in October 1984	No. in April 1985	No. of Affili-ations	No. of Historic Only		
Tyler	20	20	7	5	0	25
Upshur	16	16	3	3	6	25
Upton	8	8	0	0	0	8
Uvalde	73	73	6	2	0	75
Val Verde	399	412	31	20	1	433
Van Zandt	71	71	11	2	1	74
Victoria	72	72	12	8	1	81
Walker	47	48	4	1	3	52
Waller	11	11	0	0	0	11
Ward	3	3	0	0	0	3
Washington	16	17	6	5	0	22
Webb	31	31	10	6	2	39
Wharton	14	14	2	0	0	14
Wheeler	12	12	1	1	0	13
Wichita	0	0	0	0	0	0
Wilbarger	4	4	1	0	0	4
Willacy	64	64	16	15	0	79
Williamson	425	438	52	30	1	469
Wilson	56	56	11	7	0	63
Winkler	5	5	0	0	0	5
Wise	13	13	4	4	2	19
Wood	175	176	32	25	6	207
Yoakum	0	0	1	1	0	1

THE ANTIQUITIES CODE OF TEXAS

(Revised Sept. 1, 1987)

TEXAS ANTIQUITIES COMMITTEE P.O. BOX 12276 AUSTIN, TEXAS 78711

ANTIQUITIES CODE OF TEXAS

The Antiquities Code of Texas was established by Senate Bill No. 58, Chapter 442, Government Code of Texas, and was redefined as the Texas Natural Resource Code of 1977, a formal revision of the statutes relating to the public domain. Title 9, Chapter 191 of the Resource Code pertains to the Antiquities Committee. Further revisions to the Antiquities Code were added in the Sunset Review process as reflected in Senate Bill 231 enacted by the legislature in 1983 and in House Bill 2056 in 1987.

The nine-member Antiquities Committee is the legal custodian of all cultural resources, historic and prehistoric, within the public domain of the State of Texas. Such diverse resources as historic buildings, shipwrecks, and aboriginal campsites fall within the jurisdiction of the Committee. These sites may be designated as State Archeological Landmarks by the Committee.

Permits to conduct archeological investigation of cultural resources are granted to qualified individuals and institutions who demonstrate the capability and willingness to obtain the maximum scientific archeological and educational information from such investigation. In addition, materials recovered from such investigations must be properly stored and available to the public for study.

For additional information concerning permits and copies of the General Rules of Practice and Procedure, contact the Texas Antiquities Committee, P.O. Box 12276, Austin, Texas, 78711, 512/463-6098.

TITLE 9. HERITAGE

CHAPTER 191. ANTIQUITIES COMMITTEE

SUBCHAPTER A. GENERAL PROVISIONS

SUBCHAPTER B. ADMINISTRATIVE PROVISIONS

SUBCHAPTER C. POWERS AND DUTIES

SUBCHAPTER D. STATE ARCHEOLOGICAL LANDMARKS

SUBCHAPTER E. PROHIBITIONS

SUBCHAPTER F. ENFORCEMENT

CHAPTER 191.
ANTIQUITIES COMMITTEE

SUBCHAPTER A.
GENERAL PROVISIONS

Section 191.001. TITLE. This chapter may be cited as the Antiquities Code of Texas.

Section 191.002. DECLARATION OF PUBLIC POLICY. It is the public policy and in the public interest of the State of Texas to locate, protect, and preserve all sites, objects, buildings, pre-twentieth-century shipwrecks, and locations of historical, archeological, educational, or scientific interest, including but not limited to, prehistoric and historical American Indian or aboriginal campsites, dwellings, and habitation sites, archeological sites of every character, treasure imbedded in the earth, sunken or abandoned ships and wrecks of the sea or any part of their contents, maps, records, documents, books, artifacts, and implements of culture in any way related to the inhabitants, pre-history, history, natural history, government, or culture in, on, or under any of the land in the State of Texas, including the tidelands, submerged land, and the bed of the sea within the jurisdiction of the State of Texas.

Section 191.003. DEFINITIONS. In this chapter:

(1) "Committee" means the Antiquities Committee.

(2) "Landmark" means a state archeological landmark.

(3) "State agency" means a department, commission, board, office, or other agency that is a part of state government and that is created by the constitution or a statute of this state. The term includes an institution of higher education as defined by Section 61.003, Texas Education Code.

(4) "Political subdivision" means a local governmental entity created and operating under the laws of this state, including a city, county, school district, or special district created under Article III, Section 52(b)(1) or (2), or Article XVI, Section 59, of the Texas Constitution.

Section 191.004. CERTAIN RECORDS NOT PUBLIC INFORMATION. (a) Information specifying the location of any site or item declared to be a state archeological landmark under Subchapter D of this chapter is not public information.

(b) Information specifying the location or nature of an activity covered by a permit or an application for a permit under this chapter is not public information.

(c) Information specifying details of a survey to locate state archeological landmarks under this chapter is not public information.

(Sections 191.005-191.010 reserved for expansion)

SUBCHAPTER B.
ADMINISTRATIVE PROVISIONS

Section 191.011. CREATION AND MEMBERSHIP OF COMMITTEE. (a) There is created an Antiquities Committee, which is composed of nine members, including the Chairman of the Texas Historical Commission, the Director of the Parks and Wildlife Department, the Commissioner of the General Land Office, the State Archeologist, the State Engineer-Director of the State Department of Highways and Public Transportation, the Executive Director of the Texas Water Commission, and the following citizen members: one professional archeologist from a recognized museum or institution of higher learning in Texas; one professional historian with expertise in Texas history and culture; and one professional museum director of a major, state-funded museum that has significant research facilities. Five members represent a quorum. At no time shall any member be allowed to appoint or designate a proxy or representative for the purposes of achieving a quorum or to cast a vote on any matter pending before the committee.

(b) A person who is required to register as a lobbyist under Chapter 305, Government Code of Texas, by virtue of his activities for compensation in or on behalf of a profession related to the operation of the committee may not serve as a member of the committee or act as the general counsel to the committee.

(c) Appointments to the committee shall be made without regard to the race, creed, sex, religion, or national origin of the appointee.

Section 191.012. QUALIFICATIONS FOR CITIZEN MEMBERS. Each citizen member of the committee must be a resident of the State of Texas.

Section 191.013. APPOINTMENT OF CITIZEN MEMBERS. Each citizen member of the committee shall be appointed by the governor with the advice and consent of the senate.

Section 191.014. TERM OF CITIZEN MEMBERS. Each citizen member of the committee shall serve for a term of two years expiring on January 31 of each odd-numbered year.

Section 191.015. PER DIEM AND EXPENSES FOR CITIZEN MEMBERS. Each citizen member of the committee is entitled to receive a per diem allowance for each day spent in the performance of his duties and reimbursement for actual and necessary travel expenses incurred in the performance of his duties, as provided by the General Appropriations Act.

Section 191.016. CHAIRMAN OF COMMITTEE. At its first meeting in each calendar year, the committee shall select one of its members as chairman.

Section 191.017. QUORUM. Five members of the

committee constitute a quorum for conducting business.

Section 191.018. EMPLOYEES OF COMMITTEE. (a) The committee may employ the personnel necessary to perform its duties to the extent the employment is provided for by the General Appropriations Act.

(b) Employees of the committee are considered to be employees of the Texas Historical Commission.

Section 191.019. RECORDS OF COMMITTEE. The committee shall keep a record of its proceedings which shall be subject to inspection by any citizen of Texas desiring to make an examination in the presence of a member of the committee or an authorized employee of the committee.

Section 191.020. REMOVAL OF CITIZEN COMMITTEE MEMBER. (a) It is a ground for removal of a citizen member from the committee if the member:

(1) does not have at the time of appointment the qualifications required by Sections 191.011 and 191.012 of this code for appointment to the committee; or

(2) does not maintain during the service on the committee the qualifications required by Sections 191.011 and 191.012 of this code.

(b) The validity of an action of the committee is not affected by the fact that it was taken when a ground for removal of a member of the committee existed.

Section 191.021. COMPLIANCE WITH OPEN MEETINGS ACT AND ADMINISTRATIVE PROCEDURE AND TEXAS REGISTER ACT. (a) The committee is subject to the open meetings act, Chapter 271, Acts of the 60th Legislature, Regular Session, 1967, as amended (Article 6252-17, Vernon's Texas Civil Statutes), and the Administrative Procedure and Texas Register Act, as amended (Article 6252-13a, Vernon's Texas Civil Statutes).

(b) If an institution of higher education notifies the committee in a timely manner (as established by the committee's rules) that it protests the proposed designation of a building under its control as a landmark, the matter becomes a contested case under the provisions of Sections 12 through 20 of the Administrative Procedure and Texas Register Act. In the conduct of proceedings under the Administrative Procedure and Texas Register Act, both the hearing officer in his or her recommendations to the committee and the committee in its determinations of findings of fact and conclusions of law shall consider, in addition to such other objective criteria as the committee may establish pursuant to Section 191.091 of this chapter:

(1) that the primary mission of institutions of higher education is the provision of educational services to the state's citizens;

(2) that the authority for expenditure of the portion of the state's resources allocated to institutions of higher education for construction and repair purposes is entrusted to the governing boards of institutions of higher education for the purpose of the furtherance of the primary mission of the respective institutions of higher eduction;

(3) whether the benefit to the state from landmark designation outweighs the potential inflexibility of use that may be a consequence of the designation; and

(4) whether the cost of remodeling and or restoration that might be required under the permit procedures of the committee if the building were designated as a landmark may be so substantially greater than remodeling under procedures established by law for the review of remodeling projects for higher education buildings not so designated as to impair the proper use of funds designated by the state for educational purposes at the institution.

(c) If an institution of higher education notifies the committee in a timely manner (as established by the committee's rules) that it protests the terms of a permit proposed to be granted to an institution of higher education under this chapter, the matter becomes a contested case under the provisions of Sections 12 through 20 of the Administrative Procedure and the Texas Register Act. The hearing officer in his or her recommendations to the committee and the committee in its determination of findings of fact and conclusions of law shall consider:

(1) that the primary mission of institutions of higher education is the provision of educational services to the state's citizens;

(2) that the authority for expenditure of the portion of the state's resources allocated to institutions of higher education for construction and repair purposes is entrusted to the governing boards of institutions of higher education for the purpose of the furtherance of the primary mission of the respective institutions of higher education;

(3) whether the legislature has provided extra funds that may be required to implement any proposed requirements;

(4) the effect of any proposed requirements on maintenance costs;

(5) the effect of any proposed requirements on energy costs; and

(6) the appropriateness of any proposed permit requirements to the uses to which a public building has been or will be dedicated by the governing board of the institution of higher education.

(d) Weighing the criteria set forth in Subsections (b) and (c) of this section against the criteria it adopts pursuant to Section 191.092 of this chapter and such criteria as it may adopt with regard to permit require-

ments, the committee shall designate a building under the control of an institution of higher education as a landmark or include a requirement in a permit only if the record before the committee establishes by clear and convincing evidence that such designation or inclusion would be in the public interest.

Section 191.022. AUDITS. The State Auditor shall audit the financial transactions of the committee during each fiscal year.

Section 191.023. APPLICATION OF SUNSET ACT. The Antiquities Committee is subject to the Texas Sunset Act, Chapter 325, Government Code of Texas. Unless continued in existence as provided by that Act, the committee is abolished effective September 1, 1995.

(Sections 191.024-191.050 reserved for expansion)

SUBCHAPTER C. POWERS AND DUTIES

Section 191.051. IN GENERAL. (a) The committee is the legal custodian of all items described in this chapter that have been recovered and retained by the State of Texas.

(b) The committee shall:

(1) maintain an inventory of the items recovered and retained by the State of Texas, showing the description and depository of them;

(2) determine the site of and designate landmarks and remove from the designation certain sites, as provided in Subchapter D of this chapter;

(3) contract or otherwise provide for discovery operations and scientific investigations under the provisions of Section 191.053 of this code;

(4) consider the requests for and issue the permits provided for in Section 191.054 of this code;

(5) prepare and make available to the general public and appropriate state agencies and political subdivisions information of consumer interest describing the functions of the committee and the procedures by which complaints are filed with and resolved by the committee; and

(6) protect and preserve the archeological and historical resources of Texas.

Section 191.052. RULES. The committee may promulgate rules and require contract or permit conditions to reasonably effect the purposes of this chapter.

Section 191.053. CONTRACT FOR DISCOVERY AND SCIENTIFIC INVESTIGATION. (a) The committee may contract with other state agencies or political subdivisions and with qualified private institutions, corporations, or individuals for the discovery and scientific investigation of sunken or abandoned ships or wrecks of the sea, or any part of the contents of them, or archeological deposits or treasure imbedded in the earth.

(b) The contract shall:

(1) be on a form approved by the attorney general;

(2) specify the location, nature of the activity, and the time period covered by the contract; and

(3) provide for the termination of any right in the investigator or permittee under the contract on the violation of any of the terms of the contract.

(c) The executed contract shall be recorded by the person, firm, or corporation obtaining the contract in the office of the county clerk in the county or counties in which the operations are to be conducted prior to the commencement of the operation.

(d) Title to all objects recovered is retained by the State of Texas unless and until it is released by the committee.

Section 191.054. PERMIT FOR SURVEY AND DISCOVERY, EXCAVATION, RESTORATION, DEMOLITION OR STUDY. (a) The committee may issue a permit to other state agencies or political subdivisions or to qualified private institutions, companies, or individuals for the survey and discovery, excavation, demolition or restoration of, or the conduct of scientific or educational studies at, in, or on landmarks, or for the discovery of eligible landmarks on public land, if it is the opinion of the committee that the permit is in the best interest of the State of Texas.

(b) Restoration shall be defined as any rehabilitation of a landmark excepting normal maintenance or alterations to nonpublic interior spaces.

(c) The permit shall:

(1) be on a form approved by the attorney general;

(2) specify the location, nature of the activity, and the time period covered by the permit; and

(3) provide for the termination of any right in the investigator or permittee under the permit on the violation of any of the terms of the permit.

Section 191.055. SUPERVISION. All scientific investigations or recovery operations conducted under the contract provisions in Section 191.053 of this code and all operations conducted under permits or contracts set out in Section 191.054 of this code must be carried out:

(1) under the general supervision of the committee;

(2) in accordance with reasonable rules adopted by the committee; and

(3) in such manner that the maximum amount of historic, scientific, archeological, and educational information may be recovered and preserved in addition to the physical recovery of items.

Section 191.056. ACCEPTANCE OF GIFTS.

The committee may accept gifts, grants, devises, or bequests of money, securities, or property to be used in the pursuance of its activities and the performance of its duties.

Section 191.057. SURVEY, EXCAVATION OR RESTORATION FOR PRIVATE PARTIES. The committee may survey, excavate, or restore antiquities for private parties under rules promulgated by the committee. All real and administrative costs incurred in the survey, excavation, or restoration shall be paid by the private party.

Section 191.058. DISPLAY OF ARTIFACTS. (a) As far as is consistent with the public policy of this chapter, the committee, on a majority vote, may arrange or contract with other state agencies or political subdivisions and qualified private institutions, corporations, or individuals for public display of artifacts and other items in its custody through permanent exhibits established in the locality or region in which the artifacts were discovered or recovered. The committee, on a majority vote, may also arrange or contract with these same persons and groups for portable or mobile displays.

(b) The committee is the legal custodian of the items described in this chapter and shall adopt appropriate rules, terms, and conditions to assure appropriate security, qualification of personnel, insurance, facilities for preservation, restoration, and display of the items loaned under the contracts.

(c) Arrangements for curation of artifacts, data, and other materials recovered under Texas Antiquities Committee permits are specified in the body of the permit. Should a state agency or political subdivision lack the facilities or for any reason be unable to curate or provide responsible storage for such artifacts, data, or other materials, the Texas Antiquities Committee will arrange for curation at a suitable institution. The Texas Antiquities Committee may by rule assess costs for such curation.

Section 191.059. COMPLAINTS. (a) The committee shall keep an information file about each complaint filed with the committee.

(b) If a written complaint is filed with the committee, the committee, at least as frequently as quarterly and until final disposition of the complaint, shall notify the parties to the complaint of the status of the complaint.

(Sections 191.060-191.090 reserved for expansion)

SUBCHAPTER D. STATE ARCHEOLOGICAL LANDMARKS

Section 191.091. SHIPS, WRECKS OF THE SEA, AND TREASURE IMBEDDED IN EARTH. Sunken or abandoned pre-twentieth-century ships and wrecks of the sea, and in any part or the contents of them, and all treasure imbedded in the earth, located in, on, or under the surface of land belonging to the State of Texas, including its tidelands, submerged land, and the beds of its rivers and the sea within jurisdiction of the State of Texas, are declared to be state archeological landmarks and are eligible for designation.

Section 191.092. OTHER SITES, ARTIFACTS OR ARTICLES. (a) Sites, objects, buildings, artifacts, implements, and locations of historical, archeological, scientific, or educational interest, including those pertaining to prehistoric and historical American Indians or aboriginal campsites, dwellings, and habitation sites, their artifacts and implements of culture, as well as archeological sites of every character that are located in, on, or under the surface of any land belonging to the State of Texas or to any county, city, or political subdivision of the state are state archeological landmarks and are eligible for designation.

(b) For the purposes of this section, a structure or a building has historical interest if the structure or building:

(1) was the site of an event that has significance in the history of the United States or the State of Texas;

(2) was significantly associated with the life of a famous person;

(3) was significantly associated with an event that symbolizes an important principle or ideal;

(4) represents a distinctive architectural type and has value as an example of a period, style, or construction technique; or

(5) is important as part of the heritage of a religious organization, ethnic group, or local society.

(c) Before the committee may designate a structure or building as a state archeological landmark, the structure or building must be listed on the National Register of Historic Places.

(d) The committee shall adopt rules establishing criteria for the designation of a structure or building as a state archeological landmark.

(e) The committee shall consider any and all fiscal impacts on local political subdivisions before any structure or building owned by a local political subdivision may be designated as a state archeological landmark.

Section 191.093. PREREQUISITES TO REMOVAL, ALTERING, DAMAGING, DESTROYING, SALVAGING, OR EXCAVATING CERTAIN LANDMARKS. Landmarks under Section 191.091 or 191.092 of this code are the sole property of the State of Texas and may not be removed, altered, damaged,

destroyed, salvaged, or excavated without a contract with or permit from the committee.

Section 191.094. DESIGNATING A LANDMARK ON PRIVATE LAND. (a) Any site located on private land which is determined by majority vote of the committee to be of sufficient archeological, scientific, or historical significance to scientific study, interest, or public representation of the aboriginal or historical past of Texas may be designated a state archeological landmark by the committee.

(b) No site may be designated on private land without the written consent of the landowner or landowners in recordable form sufficiently describing the site so that it may be located on the ground.

(c) On designation, the consent of the landowner shall be recorded in the deed records of the county in which the land is located.

Section 191.095. PERMIT FOR LANDMARK ON PRIVATE LAND. All sites or items of archeological, scientific, or historical interest located on private land in the State of Texas in areas designated as landmarks, as provided in Section 191.094 of this code, and landmarks under Section 191.092 of this code, may not be taken, altered, damaged, destroyed, salvaged, or excavated without a permit from the committee or in violation of the terms of the permit.

Section 191.096. MARKING LANDMARK ON PRIVATE LAND. Any site on private land which is designated a landmark shall be marked by at least one marker bearing the words, "State Archeological Landmark."

Section 191.097. REMOVING DESIGNATION AS LANDMARK. (a) Any landmark on public or private land may be determined by majority vote of the committee to be of no further historical, archeological, educational, or scientific value, or not of sufficient value to warrant its further classification as a landmark, and on this determination may be removed from the designation as a landmark.

(b) On removal of the designation on private land which was designated by instrument of record, the committee shall execute and record in the deed records of the county in which the site is located an instrument setting out the determination and releasing the site from the provisions of this chapter.

Section 191.098. NOTIFICATION OF ALTERATION OR DEMOLITION OF POSSIBLE LANDMARK. (a) A state agency may not alter, renovate, or demolish a building possessed by the state that was constructed at least 50 years before the alteration, renovation, or demolition and that has not been designated a landmark by the committee, without notifying the committee of the proposed alteration, renovation, or demolition not later than the 60th day before the day on which the agency begins the alteration, renovation, or demolition.

(b) After receipt of the notice the committee may waive the waiting period; however, if the committee institutes proceedings to determine whether the building is a state archeological landmark under Section 191.092 of this code not later than the 60th day after the day on which the notice is received by the committee, the agency must obtain a permit from the committee before beginning an alteration, renovation, or demolition of the building during the time that the committee's proceedings are pending.

(c) Should the committee fail to provide a substantive response within 60 days to a request for a review of the project plans, application for permit, draft report review, or other business required under the Antiquities Code, the applicant may proceed without further reference to the committee.

(Sections 191.099-191.130 reserved for expansion)

SUBCHAPTER E. PROHIBITIONS

Section 191.131. CONTRACT OR PERMIT REQUIREMENT. (a) No person, firm, or corporation may conduct a salvage or recovery operation without first obtaining a contract.

(b) No person, firm, or corporation may conduct an operation on any landmark without first obtaining a permit and having the permit in his or its possession at the site of the operation, or conduct the operation in violation of the provisions of the permit.

Section 191.132. DAMAGE OR DESTRUCTION. (a) No person may intentionally and knowingly deface American Indian or aboriginal paintings, hieroglyphics, or other marks or carvings on rock or elsewhere that pertain to early American Indian or aboriginal habitation of the country.

(b) A person who is not the owner shall not willfully injure, disfigure, remove, or destroy a historical structure, monument, marker, medallion, or artifact without lawful authority.

Section 191.133. ENTRY WITHOUT CONSENT. No person who is not the owner, and does not have the consent of the owner, proprietor, lessee, or person in charge, may enter or attempt to enter on the enclosed land of another and intentionally injure, disfigure, remove, excavate, damage, take, dig into, or destroy any historical structure, monument, marker, medallion, or artifact, or any prehistoric or historic archeological site, American Indian or aboriginal campsite, artifact, burial, ruin, or other archeological remains

located in, on, or under any private land within the State of Texas.

(Sections 191.134-191.170 reserved for expansion)

SUBCHAPTER F. ENFORCEMENT

Section 191.171. CRIMINAL PENALTY. (a) A person violating any of the provisions of this chapter is guilty of a misdemeanor, and on conviction shall be punished by a fine of not less than $50 and not more than $1,000, by confinement in jail for not more than 30 days, or by both.

(b) Each day of continued violation of any provision of this chapter constitutes a separate offense for which the offender may be punished.

Section 191.172. CIVIL ACTION BY ATTORNEY GENERAL. (a) In addition to, and without limiting the other powers of the attorney general, and without altering or waiving any criminal penalty provided in this chapter, the attorney general may bring an action in the name of the State of Texas in any court of competent jurisdiction for restraining orders and injunctive relief to restrain and enjoin violations or threatened violations of this chapter, and for the return of items taken in violation of the provisions of this chapter.

(b) Venue for an action instituted by the attorney general lies either in Travis County or in the county in which the activity sought to be restrained is alleged to be taking place or from which the items were taken.

Section 191.173. CIVIL ACTION BY CITIZEN. (a) A citizen of the State of Texas may bring an action in any court of competent jurisdiction for restraining orders and injunctive relief to restrain and enjoin violations or threatened violations of this chapter, and for the return of items taken in violation of the provisions of this chapter.

(b) Venue of an action by a citizen lies in the county in which the activity sought to be restrained is alleged to be taking place or from which the items were taken.

Section 191.174. ASSISTANCE FROM STATE AGENCIES, POLITICAL SUBDIVISIONS, AND LAW ENFORCEMENT OFFICERS. (a) The chief administrative officers of all state agencies and political subdivisions are directed to cooperate and assist the committee and the attorney general in carrying out the intent of this chapter.

(b) All state and local law enforcement agencies and officers are directed to assist in enforcing the provisions and carrying out the intent of this chapter.

CHANGES TO THE ANTIQUITIES CODE ENACTED DURING THE 1987 LEGISLATIVE SESSION

The major changes to the Texas Antiquities Code enacted during the 1987 legislative session are explained below. There also were a number of minor housekeeping changes. All sections added or changed are listed at the end.

191.003(4). A definition of "political subdivision" was added to end spurious arguments by some entities of local government that they were not subject to the provisions of the Antiquities Code. References to political subdivisions were added to other sections of the Code as needed to clarify matters.

191.011. The Texas Antiquities Committee had proposed language to formalize the use of members' representatives at TAC board meetings. The legislature decided that, on the contrary, representatives of TAC members would *not* be allowed.

191.054. This clarifies a project sponsor's obligation to locate previously unknown and undesignated SALs by means of a survey prior to beginning a construction project on public lands.

191.058(c). The TAC will assist in arranging curation for permittees, but the costs may be borne by the agency or project sponsor if the committee so directs.

191.092(c), (d), and (e). These new sections assure that only the most historically important buildings will become SALs. The prerequisite of listing on the National Register of Historic Places will assure that the building has been previously assessed on the state and federal level by architectural and historical experts. These sections do not affect archeological sites.

191.098. The change from 45 to 50 years in the age requirement brings the Antiquities Code into agreement with the specifications of the National Register of Historic Places.

Sections Added

191.003 (4)
191.092 (c), (d), and (e)

Sections Amended

191.011
191.016
191.051 (5) and (6)
191.053 (a)
191.054
191.057
191.058 (a) and (c)
191.091
191.092
191.093
191.096
191.097 (b)
191.098

EXHIBIT IV-D

United States Department of the Interior
NATIONAL PARK SERVICE
SOUTHWEST REGION
P.O. BOX 728
SANTA FE, NEW MEXICO 87504-0728

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

L7619(SWR-PPE)

OCT 6 1989

RECEIVED
OCT 19
HOGAN & RASOR, INC

Mr. C. F. Rasor, P. E.
Executive Vice President
Hogan & Rasor, Inc.
Suite 620, 12900 Preston Road at LBJ
North Dallas Bank Tower
Dallas, Texas 75230

Dear Mr. Rasor:

This responds to your letter concerning a study of the water and wastewater systems in Val Verde County, Texas, sponsored by the City of Del Rio. The following comments are provided on a technical assistance basis.

As you have indicated, Amistad Recreation Area is within your study area and is managed by the National Park Service. We are enclosing a copy of the Statement For Management and the General Management Plan/Development Concept Plan for Amistad Recreation Area for your use in preparing the plan. The Statement For Management is in the process of being revised; we will send a copy to you to update your reference material as soon as it is available for public distribution.

We also have some general areas of concern. A better understanding of the aquifer is needed in order to address topics such as: the total area supplying the aquifer; the underground movement of the water; the total available flow/volume of water; the recharge rate; and the geological structure of the aquifer. The recent water "crisis" in Del Rio, concern over the proposed explosives tests in Val Verde County, and concern over proposed landfill sites in nearby counties have underscored the need for this type of information.

When this data base is available, better management planning can take place, addressing possible impacts and contamination potential. Such issues as well drilling (water, oil and gas); land use planning/patterns; increased water demands; septic, sewer and wastewater treatment needs; and prevention of contamination could then be more effectively dealt with.

At present, we maintain several water systems around the lake at developed areas; and others maintain several more. As increases in population, tourism, and development occur around Lake Amistad, increased demands upon, and risk of contamination to, our water sources will occur. The National Park Service wishes to continue being involved in the planning process for development in

the county, and we stress that water quality/quantity should remain a primary consideration in all such planning.

Please continue coordination with this office and with the Superintendent, Amistad Recreation Area, P. O. Box 420367, Del Rio, Texas 78842-0367.

Project plans and studies should also include consideration of potential impacts on recreation resources outside of Amistad Recreation Area. There are three recreation projects in the City of Del Rio (U. C. O. Park, Camp Del Rio Park, and Buena Vista Community Park) which have received grants from the Land and Water Conservation Fund (L&WCF). The L&WCF Act of 1965, as amended, established a grant program which provides states with funds to acquire and develop public outdoor recreation lands and waters. The L&WCF is administered in each state by the State Liaison Officer (SLO), appointed by the Governor. In Texas, the SLO is Mr. Charles D. Travis, Executive Director, Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, Texas 78744. The SLO and local park officials should be contacted if there are potential impacts to these recreation areas.

The L&WCF Act, Section 6(f), states that no property acquired or developed with assistance from the L&WCF shall be converted to other than public outdoor recreation uses without the approval of the Secretary of the Interior. If a conversion of use cannot be avoided, the SLO should be contacted to initiate the process for obtaining the Secretary's approval.

In addition, we strongly encourage your consideration of recreation development in connection with your wastewater treatment planning and development. We have enclosed a number of brochures which should be helpful to you in the planning process. For further information, contact the Environmental Protection Agency, 1445 Ross Avenue, Dallas, Texas 75202.

We appreciate the opportunity to provide this technical assistance and look forward to a continued cooperative effort in water systems planning which is mutually beneficial to the agencies involved.

Sincerely,

Ronald J Ice

Acting Associate Regional Director,
Planning and Resources Management,
Southwest Region

Enclosures

cc:
Superintendent, Amistad, w/o encls.

EXHIBIT IV-B

IN REPLY REFER TO:

2-12-89-I-376

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Ecological Services
9A33 Fritz Lanham Building
819 Taylor Street
Fort Worth, Texas 76102

RECEIVED
SEP
HOGAN & RASOR, INC.

September 6, 1989

Mr. C.F. Rasor
Hogan & Rasor, Inc.
12900 Preston Rd. Suite 620
Dallas, TX 75230

Dear Mr. Rasor:

This responds to your August 11, 1989 request for information regarding federally listed threatened and endangered species in Val Verde County, Texas. The information is to be used in preparation of a study of water and wastewater systems. The U.S. Fish and Wildlife Service has reviewed a general list for protected species in the county and offers the following technical assistance.

The endangered bald eagle, black-capped vireo, interior least tern, Texas snowbells, and Tobusch fishhook cactus are presently known to occur in Val Verde County. We can provide general life requisite information for these species (enclosure), but cannot adequately review your project without specific plans. It is the responsibility of the federal action agency to determine if the proposed action "may affect" the listed species. If the action "may affect" listed species, the agency shall initiate the formal consultation process pursuant to the Endangered Species Act, unless an exception has been granted. An exception may be granted with a determination by the agency and written concurrence of the U.S. Fish and Wildlife Service that the proposed action is not likely to adversely affect any listed species or critical habitat. This can be done by writing to the Field Supervisor, U.S. Fish and Wildlife Service, 819 Taylor Street, Room 9A33, Fort Worth, Texas, 76102.

If you have any questions concerning this matter, please contact Ms. Jodi Jenkins of our staff at (817) 334-2961.

Sincerely,

Robert M. Short

Robert M. Short
Field Supervisor

Enclosure

ENCLOSURE: ENDANGERED SPECIES IN VAL VERDE COUNTY

BALD EAGLE (E) - Haliaeetus leucocephalus

Winters along major rivers and reservoirs, and occasionally in rangeland areas, throughout the state from October through March. Nests in large trees near water. Feeds primarily on fish, waterfowl, and carrion. Population decline caused by human disturbance, reproductive failure due to pesticides, habitat degradation, and deliberate killing. Known breeding populations in Aransas, Bastrop, Bosque, Bowie, Brazoria, Calhoun, Colorado, Fort Bend, Goliad, Grimes, Houston, Leon, Limestone, Matagorda, Nacogdoches, Orange, Panola, Refugio, Robertson, Rusk, Sabine, San Augustine, Trinity, Upshur, Victoria, and Wharton Counties. Wintering populations may occur statewide but are known from Anderson, Angelina, Armstrong, Bailey, Bastrop, Bell, Bosque, Bowie, Brazos, Briscoe, Burleson, Burnet, Cameron, Carson, Cass, Cherokee, Clay, Coleman, Concho, Cooke, Deaf Smith, Donley, Fannin, Floyd, Franklin, Freestone, Gillespie, Grayson, Gregg, Grimes, Harris, Harrison, Hemphill, Henderson, Hood, Houston, Hunt, Hutchinson, Jeff Davis, Kaufman, Kleberg, Lamar, Lampasas, Leon, Limestone, Llano, Marion, McLennan, Montague, Moore, Morris, Nacogdoches, Palo Pinto, Panola, Potter, Rains, Randall, Red River, Rusk, Sabine, San Augustine, San Saba, Shackelford, Shelby, Smith, Swisher, Titus, Tom Green, Upshur, Val Verde, Van Zandt, Walker, Washington, and Wood Counties.

BLACK-CAPPED VIREO (E) - Vireo atricapillus

Migratory throughout Texas between Oklahoma and Mexico. Occurs in shrubland which has a few small trees (typically oak or juniper) scattered among separated clumps of bushes such as oak or sumac. These bushes are in the open and their foliage reaches the ground. The clumps are separated by bare ground, rocks, or grasses. Primary threats to this species include cowbird parasitism of the vireo nests and habitat degradation caused by overgrazing, urbanization, and succession. Breeds in central and southwest Texas. Possible and known breeding populations have been documented in Bandera, Bell, Bexar, Blanco, Bosque, Brewster, Burnet, Callahan, Coke, Comanche, Coryell, Crockett, Dallas, Eastland, Edwards, Ellis, Erath, Grayson, Hays, Irion, Kerr, Kimble, McLennan, Menard, Palo Pinto, Parker, Pecos, Reagan, San Saba, Somervell, Sutton, Tarrant, Taylor, Terrell, Tom Green, Travis, Uvalde, Val Verde, and Williamson Counties.

INTERIOR LEAST TERN (E) - Sterna antillarum

Nests on barren or sparsely vegetated alluvial islands or sandbars of rivers and reservoirs throughout the state. Migrant across eastern two-thirds of Texas. Primary threats are habitat degradation due to changes in water regimes, high predation rates, and human disturbances. Known nesting populations in Aransas, Childress, Cooke, Hall, Hemphill, Roberts, Throckmorton, Val Verde, Webb, Wichita, Wilbarger, and Zapata Counties.

retail, industrial, parks, schools, and other public-use land. The communities of Comstock and Langtry, likewise, have several different types of land-use, although not as diversified as Del Rio.

The major part of the area remaining in Val Verde County is in a category of either agricultural-related land-use or recreation.

Around Lake Amistad and adjacent to the Rio Grande, Pecos River, and Devils River there are residential, commercial, retail and park developments that range in size from a small single lot to several acres. Most of these developments are related to recreational-type activities of boating, fishing, swimming, camping, and hunting.

10. Other Programs

The City of Del Rio currently has several programs on-going for improvements to the water, wastewater, and street systems. These projects include:

- San Felipe Wastewater Treatment Additions
- Silver Lake Wastewater Treatment Additions
- Gay 90 Neighborhood - Sanitary Sewer Mains
- Industrial District - Access Street Improvements

Del Rio has plans to file other applications for financial assistance to the Texas Department of Commerce (TDOC) for planning and construction of additions to the water and wastewater system in the low and moderate income areas within the City.

An application for grant funds was filed with the TDOC in the latter part of 1988 by the County of Val Verde for construction of water distribution system improvements in the Cienegas Terrace Addition. The application has since been approved by the TDOC; however, the design and preparation of the plans and specifications for construction have not yet been prepared.

C. ALTERNATIVES TO THE PROPOSED ACTION

The proposed projects may include the installation of new water and sanitary mains, sewage lift stations, additions to the wastewater treatment plants and other related appurtenances.

As part of the requirements for receiving State funds to construct the additions to the City of Del Rio's Silver Lake Wastewater Treatment Plant, an Environmental Information Document (EID) has been submitted to the Texas Water Development Board. This project, while having some specific concerns, do have some very far-reaching effects off-site and more particularly within the stream segments downstream from the discharged effluent. The specific alternatives for the treatment plant additions are addressed in the EID for the proposed expansion of the Silver Lake Plant.

The additions to the capacity of the San Felipe Wastewater Treatment Plant are currently being planned, and an amended discharge permit has been recently issued by the Texas Water Commission. At this time, the City has not yet determined the methods by which the plant additions will be funded.

In the other areas, a first alternative for the proposed projects would be to take no action at all. This decision for "no action alternative," would foster a continuing deterioration of the water and wastewater services and would eventually result in severe problems that would potentially affect the health and welfare of the public.

More particularly, the "no action alternative" for the wastewater plant expansion is not a viable alternative since the flows to the plants are currently exceeding 90% of the available capacity. At this stage, the plants must, from the regulations of the TWC, implement a program of improvements to expand the capacity and capability to produce a higher quality of effluent. If not done expeditiously, the City would be subject to penalties, including substantial fines.

The alternatives that are available for development of the proposed improvements will basically include the following siting considerations.

1. Alignment(s) of water and sewer mains
2. Site(s) for new and/or rehabilitated sewage lift stations
3. Site(s) for new well field(s)
4. Discharge point(s) for wastewater effluent
5. Buffer zones surrounding treatment and pumping station facilities

When any of the above siting considerations for the projects are to be evaluated, a procedure of pre-design planning should be developed to include more site-specific study tasks. This would possibly entail retaining the services of environmentalists and archeologists to perform on-site investigations in coordination with the Texas Antiquities Committee, Texas Parks and Wildlife Department, U. S. Department of Interior, and other such appropriate agencies.

As the project is evaluated, each alternative should, then, identify significant adverse impacts and/or beneficial uses that address, as a minimum the following:

1. Land acquisition
2. Historical or archeological sites
3. Natural, cultural, or scenic resources
4. Air quality
5. Water quality and conservation
6. Water re-use
7. Floodways, streams, and wetlands protection
8. Plant and animal life
9. Economic growth
10. Landscape restoration
11. Operating and maintenance costs

12. Mitigation costs
13. Construction costs - Alternatives

Since specific alignments and locations have not yet been set on the ground for the proposed pipelines, pumping stations, manholes, etc., a complete environmental assessment for each project cannot be prepared at this time.

D. ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECTS

1. Primary Impacts

a. Short-Term Impacts

The alterations to land forms will be limited to dedicated rights-of-way, easements, or properties acquired by fee simple title.

Construction specifications will require sprinkling with water as a form of dust control.

The noise of construction will be minimal, and for a short-term. Blasting will not be permitted, and night work is not expected.

b. Long-Term Impacts

The proposed improvements and/or structures will not obstruct any scenic views.

The wastewater treatment plants and lift stations are a possible source of odor if not operated properly.

The improvements to the wastewater treatment plants will provide a means for producing a better quality of effluent to the receiving stream.

There are no known historical, cultural or archeological sites on the areas of proposed improvements; however, a procedure will be developed to contact the appropriate State and federal offices concerned as each specific project is developed.

The projects do not affect any present recreational areas or national preserves now, and none are proposed for the area.

The existing wastewater treatment plant sites are presently surrounded by a fence with lockable gates. This security of the plant sites will continue to be maintained.

There are no known insect nuisances, and the use of pesticides is not anticipated.

The projects should have no adverse effect on the air quality of the area.

The County and the City of Del Rio, Texas, should jointly participate, in coordination with the Texas Water Development Board, in studies to address the concerns of the National Park Service as they are related to water supplies and waste disposal systems which are provided to the recreational developments around Lake Amistad. These studies should include the long-term impacts of develoments within the re-charge zone of the San Felipe Springs and other underground aquifers in the County.

2. Secondary Impacts

Minor changes in the existing and projected land uses are anticipated as the land-use plans consider adequate sanitary sewer and water service.

The increase in population and the use of automobiles for transportation will have a negative effect on the air quality in the future. The increase in population should not affect water quality (surface and ground) as long as permitted quality is maintained. The projected growth will require an increase in all services such as water, and wastewater treatment needs and solid waste disposal.

The City of Del Rio has a rate study in progress to determine the actual cost of the improvements to the customers. This study will set an equitable water and sanitary sewer rate to all users.

Anticipated land-use and economics with the plant expansion for Del Rio in place will conform to the existing land-use and plan.

E. ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROJECT BE IMPLEMENTED

Minor adverse impacts which cannot be avoided should the projects be implemented would include a change in the landscape and removal of the natural grasses during the construction of water and sanitary sewerage facilities. The mitigation of the impact will be partiallly resolved with time by propagation of the natural grasses and restoration of the landscape to the original contours. The impacts can be further reduced to acceptable levels by careful design of the projects and control of the construction methods.

F. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The short-term and long-term environmental gains of the projects are better and more reliable water and sewerage services which will ultimately enhance the quality of life throughout the County.

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Comparison of
Positive and Negative Impacts

Negative (Short-Term)	Positive (Long-Term)
Property allocated to easements, rights-of-way, and sites for water and sanitary sewerage facilities.	Reserves the space for construction of water and sanitary sewerage facilities to provide the service to the present and future developments.
Costs for expansion of the treatment facilities and the sanitary sewerage and water distribution systems.	Provides for the capacity to protect the health and welfare of the public.
Changes in the land forms and natural vegetation in the areas of construction.	Mitigation of this impact will be resolved with time by propogation of the natural ground covers and restoration of the land forms to the original contours.
Disturbance of the wildlife and/or displacement of their natural habitat.	Construction of new developments within the County will be relative small compared to the spacist rural area. Therefore, the displacement and/or disturbance of the wildlife will be minor.

Decrease in wastewater effluent quality during construction of treatment additions.	Provides higher quality effluent to meet the required discharge parameters.

G. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES TO THE PROPOSED PROJECT

The only irreversible and irretrievable commitments to the project are the energy and chemicals used in the project and the materials used in the structures. The lands can be reclaimed, and the waterways are not affected.

PART V
FACILITY PLANNING

PART V
FACILITY PLANNING

A. GENERAL

The County of Val Verde covers some 3,241 square miles of which the greater percentage of the County is rural. The only incorporated area of the County is the City of Del Rio which provides both water and sanitary sewerage services to the public.

The communities of Comstock and Langtry, although not incorporated as municipal entities, do have small water systems that provide service to the public, and, thus, their operations must comply with the appropriate rules and regulations of the Texas Department of Health. Sewerage service for the residents in Comstock and Langtry is provided by individual on-site disposal systems.

Inasmuch as the population in the rural areas of Val Verde County is very sparse and because of the distance between communities, the regionalization of water and sanitary sewerage services through a single central point of operation does not appear to be economically feasible. Other factors that add to this conclusion include the rough terrain and low water demands. Notwithstanding these factors, the development of any public or private water and wastewater facilities should comply, as a minimum, with the current guidelines and criteria of the Texas Department of Health and the Texas Water Commission. If local standards for development of water and sewerage systems are more restrictive than State standards, the more restrictive regulations should be adhered to.

B. WATER DEMANDS AND SEWAGE FLOWS

1. Water Demands -

The available water usage records of the City of Del Rio were reviewed to determine the history of per capita consumption. The following TABLE NO. V-1 shows the relationship of water produced to the amount of water metered or sold.

TABLE NO. V-1

WATER USAGE HISTORY
CITY OF DEL RIO

Year	Water Usage - Average Daily		
	Total (Produced) (M.G.D.)	Metered (Sold) (M.G.D.)	Unaccounted (M.G.D.)
1985	10.18	5.85	4.33 (42.5%)
1986	10.13	5.22	4.91 (48.5%)
1987	9.77	4.30	5.47 (56.0%)
1988	11.74	6.76	4.98 (42.4%)
1989	13.75 *	8.25	5.50 (40.0%)

* Estimated from records through August 1989

As indicated on the preceding page, the unaccounted for water represents a significant amount of "lost" water of which some is possibly used for flushing hydrants, park watering, washing streets, construction, dust control, and other unmetered but necessary usages authorized by the City. Other "lost" water is attributable to water main leaks, storage tank leaks, inaccurate metering, etc., of which the amount is not really known. To be able to evaluate the efficiency in how well the water system is operating, a true accounting of all water usages needs to be made.

It is recommended that, through the addition of water meters where it is practical for monitoring the usage of unsold water and the implementation of the plan for a more efficient use of water, the City of Del Rio set a goal to account for, at least eighty percent (80%) of the water produced.

Unsold water usage that could be metered would include water that is used for park watering, testing and sterilization of water mains, street construction, flushing fire hydrants, maintenance at treatment facilities, fire-flow, or for other similar purposes.

The records of water usage in the other areas of the County were not available; however, from the experience in the smaller water systems and service from individual wells, the per capita usage is usually relatively low, being in a range of 80 to 125 gallons per day.

The following projected water demands of the City of Del Rio and the remaining rural areas of the County were derived from information developed by the Texas Water Development Board, September, 1988.

TABLE V-2

PROJECTED WATER DEMANDS *
DEL RIO - VAL VERDE COUNTY

	Del Rio		Laughlin AFB		Rural		Total	
Year	Pop.	Water Demand (M.G.D.)	Pop.	Water Demand (M.G.D.)	Pop.	Water Demand (M.G.D.)	Pop.	Water Demand (M.G.D.)
1990	38,302	11.88	2,971	1.55	2,490	0.35	43,763	13.78
2000	47,896	14.09	2,971	1.47	2,490	0.33	53,357	15.89
2010	59,849	16.66	2,971	1.39	2,490	0.32	65,310	18.37
2020	72,344	19.56	2,971	1.35	2,490	0.31	77,805	21.22
2030	85,406	23.09	2,971	1.35	2,490	0.31	90,867	24.75
2040	92,767	25.08	2,971	1.35	2,490	0.31	98,228	26.74

* Based on High Per Capita Water-Use with Conservation Practices (TWDB, Sept. 1988).

The conversion of the above water demands to gallons per day (G.P.C.D.) capita is shown in the following TABLE NO. V-3.

TABLE V-3

PROJECTED DAILY PER CAPITA WATER USAGES

Year	Del Rio		Laughlin AFB	Rural
	Total Produced*	Accounted for or Metered (Sold) **		
1990	310	248 (80%)	522	141
2000	294	235	495	133
2010	278	222	468	129
2020	270	216	454	124
2030	270	216	454	124
2040	270	216	454	124

* Based on water projections of TWDB, September 1988, with Conservation Practices to reflect a 15% staged per capita water-use reduction by the year 2020.

** Based on the accountability of 80% of the water produced derived through the implementation of the Water Conservation Plan and metering unsold water.

The per capita demands for the respective water users noted in the above TABLE NO. V-3 are relatively high and warrant a closer review on how and where the water is being used. Through the encouragement of the public to implement water conservation practices throughout the County and continuing improvement programs to upgrade and replace deteriorated water mains and storage facilities, the unaccounted for water can be further reduced, and, thus, the per capita water demands will be more in line with other cities of comparable size and development type.

Significant savings of water supply would be realized where re-use of adequately treated wastewater could be applied for irrigation of parks, golf course fairways, crops, pastures, and other such uses.

2. Sewage Flows -

The City of Del Rio currently operates three (3) separate wastewater treatment facilities: the Round Mountain Plant; the San Felipe Plant; and, the Silver Lake Plant. The flow records from each of these plants were furnished by the City and are tabulated below in million gallons per day (M.G.D.).

TABLE NO. V-4

WASTEWATER TREATMENT PLANT
SEWAGE FLOW HISTORY

SILVER LAKE - Permit No. TX0053830
Exp. 2/23/94

	SEWAGE FLOW - M.G.D.							
	1989		1988		1987		1986	
Month	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.
January	1.759		1.580	1.970				
February	1.738		1.640	2.580	1.900	2.900		
March	1.700		1.692	1.810			1.300	1.500
April	1.697	1.814	1.673	1.921	1.500	2.000	1.100	1.400
May	1.767	2.540	1.637	1.960	1.500	2.200	1.390	1.620
June	1.763	2.260	1.760	2.270	2.500	3.900	1.500	2.300
July			1.720	2.000	1.970	2.360	1.400	2.000
August			1.662	2.081	1.490	1.920	1.430	1.670
September			1.852	2.55	0.730	2.000	1.510	1.950
October			1.725	1.990	1.400	2.500	1.600	2.400
November			1.767	1.930	1.460	2.000	1.440	1.990
December			1.785	1.840	1.600	1.820	1.460	2.100

Permit Requirements For Discharge:

Flow Avg. = 1.76 ..G.D.
Max. = 5.28 M.G.D.

BOD_5 = 20 mg/l

TSS = 20 mg/l

ROUNDDMOUNTAIN - Permit No. TX0053856
Exp. 2/24/94

	SEWAGE FLOW - M.G.D.							
	1989		1988		1987		1986	
Month	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.
January			.522	.816				
February			.567	.816	.336	.547		
March	.592		.528	.684			.587	.756
April	.524	.671	.712	.927	.467	.780	.618	0.700
May	.655	.822	.681	.784	.528	.710	.711	.886
June			.662	.818	.563	.823	.818	1.230
July			.713	.884	.640	.886	.800	1.100
August			.663	.817	.526	.768	.776	.950
September			.746	.963	.622	.708	.789	.940

October	.746	.963	.596	1.00	.830	1.100
November	.669	.756	.571	.728	.706	.972
December	.595	.699	.536	.646	.371	.509

Permit Requirements For Discharge:

Flow Avg. = 0.613 M.G.D.
Max. = 1.840 M.G.D.

BOD_5 = 20 mg/l

TSS = 20 mg/l

SAN FELIPE - Permit No. TX0047198
Exp. 2/23/94

SEWAGE FLOW - M.G.D.

	1989		1988		1987		1986	
Month	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.
			1.300	1.600				
January	1.327		1.330	1.670				
February	1.319		1.360	1.710	1.500	2.000		
March	1.517		1.730	2.702	1.700	3.000	2.100	3.300
April	1.521	1.805	1.708	3.317	1.900	2.900	2.250	3.400
May	1.572	1.940	1.725	2.103	1.900	2.600	2.250	2.800
June					2.491	3.913	2.440	3.300
July			1.997	3.060			2.200	2.800
August	1.451		2.054	2.540	1.900	2.700	1.800	3.300
September			1.957	2.690	2.500	2.400	1.530	2.100
October			1.640	1.890	1.900	2.700	1.700	2.700
November			1.782	2.110	1.820	2.400	1.900	4.100
December			1.724	2.330	2.500	3.100	2.520	3.100

Permit Requirements For Discharge:

Flow Avg. = 1.63 M.G.D.
Max. = 2.90 M.G.D.

BOD_5 = 20 mg/l

TSS = 20 mg/l

TOTAL SEWAGE FLOWS FOR ALL PLANTS (M.G.)

Month	1989	1988	1987	1986	1985
January	113.310	107.745	106.048	107.524	120.530
February	101.201	103.611	117.529	110.250	115.698

March	118.061	122.468	102.154	122.583	128.939
April	114.592	139.445	118.279	121.629	143.992
May		125.386	120.587	134.617	143.773
June		127.490	168.286	144.291	143.622
July		137.000	145.606	141.390	164.522
August		135.807	168.286	125.538	446.966
September		136.632	139.696	115.335	142.148
October		127.000	125.157	132.359	143.435
November		126.535	108.481	121.443	139.438
December		126.911	131.113	98.630	135.194
TOTAL FLOW (M.G.)		1,516.030	1,551.222	1,475.589	1,968.257
AVERAGE DAILY FLOW (M.G.D.)		4.15	4.25	4.04	5.39

Based on the permit amendment application prepared for the San Felipe Wastewater Treatment Plant (combined with Round Mountain), August 1988, and the Facility Plan for the Silver Lake Wastewater Treatment Plant, July 1989, the existing per capita average sewage flow was found to be within a range of 105 to 128 gallons, which is about a 70% return of the metered water usage as sewage.

The following TABLE NO. V-5 outlines the projected sewage flows for Del Rio which considers the criteria established for planning the plant expansions and the allowances for infiltration/inflow (I/I) per EPA's CG-85 guidelines.

TABLE NO. V-5

PROJECTED SEWAGE FLOWS
CITY OF DEL RIO

Year	Total Projected Population	Projected Total Average Sewage Flows* (M.G.D.)	Total Flows** (M.G.D.)
1990	38,302	4.59	10.53
2000	47,896	5.85	13.17
2010	59,849	7.56	16.46
2020	72,344	8.68	19.89
2030	85,406	10.25	23.49
2040	92,767	11.13	25.51

* Based on criteria established for planning San Felipe and Silver Lake WWTP expansions for year 1990 through year 2040.
** Wet weather flow based on 275 gpcd (includes maximum allowance for I/I)

The rural areas of the County are expected to continue with on-site disposal systems, with exception of possibly the communities of Langtry, Comstock, and the developments around Lake Amistad. The projection of sewage flows for planning future sewerage collection and treatment systems should be based on the following criteria, as a minimum.

Average Daily Per Capita Sewage Flow (gpcd) = 112 gallons

Limit Allowance For Total Sewage Flow (including infiltration/inflow) = 120 gpcd (average (daily dry weather flow)

= 275 gpcd (maximum daily wet weather flow)

C. WATERWORKS SYSTEMS

1. Water Supply -

a. Existing -

- Del Rio - The City of Del Rio is currently permitted under Certificate of Adjudication No. 23-2672, issued August 15, 1983, to take 11,416 acre feet (AF) per annum (10.19 M.G.D.) from the San Felipe Springs. The maximum diversion rate permitted is 26.96 cubic feet per second (CFS) or 17.42 M.G.D.

The other sources of water supply presently developed for Del Rio include two (2) deep wells located in the northern part of the City and three (3) shallow wells west of the San Felipe Springs pump station. The rated pumping capacities, depth of wells, and motor horsepowers are listed in the following table.

TABLE NO. V-6

GROUND WATER SUPPLY FACILITIES

Well Pump Site	Depth	Pump Capacity	Horsepower	Total Dynamic Head	R.P.M.
No. 1	NA	750 G.P.M. (Vertical Turbine)	100	360'	1,770
No. 2	431'	475 G.P.M. (Vertical Turbine)	75	457'	1,765
WEST WELLS (Country Club)					
No. 3	NA	2,400 G.P.M.	200	265'	NA

No. 4	NA	2,400 G.P.M.	200	265'	NA
No. 5	NA	2,400 G.P.M.	200	265'	NA

Utilizing both surface water (San Felipe Springs) and ground water supplies, the City potentially has approximately 22.33 M.G.D. of water supply available for average daily usage.

In providing water during the maximum rate of diversion from the San Felipe Springs and the wells, the City has approximately 29.55 M.G.D. of water supply available to meet the maximum daily demand of water usage.

Photographs of the City's water supply facilities are included on the following pages.

- Rural Areas - For the communities of Comstock and Langtry, the water supply is furnished to the customers from groundwater. Based on information received from each of these systems, the deep well in Comstock is developed at a depth of approximately 900 feet and has a capacity of about 135 G.P.M.; the Langtry water system also has one well reportedly developed at a depth of about 450 feet and a pumping capacity of 34 G.P.M.

The water supply for the other rural communities of Pandale, Loma Alta, Pumpville and Juno, the areas around Lake Amistad, and the individual ranches in Val Verde County is furnished from groundwater wells or windmills developed at various depths. The capacities also vary with the type of development and water demands required.

b. Future -

- Del Rio - For the twenty (20)-year water usage projections of Del Rio, the anticipated average water demand will be approximately 16.66 M.G.D., and coupled with the projected demands of Laughlin Air Force Base, a total of 18.05 M.G.D. will be needed in water supply. The current supply available from the San Felipe Springs and the existing wells will satisfy these requirements.

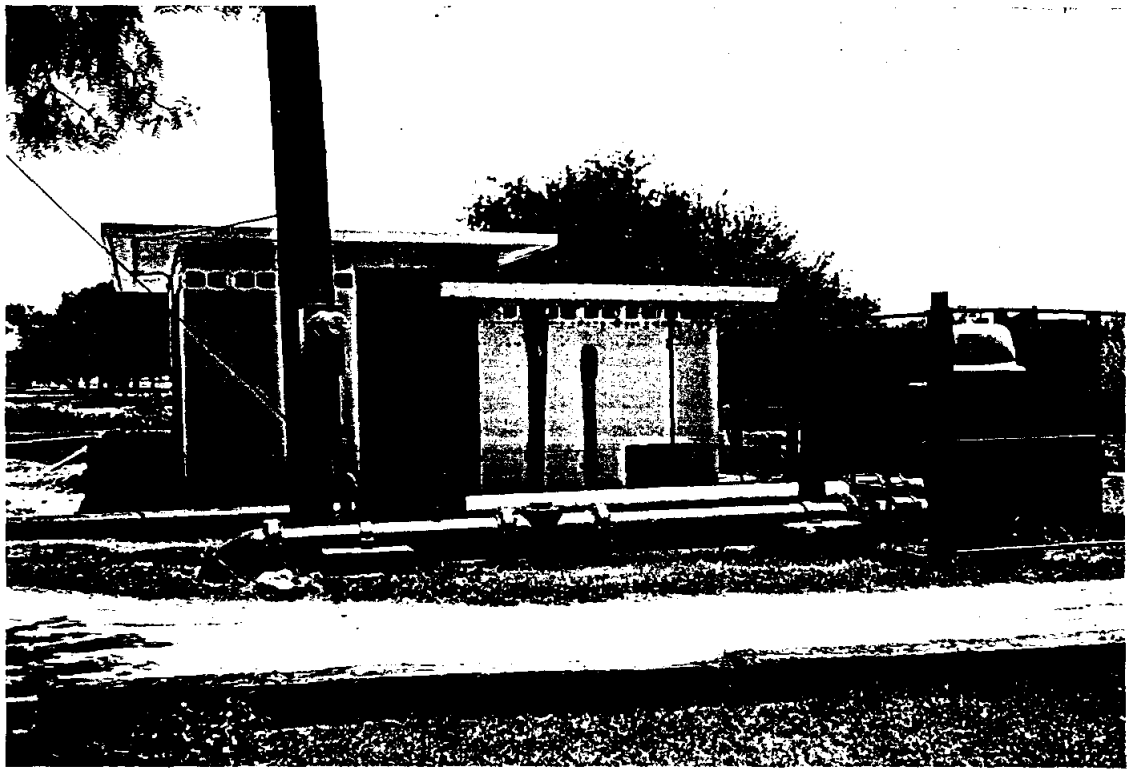
In considering that the San Felipe Springs and existing wells will continue to supply an average of about 22.32 M.G.D., an additional 2.11 M.G.D. of water supply will need to be developed by the year 2030. One possibility for obtaining this additional supply may be achieved by developing well field(s) and collection system(s), whereby, through subsurface testing, an area near Del Rio would be reserved for drilling several water wells. The wells would then be interconnected by a

CITY OF DEL RIO, TEXAS
EXISTING WATERWORKS SYSTEM FACILITIES

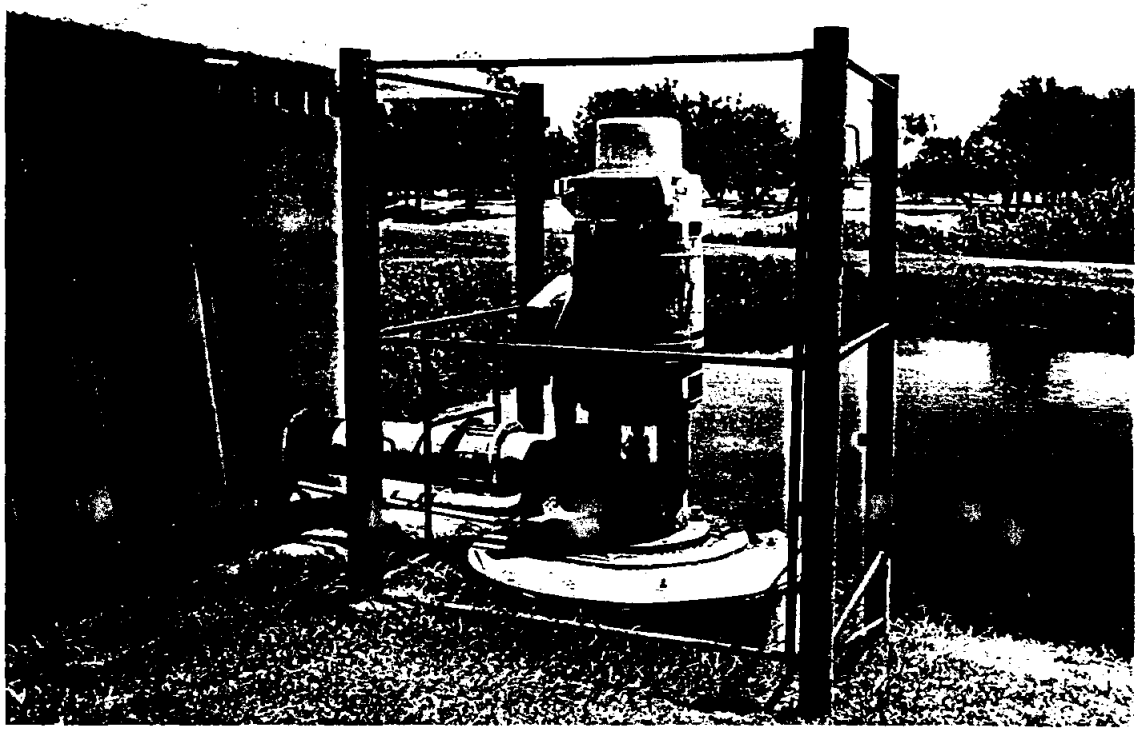
SAN FELIPE SPRINGS PUMPING STATION
(EAST FACILITY)

SUCTION HEADERS FOR
SAN FELIPE SPRINGS PUMPING STATION
(EAST FACILITY)

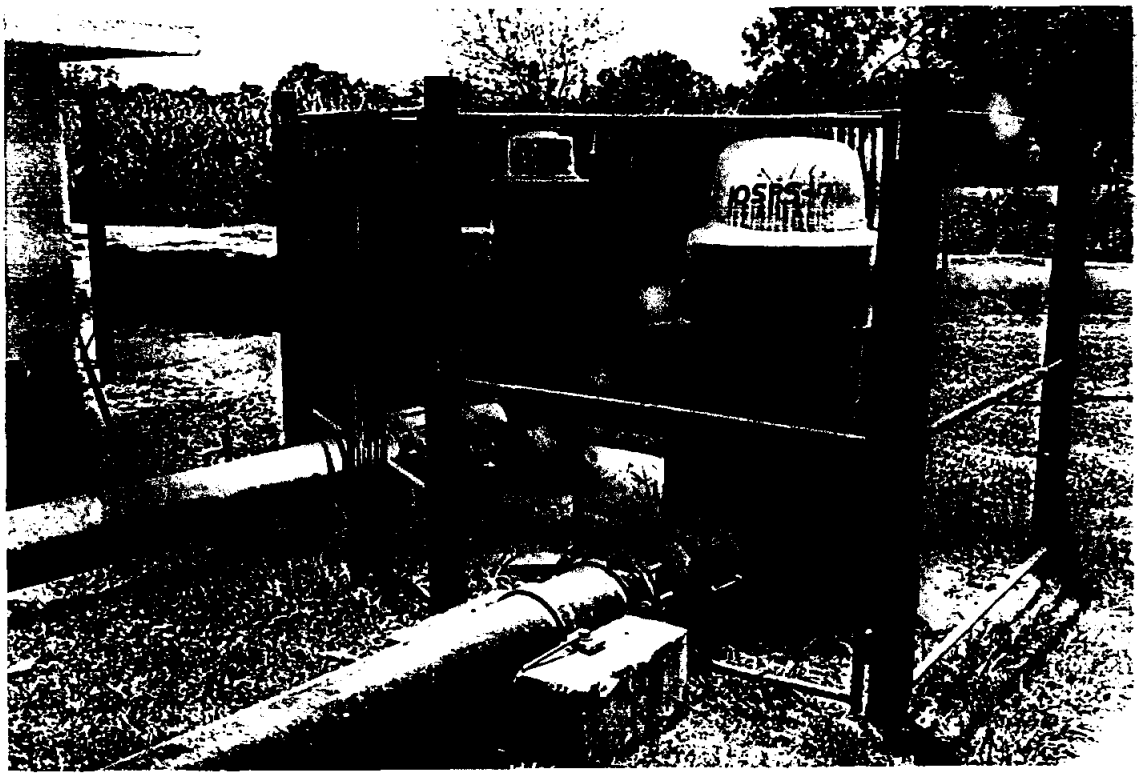
SAN FELIPE WELL PUMPING STATION - NORTH ELEVATION
(WEST FACILITY)



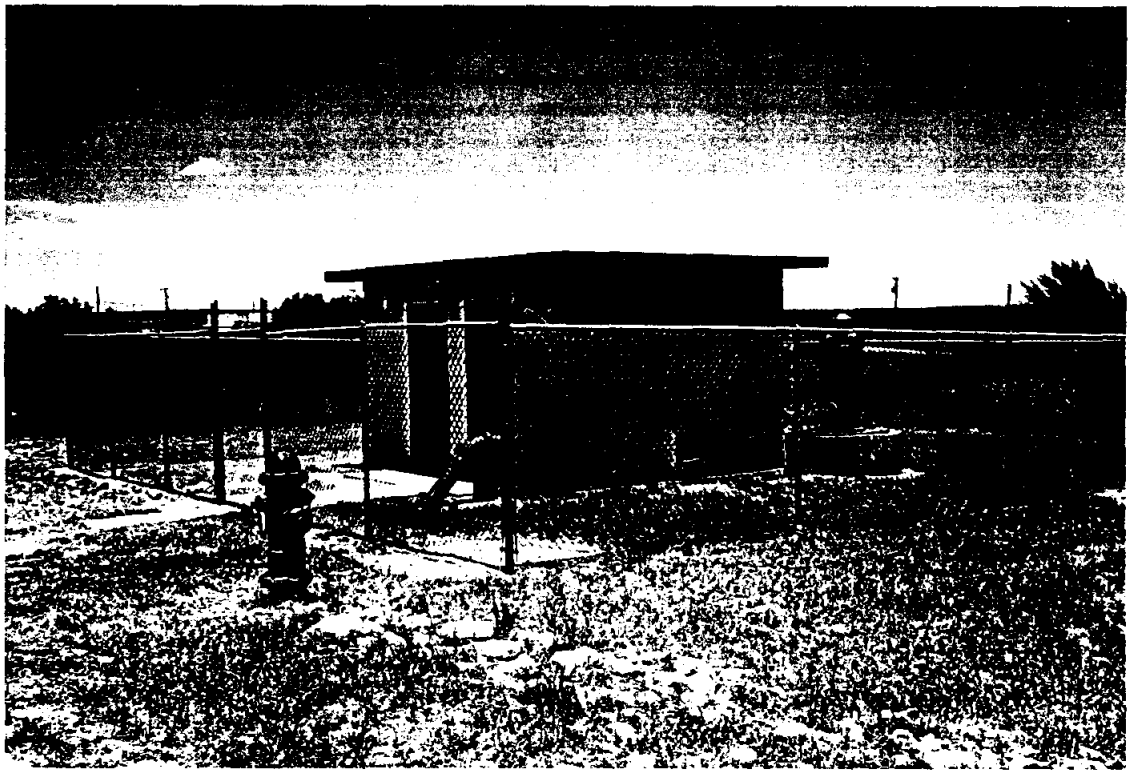
SAN FELIPE WELL PUMPING STATION - WEST ELEVATION
(WEST FACILITY)



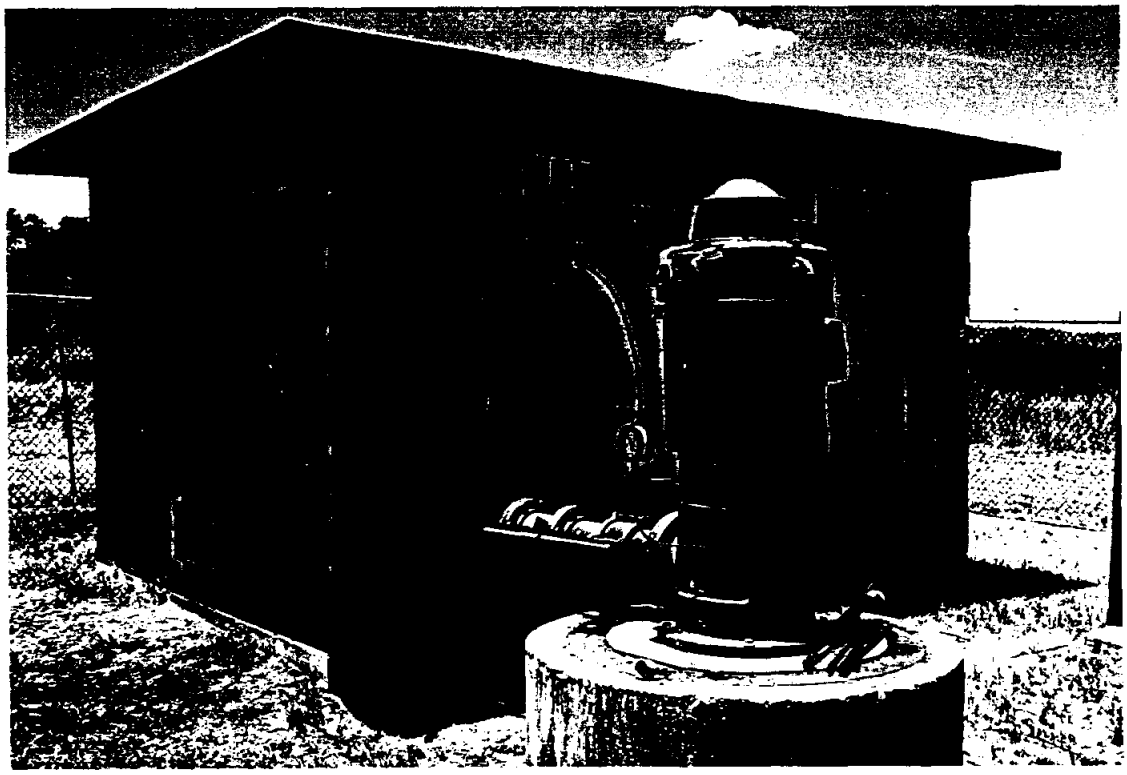
VERTICAL TURBINE PUMP NO. 5
AT THE SAN FELIPE STATION - WEST FACILITY
NO. 5 - 2,300 G.P.M. - 200 HP MOTOR



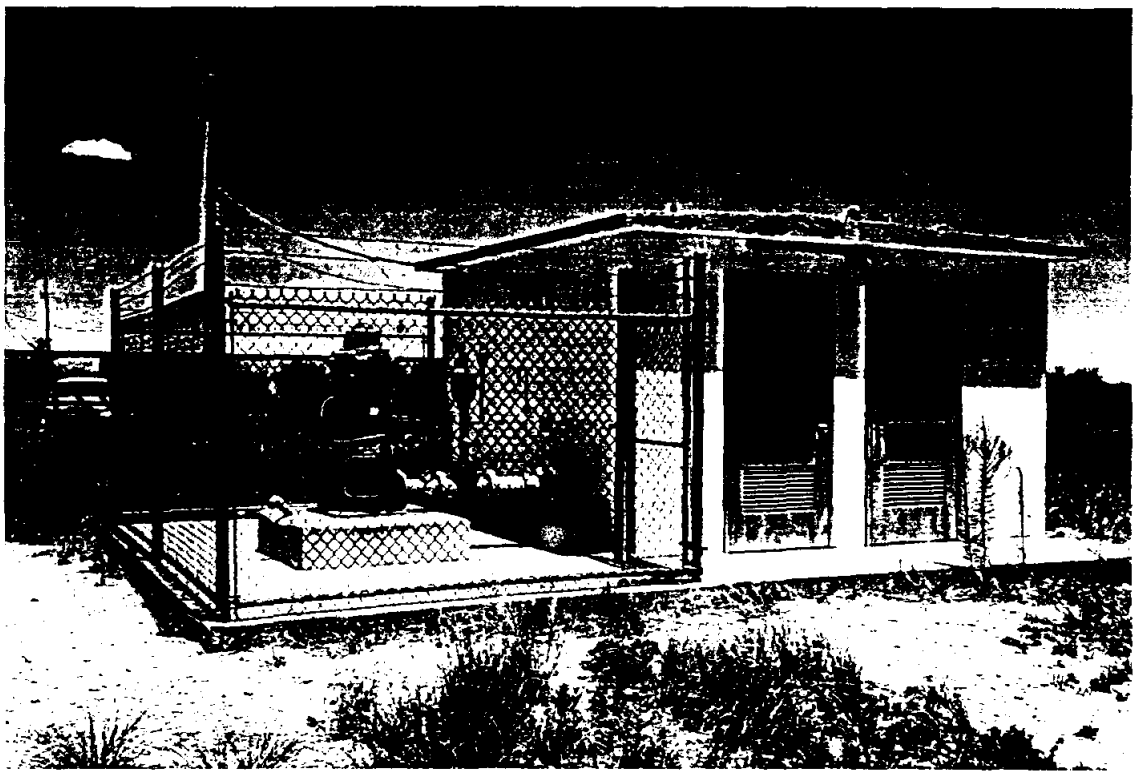
VERTICAL TURBINE PUMPS NO. 6 AND NO. 7
AT THE SAN FELIPE STATION - WEST FACILITY
NO. 6 - 2,600 G.P.M. - 200 HP MOTOR
NO. 7 - 2,850 G.P.M. - 200 HP MOTOR



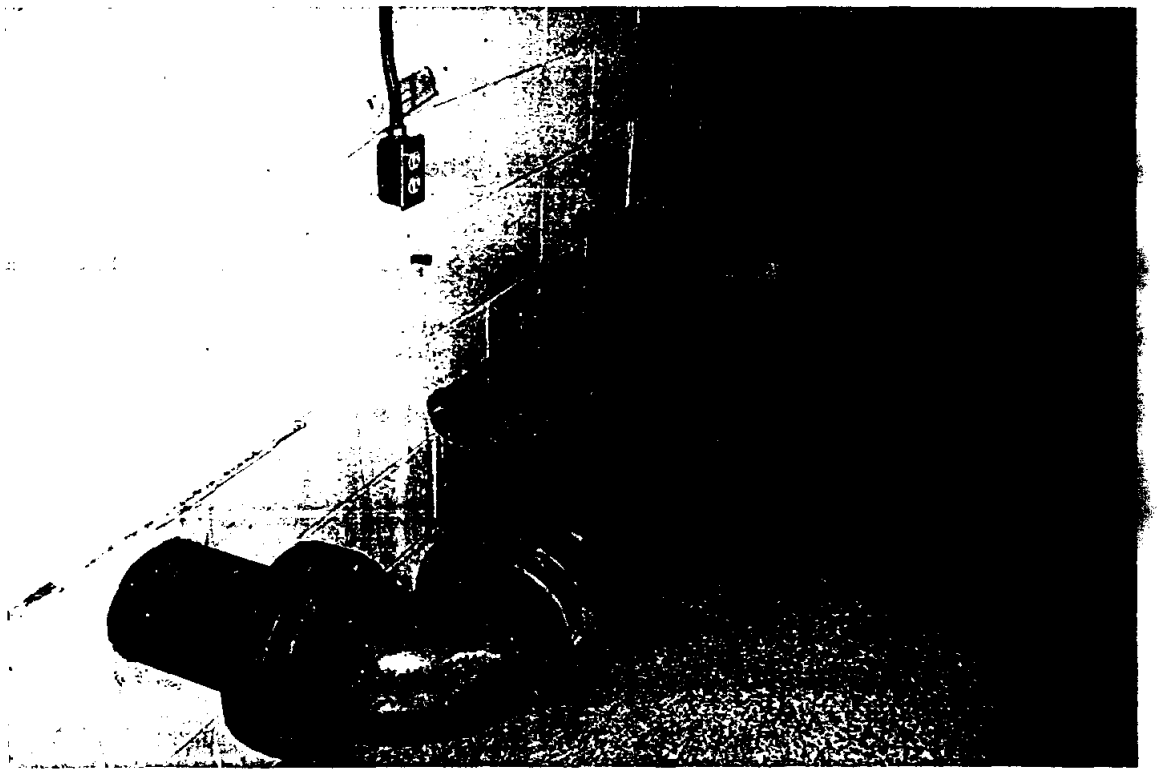
WELL SITE NO. 1
NORTH OF AGARITA DRIVE



WELL NO. 1
VERTICAL TURBINE PUMP
750 G.P.M. @ 360 TDH
100 HP MOTOR



WELL SITE NO. 2
SOUTH OF PINEWOOD DRIVE
VERTICAL TURBINE PUMP
475 G.P.M. @ 457 TDH
75 HP MOTOR



DISCHARGE HEADER AT WELL NO. 2

piping system for collecting and delivering the groundwater to a storage reservoir. The reservoir may be one of the City's existing ground storage tanks or may be a new tank developed at or near the location of the well field.

Other studies are currently in progress by the City of Del Rio to investigate the possibility of utilizing the wells now serving the developments (San Pedro and Lake Ridge Additions) around Lake Amistad for service also to the existing and future areas of development north of the City and within the five-mile extraterritorial jurisdiction (ETJ). In this concept of using existing wells as a water supply service for the North Del Rio area, additional wells will likely need to be developed as the population density increases between North Del Rio and Lake Amistad.

Since all the available surface water rights in the Middle and Lower Rio Grande Watersheds are currently allocated, another possibility for obtaining additional water supply is through an active and continuing search to purchase water rights from other cities, industries, irrigation districts or individuals that are permitted to take water from the Amistad/Falcon Reservoirs account.

Should an existing development or subdivision or any area within the City's five-mile ETJ request annexation or water service, one primary condition for acceptance of the request would be that the ownership of any water rights that the area or particular entity possesses would be transferred to the City. As mentioned previously, this could be handled through the provisions of a contract for utility services.

In the sections of Chapter 303, adopted under the authority of Texas Water Code 5.103, the Texas Water Commission is provided the authority to manage the surface water rights in the Rio Grande Basin below Fort Quitman, excluding the Pecos and Devils watersheds. According to Section 303.21, Amistad and Falcon Reservoirs are considered as a single storage system, and, therefore, water rights could conceivably be obtained from an account in the Lower Rio Grande for use in Val Verde County.

The allocation of distribution of the surface water from the accounts in Amistad/Falcon Reservoirs is divided into three (3) major accounts.

- a reserve of 225,000 acre-feet of water for domestic, municipal, and industrial uses;
- an operating reserve which is to fluctuate between 380,000 acre-feet and 270,000 acre-feet of water based on the monthly levels of the Amistad-Falcon Reservoir system; and,
- the accounts for irrigation used and all other cases.

The allotment of surface water for irrigation and mining uses is divided into Class A and Class B, with the Class A allottees receiving 1.7 times as much water as that allotted to Class B allottees.

The owner of a water right may convey his water right; however, the purpose and place of use can not be changed without authorization from the Texas Water Commission. Accordingly, the Texas Water Commission will consider applications to amend water rights.

In the conservation of water rights from irrigation or mining use to either domestic, municipal, or industrial purposes, the following quantities of water would be received.

- One (1) acre-foot of Class A irrigation water right shall be converted to 0.5 acre-feet of water per annum for either domestic, municipal, or industrial purposes.
- One (1) acre-foot of Class B irrigation water right shall be converted to 0.4 acre-feet of water per annum for either domestic, municipal, or industrial purposes.

For purposes of planning the development of future water supply for Del Rio, the following table is prepared to show when additional water supplies will be needed and the steps to be taken to develop such water supply.

TABLE V-7

WATER SUPPLY DEVELOPMENT SCHEDULE

Year	Water Supply Available M.G.D.				Water Supply Required * M.G.D.	Sources to be Developed **	Steps to be Taken
	San Felipe Springs	West Wells	Wells No. 1 & No. 2	Total			
1990	10.19	10.37	1.76	22.32	13.43		
2000	10.19	10.37	1.76	23.32	15.56		Subsurface Testing to locate potential areas for development of well field(s).
2010	10.19	10.37	1.76	22.32	18.05		
2020	10.19	10.37	1.76	22.32	20.91	Groundwater	
2030	10.19	10.37	1.76	22.32	24.44		
2040	10.19	10.37	1.76	22.32	26.43		

* Includes Laughlin AFB
** Includes an active and continuing search to purchase water rights from others as an on-going program.

The preceding table is presented to emphasize the need to implement a groundwater study to determine where potential site(s) may be located for developing well fields for future water supplies. Although the City appears to have an adequate water supply for the next twenty-five (25) to thirty (30) years

based on the projected trend of growth, the plan for developing additional water supplies of good quality must be a continuing effort. Surface water rights, again, will need to be acquired through negotiations and purchase from other entities. Groundwater supplies, although not now fully controlled by the State, will possibly require permits for water rights in the future.

Where several wells may be needed, the groundwater supply plan will require a system of collection mains for transferring the water produced to a receiving storage reservoir, whereby, the stored water can, then, be treated, as required, and pumped into the distribution system.

- Rural Areas - The communities of Comstock and Langtry, each having a water well which provides the water supply for their respective water systems, should continue to use the ground water resources as their primary water supply. The periodic monitoring of the water levels and testing of the water quality should be a part of the routine operation.

As mentioned previously, the small developments and subdivisions around Lake Amistad should continue to utilize the ground water resources for their water supply. A sharing or combining of the water production from the wells for several subdivisions is a possibility where the terrain is conducive to extending the distribution system to serve an area within the capacity limits of the well supply. Where developments are somewhat isolated, such as the Rough Canyon Area, service to other areas from the existing well or wells would be difficult. Therefore, the water supply for the Rough Canyon Area, and other similar isolated developments would continue to be from groundwater for basically only that one area.

The residents in the remaining areas of the County will continue to be furnished with water from wells developed at varying depths. Pressure for the water produced from the wells will be supplied through small hydropneumatic or pressure tank systems.

The common factor that should always be considered in the process of any planning for water and wastewater systems is in the reservation, as soon as possible, of property for construction of the proposed and future facilities. Since a well field would possibly require several sites for the wells and roadways for access, easements for the collection mains, and a site for a receiving storage reservoir, these properties need to be acquired or at lease reserved to avoid any major conflicts in the future. The alternatives for these improvements should be considered in the environmental assessment.

2. Water Treatment -

a. Existing -

- Del Rio - The treatment of the water produced from the wells and the San Felipe Springs is provided by chlorination.

- Rural Areas - The water produced from wells which supply Comstock and Langtry also receives chlorination as the method for treatment of the water supply.

Private or individual wells, for the most part, receive no treatment at all, either chemical or physical.

b. Future -

According to "Ground-Water Resources of Val Verde County, Texas, Report 172, June 1973", prepared by the U.S. Geological Survey under cooperative agreement with the Texas Water Development Board, a chemical analysis was made of 310 water samples from 207 wells and 17 springs.

The quality of the water for domestic consumption was found to be generally good to excellent in Val Verde County, with some exceptions. Variations in the chemical constituents of the water samples analyzed varied with the location of the water source.

The suitability of the water supply quality for Val Verde County will depend upon the intended use. Therefore, the treatment of the water will vary according to the concentration of the constituents found. As each water supply source is developed (i.e. individual wells, community wells, surface water, etc.) an analysis of the water should be made in order to determine what degree of treatment is needed.

As a minimum, all domestic water supply wells should be disinfected at least once each year to insure a safe water supply.

Common sources of contamination of wells by bacteria are cesspools, improperly constructed septic systems, seepage from livestock waste, waste from burrowing warm-blooded animals, precipitation runoff containing animal and fowl waste, and leaks from the pump and/or pipes which dissolve waste on the pump base that drains back into the well.

Changes in the taste of the water coming from the well, a foul odor, and/or discoloration of the water are indicators that bacterial contamination may have occurred. However, the water may be contaminated without any apparent change.

The Texas Department of Health recommends a concentration of chlorine of 100 parts per million (ppm) for disinfecting the well base, pumps, pipe, etc. The approximate quantities of chlorine compound required to produce a chlorine concentration of 100 ppm is given in the following Table.

TABLE NO. V-8

CHLORINE COMPOUND REQUIRED
FOR
CONCENTRATION OF 100 PPM

Gallons of Water in Well	Liquid Bleach (5 percent)	Calcium Hypochlorite (65 percent
250	1/2 gallon	0.32 pound
500	1 gallon	0.65 pound
750	1-1/2 gallons	0.97 pound
1,000	2 gallons	1.30 pounds
1,500	3 gallons	1.95 pounds
2,000	4 gallons	2.60 pounds
2,500	5 gallons	3.35 pounds
3,000	6 gallons	3.90 pounds
3,500	7 gallons	4.55 pounds
4,000	8 gallons	5.20 pounds
4,500	9 gallons	5.85 pounds
5,000	10 gallons	6.50 pounds
7,500	15 gallons	9.75 pounds
10,000	20 gallons	12.00 pounds

The liquid bleach may be added directly to the well, followed by a quantity of water at least equal to the amount of bleach used. The water added is for purpose of washing the bleach residual from the pump and casing.

The calcium hypochlorite will normally be in a dry granular or powder form and must be dissolved in water prior to adding it to the well. The carrier of the calcium hypochlorite (about 35% of the dry chemical mix) will not readily dissolve in water. The solids which do not dissolve must be filtered out prior to adding the saturated solution of chlorine to the well. Again, water should be added after the treatment to wash the residual from the pump and casing.

Should surface water supplies be obtained from the Rio Grande or other sources other than groundwater, the conventional processes for water treatment would need to be installed. These processes may include the pre-chlorination of the raw water, the addition of chemicals for odor and taste control and to accelerate the sedimentation of the solids, and the

filtering process to remove the finer particles. The filtered water would then be chlorinated and stored ready for distribution to the consumer. Other treatment processes, both chemical and physical, may be required according to the quality of the raw water to be treated and the intended use.

3. Water Distribution -

a. Existing -

- Del Rio - The existing water distribution facilities are basically comprised of storage reservoirs, high service pumps, and a network of water mains of diameters up through 20 inches.

The storage reservoirs currently in service are listed below in TABLE NO. V-9.

TABLE NO. V-9

EXISTING STORAGE RESERVOIRS

Location	Ground Storage	Elevated Storage
Bedell Street	1 - 2.00 M.G. 2 - 1.00 M.G.	
Agarita Street		1 - 0.750 M.G. 1 - 0.500 M.G.
East Highway 90		1 - 0.200 M.G.
Eagle Pass Hill		1 - 0.174 M.G. (Standpipe)
Total Capacity	4.00 M.G.	1.624 M.G.

TABLE NO. V-10 below outlines the location and the rated capacities of the existing high service pumping and booster pumping facilities operating in Del Rio's water system.

TABLE NO. V-10

EXISTING
HIGH SERVICE PUMPING
AND
BOOSTER STATION FACILITIES

Location	Capacity	TDH	Horsepower	RPM
East Springs	3,400 G.P.M.	208'	200	
	3,200 G.P.M.	208'	200	
	2,800 G.P.M.	208'	200	
	2,800 G.P.M.	208'	200	
Bedell Street	2,800 G.P.M.	210'	460	1,770
	2,800 G.P.M.	210'	460	1,770
	2,800 G.P.M.	210'	460	1,770

East Highway 90 (Booster Pumps)	Capacities	30	1,750
	Not Available	30	1,750
Virginia Street (Booster Pumps)	Information Not Available		

The booster pumping stations serve to lift the water to facilitate filling the East Highway 90 Elevated Tank and the Eagle Pass Hill Standpipe.

The operation of the City's distribution system is divided into two (2) pressure planes, with the separation at or near the 1,050-foot elevation. Other than several relatively short sections of 16-inch and 20-inch diameter mains near the high service pumping stations, the largest transmission main now in service within the system is 12 inches in diameter. Many of the 12-inch diameter mains are not looped or connected to other major mains and, thus, create "bottlenecks" in the system. The discontinuity of these major mains can cause pressure losses and lower volumes of water to the customers.

The water from the San Felipe Springs is chlorinated and pumped to the Bedell Street ground storage reservoirs which, in turn, is delivered by the Bedell Street high service pumping station into the upper pressure plane. Also, the water from the Bedell Street reservoirs is released to the lower system through mains connected directly to the tanks. Thus, the Bedell Street storage reservoirs serve a dual function -- ground storage for the upper pressure plane and elevated storage for the lower pressure plane.

The developments outside the City Limits of Del Rio where water service is already being provided or is anticipated to be extended in the future include:

Development (Colonias)	Lots	Projected * Population @ Full Development	Provisions For Water Service From Del Rio	Projected Water Demand Potential ** (M.G.D.)
		Existing		
Cienegas Terrace	844	2,701	Existing	0.73
Val Verde Park Estates	1,236	3,943	Existing	1.09
Chapparal Hills	200	640	Existing	0.17
2. Brewer Subdivision	43	138	Existing	0.04
3. Payment Subdivision	30	96	Existing	0.03
4. Owens Addition	37	118	Existing	0.03
5. Rosenow Subdivision	94	300	Existing	0.08
6. Rio Bravo Addition	69	112	Existing	0.03
7. Los Campos	181	572	Future	0.15

8. Escondido Estates	147	470	Future	0.13	
9. Spring Lake Addition		217	Existing	0.06	Paved (no gravel)
	2,389	9,402		2.54	

* Based on 3.2 people per lot
** Based on 270 gallons per capita per day

FIGURE NO. V-1, on the following page, shows the location of the existing major waterworks facilities within the planning area of Del Rio. Following FIGURE V-1 are photographs of the City's existing water supply, high service pumping and storage facilities.

- Rural Areas - The communities of Comstock and Langtry both have small water distribution systems which include ground storage, pumping facilities, a pressre tank, and water mains in diameters up through 6 inches. These types of systems are referred to as hydro-pneumatic systems, whereas, the pressure is developed from pumps delivering the water from a ground storage tank into a pressure tank. Elevated storage tanks are not usually needed in these types of systems since the pressure is furnished by the "compressed air" in the pressure tank.

Comstock has two (2) ground storage tanks -- a 40,000-gallon bolted steel tank and a 150,000-gallon welded steel tank. Langtry's ground storage tank has a capacity of 500 barrels or about 27,500 gallons.

The pumping units (two) in the Comstock system are horizontal centrifugal-type pumps with rated capacities of 130 G.P.M. and 150 G.P.M.

The Langtry water system also has two (2) horizontal centrifugal-type pumps; however, the information on the rated capacity of the pumps was not available.

Photographs of the Comstock and Langtry storage and hydro-pneumatic systems are included on the following pages.

b. Future -

- Del Rio - The operation of the distribution system of the City should continue to be on two pressure planes with each having sufficient storage, high service pumping, and water mains to serve its specific service area.

In order to optimize the system operation and to effectively plan for the future additions without unwarranted expenditures, the overall system of Del Rio should be studied through the computerized Hardy Cross analysis program which is explained in Part II, Paragraph B.6., Page II-17.

TEXAS WATER DEVELOPMENT BOARD
Economically Distressed Areas Program
Designated Areas Information - 12/11/91 STATUS

County	Applicant	Project Area	Project Description	Project Engineer	Est.Pop (90)	Notes
El Paso	EPLWDA	San Elizario	Provide new wastewater service & improve existing water service	Moreno Cardenas, Inc.	4490	Identifying problems and needs; surveying and documenting housing occupancy.
Hidalgo	City of Weslaco	South of city within ETJ	Provide new wastewater service & improve existing water service	MSA;Mariah;Sigler, Winston,Greenwood	1625	Identifying problems and needs; surveying and documenting housing occupancy.
Webb	Webb Co.	S.H. 359 & Mines Road	Provide new water service	Southwest Engineers, Inc.	2016	Identifying problems and needs; surveying and documenting housing occupancy.
Hidalgo	City of Pharr	Las Milpas	Improve water & wastewater service	Melden & Hunt Inc.	8800	Initial stages of Ph.I
ValVerde	City of Del Rio	Cienegas Terrace	Provide new water & wastewater service	Hogan Consultants	1965	Designated at May 20 Board meeting; preparing application;submittal expected early December.

SUMMARY

Ph I application stage	1
Ph I report preparation stage	6
Ph I report completion	7
Ph II plans and specifications stage (Ph I complete)	3

The analysis of the City's water system should include those areas of development that are proposed to be served in the future. It is not likely that the colonias or developments can be provided initially with full utility services for the total area from the standpoint of economics. Therefore, a phased program for installing the water mains is proposed for each of the larger Colonias, those being Cienegas Terrace, Val Verde Park Estates, and Los Campos. The Escondido Estates, a development east of Laughlin Air Force Base, is a remote area that is not anticipated to be sufficiently populated within the near future to warrant the expenditures of extending water mains to the area. Future water mains are, however, shown to indicate a layout of how the Escondido Estates can be served with water service at such time when the mains are extended to the area.

FIGURES NO. V-2, NO. V-3, and NO. V-4 show a suggested layout for a phased program of improvements to the water system within the three (3) major colonias indicated above.

The other developments (colonias) outside the corporate limits have water and/or sewerage services provided by the City and do not appear to have any major problems at this time. The average daily water demand for all of the colonias at full development is projected to be approximately 2.54 M.G. This is based on the projected population of 9,402, with the water usage per capita at 270 gallons.

The criteria for planning the future additions, as previously set in Part II, should always consider, as a minimum, the regulations of the Texas Department of Health, the Texas Water Commission, the State Board of Insurance, and the Fire Prevention and Engineering Bureau of Texas. If local regulations and standards are more restrictive, the local criteria should be used.

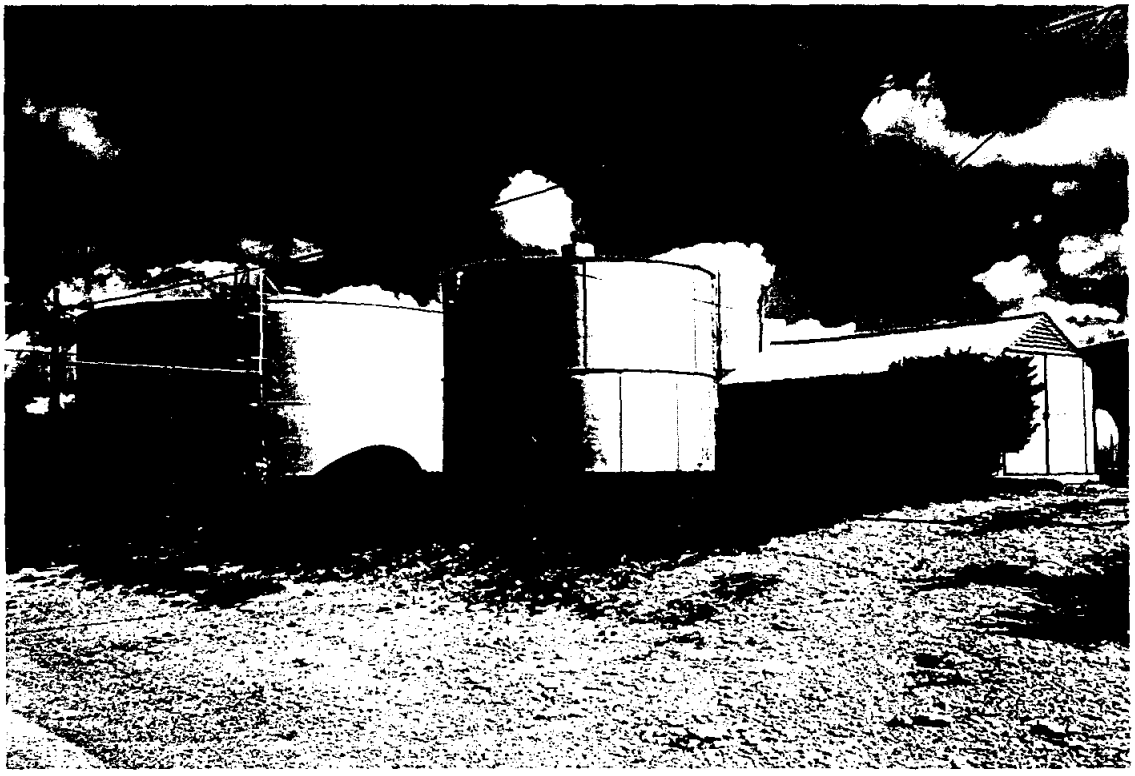
For general planning purposes, Del Rio's total storage requirements are as follows:

TABLE NO. V-11

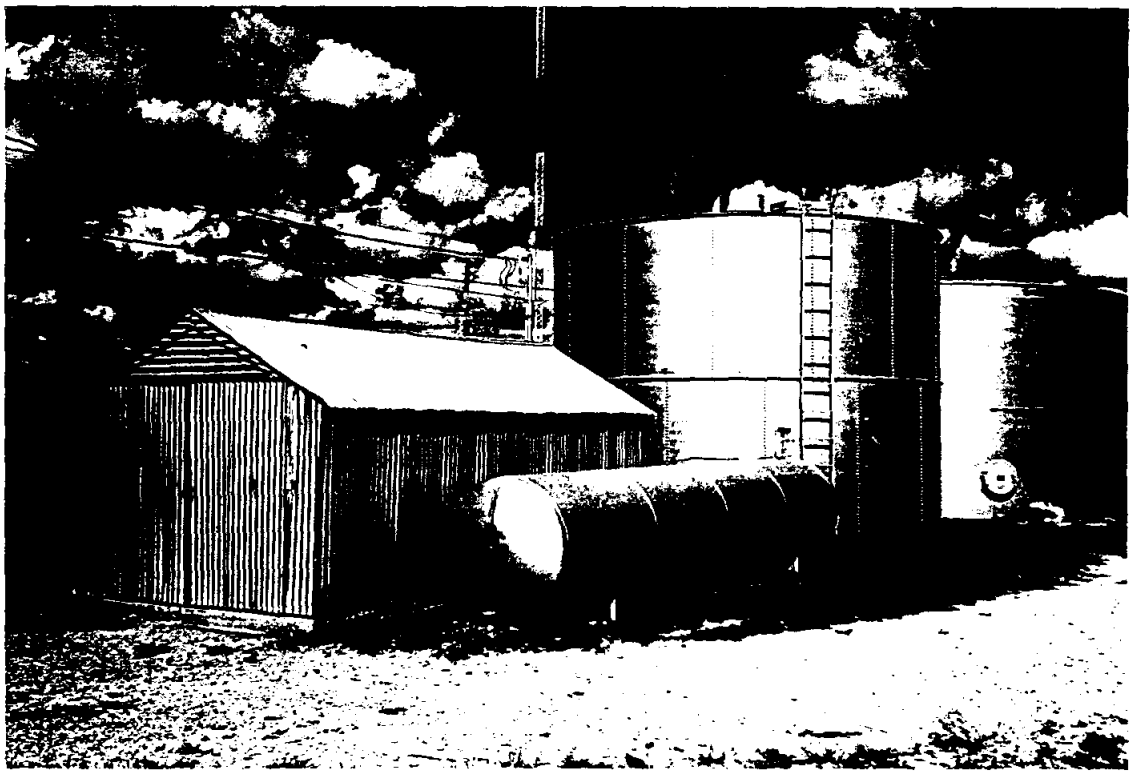
FUTURE STORAGE REQUIREMENTS
CITY OF DEL RIO, TEXAS

Year	Projected Population	Ground Storage* M.G.	Elevated Storage* M.G.
1990	38,302	4.98	2.06
2000	47,896	6.23	2.60

COMSTOCK, TEXAS
EXISTING WATERWORKS SYSTEM FACILITIES



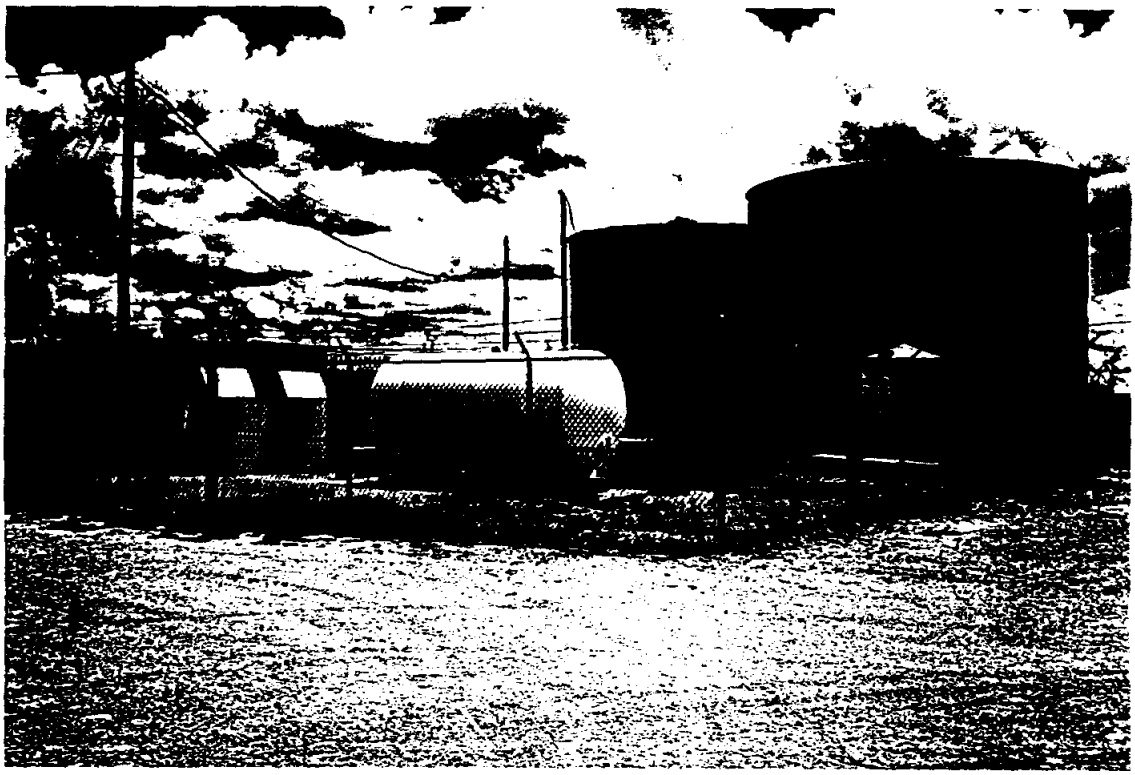
150,000 - GALLON GROUND STORAGE TANK (LEFT)
40,000 - GALLON GROUND STORAGE TANK (CENTER)
PUMP STATION BUILDING (RIGHT)



2,500 - GALLON PRESSURE TANK

LANGTRY, TEXAS

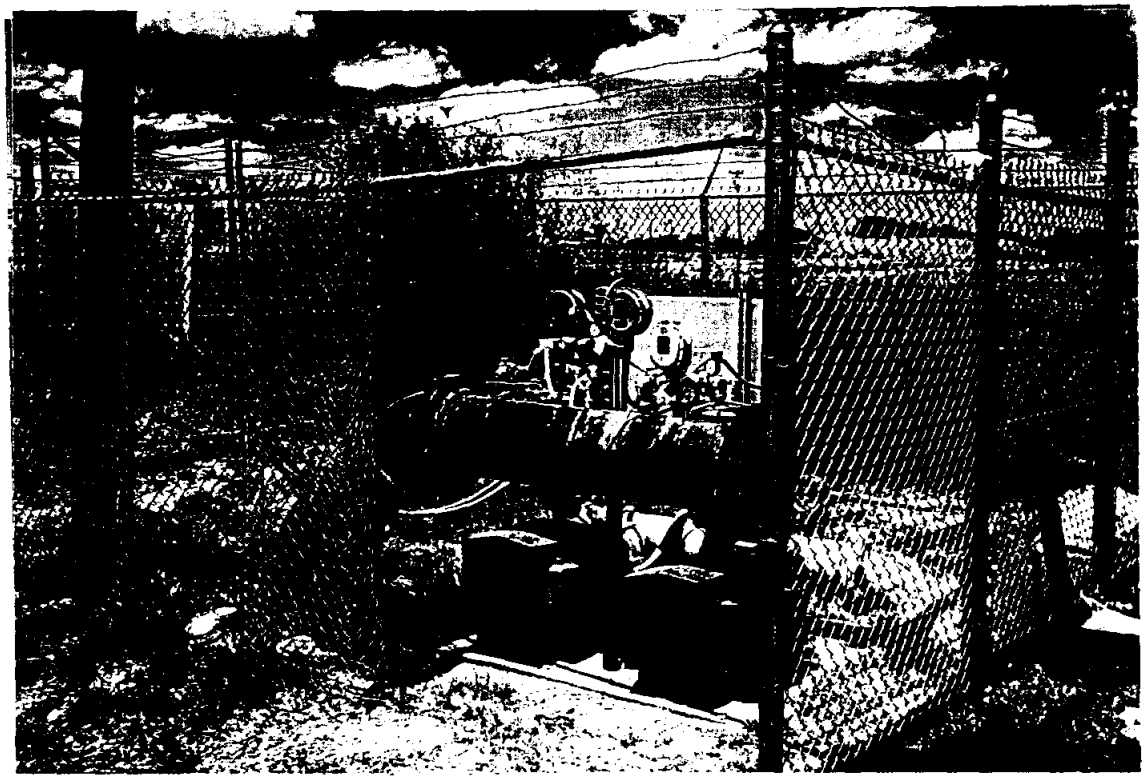
EXISTING WATERWORKS SYSTEM FACILITIES



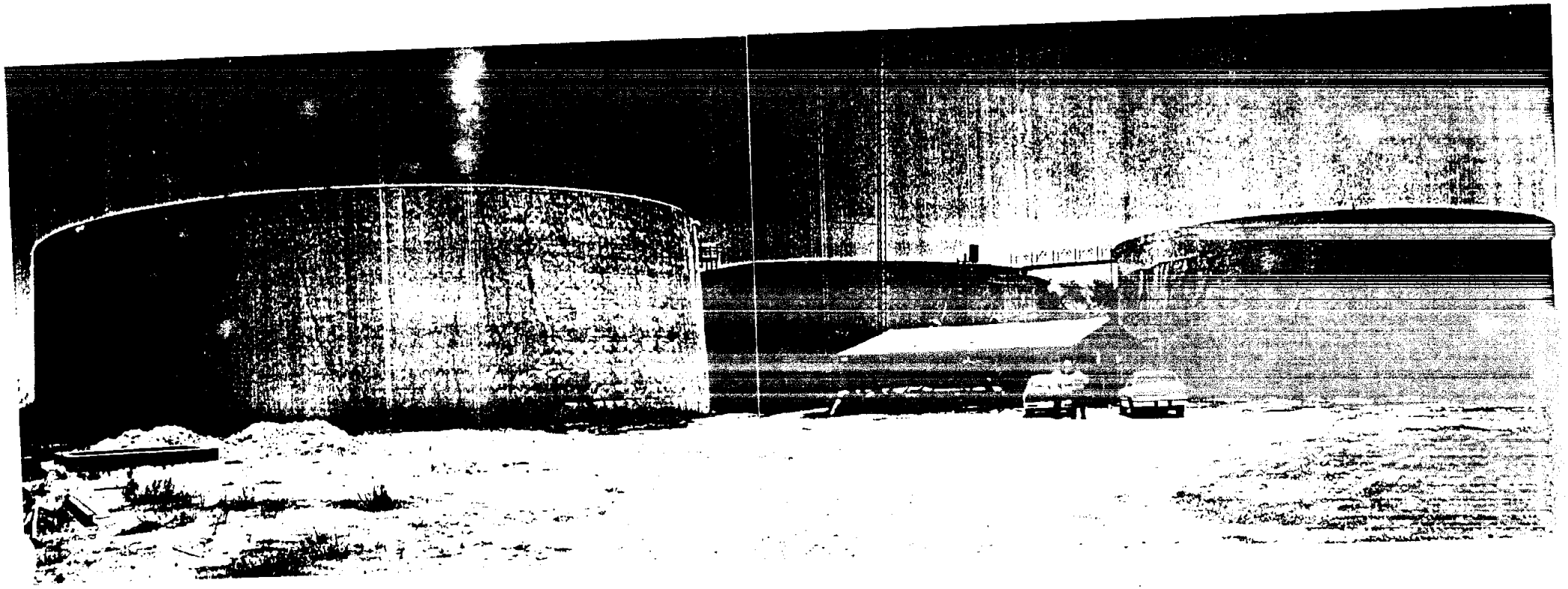
U.S. HWY. 90
STORAGE, PUMPING, AND
HYDROPNEUMATIC PRESSURE SYSTEM

27,500 - GALLON GROUND STORAGE TANK (RIGHT)
2,500 - GALLON PRESSURE TANK

ELEVATED STORAGE
EAST U.S. HWY. 90
200,000 GALLONS



BOOSTER PUMP STATION
TO FILL EAST U.S. HWY. 90
ELEVATED STORAGE



GROUND STORAGE RESERVOIRS
AND
HIGH SERVICE PUMPING STATION

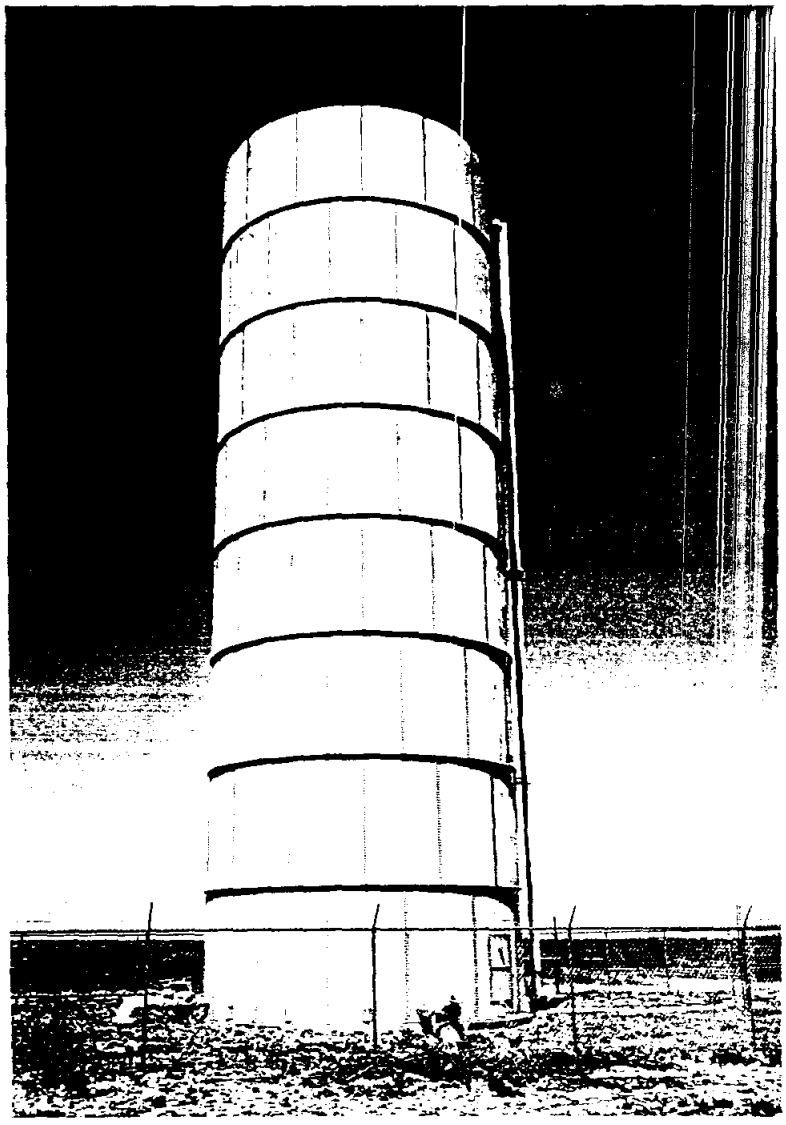
STORAGE

1 @ 2,000,000 - GALLON
2 @ 1,000,000 - GALLON

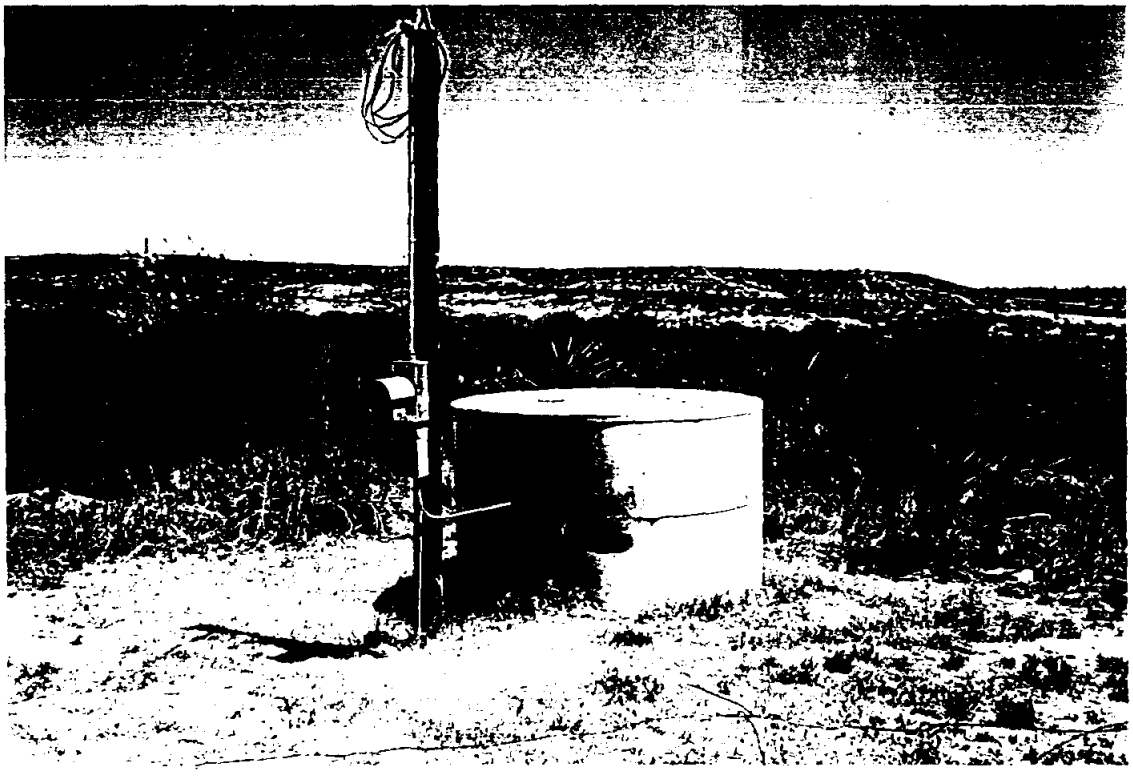
PUMPS - HORIZONTAL CENTRIFUGAL

3 @ 2,800 G.P.M. - 460 HP MOTORS

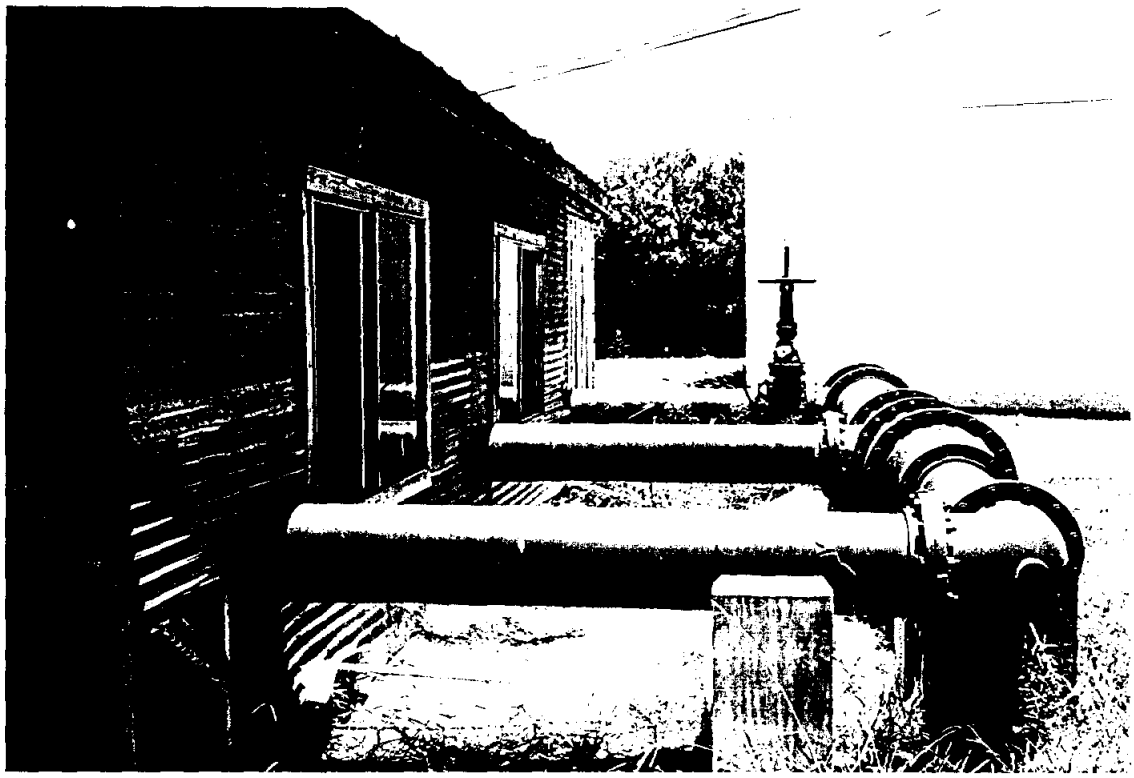
ELEVATED STORAGE
NORTH OF AGARITA DRIVE
1 - 500,000 - GALLON (LEFT)
1 - 750,000 - GALLON (RIGHT)



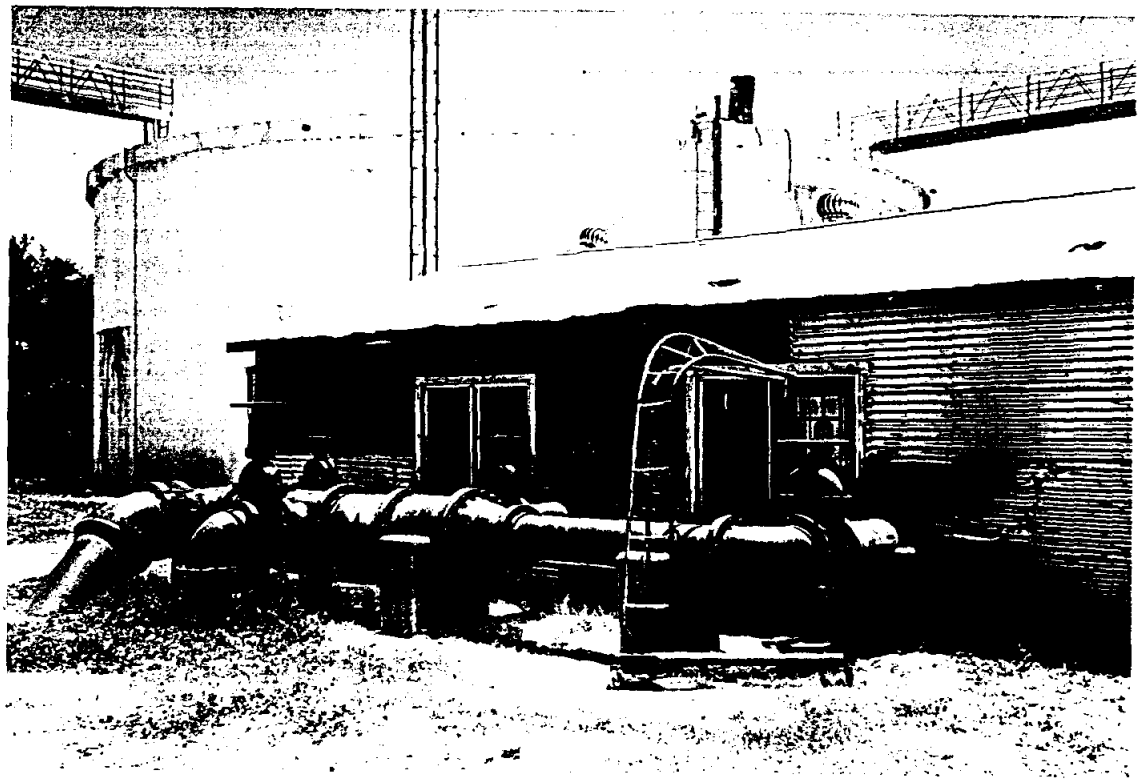
STANDPIPE
FOR
WATER STORAGE
EAST OF DEL RIO
NEAR EAGLE PASS HILL
APPROXIMATELY 150,000 GALLONS



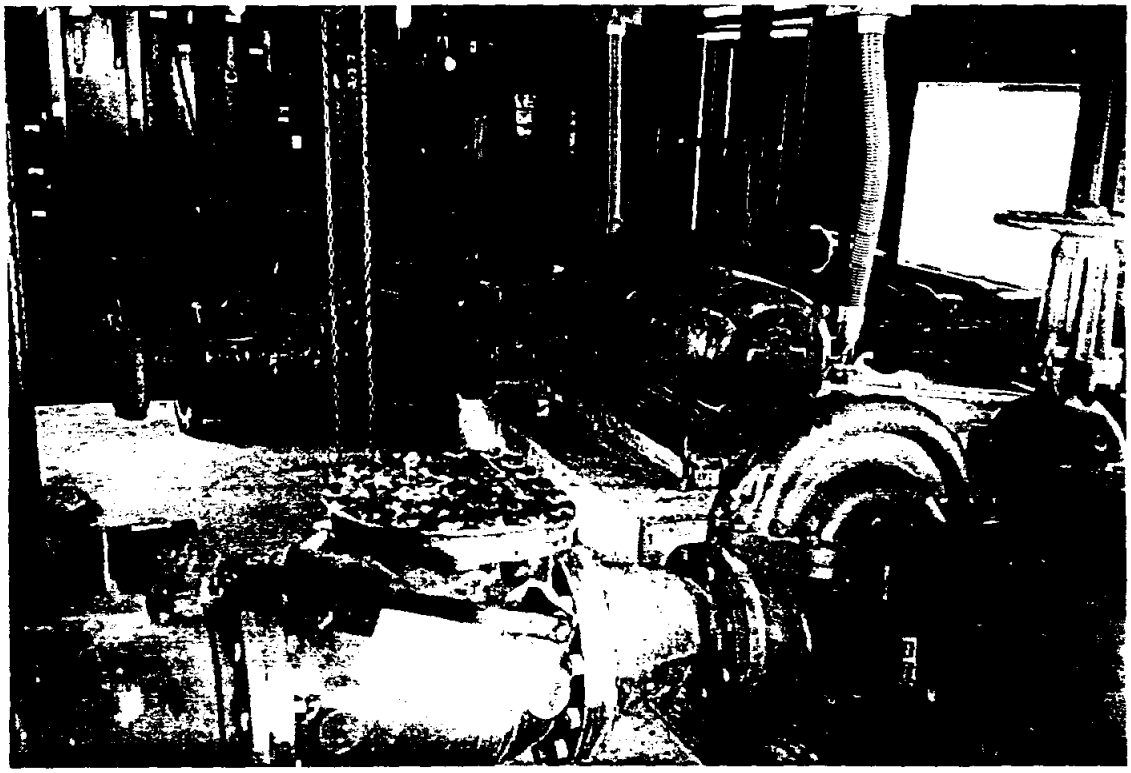
VAULT FOR BOOSTER PUMPS
TO FILL STANDPIPE



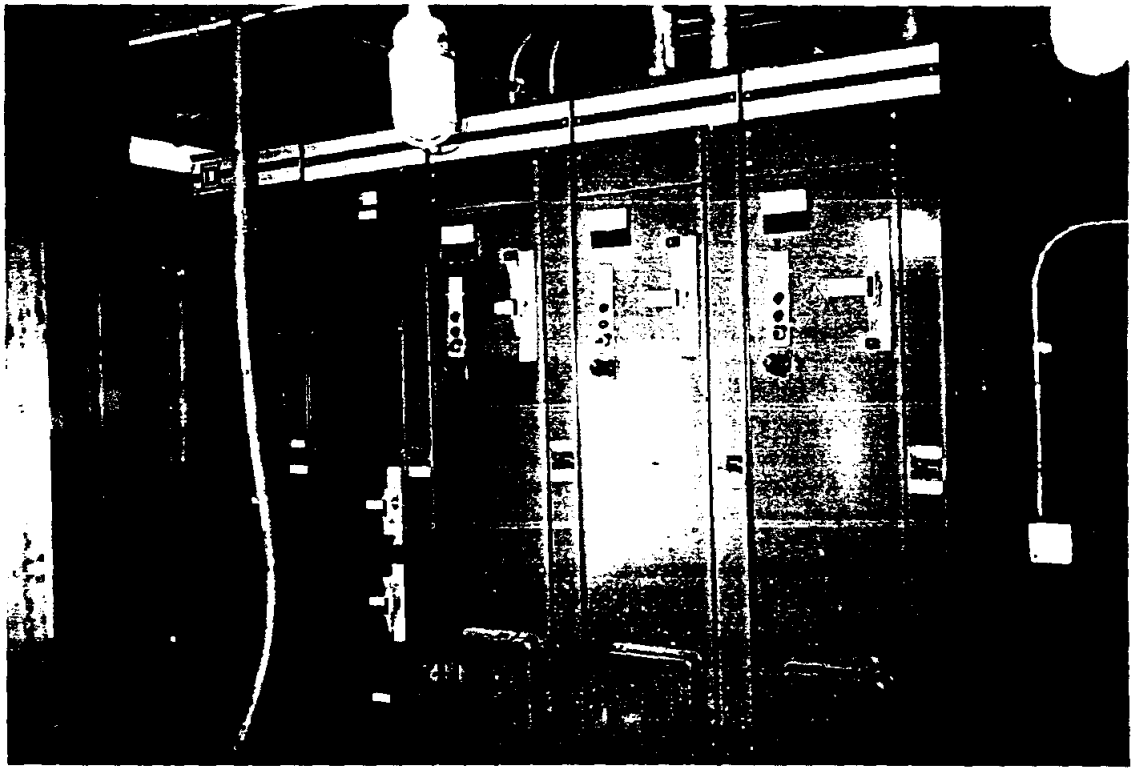
SUCTION HEADER
AT THE HIGH SERVICE PUMP STATION



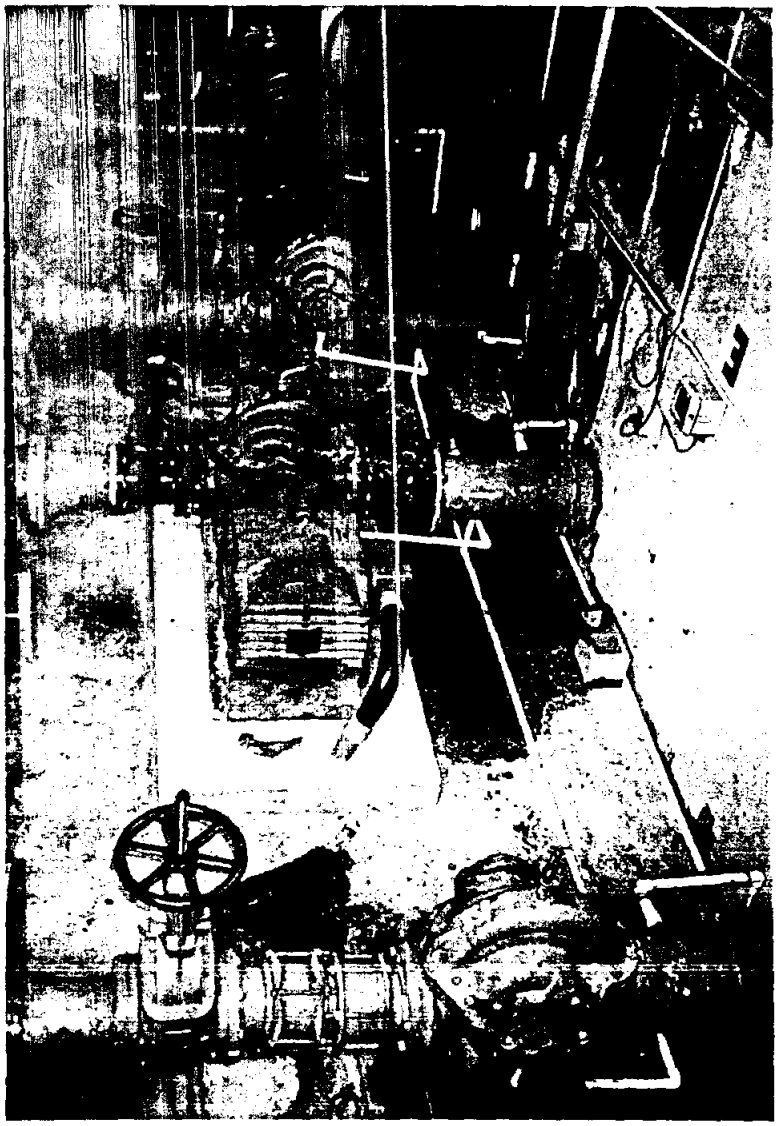
DISCHARGE HEADER
AT THE HIGH SERVICE PUMP STATION



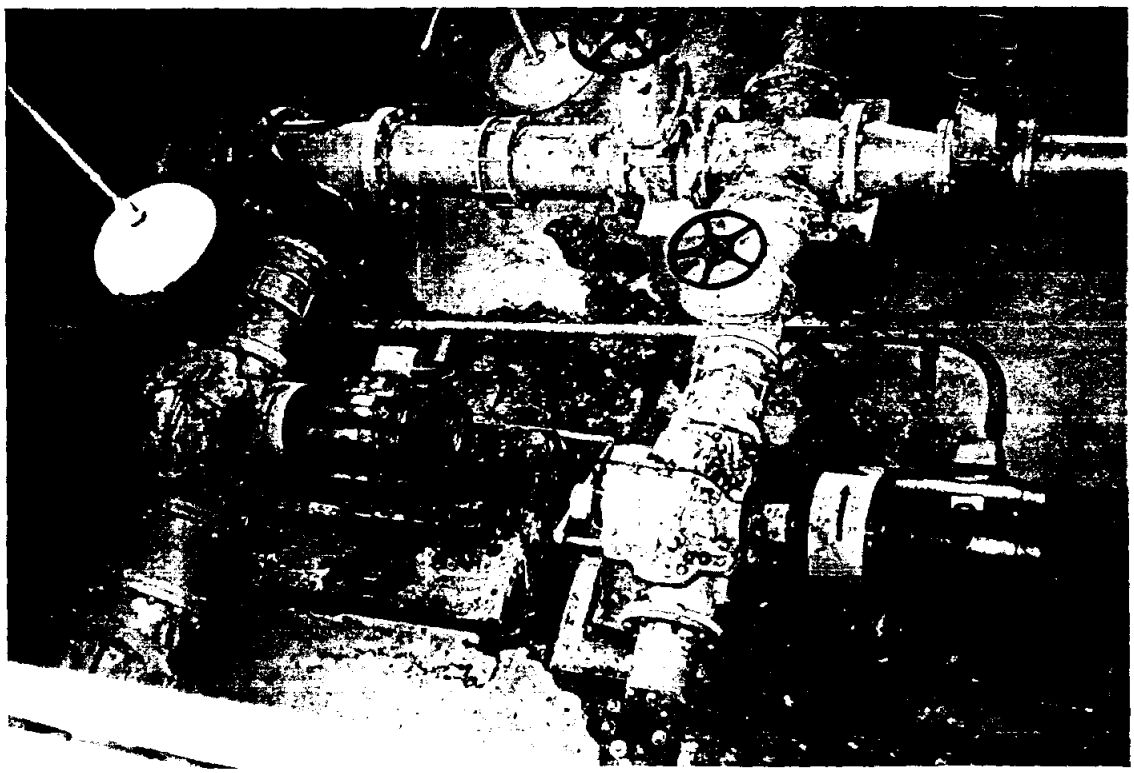
HIGH SERVICE PUMPING UNITS
3 @ 2,800 G.P.M. - 460 HP MOTORS



MOTOR CONTROL CENTER
AT THE
HIGH SERVICE PUMPING STATION



SAN FELIPE SPRINGS
PUMPING STATION
(DEL RIO PUMPING UNITS)
1 - 3,400 G.P.M. - 200 HP MOTOR
1 - 3,200 G.P.M. - 200 HP MOTOR
1 - 2,800 G.P.M. - 200 HP MOTOR
1 - 2,800 G.P.M. - 200 HP MOTOR



SAN FELIPE SPRINGS PUMPING STATION
(LAUGHLIN AIR FORCE BASE PUMPING UNITS)
2 - 2,100 G.P.M. - 60 HP MOTORS

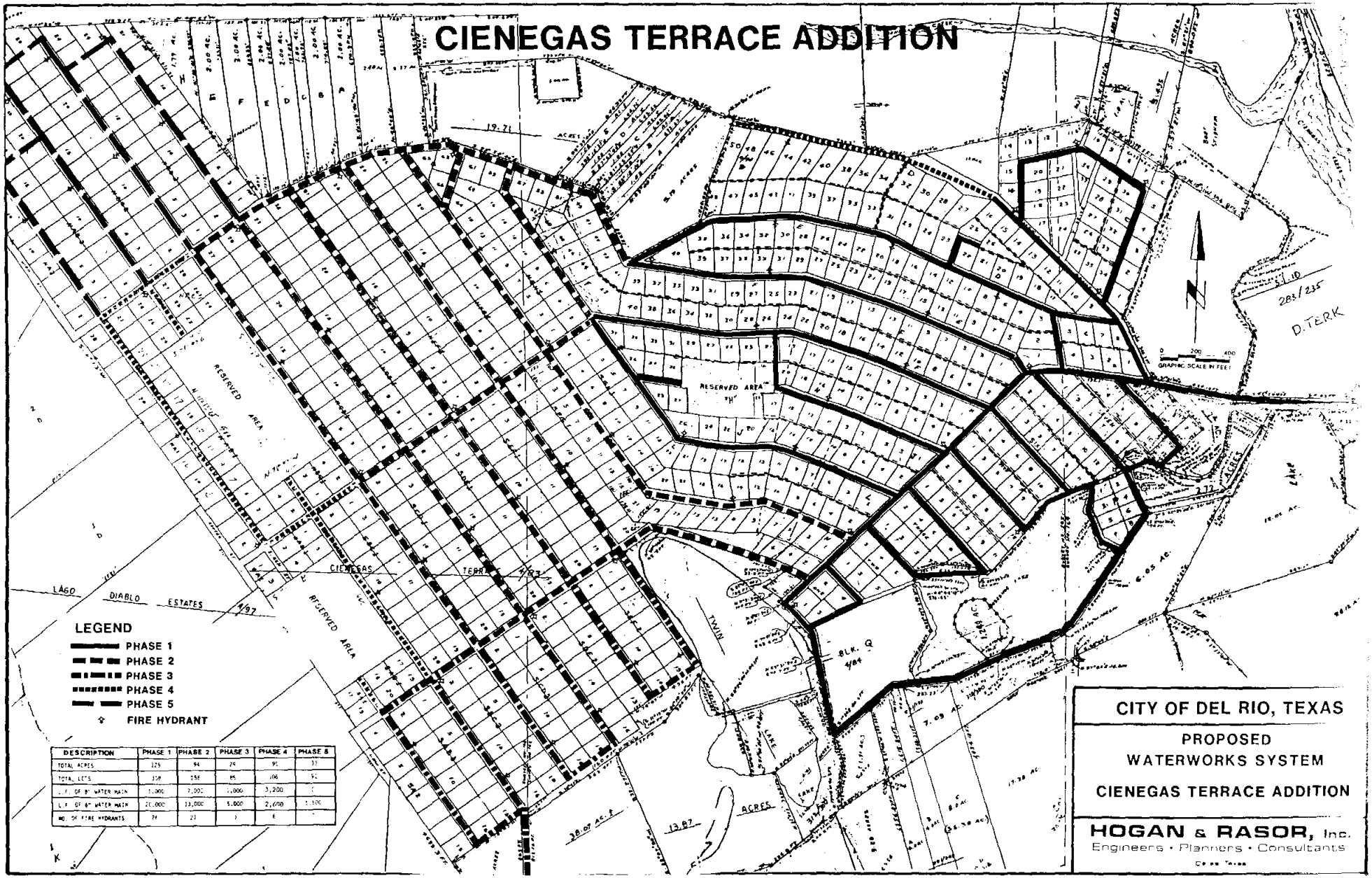
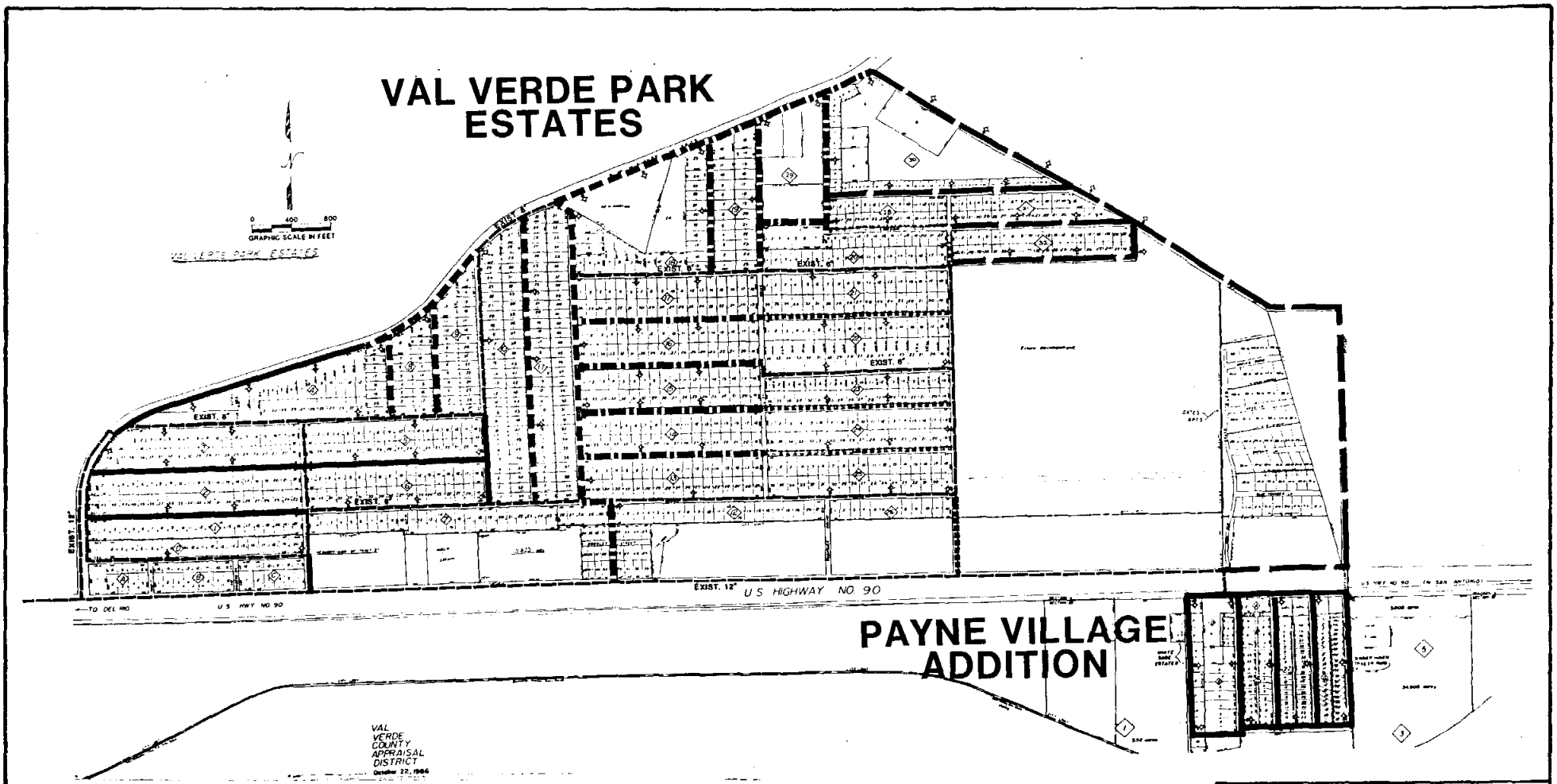

CIENEGAS TERRACE ADDITION
LEGEND
PHASE 1
PHASE 2
PHASE 3
PHASE 4
PHASE 5
FIRE HYDRANT
DESCRIPTION | PHASE 1 | PHASE 2 | PHASE 3 | PHASE 4 | PHASE 5
TOTAL ACRES | 125 | 94 | 29 | 90 | 33
TOTAL LOTS | 358 | 256 | 85 | 106 | 91
L.F. OF 8" WATER MAIN | 15,000 | 7,000 | 1,000 | 3,200 | -
L.F. OF 6" WATER MAIN | 20,000 | 13,000 | 5,000 | 2,600 | 1,300
NO. OF FIRE HYDRANTS | 39 | 23 | 7 | 6 | -
RESERVED AREA
RESERVED AREA "H"
LAGO DIABLO ESTATES
CIENEGAS TERRACE
TWIN
BLK. Q
GRAPHIC SCALE IN FEET
CITY OF DEL RIO, TEXAS
PROPOSED
WATERWORKS SYSTEM
CIENEGAS TERRACE ADDITION
HOGAN & RASOR, Inc.
Engineers • Planners • Consultants

FIGURE NO. V- 2



DESCRIPTION	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5
TOTAL ACRES	198	123	165	123	107
TOTAL LOTS	434	185	290	238	115
L.F. OF 12" WATER MAIN	0				8,000
L.F. OF 8" WATER MAIN	2,500	5,000	2,000	0	1,000
L.F. OF 6" WATER MAIN	8,100	4,500	13,000	8,000	6,500
NO. OF FIRE HYDRANTS	25	14	19	17	14

LEGEND

- PHASE 1
- PHASE 2
- PHASE 3
- PHASE 4
- PHASE 5
- FIRE HYDRANT

CITY OF DEL RIO, TEXAS

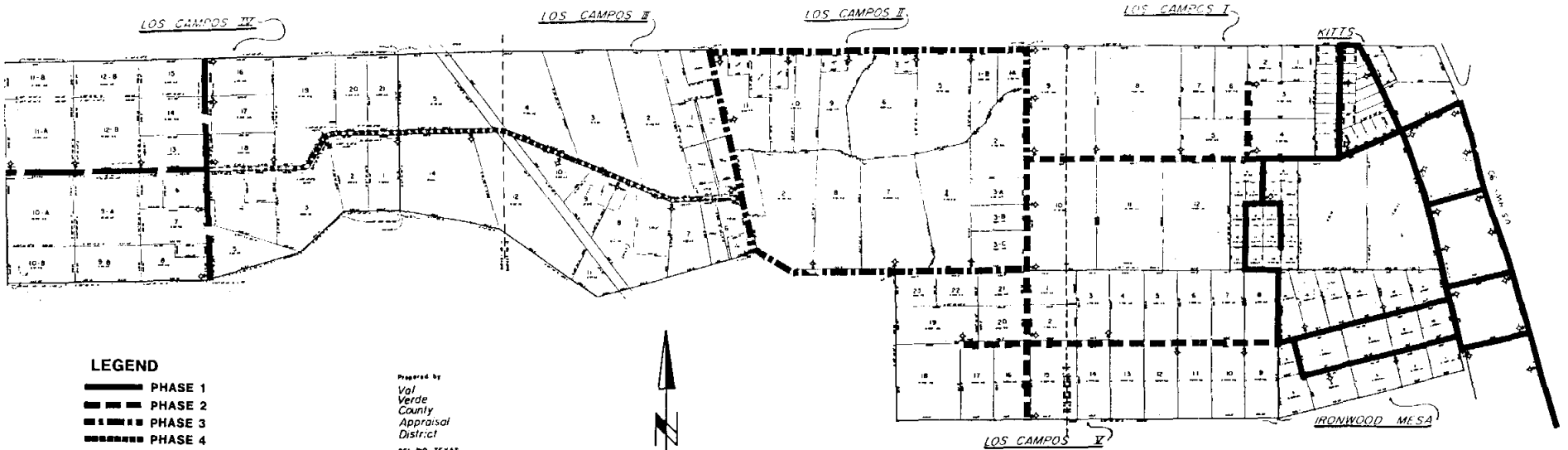
PROPOSED WATERWORKS SYSTEM

VAL VERDE PARK ESTATES

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants

FIGURE NO. V-3

LOS CAMPOS ADDITION



LEGEND

- PHASE 1
- PHASE 2
- PHASE 3
- PHASE 4
- PHASE 5
- FIRE HYDRANT

Prepared by
Val Verde County Appraisal District
DEL RIO, TEXAS
SEPTEMBER, 1986

0 400 800
GRAPHIC SCALE IN FEET

DESCRIPTION	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5
TOTAL ACRES	161	201	179	220	100
TOTAL LOTS	74	33	24	34	15
L.F. OF 8" WATER MAIN	12,000	5,000	6,000	5,500	4,000
L.F. OF 6" WATER MAIN	9,000	4,000	3,000	0	0
NO. OF FIRE HYDRANTS	21	13	13	7	8

CITY OF DEL RIO, TEXAS

PROPOSED WATERWORKS SYSTEM

LOS CAMPOS ADDITION

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Del Rio, Texas

FIGURE NO. V-4

2010	59,849	7.78	3.24
2020	72,344	9.40	3.92
2030	85,406	11.10	4.63
2040	92,767	12.06	5.03

* Based on criteria of the State Board of Insurance

In February, 1980, the State Board of Insurance (SBI) made a review of the water system to determine a Key Rate grading. The SBI also made an inspection of the City's fire department and fire prevention program. From these reviews by the SBI, their comments indicated that the 4.00 M.G. of ground storage amounted to less than a day's water use. The SBI further commented that for a water supply such as Del Rio has, no Key Rate charge would apply for lack of ground storage. A Key Rate charge would, however, apply when the elevated storage capacity becomes deficient.

It is apparent that the need for an analysis of the Del Rio's water system is eminent in order to determine how the system can be better and more efficiently operated with the installation of new storage tanks, high service pumping facilities, and transmission and distribution mains.

FIGURE NO. V-5, on the following page, shows the overall plan for the layout of major transmission mains. Again, the plan is conceptual, and the consideration of how the system can best be operated will need to be determined from a computer analysis.

- Rural Areas - Although the water systems in Comstock and Langtry are relatively small, the planning for future improvements is no less important than for the larger systems. If the systems are proposing to provide water service for both consumption and fire protection, the adequacy and reliability of the service will largely depend on compliance with the demand requirements and the regulations of the State agencies. This can be achieved by maintaining accurate and complete records of water-use, projecting the future needs, preparing capital improvement schedules, and installing the new improvements as they are needed.

The small areas of development around Lake Amistad will, likewise, experience some growth, and the water systems will need to be upgraded in order to maintain the reliability and adequacy of service.

4. Conclusions and Recommendations -

The following conclusions and recommendations are presented with regard to the regional planning for the waterworks systems.

a. Water Supply -

(1) The County of Val Verde is projected to require approximately 18.37 M.G.D. by the year 2010 and 26.74 M.G.D. by the year 2040, according to information developed by the Texas Water Development Board.
(2) Of the County's total water supply needs, the City of Del Rio will require 91%, or 16.66 M.G.D. of the water by the year 2010 and 25.08 M.G.D. by the year 2040.
(3) Laughlin Air Force Base will require about 7%, or 1.39 M.G.D. of the projected water supply needs of the County, with the remaining % of the water going to the rural areas.
(4) The current supply of water in the rural areas and communities of the County is primarily furnished from groundwater of varying depths.
(5) The supply of water for the City of Del Rio is presently obtained from five (5) wells (groundwater) and the San Felipe Sprrngs (surface water).
(6) Based on the City of Del Rio's projected needs for water, the City appears to have an adequate water supply through the year 2030.
(7) It is recommended that the rural areas, recreation parks, and County communities continue to utilize the groundwater resources as their primary water supply.
(8) It is recommended that the City of Del Rio actively seek surface water rights from other permittees out of the Amistad/Falcon water storage account.
(9) It is recommended that the City of Del Rio immediately initiate a study of the groundwater resources that may be available for development as a supplemental supply.

b. Water Treatment -

(1) The groundwater and surface water supplies utilized for the City of Del Rio's customers is chlorinated prior to the distribution.
(2) The groundwater supply for the smaller water systems of Comstock, Langtry, and the systems bordering Lake Amistad, also, is disinfected by the addition of chlorine.
(3) It is recommended that the groundwater and surface water be tested, as a minimum, once each year to determine the constituents.
(4) It is recommended that treatment of the water by chlorination continue, unless the quality of the water changes significantly.

(5) It is recommended that the wells used for production of water for domestic use be disinfected once each year, as a minimum.

c. Water Distribution -

(1) The rural communities of Comstock and Langtry, both have distribution systems, including storage tanks, high service pumping facilities, and pressure tanks.
(2) Other smaller water systems exist in the County such as around Lake Amistad that serve developments and recreation facilities.
(3) The City of Del Rio operates the largest water distribution system in Val Verde County, which currently serves approximately 10,184 customers.
(4) A potential of approximately 2,400 additional customers currently exists in the developments (colonias) outside the present City Limits.
(5) Del Rio's water distribution system is comprised of 4.00 M.G. of ground storage and 1.624 M.G. of elevated storage, high service pumping facilities, and mains up through 20 inches in diameter.
(6) It is recommended that the smaller water distribution systems in the County continue to operate as they have in the past, with the exception that an elevated tank may be utilized in the future in lieu of the pressure tank.
(7) It is recommended that the City of Del Rio initiate a water system study to determine how the system can be more efficiently and effectively operated.
(8) It is recommended that the water system study for Del Rio include a Hardy Cross Analysis for the two pressure planes which will provide future storage tank locations, size and location of transmission mains, future supply resources, and extensions to the developments (colonias) outside the present City Limits.
(9) It is recommended that the City of Del Rio initiate a capital improvements program to include additions to the major transmission main system (8 inches and larger) and replacement of substandard mains (4 inches and smaller).
(10) It is recommended that the City continue to investigate sources of unaccounted-for or "lost water" and meter the unsold water used for construction, parks, and other municipal operations.
(11) It is recommended that the City of Del Rio initiate steps, as may be appropriate, to seek grant funds through the State to assist in constructing the extensions to and improvements within the developments (colonias) outside the City.
(12) It is recommended that the planning for the future waterworks system generally follow the conceptual layout shown on FIGURE NO. V-5.

D. WASTEWATER SYSTEMS

1. Wastewater Collection -

a. Existing -

- Del Rio - The City's collection of sewerage is through a series of gravity mains in sizes of 6 inches through 18 inches in diameter. As part of the collection system, ten (10) sewage lift stations are currently maintained and operated to pump the sewage to a point where the flow can continue by gravity until it reaches the treatment plant. The following TABLE NO. V-11 lists the location of the existing lift stations and information available on each.

TABLE NO. V-11

EXISTING SEWAGE LIFT STATIONS

Location	Pumps	Type	Capacity (G.P.M.)	Motor H. P.	Main Dia.
No. Del Rio (Heghes)	2	Centrifugal	NA	5	4"
East U. S. 90	2	Submersible	NA	1	4"
U. S. 277-Eagle Pass HWY	2	Submersible	NA	2	4"
Perez & Barron	2	Submersible	NA	3	4"
Greenway & Qualia	2	Submersible	NA	NA	2"
Pierce & Holmig	1	Self-Priming	NA	7.5	4"
Meadow Lane	2	Submersible	NA	2	2"
Gillis Ave. & San Felipe Ck.	2	Submersible	NA	NA	4"
Nicholson	3	Submersible	NA	10	6"
Brinkley	2	Submersible	NA	3	2"

At the present time, the City of Del Rio serves approximately 7,970 residential customers and 790 commercial accounts.

The customers that receive only water services have on-site disposal systems (septic tanks and absorption field lines).

Most of the areas of development within the planning area of Del Rio, outside the City Limits, have on-site disposal systems. The developed lots of Cienegas Terrace and Val Verde Park Estates are relatively small, and, thus, the area available for installation of septic tank systems are very restrictive. According to the Val Verde County Soil Survey, prepared by the Soil Conservation Service, the soils are characterized as having moderate to severe limitations that affect septic tank absorption fields.

By definition of the Soil Conservation Service, moderate limitations indicates the "soil properties or site features are not favorable for the indicated use and special planning, design or maintenance is needed to overcome or minimize the limitations". The severe limitations is defined by the Soil Conservation Service "if said properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required".

The Los Campos Addition north of Del Rio has soils that are indicated by the Soil Conservation Service as having both moderate and severe limitations for septic tanks systems. The lots or tracts, however, are relatively large and the limitations can be overcome by increasing the size of the absorption field or possibly use another type of disposal system.

A map of the existing wastewater system, operated by Del Rio, is shown on the following page noted as FIGURE NO. V-6. Photographs of the existing lift stations are included following FIGURE NO. V-6.

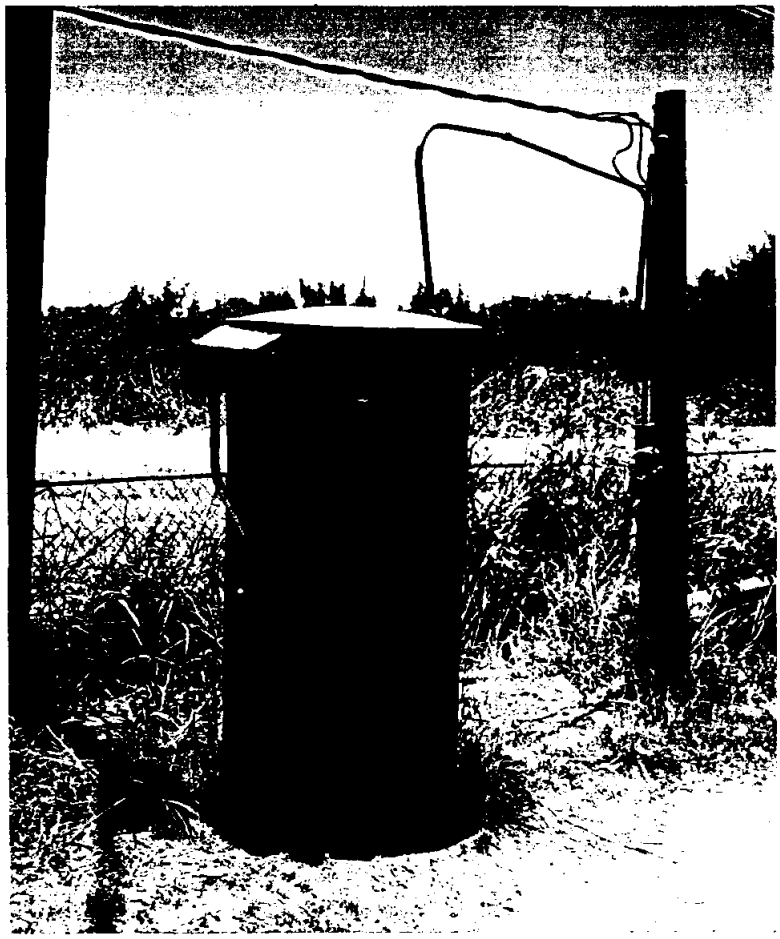
- Rural Areas - The residents in the communities of Comstock and Langtry both are served by individual on-site disposal systems.

All of the developed area of Langtry is on soils classified as having severe limitations for the installation of absorption fields. The major part of the development in Comstock is, also, on soils indicated by the Soil Conservation Service as having severe limitations for operating septic tank absorption fields.

b. Future -

- Del Rio - The City, as previously noted, operates ten (10) lift stations which require constant surveillance and maintenance, and, where possible, should eventually be eliminated with the installation of gravity sewers. Many of the lift stations within the main part of the City can be eliminated with the construction of a main interceptor sewer along San Felipe Creek. This installation would allow the Gillis Avenue, the Meadow Lane, the Nicholson Drive, the Perez/Barron Street lift stations to all be abandoned. Although the initial construction cost for this interceptor sewer main would be high, the long-term benefits would be lower system operation and maintenance costs and would greatly reduce the potential for the pollution of San Felipe Creek with raw sewerage overflows due to electrical or mechanical failures at the pumping stations.

CITY OF DEL RIO, TEXAS
EXISTING WASTEWATER SYSTEM FACILITIES



HEGHES
SEWAGE LIFT STATION

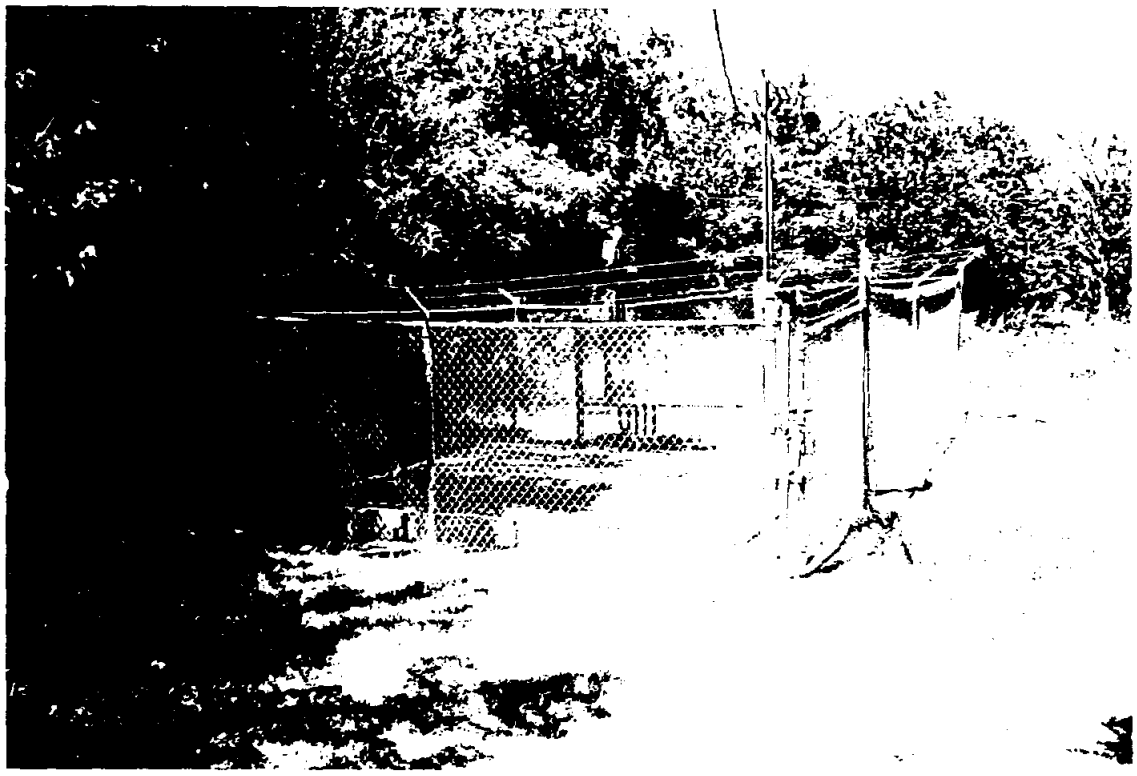
EAST OF U.S. HWY. 90
BEHIND APARTMENTS
AT 102 EDWARDS STREET

WET PIT/ DRY PIT TYPE
PRE-FABRICATED DUPLEX PUMPS
MANUFACTURED BY CAN-TEX CO.

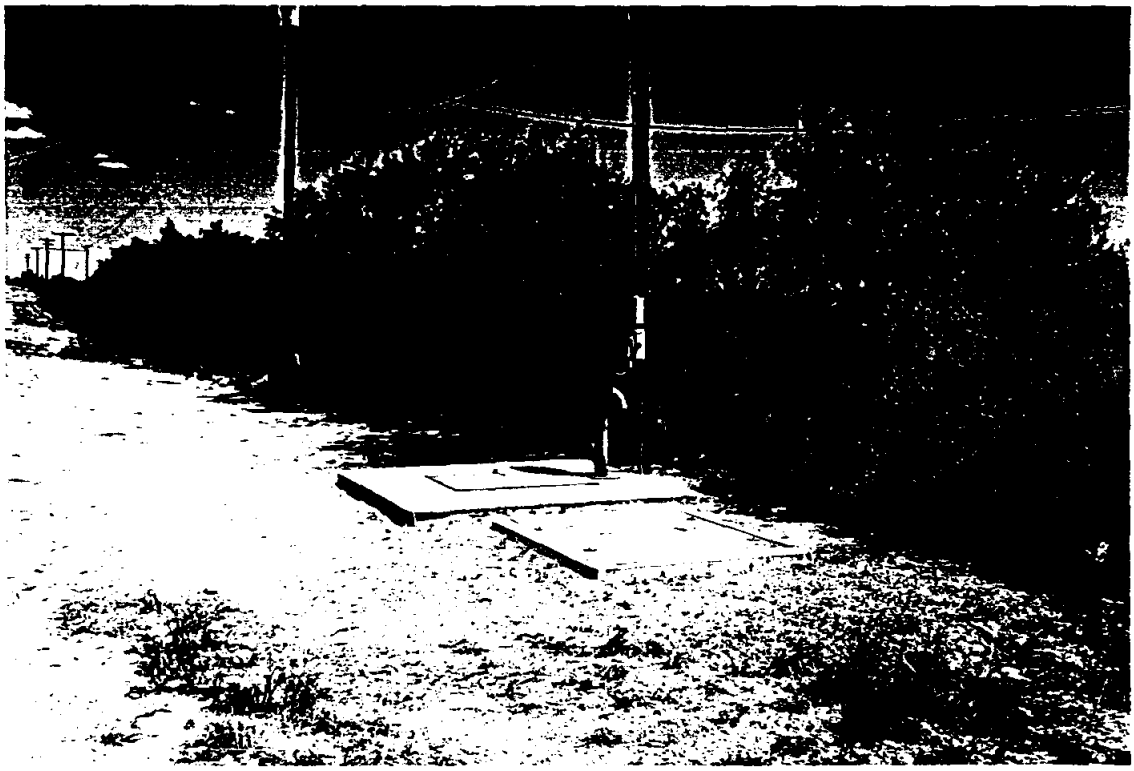
EAST U.S. HWY. 90 SEWAGE LIFT STATION
2 - SUBMERSIBLE-TYPE PUMPS

PEREZ AND BARRON STREETS
SEWAGE LIFT STATION

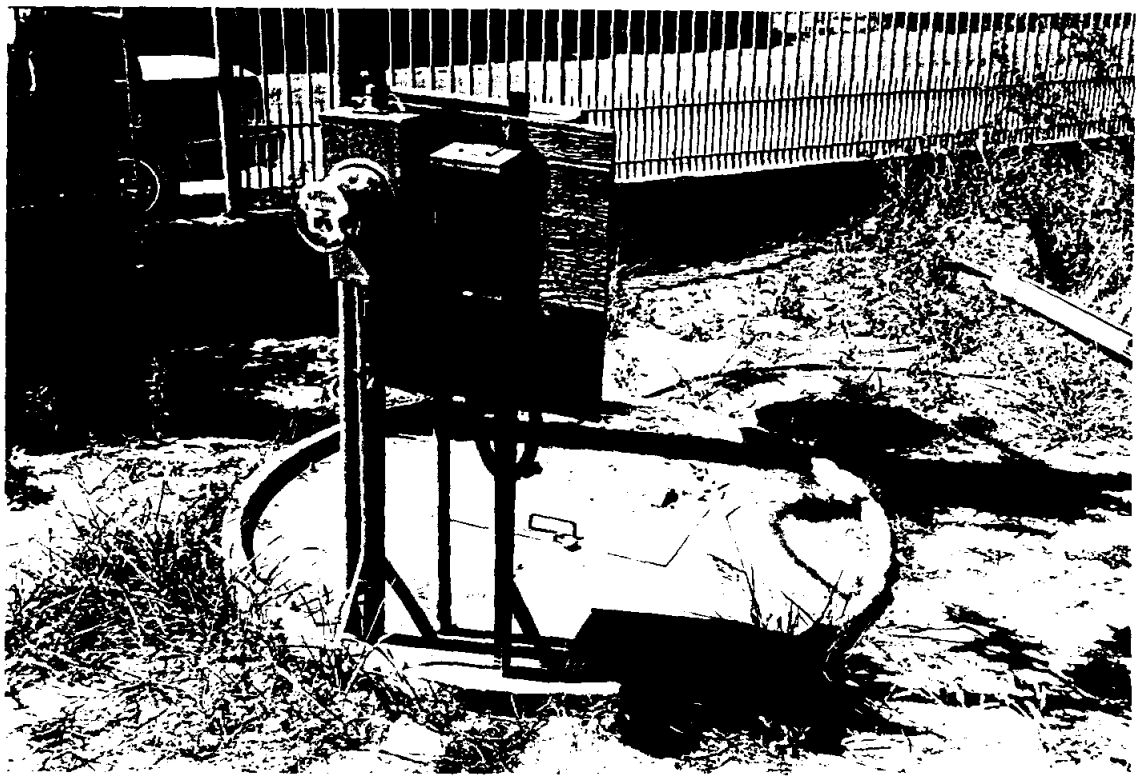
WET PIT TYPE WITH
DUAL PUMPING UNITS
AND 3 HP MOTOR



NICHOLSON DRIVE (RIVER ROAD)
SEWAGE LIFT STATION
THREE PUMPING UNITS



U.S. HWY. 277
SEWAGE LIFT STATION
DUAL SUBMERSIBLE-TYPE PUMPING UNITS



QUALIA DRIVE
SEWAGE LIFT STATION
DUAL SUBMERSIBLE-TYPE
PUMPING UNITS

MEADOW LANE
SEWAGE LIFT STATION
DUAL SUBMERSIBLE-TYPE
PUMPING UNITS

PIERCE AND HOLMIG STREETS
SEWAGE LIFT STATION

SINGLE SELF-PRIMING-TYPE PUMPING UNIT AT THE
PIERCE / HOLMIG STATION

In considering the provision for sewerage service to the developments (colonias) outside the present City limits, additional mains and lift stations with force mains will need to be constructed in some areas that will be parallel to the existing system.

Along the Rio Grande, randomly developed and remotely located residences will need to take special care to design on-site disposal systems so as to provide adequate capacity; however, if at all economically feasible, wastewater collection systems should be constructed to provide the sewerage service to carry the flows to either the Silver Lake or San Felipe Treatment Plant.

Where concentrated growth now or in the future occurs along the Rio Grande, it is recommended that a wastewater collection system be designed and constructed to provide capacity for ultimate growth. Treatment facilities will then be provided by either of the two existing plants of Del Rio or, if not feasible, a new treatment plant may need to be considered.

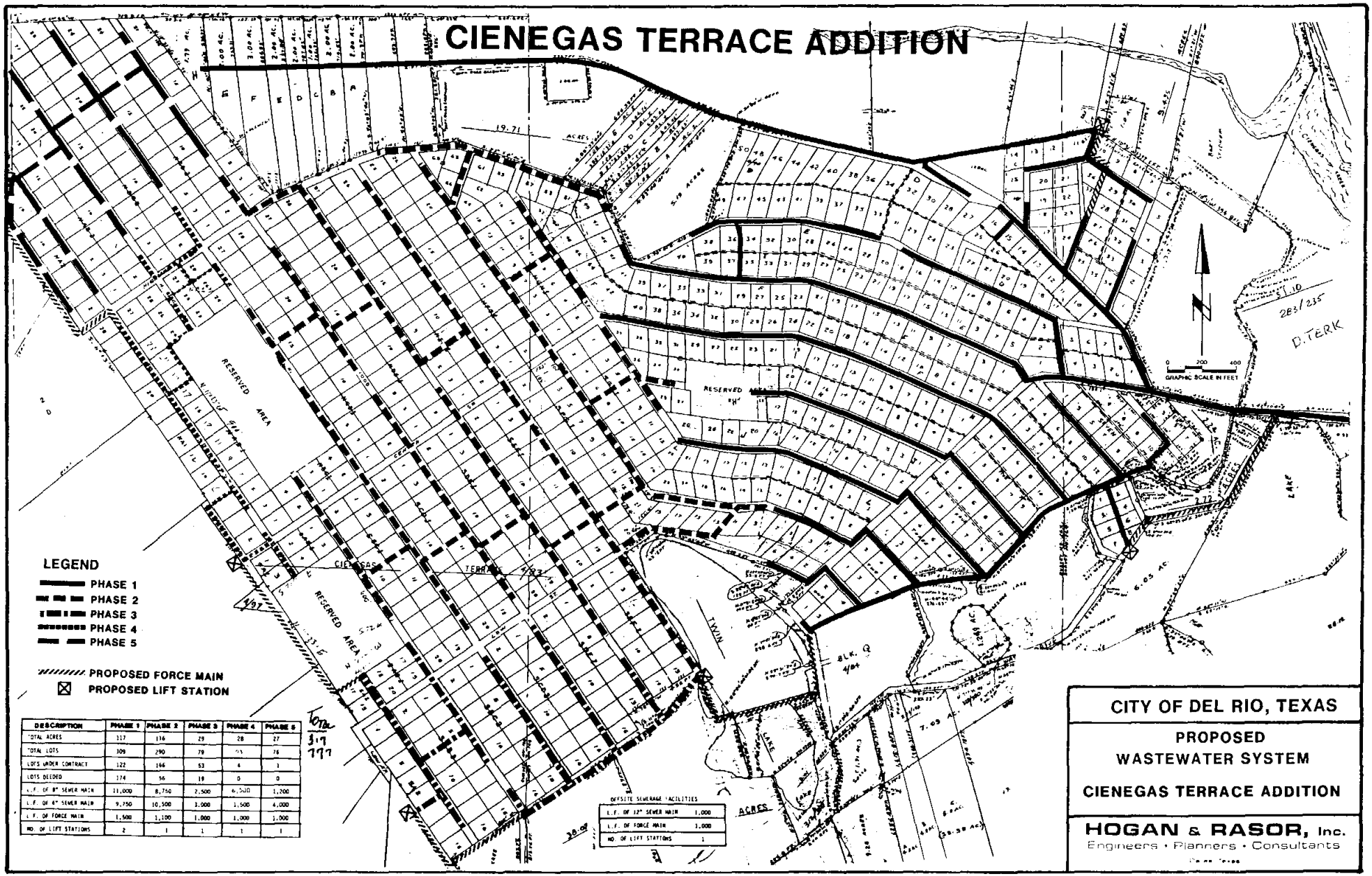
In other areas of the Del Rio system, lift stations will need to be maintained until further developments warrant the expansion and extensions of gravity sewers to relieve the need to pump the sewage to aggravity sewer main.

The future lift stations should have, as a minimum, two pumps with each having a capacity equal to the required peak flow for the area of development it serves.

The proposed gravity sewer mains should be designed to carry peak flows according to area of potential development. In many cases, the initial construction of the pipe required is prohibitive because of costs; therefore, parallel mains can be planned to be installed in stages.

In construction of parallel mains, particularly across private properties, sufficient right-of-way or easement width must be acquired along with a temporary construction easement. Normally, an easement width of 20' to 25' is adequate for a single sewer main, and 40' to 50' is needed for dual sewer mains so that access for maintenance is convenient.

FIGURE NO. V-7, following this page, illustrates a conceptual plan for the major outfall and interceptor sewer mains that may be required to serve developments within the service area of Del Rio.



DESCRIPTION	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5
TOTAL ACRES	117	116	29	28	27
TOTAL LOTS	309	290	79	93	76
LOTS UNDER CONTRACT	122	166	53	4	1
LOTS DEEDED	174	56	18	0	0
L.F. OF 8" SEWER MAIN	11,000	8,750	2,500	6,500	1,200
L.F. OF 6" SEWER MAIN	9,750	10,500	3,000	1,500	4,000
L.F. OF FORCE MAIN	1,500	1,100	1,000	1,000	1,000
NO. OF LIFT STATIONS	2	1	1	1	1

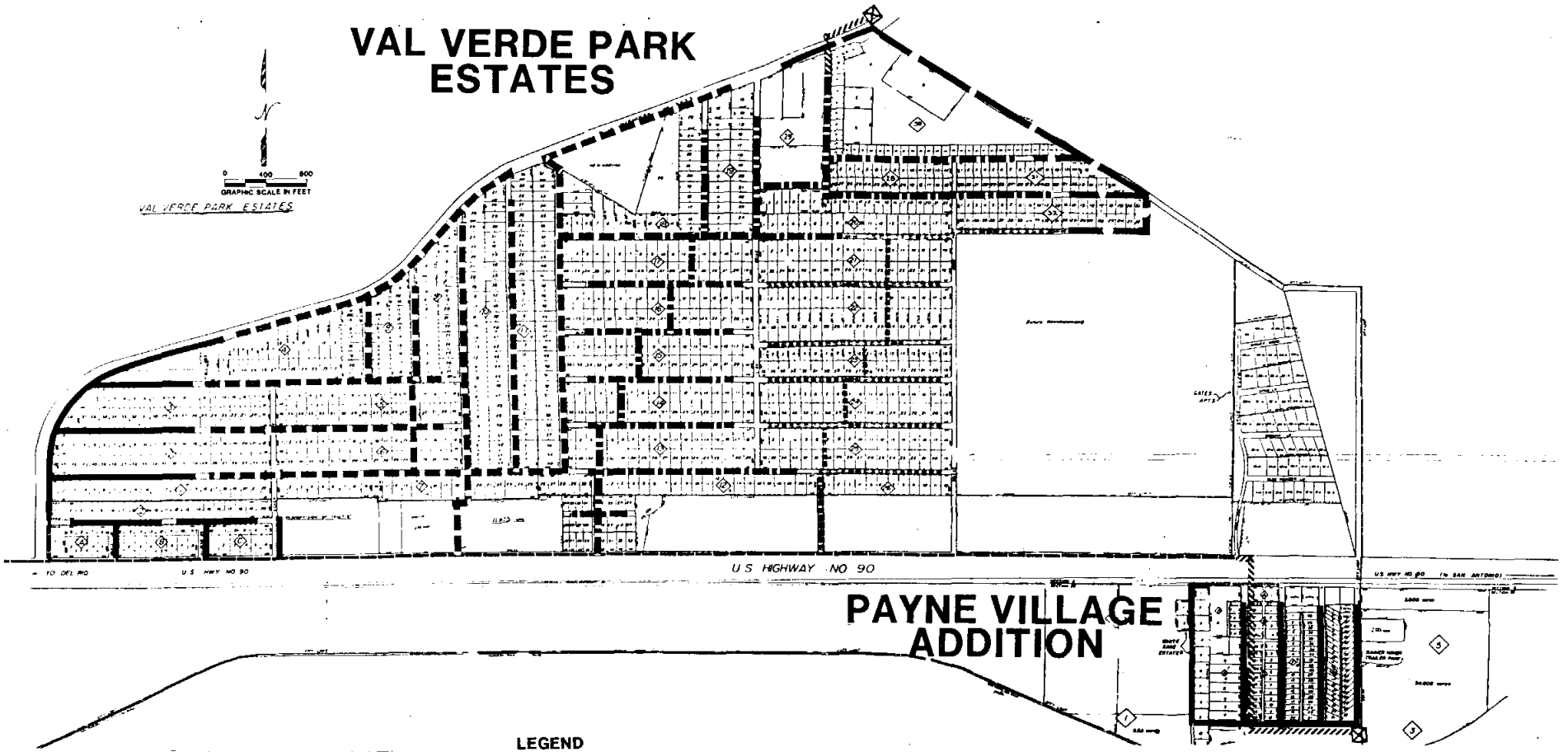
CITY OF DEL RIO, TEXAS

PROPOSED
WASTEWATER SYSTEM

CIENEGAS TERRACE ADDITION

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants

FIGURE NO. V-8



DESCRIPTION	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5
TOTAL ACRES	123	214	195	104	39
TOTAL LOTS	276	354	390	201	43
L.F. OF 8" SEWER MAIN	0	14,500	10,000	3,500	3,000
L.F. OF 6" SEWER MAIN	9,000	9,500	10,000	8,500	1,000
L.F. OF FORCE MAIN	2,500	0	0	0	1,300
NO. OF LIFT STATIONS	1	0	0	0	1

LEGEND

- PHASE 1
- PHASE 2
- PHASE 3
- PHASE 4
- PHASE 5
- PROPOSED FORCE MAIN
- PROPOSED LIFT STATION

CITY OF DEL RIO, TEXAS

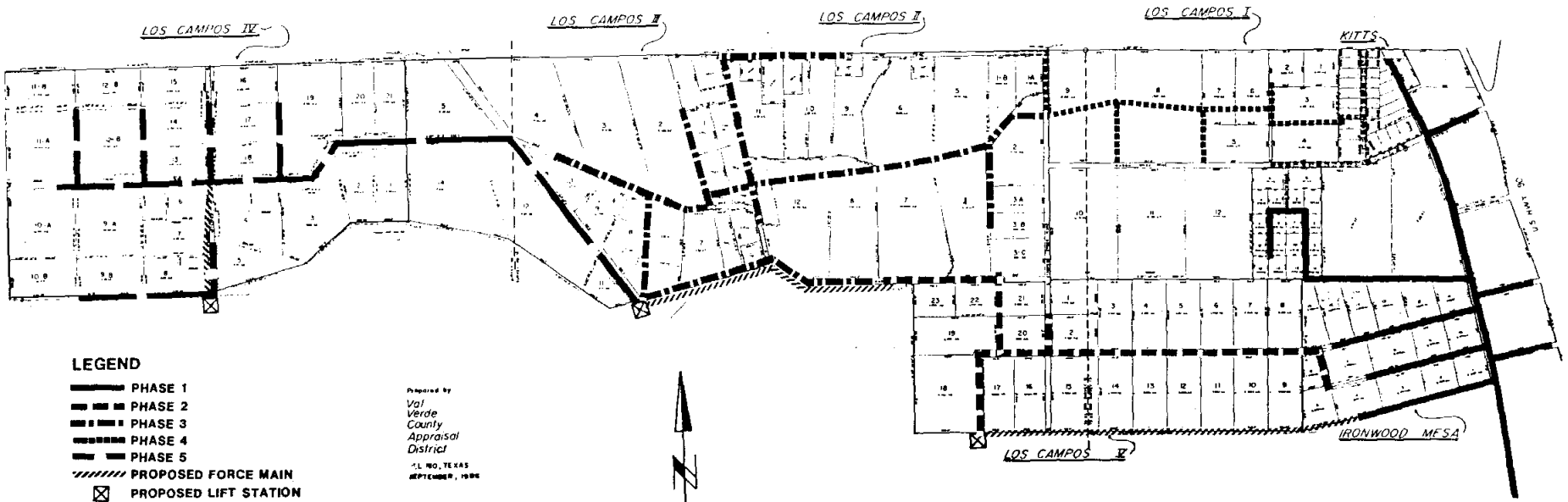
PROPOSED WASTEWATER SYSTEM

VAL VERDE PARK ESTATES

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Del Rio, Texas

FIGURE NO. V- 9

LOS CAMPOS ADDITION



LEGEND

- PHASE 1
- PHASE 2
- PHASE 3
- PHASE 4
- PHASE 5
- PROPOSED FORCE MAIN
- PROPOSED LIFT STATION

Prepared by
Val Verde County Appraisal District
DEL RIO, TEXAS
SEPTEMBER, 1986

GRAPHIC SCALE IN FEET
0 400 800

DESCRIPTION	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5
TOTAL ACRES	145	126	225	133	228
TOTAL LOTS	49	25	38	35	32
L.F. OF 8" SEWER MAIN	4,000	5,000	7,500	3,500	6,000
L.F. OF 6" SEWER MAIN	8,000	1,000	5,000	4,000	5,500
L.F. OF FORCE MAIN		3,500	2,500	0	1,000
NO. OF LIFT STATIONS		1	1	0	1

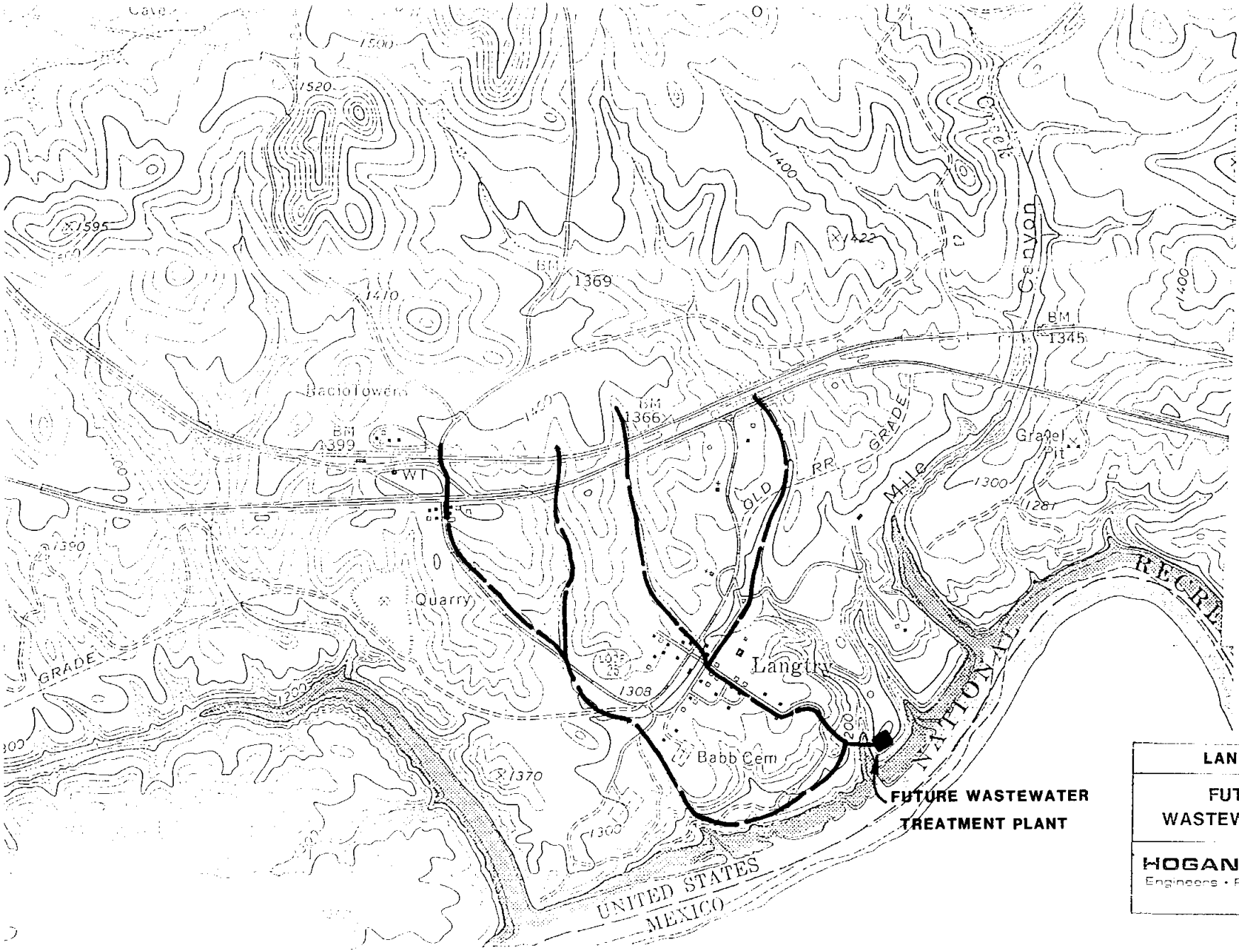
CITY OF DEL RIO, TEXAS

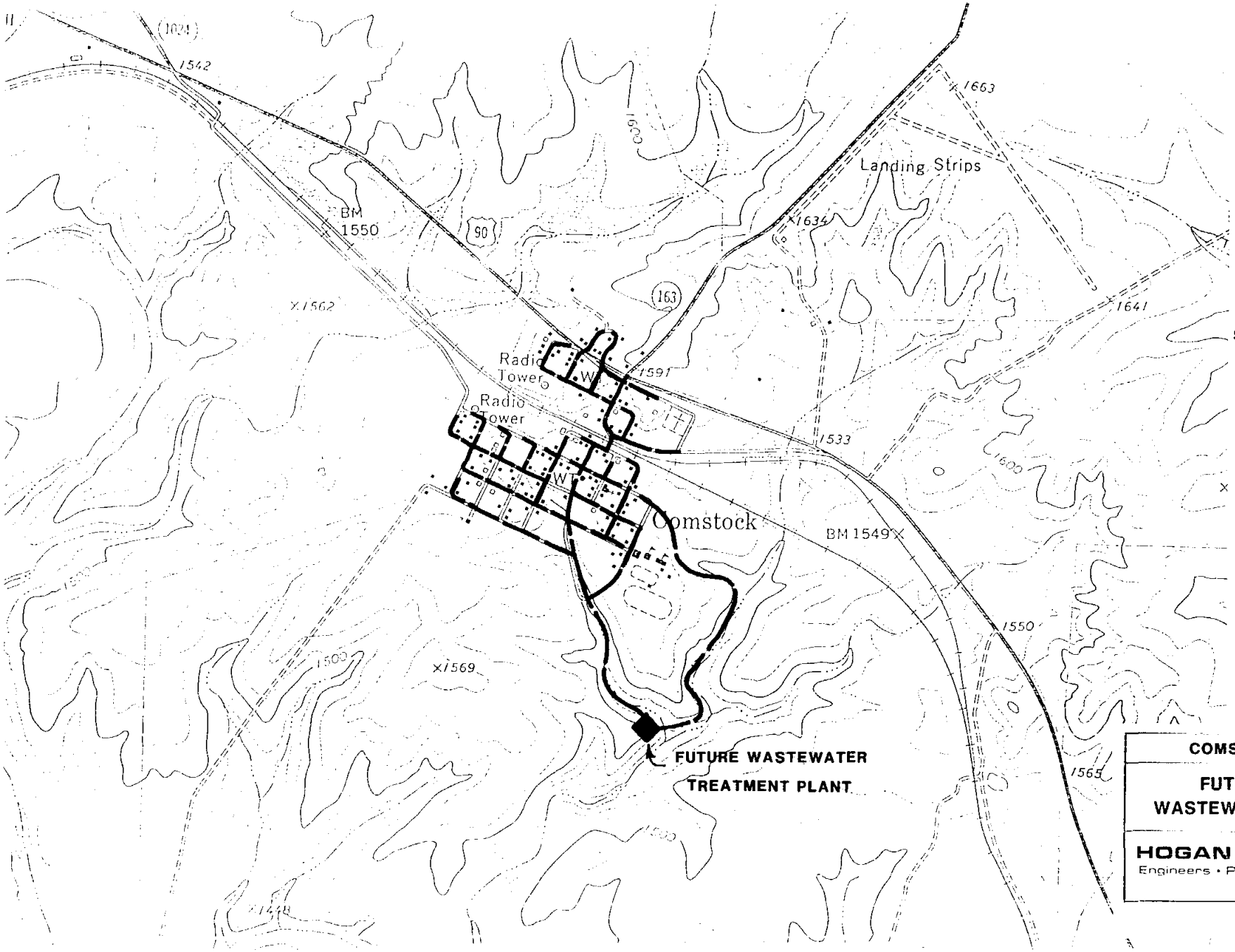
PROPOSED
WASTEWATER SYSTEM

LOS CAMPOS ADDITION

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Del Rio, Texas

FIGURE NO. V-10


SCALE: 1" = 1,000'
FUTURE WASTEWATER TREATMENT PLANT
LANGTRY, TEXAS
FUTURE PLAN
WASTEWATER SYSTEM
HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas, Texas
FIGURE NO. V-11



SCALE: 1" = 1,000'

COMSTOCK, TEXAS

FUTURE PLAN
WASTEWATER SYSTEM

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas, Texas

FIGURE NO. V-12

Following FIGURE NO. V-7, FIGURES NO. V-8, NO. 9, and NO. 10, show the overall layout for the wastewater collection systems for the Cienegas Terrace, Val Verde Park, and Los Campos developments, respectively.

FIGURES NO. V-11 and NO. V-12 show a very general layout for planning a wastewater collection system for the communities of Langtry and Comstock, respectively.

2. Wastewater Treatment -

a. Existing -

- Del Rio - The City currently operates three (3) wastewater treatment plants located on separate sites, being the Round Mountain Plant, the San Felipe Plant, and the Silver Lake Plant.

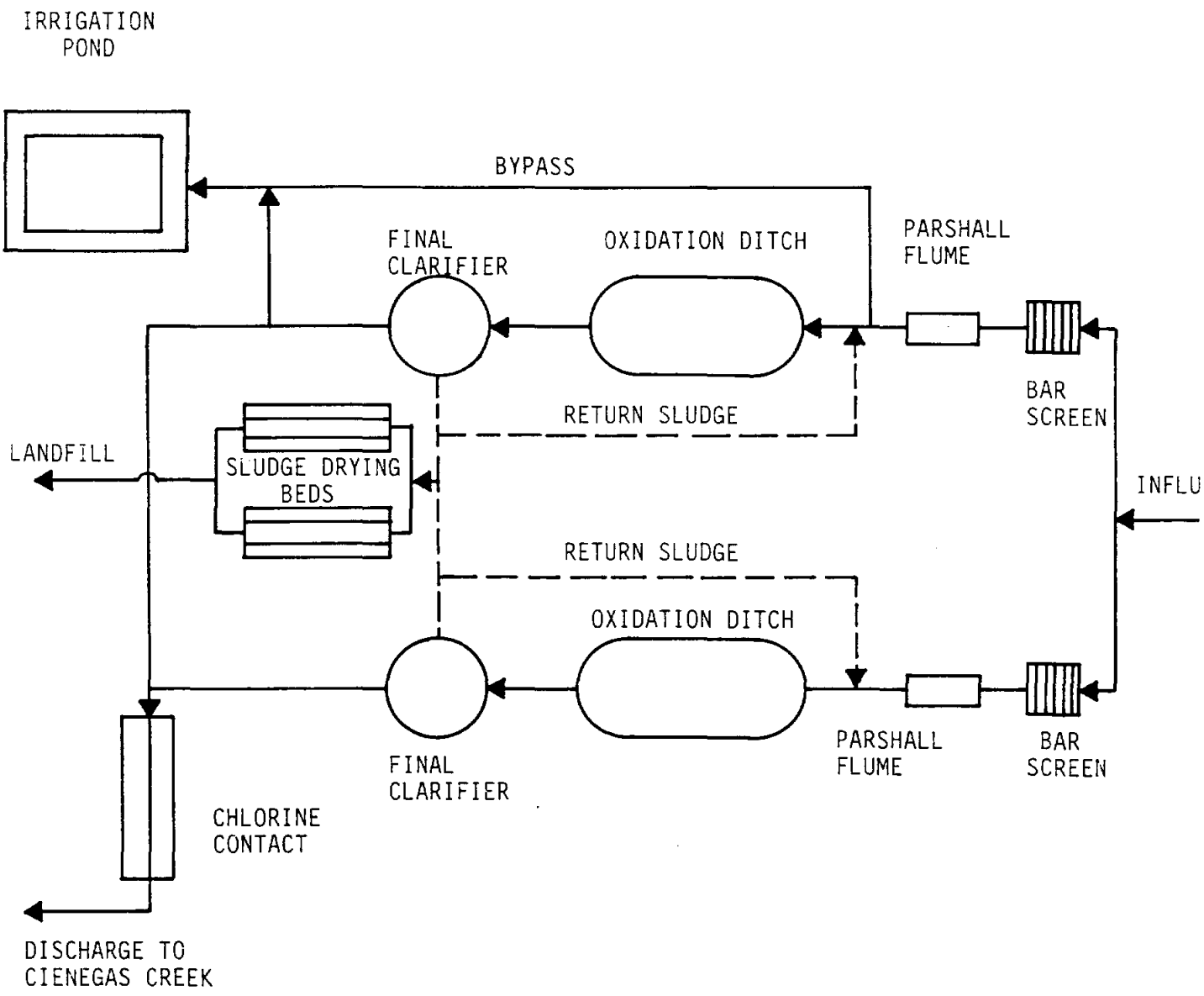
All of the plants have a similar type of treatment process which include an oxidation ditch receiving raw sewage, a final clarifier for solids settling and removal, sludge drying beds, and a chlorine contact chamber for detention of the flow prior to releasing the wastewater to the receiving stream. Schematic flow diagrams for each of the plants are shown on the following pages (FIGURES NO. V-13, NO. V-14, and NO. V-15).

The flow records of each plant are presented in paragraph B.2. of this Part V, and when combined, the average daily flow for the past years of 1985 through 1988 ranged from 4.04 to 5.39 M.G.D. The average flow the four-year period was 4.46 M.G.D. With an average population for the same period of time estimated at 34,800, the daily flow per capita was derived to be 128 gallons.

At the present time, their are no significant commercial or industrial wastewater flows received at the City's treatment facilities. The sewage flows currently being discharged from the industrial and commercial districts are basically a strength of residential sewage and, thus, poses no adverse loading impact on the treatment facilities.

The average sewage flow currently being received at each plant equals or exceeds 75% of the plant's permitted capacity; thus, according to the Texas Water Commission, with this condition of exceeding the permitted average daily flow occurring for three (3) consecutive months, the City must initiate engineering and financial planning for expansion and/or upgrading the wastewater treatment plant(s).

The present permitted capacities of each of the City's wastewater treatment plants are as follows:

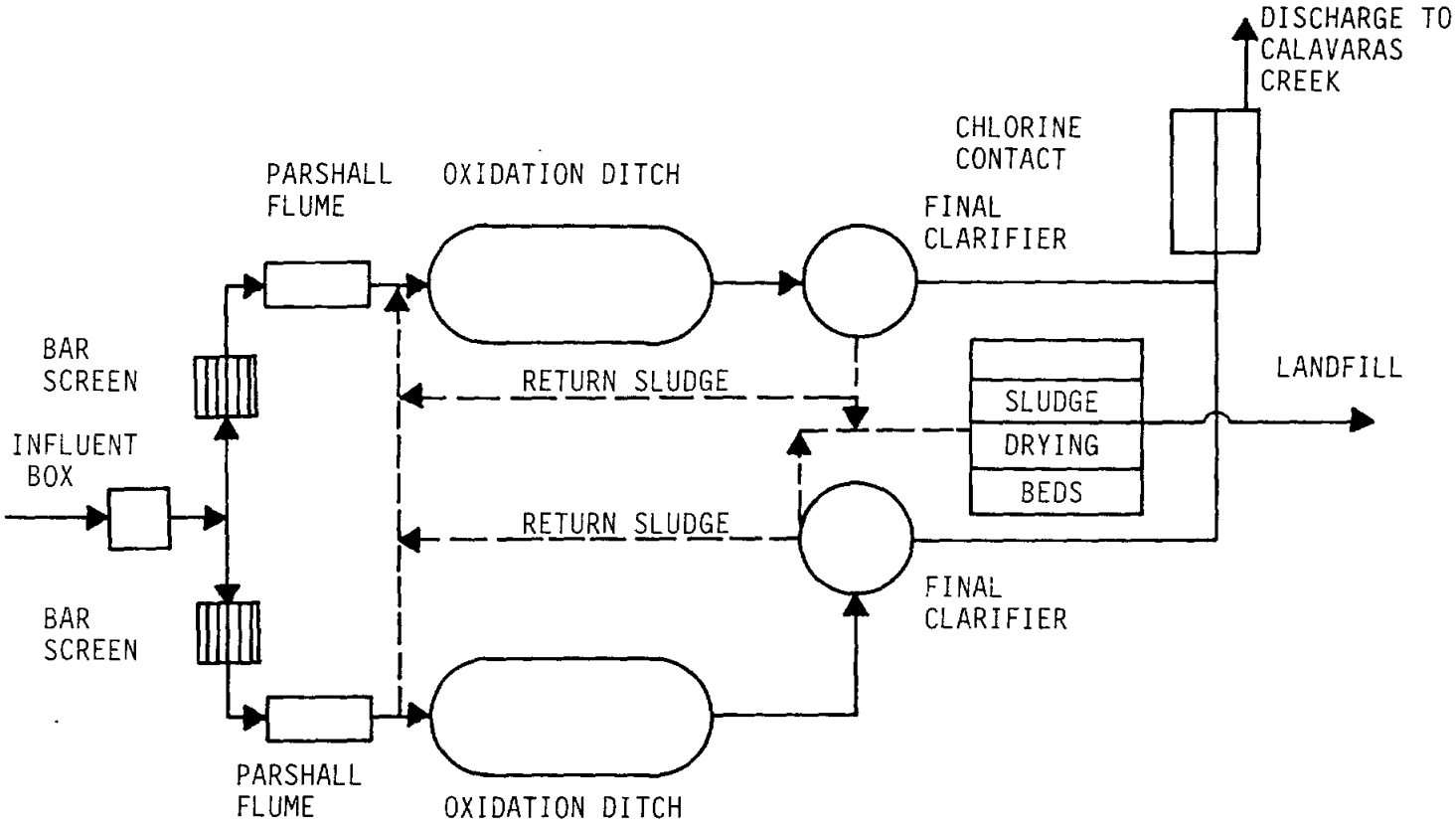


CITY OF DEL RIO, TEXAS

SILVER LAKE
WASTEWATER TREATMENT PLANT
SCHEMATIC FLOW DIAGRAM

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas, Texas

FIGURE NO. V- 13

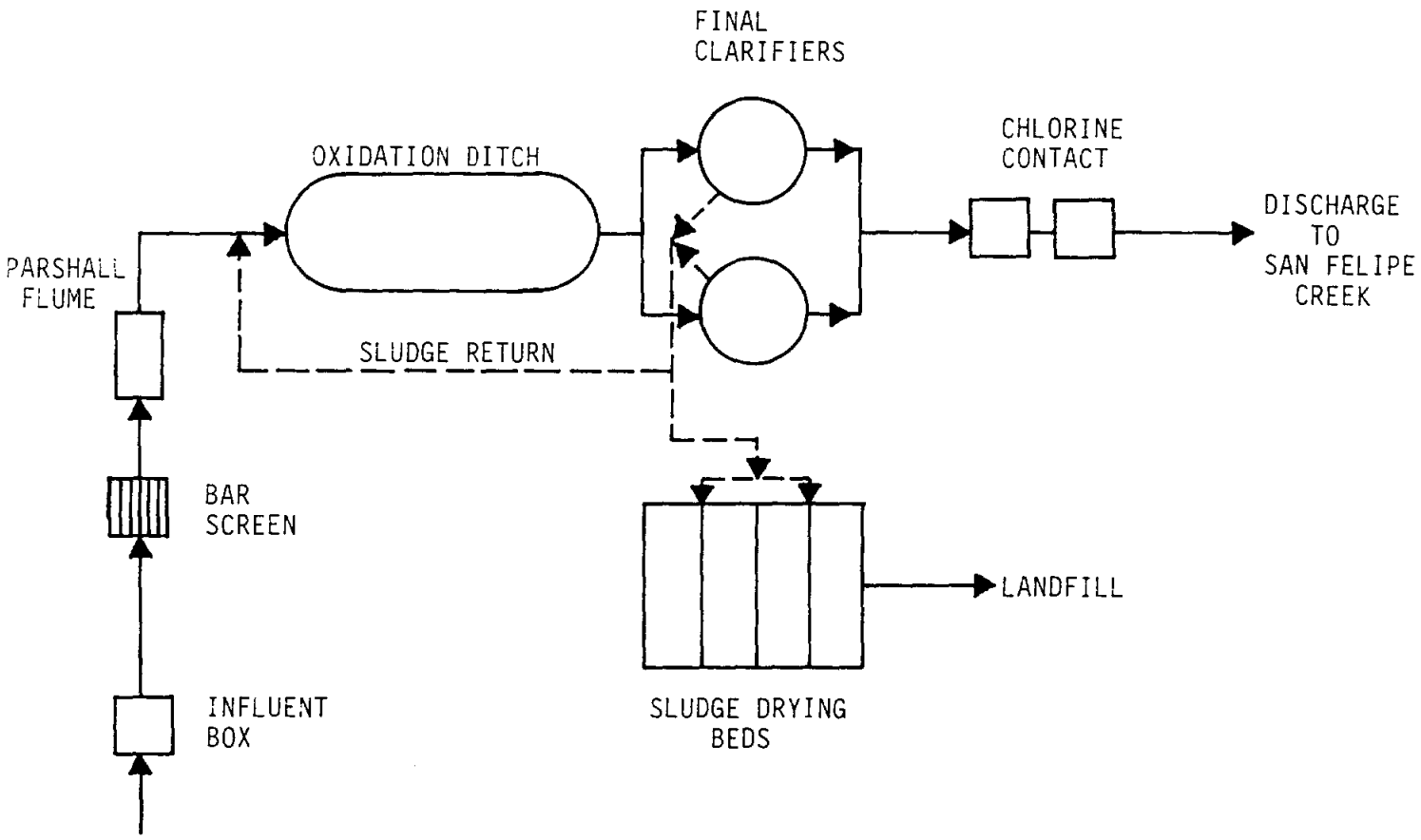


CITY OF DEL RIO, TEXAS

ROUND MOUNTAIN
WASTEWATER TREATMENT PLANT
SCHEMATIC FLOW DIAGRAM

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas, Texas

FIGURE NO. V-14



CITY OF DEL RIO, TEXAS

SAN FELIPE
WASTEWATER TREATMENT PLANT
SCHEMATIC FLOW DIAGRAM

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas, Texas

FIGURE NO. V-15

TABLE NO. V-12

CURRENT PERMITTED CAPACITIES
FOR
WASTEWATER TREATMENT

Plant	Flow (M.G.D.) Avg.	Peak	Effluent Quality BOD_5 (mg/l)	TSS (mg/l)
San Felipe	1.63	2.90	20	20
Round Mountain	0.61	1.84	20	20
Silver Lake	1.76	5.28	20	20

Photographs of the City's existing wastewater treatment facilities are shown on the following pages.

- Rural Areas - The existing treatment facilities in the rural communities of Comstock and Langtry, the small developments around Lake Amistad, and the individual residents of the County operate on-site disposal systems being either septic tank and absorption fields, evapotranspiration systems, and/or lagoons.

b. Future -

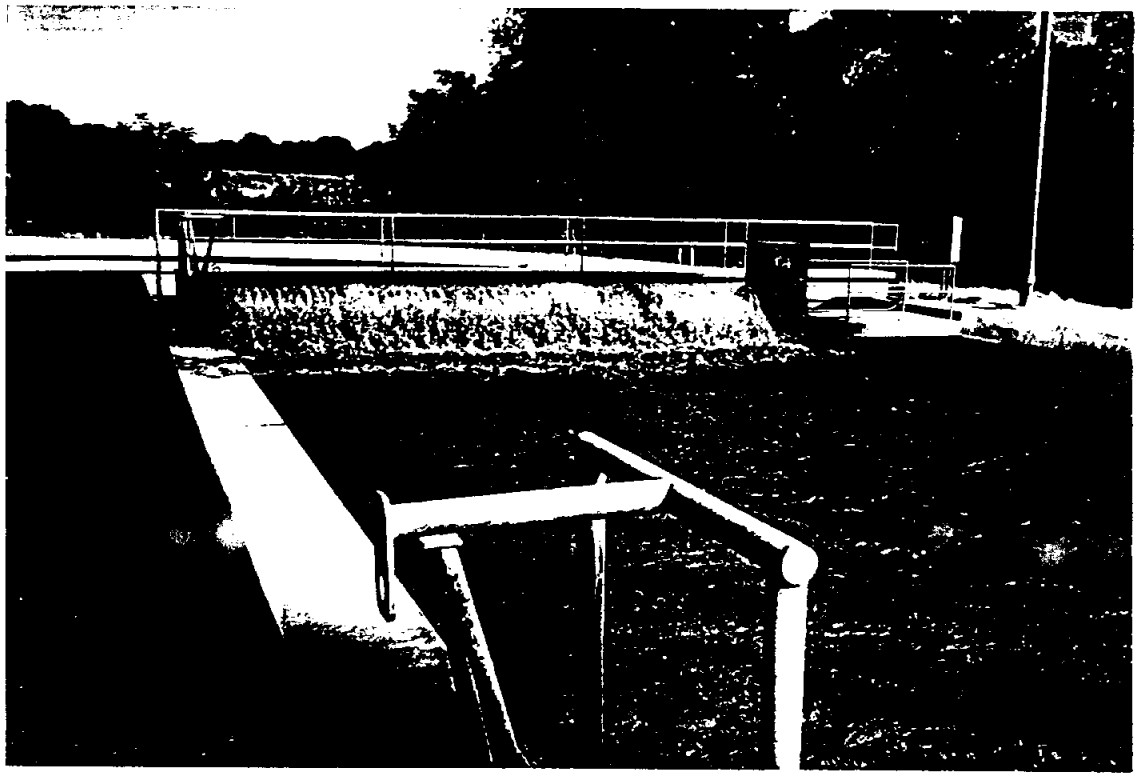
- Del Rio - In February of 1988, an update of the City's Capital Improvement Program for the Water and Wastewater System, prepared by Lockwood, Andrews & Newnam, Inc., proposed that the Round Mountain Wastewater Treatment Plant be expanded from the present capacity of 0.61 M.G.D. to 2.0 M.G.D. at an estimated cost of $1,500,000. At that time of planning for this expansion, Laughlin Air Force Base was considering the transporting of their wastewater to the City of Del Rio for treatment, however, the feasibilty of this plan of treating Laughlin's wastewater was not thoroughly investigated. It noted in the 1988 Update that the costs for any additional expansion and operation and maintenance required for treatment of Laughlin's wastewater flows would be borne by Laughlin Air Force Base.

Since the preparation of the 1988 Update of the City's Capital Improvements Program, other studies and reports have been completed which alters the plan to maintain the treatment facilities at the Round Mountain site. In August of 1988, a discharge permit application was prepared for the City for the San Felipe Wastewater Treatment Plant. This permit application considers the transfer of the wastewater flows from the Round Mountain Plant to the San Felipe Plant. The discharge permit

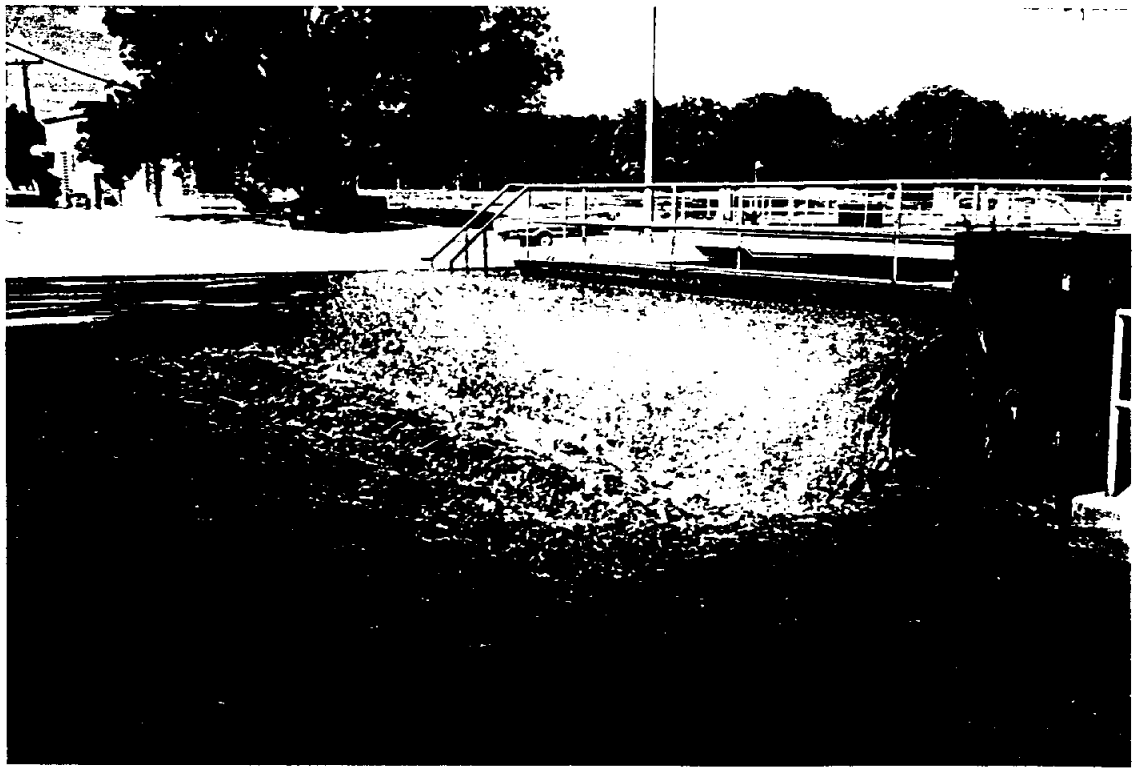
SAN FELIPE
WASTEWATER TREATMENT PLANT
EXISTING FACILITIES

OXIDATION DITCH

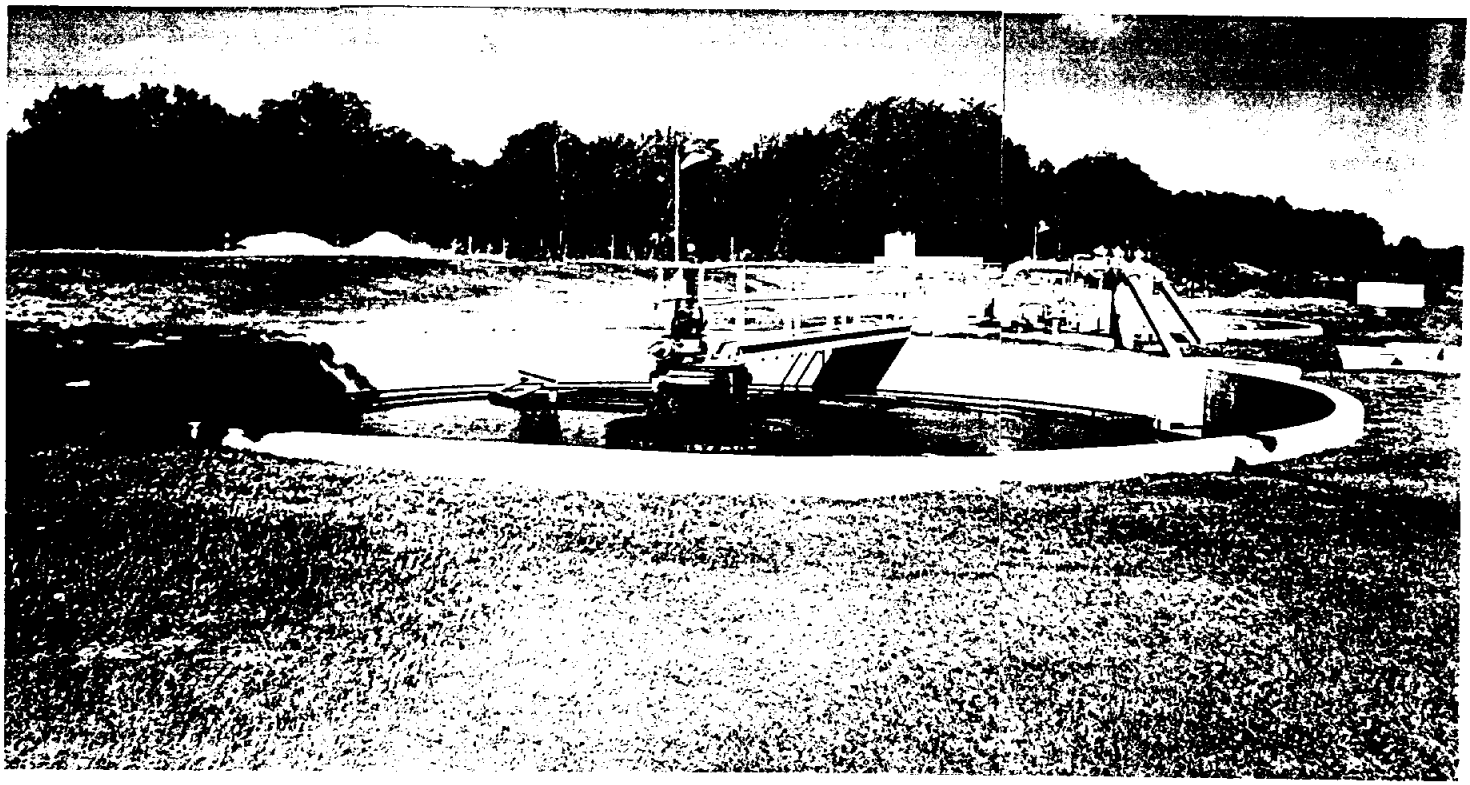
INLET STRUCTURE
WITH BAR SCREEN AND PARSHALL FLUME



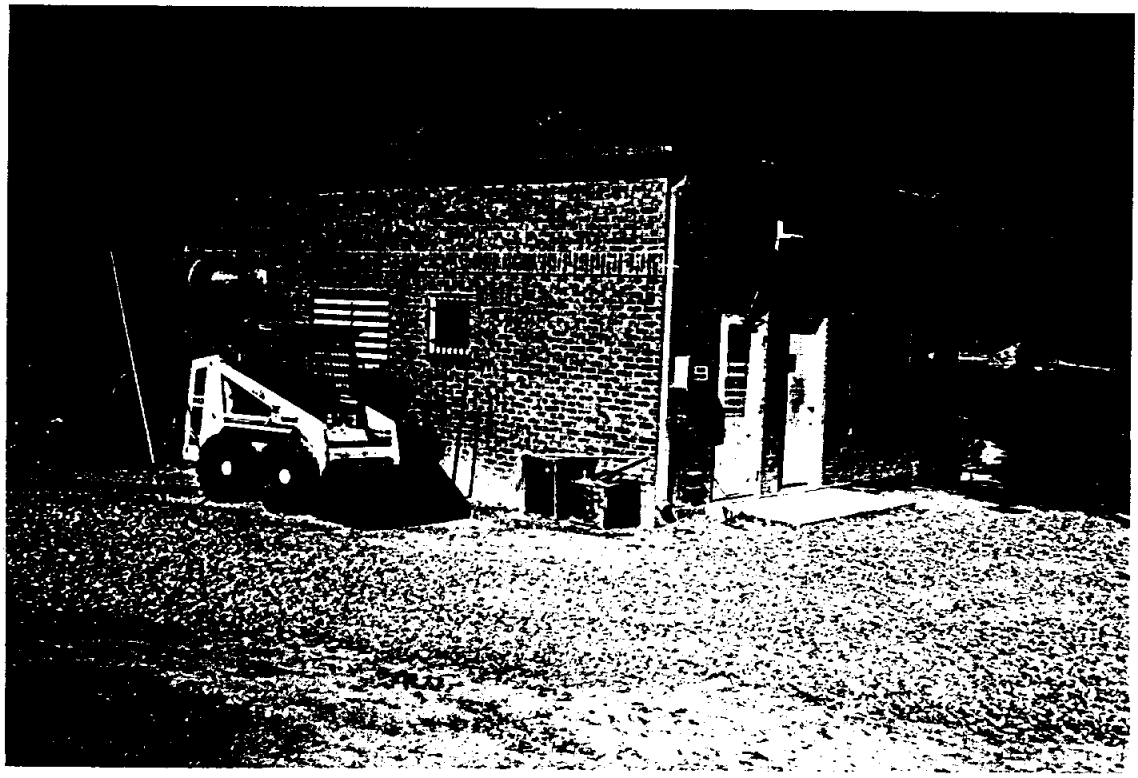
ROTOR AT NORTH END OF
OXIDATION DITCH



ROTOR AT SOUTH END OF
OXIDATION DITCH

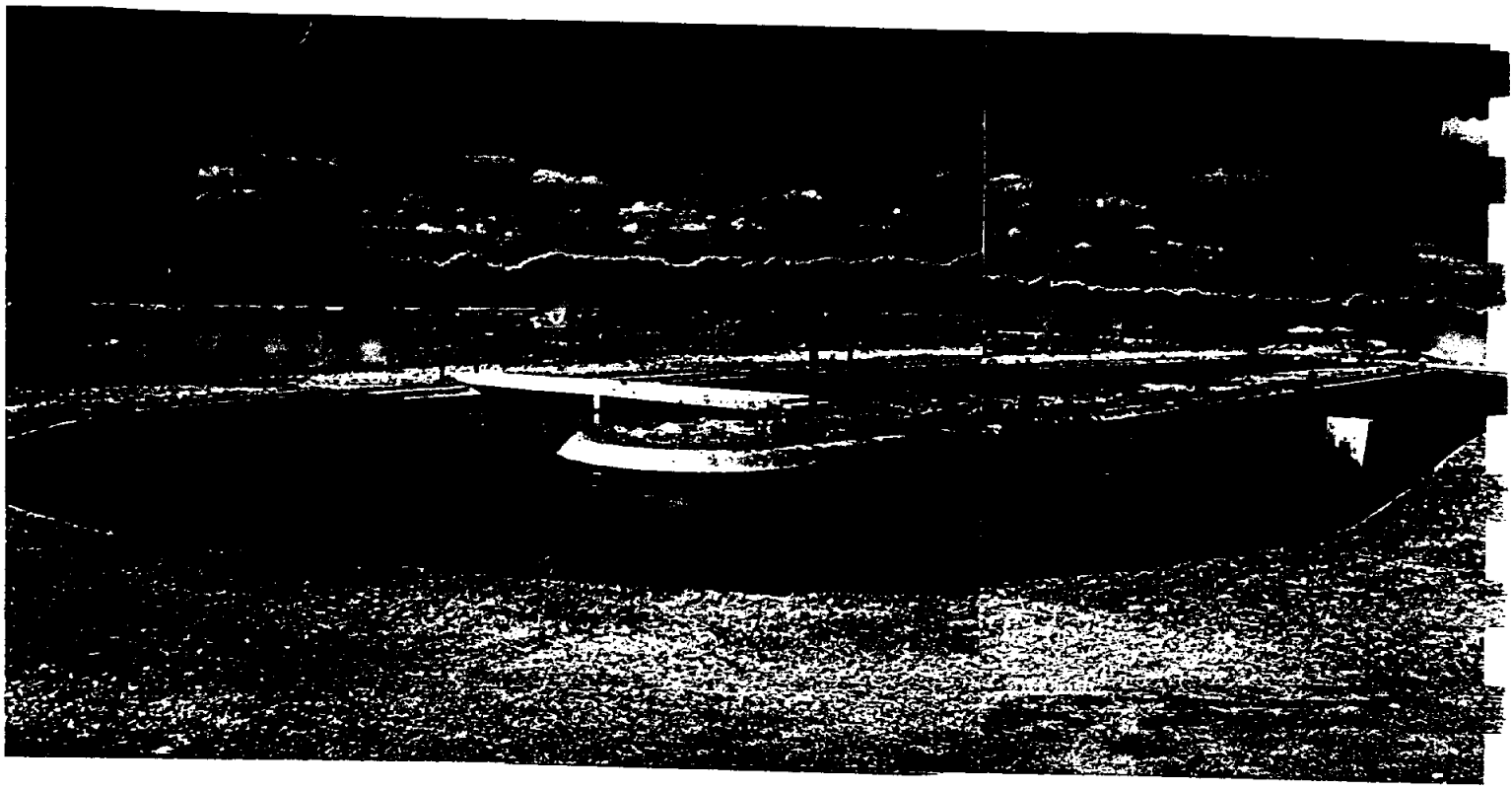


FINAL CLARIFIERS

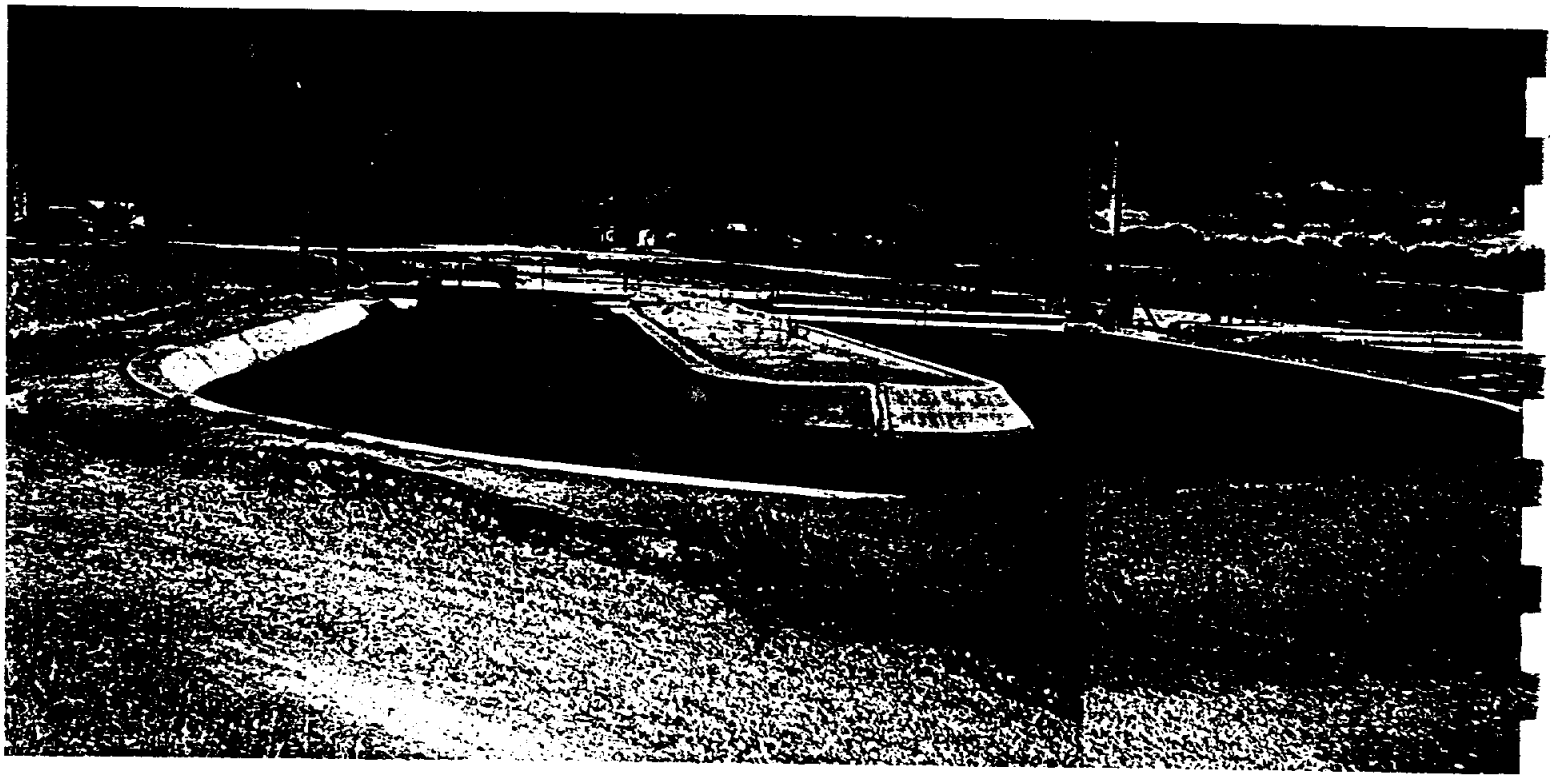


LABORATORY AND
CHLORINATION EQUIPMENT

ROUND MOUNTAIN
WASTEWATER TREATMENT PLANT
EXISTING FACILITIES

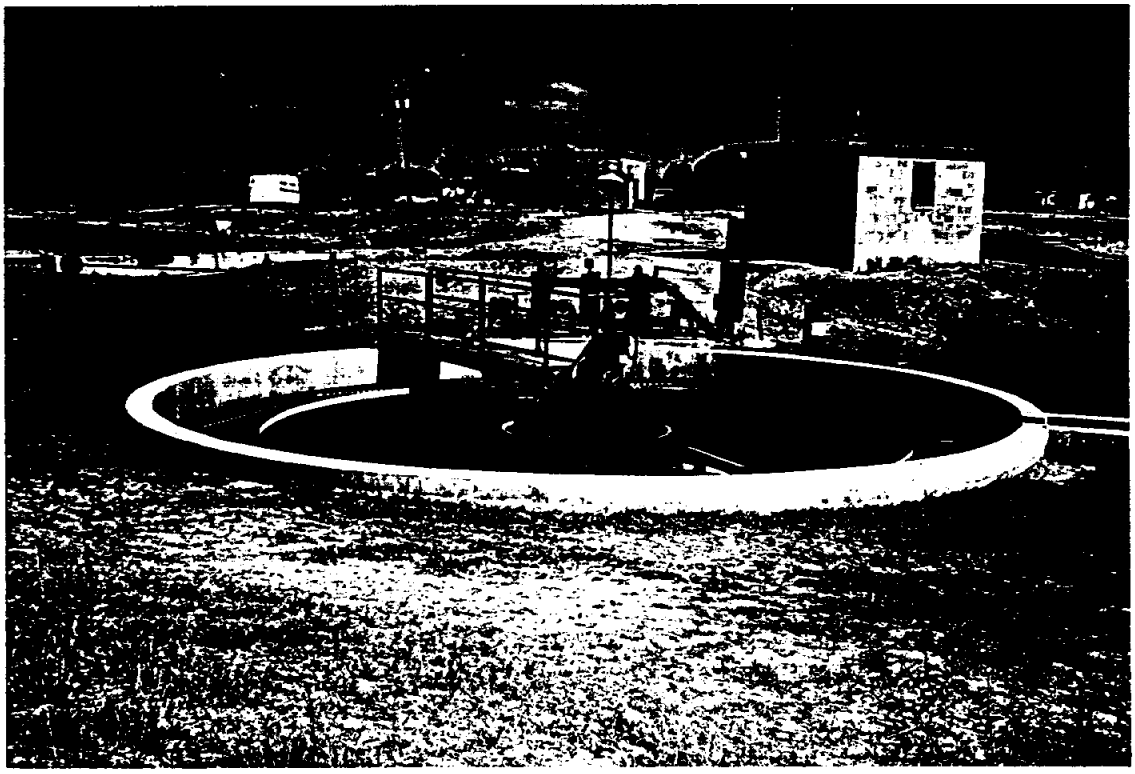


OXIDATION DITCH NO. 1



OXIDATION DITCH NO. 2

FINAL CLARIFIER



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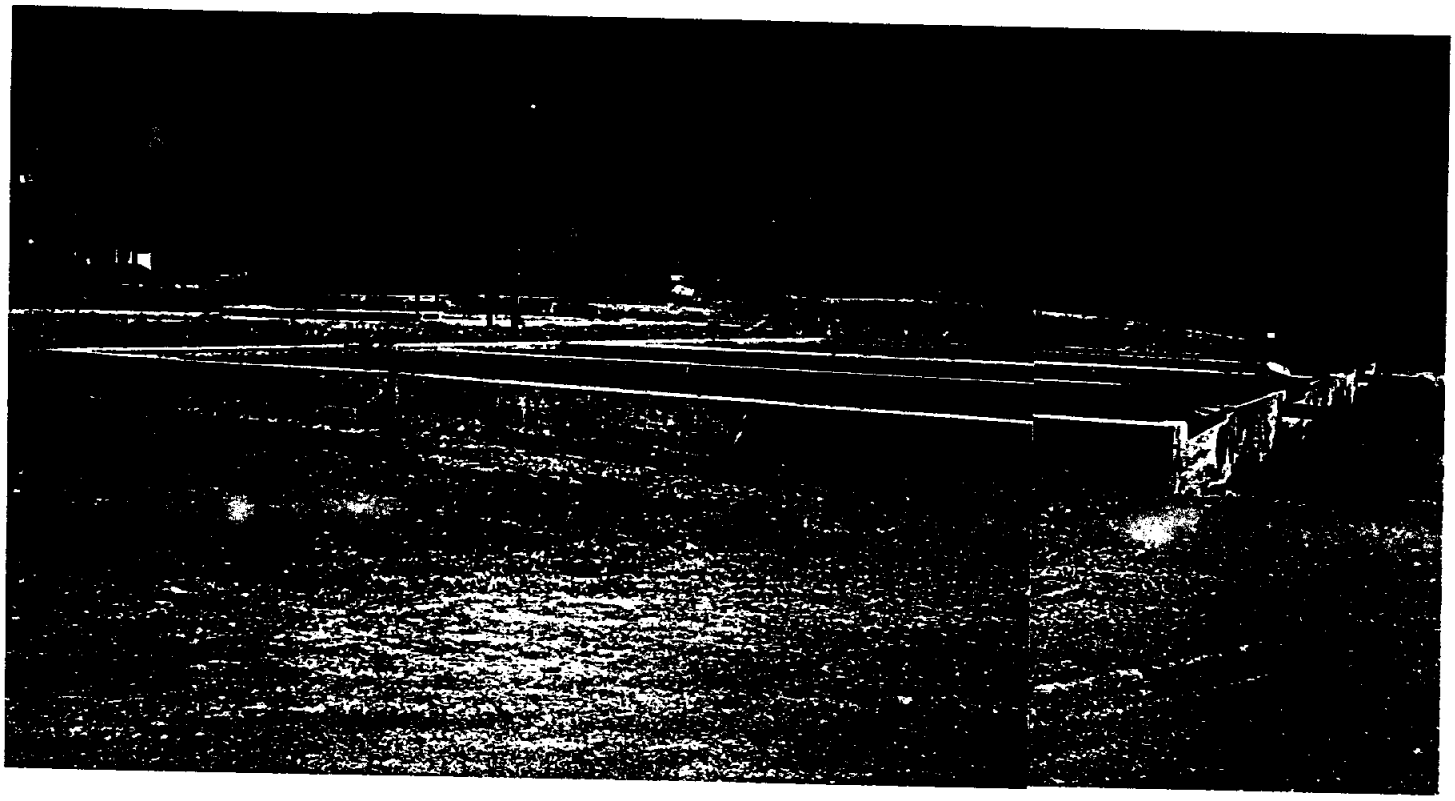
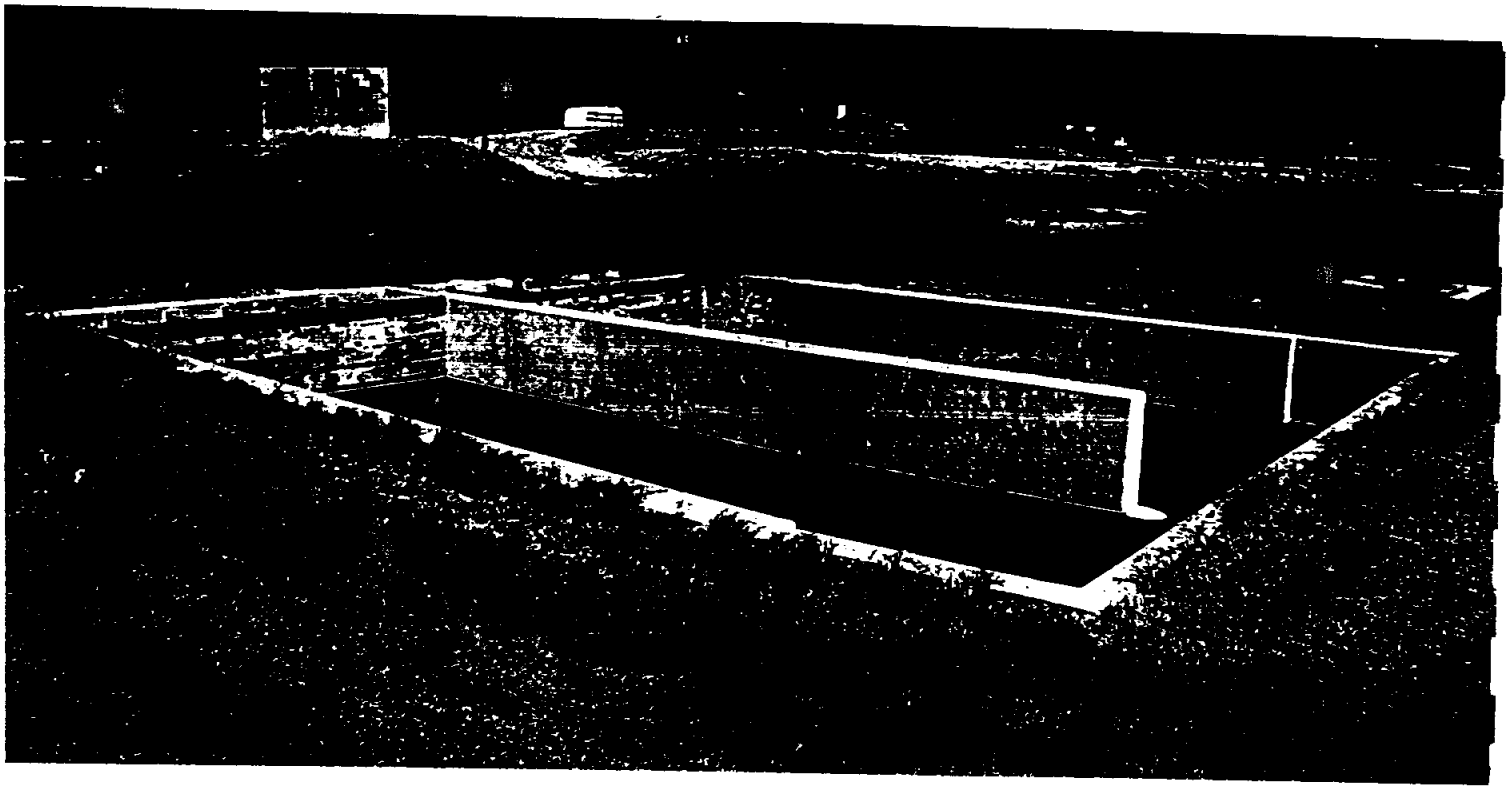
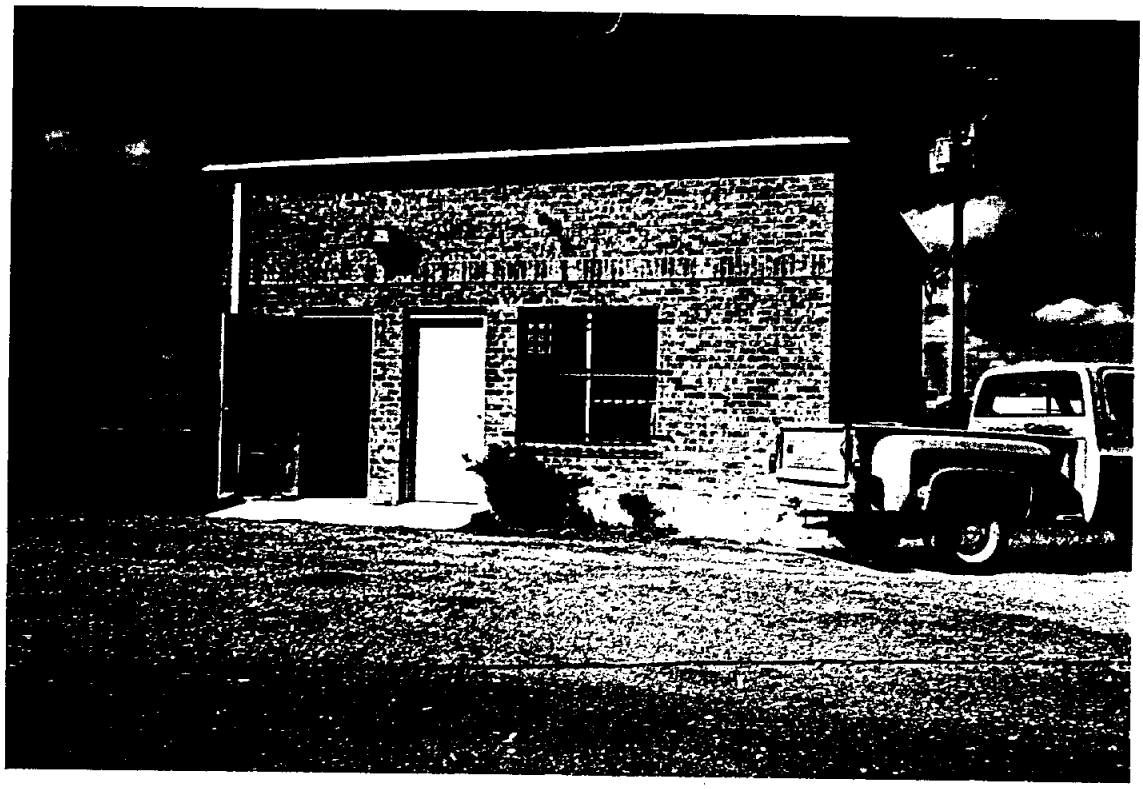


SLUDGE DRYING BEDS



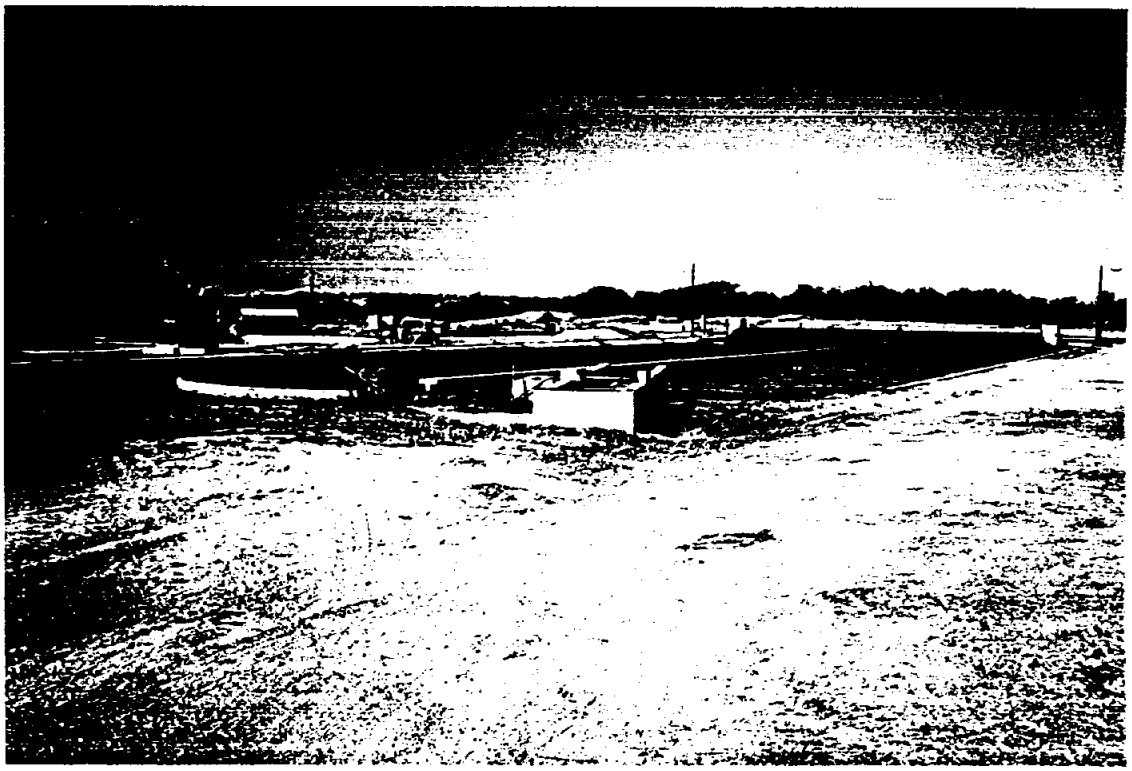
CHLORINE CONTACT BASIN



LABORATORY AND
CHLORINATION FACILITIES

SILVER LAKE
WASTEWATER TREATMENT PLANT
EXISTING FACILITIES

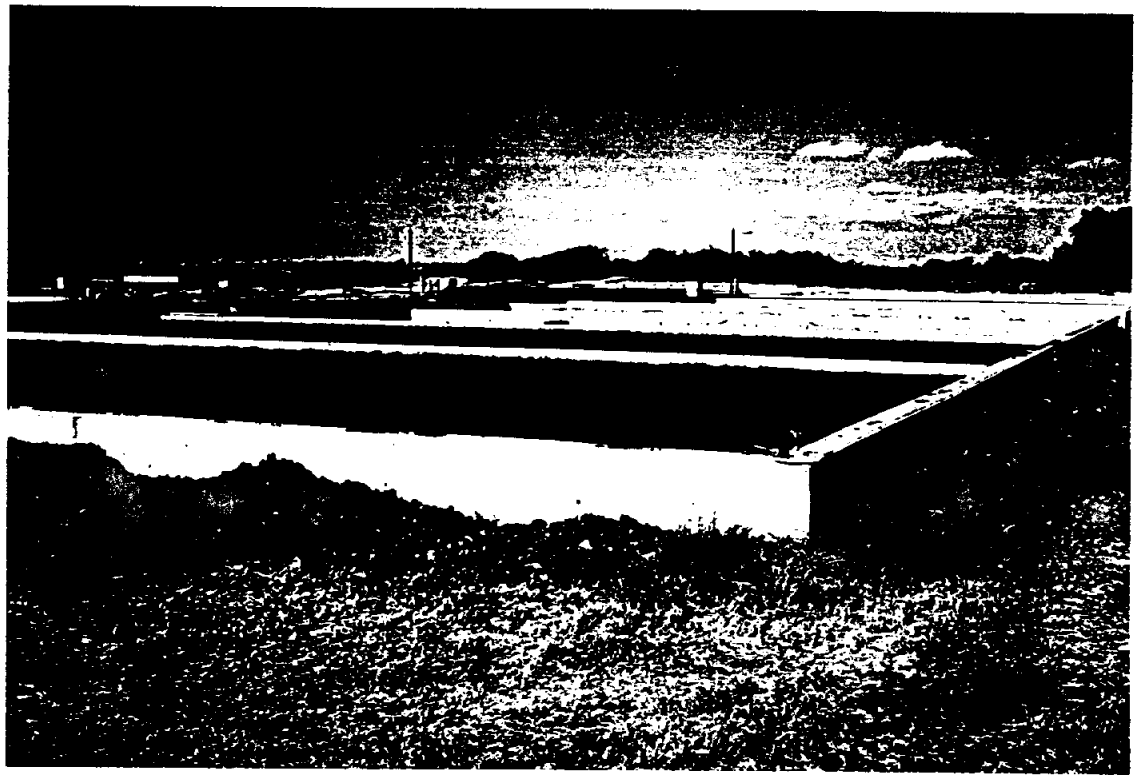
OXIDATION DITCH NO. 1



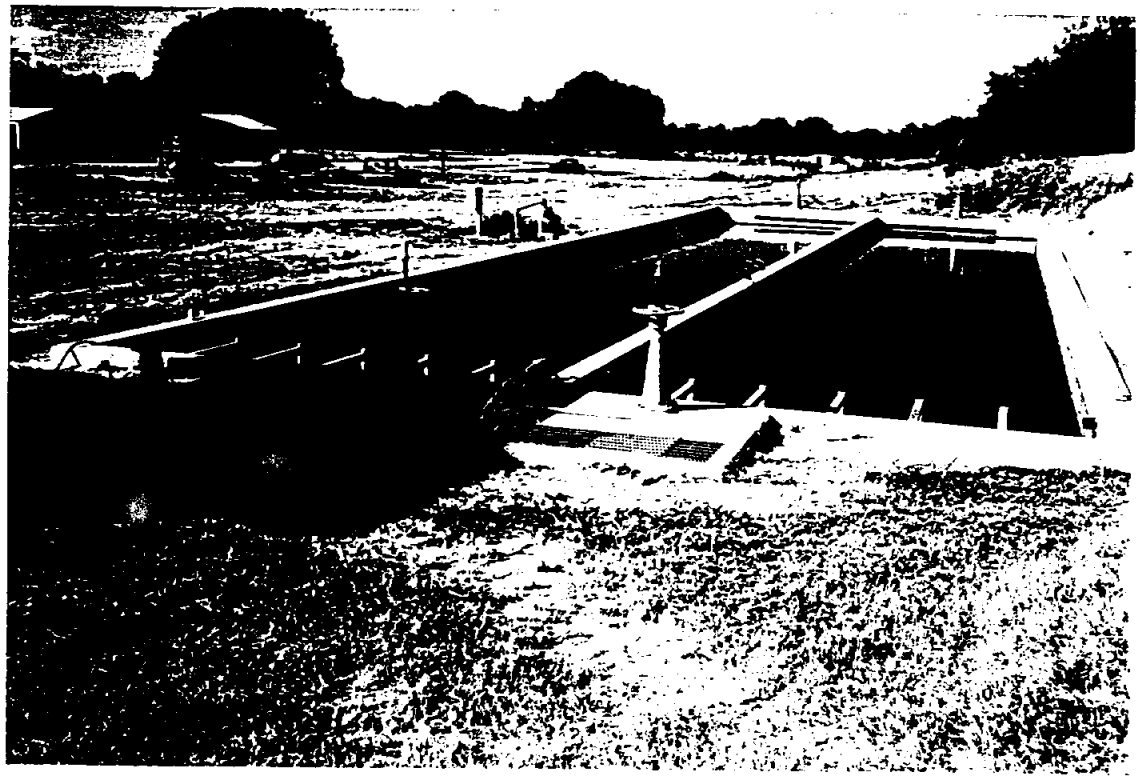
OXIDATION DITCH NO. 2

FINAL CLARIFIER

FINAL CLARIFIER



SLUDGE DRYING BEDS



CHLORINE CONTACT BASIN

for the San Felipe Plant (Permit No. 10159-01) was approved and issued by the Texas Water Commission, to be effective on January 17, 1990.

In a later publication, prepared in June, 1989, by S. A. Garza Engineers, Inc., a SRF Priority Rating Report, was furnished to the Texas Water Development Board. This report, basically, summarizes the latest plan of proposed wastewater system improvements with factual data including descriptions of the existing facilities and proposed improvements, discharge information, number of connections, boundaries of service, construction costs, development schedules, and other pertinent information. This report of Garza acknowledges the planning concept of transferring the sewage flows from the Round Mountain Plant to the San Felipe Plant.

The City of Del Rio has already implemented the first step for expanding the Silver Lake Treatment Plant. The facility planning report, the environmental information document, the water conservation and drought contingency plan, and the application to amend the discharge permit were all submitted to the Texas Water Development board in early 1989, as part of the application requesting low interest loan assistance through the State Revolving Fund (SRF).

Steps are currently being taken to prepare the other documents necessary for funding the San Felipe Plant Expansion possibly through the sale of revenue bonds.

The current planning for the expansion of the wastewater treatment plants (San Felipe and Silver Lake) include the capability to handle average flows of 3.80 M.G.D. and 2.76 M.G.D., respectively. According to the amended discharge permits recently received by the City, the quality of the effluent remains 20 mg/l for the BOD_5 and 20 mg/l for the TSS at both plants.

Other requirements of the amended discharge permits for the Silver Lake and San Felipe Wastewater Treatment Plants include:

Silver Lake Wastewater Treatment Plant - Permit No. 10159-03

Interim I - Beginning from date of permit issuance through December 31, 1990.

- Flow - 1.76 M.G.D. Average Daily
- Effluent Chlorine Residual - 1.0 mg/l with 20 min. detention.
- pH - not less than 6.0 nor greater than 9.0 standard units.
- No discharge of floating solids, visible foam or visible oil.

- Effluent Monitoring Samples - to be taken following the final treatment unit.
- Dissolved Oxygen - minimum effluent concentration of 2.0 mg/l.

Interim II - Beginning January 1, 1991, through the completion of the expansion of facilities to 2.76 M.G.D.

- All of the discharge parameters of Interim I are required with the addition that the City must provide for dechlorination of the effluent to less than 0.1 mg/l of chlorine residual.

Final Effluent Limitations and Monitoring Requirements - Beginning upon completion of expansion of facilities to 2.76 M.G.D. and lasting through the date of expiration.

Flow - 2.76 M.G.D. Average Daily
5,116 G.P.M. 2-hour peak

- All of the other discharge parameters of Interim I and II are required with the addition that the City must provide the facilities to produce an effluent with a minimum dissolved oxygen concentration of 5.0 mg/l.

Other Requirements -
- Sludge disposal - In a TDH approved landfill
- Irrigation with treated effluent -
  = Limited to approximately 100 acres.
  = Required to obtain a secondary-use permit.
  = Required to monitor effluent flow.
  = Required to provide tailwater control.
  = Limited to application rate of 4.5 acre-feet/acre/year.
  = Holding ponds are to conform to requirements of TDH/TWC.
  = Required to perform annual soil sampling from the root zone.
- Buffer Zone
  = 500 feet from lagoons with zones of anaerobic activity and 150 feet from all other wastewater treatment plant structure or process units to the nearest residential property line.
- Mixing Zone
  Defined to be a point 100 feet upstream of the point of discharge to a point 300 feet downstream of the point of discharge.

<u>San Felipe Wastewater Treatment Plant</u> - Permit No. 10159-01

Interim - Beginning from the date of issuance and lasting through the date of completion of additional facilities.

- Flow - 1.63 M.G.D. Average Daily
- Effluent Chlorine Residual - 1.0 mg/l with 20 min. detention.
- pH - not less than 6.0 nor greater than 9.0 standard units.
- No discharge of floating solids, visible foam, or visible oil.
- Effluent Monitoring Samples - to be taken following the final treatment unit.
- Dissolved Oxygen - minimum effluent concentration of 2.0 mg/l.

Final Effluent Limitations and Monitoring Requirements - Beginning upon the date of completion of additional facilities and lasting through the date of expiration.

- Flow - 3.80 M.G.D. Average Daily
  9,236 G.P.M. 2-hour peak

- All of the other discharge parameters of the Interim are required.

Other Requirements -
- Notification of TWC when new facilities are completed.
- Sludge disposal - In a manner approved by TDH.
- Notification of TWC at least ninety (90) days prior to construction of any intermediate facilities if flow capacities were not already specified in the permit.
- Provision for protection of the facilities from a 100-year flood.
- Operation of two parallel trains with flow measuring devices and sampling points for each:
  Train One - Existing
  Flow - 1.18 M.G.D. Average Daily
  3.142 M.G.D. 2-hour peak
  Train Two - Proposed
  Flow - 2.62 M.G.D. Average Daily
  10.16 M.G.D. 2-hour peak
- Buffer Zone
  = 500 feet from lagoons with zones of anaerobic activity and 150 feet from all other wastewater treatment structures or process units to the nearest residential property line.
- Approval from the TWC required prior to acceptance of any industrial waste.
- Mixing Zone
  Defined to be a point 100 feet upstream of the point of discharge to a point 300 feet downstream of the point of discharge.

Based on the projections of the future sewage flows for the 20-year planning period for each plant, the following TABLE NO. V-13 presents the percentages of flow that is expected to be

received at each plant. Note that population equivalents are used, as was presented in the San Felipe Plant permit amendment application, to represent sewage flows contributed from industrial and commercial development, which included allowances for approximately 0.20 M.G.D. This projected industrial and commercial flow is about 5.3% of the total sewage flow to the San Felipe Plant.

Where the wastewater flows would be considered to be significant or of a categorical nature, pre-treatment by the industry is recommended.

TABLE NO. V-13

PROJECTED AVERAGE SEWAGE FLOWS (M.G.D.)
AT
EACH TREATMENT PLANT

Plant	1990		2000		2010	
	Pop. Equiv.	Flow	Pop. Equiv.	Flow	Pop. Equiv.	Flow
San Felipe *	24,000	2.70(59%)	30,000	3.21(55%)	36,000	3.80(51%)
Silver Lake **	15,240	1.89(41%)	21,976	2.64(45%)	32,800	3.76(49%)
	39,240	4.59	51,976	5.85	68,800	7.56

* Based on data from Permit Application, City of Del Rio, San Felipe Water Factory, August 1988, as prepared by Lockwood, Andrews & Newnam, Inc. The year 2000 sewage flow was interpolated between the years 1990 and 2010.

** Based on data from Facility Plan, Silver Lake Wastewater Treatment Plant, July 1989, as prepared by Hogan & Rasor, Inc.

The above Table No. V-13 reflects that, on the average, the per capita sewage flows to each plant are projected to decrease by approximately 6%-7% as programs are implemented to encourage the use of water conservation plumbing devices.

The major developments currently existing outside the City Limits of Del Rio, but within a reasonable reach of being provided with sewerage services from the City include the Cienegas Terrace Addition, the Val Verde Park Estates, and the Los Campos Additions.

Some very serious concerns have been expressed by the City staff and other local authorities with respect to the future impact of using septic tanks and absorption field lines as an acceptable means of on-site waste disposal in subdivisions for the long-term. Where conditions currently exist with small lot

sizes in the subdivisions combined with soil conditions that are not conducive for septic tank/field absorption wastewater disposal, it is recommended that other means of providing sewerage service be considered, if at all possible.

Cienegas Terrace Addition, for example, would best be served with the installation of a sewerage collection system with the sewage flows pumped to the Silver Lake Wastewater Treatment Plant. Likewise, the Los Campos Addition would eventually be served by the Silver Lake Plant, however, most of the Los Campos development has very large tracts, and on-site disposal systems can be designed to adequately handle the individual residences for a longer period of time.

The Val Verde Park Estates has relatively small lots, and in its ultimate development, the septic tank/absorption field system for each residence would not be advisable for the long-term. Sewage flows from the Val Verde Park Estates will be carried to the San Felipe Wastewater Treatment Plant.

A letter of April 23, 1990, from the County Health Inspector, Mr. Harold E. Reed, is included on the following page to support the concerns of continuing to develop in the areas where subdivided lot sizes are less than the minimum required for installing on-site disposal systems.

For each of these existing developments, the planning for the installation of new sewerage collection systems have been divided into five (5) phases. Within each of the phases, projected sewage flows are made in order to assess what the impact of capacity requirements will be at each of the wastewater treatment plants. The following TABLES NO. V-14 through NO. V-19 show the projected sewage flows that are anticipated to be generated as each phase of the new collection system improvements are installed in each of the outlying developments.

COUNTY OF VAL VERDE

COUNTY HEALTH INSPECTOR
302 CANTU STREET – BROWN PLAZA
DEL RIO, TEXAS 78840

April 23, 1990

Mr. Clarence Bolner
City Engineer
109 West Broadway
Del Rio, Texas 78840

Dear Mr. Bolner,

I am writing this letter in reference to the conference we had at the city council meeting room on April 3, 1990.

Under the grant program which Mr. Charles M. Trost is the manager, approximately forty septic tank systems have been installed in the subdivision known as Cienegas Terrace. These were installed under conditions where a dwelling existed and such dwelling has no-on site private sewage facility.

Inquirements have been made about the suitability of properties in Cienegas Terrace for the use of septic tanks. The conditions are such that if the program was not intended to resolve emergency health conditions, we would not have installed septic systems. As there was no other alternative to resolving a public health problem, we installed such systems.

In Cienegas Terrace, all of the lots are far too small. With a public water system, the State Standards call for minimum lot area of one half acre, or 21,780 square feet. Most of the lots in this subdivision are approximately seven thousand too eight thousand square feet in area. No soil in the subdivision is truly suitable for the use of absorption fields with a septic tank. There are two predominate soil conditions. About 3 inches of loam over indurated caliche or limestone or a gravely colluvium that water passes through like a sieve.

774-7569

I hope that this information is adequate for your needs.

Sincerely,

Harold E. Reed
County Health Inspector

775-1105
Home

Sen
fed-e-qua

TABLE V-14

PROJECTED SEWAGE FLOWS CIENEGAS TERRACE ADDITION

Phase No.	Year	Lots Developed	Acreage	Projected Population	Average Sewage Flow (M.G.D.)	Accumulative Avg Flow (M.G.D.)	Peak Sewage Flow By Phase (M.G.D.)	Peak Sewage Flow By Population (M.G.D.)	Accumulative Population	Ratio Peak/Av Flows
1	(1990)	309	117	989	0.119	0.119	0.593	0.593	989	5.00
2	(1995)	290	116	928	0.111	0.230	0.557	1.003	1,917	4.36
3	(2000)	79	29	253	0.030	0.260	0.150	1.130	2,170	4.34
4	(2005)	90	79	288	0.035	0.295	0.175	1.236	2,458	4.19
5	(2010)	76	27	243	0.029	0.324	0.145	1.296	2,701	4.00
Totals		844	368	2,701	0.324	0.324	1.620	1.296	2,701	

The sewage flows from the Cienegas Terrace area will all be treated at the Silver Lake Wastewater Treatment Plant. The Silver Lake Plant's capacity is proposed to be initially expanded to 2.76 M.G.D., which will handle the projected population in approximately the year 2000 of 22,500. Therefore, if the growth of the service area for the Silver Lake Plant occurs as predicted, the Silver Lake Plant facilities will need to be expanded by the year 2000, to a capacity, at a minimum, of 3.76 M.G.D.

The contributing sewage flows of the Cienegas Terrace area, as the phases of the sewage collection system are installed, are as follows:

TABLE NO. V-15

TREATMENT CAPACITY REQUIREMENTS FOR THE CIENEGAS TERRACE ADDITION

Phase	Silver Lake Plant Capacity (Avg) (M.G.D.)	Total Sewage (Avg) Flow From Service Area (M.G.D.)	Sewage Flow (Avg) From Cienegas Terrace (M.G.D.)	Percentage
1 (1990)	2.76 (Expansion)	1.89	0.119	6.3%
2 (1995)	2.76	2.27	0.230	10.1%
3 (2000)	3.76 (Expansion)	2.64	0.260	9.9%
4 (2005)	3.76	3.20	0.295	9.2%
5 (2010)	3.76	3.76	0.324	8.6%

The projected sewage flows from the Val Verde Park Estates are outlined below in TABLE NO. V-16.

TABLE V-16

PROJECTED SEWAGE FLOWS VAL VERDE PARK ESTATES

Phase No.	Year	Lots Developed	Acreage	Projected Population	Average Sewage Flow (M.G.D.)	Accumulative Avg Flow (M.G.D.)	Peak Sewage Flow By Phase (M.G.D.)	Peak Sewage Flow By Population (M.G.D.)	Accumulative Population	Ratio Peak/Avg Flow
1	1990	248	123	794	0.095	0.095	0.475	0.475	794	5.00
2	1995	354	213	1,333	0.136	0.231	0.593	1.008	1,927	4.36
3	2000	390	195	1,248	0.150	0.381	0.602	1.528	3,175	4.01
4	2005	201	104	643	0.077	0.458	0.293	1.741	3,818	3.80
5	2010	43	39	125	0.015	0.473	0.057	1.793	3,943	3.79
Totals		1,236	675	3,943	0.473	0.473	2.020	1.793	3,943	

The sewage flows from the Val Verde Park Estates will be treated at the San Felipe Wastewater Treatment Plant. The plant is proposed to be expanded for an average daily flow of 3.80 M.G.D. Based on the projected sewage flows from the Val Verde Park Estates, the percentage contributed by phase of development is shown in the following TABLE NO. V-17.

TABLE NO. V-17

TREATMENT CAPACITY REQUIREMENTS FOR THE VAL VERDE PARK ESTATES

Phase	San Felipe Plant Capacity (Avg) (M.G.D.)	Total Sewage Flow (Avg) From Service Area (M.G.D.)	Sewage Flow (Avg) From Val Verde Park (M.G.D.	Percentage
1 (1990)	2.60	2.70	0.095	3.5%
2 (1995)	3.80 (Expansion)	2.96	0.231	7.8%
3 (2000)	3.80	3.21	0.381	11.9%
4 (2005)	3.80	3.51	0.458	13.1%
5 (2010)	3.80	3.80	0.473	12.5%

The projected sewage flows from the Los Campos Addition are shown below in TABLE NO. V-18.

TABLE NO. V-18

PROJECTED SEWAGE FLOWS LOS CAMPOS ADDITION

Phase No.	Phase Year	Lots Developed	Acreage	Projected Population	Average Sewage Flow (M.G.D.)	Accumulative Avg Flow (M.G.D.)	Peak Sewage Flow By Phase (M.G.D.)	Peak Sewage Flow By Population (M.G.D.)	Accumulative Population	Ratio Peak/Avg Flow
1	1990	49	145	156	0.019	0.019	0.095	0.095	156	5.0
2	1995	25	126	80	0.010	0.029	0.050	0.142	236	5.0
3	2000	38	225	122	0.015	0.044	0.075	0.215	358	5.0
4	2005	35	133	112	0.013	0.057	0.065	0.282	470	5.0
5	2010	32	228	102	0.012	0.069	0.060	0.343	572	5.0
Totals		179	857	572	0.069	0.069	0.345	0.343	572	

The percentage of sewage flows entering the Silver Lake Wastewater Treatment Plant as the phased program of collection system improvements are installed is shown below in TABLE NO. V-19.

TABLE NO. V-19

TREATMENT CAPACITY FOR THE LOS CAMPOS ADDITIONS

Phase	Silver Lake Plant Capacity (Avg) (M.G.D.)	Total Sewage Flow (Avg) From Service Area (M.G.D.)	Los Campos Addn. (M.G.D.)	Percentage
1 (1990)	2.76 (Expansion)	1.89	0.019	1.0%
2 (1995)	2.76	2.27	0.029	1.3%
3 (2000)	3.76 (Expansion)	2.64	0.044	1.7%
4 (2005)	3.76	3.20	0.057	1.8%
5 (2010)	3.76	3.76	0.069	1.8%

As other subdivisions outside the City Limits are developed, the calculations of their respective sewage flows projected over a period time should be made in order to assess their impact on the capacity of the treatment facilities.

Some very preliminary layouts have been prepared by others in recent years for combining the sewage flows at one central plant. This concept for regionalizing wastewater treatment for

Del Rio was stimulated principally from the concerns for protecting the environment along the San Felipe Creek and for reducing the operating costs in the long-term. Modifications of the options previously prepared are illustrated on FIGURES NO. V-16, NO. V-17, NO. V-18, NO. V-19, NO. V-20, and No. V-21 following this page. The layouts show only the major facilities; however, other collection and interceptor system mains will need to be added to serve new developments.

All of the options for eventually regionalizing or combining the wastewater treatment at one site have included the abandonment of the Round Mountain Plant which does conform to the current plan. At such time any of the other options would be seriously considered for combining the treatment of the wastewater at either Silver Lake, at San Felipe, or at a new site, additional studies would be recommended to determine the feasibility of maintaining the existing facilities for primary treatment and solids settling prior to transferring the wastewater to the site selected for the final treatment and effluent discharge.

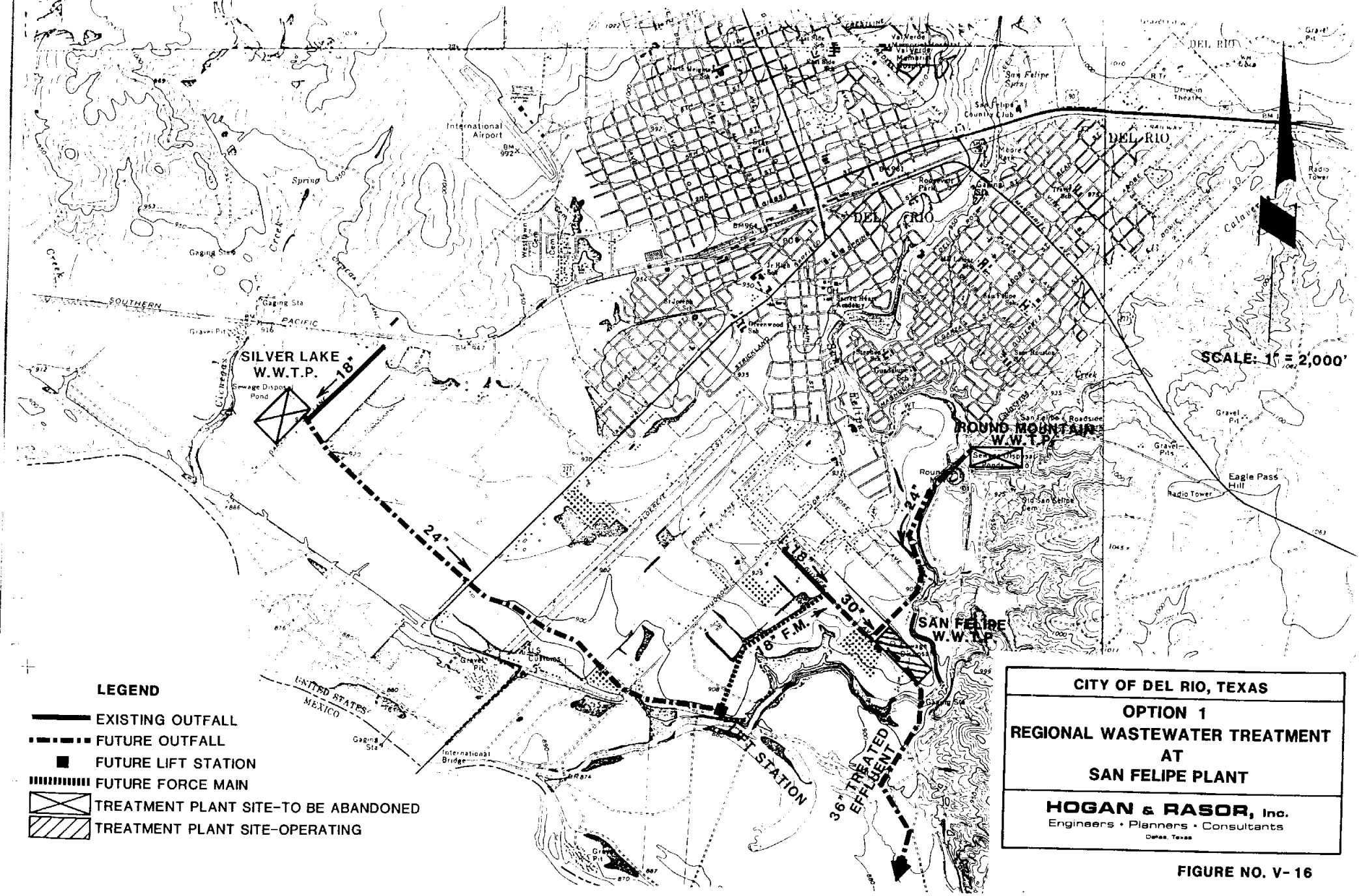
The sizing of the future mains for regionalizing the treatment system is based on the projected sewage flows for the year 2010 at a peak factor of 2.0 times average daily flow.

- Rural Areas - As more developments occur in the rural communities and particularly around Lake Amistad, there will be a need for a more sophisticated type of wastewater treatment. Septic tanks and absorption fields will not provide a long-term solution for wastewater treatment in the more populated areas.

Although the communities of Comstock and Langtry may increase in population only slightly within the next twenty (20) years, the continued operation of on-site disposal facilities will possibly create a saturated condition in the soil from the absorption fields and, thus, this method of sewage treatment for the homeowner will eventually become ineffective. Likewise, the developments around Lake Amistad can expect their on-site disposal systems to eventually become clogged, and the drain or absorption fields will no longer perform their intended function. As mentioned previously, the characteristics of the soils are not conducive to the operation of septic tank absorption fields. For the communities of Comstock and Langtry and the areas around the Lake, several treatment alternatives may be investigated to determine the most practicable for the long-term.

- Gravity sewer mains, with lift stations and a small package-type wastewater treatment plant.

- Low pressure sewerage system utilizing grinder pumping units at each service, small diameter mains

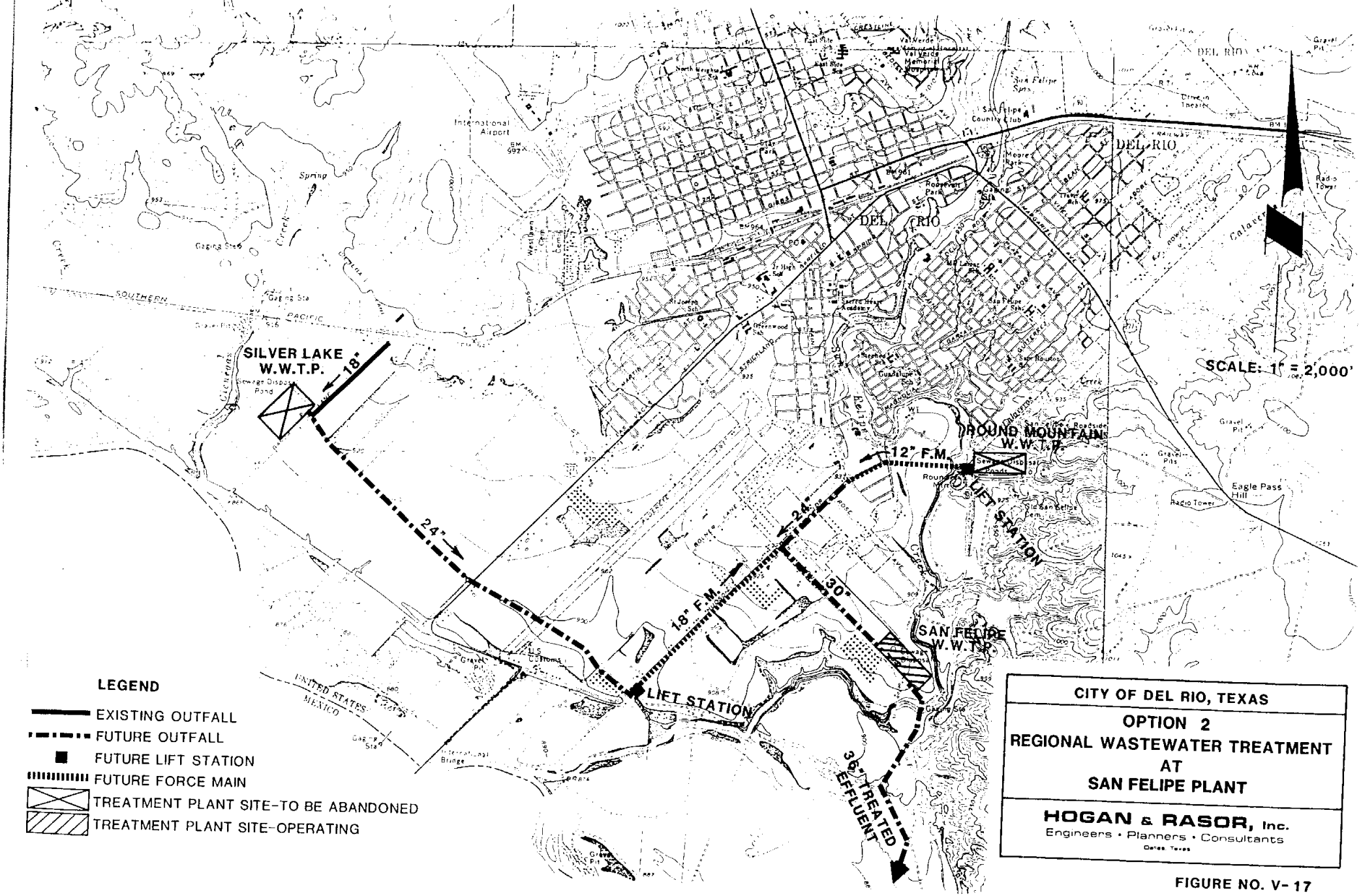


CITY OF DEL RIO, TEXAS

OPTION 1
REGIONAL WASTEWATER TREATMENT
AT
SAN FELIPE PLANT

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas, Texas

FIGURE NO. V-16

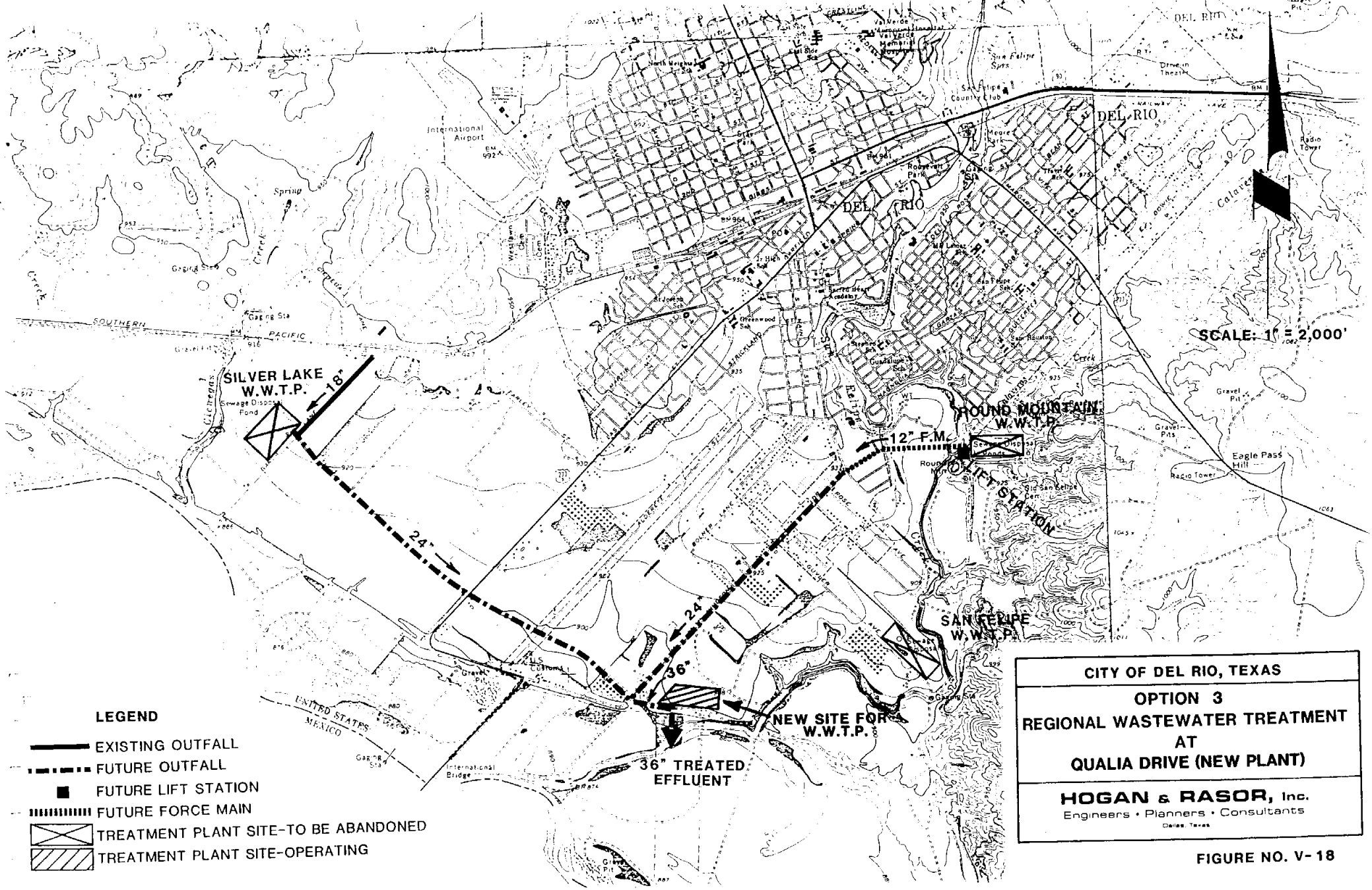


CITY OF DEL RIO, TEXAS

OPTION 2
REGIONAL WASTEWATER TREATMENT
AT
SAN FELIPE PLANT

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas, Texas

FIGURE NO. V-17

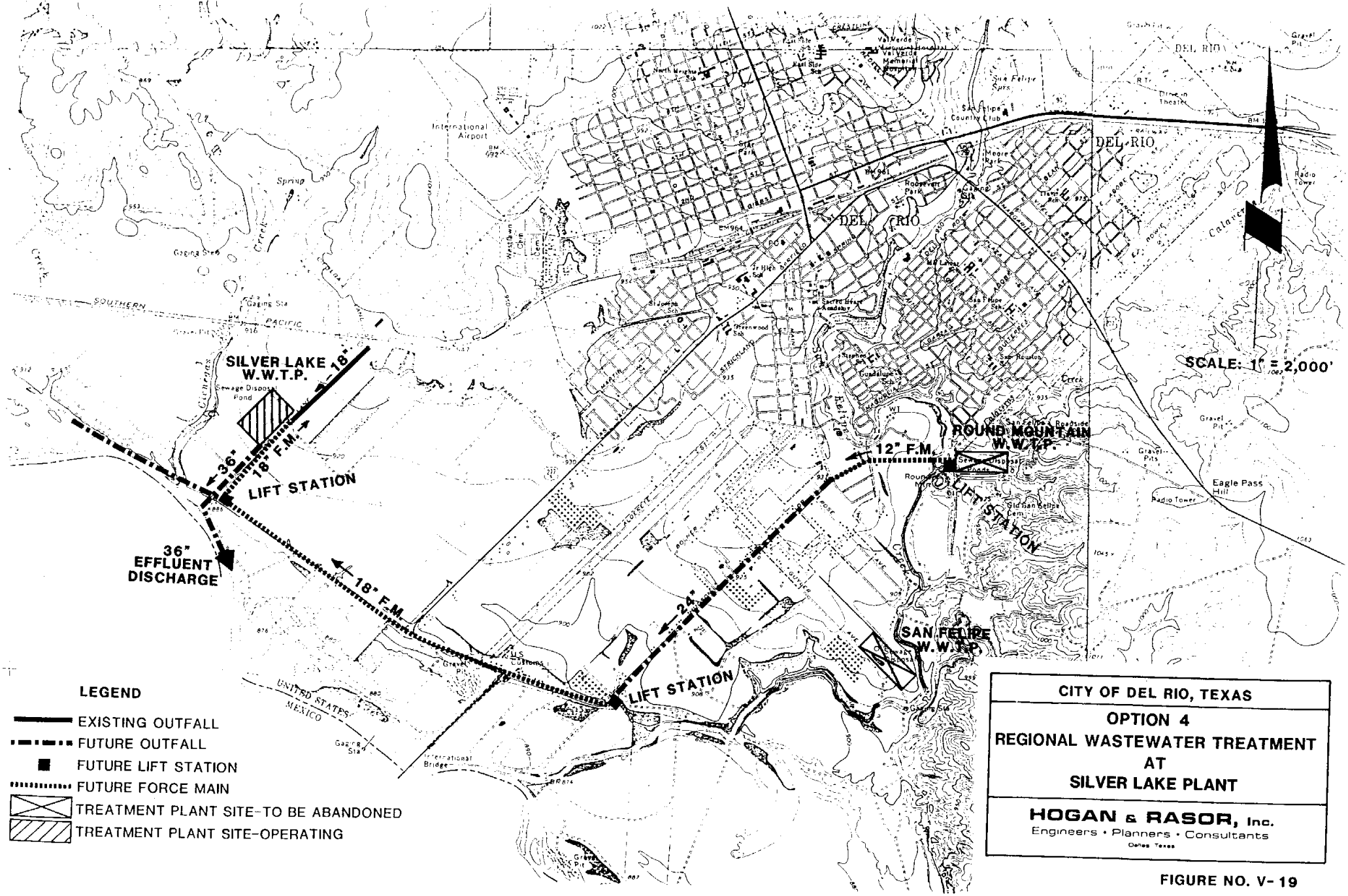


CITY OF DEL RIO, TEXAS

OPTION 3
REGIONAL WASTEWATER TREATMENT
AT
QUALIA DRIVE (NEW PLANT)

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas, Texas

FIGURE NO. V-18

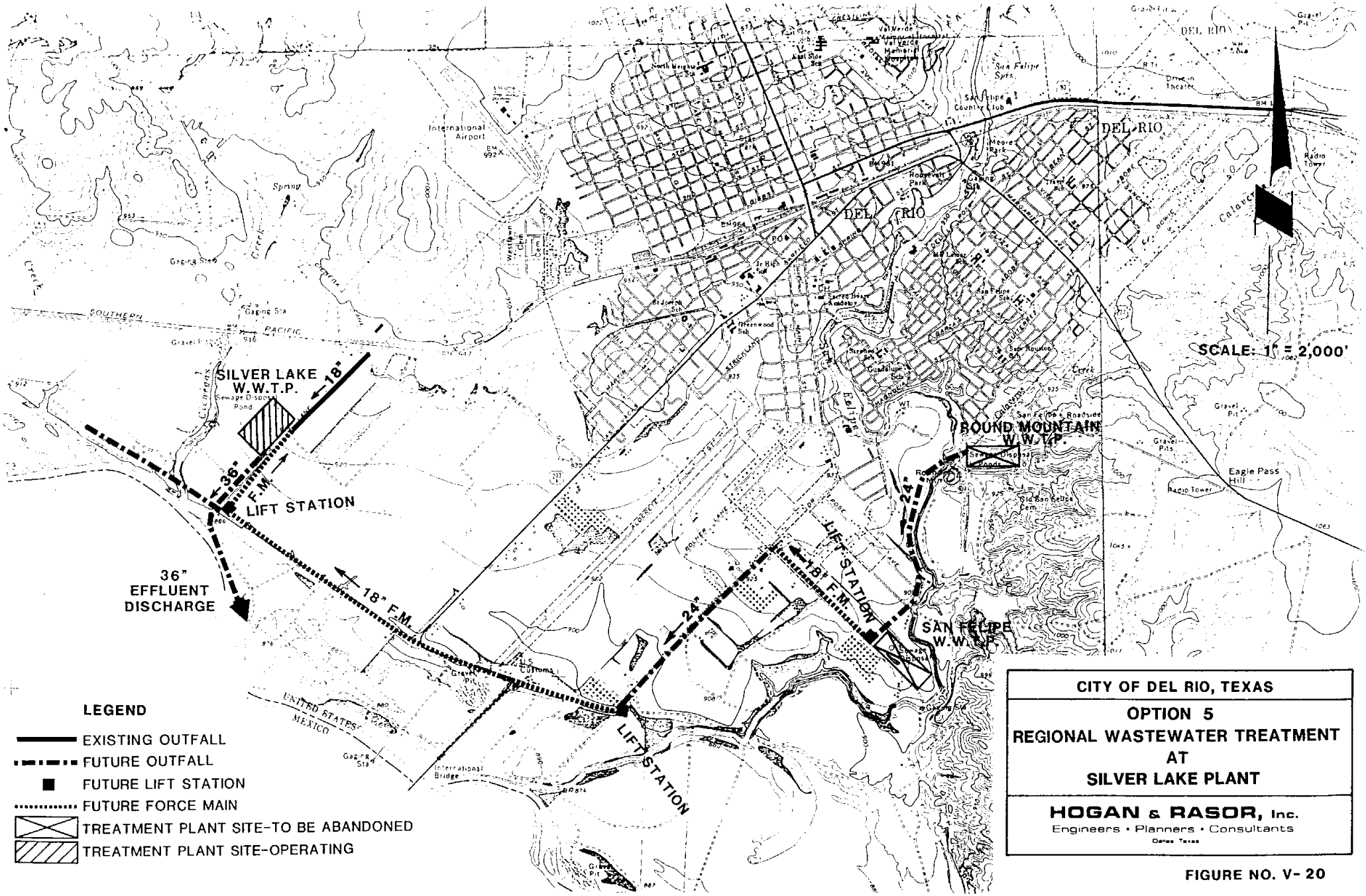


CITY OF DEL RIO, TEXAS

OPTION 4
REGIONAL WASTEWATER TREATMENT
AT
SILVER LAKE PLANT

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas Texas

FIGURE NO. V-19

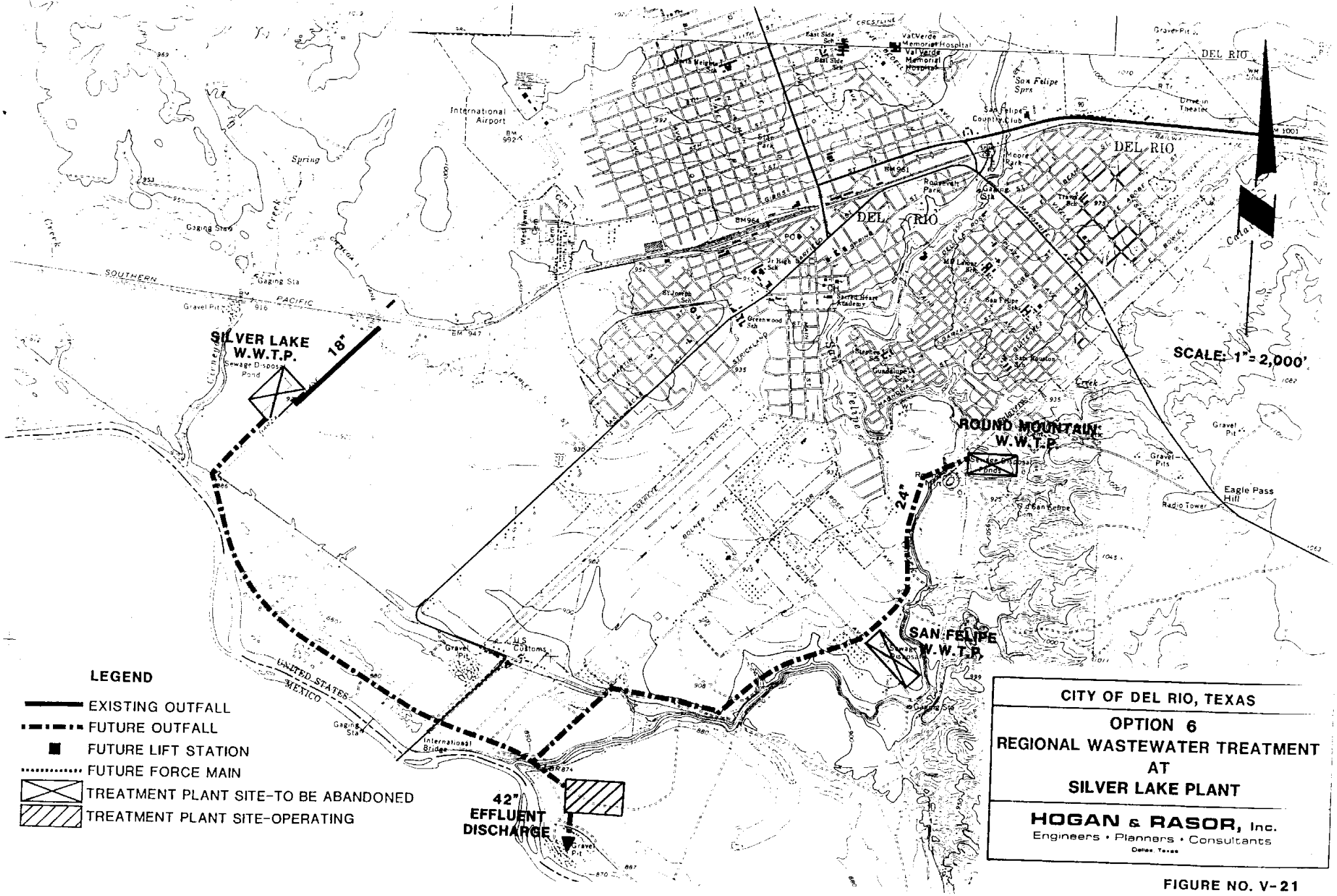


CITY OF DEL RIO, TEXAS

OPTION 5
REGIONAL WASTEWATER TREATMENT
AT
SILVER LAKE PLANT

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas Texas

FIGURE NO. V- 20



CITY OF DEL RIO, TEXAS

OPTION 6
REGIONAL WASTEWATER TREATMENT
AT
SILVER LAKE PLANT

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants
Dallas, Texas

FIGURE NO. V-21

installed at shallow depths following the contour of the terrain, and a small package-type wastewater treatment plant.

- Large evapotranspiration systems where conditions are not suitable for soil absorption systems.

The planning, design, and construction of the alternative selected for the particular development(s) should all be according to the regulations and guidelines of the Texas Water Commission and Texas Department of Health.

3. Conclusions and Recommendations -

The following conclusions and recommendations are presented with regard to the regional planning for the wastewater systems.

a. Wastewater Collection System -

(1) The City of Del Rio operates and maintains the only major sewage collection system in Val Verde County which provides service to approximately 8,760 customers.
(2) The developments around Lake Amistad, the communities of Comstock and Langtry, and the residents in the rural areas do not operate wastewater collection systems.
(3) The three (3) existing major areas of development outside the City limits of Del Rio, being Cienegas Terrace Addition, Val Verde Park Estates, and Los Campos Additions, has a potential for an additional 2,259 customers to be served by the City of Del Rio.
(4) At full development, the Cienegas Terrace Addition, the Val Verde Park Estates, and the Los Campos Additions will contribute approximately 866,000 gallons per day of wastewater, or about 12.03% of the total projected wastewater flow for Del Rio.
(5) The City of Del Rio operates ten (10) sewage pumping stations within the collection system.
(6) Reconnaissance studies performed within the Silver Lake Wastewater Treatment service area indicated that no significant quantities of infiltration/inflow exists.
(7) It is recommended that engineering studies be performed to analyze the condition of the existing collection system mains and to determine the required capacities for major outfall and interceptor mains.
(8) It is recommended that the existing sewage pumping stations be maintained with a minimum of two (2) pumping units each with a capacity equal to the peak sewage flow entering the station.
(9) It is recommended that a full infiltration/inflow evaluation study be implemented for the total collection system of Del Rio.

(10) It is recommended that the planning, design, and construction of all improvements to the Del Rio collection system or any new systems be made in strict compliance with the regulation of the Texas Water Commission.

(11) It is recommended that the deteriorated smaller diameter (6-inch through 10-inch) sewer mains be replaced as part of an annual program of improvements, or possibly a capital improvements program.

(12) It is recommended that consideration be given to the future extensions and expansion of the major interceptors and outfall mains requiring significant costs being financed with bond funds.

(13) It is recommended that manholes located in all floodprone areas be constructed with water-tight covers or with the elevation of the top manhole cover a minimum of one foot above the 100-year flood plain, whichever is the most reasonable for maintenance purposes.

(14) It is recommended that the existing and any future lift stations be equipped with a minimum of two (2) pumps, with the capacity of the lift station equal to the design flows with the largest pump out of service.

(15) It is recommended that, where proposed highways and thoroughfares are planned and where grades can be determined, carrier and/or encasement pipes be installed to provide for future crossings and extensions to the sewage collection system.

(16) It is recommended that a monitoring and sampling program for the waste discharged from each industry be implemented to document the characteristics and potential problems that may be encountered. This program will need to conform with the requirements of the U. S. Environmental Protection Agency.

b. Wastewater Treatment -

(1) The City of Del Rio currently operates three (3) separate wastewater treatment plants -- the Round Mountain Plant, the San Felipe Plant, and the Silver Lake Plant.

(2) The average sewage flow now being received at each of the plants equals or exceeds the plant's permitted capacity.

(3) Laughlin Air Force Base operates one (1) wastewater treatment plant.

(4) Wastewater treatment for the developments around Lake Amistad, the communities of Langtry and Comstock, and the residents in the rural areas of Val Verde County is provided by on-site disposal systems.

(5) Current planning studies show that the Round Mountain Wastewater Treatment Plant is to be phased out of service, with the sewage flows being transferred to the San Felipe Plant.

(6) The characteristics of the soils in Val Verde County are,

generally, not conducive to the operation of septic tank absorption fields for the long-term.

(7) Regionalization of the wastewater treatment for the long-range plan of Del Rio will require further studies and detailed cost-effective analysis.

(8) It is recommended that the City of Del Rio continue to operate the San Felipe and Silver Lake Plants, with the provision that the capacity of the plants be expanded to meet the State and federal discharge requirements.

(9) It is recommended that the major developments (Cienegas Terrace Addition, Val Verde Park Estates, and Los Campos Additions) outside the City of Del Rio be constructed in a phased program, with the initial improvements installed according to a priority of need and cost effectiveness.

(10) It is recommended that the City continue to seek financial assistance for the plant additions through low-interest loan funds through the Texas Water Development Board.

(11) It is recommended that where higher densities of development exists in the rural areas of the County, that is, around Lake Amistad and the communities of Langtry and Comstock, sewage collection and treatment systems be considered in the future.

(12) It is recommended that, where on-site disposal systems exist for the individual homeowner in the rural and remote areas, they continue to be operated unless the septic tank absorption field are no longer effective. Alternate on-site disposal systems should, then, be considered.

(13) It is recommended that funding for the extensions and additions to the developments outside the City Limits of Del Rio be investigated through the appropriate programs administered through the Texas Water Development Board.

PART VI
FINANCIAL PLAN

PART VI
FINANCIAL PLAN

PART VI
FINANCING PLAN

A. GENERAL

From the summary of conclusions and recommendations outlined in this report, a phased program of improvements and cost projections has been developed.

The cost projections included herein have been prepared for budget purposes only and are not guaranteed as the exact amounts which will be bid for furnishing and installing the proposed improvements or charged for services performed.

The costs shown herein are based on current prices and include allowances for engineering and contingencies; however, the projected costs should be constantly reviewed and updated since the rate of inflation may change and significantly affect the total project cost. The project costs presented herein do not include the cost of land and easements, nor any legal, fiscal, or administrative expenses.

B. CONSTRUCTION PRIORITIES

In scheduling the initial phases for the proposed projects, consideration was given to constructing those improvements to the water and wastewater systems most urgently needed.

The water system improvements consist primarily of water transmission and distribution mains, and related appurtenances to relieve many current problems in general maintenance, dead-end mains, low water pressures, inadequacy of water supply, and poor water distribution and circulation.

The wastewater system improvements will include collection mains, lift stations, force mains, treatment additions, and other related appurtenances to provide residents an adequate service particularly in areas where there is a high density of population.

To keep the plan active beyond the implementation of the initial capital improvements presented herein, an assessment of the past accomplishments and future needs must continue on a regular annual basis. This yearly re-evaluation time of the improvements completed and those needed will be extremely important for purposes of updating cost projections, budgeting, and establishing the priorities for the next year's improvements.

C. CAPITAL IMPROVEMENTS AND COST PROJECTIONS

- Del Rio - Proposed water and wastewater system improvements were presented in the Capital Improvements Program (CIP) Update, 1988, as prepared by Lockwood, Andrews & Newnam, Inc. The wastewater system

improvements were further revised in the SRF Priority Rating Report, prepared by S. A. Garza Engineers, Inc., in June 1989.

The City's budget for the future capital improvements has included the recommendations of both the 1988 CIP Update and the revised wastewater plan of Garza, as well as other projects. This program of proposed projects and costs for the water and wastewater systems, as adopted by the City, is outlined in TABLE NO. VI-1 for the years 1990 through 1994. Additional improvements beyond the year 1994, are also shown to include the proposed projects scheduled for implementation at or about the time indicated in the City's 1988 CIP Update.

It is suffice to say that the schedule for construction of these proposed projects, may very well be revised at any given time with changes in growth patterns, developer participation, additional studies, financing programs, and/or other factors that would alter the priorities for their need. Thus, frequent reviews and other studied of the needs for the City's water and wastewater systems will be critically important so that the response time for implementation can be kept to a minimum.

The proposed capital improvements for Del Rio's water and wastewater systems are shown on FIGURES NO. VI-1 and NO. VI-2, following TABLE NO. VI-1. Again, it is emphasized that the projects are included as part of the continuing capital improvements program and is included herein as a "carry-over" from previous studies.

TABLES NO. VI-2 and NO. VI-3, following FIGURE NO. VI-2, present a schedule of the proposed capital improvements and cost analysis for the Cienegas Terrace Addition and the Val Verde Park Estates. These two (2) developments currently make up the greatest percentage of the populated areas within the extra-territorial jurisdiction of the City.

The other developments, such as Chapparal Hills, Brewer Subdivision, Payment Subdivision, Owens Addition, and Rosehow Subdivision are already provided with water and sanitary sewerage services. The Rio Bravo Addition, a small development near the Texas/Mexico border, currently has water service and on-site disposal systems. Wastewater collection improvements to this development will be made at such time when other developments in the immediate vicinity warrant the expenditures or when the on-site disposal systems cease to function.

The Escondido Estates, east of the Laughlin Air Force Base, covers a very large subdivided area, however, only few residences now exist. The planning for the provision of water and sewer mains in this area is not eminent and the use of private wells and on-site disposal systems should be continued until the conditional for growth in the Escondido Estates are evident.

Although the Spring Lake Addition, contiguous to the west City Limits of Del Rio, is relatively accessible for service from the City, the development is sparsely populated. Water service is provided from a water main, reported to be 8 inches in diameter, extending westward along

TABLE NO. VI-1

CAPITAL IMPROVEMENTS
WATER AND WASTEWATER SYSTEMS
CITY OF DEL RIO, TEXAS

CAPITAL IMPROVEMENTS *	YEAR OF IMPLEMENTATION											
Description of Water:	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Dedel Water Tank Improvements		$350,000			$350,000							
Water Distribtion Improvements	$150,000	150,000										
W-2 1,200 L.F. 12" along Gillis			$ 46,000									
W-7 3,400 L.F. 12" on Dodson					254,000							
W-10 3,500 L.F. on Griner					199,000							
W-18 1,800 L.F. 16" Crossing Hwy 90				$ 116,000								
W-19 2,500 L.F. along Cortinas					98,000							
W-20, East Springs Operations/Manifold	55,000											
W-21 New Water Supply **	200,000	100,000	100,000	150,000	150,000			200,000				
W-22 Replace 2" Mains **	45,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	200,000	
West Spring Pumps and Sand Separator	200,000											
W-8 3,400 L.F. 16" along Railroad							201,100					
W-11 E.S.T. on Lausen Rd., mains, booster pump							1,100,000					
W-14 2,600 L.F. 8" along Mary Lou						93,000						
W-16 3,700 L.F. 12" along Dodson						167,000						
W-23 6,700 L.F. 12" along Virginia									447,000			
Total Water	$ 650,000	700,000	246,000	366,000	1,151,000	360,000	1,401,000	300,000	547,000	100,000	200,000	
Projects from O & M **	245,000	200,000	200,000	258,000	250,000							
Available from Interest Earnings	24,400	27,600	24,600	36,200	20,200							
Project from Revenue Bonds	380,600	472,400	21,400	79,000	880,800							
Wastewater:												
San Felipe Wastewater Plant Expansion	4,500,000											
S-30 Silver Lake Wastewater Plant Expansion	1,736,000											
S-3 Large main Arroyo/Fiesta				191,000								
S-4 Replace mains Ave E			74,000								1,199,500	
S-13 Replace mains Gibb St.				297,000								
S-14 New Trunk Cienegas Rd.			995,000									
S-15 New Trunk Garza		527,000										
S-16 New main Ave E					172,000							
S-17 New Lift Station Ave G					296,000							
S-18 New Main Bedell				126,000								
S-19 New main Dodson				81,000								
S-20 New main Braddle												
S-21 Replace main Fox Dr.					340,000							
S-22 Lift Station Improvements **	60,000											
Infiltration Improvements **	30,000	60,000		340,000								
S-7 Replace main Ave. U				203,000								
S-24 Replace main Chevrolet Dr.												
S-25 Replace main Fox Dr.								89,000				
S-26 New Trunk, Cienegas Ck.								135,000				
S-27 New Trunk, Martinez, Broadbent to Round Mtg. 15" 2,200 L.F.												
S-28 New Trunk, Broadbent at Martinez to Garza at Vitela, 12"						106,000						2,804,000
Total Sewer	6,326,000	587,000	1,069,000	1,238,000	808,000	106,000		224,000		328,000		
Projects from O & M **	90,000	60,000	0	340,000	0							
Available from Interest Earnings	97,600	110,400	90,400	144,000	80,000					1,527,500	2,804,000	
Projects from SRF Debt	1,300,000											
Projects from Revenue Bonds	4,838,400	416,600	970,600	1,093,700	727,700							
Assumed Revenue Bond Issue - 1990-91 Req.	6,108,000											
Assumed Revenue Bond Issue - 1992-94 Req.			3,773,000									

* Source: C. A. Bolner, DPW-Del Rio

** Projects from O&M in FY 1990 may have to be reduced by approximately $170,000 due to lower revenues in FY 1990 from new rates in effect only 10 months of the year

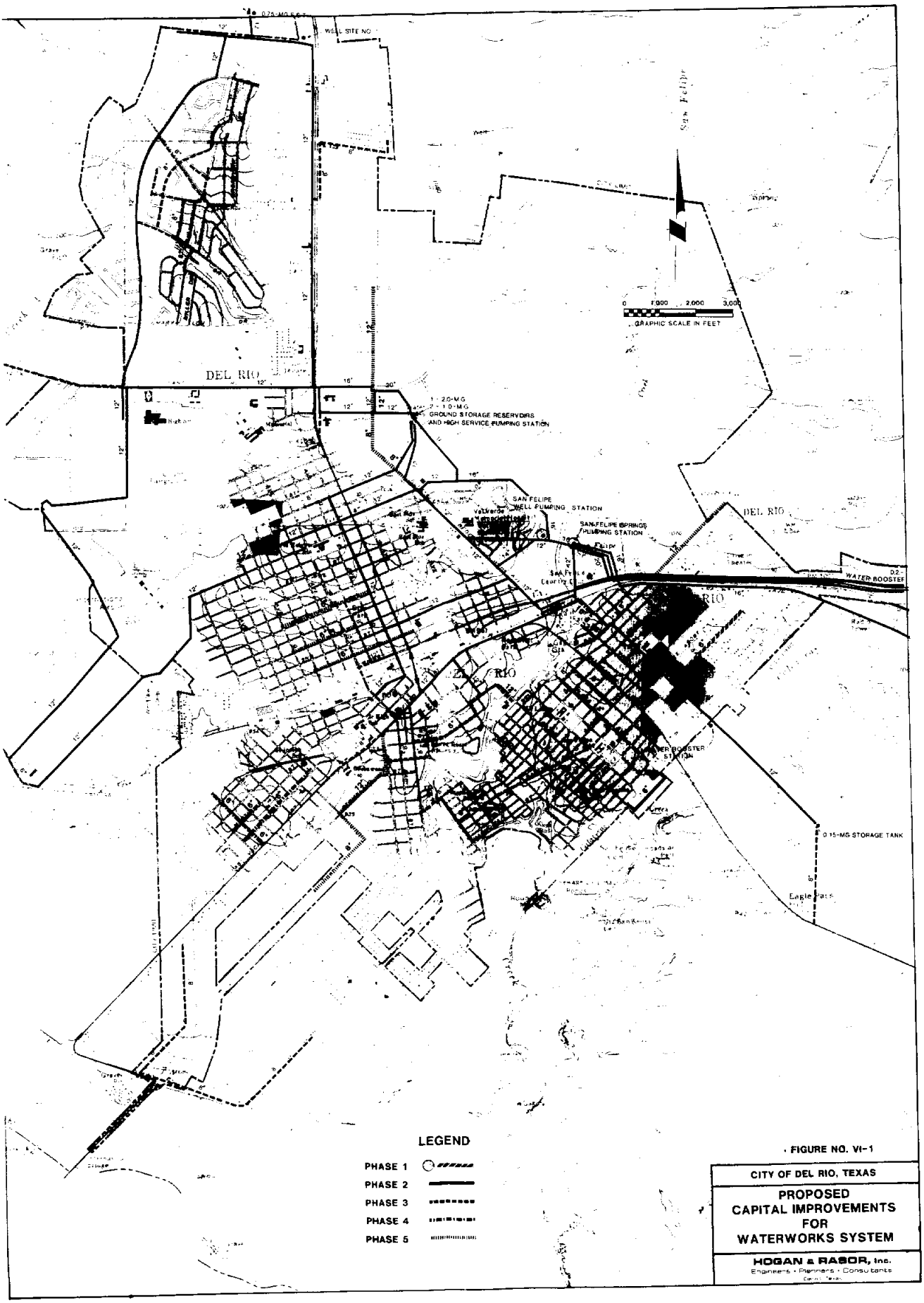


FIGURE NO. VI-1

CITY OF DEL RIO, TEXAS

PROPOSED CAPITAL IMPROVEMENTS FOR WATERWORKS SYSTEM

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants

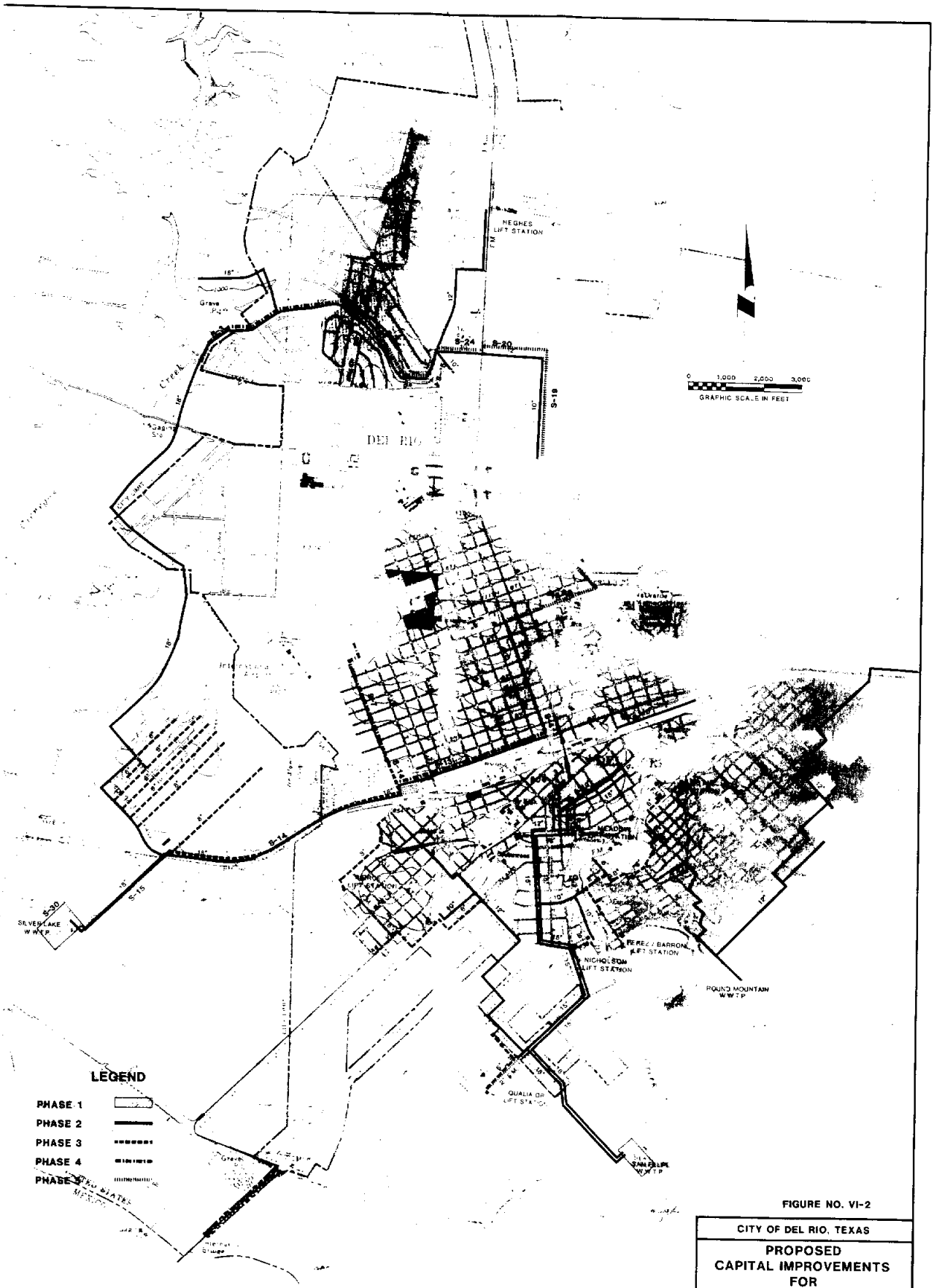


FIGURE NO. VI-2

CITY OF DEL RIO, TEXAS

PROPOSED CAPITAL IMPROVEMENTS FOR WASTEWATER SYSTEM

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants

TABLE NO. VI-2

SCHEDULE OF WATER AND WASTEWATER SYSTEM
CAPITAL IMPROVEMENTS
FOR THE
CIENEGAS TERRACE ADDITION

Improvements	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
	Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost
Water Mains (6")	19,600 L.F.	$352,800	13,100 L.F.	$235,800	4,600 L.F.	$82,800	2,600 L.F.	$ 46,800	4,400 L.F.	$79,200
Water Mains (8")	3,000 L.F.	72,000	2,600 L.F.	62,400	0	0	3,200 L.F.	76,800	0	0
Water Mains (12")	2,800 L.F.	100,800	4,400 L.F.	158,400	600 L.F.	21,600	0	0	1,200 L.F.	43,200
Fire Hydrants	26 Ea.	52,000	21 Ea.	42,000	7 Ea.	14,000	6 Ea.	12,000	7 Ea.	14,000
Sewer Mains (6")	10,000 L.F.	180,000	12,000 L.F.	216,000	3,000 L.F.	54,000	1,500 L.F.	27,000	4,500 L.F.	81,000
Sewer Mains (8")	10,500 L.F.	252,000	7,500 L.F.	180,000	2,500 L.F.	60,000	6,500 L.F.	156,000	1,200 L.F.	28,800
Lift Stations	2 Ea.	160,000	1 Ea.	60,000	1 Ea.	50,000	1 Ea.	40,000	1 Ea.	30,000
Force Mains	1,500 L.F.	29,250	1,100 L.F.	19,800	1,000 L.F.	18,000	1,000 L.F.	15,000	1,000 L.F.	15,000
* Offsite:										
Water Mains (12")	4,500 L.F.	71,300	0	45,400	0	14,600	0	16,200	0	14,600
Sewer Mains (12")	1,000 L.F.	15,850	0	10,100	0	3,250	0	3,600	0	3,250
Force Main	1,000 L.F.	10,600	0	6,750	0	2,200	0	2,400	0	2,200
Lift Station	1 Ea.	44,000	0	28,000	0	9,000	0	10,000	0	9,000
Subtotal - Construction Cost		$1,340,000		$1,064,650		$329,450		$405,800		$320,250
Construction Contingencies (10%)		134,000		106,350		33,000		40,600		32,000
Engineering and Tech. Services		260,000		213,000		66,000		89,300		64,000
TOTAL CAPITAL COST		$1,742,600		$1,384,000		$420,450		$535,700		$416,250

* Costs are pro-rated for each Phase according to percentage of lots served.

Annual Costs

	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
	Water	Wastewater	Water	Wastewater	Water	Wastewater	Water	Wastewater	Water	Wastewater
Capital Improvements:										
Amortized Cost *	$09,155	$ 94,988	$74,746	$71,502	$18,271	$27,004	$27,715	$34,093	$20,733	$23,252
Wastewater System O & M:										
Treatment -										
Pro-rated share of amortized capital costs **		7,386		6,787		1,796		2,196		1,796
Pro-rated share of treatment operation and maintenance costs **		2,645		2,431		643		787		643
Collection System -										
Lift Stations		8,015 (3)		4,285 (2)		3,581 (2)		3,614 (2)		3,581 (2)
Sewer Mains @ $0.15/ft.		3,432		3,174		1,002		1,300		1,032
Waterworks System O & M:										
Water Supply - Pumping	6,140		5,722		1,587		1,771		1,518	
Distribution mains @ $0.15/ft.	4,107		3,204		840		938		900	
TOTAL ANNUAL O & M COSTS	$99,402	$116,466	$93,722	$88,179	$20,698	$34,026	$24,424	$ 42,870	$ 23,151	$30,304
Total Lots	300 (36%)	309 (37%)	256 (30%)	200 (34%)	85 (10%)	72 (9%)	106 (13%)	93 (11%)	92 (11%)	76 (9%)
Household Cost (@ 90% Occupancy)/Yr.	$ 359	$ 419	$ 364	$ 338	$ 269	$ 479	$ 257	$ 510	$ 282	$ 446
Household Cost/Month	$ 30	$ 35	$ 30	$ 28	$ 22	$ 40	$ 21	$ 43	$ 24	37

* Debt service based on interest rate of 8.5% for a 20-year term
** Based on calculations presented in the Facility Plan, Silver Lake Wastewater Treatment Plant, July 1989

TABLE NO. VI-3

SCHEDULE OF WATER AND WASTEWATER SYSTEM
CAPITAL IMPROVEMENTS
FOR THE
VAL VERDE PARK ESTATES

Improvements	Phase 1 Quantity	Phase 1 Const. Cost	Phase 2 Quantity	Phase 2 Const. Cost	Phase 3 Quantity	Phase 3 Const. Cost	Phase 4 Quantity	Phase 4 Const. Cost	Phase 5 Quantity	Phase 5 Const. Cost
Water Mains (6")	8,000 L.F.	$144,000	4,000 L.F.	$ 72,000	12,000 L.F.	$216,000	6,000 L.F.	$108,000	6,500 L.F.	$117,000
Water Mains (8")	3,000 L.F.	72,000	5,000 L.F.	120,000	5,000 L.F.	120,000	2,500 L.F.	60,000	8,000 L.F.	192,000
Water Mains (12")	0	0	0	0	0	0	0	0	1,000 L.F.	36,000
Fire Hydrants	35 Ea.	70,000	13 Ea.	26,000	19 Ea.	38,000	17 Ea.	34,000	14 Ea..	28,000
Sewer Mains (6")	9,000 L.F.	162,000	10,000 L.F.	180,000	12,000 L.F.	216,000	9,000 L.F.	162,000	3,500 L.F.	63,000
Sewer Mains (8")	0	0	15,000 L.F.	360,000	10,000 L.F.	240,000	3,500 L.F.	84,000	3,000 L.F.	72,800
Lift Stations	1-Rehab.	20,000	0	0	0	0	0	0	1 Ea.	30,000
Force Mains	0	0	0	0	0	0	0	0	1,000 L.F.	15,000
Subtotal - Construction Cost		$468,000		$758,000		$ 830,000		$448,000		$553,800
Construction Contingencies (10%)		47,000		76,000		83,000		45,000		56,000
Engineering and Tech. Services		94,000		152,000		166,000		90,000		111,000
TOTAL CAPITAL COST		$609,000		$966,000		$1,079,000		$583,000		$720,800

Annual Costs

	Phase 1 Water	Phase 1 Wastewater	Phase 2 Water	Phase 2 Wastewater	Phase 3 Water	Phase 3 Wastewater	Phase 4 Water	Phase 4 Wastewater	Phase 5 Water	Phase 5 Wastewater
Capital Improvements: Amortized Cost *	$39,313	$25,044	$29,968	$ 74,223	$51,356	$62,663	$27,666	$33,920	$51,250	$24,917
Wastewater System O & M:										
Treatment -										
Pro-rated share of amortized capital costs **		9,890 (2.5%)		14,326 (3.6%)		15,808 (4.0%)		7,904 (2.0%)		1,482 (0.4)
Pro-rated share of treatment operation and maintenance costs **		7,500		10,875		12,000		6,000		1,125
Collection System -										
Lift Stations		5,201 (2)		6,493 (2)		6,591 (2)		3,208 (2)		624 (2)
Sewer Mains @ $0.15/ft.		1,350		3,750		3,300		1,875		1,125
Waterworks System O & M:										
Water Supply - Pumping	5,029		7,179		7,908		4,077		872	
Distribution mains @ $0.15/ft.	1,650		1,350		2,550		1,275		2,325	
TOTAL ANNUAL O & M COSTS	$45,992	$48,975	$38,497	$109,667	$61,814	$100,362	$33,038	$52,907	$54,447	$29,273
Total Lots	434	276 (20%)	185	354 (29%)	292	390 (32%)	238	201 (16%)	115	43 (3%)
Household Cost (@ 90% Occupancy)/Yr.	$ 118	$ 197	$ 231	$ 344	$ 235	$ 286	$ 154	$ 292	$ 524	$ 751
Household Cost/Month	$ 10	$ 16	$ 19	$ 29	$ 20	$ 24	$ 13	$ 24	$ 44	63

* Debt service based on interest rate of 8.5% for a 20-year term
** Based on calculations of capital costs for San Felipe WWTP and Transfer
[illegible] this [illegible] of [illegible]

Cantu Road. Sewerage service, is provided by on-site disposal systems. A sewage collection for the current development would require a considerable length of pipe, a lift station, and a force main which would, on an individual household cost, be very expensive.

The average cost per household for constructing the five phases of water and wastewater system improvements in the Cienegas Terrace Addition (TABLE NO. VI-2) is approximately $25 and $37, respectively. This area of development is predominately families with a low and moderate income level. The $62 cost per family for water and sewerage service would likely be a burden, thus, financing assistance would possibly need to be acquired in the form of grants or low interest loans. FIGURES NO. V-2 and NO. V-8, previously presented in Section V, show the locations for the proposed water and wastewater system improvements in the Cienegas Terrace Addition.

For the Val Verde Park Estates, a large part of this development is already served by standard water mains, therefore, service from the existing water system is in fair condition. The existing residents are all served by on-site disposal systems and, thus, a complete sewage collection system is proposed to be constructed in five (5) phases. Based on the outline of capital improvements, annual costs, and lots served per phase (TABLE NO. VI-3), the average cost for the water and wastewater additions was found to be approximately $21 and $31, respectively. This area is also developed by families of low and moderate income levels, and financing assistance in the form of grantsor low interest loans will need to be acquired in order to provide an affordable cost per family.

FIGURES NO. V-3 and NO. V-9, presented in Section V, show the locations of the proposed water and wastewater system improvements in the Val Verde Park Estates.

The TABLE NO. VI-4, on the following page, outlines the proposed water and wastewater collection system improvements and related annual costs in the Los Campos Additions. FIGURES NO. V-4 and V-10, presented in Section V, show the locations of the proposed water and wastewater system improvements in the Los Campos Additions.

This development, because of the large tracts and low density of households was anticipated to have a relatively high average cost per household for the water and wastewater improvements, which calculated to be $97 and $122, respectively. These costs are not affordable by the low and moderate income household and would need major financing support from grant funds.

Because of the large tracts in the Los Campos Additions, the development would be conducive to utilizing on-site wastewater disposal systems for each household, and with an adequately designed and maintained system, municipal sewerage service would not be needed for a number of years. The supply of water to the Los Campos area should, however, be the principal interest to the residences. Although the individual wells may

TABLE NO. VI-4

SCHEDULE OF WATER AND WASTEWATER SYSTEM
CAPITAL IMPROVEMENTS
FOR THE
LOS CAMPOS ADDITIONS

Improvements	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
	Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost	Quantity	Const. Cost
Water Mains (6")	9,500 L.F.	$171,800	4,000 L.F.	$ 72,000	3,000 L.F.	$ 54,000	0	$ 0	0 L.F.	$ 0
Water Mains (8")	9,000 L.F.	216,000	4,500 L.F.	108,000	5,500	132,000	5,500 L.F.	132,000	4,000 L.F.	96,000
Water Mains (12")	0	0	0	0	0	0	0	0	0	0
Fire Hydrants	20 Ea.	40,000	13 Ea.	26,000	13 Ea.	26,000	7 EA.	14,000	8 Ea.	16,000
Sewer Mains (6")	8,500 L.F.	153,000	1,000 L.F.	18,000	5,500 L.F.	99,000	4,000 L.F.	72,000	5,500 L.F.	99,000
Sewer Mains (8")	3,000 L.F.	72,000	5,500 L.F.	132,000	7,500 L.F.	180,000	3,500 L.F.	84,000	6,000 L.F.	144,000
Lift Stations	0 Ea.	0	1 Ea.	50,000	1 Ea.	40,000			1 Ea.	30,000
Force Mains	0	0	3,500 L.F.	63,800	2,500 L.F.	37,000	0	0	1,000 L.F.	15,000
* Offsite:										
Water Mains (12")	4,000 L.F.	58,896	0	26,208	0	19,152	0	27,072	0	12,672
Sewer Mains (8")	1,000 L.F.	6,504	0	3,312	0	5,040	0	4,896	0	4,248
Sewer Mains (12")	4,500 L.F.	43,902	0	22,356		34,020		3,672		3,186
Force Main (6")	1,000 L.F.	4,878	0	2,484	0	3,780	0	12,240	0	10,620
Lift Station	1 Ea.	16,260	0	8,280	1	12,600	0	33,048	0	28,674
Subtotal - Construction Cost		$ 782,440		$531,640		$643,092		$382,928		$459,400
Construction Contingencies (10%)		78,300		53,200		64,300		38,300		46,000
Engineering and Tech. Services		156,500		106,350		128,650		76,600		92,000
TOTAL CAPITAL COST		$1,017,240		$691,190		$836,042		$497,828		$597,400

* Costs are pro-rated for each Phase according to percentage of lots served.

Annual Costs

	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
	Water	Wastewater	Water	Wastewater	Water	Wastewater	Water	Wastewater	Water	Wastewater
Capital Improvements:										
Amortized Cost *	$66,752	$ 40,741	$31,903	$41,136	$31,754	$56,591	$23,773	$28,833	$17,137	$45,991
Wastewater System O & M:										
Treatment -										
Pro-rated share of amortized capital costs **		955		478		751		648		580
Pro-rated share of treatment operation and maintenance costs **		342		171		269		232		208
Collection System -										
Lift Stations		520		275		411		360		330
Sewer Mains @ $0.15/ft.		2,700		1,500		2,325		1,125		1,875
Waterworks System O & M:										
Water Supply - Pumping	1,414		621		448		655		310	
Distribution mains @ $0.15/ft.	3,375		1,275		1,275		825		600	
TOTAL ANNUAL O & M COSTS	$71,541	$45,258	$33,799	$43,560	$33,477	$60,347	$25,253	$31,198	$18,047	$48,984
Total Lots	74 (41%)	49 (27%)	33 (18%)	25 (14%)	24 (13%)	38 (21%)	34 (19%)	37 (20%)	16 (9%)	32 (18%)
Household Cost (@ 90% Occupancy)/Yr.	$ 1,068	$ 1,029	$ 1,127	$ 1,894	$ 1,522	$ 1,775	$ 815	$ 945	$ 1,289	$ 1,689
Household Cost/Month	$ 89	$ 86	$ 94	$ 158	$ 127	$ 148	$ 68	$ 79	$ 107	$ 141

* Debt service based on interest rate of 8.5% for a 20-year term
** Based on calculations presented in the Facility Plan, Silver Lake
West Texas Plant, 198[illegible]

2. Potential Sources of Funding Waterworks and Wastewater System Improvements

a. Farmers Home Administration

Farmers Home Administration is authorized to make loans and grants for development of water, sewer, and solid waste facilities for public use in rural areas and towns up to 10,000 people and loans to provide essential community facilities for public use in rural areas and towns up to 20,000 people. Priority will be given to municipal borrowers in communities smaller than 5,500 people to restore a deteriorated water supply, improve, enlarge or modify a water system or an inadequate sewer system, or to merge, construct, enlarge, or improve water, sewer, and solid waste disposal systems and other community facilities that provide essential service to rural residents, and to pay necessary costs connected with such facilities.

State Director
Farmers Home Administration
Federal Building, Suite 102
101 South Main Street
Temple, Texas 76501 (817) 774-1301

b. Economic Development Administration (EDA)

Economic Development Districts can be established to help solve the job and income problems in areas of high unemployment or low family income. Groups of five to ten adjacent counties with similar or related economic problems usually join to form a District. To be eligible for EDA grants and loans, the District must contain at least one county which has been designated as a Redevelopment Area and must contain a growth center. A growth center is a city or center of economic activity that contains a population of not more than 250,000 and has the development potential to provide jobs and services for the unemployed or underemployed of the Redevelopment Areas in the District. The District's needs and priorities are decided by a "grass roots" development committee. This is an organization representative of the economic, political, civic, and social interests in the District.

District and supplementary grants may be used to develop land and improvements for public works, public service, or development facility usage, and to acquire, construct, rehabilitate, alter, expand, or improve such facilities, including related machinery and equipment. To be eligible, a project must be located with an EDA designated area or designated Economic Development Center and must be consistent with the approved Overall Economic Development Program.

Economic Development Administration
611 E. 6th Street, Suite 201
Austin, Texas 78701 (512) 482-5823

c. Texas Department of Commerce (TDOC)

The Community Development Block Grant Program is administered by the Finance Division. This program includes the Planning Capacity Building Fund, the Texas Capital Fund, Interim Financing Fund, Community Development Fund, Special Impact Fund, Emergency Need Fund, and the Texas Rental Rehab Program.

The Community Development Block Grant Program provides grant funding on a competitive basis to non-entitlement cities and counties in Texas for various types of eligible public facilities, housing rehabilitation assistance, planning, and economic development projects. Each project must meet one of the national objectives established by Congress. The national objectives are:

(1) The project primarily benefits low and moderate income persons in which at least 60% of those benefitting must qualify as low and moderate income.

(2) The project eliminates slums and blight as defined by law and Texas Department of Commerce criteria.

(3) The project addresses an urgent need that represents a serious and immediate threat to public health and safety, as defined by federal law and state requirements.

The Block Grant Program is divided into the following funding categories; however, these are reviewed and revised annually.

The Community Development Project Fund provides grants based on annual competitions for public facilities and housing rehabilitation.

The Planning Fund provides grants based on annual competitions for comprehensive physical planning.

The Emergency/Urgent Need Fund provides grants on an as-needed basis to respond to natural disasters and/or urgent needs that pose an immediate threat to the health and safety of local residents.

The Texas Capital Fund provides funds to encourage business development on expansion, and to assist in local infrastructure improvements that support private economic development. Funds will be awarded to eligible cities or counties on the basis of bimonthly statewide reviews for

the express purpose of creating new permanent jobs on retaining existing jobs primarily for low and moderate income persons.

The program also administers the Department of Housing and Urban Development funded housing assistance program which has an overall goal to improve the quality of existing rental housing available to low and very low income residents. Grants are made to eligible cities and/or counties after an annual competition.

d. Texas Water Development Board

The Texas Water Development Board (TWDB), through its Water Development Fund, provides loans to political subdivisions of the State for water supply, wastewater, and flood control projects. The loans are in the form of purchasing bonds from the political subdivision.

The Board can provide funds for water supply projects to entities who cannot sell their bonds on the open market at reasonable rates of interest, those who are a part of a regional system, and those who are converting from a ground-water source to a surface water source. The funds can be used for any part of a water supply system except in the retail distribution loop.

Water Development Board funds can be used for all parts of a wastewater system. The political subdivision must either demonstrate that it cannot sell bonds on the open market at a reasonable rate of interest or be a part of a regional project.

- State Water Pollution Control Revolving Fund (State Revolving Fund, or SRF)

The SRF is a perpetual fund through which the Texas Water Development Board provides low interest loans to Texas communities for the construction of wastewater treatment works. The current interest rate for loans is about 5 1/2%, but may vary with changing market conditions, and the maximum term is 20 years after project completion. The TWDB can also make low interest loans to refinance certain debts incurred after March 7, 1985, if the applicable program requirements are met.

Texas Water Development Board
Construction Grants Division
P.O. Box 13231, Capitol Station
Austin, Texas 78711-3231
(512) 463-7853 or 463-7751

- State Loan Program Water Quality Enhancement Loan, or WQEL

The WQEL is a state financed fund through which the TWDB provides 100% loans to Texas communities for construction of wastewater treatment works. Interest rates are determined by current bond market conditions and may be higher than rates available from the SRF Loan Program; however, the federal requirements of the Clean Water Act do not apply to these loans. Financial assistance from the WQEL program may be more readily available than from the SRF because of the higher interest rates of the WQEL.

Texas Water Development Board
Development Fund Office
P.O. Box 13231, Capitol Station
Austin, Texas 78711-3231
(512) 463-7867

- Construction Grants for Wastewater Treatment Works

The Construction Grants Program is administered by the Texas Water Development Board. The Program provides federal funds to cover 55% of the eligible costs of wastewater treatment facilities. This Program is being replaced by the State Water Pollution Control Revolving Fund (SRF) and will terminate in FY 1990.

Texas Water Development Board
Construction Grants Division
P.O. Box 13231, Capitol Station
Austin, Texas 78711-3231
(512) 463-7853 or 463-7751

- Facility Planning

The Texas Water Development Board assists local governments in developing wastewater treatment facility plans required prior to obtaining a construction grant or state loan to fund facility construction costs. This funding assistance, in the past, has been in the form of grant monies. This program of "advance" planning funds will probably no longer be offered, according to the report of the TWDB.

Texas Water Development Board
Construction Grants Division
P.O. Box 13231, Capitol Station
Austin, Texas 78711-3231
(512) 463-7853 or 463-7751

- Senate Bill No. 2 (SB-2)

Senate Bill No. 2, passed in the regular session of 71st Texas Legislature and passed by the vote of the public on November 7, 1989, provides for $100 million in financing assistance in the form of loans to economically distressed areas.

This Act is specifically targeted towards financial assistance to provide facility engineering and adequate water supply and sewer services to those areas qualifying to receive funds and is sometimes referred to as the "Economically Distressed Area Program (EDAP)".

Under SB-2, a county with unemployment 25% higher than the statewide average, and with per capita income 25% lower than the average, may participate in this new assistance program. The cities, water districts, and non-profit corporations within the designated counties of high unemployment and low income may also be eligible to receive these funds.

This legislation was prompted by the plight of residents in unincorporated "colonias" concentrated in counties along the Texas-Mexico border.

The rules and regulations are currently being prepared by the TWDB, and the procedures for filing the assistance applications will reportedly be ready in mid 1990.

Texas Water Development Board
Development Fund Office
P.O. Box 13231, Capitol Station
Austin, Texas 78711-3231
(512) 463-7867

APPENDIX

APPENDIX "A"

TEXAS DEPARTMENT OF HEALTH
DIVISION OF WATER HYGIENE

DRINKING WATER STANDARDS GOVERNING
DRINKING WATER QUALITY AND REPORTING
REQUIREMENTS FOR PUBLIC
WATER SUPPLY SYSTEMS

ADOPTED BY THE TEXAS BOARD OF HEALTH JUNE 4, 1977, EFFECTIVE JULY 1, 1977
REVISED NOVEMBER 30, 1977, EFFECTIVE JANUARY 3, 1978
REVISED FEBRUARY 24, 1980, EFFECTIVE MARCH 17, 1980
REVISED NOVEMBER 1, 1980, EFFECTIVE NOVEMBER 29, 1980
REVISED OCTOBER 19, 1985, EFFECTIVE JANUARY 1, 1986
REVISED DECEMBER 13, 1986, EFFECTIVE JANUARY 6, 1987
REVISED APRIL 16, 1988, EFFECTIVE MAY 9, 1988

§337.1 Purpose. The purpose of these standards is to assure the safety of public water supplies with respect to bacteriological, chemical and radiological quality and to further efficient processing through control tests, laboratory checks, operating records and reports of public water supply systems. These standards are written so as to comply with the requirements of Public Law 93-523, the Federal "Safe Drinking Water Act," and the "Interim Primary Drinking Water Regulations" which have been promulgated by the Environmental Protection Agency, under the authority granted by Public Law 93-523.

§337.2 Definitions. The following definitions shall apply in the interpretation and enforcement of these standards:

Approved laboratory - a laboratory certified and approved by the Department to analyze water samples to determine their compliance with maximum allowable levels.

Community water system - a public water system which has a potential to serve at least 15 service connections on a year-round basis or serves at least 25 individuals on a year-round basis. Service connections shall be counted as one for each single family residential unit or each commercial or industrial establishment to which drinking water is supplied from the system.

Control tests - chemical, radiological, physical or bacteriological tests made by the operator of the water system to control the quality or quantity of water served to the public and recorded regularly in the operating records.

Department - the Texas Department of Health.

Drinking water - all water distributed by any agency or individual, public or private, for the purpose of human consumption or which may be used in the preparation of foods or beverages or for the cleaning of any utensil or article used in the course of preparation or consumption of food or beverages for human beings. The term "Drinking Water" shall also include all water supplied for human consumption or used by any institution catering to the public.

Human consumption - uses by humans in which water can be ingested into or absorbed by human body. Examples of these uses include, but or not limited to drinking, cooking, brushing teeth, bathing, washing hands, washing dishes and preparing foods.

Laboratory checks - chemical, radiological, physical or bacteriological tests made in a laboratory, approved by the Department on water samples submitted by the operator of the system to confirm the quality of the water.

Monthly Reports of Water Works Operations - the daily record of data relating to the operation of the system facilities compiled in a monthly report.

Noncommunity water system - any public water system which is not a community water system.

Nontransient noncommunity water system or "NTNCWS" - a public water system that is not a community water system and that regularly serves at least 25 of the same persons over six months per year.

Public water system - a system for the provision to the public or piped water for human consumption, which includes all uses described under the definition for drinking water. Such a system must have a potential for at least 15 service connections or serve at least 25 individuals at least 60 days out of the year. This term includes any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system; and any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. Two or more water systems with each having a potential to serve less than 15 connections or less than 25 individuals but owned by the same person, firm or corporation and located on adjacent land will be considered a public water system when the total potential service connections in the combined systems are 15 or greater or if the total number of individuals served by the combined systems total 25 or more at least 60 days out of the year. Without excluding other meanings of the terms "individual" or "served," an individual shall be deemed to be served by a water system if he resides in, uses as his place of employment, or works in, a place to which drinking water is supplied from the system. A public water system is either a "community water system" or a "noncommunity water system" as defined in this section.

Sanitary survey - an onsite review of the water source, facilities, equipment, operation and maintenance of a public water system, for the purpose of evaluating the adequacy for producing and distributing safe drinking water.

Status reports - written public notification issued by a supplier of water whenever the supplier's system fails to comply with a maximum contaminant level, is granted a variance or exemption from a maximum contaminant level or fails to comply with a schedule for contaminant levels prescribed pursuant to a variance or exemption.

§337.3 Standards of Chemical Quality. All analyses to determine compliance shall be performed by laboratories approved by the Department. Analyses shall be performed on treated water as furnished to the customer.

(1) Inorganics. Maximum constituent levels for nitrate are applicable to both the community and noncommunity water systems, except as provided in paragraph (2) of this section. The other constituent limits in the following table are applicable only to community type systems.

Constituent	Level, Milligrams Per Liter
Arsenic	0.05
Barium	1.
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.
Selenium	0.01
Silver	0.05

(2) Nitrate. At the discretion of the Department, nitrate (as N) levels not to exceed 20 milligrams/liter may be allowed in a noncommunity system if the supplier of water demonstrates to the satisfaction of the Department that:

(A) such water will not be available to children under six months of age,

(B) there will be continuous posting of the fact that nitrate levels exceed 10 milligrams/liter and the potential health effects of exposure,

(C) local and State public health authorities will be notified that nitrate levels exceed 10 milligrams/liter, and

(D) no adverse health effects shall result.

(3) Fluoride. Maximum allowable level for fluoride in community type water systems is 4.0 mg/l. Also, see §337.14 of this title (relating to Recommended Secondary Constituent Levels Applicable to All Public Water Systems) which establishes a recommended secondary constituent level of 2.0 mg/l.

(4) Organics. Maximum constituent levels for organic chemicals.

(A) The following maximum contaminant levels apply to community water systems.

Constituent	Level, Milligrams Per Liter	Level, Micrograms Per Liter
(i) Chlorinated hydrocarbons:		
Endrin (1,2,3,4,10, 10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8, 8a-octahydro-1,4-endo, endo-5, 8-dimethano napthalene).	0.0002	0.2
Lindane (1,2,3,4,5,6-hexchloro-cyclohexane, gamma isomer).	0.004	4.0
Methoxychlor (1,1,1-Trichloro-2,2-bis [p-methoxyphenyl] ethane).	0.1	100
Toxaphene ($C_{10}H_{10}C_{18}$ - Technical chlorinated camphene, 67-69 percent chlorine).	0.005	5.0
(ii) Chlorophenoxys:		
2,4-D (2,4-Dichlorophenoxyacetic acid).	0.1	100
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid).	0.01	10

(B) The following maximum contaminant levels for organic contaminants apply to community water systems and nontransient noncommunity water systems. The effective date is January 9, 1989.

CONTAMINANT	MAXIMUM CONTAMINANT LEVEL IN MILLIGRAMS PER LITER	MICROGRAMS PER LITER
Benzene	0.005	5
Vinyl Chloride	0.002	2
Carbon Tetrachloride	0.005	5
1,2-Dichloroethane	0.005	5
Trichloroethylene	0.005	5
1,1-Dichloroethylene	0.007	7
1,1,1-Trichloroethane	0.20	200
para-Dichlorobenzene	0.075	75

(5) Maximum allowable levels for turbidity. This standard shall apply only to systems which treat surface water. The maximum allowable levels for turbidity in drinking water measured at a representative entry point(s) to the distribution system are as follows.

(A) One turbidity unit (TU), as determined by a monthly average, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the Department that the higher turbidity does not do any of the following:

(i) interfere with disinfection;

(ii) prevent maintenance of an effective disinfectant agent throughout the distribution system; or

(iii) interfere with microbiological determinations.

(B) Five turbidity units based on an average for two consecutive days.

(C) Exceptions to the five or fewer turbidity units must be by written request for a specific time frame and submitted to the Department prior to that time.

(6) Verification of excessive chemical level.

(A) When the results of a chemical analysis indicate that the level of any constituent except nitrate exceeds the maximum allowable level at least three additional samples shall be collected within one month of notification to the Department. The four analysis results shall be averaged to determine if the water served to the public exceeds the maximum allowable level.

(B) When a level exceeding the maximum allowable level for nitrate is found, a second analysis must be initiated within 24 hours of receipt of notification. If the mean of the two samples exceeds the allowable level, the supplier of water must report to the Department and notify the public, in accordance with paragraph (8) of this subsection.

(7) Variances and exemptions. Variances and exemptions shall be defined as follows.

(A) Variance - An exception to one or more of the maximum allowable levels which is necessary because the condition of the system's raw water is such that the maximum allowable level cannot be met despite the application of the best available treatment techniques (taking costs into consideration) subject to the following conditions:

(i) the public water system requesting the variance was in operation on the date these standards became effective;

(ii) the granting of the variance will not result in an unreasonable risk to public health;

(iii) a schedule, including increments of progress, is established to bring the system into compliance with the standard in question.

(B) Exemption - Exception to a provision of these standards where, because of compelling factors (which may include economic), the system is unable to comply with a specified allowable level. An exemption may be granted only under the following circumstances:

(i) the public water system requesting the exemption was in operation on the date these standards became effective, or for a system that was not in operation by that date, only if no reasonable alternative source of drinking water is available to such new system;

(ii) the granting of the exemption will not result in an unreasonable risk to public health;

(iii) a schedule is established to bring the system into compliance with the standard in question.

(C) Variances and exemptions, as defined above, may be granted at the discretion of the Department. Applications for such variances and/or exemptions must be submitted by the water system requesting a variance or exemption and must include the following:

(i) a statement of the standard which is not met;

(ii) an estimate of the risk involved to public health with supporting evidence from physicians or dentists in the area;

(iii) a long range plan for the correction of the problem. This plan or compliance schedule must be submitted within one year following written notification that a variance or exemption has been granted;

(iv) a detailed economic evaluation of the current and future situation.

(D) A variance or exemption covering a group or class of systems with a common standard which is not met may be issued by the Department without individual application. However, individual compliance schedules will be required for each such system within one year following written notification by the Department that such a variance or exemption has been granted. After receiving notification from the Department that a group or class variance or exemption has been issued to their system, each system must submit the above items in accordance with paragraph (7)(C)(ii), (iii), and (iv) of this subsection.

(E) The Department is required to act upon all requests for variances or exemptions within a reasonable time period, not to exceed 90 days.

(F) Procedures for public comment and public hearings on variances, exemptions, and compliance schedules as a condition of a variance or exemption will be as stated in the EPA National Interim Primary Drinking Water Regulations, of 40 Code of Federal Regulations, §141.4 and §142.20.

(8) Public notification requirements.

(A) Status reports are required of any public water supply system which

(i) violates maximum allowable levels,

(ii) fails to use prescribed treatment techniques,

(iii) is granted a variance or exemption,

(iv) fails to comply with a variance or exemption schedule, or

(v) fails to perform required monitoring.

(B) Status reports shall conform to the following requirements:

(i) notices given shall be written in a manner reasonably designed to inform fully the users of the system;

(ii) notices shall be conspicuous and shall not use unduly technical language, unduly small print, or other methods which would frustrate the purpose of the notice;

(iii) notices shall disclose all material facts regarding the subject including the nature of the problem and, where appropriate, a clear statement that a primary drinking water regulation has been violated and any preventive measures that should be taken by the public;

(iv) bilingual notice shall be given where designated by the Department.

(C) Status reports required under subparagraph (A) of this paragraph must be issued as follows:

(i) with the next water bill or by written notice if water bill is issued quarterly or not issued at all, and quarterly thereafter;

(ii) in such other form as may be prescribed by the Department, including posting of conspicuous notice for noncommunity systems;

(iii) in the case of a failure to comply with a maximum contaminant level which is not corrected promptly after discovery, the supplier of water must give other general public notice of the failure, in addition to notice by direct mail, in a manner specified by the Department. Such notice may consist of newspaper advertisement, press release, or other appropriate means.

(iv) The requirements of clause (iii) of this subparagraph may be waived by the Department if it determines that the violation has been corrected promptly after discovery and the cause of the violation has been eliminated.

(D) Example copies of all status reports required under this subsection must be sent to the Department within ten days of its distribution as proof of notification.

§337.4 Control Tests. These tests permit the operator of the system to judge variations in water quality, to identify objectionable water characteristics, and to detect the presence of foreign substances which may adversely affect the potability of the water. These control tests shall be performed in accordance with procedures approved by the Department.

(1) Surface supplies. Operators of water treatment plants utilizing coagulation, settling, softening or filtration shall perform daily the following chemical control tests on the filtered water, list them on the Monthly Report of Water Works Operation and submit a copy of this report to the Department after each month of operation.

TEST	APPLICABILITY
Turbidity	All Public Supplies
pH	Community Type Systems Only
Alkalinity	Community Type Systems Only
Chlorine Residual	All Public Supplies

(2) Water samples for bacteriological quality. The minimum number of samples to be collected from a public water supply and submitted for examination shall be in accordance with the following table with the exception of noncommunity water systems which meet the conditions of §337.6(c) of this title (relating to Microbiological Contaminant Sampling and Analytical Requirements). The Department may require a sampling frequency in excess of the minimum number of monthly samples.

Population Served	Minimum Number of Samples Per Month
0 to 1,000	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 9,400	10
9,401 to 10,300	11
10,301 to 11,100	12
11,101 to 12,000	13
12,001 to 12,900	14
12,901 to 13,700	15
13,701 to 14,600	16
14,601 to 15,500	17
15,501 to 16,300	18
16,301 to 17,200	19
17,201 to 18,100	20
18,101 to 18,900	21
18,901 to 19,800	22
19,801 to 20,700	23
20,701 to 21,500	24
21,501 to 22,300	25
22,301 to 23,200	26
23,201 to 24,000	27
24,001 to 24,900	28
24,901 to 25,000	29
25,001 to 28,000	30
28,001 to 33,000	35
33,001 to 37,000	40
37,001 to 41,000	45
41,001 to 46,000	50
46,001 to 50,000	55
50,001 to 54,000	60

54,001 to 59,000	65
59,001 to 64,000	70
64,001 to 70,000	75
70,001 to 76,000	80
76,001 to 83,000	85
83,001 to 90,000	90
90,001 to 96,000	95
96,001 to 111,000	100
111,001 to 130,000	110
130,001 to 160,000	120
160,001 to 190,000	130
190,001 to 220,000	140
220,001 to 250,000	150
250,001 to 290,000	160
290,001 to 320,000	170
320,001 to 360,000	180
360,001 to 410,000	190
410,001 to 450,000	200
450,001 to 500,000	210
500,001 to 550,000	220
550,001 to 600,000	230
600,001 to 660,000	240
660,001 to 720,000	250
720,001 to 780,000	260
780,001 to 840,000	270
840,001 to 910,000	280
910,001 to 970,000	290
970,001 to 1,050,000	300
1,050,001 to 1,140,000	310
1,140,001 to 1,230,000	320
1,230,001 to 1,320,000	330
1,320,001 to 1,420,000	340
1,420,001 to 1,520,000	350
1,520,001 to 1,630,000	360
1,630,001 to 1,730,000	370
1,730,001 to 1,850,000	380
1,850,001 to 1,970,000	390
1,970,001 to 2,060,000	400
2,060,001 to 2,270,000	410
2,270,001 to 2,510,000	420
2,510,001 to 2,750,000	430
2,750,001 to 3,020,000	440
3,020,001 to 3,320,000	450
3,320,001 to 3,620,000	460
3,620,001 to 3,960,000	470
3,960,001 to 4,310,000	480
4,310,001 to 4,690,000	490
4,690,001 or more	500

§337.5 Max mum Bacteriological Contaminant Levels. The maximum contaminant levels for coliform bacteria, applicable to community water systems and noncommunity water systems are as follows.

(1) When the membrane filter technique is used, the number of coliform bacteria shall not exceed any of the following:

(A) one per 100 milliliters as the arithmetic mean of all samples examined per month;

(B) four per 100 milliliters in more than one sample when less than 20 are examined per month; or

(C) four per 100 milliliters in more than 5 percent of the samples when 20 or more are examined per month.

(2) When the fermentation tube method and 10 milliliter standard portions are used, coliform bacteria shall not be present in any of the following:

(A) more than 10 percent of the portions examined in any month;

(B) three or more portions in more than one sample when less than 20 samples are examined per month; or

(C) three or more portions in more than 5 percent of the samples when 20 or more samples are examined per month.

§337.6 Microbiological Contaminant Sampling and Analytical Requirements.

(a) Suppliers of water for community water systems and noncommunity water systems shall analyze for coliform bacteria for the purpose of determining compliance with §337.5 of this title (relating to Maximum Bacteriological Contaminant Levels). A 100-milliliter sample is required for the analysis and all samples must be submitted to a laboratory approved by the Department. The samples shall be taken at points which are representative of the conditions within the distribution system.

(b) A supplier of water of a community water system may, with the approval of the Department and based upon a sanitary survey, substitute the use of chlorine residual monitoring for not more than 75 percent of the samples required to be taken by §337.4(2) of this title (relating to Control Tests). This may be done provided the supplier of water takes chlorine residual samples at points which are representative of the conditions within the distribution system at the frequency of at least four for each substituted microbiological sample. There shall be at least daily determination of chlorine residual. When the supplier of water exercises the option provided in this subsection, a total chlorine residual of at least 0.5 milligrams/liter shall be maintained throughout the public water distribution system. Analyses for chlorine residual shall be made in accordance with "Standard Methods for the Examination of Water and Wastewater,"

16th Edition, pp. 306-310. Field test kits employing the DPD method of chlorine residual testing which are accepted by the U.S. Environmental Protection Agency or the Department may be used for chlorine residual monitoring as required in this subsection. The chlorine residuals must be reported to the Department on the "Monthly Report of Water Works Operation" form. The Department may withdraw its approval of the use of chlorine residual substitution at any time.

(c) Based on a history of no coliform bacterial contamination and on a sanitary survey by the Department showing the water system to be supplied solely by a protected groundwater source and free of sanitary defects, a noncommunity water system, with written permission from the Department, may reduce the number of samples submitted except that in no case shall it be reduced to less than one per month.

(d) When the coliform bacteria in a single sample examined using the membrane filter technique exceed four per 100 milliliters, at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the Department, until the results obtained from at least two consecutive check samples show less than one coliform bacterium per 100 milliliters.

(e) When coliform bacteria occur in three or more 10-milliliter portions of a single sample examined using the multiple tube fermentation technique, at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the Department, until the results obtained from at least two consecutive check samples show no positive tubes.

(f) The location at which the check samples were taken shall not be eliminated from future sampling without approval of the Department. The results from all coliform bacterial analyses performed pursuant to this subpart, except those obtained from check samples and special purpose samples, shall be used to determine compliance with the maximum contaminant level for coliform bacteria. Check samples shall not be included in calculating the total number of samples taken each month to determine compliance.

(g) A positive routine monthly sample may be excluded from calculation with compliance to §337.5 of this title (relating to Maximum Bacteriological Contaminant Levels) on a case-by-case basis if:

(1) the Department determines that no unreasonable risk to health existed using but not limited to the following factors:

(A) the public water system maintained an active chlorine residual in the distribution system;

(B) the evaluation of potential contamination by a sanitary survey;

(C) the history of the systems water quality monitoring efforts;

(2) the supplier of water collects check samples on each of two consecutive days from the same sampling point within 24 hours after notification that the routine sample is positive, or as soon as possible if the laboratory is closed, and each of these check samples is negative.

(h) When the presence of coliform bacteria in water taken from a particular sampling point has been confirmed by any check samples examined as directed in this section, the supplier of water shall report to the Department within 48 hours.

(i) When a maximum contaminant level set forth in this section is exceeded the supplier of water shall report to the Department and notify the public, as prescribed in §337.3(8) of this title (relating to Standards of Chemical Quality).

(j) Special purpose samples, such as those taken to determine whether disinfection practices following pipe placement, replacement, or repair have been sufficient, shall not be used to determine compliance with this section.

(k) Where water systems are required to submit less than four samples per month, compliance with the limits established in §337.5 of this title (relating to Maximum Bacteriological Contaminant Levels) shall be determined on a three month basis, instead of monthly.

(1) Microbiological samples reported only as unsuitable for analysis (i.e. confluent growth, heavy silt present, too old for analysis, insufficient quantity, not in approved container, etc.) will not be counted as meeting the minimum number of samples required in §337.4(2) of this title (relating to Control Tests). However, microbiological samples reporting coliform found plus confluent growth or too numerous to count will be considered positive samples and subject to compliance with the limits in §337.5 of this title (relating to Maximum Bacteriological Contaminant Levels).

§337.7 Turbidity Sampling and Analytical Requirements.

(a) Samples shall be taken by suppliers of water for both community water systems and noncommunity water systems at a representative entry point(s) to the water distribution system at least once per day, for the purpose of making turbidity measurements to determine compliance with §337.3(5) of this title (relating to Standards of Chemical Quality). The measurement shall be made by the Nephelometric Method in accordance with the recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 16th Edition, pp. 134-136, or "Methods for Chemical Analysis of Water and Wastes," pp. 295-298, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(b) If the result of a turbidity analysis indicates that the maximum allowable level has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the Department within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples taken on consecutive days exceeds 5 TU, the supplier of water shall report to the Department and notify the public in accordance with §337.3(8) of this title (relating to Standards of Chemical Quality).

(c) The requirements of this section shall apply only to public water systems which use water obtained in whole or in part from surface sources.

§337.8 Inorganic Chemical Sampling and Analytical Requirements.

(a) Analyses for the purpose of determining compliance with §337.3 (1) of this title (relating to Standards of Chemical Quality) are required as follows:

(1) analyses for all community water systems utilizing surface water sources shall be performed at yearly intervals;

(2) analyses for all community water systems utilizing only ground water sources shall be performed at three-year intervals;

(3) for noncommunity water systems, whether supplied by surface or groundwater sources, analyses for nitrate shall be performed at intervals determined by this Department. None of the other maximum constituent levels for inorganics are applicable to noncommunity systems.

(b) If the result of an analysis made pursuant to subsection (a) of this section indicates that the level of any constituent listed in §337.3(1) of this title (relating to Standards of Chemical Quality) exceeds the maximum constituent level, the supplier of water shall report to the Department within seven days and initiate three additional analyses at the same sampling point within one month.

(c) When the average of four analyses made pursuant to subsection (b) of this section, rounded to the same number of significant figures as the maximum constituent level for the substance in question, exceeds the maximum constituent level, the supplier of water shall notify the Department and give notice to the public, in accordance with §337.3(8) of this title (relating to Standards of Chemical Quality). Monitoring after public notification shall be at a frequency designated by the Department and shall continue until the maximum constituent level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption, or enforcement action shall become effective.

(d) The provisions of subsections (b) and (c) of this section notwithstanding, compliance with the maximum constituent level for nitrate shall be determined on the basis of the mean of two analyses. When a level exceeding the maximum constituent level for nitrate is found, a second analysis shall be initiated within 24 hours, and if the mean of the two analyses exceeds the maximum constituent level, the supplier of water shall report his findings to the Department and shall notify the public in accordance with §337.3(8) of this title (relating to Standards of Chemical Quality).

§337.9 Organic Chemical other than Total Trihalomethanes, Sampling and Analytical Requirements.

(a) An analysis of substances for the purpose of determining compliance with §337.3(4)(A) of this title (relating to Standards of Chemical Quality) shall be made as follows:

(1) for all community water systems utilizing surface water sources, samples shall be collected during the period of the year designated by the Department as the period when contamination by pesticides is most likely to occur. These analyses shall be repeated no less frequently than at three-year intervals;

(2) for community water systems utilizing only groundwater sources, analyses shall be completed by those systems specified by the Department.

(b) If the result of an analysis made pursuant to subsection (a) of this section indicates that the level of any constituent exceeds the maximum constituent level, the supplier of water shall report to the Department within seven days and initiate three additional analyses within one month.

(c) When the average of four analyses made pursuant to subsection (a) of this section, rounded to the same number of significant figures as the maximum constituent level for the substance in question, exceeds the maximum constituent level, the supplier of water shall report to the Department and give notice to the public pursuant to §337.3(8) of this title (relating to Standards of Chemical Quality). Monitoring after public notification shall be at a frequency designated by the Department and shall continue until the maximum constituent level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption, or enforcement action shall become effective.

(d) Analysis of the comtaminants listed in §337.3(4)(B) of this title (relating to Standards of Chemical Quality) for purposes of determining compliance with the maximum contaminant levels shall be conducted as follows.

(1) Groundwater systems shall sample at points of entry to the distribution system representative of each well. Sampling must be conducted at the same location or a more representative location each quarter. Groundwater systems must sample every three months for each entry point to the distribution system except as provided in paragraph (5)(A) of this subsection.

(2) Surface water systems shall sample at points in the distribution system representative of each source or at entry points to the distribution system after any application of treatment. Surface water systems must sample each source every three months except as provided in paragraph (5)(B) of this section. Sampling must be conducted at the same location or a more representative location each quarter.

(3) If the system draws water from more than one source and sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions.

(4) All community water systems and nontransient noncommunity water systems serving more than 10,000 people shall analyze all distribution or entry point samples, as appropriate, representing all source waters beginning no later than January 1, 1988. All community water systems and nontransient noncommunity water systems serving from 3,300 to 10,000 people shall analyze all distribution or entry-point samples, as required in this subsection, representing source waters no later than January 1, 1989. All other community and nontransient noncommunity water systems shall analyze distribution or entry-point samples, as required in this subsection, representing all source waters beginning no later than January 1, 1991.

(5) The State may reduce the monitoring frequency specified in paragraphs (1) and (2) of this subsection, as follows.

(A) The monitoring frequency for groundwater systems is as follows:

(i) when volatile organic chemicals (VOC's) are not detected in the first sample (or any subsequent samples that may be taken) and the system is not vulnerable as described in subparagraph (D) of this paragraph, monitoring must be repeated every five years;

(ii) when VOC's are not detected in the first sample (or any subsequent sample that may be taken) and the system is vulnerable as defined in subparagraph (D) of this paragraph:

(I) monitoring must be repeated every three years for systems greater than 500 connections;

(II) monitoring must be repeated every five years for systems less than 500 connections;

(III) if VOC's are detected in the first sample (or any subsequent sample that may be taken), regardless of vulnerability, monitoring must be repeated every three months, as required under paragraph (1) of this subsection.

(B) The repeat monitoring frequency for surface water systems is as follows:

(i) when VOC's are not detected in the first year of quarterly sampling (or any other subsequent sample that may be taken) and the system is not vulnerable as defined in subparagraph (D) of this paragraph, monitoring is only required at State discretion;

(ii) when VOC's are not detected in the first year of quarterly sampling (or any other subsequent sample that may be taken) and the system is vulnerable as defined in subparagraph (D) of this paragraph;

(I) monitoring must be repeated in three years for systems greater than 500 connections;

(II) monitoring must be repeated every five years for systems less than 500 connections;

(III) when VOC's are detected in the first year of quarterly sampling (or any other subsequent sample that may be taken), regardless of vulnerability, monitoring must be repeated every three months, as required under paragraph (2) of this subsection.

(C) States may reduce the frequency of monitoring to once per year for a groundwater systems or surface water systems detecting VOC's at levels consistently less than the maximum contaminant level (MCL) for three consecutive years.

(D) Vulnerability of each public water system shall be determined by the State based upon an assessment of the following factors:

(i) previous monitoring results;

(ii) numbers of persons served by public water system;

(iii) proximity of a smaller system to a larger system;

(iv) proximity to commercial or industrial use, disposal, or storage of volatile synthetic organic chemicals;

(v) protection of the water source.

(E) A system is deemed to be vulnerable for a period of three years after any positive measurement of one or more contaminants listed in §337.3(4)(B) of this title (relating to Standards of Chemical Quality), or referred to in subsection (e) of this section except for trihalomethanes or other demonstrated disinfection by-products.

(6) Compliance with §337.3(4)(B) of this title (relating to Standards of Chemical Quality) shall be determined based on the results of running annual average of quarterly sampling for each sampling location. If one location's average is greater than the MCL, then the system shall be deemed to be out of compliance. If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, only that part of the system that exceeds any MCL as specified in §337.3 (4)(B) of this title (relating to Standards of Chemical Quality) will be deemed out of compliance. If any one sample result would cause the annual average to be exceeded, then the system shall be deemed out of compliance immediately. For systems that only take one sample per location because no VOC's were detected, compliance shall be based on that one sample.

(e) Analyses of unregulated contaminants shall be as specified in 40 Code of Federal Regulations, §141.40. The Department adopts by reference the Federal Regulations referred to in this subsection.

§337.10 Radiological Sampling and Analytical Requirements.

(a) Maximum contaminant levels for radium-226, radium-228 and gross alpha particle radioactivity for community systems:

(1) Combined radium-226 and radium-228 - 5 pCi/l

(2) Gross alpha particle activity (including radium-226 but excluding radon and uranium) - 15 pCi/l.

(b) Maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides in drinking water in community water systems.

(1) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem (mrem)/year.

(2) Except for the radionuclides listed in Table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents shall be calculated on the basis of a 2-liter-per-day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure," NBS Handbook 69 as amended August, 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 mrem/year.

Table A - Average annual concentrations assumed to produce a total body or organ dose of 4 mrem/year.

Radionuclide	Critical Organ	pCi Per Liter
Tritium	Total Body	20,000
Strontium-90	Bone Marrow	8

(c) Monitoring frequency for radioactivity in community water systems.

(1) Monitoring requirements for gross alpha particle activity, radium-226 and radium-228.

(A) Compliance with subsection (a) of this section shall be based on the analysis or analyses of four samples obtained at quarterly intervals.

(i) A gross alpha particle activity measurement may be substituted for the required radium-226 and radium-228 analysis provided that the measured gross alpha particle activity does not exceed 5 pCi/l at a confidence level of 95 percent (1.65 where is the standard deviation of the net counting rate of the sample.)

(ii) When the gross alpha particle activity exceeds 5 pCi/l, the same or an equivalent sample shall be analyzed for radium-226. If the concentration of radium-226 exceeds 3 pCi/l the same or an equivalent sample shall be analyzed for radium-228.

(B) Suppliers of water shall monitor at least once every four years following the procedure required by subparagraph (A) of this paragraph. At the discretion of the Department, when an annual record taken in conformance with subparagraph (A) of this paragraph has established that the average annual concentration is less than one-half the maximum contaminant levels established by subsection (a) of this section, analysis of a single sample may be substituted for the quarterly sampling procedure required by subparagraph (A) of this paragraph.

(i) More frequent monitoring shall be conducted when required by the Department in the vicinity of mining or other operations which may contribute alpha particle radioactivity to either surface or groundwater sources of drinking water, or when changes in the distribution system or treatment processing occur which may increase the concentration of radioactivity in the finished water.

(ii) A supplier of water shall monitor in conformance with subparagraph (A) of this paragraph within one year of the introduction of new water source for a community water system.

(iii) A community water system using two or more sources having different concentrations of radioactivity shall monitor the source of water, in addition to water from a free-flowing tap, when required by the Department.

(iv) Monitoring for compliance with subsection (a) of this section after the initial period need not include radium-228 provided that the average concentration of radium-228 has been assayed at least once using the quarterly sampling procedure required by subparagraph (A) of this paragraph.

(v) Suppliers of water shall conduct annual monitoring of any community water system in which the radium-226 concentration exceeds 3 pCi/l when required by the Department.

(C) If the average annual maximum contaminant level for gross alpha particle activity or total radium as set forth in subsection (a) of this section is exceeded, the supplier of a community water system shall give notice to the Department and notify the public as required by §337.3(8) of this title (relating to Standards of Chemical Quality). Monitoring at quarterly intervals shall be continued until the annual average concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(2) Monitoring requirements for man-made radioactivity in community water systems.

(A) Systems using surface water sources and serving more than 100,000 persons and such other community water systems as are designated by the Department shall be monitored for compliance with subsection (b) of this section by analysis of four quarterly samples. Compliance with subsection (b) of this section may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/l and if the average annual concentrations of tritium and strontium-90 are less than those listed in Table A of subsection (b)(2) of this section, provided that if both radionuclides are present the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year.

(i) If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with subsection (b) of this section.

(ii) Suppliers of water shall conduct additional monitoring, as required by the Department to determine the concentration of man-made radioactivity in principal watersheds designated by the Department.

(iii) At the discretion of the Department, suppliers of water utilizing only groundwaters may be required to monitor for man-made radioactivity.

(B) After the initial analysis required by subparagraph (A) of this paragraph, suppliers of water shall monitor at least every four years following the procedure given in subparagraph (A) of this paragraph.

(C) The supplier of any community water system designated by the Department as utilizing waters contaminated by effluents from nuclear facilities shall initiate quarterly monitoring for gross beta particle and iodine-131 radioactivity and annual monitoring for strontium-90 and tritium.

(i) Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples. If the gross beta particle activity in a sample exceeds 15 pCi/l, the same or an equivalent sample shall be analyzed for strontium-89 and cesium-134. If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with subsection (b) of this section.

(ii) For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. When iodine-131 is identified in the finished water more frequent monitoring shall be conducted as required by the Department.

(iii) Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of four quarterly samples.

(iv) The Department may allow the substitution of environmental surveillance data taken in conjunction with a nuclear facility for direct monitoring of man-made radioactivity by the supplier of water where the Department determines such data is applicable to a particular community water system.

(D) If the average annual maximum contaminant level for man-made radioactivity set forth in subsection (b) of this section is exceeded, the operator of a community water system shall give notice to the Department and to the public as required by §337.3(8) of this title (relating to Standards of Chemical Quality). Monitoring at monthly intervals shall be continued until the concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

§337.11 Construction and Siting Requirements. Construction features and siting of all facilities for new water systems, and for major improvements to existing water systems, must be in conformity with applicable rules and regulations, as promulgated by the Texas Board of Health.

§337.12 Approved Laboratory.

(a) All samples for chemical, radiological, or bacteriological analysis must be submitted to a laboratory approved by the Department, with the exception of turbidity and any control tests such as chlorine residual, alkalinity, and pH which are not used to determine compliance with these Standards. Such control tests may be run in the plant laboratory.

(b) To be approved by the Department to perform microbiological analyses, a laboratory shall be certified in accordance with the requirements of the U.S. Environmental Protection Agency Manual for the Certification of Laboratories Analyzing Drinking Water, Chapter V, Microbiology, which is herein adopted by reference. Copies are indexed and filed in the Bureau of Laboratories, Texas Department of Health, 1100 West 49th Street, Austin, Texas, and are available for public inspection during regular business hours.

(c) Methods of analysis shall be as specified in 40 Code of Federal Regulations, §141.21(a) (microbiological), §141.22(a) (turbidity), §141.23(f) (inorganics), §141.24(e) (f) and (g) (organics) and §141.25 (radionuclides) of the National Interim Primary Drinking Water Regulations, or by any alternative analytical technique as specified by the State and approved by the Administrator under 40 Code of Federal Regulations §141.27.

(d) The Department adopts by reference the Federal Regulations referred to in subsection (c) of this section.

§337.13 Recordkeeping and Reporting Required of Water Systems. Any owner or operator at a public water system subject to the provisions of this chapter shall retain on the water system premises or at a convenient location near the premises the following records:

(1) Records of bacteriological analyses must be retained for no less than five years, and records of chemical analyses must be retained for no less than ten years.

(2) Records of action taken by the system to correct violations of primary drinking water regulations must be retained for at least three years after the last action taken with respect to the particular violation involved.

(3) Copies of written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by the Department shall be kept for a period not less than ten years after completion of the survey involved.

(4) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than five years following the expiration of such variance or exemption.

(5) Any owner or operator of a public water system subject to the provisions of this chapter is required to report to the State the results of any test, measurement or analysis required to be made by these standards within ten days following such test, measurement or analysis.

§337.14 Recommended Secondary Constituent Levels Applicable to All Public Water Systems

(a) The following secondary constituent levels are recommended limits, except for water systems which are not in existence as of the effective date of these standards. For water systems which are constructed after the effective date, no source of supply which does not meet the recommended Secondary Constituent Levels may be used without written approval by the Department. The determining factor will be whether or not there is an alternate source of supply of acceptable chemical quality available to the area to be served.

Constituent	Level
Chloride	300 mg/l
Color	15 color units
Copper	1.0 mg/l
Corrosivity	noncorrosive
Fluoride (applicable to community systems only)	2.0 mg/l
Foaming agents	0.5 mg/l
Hydrogen sulfide	0.05 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Odor	3 Threshold Odor Number
pH	7.0
Sulfate	300 mg/l
Total Dissolved Solids	1,000 mg/l
Zinc	5.0 mg/l

(b) For all instances in which drinking water does not meet the recommended limits and is accepted for use by the Department, such acceptance is valid only until such time as water of acceptable chemical quality can be made available at reasonable cost to the area(s) in question from an alternate source. At such time, the water which was previously accepted would either have to be treated to lower the constituents to acceptable levels, or water would have to be secured from the alternate source.

(c) Community water systems that exceed the secondary maximum constituent level for fluoride but are below the level listed in §337.3 of this title (relating to Standards of Chemical Quality) must notify the public. The notice must be made annually by including it with the water bill or by separate mailing to all customers. The form and content of the notice shall be as prescribed by the Department.

§337.15 Modified Monitoring. When a public water system supplies water to one or more other public water systems, the Department may modify the monitoring requirements imposed by this part to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the Department and concurred in by the Administrator of the U.S. Environmental Protection Agency.

§337.16 Exceptions to these Standards. These standards shall apply to each public water system, unless the public water system meets all of the following conditions:

(1) consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

(2) obtains all of its water from, but is not owned or operated by, a public water system to which such standards apply;

(3) does not sell water to any person; and

(4) is not a carrier which conveys passengers in interstate commerce.

§337.17 Control of Trihalomethanes in Drinking Water.

(a) For the purpose of this section the following definitions will apply:

(1) "Halogen" means one of the chemical elements chlorine, bromine, or iodine.

(2) "Trihalomethane" (THM) means one of the family of organic compounds named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

(3) "Total Trihalomethanes" (TTHM) means the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane, i.e., chloroform; dibromochloromethane; bromodichloromethane; tribromomethane, i.e., bromoform) rounded to two significant figures.

(4) "Maximum Total Trihalomethane Potential" (MTP) means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after seven days at a temperature of 25° C or above.

(5) "Disinfectant" means any oxidant added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

(b) The maximum contaminant level (MCL) for total trihalomethanes shall be 0.10 milligrams/liter. The MCL shall apply only to those systems which serve a population of 10,000 or more individuals.

(c) Sampling and analytical requirements for total trihalomethanes:

(1) For the purpose of this section, the minimum number of samples required to be taken shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer shall be considered as one treatment plant for determining the minimum number of samples. All samples taken within one sampling period shall be collected within a 24-hour period.

(2) For all community water systems utilizing surface water sources in whole or in part, and for all water systems utilizing only groundwater sources that have not been determined to qualify for the monitoring requirements of paragraph (4) of this subsection, analyses for total trihalomethanes shall be performed on at least four samples of water per quarter from each treatment plant used by the system. At least 25 percent of the samples shall be taken at locations within the distribution system reflecting the maximum residence time of the water in the system. The remaining 75 percent shall be taken at representative locations in the distribution system, taking into account number of persons served, different sources of water, and different treatment methods employed. The results of all analyses per quarter shall be arithmetically averaged and reported to the Department within 30 days of the system's receipt of such results. All samples collected shall be used in computing the average, unless the analytical results are invalidated for technical reasons.

(3) Upon the written request of a community water system, the monitoring frequency required by paragraph (2) of this subsection may be reduced by the Department to a minimum of one sample analyzed for TTHM's per quarter taken at a point in the distribution system reflecting the maximum residence time of the water in the system, upon a written determination by the Department that the data from at least one year of monitoring in accordance with paragraph (2) of this subsection and local conditions demonstrate that total trihalomethane concentrations will be consistently below the maximum contaminant level.

(A) If at any time during which the reduced monitoring frequency prescribed under this subsection applies, the results from any analysis exceed 0.10 milligrams/liter of TTHM's and such results are confirmed by at least one check sample taken promptly after such results are obtained, or if the system makes any significant change to its source of water or treatment program, the system shall immediately begin monitoring in accordance with the requirements of paragraph (2) of this subsection.

(B) If a system is required to begin monitoring in accordance with paragraph (2) of this subsection, such monitoring shall continue for at least one year before a reduction in monitoring frequency may be considered.

(4) Upon the written request to the Department, a community water system utilizing only groundwater sources may seek to have the monitoring frequency reduced to a minimum of one sample for maximum TTHM potential per year taken at a point in the distribution system reflecting maximum residence time of the water in the system. The system shall submit to the State the results of at least one sample analyzed for maximum TTHM potential taken at a point in the distribution system reflecting the maximum residence time of the water in the system. The system's monitoring frequency may only be reduced upon a written determination by the Department that, based upon the data submitted by the system, the system has a maximum TTHM potential of less than 0.10 milligrams/liter and that, based upon an assessment of the local conditions of the system, the system is not likely to approach or exceed the maximum contaminant level for TTHM's. The results of all analyses shall be reported to the Department within 30 days of the system's receipt of such results. All samples collected shall be used for determining whether the system must comply with the monitoring requirements of paragraph (2) of this subsection, unless the analytical results are invalidated for technical reasons.

(A) If at any time during which the reduced monitoring frequency prescribed under this subsection is in effect, the result from any analysis taken by the system for the maximum TTHM potential is equal to or greater than 0.10 milligrams/liter, and such results are confirmed by at least one check sample taken promptly after such results are received, the system shall begin immediately to monitor in accordance with the requirements of paragraph (2) of this subsection.

(B) If it becomes necessary to begin monitoring in accordance with paragraph (2) of this subsection, such monitoring shall continue for at least one year before the monitoring frequency may be reduced.

(C) In the event of any significant change to the system's raw water or treatment program, the system shall immediately analyze an additional sample for maximum TTHM potential taken at a point in the distribution system reflecting the maximum residence time of the water in the system for the purpose of determining whether the system must comply with the monitoring requirement of paragraph (2) of this subsection.

(5) Compliance with the MCL of 0.10 milligrams/liter for total trihalomethanes shall be determined based on a running annual average of quarterly samples collected by the system as prescribed in paragraph (2) of this subsection. If the average of samples covering any 12-month period exceeds the maximum contaminant level, the supplier of water shall report to the Department within 30 days and notify the public as required under §337.3(8) of this title (relating to Standards of Chemical Quality). Monitoring after public notification shall be at a frequency designated by the Department and shall continue until a monitoring schedule as a condition of a variance, exemption, or enforcement action shall become effective.

(6) Before a community water system makes any significant modification to its existing treatment process for the purpose of achieving compliance with this subsection, the system must submit and obtain Department approval of a detailed plan setting forth its proposed modifications and those safeguards that it will implement to ensure that the bacteriological quality of the drinking water served by such system will not be adversely affected by such modifications.

(7) All analyses for determining compliance with the provisions of this subsection shall be conducted in accordance with the procedures required by the United States Environmental Protection Agency.

§337.18 Fees for Services to Drinking Water Systems.

(a) Purpose and scope.

(1) The purpose of this section is to establish fees for services provided by the Department to drinking water systems.

(2) The scope of this section covers fees for services such as analyzing drinking water for chemical content, testing for bacteriological quality, inspecting public water systems, reviewing plans for new systems and major improvements to existing systems, and providing technical assistance as required.

(b) Services to public water systems.

(1) The services which are covered under this subsection do not cover bacteriological testing. Provisions covering bacteriological testing are covered in subsection (c) of this section.

(2) The Department will provide services to public water systems, as follows:

(A) analyze drinking water for chemical content;
(B) inspect public water systems;
(C) review plans for new systems and major improvements to existing systems; and
(D) provide technical assistance as needed.

(3) The fees which the Department will charge for services provided to community water systems under this subsection will be according to the following schedule:

NUMBER OF CONNECTIONS*	FEE
1-49	$ 50
50-199	100
200-499	250
500-999	400
1000-1999	500
2000-4999	1,000
5000-9999	1,500
10,000-29,999	2,000
30,000-99,999	3,000
100,000-199,999	4,000
200,000 and greater	5,000

*Number of connections will be determined from data collected from the latest sanitary survey report. State, federal and certain community water system installations determined by the Department which serve large populations through a few connections shall have the number of connections for fee purposes determined by dividing the population served by a value of ten. Examples of such installations are universities, children's homes, correctional facilities, military facilities, etc. which generally do not bill customers for water service.

(4) New public water systems will not be assessed a fee for services until water is supplied to the first connection. Fees will not be assessed to those public water systems which are currently paying another fee to the Department which includes an inspection of the water system (i.e. youth camps and migrant labor camps).

(5) The Department will charge a fee of $25.00 for services provided under this subsection to noncommunity water systems.

(6) All fees are due by January 1 of each year, shall be paid by check or money order, and shall be made payable to the Texas Department of Health.

(c) Services concerning bacteriological testing.

(1) This subsection covers fees for services for bacteriological testing provided by the Department to public water systems and individual home water supplies (i.e., a well, spring or stream serving a person's home or residence; or any system that is not a public water system).

(2) The Department will charge a fee of $5.00 per sample for bacteriological testing. This fee applies to the Department laboratory in Austin.

(3) The fee shall be paid at the time the sample is submitted for testing or the Department may bill the service recipient on a monthly basis.

(4) The fee shall be paid by check or money order, and shall be made payable to the Texas Department of Health. Cash will be accepted for payment when the fee is paid at the time the sample is submitted for testing.

(5) Nonprofit laboratories approved by the Department to perform bacteriological testing shall perform the test, determine their own cost and may collect and retain the fees locally. The contracts between Local Health Departments and the Department may require that the Local Health Department reimburse the Department for supplies, reagents and personnel time contributed by the Department to this service. Parent organizations of local approved laboratories may be exempted from fees.

(d) Failure to make payments as required under subsection (b) or (c) of this section will subject the violator to the penalty provisions of Texas Civil Statutes, Article 4477-1.

APPENDIX "B"

CONFIRMATION CORRESPONDENCE

OF

PUBLIC MEETINGS

HOGAN & RASOR, Inc.
Engineers • Planners • Consultants

June 19, 1989

Mr. Jeffrey A. Pomeranz
City Manager
City of Del Rio
109 West Broadway
Del Rio, Texas 78841

Re: Val Verde County
Water and Wastewater Systems Study
H & R Project No. 134-06.11

Dear Mr. Pomeranz:

On June 13, 1989, a pre-work conference was held at the City Hall for the purpose of discussing the overall scope of work, schedule, and the initial task of collecting data on the existing water and sanitary sewerage systems in Val Verde County.

Those attending this pre-work conference were as follows:

Mr. Jeffrey Pomeranz, City Manager
Mr. Oscar Rodriguez, Assistant City Manager
C. Frank Rasor, P.E., Hogan & Rasor, Inc.
Sister Maribeth Larkin, The Border Organization
Residents of Val Verde County:
Enriqueta Castillo
Virginia Guerrero
Maria L. Saucedo
Eva Cartazzo
Gloria G. Heredia

The following is a brief outline of the items discussed:

1. The cost applied per household for extending the water and sewer mains and related improvements to the colonias in other areas has been in a range of $25.00 to $30.00, according to Sister Maribeth Larkin. Any cost over and above this amount may need to be obtained from the State through grant funds. As we understand, in order to apply for grant funds, the development must be at least 80% occupied.

2. The scheduling for the study will largely depend on the data collection and availability of records furnished by the various entities. The preliminary draft report is scheduled be filed with the Texas Water Development Board (TWDB) on or about the middle of August, with the final draft report submitted about mid-September. Additional meetings will be scheduled with the City and representatives of the developments prior to the submittals to the State.

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3. The study will include a review of the wastewater treatment capacity requirements for the additional flows generated from the colonia developments. The possibility of funding for the plant expansions will be discussed with the appropriate State agencies.

4. The following reports were furnished by the City to Hogan & Rasor, Inc., as part of the data collection and system inventory task.

   - Comprehensive Master Plan - June 30, 1971
     Preliminary Development Program
     Report Two
     By: Urban Research Group

   - Comprehensive Plan - May 1965
     By: Bryant - Curington, Inc.

   - Water & Wastewater Rate Analysis - July, 1982
     By: Lockwood, Andrews & Newnam, Inc.

   - A Sourcebook for Rio Grande/Rio Bravo
     Water Management, Number 57
     By: The Texas/Mexico Border Water Policy Research Project

   - Val Verde County Economic Development Council Handbook
     By: Middle Rio Grande Development Council and Private Industry Council

   - Capital Improvements Program
     Water & Wastewater Master Plan, February 1988
     By: Lockwood, Andrews & Newnam, Inc.

   - Capital Improvements Program
     Water & Wastewater Master Plan, 1988 Update

   - Development Manual for City of Del Rio

   - Land Use Planning for the Moody Lands, July 1963

On June 14, 1989, C. Frank Rasor, traveled to Comstock, Lantry, Pandale, and the Rough Canyon Development/Marina to review the areas and collect information on their existing water and sewerage system.

In Comstock, we met with Mr. Brotherton, President of the Comstock Water Company, and Mrs. McKassle, Secretary of the Company. Little information was collected, however, we will send a follow-up letter to confirm what we did receive.

We met with Mr. Neal Billings at the Roy Bean Visitor Center in Lantry, and Mr. Billings Provided information regarding the community's existing water system facilities. Septic tanks provide the residents their only means for treatment of sewage wastes.

The community of Pandale appears to be served by individual water wells and septic tank systems. No one was available to discuss the existing facilities; however, because of the sparse population, the Pandale community will likely continue to operate as it currently does with private wells and septic tank systems.

The Rough Canyon Development and Marina is served by a private water system and individual septic tanks. The development is largely made up of mobile homes with several retail and commercial businesses which provide services to both the residents and non-residents. The recreational area, operated by the National Park Service, also operates a small water system that serves their facilities and septic tanks provide treatment for the sewage wastes.

In addition to the reports and background information furnished by the City previously listed herein, several plats of the colonia developments were obtained from the City files. Copies of the plats were purchased from David Trent, surveyor, and included the following developments.

- Escondido Estates
- Los Campos
- Rough Canyon Area
- Cienegas Terrace
- Val Verde Park Estates
- Chaparell Hills
- Owens Subdivision

The other plans that we have not yet obtained include:

- Comalia
- Rio Bravos
- Vega Verde
- Rio Verde

Additional information to be furnished by the City of Del Rio include:

- Existing water and sewerage systems within each of the colonia developments.
- Existing water and sewerage mains extending outside the City limits.
- T.D.O.C. application for water and sewerage system improvements in the Cienegas Terrace development.
- Percent of the area within each colonia that is developed.
- Water usage records for past three to five years (3-5 years).
- Past and current estimated population by year (3-5 years).
- Past and current number of water and sewer customers.
- Name(s) of private companies currently operating water and/or sewerage systems outside the City.
- Past and current sewage flows received at each of the wastewater treatment Plants (3-5 years).

In regard to the third item above, we contacted Mr. Charles Troost on June 15, 1989, and was advised that he had no information available to provide us. We will need to look to the City for assistance in obtaining the information of what is being planned for the Cienegas Terrace development.

We certainly do appreciate the time and effort of the City thus far provided in assisting us with the data collection Task. As you can see, however, we still have a considerable amount of data yet to obtain from the City, and it is crucial that the information be provided as soon as possible if we are to meet the indicated deadlines of the State. Tentatively, we will plan to be in Del Rio during the week of June 26 to complete the remaining items of the data collection Task and review the planning area maps if this time will be convenient. In any event, we will later confirm the date(s) and time for our trip to Del Rio.

Respectfully submitted,

HOGAN & RASOR, INC.

C. Frank Rasor, P.E.
Exec. Vice President

cc: Mr. Oscar Rodriguez, Assistant City Manager
Mr. Robert Wear, Contract Manager, Texas Water Development Board

JUNE 13, 1989

ATTENDANCE - PRE-WORK CONFERENCE - VAL VERDE REG. W&S Study

ENRIQUETA CASTILLO		
Enriqueta Castillo	510 Adams Graham Street	775-96[illegible]
Virginia Guerrero	1011 E. Rodriguez Bay 90 Neighborhood	775-963
Maria L. Saucedo	Hwy 90 E Box 125 Del Rio	298118 Val Verde Park
Eva Cortez	Ciudad Juarez	775-8824
Gloria S. Heredia	204 E. 6th Comalia	775-6049
SR. Marcelo Larkin	[illegible]	775-[illegible]2
J A Tomeran	CITY OF D.R	4-8510
OSCAR S. RODRIGUEZ	ACM	774-8552
FRANK RASON	H+R, Inc.	214/392-4600

d 2 K

HOGAN & RASOR, Inc.

Engineers • Planners • Consultants

August 7, 1989

Mr. Jeffrey Pomeranz
City Manager
City of Del Rio
P.O. Box 4239
Del Rio, TX 78841

Re: Val Verde County
Water and Wastewater Systems Study
H & R Project No. 134-06.11

Dear Mr. Pomeranz:

This letter is to confirm that a public meeting was held in the City Council Chambers, at City Hall, on August 3, 1989, at 10:00 a.m., for the purpose of presenting the preliminary planning maps for the proposed and future extensions of water and sanitary sewerage facilities to the developments outside the City limits of Del Rio.

There were twenty-eight (28) signatures indicated on the attendance sheet. A copy of the attendance sheet is attached for your records.

The presentation of the study included a discussion of the tasks that have been performed and the progress of work completed to date in collecting information and data throughout the County. The areas of Langtry, Comstock, Pandale, and Loma Alta have all been reviewed, as well as many of the developed areas around Lake Amistad.

The topics of planning criteria and standards, water supply, storage, pumping, wastewater collection and treatment, and scheduling for construction were presented during the public meeting.

During the presentation, many questions and comments were received about the plan for the water and sewer extensions. For the most part, the main concern of the citizens attending was directed towards when improvements could be scheduled for construction. The aspect of financing these projects with State funds for the engineering services and construction was presented by Mr. Robert Wear, Project Manager for the Texas Water Development Board. It was indicated by Mr. Wear that the State funds for engineering the projects could possibly be available as early as September/October; however, funds for the construction would probably, not be available until after the first of the year.

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Dallas, Texas 75230

The english version of the presentation was made by C. F. Rasor, and Mr. Oscar Rodriguez, Assistant City Manager, interpreted the presentation in spanish.

The next public meeting is planned to be held sometime during the latter part of August or early September.

Respectfully submitted,

HOGAN & RASOR, INC.

C. F. Rasor, P.E.
Exec. Vice President

CFR:gg

cc: Mr. Oscar Rodriguez, Assistant City Manager

8/3/89

VAL VERDE COUNTY WATER AND WASTEWATER SYSTEMS STUDY PUBLIC MEETING / STAFF WORKSHOP ATTENDANCE SHEET

	NAME	ADDRESS
1	Bob Wear	Tex Water Dev. Bd - Austin
2	Armandina Espinoza	Graham 304
3	Refugio Garcia	Hck 3 Box 19 Cyna DR
4	Rosa Ma. Montalvo	Graham 306
5	Concepcion Montalvo	616 Laguna
6	Violet Seary	504 E 1st
7	J. a. Vazquez.	HCR 2 Box 80 Cienegas Terr
8	[illegible]	P. O Box 743 - Killeen Dr Cienegas Ter.
9	FRED SANDERS	304 Fox DR, Del Rio, TX 78840
10	Mary Nava	P.O Box 2037 Texas Street
11	Carmen R de Vasquez	308 Graham.
12	Pedro R Martinez	207 Rojas
13	Dora Martinez	200 Leticia
14	Ludivina Sanchez	ARROYO DR. Cienegas
15	Pablo Padilla	616 W 13th Del Rio
16	[illegible]	102 Eduardo Cyn S Del Rio
17	Fred C. KNOll	308 Inspiration Way
18	VALENTIN Y HERMINDA NAVA	LOT 12 MESA DR. Cienegas Terrace
19	Alfonso Y Ana S. Arizpe	Lot 30 Glendale DR. Cienegas
20	[illegible]	[illegible]
21	[illegible] Castillo	P. O Box. 1854 Cienegas Terrace
22	Guillermina B Castillo	P. O. Box 1854 Cienegas Terrace

	NAME	ADDRESS
23	Jesse E. Rangel	RT. 2 Box 56 Del Rio. MESA DR. LOT. 13
24	Irma Rangel	RT. 2 Box 56 Del Rio. MESA DR. LOT. 13
25	Ernesto Vazquez	de la Cruz, Garden 308
26	Frank Kasor	- Hogan's Bacon Inc.
27	Oscar Rodriguez	- City of Del Rio
28	[illegible] Pinedo	- City of Del Rio
29		
30		

HOGAN & RASOR, Inc.

Engineers • Planners • Consultants

September 1, 1989

Mr. Jeffrey A. Pomeranz
City Manager
City of Del Rio
109 W. Broadway
Del Rio, Texas 78841

Re: Val Verde County - Study
Water and Wastewater Systems
H & R Project No. 134-06.11

Dear Mr. Pomeranz:

On August 30, 1989, a public meeting was held in the Council Chambers, at 7:30 p.m., for the purpose of presenting the work thus far prepared on the study of the water and wastewater systems of Val Verde County.

There were approximately twenty-five (25) in attendance at this public meeting. Among those attending were members of the City Staff, the City Planning and Zoning Commission, a City Councilman, the Amistad Planning and Zoning Commission, and a County Commissioner. A copy of the sign-in sheet is attached for your review.

The presentation included a review of the planning tasks, the results of the initial work in the data collection and inventories of the water and wastewater systems in Val Verde County, the additional planning and phasing of the water and sewerage systems in the Cienegas Terrace, Val Verde Estates, Payne Village, and Los Campos Developments, and planning for other future utility improvements.

There was a brief discussion of the potential sources for funding the projects and the scheduling of when it is anticipated funds might be available through the provisions of SB 3.

It is indicated to those in attendance that possibly two more public meetings will be held sometime during the months of September and October, with the final draft of the report scheduled for submittal on or before October 31, 1989.

There were a number of questions and comments received from the audience, however, the primary concerns of most of the people were related to the funding and scheduling of the proposed improvements. Some questions and discussion were directed toward County Commission John Cody with regard to the Texas Department of Commerce (TDOC) funded project for water improvements in the Cienegas Terrace development. It is understood that the County has received notice of the approval for the funding of this project by the TDOC,

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North Dallas Bank Tower
Dallas, Texas 75230

however no action has yet been taken by the County to implement the subsequent phases for design and construction.

The public meeting ended at approximately 9:30 p.m.

Respectfully submitted,

HOGAN & RASOR, INC.

C. F. Rasor, P.E.

C. F. Rasor, P.E.
Exec. Vice President

CFR:gg

cc: Mr. Oscar Rodriguez, Assistant City Manager
Mr. Robert Wear, Contract Manager, TWDB

PUBLIC MEETING ATTENDANCE

VAL VERDE CO. W & S STUDY
AUGUST 30, 1989

1.	FRANK RASOR	Hogan & Rasor, Inc.	Dallas, Texas
2.	Eulalio Valdez	City Councilman	Del Rio, Tx
3	Pearl O. Durbin	43 Hill Dr. Cienegas Ter.	Del Rio, Tx
4.	Fidel C. Vazquez	HCR 2 BOX 80	DEL RIO, TX
5	Violet Essary	504 E 1st	Del Rio
6.	Gabriel A. Garza	HCR 2 Box 127	Del Rio, Tx
7.	ELVIRA GARZA	HCR 2 BOX 127	Del Rio, Tx
8	[illegible]	HCR 2 Box 137	Del Rio Tx
9	[illegible]	[illegible]	D.R.
10	[illegible]	[illegible]	D.R.T.
11	[illegible]	PO Box [illegible]	D.R.
12	[illegible]	303 [illegible] St	D.R.
13	ANDY VALDEZ	310 RODRIGUEZ	DEL RIO
14	John M. Cody	PO Box 862	Del Rio Tx 78841
15	[illegible]	P.O. Box 557	Del Rio Tx
16	Enriqueta Castillo	312 Adobe	Del Rio
17	[illegible] Bauer	City	Del Rio
18	[illegible]	303 Enchanted Way	Del Rio
19	S.W. CAWTHORN	232 W. STRICKLAND	DEL RIO, TX
20.	Val Cadena, Jr	607 Pecan	Del Rio, Tx
21.	Daniel W. Bus	100 Glendale	Del Rio, TX
22	John M. Pillard	118 Ridgewood	Del Rio, TX
23	John T. DICKEHUT	P.O. Box 1588	Del Rio, TX
24.	OSCAR S. RODRIGUEZ		
25	Mark Essary	504 E 1st St	Del Rio, Tex

134-06.13

CITY OF DEL RIO, TEXAS
REGULAR CITY COUNCIL MEETING AND
UTILITIES COMMISSION
COUNCIL CHAMBER - CITY HALL
FEBRUARY 13, 1990 - 7:30 P.M.

A G E N D A

1. CALL TO ORDER

2. ROLL CALL

3. INVOCATION: Reverend Martin Homan - Del Rio Christian Fellowship

4. APPROVAL OF MINUTES: January 23, 1990

5. JOINT PUBLIC HEARING: City Council - Utilities Commission - Planning and Zoning Commission

   a. Luis Castillo R. Corner Aldrete Lane and Rio Grande Road - 0.816 acres out of Sec. 4 in Div. B of the S.F.A.M.&I. Survey 160 From R-S to C-2-A (commercial, first height) for a Business and Office

   b. City Council - Utilities Commission - Val Verde County Commissioners - Regional Water/Wastewater Systems Study

6. VISITORS

   a. Ann Stool - Del Rio Council of the Arts

   b. Ross Foster and members of the Devils River Soil Conservation District

   c. Carole Rodriguez - U. S. Census

   d. "Service is My Business" Graduates

   d. Employee of the Month - January 1990

7. ORDINANCES

   a. O:90-03 - Approve Zoning Request - Luis Castillo R. - Corner of Aldrete Lane and Rio Grande Road - 0.816 acres out of Sec. 4 in Div. B of the S.F.A.M.&I. Survey 160 - from R-S to C-2-A (commercial, first height) for a business and office

   b. O:90-04 - Declare Public Necessity - Sanitary Sewer Easement

c. O:90-05 - Order and Fix Date of Election - May 5, 1990

8. RESOLUTIONS

a. R:90-13 - Resolution of Recognition - Ecpectacion Barrera, Jr. - Retiree

b. R:90-14 - Resolution of Recognition - Miguel Ortiz - Retiree

c. R:90-16 - Select Financial Advisor - City of Del Rio

d. R:90-17 - Authorize Agreement - Southern Pacific Transportation Company/City of Del Rio

e. R:90-18 - Authorize Advertisement For Bids - Backhoe/Tractor/Loader

9. OTHER BUSINESS - Action May Be Taken On These Matters

a. Status Report - Gay 90 Sewer Extension

b. Animal Control (Requested by Councilman Wilson)

c. Littering (Requested by Councilman Wilson)

d. Stocking San Felipe Creek (Requested by Councilman Cervantes)

e. Star Park - Greenwood Park - Creekwalk Development (Requested by Mayor Gutierrez)

f. Handicapped Transportation (Requested by Councilman Cervantes)

10. MONTHLY REPORTS - January, 1990

11. FINANCIAL REPORTS - December, 1989

12. ADJOURNMENT

I, Bessie M. Locker, City Secretary, hereby certify that the above agenda was posted on the bulletin board in the Municipal building by 7:30 P.M. on the 9th day of February, 1990.

Bessie M. Locker

BESSIE M. LOCKER, City Secretary

a:agenfeb.13

DEL RIO
Texas

109 West Broadway P. O. Box 4239 Del Rio, Texas 78841 (512) 774-2781

CERTIFICATION

This is to certify the attached is a true and correct copy of an exerpt from the official minutes of the City Council meeting held February 13, 1990 in the municipal building at Del Rio, Texas.

WITNESS my hand and official seal of office this 4th. day of June, 1990.

Bessie M. Locker, City Secretary

9.21.1987 12:47 P. 2 FROM

February 13, 1990

MINUTES
CITY OF DEL RIO, TEXAS
REGULAR CITY COUNCIL MEETING AND
UTILITIES COMMISSION
COUNCIL CHAMBERS - CITY HALL
FEBRUARY 13, 1990 - 7:30 P.M.

1. CALL TO ORDER

The meeting was called to order on the above date by Mayor Gutierrez at 7:00 P.M.

2. ROLL CALL

The following members were present constituting a quorum:

Alfredo Gutierrez, Jr., M.D., Mayor
Garry W. Kyle
Eulalio Calderon, Jr.
Dan Burr
Lee Weathersbee
Bob Wilson
Al Cervantes

Absent: None

Others Present: Jeffrey A. Pomeranz, James Bayne, Florencio Sauceda, Carlos Martinez, Clarence Bolner, Yvonne Gomez, Bessie Locker, News Media Representative and others.

3. INVOCATION - Reverend Martin Homan - Del Rio Christian Fellowship

In the absence of Reverend Homan, Councilman Kyle gave the invocation. The Council and Audience gave the pledge of allegiance to the flag.

4. JOINT PUBLIC HEARING: CITY COUNCIL - UTILITIES COMMISSION - PLANNING AND ZONING COMMISSION

Present for the Planning & Zoning Commission constituting a quorum were:

Frank Ayres, Chairman
Dan Bus
Val Cadena, Jr.
John Pillard
Bill Cauthorn

a. Luis Castillo R. - Corner Aldrete Lane and Rio Grande Road - 0.816 acres out of Sec. 4 in Div. B of the S.F.A.M.& I Survey 160 From R-S to C-2-A (Commercial, First Height) for a Business and Office

The Hearing was opened for those wishing to speak for or against this zoning request. There was no one to speak. The hearing was closed to await the recommendation of the Planning and Zoning Commission after their meeting.

Present for the Utilities Commission and County Commissioners Court were:

Alfredo Gutierrez, Jr.
Bob Wilson
John Watts
Fred Sanders
John Cody
Martin Wardlaw
Robert Rodriguez

b. Regional Water/Wastewater Systems Study

Mr. Pomeranz opened the meeting by explaining the Texas Water Development Board (TWDB) approved the application for financial assistance to the City of Del Rio, Texas to develop a regional water supply and wastewater plan for Val Verde County. Hogan & Rasor, Inc. agreed to perform the studies and planning. The objectives of the study are: 1. To document service needs in the planning area: 2. To identify feasible alternatives to meet these needs: 3. To present cost projections associated with these alternatives: 4. To evaluate various institutional arrangements to deliver water and wastewater service to these areas: and 5. To develop a plan of implementation with priorities assigned to the recommended program of improvements. Mr. Rasor gave a review of the study in detail giving the area studied and projected costs to finance with and without State aid for certain areas that need full development in the utility area. Mr. Wardlaw asked they include Escondido Est. in the study saying the sparse development is due to no utilities. Mr. Rasor noted lines must be done to specification as they will be in the City in the future. We don't know what the State aid will amount to so the estimates for costs may be off some. Mr. Burr suggested in the process of serving the county residents to receive water and wastewater - they should submit to annexation so they can have the services the City offers. Mr. Rasor said the water pipe on Highway 90 East should be large enough to serve the area as it is now, however, maybe not if the demands are enlarged too much. The amount of water in the City approved permit and other water rights were discussed. After lengthy discussions the meeting was closed with the Mayor thanking the County Commissioners for their participation and anticipated cooperation to work together more aggressively for solutions.

5. VISITORS

a. ANN STOOL - DEL RIO COUNCIL OF THE ARTS

Mrs. Stool congratulated the City on the Rosa Tormenta program presented at the Paul Poag Theatre. Over five hundred people were in attendance and the Council of the Arts appreciated the assistance. Mr. Bolan gave a review of April 6th. performance of a childrens theatre program. Mrs. Susan Fitzpatrick requested input for proposed pictures for City Hall walls.

b. ROSS FOSTER - DEVILS RIVER SOIL CONSERVATION DISTRICT

Mr. Ross Foster spoke for the Devils River Soil Conservation District requesting the City Council support them in their Resolution against hazard waste dumps. They are going to ask the same support from each soil conservation district in the state. Mayor Gutierrez told Mr. Ross the Council has adopted resolutions against the Spofford and Dryden dumps. Mr. Kyle moved the Council support the resolution presented by the Soil Conservation District. Mr. Wilson seconded the motion. Mr. Burr asked do we know anything about this situation? The intention of this resolution could make the situation worse. The vote to approve the motion to support the resolution carried six to one with Mr. Burr opposed.

c. CAROLE RODRICUEZ - U.S. CENSUS

Ms. Rodriguez was not able to attend.

d. "SERVICE IS MY BUSINESS" GRADUATES

Mr. Pomeranz introduced and gave certificates to twelve graduates of the "Customer Relations Seminar" class recently conducted by Mr. Sauceda, Assistant City Manager. This is part of the Citys ongoing training classes to better serve the public.

EMPLOYEE OF THE MONTH - JANUARY 1990

Mr. Pomeranz praised City Policeman Manuel Herrera for his hard work as a patrol officer that is now an investigator working as a Juvenile Officer. He works with the schools and students in a very positive manner. He expressed his and the Councils appreciation to Mr. Herrera for his dedicated service to the City. He read one of many thank you letters from the students for Mr. Herrera's assistance in bring "Alamo City Heat", a musical group of San Antonio policemen that advocate "say no to drugs", to perform for the schools in Del Rio. Mr. Pomeranz presented Mr. Herrera with a plaque honoring him as the empolyee of the month.

5. ORDINANCES

a. O:90-03 - APPROVE ZONING REQUEST - LUIS CASTILLO R. - Corner of Aldrete Lane and Rio Grande Road - 0.816 acres out of Sec. 4 in Div. B of the S.F.A.M.& I. Survey 160 - from R-S to C-2-A (Commercial, first height) for a business and office.

The Ordinance was read in its entirety with the following caption:

ORDINANCE NO. O:90-03

AN ORDINANCE IN ACCORDANCE WITH THE DEL RIO CITY CHARTER AND STATE LAW PROVIDING FOR THE RE-ZONING OF CERTAIN PROPERTY WITHIN THE CITY OF DEL RIO

The recommendation of the Planning & Zoning Commission was a unanimous approval. Mr. Wilson moved to approve the Resolution changing the zoning to C-2-A. Mr. Calderon seconded the motion which carried unanimously.

b. O:90-04 - DECLARE PUBLIC NECESSITY - SANITARY SEWER EASEMENT

The Ordinance was read in its entirety with the following caption:

AN ORDINANCE IN ACCORDANCE WITH THE DEL RIO CITY CHARTER AND STATE LAW DECLARING A PUBLIC NECESSITY FOR THE ACQUISITION OF A SANITARY SEWER EASEMENT IN, UPON, OVER AND ACROSS THE REAL PROPERTY SITUATED IN VAL VERDE COUNTY, TEXAS, DESCRIBED IN THE BODY HEREOF FOR PUBLIC PURPOSES, TO WIT: THE LOCATION, CONSTRUCTION, RECONSTRUCTION, IMPROVEMENT, REPAIR AND MAINTENANCE OF A SANITARY SEWER LINE

Mr. Kyle moved to approve the Ordinance O:90-04. Mr. Calderon seconded the motion which carried unanimously.

c. O:90-05 - ORDER AND FIX DATE OF ELECTION - May 5, 1990

The Ordinance was read in its entirety with the following caption:

ORDINANCE No. O:90-05

AN ORDINANCE IN ACCORDANCE WITH THE DEL RIO CITY CHARTER AND STATE LAW ORDERING AND FIXING A DATE FOR HOLDING AND CONDUCTING A REGULAR ELECTION IN AND THROUGHOUT THE CITY OF DEL RIO FOR THE PURPOSE OF ELECTING PERSONS TO HOLD THE OFFICES OF MAYOR, COUNCILPERSON-AT-LARGE PLACE C; DISTRICT I COUNCILPERSON; AND DISTRICT II COUNCILPERSON; PROVIDING FOR THE APPOINTMENT OF ELECTION JUDGES; FIXING THE MAXIMUM NUMBER OF ELECTION CLERKS AND ESTABLISHING THE RATE OF PAY FOR ALL THE ELECTION OFFICERS; PROVIDING FOR THE DESIGNATION AND LOCATION OF MUNICIPAL ELECTION PRECINCTS AND POLLING PLACES; PROVIDING FOR PUBLIC NOTICES OF SAID ELECTION; FIXING A DATE FOR HOLDING A RUN-OFF ELECTION IF REQUIRED; AND CONTAININC AN EFFECTIVE DATE

Mr. Weathersbee suggested the absentee voting be conducted on Saturdays during the absentee voting period. Mr. Calderon moved to approve the Ordinance with the two Saturdays during the absentee voting period being voting days also. Mr. Weathersbee seconded the motion which carried unanimously.

7. RESOLUTIONS

a. R:90-13 - RESOLUTION OF RECOGNITION - ESPECTACION BARRERA, Jr. - RETIREE

The Resolution was read in its entirety with the following caption:

RESOLUTION NO. R:90-13

A RESOLUTION IN RECOGNITION OF ESPECTACION BARRERA, JR.

Mr. Kyle moved to approve the resolution. Mr. Calderon seconded the motion which carried unanimously. Mr. Pomeranz presented Mr. Barrera with a plaque and expressed the Council and employees appreciation to Mr. Barrera for seventeen years of dedicated service to the City of Del Rio as Maintenance Services Assistant Superintendent.

b. R:90-14 - RESOLUTION OF RECOGNITION - MIGUEL ORTIZ - RETIREE

The Resolution was read in its entirety with the following caption:

RESOLUTION NO. R:90-14

A RESOLUTION IN RECOGNITION OF MIGUEL ORTIZ

Mr. Kyle moved to approve the resolution. Mr. Calderon seconded the motion which carried unanimously. Mr. Ortiz is retiring after nine years service in the Del Rio International Airport Maintenance Program. He will be presented a plaque later as he was not able to attend this meeting.

c. R:90-16 - SELECT FINANCIAL ADVISOR - CITY OF DEL RIO

The Company recently selected for the Financial Advisor has discontinued their office in Texas. Staff introduced Mr. Carl White of M.E. Allison & Co. who recently submitted a proposal for this position. Mr. Burr moved to approve the Resolution with M. E. Allison Company as the Financial Advisor for the City of Del Rio. Mr. Wilson seconded the motion which carried unanimously. The resolution had been read in its entirety with the following caption before the motion was made.

RESOLUTION NO. R:90-16

A RESOLUTION AUTHORIZING AND DIRECTING THE MAYOR AND CITY SECRETARY TO EXECUTE AND ATTEST TO, RESPECTIVELY, AN AGREEMENT FOR FINANCIAL ADVISORY SERVICES BETWEEN M. E. ALLISON COMPANY AND THE CITY OF DEL RIO, TEXAS

d. R:90-17 - AUTHORIZE AGREEMENT - SOUTHERN PACIFIC TRANSPORTATION COMPANY/ CITY OF DEL RIO

The Resolution was read in its entirety with the following caption:

RESOLUTION NO. R:90-17

A RESOLUTION AUTHORIZING AND DIRECTING THE CITY MANAGER TO EXECUTE AN AGREEMENT WITH SOUTHERN PACIFIC TRANSPORTATION COMPANY TO PURCHASE THE PASSENGER DEPOT LOCATED ON APPROX-IMATELY ONE ACRE OF LAND

Mr. Wilson moved to approve the resolution. Mr. Calderon seconded the motion. After discussion the motion was amended to include structural defect as a condition for termination of the contract. The vote to approve the motion with the amendment was unanimous.

e. R:90-18 - AUTHORIZE ADVERTISEMENT FOR BIDS - BACKHOE/TRACTOR/LOADER FOR THE GAS DEPARTMENT

The Resolution was read in its entirety with the following caption:

RESOLUTION NO. R:90-18

A RESOLUTION AUTHORIZING THE ADVERTISEMENT FOR SUBMISSION OF BIDS FOR THE PURCHASE OF A BACKHOE/TRACTOR/LOADER FOR THE CITY OF DEL RIO, TEXAS

Mr. Cervantes moved to approve the resolution. Mr. Wilson seconded the motion which carried unanimously.

8. OTHER BUSINESS - Action May Be Taken On Those Matters

a. STATUS REPORT - GAY 90 SEWER EXTENSION

Mr. Martinez reported the sewerage improvements project for the Gay 90 area is ready to let out bids for construction of the sewer lines. The residents of the Round Mountain sewer plant area are concerned with the effect of the additional wastewater. An agreement has been reached between the two neighborhood groups to allow the installation of the pipes but not have any actual connections made until after the expansion of the San Felipe Westewater Treatment Plant is completed. The work needs to begin to meet the completion deadline of the grant. Mr. Calderon moved to proceed with the project. Mr. Weathersbee seconded the motion which carried unanimously.

b. ANIMAL CONTROL (REQUESTED BY COUNCILMAN WILSON)

Mr. Wilson suggested the City needs to have animal control officers on duty untill at least midnight: We need publicity for people to keep up with their pets and keep them in or on leashes: To have rabies clinics: Report all suspicious animals. There was much discussion of the problems and solutions. Dr. Davis, local health officer for the County, expressed great concern that rabies here could get out of hand if all precautions are not taken immediately.

c. LITTERING (REQUESTED BY COUNCILMAN WILSON)

Mr. Wilson asked we pass this topic.

d. STOCKING SAN FELIPE CREEK (REQUESTED BY COUNCILMAN CERVANTES)

Mr. Cervantes said that even though it was published that the San Felipe Creek would be stocked with fish for the youth of the City to try to catch the plan did not receive final approval because of the endangered Devils River Minnow that inhibits the creek. He is sorry for the disappointment to the citizens.

e. STAR PARK - GREENWOOD PARK - CREEKWALK DEVELOPMENT (REQUESTED BY MAYOR GUTIERREZ)

Mayor Gutierrez gave a review of the three parks. The Star Park is dedicated to the Veterans Organizations. The present concept of improvement there is to restore the star in the center of the park, possibly with donations or on a voluntary basis. He showed several designs for the star work. Lights have been installed in the park. Greenwood Park has a committee working on plans for improvements there. The Creekwalk Association is developing a master plan for this area to include restrooms, permanent fencing, channel of water in

front of the amphitheatre with a pump over a cascade with landscaping. The water will be drained for use of dancing space. The association has raised over $7,000 to work on these projects. All their profits go back into the creekwalk area. He asked for suggestions for any of these projects. Mr. Weathersbee inquired about the City's liability for the channel of water and suggested the money be used for purchase of land instead. After much discussion Mr. Calderon moved to approve the concept of the projects. Mr. Cervantes seconded the motion which carried six to one with Mr. Weathersbee opposed.

f. HANDICAPPED TRANSPORTATION (REQUESTED BY COUNCILMAN CERVANTES)

Mr. Pomeranz reported the staff is working with Val Verde DRIVE to furnish transportation for the handicapped.

9. MONTHLY REPORTS - JANUARY, 1990

Monthly reports from all departments are included in the agenda packets.

10. FINANCIAL REPORTS - DECEMBER, 1989

There was no discussion of the financial reports in the agenda packets.

11. ADJOURNMENT

No further business to come before the Council the meeting was adjourned.

Alfredo Gutierrez, Jr., M.D., Mayor

Bessie M. Locker, City Secretary

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MINUTES
CITY OF DEL RIO, TEXAS
REGULAR CITY COUNCIL MEETING
COUNCIL CHAMBER - CITY HALL
FEBRUARY, 27, 1990 - 7:30 P.M.

1. CALL TO ORDER

The Mayor called the meeting to order on the above date at 7:30 P.M.

2. ROLL CALL

The following members were present constituting a quorum:

Alfredo Gutierrez, Jr., M.D., Mayor
Dan Burr
Bob Wilson
Eulalio Calderon, Jr.
Al Cervantes
Lee Weathersbee
Garry W. Kyle

Absent: None

Others present: Jeffrey A. Pomeranz, Florencio Sauceda, Yvonne Gomez, Clarence Bolner, Carlos Martinez, Bessie Locker, News Media Representative and others.

3. INVOCATION - Reverend Carrell Still - First Christian Church

Reverend Eddie Escue of the Grace Community Church gave the invocation. The Council and audience gave the pledge of allegiance to the flag.

4. APPROVAL OF MINUTES - January 23, 1990 and February 13, 1990

Mr. Kyle moved to approve the minutes as presented. Mr.Calderon seconded the motion which carried unanimously.

5. VISITORS

a. CAROLE RODRIGUEZ - U. S. CENSUS

Ms. Rodriguez thanked the Mayor and Council for their assistance with the census by their radio advertisements. She gave out packets of literature about the census and copies of the questionaire to be sent to each household. She explained the reasons for needing a complete and accurate count.

Val Verde County
Regional Waterworks And Wastewater System Study
June 1990

The following maps are not attached to this report. Due to their size, they could not be copied. They are located in the official file and may be copied upon request.

City Of Del Rio, TX – Existing Waterworks System
Figure No. V-1

Figure No. V-5

Figure No. V-6

Figure No. V-7

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