CITY OF WHITEHOUSE

Water & Wastewater Facilities Planning

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WATER & WASTEWATER FACILITIES PLANNING

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SECTION 1

CITY OF WHITEHOUSE
WATER & WASTEWATER FACILITIES PLANNING

SECTION 1.0 - EXECUTIVE SUMMARY

The City of Whitehouse owns and operates its own water and wastewater systems. The water system consists of one (1) water well in the Wilcox aquifer, an interconnection to purchase water from the City of Tyler, and associated storage tanks, pumps and piping network. Pipe sizes range from 2" to 12" in diameter.

The wastewater system consists of a collection system comprising 53,750 linear feet of gravity pipes, 392 manholes, and eight (8) lift stations with force mains (pressure lines). Pipe sizes range from 6" to 10" in diameter. Wastewater is treated by one (1) treatment plant, which discharges into Blackhawk Creek which eventually flows into Mud Creek and the Angelina River. Due to population growth and development within the region, both the water and wastewater systems are in need of major improvements to upgrade, expand, and relocate facilities.

POPULATION SERVED

There are currently approximately 2,100 water system customers representing an estimated population served by the water system of 6,300, all inside the city limits. In addition, six (6) campuses of the Whitehouse I.S.D. are served by the system. Many of the students reside outside the city limits. The projected population to be served by the water system is 16,007 in the year 2030, or a 154% increase. Water usage is currently at 1.86 million gallons for the highest use day of the year. The projected high usage for planning purposes is 5.14 MGD, or a 176% increase.

There are currently approximately 2,000 sewer system customers and an estimated population served by the wastewater system of 6,000. All sewer customers are inside the city limits and are also water system customers. The projected population to be served by the wastewater system is 16,007 in the year 2030, or a 167% increase. Wastewater flow is currently at 0.4 MGD in dry weather and has been over 0.6 MGD in wet weather. The projected maximum month average flow in 2030 is 1.92 MGD or a 220% increase, including an allowance for future I/I and commercial and residential growth.

WATER SYSTEM NEEDS

The most pressing water system needs are:

- repair and painting of existing elevated and ground storage tanks
- elevated storage on the south side
- backup power generators for the high service pumps at Plant No. 2
- updated control and monitoring capabilities
- upgrade of Plant No. 2 pump station
- upgrade of main supply line from 12" to 18"
- FM 346 W booster pump station

- upgrade and relocation of lines along FM 346 E & W
- additional well supply and pump station

The total cost for these most pressing needs is approximately $7.8 million over the next four (4) years. Additional water system improvements which are less pressing were identified at a cost of $1.9 million to be incurred 5-10 years from now. The City should continue efforts to secure additional water supply.

WASTEWATER SYSTEM NEEDS

The wastewater system is also in need of significant improvement. The City has been mandated by the TNRCC to begin engineering plans for expansion of its treatment plant. In addition, growth and development in the City requires that existing gravity mains be upgraded or relocated. The treatment plant expansion to 2.0 MGD can be accomplished in two phases. The first phase would expand the plant to 1.0 MGD and relocate it downstream at a cost of $3.5 million over the next 3 years. If significant reductions are accomplished in wet weather I/I due to improved collection system maintenance and if growth occurs more slowly than projected, then a capacity of 1.0 MGD may be sufficient for up to 10 years.

The most pressing needs for the wastewater system and opinions of probable costs are as follows:

• Collection system improvements to expand capacity	$0.7 million
• Sewer line relocation on FM 346	$0.8 million
• Collection system improvements to extend service	$0.5 million
• Treatment plant expansion, Phase I	$4.5 million
TOTAL	**$6.5 million**

These wastewater system needs are required to be met over the next 3 years.

In addition, other improvements are recommended to meet long-term growth needs and extend service to areas not currently provided with sewer service. These additional improvements are estimated to cost $3.3 million, including Phase II of the plant expansion. All costs are in 2000 dollars. For projects constructed after 2000, these costs should be expected to increase due to inflation.

SUMMARY OF SUMMARY

Opinions of probable costs (in 2000 dollars) and time frame within which costs will be incurred are summarized as follows:

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Recommendation	Time Period Implemented	Cost
• Most pressing water system improvements	0-4 years	$7.8 million
• Less pressing water system improvements	5-10 years	$1.9 million
• Wastewater collection system improvements to meet current needs	0-3 years	$2.0 million
• Wastewater treatment plant expansion, Phase I	0-3 years	$4.5 million
• Wastewater collection system improvements to meet future needs	3-8 years	$1.4 million
• Wastewater treatment plant expansion, Phase II	7-10 years	$1.9 million
TOTAL		**$19.5 million**

SECTION 2

SECTION 2.0 - AUTHORIZATION AND SCOPE

2.1 Authorization and Organization

The City of Whitehouse retained Burton & Elledge, Inc. to perform a study of its water and wastewater facilities to meet the increased demands being caused by rapid growth in the City and surrounding region. Because of their individual interests in the City of Whitehouse and its facilities, other participating entities include the City of Tyler, the Greater Whitehouse Utility Company, Inc., Quail Run Property Owners' Association, Smith County, and the Walnut Grove Water Supply Corporation. The City of Whitehouse, through a combination of cash and in-kind contribution, funded 50% of the study. The other 50% of the cost was provided by the Texas Water Development Board from its Research and Planning grant funds.

The planning area includes the City of Whitehouse, its ETJ, the currently populated areas of Smith County in the Walnut Grove WSC service area known as Quail Run, Richland Hills, and Lost Creek Subdivisions, and other surrounding unpopulated areas of Smith County.

The study area was selected because of the City's immediate need for facility improvements and recent problems with water and sewer service for these surrounding areas.

2.2 Scope and Objectives of Study

The City of Whitehouse has recognized a need for developing long term water and wastewater plans since its Comprehensive Plan was completed in 1995.[1] The City of Tyler has started the process of expanding its water supply capability with water from Lake Palestine and has expressed its intent to become a regional water supplier.

The objective of this study was to investigate the most feasible alternatives for meeting the growing demand for water and sewer service in Whitehouse and the surrounding region. The scope of the study included projection of those needs and recommendations for addressing them within the City of Whitehouse in coordination with other projects and growth needs being experienced in the region.

SECTION 3

CITY OF WHITEHOUSE
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SECTION 3.0 - INTRODUCTION

3.1 Climatology

The climate in Smith County is typical of east Texas and is classified as subtropical humid. Summers are generally warm and humid with the daily maximum temperatures in August averaging 93 degrees. Spring and fall are pleasant and transitional. Winters are mild with the temperature only rarely remaining below freezing. About two inches of snow fall yearly. Winds are from the south most of the year, shifting occasionally to the south-southeast.[3]

The annual precipitation in this region is quite high and is summarized in Exhibit 2. The mean annual precipitation as measured at Tyler for the period 1972 through 1992 was 46.6 inches, with an annual maximum of 66.0 inches occurring in 1990 and annual minimum of 30.5 inches occurring in 1980. These compare favorably with longer-term records (1955 – 1984) which indicate an annual average of 43.1 inches and an annual maximum of 67.3 inches.[4] Monthly precipitation ranged from a minimum of 0.25 inches in January 1986 to a maximum of 12.9 inches in October 1985. Average monthly precipitation falls within a fairly tight range, varying from approximately 2.5 inches in August, to 4.9 inches in May and April. The average driest months were July and August, at 2.8 and 2.5 inches respectively.

Average temperatures at Tyler range from 47° F (8° C) in January to 83° F (28° C) in July and August. The mean maximum temperature in July (average of daily maxima) is 94° F, and mean minimum temperature in January (average of daily minima) is 33° F. The recorded extremes are 0° F (-18° C) and 108° F (42° C).

The average annual gross lake surface evaporation for the area is approximately 52 inches which exceeds the average rainfall by approximately 9 inches. Average monthly evaporation rates, summarized in Exhibit 2 range from a low of 2.05 inches in January to a high of 7.34 inches in August.[2] Average monthly evaporation exceeds average rainfall rates from June through October.

3.2 Geology

The geology of the area has been extensively studied and reported in publications by the Bureau of Economic Geology[3] and the Texas Department of Water Resources.[5] The surface geology of Smith County and a geologic section illustrating the general stratigraphy in the area near Whitehouse are presented in Exhibit 3.

The geological formations of interest in the Smith County area include the Midway Group, the Wilcox Group, and the Clairborne Group. In the Whitehouse area, the Midway Group occurs at a depth of approximately 1600 to 1800 feet below surface. The Midway Group is important because it forms the basal confining layer for the usable groundwater. The Group consists largely of calcareous clay with stringers of limestone and glauconitic sand.

The Wilcox Group overlies the Midway Group and contains most of the water-bearing sands. It outcrops in the counties north, east, and west of Smith County. The formation contains layers of sand, sandy clay, river sand, lignite seams, and stratified silt. The upper beds have a higher proportion of sand while the lower beds are higher in clay and shale. Total thickness of the Wilcox Group ranges from approximately 730 feet to 1300 feet with a formation thickness of approximately 900 feet over most of the county. Depth to the base of the Wilcox Group ranges from 400 to 2,300 feet in the County.

The Clairborne Group is the uppermost and contains the Queen City, Reklaw and Carrizo Formation. The Carrizo Formation is hydrologically interconnected to the Wilcox Group, and together they form the Wilcox-Carrizo aquifer. High clay content in the Reklaw Formation precludes significant vertical recharge from the overlying, relatively shallow Queen City Formation. The Carrizo ranges in thickness from 40 to 225 feet over Smith County and averages approximately 100 feet thick. Most of this thickness is composed of sand. The depth to the top of the Carrizo ranges from 0 to 1000 feet below surface.

3.3 Land Use Patterns

An existing land use analysis and a proposed land use plan were presented in the "Draft Baseline Studies, 1995 Whitehouse Comprehensive Plan".[1] Existing and planned land use is an important consideration in the preparation of a Water and Wastewater Master Plan because it allows assessment of existing utility capacity and utility planning for future growth within the City.

The majority of the existing land use within Whitehouse City Limits is single family residential. Single family residential housing occupied approximately 50 percent of the total acreage within the city limits. The next largest land uses were approximately 20 percent for streets/alley rights-of-way and 15 percent for schools, churches and other public and semi-public areas. Commercial, retail, office and financial accounted for approximately 9 percent of the total. Two family (duplexes), multifamily, and mobile homes accounted for approximately 3.5% of the total. There was no reported industrial land use within the city limits. The railroad accounted for approximately 2.3 percent of the total. Existing land uses are graphically shown in Exhibit 4.

As noted from Exhibit 4, single family residential areas are scattered. Commercial and retail areas are located along SH 110 with some commercial scattered in other areas. One mobile home park lies near the intersection of SH 110 and FM 346; others lie adjacent to SH 110 or FM 346. Schools and other public facilities are primarily located at the intersection of SH 110 and FM 346. All development lies within a short distance of SH 110 or FM 346.

The breakdown of land uses within the City is important with regard to sizing of water and sewer lines. It is important that growth of an area be managed with regard to future use to allow planning for utility improvements and upgrades. When areas are delineated for specific uses (e.g., commercial, retail, residential, etc.), it is possible to install water and

wastewater improvements that will efficiently accommodate both existing and future development. In many instances, fire flow will control water line sizes. For example, insurance requirements for fire protection stipulate that retail/commercial areas have a much higher fire flow (1500 – 3500 gpm) and closer fire hydrant spacing than residential areas (500 to 750 gpm). If a residential development is located adjacent to a commercially zoned area, the sizing of the water line is usually controlled by the fire flow requirements for the retail/commercial zone.

A proposed future land use plan was also presented in the 1995 Comprehensive Plan (Exhibit 4). This plan envisions a town center at the northeast corner of SH 110 and FM 346. Retail/office would continue to grow along the SH 110 corridor. Commercial/warehouse facilities are envisioned south of FM 346 and adjacent to the railroad, light industrial on the northern edge of the City along SH 110 and a business park near the southern city limits.

Typically, water transmission mains will follow major roadways and provide a backbone for a water distribution system. This allows the fire fighting capacity required by commercial/retail and warehouses to be met directly from the transmission main. Smaller distribution lines looping off the transmission main will provide reliable service to residential users. Water lines are located within roadway rights-of-way where possible to minimize easement acquisition costs. However, utilities routed in state rights-of-way may have to be relocated at the Owner's expense in event of future road improvements that conflict with the utility.

The location of wastewater collection lines and interceptors will not necessarily follow roadway layout. Although it is desirable to follow existing roadways, wastewater lines are gravity flow where possible and are constrained by topographic features.

3.4 Customer Inventory

Currently, the City of Whitehouse has approximately 2,025 connections to the water system.[6] The other subdivisions within the planning area, Quail Run, Richland Hills, and Lost Creek subdivisions which lie in the Walnut Grove Water Supply Corporation (WSC) service area, have a total of 234 connections.

A summary of the connections in the planning area is presented below. Residential customers comprise the vast majority of the connections to the water system, accounting for 91.6 percent of all. Commercial connections account for 7.2 percent of connections. BLD (builders) accounts for only a minor percentage of connections and demand. There are currently no industrial connections to the system.

SUMMARY OF EXISTING WATER CONNECTIONS			
User	Type	No. Connections May 1999	% Total Connections
Whitehouse	Residential	1854	91.6
	Commercial	146	7.2
	BLD	25	1.2
Total Whitehouse		2025	100
Quail Run	Residential	120	
Lost Creek	Residential	38	
Richland Hills	Residential	76	

Included in the commercial category are five (5) campuses of the Whitehouse I.S.D.. A sixth campus for the new high school is under construction. A separate breakdown showing present and future enrollment at each campus is presented below.

SUMMARY OF WHITEHOUSE I.S.D. ENROLLMENT			
Campus	No. of Students Present Year	Next Year	Grade
Cain Elementary	641		Pre-K – K
Brown Elementary	569		1 – 2
Higgins Intermediate	946		3 – 4
Holloway Middle School	637		5 – 6
Whitehouse High School	1110		7 – 8
New High School	0	1110	9 - 12
Total	3,903		

The Whitehouse I.S.D. boundary is shown in Exhibit 1. Currently, there are approximately 5,300 households in the district, of which 3,400 are outside the city limits.[9] The population of Smith County is projected to grow by 18% by the year 2030.[8] Assuming the population of the Whitehouse I.S.D. will grow by this same percentage, then the number of students enrolled in the district should increase to 4,624 in 2030.

3.5 Water Sales

Residential customers represent the largest class of water sales at 85%. The schools purchased 2.5% of all water sold in 1999, and other commercial customers purchased the remaining 12.5%. A summary of water sales for 1998-99 is presented below.[6]

WHITEHOUSE WATER SALES				
Customer Class	**1998**		**1999**	
	Total Sold (1000 gal)	**% of Total**	**Total Sold (1000 gal)**	**% of Total**
Residential	192,323	85.7%	179,429	84.7%
Schools	5,614 (est.)	2.5%	5,264	2.5%
Other Commercial	26,608	11.8%	27,111	12.8%
TOTAL	**224,545**	**100%**	**211,804**	**100%**

3.6 Population Projections

Historical and projected population data for the City were obtained from the Texas Water Development Board Planning Division (TWDB). The TWDB is designated as the planning authority for the State for water and wastewater planning and construction projects.

Population estimates were also obtained from the East Texas Council of Governments (ETCOG), and the "1995 Comprehensive Plan" and compared with the TWDB projections. The ETCOG estimates were too low for further consideration. A summary of these estimates is presented below; and graphically in Exhibit 17. It should be noted that projections from TWDB are provided for three distinct ranges based upon different migration rates. Only the TWDB "Most Likely Series" projections which are most appropriate to use for water system planning, were used for this study.

WHITEHOUSE POPULATION PROJECTIONS					
Year	TWDB "Most Likely" Series	1995 Comprehensive Plan			Adjusted Growth Rate Series
		Low	Medium	High	
1990*	4,032	4,032	4,032	4,032	4,032
1995	----	5,100	5,100	5,100	5,574
2000	7,230	6,300	7,000	7,600	7,115
2005	----	7,800	9,600	12,500	9,466
2010	9,535	10,000	14,100	17,000	11,818
2015	----	13,000	17,800	25,000	13,195
2020	11,289	----	----	----	14,572
2025	----	----	----	----	15,289
2030	11,724	----	----	----	16,007

* 1990 Census data.

It is important that projections not be overstated or funds will be wasted on system capacity that is not used. Similarly, understating the projections will result in unnecessary and costly additional construction and continually trying to catch up to growth instead of being prepared for growth.

The medium and high projections from the 1995 Comprehensive Plan appear unrealistically high. The low projection, however, agrees closely with actual conditions and is more reasonable. The shape of the Comprehensive Plan growth curves, with increasing rates of growth, were not considered realistic because of growth limitations imposed on Whitehouse by Tyler to the north and Lake Tyler to the east. The shape of the TWDB growth curve was considered to be more representative, with a declining rate of growth over time. It was therefore used for the base projection. This base projection was then adjusted upward to reflect current conditions.

There are currently over 2,000 people living just outside the City. Many of these people have expressed an interest in being provided water and wastewater service by the City of Whitehouse. Also, four new residential subdivisions were started in Whitehouse in 1999. With expanded service capability, the population served by the City of Whitehouse water and wastewater systems could easily double within the next 10 years, rather than the 30-year period reflected in the TWDB projection. Therefore, a more accelerated growth rate for the period 2000-2010 was deemed more appropriate. In addition, the transportation improvement projects planned by TxDOT will spur additional growth in the City service areas. The water use and wastewater flow projections and resulting recommendations presented in Sections 4.0 and 5.0 are based on the "adjusted" population projection presented in Exhibit 7.

SECTION 4

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SECTION 4.0 - WATER FACILITIES PLANNING

4.1 Water Supply Sources

The City of Whitehouse has two existing sources of supply for potable water. These include purchased water from the City of Tyler and ground water produced from its own water well.

City of Tyler

The City of Whitehouse and the City of Tyler entered into an agreement in 1985 for Tyler to supply water to Whitehouse through a 14 inch water line located adjacent to State Highway 110 (SH 110). A copy of the current contract between the two cities is included in Exhibit 9. The 14 inch line supplies water to a 500,000 gallon ground storage tank located at Whitehouse Water Plant No. 2. By contract, the City of Tyler reserved capacity equivalent to a 10 inch line for the City of Whitehouse's use; the remaining capacity was reserved for "future potential customers of Tyler." An additional 12" supply line was recently constructed by Tyler with cost-participation by Whitehouse and Walnut Grove WSC.

Tyler has a current water supply capacity of 41.5 MGD. Lake Tyler is the largest source, providing up to 33.5 MGD or 81% of Tyler's total capacity. Additionally, 8 active wells produce 8 MGD, or 19% of the total. The wells produce from the Carrizo-Wilcox Aquifer. The City of Tyler is currently expanding its water supply capacity to 72 MGD with water from Lake Palestine by December 31, 2002, with future plans to expand to 102 MGD by 2018.[10]

The City of Whitehouse currently has a single water supply well which produces from the Wilcox acquifer at a depth of 1176 feet. Designated Well No. 3 and located at the Russell Road plant, the well was reworked in 1999 and currently produces 350 gpm. Two other smaller wells (No. 1 and 4) which produced less than 100 gpm each were plugged and abandoned in the Spring of 2000. The City is in the process of drilling additional test holes in an attempt to increase its own water supply capability.

Lake Eastex

Lake Eastex is a proposed reservoir, located in the Mud Creek flood plain, approximately 10 miles northeast of Jacksonville. It would be 14 miles in length, 1.5 miles wide, cover 10,000 acres, and impound approximately 188,000 acre-feet of water. It is estimated that nearly 86,000 acre-feet of water would be provided annually to water supply customers.[11]

in service. The current purchase contract between Tyler and Whitehouse is based upon an estimated 20% self-supplied by Whitehouse.

In order to monitor the integrity of the water system and accounting procedures, City staff routinely compare water production with water sales. This comparison for 1998 and 1999 is summarized below.

WHITEHOUSE WATER PRODUCTION AND SALES COMPARISON				
Calendar Year	Water Production (1000 gallons)	Water Sales (1000 gallons)	Water Not Accounted For	
			1000 gallons	Percent
1998	280,833	224,545	56,288	20%
1999	272,677	211,804	60,886	22%
2-Yr. Total	**553,510**	**436,349**	**117,161**	**21%**

The above comparison is presented graphically in Exhibit 10 and indicates that one-fifth of the water produced by the City is not being accounted for. Possible reasons for the discrepancy include loss due to system leaks, fire hydrant flushing, loss due to system repairs, unmetered or illegal connections, faulty meters, inaccurate meter readings, and inaccurate billing procedures. An actual loss of 20% is excessive and should be corrected. However, it should be noted that this apparently large discrepancy is based on the premise that meter readings are fairly accurate. The City should consider a comprehensive water audit to accurately quantify the actual water loss. A certain percentage of loss is typically acceptable and is not cost-effective to attempt to reduce. In addition, a meter replacement program should be considered since meters will tend to read lower, not higher than actual usage as they lose accuracy due to age and deterioration.

4.3 Treated Water Demand

When estimating future water demands for planning purposes, three water usage terms are commonly used:

1. Annual Average Use – This is the total water produced over a twelve month period in million gallons divided by 365 days to express in million gallons per day (MGD). This figure is often used as a baseline to compare actual usage with typical values. It is also used to estimate the maximum month and maximum day figures, which are used for planning purposes.

2. Maximum Month Average Use – This is the total water produced in the month of highest usage in a given year (typically July or August) in million gallons divided by 30 or 31 to express in MGD. This figure is sometimes used to evaluate and plan for treatment facilities and maximum diversion rates from reservoirs.

3. Maximum Day Average Use – This is the total water produced on the day of highest usage in a given year and usually occurs in the month of highest usage, also expressed in MGD. This figure is typically used to evaluate and plan for future water supply and production needs. It is often estimated to be 2.0-2.5 times the annual average use.

By dividing the above usage terms by the population served, each will then be expressed in gallons per capita per day (gpcd) which are then multiplied by projected populations to project future water demands.

The estimated 1998 City population was 5,800 for which Whitehouse supplied potable water. Based on the actual water production records, the City's water demand for 1998 was as follows:

Parameter	Period Used	Production Rate (MGD)	Per Capita Demand (gpcd)
Max. Day Avg.	Highest Use Day in June 1998	1.86	321
Max. Month Avg.	July 1998	1.15	198
Annual Avg.	Jan 98 – Dec 98	0.77	133

Generally, the per capita demand will vary from city to city depending on such factors as average household income, climate, industrial water use, etc. The per capita demand tends to increase as population increases due to industrial and commercial usage. However, water conservation efforts should serve to counter this upward trend in per capita demand. For these reasons, projections of future demands were made assuming per capita demands would remain constant for the 25-year planning period due to water conservation efforts.

Based on these assumptions, the population projection presented in Exhibit 7, and the current per capita demands presented above, future water demands are expected to be as follows:

WHITEHOUSE FUTURE WATER DEMAND (MGD)			
Year	**Max. Day**	**Max. Month**	**Annual Avg.**
2000	2.28	1.41	0.95
2010	3.79	2.34	1.57
2020	4.68	2.89	1.94
2030	5.14	3.17	2.13

It should be noted that future increases in industrial demands could result in acceleration of these projections. For future planning, the above values based on the "adjusted" TWDB population projections were used. The annual average and maximum day water demand projections are tabulated and presented graphically in Exhibit 7.

4.4 Distribution System

4.4.1 Existing Facilities

The Whitehouse water distribution piping system consists primarily of PVC pipe. Sizes range from 2 inches up to 12 inches in diameter. The majority of the water system piping, in the downtown area and the surrounding residential areas, is at least 50 years old. A map of the distribution system, including the locations of the water wells, storage tanks, and booster station is presented in Exhibit 9.

a. Pressure Planes

Water pressures throughout the distribution system are controlled by means of one pressure plane. The pressure plane is controlled by the water level in the Downtown elevated storage tank, which is supplied by the high service pumps at Plant No. 2. The high water level is at elevation 600' above mean sea level. It determines pressures throughout the system where ground elevations vary from 400 to 520, resulting in static pressures ranging from 35 to 87 psi. The Russell Road elevated tank is at the same high water level. It would maintain system pressure should the Downtown tank be removed from service. The high service pumps at Plant No. 2 would maintain system pressure should both elevated tanks be removed temporarily from service. In addition, a bypass valve inside the pump building enables temporary, emergency pressure maintenance from the much higher Tyler pressure plane at elevation 725.[10]

b. Storage Tanks

Two ground storage tanks and two elevated storage tanks are currently in use by the City and are shown on the Distribution System Map. Photographs and data sheets are also included in Exhibit 6. Both existing ground storage tanks are located at Plant No. 2 where the Tyler water is delivered. A third ground storage tank is under construction at the same location. One elevated storage tank is located on Russell Road, at the northern end of town and the other one is located near the downtown area on Horton Street just north of City Hall.

The ground storage tanks are filled by the 14-inch Tyler supply line and a separate 8-inch transmission line from Well No. 3. When the Downtown tank level is low, the high service pumps at Plant No. 2 transfer water from the ground storage tanks into the elevated tank via a 12-inch distribution line. The following table summarizes the capacities of these storage tanks.

Tank Location	Ground Storage Capacity (gal)	Elevated Storage Capacity (gal)
Plant No. 2	500,000	-
Plant No. 2	500,000	-
Plant No. 2	63,000	-
Russell Road	-	100,000
Downtown (Horton Street)	-	100,000
TOTAL	**1,063,000**	**200,000**

c. High Service Pumps

Water from the well and from Tyler is pumped from the ground storage tanks into the system by means of high service pumps located at Plant No. 2. The pumps are controlled by the water level in the Downtown elevated tank. Data sheets and photographs are shown in Exhibit 6. Information regarding each service pump is summarized below:

Whitehouse High Service Pumps		
Location	**Number of Pumps**	**Capacity (gpm)**
Plant #2	3	1,000
Total Pumping Capacity		**3,000 gpm**

The capacities for each pump are reported as they are listed on the nameplates, since actual measurements were not taken. However, pump calculations and the experience of operations personnel agree that the firm capacity of the station is approximately 1,600 gpm.

4.4.2 Distribution System Controls

A schematic diagram of the water system is presented as Exhibit 15. Well No. 3 at Russell Road pumps directly into the 0.5 MG ground storage tank located at Plant No. 2. The ground storage tank is equipped with a high level and low level electrode which control operation of the well pump. At high level the well pump is turned off to prevent overflowing the tank. At low level the well pump is turned on to allow the

tank to refill. The high service pumps are controlled in the same way with low and high level electrodes in the Downtown elevated storage tank. Although the Russell Road elevated tank is not equipped with electrodes, it is prevented from overflowing because it is at the same elevation as the Downtown tank. The elevated tank electrodes communicate with the high service pump starters via radio telemetry. The GST electrodes communicate with the well pump starter via telephone line.

When the single well is unable to satisfy system demand, a second low level electrode in the ground storage tank signals for an automatic valve on the Tyler line to open. The 14-inch line from Tyler and the new 12-inch line from Tyler will supply enough water to meet all current Whitehouse demands.

4.4.3 Operations and Maintenance

The City currently has two (2) full time and two (2) part-time personnel assigned to water system operations. These include the following:

WHITEHOUSE WATER O&M PERSONNEL		
Title	**Operator Class**	**Full/Part Time**
Public Works Director	C	P
Code Enforcement Officer	C	P
Maintenance Worker III	D	F
Maintenance Worker II	-	F

There are additional personnel (e.g., City Manager, City Secretary, etc.) which handle the administrative tasks of the water department. Other personnel are hired to read meters and to help with maintenance during the summer.

All water personnel also assist with operation of the sewer system as needed.

Routine tasks include line locations to assist contractors and other utilities, leak repairs, new taps, cut-offs, inspections of new construction, hydrant flushing, production meter reading and record-keeping, equipment maintenance and repair, etc.

Other tasks are assigned as needed. For example, assistance may be needed by the street department, the sewer department, or for general customer service (i.e., responding to complaints).

It is recommended that two additional full time personnel (one operator and one maintenance worker) be budgeted for the water department. This is especially needed with all of the development and construction activity ongoing in the City and with the additional water facilities which are recommended.

The current FY 1999-2000 annual budgets for "water operations" are as follows:

WHITEHOUSE ANNUAL WATER OPERATIONS BUDGET	
Expense Category	**Amount**
Personnel Services	$63,191
Supplies & Materials	27,500
Maintenance of Buildings & Land	29,000
Maintenance of Equipment & Machinery	13,550
Contract Services	28,300
Capital Outlay	232,000
TOTAL	**$393,541**

4.5 Regulatory Capacity Requirements

The Texas Natural Resource Conservation Commission (TNRCC) publishes criteria for the design and operation of water supply and treatment facilities and distribution systems, as well as setting limits for minimum capacity requirements. The capacity requirements are published in Chapter 290 of Title 30 of the Texas Administrative Code (TAC). The following table summarizes the compliance status of the water system with 30 TAC § 290.

System Component	Minimum Requirements	Existing Conditions
1. Water Supply Capacity	0.6 gpm/conn * 2050 conn's = **1230 gpm** Supply from Tyler can easily meet the minimum requirement.	Well 3 – 350 gpm Tyler 14" & 12" lines **Total = 350 gpm + Tyler**
2. Ground Storage Capacity	200 gal/conn * 2050 conn's = **410,000 gal**	No. 1 GS Tank – 63,000 gal No. 2 GS Tank – 500,000 gal No. 3 GS Tank* - 500,000 gal * Under construction **Total = 1,063,000 gal**
3. Elevated Storage Capacity	100 gal/conn * 2050 conn's = **205,000 gal**	Downtown Tank = 100,000 gal Russell Road Tank = 200,000gal **Total = 200,000 gal**

System Component	Minimum Requirements	Existing Conditions
4. Service Pump Capacity	Each pump station must have 2 pumps that provide: 2 gpm/conn * 2050 conn's = 4,100 gpm OR 0.6 gpm/conn * 2050 conn's = **1,230 gpm** if elevated storage capacity > 200 gal/conn The service pump capacity would meet minimum requirements if elevated storage capacity >/= 410,000 gal.	Plant No. 2 Svc. Pump = 3 * 1,000 gpm **Total = 3,000 gpm**

There are approximately 2,050 retail service connections within the city limits. As shown above, the City currently is deficient in TNRCC minimum capacity requirements for service pumps and elevated storage. The construction of an additional 500,000 gallon elevated storage tank is recommended for immediate needs. This would also bring the service pump capacity into compliance.

4.6 Distribution System Modeling

4.6.1 Model Description

The computer model used to evaluate the City of Whitehouse's water supply system was *Kentucky Pipe*, a program created by the Civil Engineering Department of the University of Kentucky. The model has been in use for over twenty years and was last updated in 2000. The model performs steady state flow analysis in pipe networks and incorporates a variety of components in its analysis including variable level storage tanks, pumps, pressure regulating valves, and variable demand cases. *Kentucky Pipe* can also perform simulations over an extended period of time with water levels in tanks varying in order to model pump operations controlled by water levels.

The procedure used in this analysis included the formulation of the initial computer model followed by actual field measurements to verify pressure and flow. The computer model was then calibrated based on actual field measurements. Once the model was calibrated, the distribution system was analyzed as it currently exists. The

system was also examined to verify that the proposed changes actually improved the distribution capability.

The benefits provided by the model include the ability to locate existing problems, make changes and examine the effects of the changes on the distribution system. This is all accomplished without unnecessary excavation or pipe purchases. The model and analysis provide a workable solution that can be budgeted and scheduled.

4.6.2 Methodology

The distribution system was analyzed in accordance with the following tasks:

1. Preparation of an updated piping map;
2. Determination of storage, pumping and production capacities;
3. Determination of existing water consumption rates;
4. Formulation of a computer simulated model of the existing system;
5. Computations of current and future water distribution capabilities utilizing the computerized model;
6. Recommendations for possible improvements to the system as a result of current and future demands.

The first phase in constructing a computer model is to prepare an accurate up-to-date water distribution system map. The Autocad drawing of the City of Whitehouse Water Distribution System Map is shown as Exhibit 9. This drawing was used as the skeleton background to configure the model. The City's distribution system is composed of PVC piping ranging in size from 2" to 12" as described in the table below.

Pipe Size	2"	4"	6"	8"	10"	12"
Length (feet)	13,093	4,174	123,606	31,267	N/A	22,369

The water distribution network was modeled using 262 pipe links and 214 nodes. A map of the model showing pipe links and nodes is shown as Exhibit 11. The water demand rates and allocations are based on the TNRCC requirement of 1.5 gpm per connection. This is representative of peak demand conditions at maximum day. Initial friction coefficients (Hazen-Williams) were set at C=140 for PVC pipe.

4.6.3 Calibration Results

Pressure data was obtained at three locations within the City using pressure recorders. The recorder charts are presented in Exhibit 12. A comparison of actual static water pressures measured at various locations with the model predictions is described in the table below.

Physical Location	Model Node Location	Avg. Measured (psi)	Model Prediction (psi)
1811 Topaz	J-52	80	79.73
233 Willowbrook	J-100	60	60.23
414 Shande	J-112	80	80.17

As shown, the pressures calculated by the calibrated model are in close agreement with the actual field measurements.

To calibrate the model, Junction 100 and 112 were added to the model with corresponding elevations to represent the actual physical location of the pressure recorders. Junction 52 and its corresponding elevation were previously described as part of the existing water distribution system. Also, as an initial setting, the system operating elevation level was set at 600', which is the high water level in the elevated storage tanks. This elevation did not require adjusting to calibrate the model.

4.6.4 Capability of Existing System

Water demand for the system was set to simulate the existing number of water customers, 2050 connections at 1.5 gpm per connection as required by the TNRCC design criteria. Results of this simulation are shown on the Peak Flow Pressure Map in Exhibit 12. State regulations require a minimum normal operating pressure of 35 psi. Pressures in the northwest and southwest quadrants along FM 346 and north of FM 346 did not meet this requirement. These lower pressures reflect the higher elevation of the terrain.

In addition, both TNRCC and the Texas Commission on Fire Protection require a minimum residual pressure of 20 psi for fire fighting. The model was set to simulate fire flow conditions by adding 1500 gpm demand in a commercial area (J-77) and 750 gpm demand in a residential area (J-122). As expected, pressures in the northwest and southwest quadrants along FM 346 and north of FM 346 did not meet this requirement.

4.6.5 Distribution System Modifications

Several modifications were made in the model to evaluate and compare various alternatives for correcting the above deficiencies with future growth demand. Future demand was projected for 5333 connections. The modifications are as follows:

1. Install elevated storage tank, 0.6 MG, Hagan Road @ Memory Lane.
2. Install elevated storage tank, 0.5 MG, SH 110 @ CR 2198.
3. Close existing elevated storage tank at Russell Road.
4. Install SH 110 18" water main, CR 2198 to existing Downtown tank.

5. Install Hagan Road, 12" water main, SH 110 east to existing 12" line.
6. Install Nunn St., 12" water main, SH 110 to Willingham.
7. Install Willingham, 8" water main, Nunn St. to FM 346 west.
8. Install FM 346 west, 8" water main, SH 110 to Maji Road, with booster pump.
9. Install SH 110 N, 18" water main, Downtown tank to Plant #2.
10. Install Acker Tap Road, 12" water main, Bascom Road.

The computer simulation results of the above modifications are shown in Exhibit 12. As shown, with these modifications, the pressures throughout the water distribution system meet the TNRCC minimum pressure requirement of 35 psi at 1.5 gpm per connection.

Fire flow demands of 1500 gpm commercial and 750 gpm residential were added to the computer simulation modification run. The results are also presented in Exhibit 12. As shown, the residual pressures throughout the water distribution system meet the TNRCC and Texas Commission on Fire Protection minimum fire flow residual pressure requirement of 20 psi at 1.5 gpm per connection.

4.6.6 Discussion

The proposed modifications to the City of Whitehouse's water distribution system and the expected benefits are discussed as follows. Opinions of probable cost for these modifications are presented in Exhibit 33. Installation of elevated storage tanks at Hagan Rd./Memory Ln. and SH 110/CR 2198 balances the pressures throughout the system. The elevated storage tanks allow peak demands to be met with a two-way feed. Completing the loops with the 12" water mains at Hagan Rd., Nunn St., and Acker Tap and the 8" water mains at Willingham and FM 346 west increases system reliability, enhancing the ability to feed lines from different directions with adequate volume and pressure.

Installation of the booster pump station for the FM 346 west 8" water main creates a pressure plane for the higher elevations in that area of the system. The projected population to be served by this portion of the system is not sufficient to warrant the installation of an additional elevated storage tank.

Installation of the SH 110 north/south 18" water main allows the system to meet future demands and fire protection, and provides a well balanced system at peak demand conditions.

4.7 Line Relocations

Due to the widening by TxDOT of FM 346 through Whitehouse, the City must move/relocate approximately 13,000 LF of 6", 8", and 12" water main. The majority of the existing 6" line needs to be upgraded to 12". An opinion of probable cost for this project is included in Exhibit 33, and the line locations are indicated in Exhibit 14.

4.8 Recommendations for Water System

Based on the preceding discussions and water demand projections, the City should be concerned about regulatory compliance issues, future water supply sources, and distribution system facilities and controls. Recommendations for addressing these concerns are presented below and in Exhibit 14, 33, and 35.

4.8.1 Elevated Storage

Due to the regulatory compliance deficiency in elevated storage capacity, it is recommended that 0.6 MG of elevated storage be provided immediately. The optimum location would be near the intersection of Memory Lane and Hagan Road where the ground elevation is approximately 450 and there is an existing 12-inch line. A high water elevation of 680 would produce a static pressure at the tank base when full of 65 psi. The height above ground to the high water level would be 150 feet.

Another elevated storage tank is also recommended for future needs. This would help to balance pressures throughout the system and would provide a backup storage tank to facilitate repairs and maintenance on the Memory Lane tank. The optimum location would be on the hill on the west side of SH 110 at 0.7 mile south of Fowler Road where the ground elevation is approximately 500. This would enable construction of a tank with high water level (HWL) 100' above ground to match the Downtown tank HWL of 600.

The existing 0.1 MG Russell Road tank is ineffective in its present location where there is very little demand. The pressures at the HSP station prevent water from being withdrawn from the tank even at peak usage times. The piping and control modifications required to enhance its usefulness would not be cost-effective. Therefore, it is recommended for abandonment. Perhaps it could be of use to Tyler or Walnut Grove WSC.

The Downtown elevated tank is and will continue to be the primary facility in the system for pressure maintenance and control. It should be protected and well maintained. It is currently in need of painting and other structural modifications. The TNRCC has cited the City in its most recent inspection and initiated enforcement action for the poor condition of the tank coatings.

4.8.2 Water Line Extensions

As discussed in Section 4.6, the distribution system analysis identified some water line improvements needed to meet system demands. In addition, line relocations required due to the widening of FM 346 were identified.

Some additional recommended improvements were identified, simply by studying the water system map and identifying some "common sense" improvements to either extend service to unserved areas, or to eliminate system bottlenecks. Recommended water line improvements are shown in Exhibit 14 and 33 and Section 4.6, with an implementation schedule presented in Exhibit 35.

4.8.3 Emergency Power

With current system demands of 2.3 MGD, there will be less than a one day supply of available water in elevated storage in the event of a power outage at Plant No. 2. Emergency power provisions are therefore recommended at Plant No. 2. Preliminary estimates of power requirements indicate that a 320 KW generator would be needed.

4.8.4 System Control

As discussed in Section 4.4, manpower, energy, and water would be conserved with improved monitoring and control capabilities for water system operators. A SCADA system is therefore recommended.

The recommended system would include a central terminal unit (CTU) and two remote terminal units (RTUs) located as follows:

Unit	Location
CTU	City Hall
RTU #1	Plant No. 2
RTU #2	Downtown EST

Additional RTUs could be added as improvements are added to the system. The wastewater treatment plant and sewer lift stations could also be added as funds allow.

Each RTU location would include the following cost items:

1. RTU with radio transceiver
2. Conduit and wire
3. Field devices (contacts, etc.)
4. Concrete foundation and 40' – 50' antenna tower
5. Installation and programming

The CTU would include the following cost items:

1. Desk top computer with monitor
2. Uninterruptable power supply
3. Communications interface (e.g. phone modem)
4. Software and programming
5. 150' guyed tower

Direct line-of-sight between the CTU tower and all RTU towers may or may not be necessary, depending on the radio frequency obtained.

4.8.5 Distribution System O&M

It is evident that operation and maintenance requirements of the supply and distribution system components by City staff has increased significantly in the past few years. It is recommended that the City continue to fund and support the O&M efforts of the water department to ensure that tanks are painted, grass is mowed, and equipment is maintained. As the system ages it will tend to deteriorate. Funding for necessary O&M should therefore be expected to increase every year. Efforts to replace meters, replace 3" and smaller lines with 6" looped lines, and reduce the percentage of water not accounted for should not deplete the resources currently designated for routine O&M. It is estimated that two more full-time personnel will be needed in the water O&M staff.

4.8.6 Additional Supply

It is recommended that the City of Whitehouse immediately locate and develop additional water wells to supplement the Tyler supply. The City's goal should be to have its own supply capacity of at least 1,000 gpm by 2010 and 1,500 gpm by 2030. This would enable the City of Whitehouse to purchase a constant, minimum amount from Tyler each month and to meet higher seasonal demands with its own supplies. This should be advantageous to both cities and should minimize water purchase costs for Whitehouse.

It is recommended that Whitehouse continue its participation in Lake Eastex. However, other sources may be more feasible and should be considered. For example, with Tyler adding Lake Palestine as a supply source, there may be opportunities for negotiations to purchase raw water from Lake Tyler. By construction of a channel dam in Mud Creek below Lake Tyler, another regional water supply might be beneficial to Whitehouse, along with Arp and Troup.

SECTION 5

CITY OF WHITEHOUSE
WATER & WASTEWATER FACILITIES PLANNING

SECTION 5.0 - WASTEWATER FACILITIES PLANNING

The City of Whitehouse wastewater system consists of one treatment plant, gravity main lines (outfall lines), which discharge into the treatment plant, other gravity lines, which discharge into the outfall lines, the lift stations and their force (pressure) mains, which discharge into a gravity main, the gravity lines, which collect and discharge into the lift stations, and the smaller diameter gravity lines (collection lines), which receive the wastewater from the individual customers. Although the service lines, which deliver wastewater from the individual customers to the City owned collector lines are not owned by the City, they should be considered a part of the overall wastewater system. A wastewater system map is included as Exhibit 16.

5.1 Wastewater Characteristics

The wastewater of the City of Whitehouse can be characterized as "typical municipal", but with very little if any industrial influence. Test results on raw wastewater at the treatment plant are limited. Test results from seven consecutive days of 24-hour composite samples collected in June 1994[3] were as follows:

Raw Wastewater Characteristics	
Blackhawk Creek WWTP	
Day	**BOD_5 (mg/l)**
1	147
2	134
3	133
4	138
5	124
6	119
7	120
Average	130.7
Standard Deviation	9.5

5.2 Wastewater Flow Contributions/Projections

There are approximately 2,000 sewer customers, of which 92% are classified as residential. The remainder includes commercial and schools. All users contribute typical domestic wastewater. The current wastewater contribution from each, as a percentage of the total wastewater flows, can be estimated from the water sales data presented in Section 3.5.

WHITEHOUSE WASTEWATER FLOW CONTRIBUTIONS, 1998-99		
Customer Category	**Dry Weather Approx. Flow Contribution (MGD)**	**Percentage Dry Weather Flow Contribution**
Residential	0.461	87.0%
Commercial	0.058	10.9%
Schools	0.011	2.1%
TOTAL	**0.530**	**100.0%**

Influence of Whitehouse I.S.D.

As discussed in Section 3.4, there are six campuses of the school district served by the City's wastewater system. The district has a total projected enrollment of 4,624 students by 2030. It is estimated that 64% of the total current enrollment live outside the City. Including an additional 10% for teachers and other district employees, approximately 5,000 people, or 30% of the projected population, will be served by the wastewater system during school periods and functions. The school district purchased 5.2 million gallons of water from the City in 1999. It is estimated that 25% was for watering lawns and ball fields, washing vehicles, and other consumptive uses. This results in 3.9 million gallons of wastewater discharged to the City in 1999, which is 2.1% of the total dry weather flow. Two main sewer lines will need to be upgraded from 8" and 10" to 10" and 14" in order to adequately serve the new high school. In addition, the water and sewer line relocations required for widening FM 346 can be partially attributed to school traffic.

5.3 Infiltration/Inflow

By comparing the amount of wastewater treated to the amount of retail water sold, an indication of the severity of the amount of I/I present in the wastewater collection system can be obtained. The expected wastewater flow can be estimated as 85% of the water sold during the months of November through March, when lawn watering and other consumptive uses are at a minimum. Such a comparison for 1998-99 is shown below and indicates that approximately one-third of all wastewater treated is I/I.

Year	Actual WW Flow (MGD)	Expected WW Flow (MGD)	Estimated I/I (MGD)	% of Actual Flow
1998	.481	.349	.132	27%
1999	.488	.333	.155	32%
2-Year Average	**.484**	**.341**	**.143**	**30%**

A similar comparison was made for 1992-93, which showed a two-year average I/I of 14%.[3] Thus, the percentage I/I in the collection system has doubled in 5 years. This trend must be stopped by proper operation and maintenance of the collection system, especially where lines are located in remote areas along creeks and through woods where problems often go unnoticed. If the trend is allowed to continue, then future expenditures for increased

treatment plant capacity and line capacities will be needed simply to transport and treat storm water which enters the collection system during wet weather.

5.4 Existing Collection System Facilities

5.4.1 Gravity Mains

The City's existing collection system is composed of approximately 53,750 linear feet of gravity sewer mains ranging from 6" to 10" in diameter. In addition, there are approximately 392 manholes and 8 lift stations.

The collection system can be broken down into the following approximate percentages:

SIZE	PERCENT OF TOTAL
6" dia.	35%
8" dia.	39%
10" dia.	26%

A map of the wastewater collection system showing line sizes, manholes, treatment plant and lift stations is included in Exhibit 16.

5.4.2 Lift Stations

The City of Whitehouse operates and maintains eight (8) lift stations at various locations throughout the City. Each station is provided with two pumps. The design capacity of these duplex pump stations is the capacity of one pump running. One pump is used as a back-up in case of a mechanical or electrical failure with the other pump. Data sheets, photographs, and comments about each lift station are included in Exhibit 17.

Each lift station was visited in order to assess the general condition and note the features available at each of the stations. The table below is a summary of the features at each station.

CITY OF WHITEHOUSE
WATER & WASTEWATER FACILITIES PLANNING

City of Whitehouse Sewer Lift Stations FEATURES										
No.	**Name**	**Alarm Light**	**Audible Alarm**	**Elapsed Time Meter**	**Auto Dialer**	**Site Fence**	**Vehicle Access**	**Crane, Hoist, Winch**	**Light -ing**	**Capa-city (gpm)**
1	Hwy 110, ETMC	✓					✓		✓	150
2	David/ Hill-Creek	✓					✓		✓	150
4	Meadow-Lark/ Robin	✓					✓		✓	30
5	Hwy 110 North	✓				✓	✓		✓	150
6	Bascom/ Hillcreek	✓	✓	✓	✓	✓	✓	✓	✓	50
7	Willows Subdivi-sion	✓		✓		✓	✓	✓	✓	160
8	Waterton Subdivi-sion	✓	✓	✓		✓	✓	✓	✓	135
9	Brittain Court Subdivi-sion	✓	✓	✓		✓	✓	✓	✓	100

Note: Lift Station #3 was removed from service when the Willingham outfall line was constructed in 1993.

All eight lift stations are equipped with local alarm capabilities however, only Lift Station #6 is equipped with an auto dialer. The auto dialer is a device that will call programmed numbers in case of alarm. This would allow the City a faster response time in case of emergency, thereby decreasing the likelihood of unauthorized discharges of untreated wastewater. It is recommended that auto dialers be installed at all Lift Stations. It is also recommended that all lift stations have intruder-resistant site fencing for safety reasons.

It should be noted that no elapsed time meters are provided at four of the lift station locations. While this feature is not as important as the alarm capability, information from these meters will indicate when a station is nearing its design capability or in some cases, is overloaded. When compared with rainfall data, time meter data can be

used to identify severe infiltration and inflow in the portion of the collection system contributing to the lift station.

One other feature worth noting is the crane and hoist. Devices designed to remove equipment from wet wells make maintenance work more time efficient and less hazardous to City personnel, especially where submersible pumps are installed. It is recommended a crane and hoist be installed at Lift Station #4.

5.4.3 Maintenance Requirements

Maintenance can be defined as the act of keeping equipment, structures and related facilities in a condition to perform as they were intended. Maintenance in the collection system can be broken down into two categories: a) Lift Stations Maintenance, and b) Collection System Maintenance.

a) Lift Station Maintenance

Effective maintenance at a lift station begins with good housekeeping. Keeping the grass mowed and trimmed and keeping all concrete and metal surfaces painted improve the appearance of the station and promote a public image of a well operated and maintained facility. Additionally, painting will increase the life span by protecting these materials from the elements and the highly corrosive environment inherent in sewer systems.

Equipment maintenance at the lift station begins with lubrication. Following manufacturer's recommendations regarding the frequency of lubrication and the type of lubricant cannot be over emphasized. Good lubrication will reduce friction and wear of moving parts. It also prevents rust and other forms of corrosion.

Maintaining manufacturer's instructions and the O&M manual provides valuable information to the City. Information regarding parts and service are usually found in the O&M manual. This manual also provides manufacturer's recommendations regarding lubrication and overall maintenance procedures.

b) Collection System Maintenance

Preventive maintenance is a program of scheduled inspections, cleaning and minor repairs. An effective program discovers potential problems and prevents their development before failures occur. Since failures usually require major repairs, preventive maintenance will save the City money.

Each portion of the collection system should be inspected at scheduled intervals. The frequency of these inspections should be scheduled to discover and correct developing problems before serious damage results. Factors affecting the

frequency of inspection include sewer size, material, type of construction, service area, flow rates, past problems, and the size of crew and equipment required.

Operators receive excellent training and instruction in the short schools offered by the Texas Engineering Extension Service and through active memberships in the Texas Water Utilities Association and the Water Environment Association of Texas. Such training is part of the TNRCC licensing requirements. This report also stresses the importance of good record keeping practices and the types of information that should be recorded. Both the frequency of the maintenance work and the type of work performed should always be recorded. In lift stations, run time meter information should be recorded. In the collection system, a map showing the lines and manholes that have been inspected and those locations where other work has been performed should be maintained. Eventually, the City will have a database of information that will be useful in planning upgrade and replacement programs. A database of identified I/I sources and a rehabilitation program will be money and time well spent because of the costs which will be avoided for treatment plant expansion and major line upgrades.

c) Budget

The City currently has two (2) full-time and two (2) part-time personnel assigned to wastewater operations. These include the following:

WHITEHOUSE WASTEWATER O&M PERSONNEL		
Title	**Operator Class**	**Full/Part Time**
Public Works Director	C	P
Code Enforcement Officer	B	P
Chief Plant Operator	C	F
Assistant Plant Operator	C	F

There are additional personnel assigned to perform administrative tasks. Other personnel and summer hires are utilized routinely as needed.

All wastewater personnel also assist with operation of the water system as needed. Routine tasks include line locations to assist contractors and other utilities, line repairs, new taps, inspections of new construction, line cleaning, lift station O&M, equipment maintenance and repair, sampling, testing, and record-keeping.

Other tasks are assigned as needed. For example, assistance may be needed by the street department, the water department, or for general customer service (i.e., responding to complaints).

The current (FY 1999-2000) annual budgets for "wastewater operations" are as follows:

WHITEHOUSE ANNUAL WASTEWATER OPERATIONS BUDGET	
Expense Category	**Amount**
Personnel Services	$65,404
Supplies & Materials	17,650
Maintenance of Buildings & Land	15,000
Maintenance of Equipment & Machinery	13,900
Contract Services	39,272
Capital Outlay	52,000
TOTAL	**$203,226**

5.5 Collection System Evaluation

5.5.1 Map Update

The collection system map was originally prepared in 1988. This map was updated to show the numerous extensions and subdivisions which have been added to the system since then. An up to date collection system map is crucial to evaluating and maintaining the collection system. The updated map is presented in Exhibit 16.

5.5.2 Subarea Delineation

In order to assess line capacities the collection system was divided into subareas and a schematic diagram was developed to show how each subarea is interconnected. The subarea map and schematic diagram are presented in Exhibit 21. The schematic diagram is in Exhibit 21. Current and future populations were then apportioned to the various subareas as shown in the two exhibits.

The subareas were designated as "E1 – E17" or "W1 – W19" depending on which side of SH110 the subarea is located. The system has two main branches, both of which terminate at the WWTP with 10-inch diameter lines. There are no lines larger than 10" in the system.

The wastewater flow rate generated in each subarea was estimated by multiplying the subarea population by an estimated per capita peak flow rate as follows:

(population)(100 gallons/person/day)(peaking factor of 4.0)/1,140 minutes per day

E.g., (100)(100 gpcd)(4.0)/1,440 = 83 gpm

Thus, assuming a peaking factor of 4.0, a population of 100 could be expected to generate a design flow rate of 83 gpm.

A summary of the flows from each subarea is presented in Exhibit 22. These flows were combined as dictated by the schematic diagram.

5.5.3 Main Line Capacities

It is important to know the capacities of main lines when planning for future growth because, any line that currently flows at capacity will not accept this growth. Several factors should be considered when determining if a main line is adequate for current and future needs. Some of these factors are as follows:

- What is the area served by the line?
- Is the area fully developed?
- Do only residential areas contribute or do commercial and industrial areas contribute as well?
- Is it likely that other drainage basins will be pumped to the line?
- What is the current flow in the line?
- What is the theoretical (calculated) capacity of the line?

The line capacities were calculated using Manning's equation and assuming minimum grade per TNRCC design criteria. This is appropriate for the Whitehouse area for the main lines, most of which have segments installed at minimum grade. This methodology assumes uniform gravity flow with no allowance for increased hydraulic gradient when lines are surcharged.

By comparing line capacities with generated flow rates at both current and projected populations, an assessment was made regarding adequacy of the existing lines. A summary of main line capacities in Exhibit 22 shows that three (3) main lines need to be upgraded to handle projected sewer flow rates.

5.6 Line Relocations

The Texas Department of Transportation (TxDOT) has a number of projects planned to increase traffic capacities in the Whitehouse area. A map of these proposed TxDOT projects is included as Exhibit 13. The widening of FM 346 through Whitehouse will require that the City relocate its sewer lines in conflict with the widening project. Approximately 15,000 LF of existing sewer main, including 31 manholes will have to be relocated by the City. The affected lines are indicated on Exhibit 32.

5.7 Regulatory Compliance

The City has a good record of consistent permit compliance since its plant was upgraded in 1995. However, flows have increased since then due to an increased number of customers. In addition, as discussed in Section 5.3, I/I has also increased. Plant effluent data are presented in Exhibit 18 which shows the compliance history.

Due to the increased flows, the City has been mandated by the TNRCC to initiate engineering and financial planning for expansion of its facilities in accordance with 30 TAC 305.126. This same statute will require that construction for expansion begin when flow rates exceed 90% of the permitted flow rate (i.e., 0.612 MGD) for three consecutive months. This is expected to occur in 2001.

5.8 Treatment Plant Expansion Options

5.8.1 Existing Facility

A layout of the existing facility is included as Exhibit 23. The wastewater treatment plant currently serving the City of Whitehouse was originally constructed in 1970 and, initially, consisted of an oxidation ditch and two polishing ponds. A plant upgrade in 1986 implemented an extended aeration activated sludge process with the addition of an aeration basin and clarifier in a single above ground steel tank, an intermediate lift station, a chlorine contact chamber, and sludge drying beds. The plant was designed to treat 0.680 MGD of domestic wastewater.[5]

In 1995, the plant was upgraded due to more stringent permit limits and to achieve nitrification.[13] It was converted to a complete mix process with the following improvements:

- new grit separator
- convert digester to additional aeration capacity
- replace mechanical aerators with diffused aeration system
- convert pre-aeration oxidation ditch to aerobic digester
- add enhanced sludge dewatering capability

The permitted and design flow rate remained at 0.680 MGD. The current permit is included as Exhibit 19. Photos of plant components are included in Exhibit 24.

5.8.2 Design Flow Rate

Flow data in Exhibit 18 show a maximum month, average daily flow rate of 0.6 MGD in 1998 when the estimated population was 6,000. This equates to a per capita flow contribution of 600,000 gpd/6,000 = 100 gpcd. A 20% allowance for future commercial users and I/I results in a per capita flow contribution for design purposes of 120 gpcd. This figure was multiplied times the population projection presented in Exhibit 7 to project future wastewater flows presented in Exhibit 20. The projected flow rate for 2030 is 1.92 MGD. The design flow rate for comparing alternatives was 2.0 MGD.

5.8.3 Option 1: Expand Existing Plant

There are pros and cons associated with each option. The pros and cons of expansion of the existing plant are as follows:

Option 1 : Expansion on Existing Site	
Pros	**Cons**
• Avoid acquisition of land for new plant site and new outfall easement • Continued use of existing structures and equipment • Infrastructure to serve plant (electricity, water, access, etc.) is in-place • Less risk of contested permit proceedings	• Potential for odors and noise in close proximity to residential neighborhoods • Service area which can gravity flow is limited to present area • Site limitations result in less than optimum layout, and limited future expansion • Limited flexibility to optimize plant for energy efficiency

A proposed layout and schematic flow diagram for expansion to 2.0 MGD on the existing plant site is presented in Exhibit 25. Improvements would include the following:

- Construct new influent pump station and mechanical bar screen.
- Demolish/abandon existing oxidation ditch.
- Convert existing above ground steel aeration basin/clarifier to aerobic digester, using existing blowers for aeration and mixing.
- Convert existing chlorine contact chamber to digester supernatant decant unit.
- Construct new aeration basin, dual train.
- Construct two new clarifiers.
- Construct new blower building for aeration basin.
- Construct new RAS and WAS pump station.
- Construct new sludge dewatering facility.
- Construct new UV disinfection system.
- Construct new paving and drainage facilities.
- Other miscellaneous items:
  - Electrical instrumentation
  - Yard piping
  - Splitter boxes
  - Plant water & sewer

The probable cost for Option 1 is included in Exhibit 34.

5.8.4 Option 2: Construct New Facility

A possible site for construction of a new plant downstream of the existing site was selected by examining the contours and other topographic features shown on the U.S.G.S. 7.5 minute quad map. The Smith County Appraisal District Maps were also examined for property boundary information. The site was selected based on accessibility, constructability, and a location which would optimize the additional watershed service area for gravity flow. The selected site location is shown in Exhibit 26. The pros and cons of constructing a new plant at a new location are as follows:

Option 2: Construct New Facility	
Pros	**Cons**
• Can optimize new site for ease of operation and future expansion • Opens new areas for economical service • Remote location reduces risk of noise/odor issues • More flexibility to optimize treatment process for energy efficiency	• Will require acquisition of land for plant site and outfall line easement (and possibly site access) • Risk of contested permitting process • Cost of new outfall line and more right-of-way to maintain • Infrastructure not in place

A proposed layout and schematic flow diagram for a new 2.0 MGD plant at a new location are presented in Exhibit 26. Improvements would include the following:

- Influent pump station and mechanical bar screen
- Grit removal system
- Dual train aeration basin with diffused aeration
- Two clarifiers
- RAS and WAS pump station
- Sludge dewatering and loading facility
- UV disinfection system
- Two-stage digestion and decant facility
- Blower building
- Access, paving, and drainage facilities
- Lab and office building
- Maintenance/storage shop
- Other miscellaneous items:;
  - Electrical and instrumentation
  - Yard piping

- Splitter/junction boxes
- Plant water & sewer
- Grading and fencing

The probable cost for Option 2 is included in Exhibit 34.

5.8.5 Option 3: Pump to Tyler Southside Plant

Due to the close proximity of Whitehouse to Tyler, consideration was given to abandoning the Whitehouse WWTP and pumping all Whitehouse wastewater to Tyler's Southside WWTP for treatment. This would require that a new pump station be constructed at the existing Whitehouse plant capable of pumping up to 4,200 gpm. A 24-inch diameter force main would be required. The force main route was selected from Whitehouse, Smith County, and U.S.G.S. maps to following existing roadways. The route location is shown in Exhibit 27. The pros and cons of this option are as follows:

Option 3: Pump to Tyler Southside Plant	
Pros	**Cons**
• Whitehouse is out of the wastewater treatment business, but remains in collection and transport business. • Reduction in City labor force for plant O&M • Recover plant site land for other uses. • Avoid costs to O&M WWTP, much lower electricity costs.	• Extensive contract negotiations with Tyler to establish precedent as regional sewer system. • Lose control over wastewater treatment costs and rate structure. • Risk of downstream water rights issues.

The probable cost for Option 3 is included in Exhibit 34.

5.9 Evaluation of Quail Run System

Quail Run is a residential subdivision located just west of Whitehouse in the Walnut Grove WSC service area. Sewer service is provided by the Greater Whitehouse Utility Company, Inc. (GWUCI). Both the Quail Run Property Owners' Association and the GWUCI have approached the City of Whitehouse about taking over the sewer system serving Quail Run. The location of the subdivision is shown in Exhibit 1.

Due to a petition filed with the TNRCC by GWUCI, administrative hearings were held by the TNRCC prior to completion of this report. A separate report was prepared for use in the hearings entitled "Quail Run Subdivision Sewer System Evaluation". The results of that report are presented in Exhibits 30 and 31. The report concluded the following:

"Information gathered during this evaluation indicates that the entire collection system serving Quail Run Subdivision does not meet TNRCC requirements. The system must, therefore, be replaced. It is recommended that Option 2 of the collection system alternatives be implemented. The opinion of probable cost for this option is $424,000. Implementation of this option will result in a collection system that meets TNRCC requirements and transports the wastewater to the City of Whitehouse WWTP for treatment and disposal. This will also ensure that, when annexed, the City of Whitehouse will inherit a system that meets their requirements."

5.10 Recommendations for Wastewater System

Improvements to the City's wastewater treatment and collection system are required for the City of Whitehouse to maintain compliance with its discharge permits, to accommodate current sewer needs in the region, to accommodate future growth, and to accommodate pending transportation system improvements. Proposed treatment plant improvements are designed to increase the City's treatment capabilities to 2.0 MGD. Based on the population and flow projections, this design condition should provide adequate treatment capacity until the year 2030. Proposed improvements to the collection system are designed to increase hydraulic capacity of the system, reduce long term capital expenditures through enhanced O&M, and increase system reliability. A map showing the locations of these proposed improvements is included in Exhibit 32.

When considering prioritization of improvements, a three-tiered approach was developed. Tier I improvements are those projects that are required to meet current system deficiencies and short-term growth needs, and which are scheduled for implementation within the next 5 years. Tier II improvements are those projects which are recommended for extending service to currently developed or developing areas. These are areas for which the City has already considered providing service outside the current city limits and for which the cost of providing service has been investigated. Tier II projects may or may not be implemented within the next 5 years, depending on availability of funding, financial feasibility, and other institutional and legal considerations. In addition, Phase 2 of the WWTP expansion is considered as a Tier II project because it is somewhat dependent on the implementation of the other Tier II projects. Tier III improvements are those projects that will provide service to newly developed areas and/or will enable the City to eliminate one or more lift stations. Tier III projects serve as a guide which the City can use as a "lift station elimination plan" for reducing long-term O&M costs. Opinions of probable costs for Tier I and II projects were developed and are included in Exhibit 34. Costs associated with Tier III projects were not developed because these projects will be constructed only as these areas are developed and the City evaluates the cost vs. benefit of each.

5.10.1 WWTP Expansion

It is recommended that a plan be immediately adopted and implemented to expand the City's wastewater treatment capacity to 2.0 MGD in two phases.

In planning for the WWTP expansion, it is recommended that the following features be incorporated:

- addition of a mechanically cleaned bar screen and grit removal
- expansion of lab/office building
- addition of system to use plant effluent for washdown and onsite irrigation
- addition of belt filter press to supplement existing drying beds
- conversion from chlorine to ultraviolet disinfection
- addition of lime stabilization for meeting Class B sludge requirements
- addition of maintenance building/shop

Opinions of probable costs for the three alternatives evaluated are presented in Exhibit 34. Implementation schedules for a two phase approach are presented in Exhibit 36.

5.10.2 Main Line Upgrades

It is recommended that three of the existing main lines be upgraded to meet current deficiencies and short-term growth needs. The existing lines should not be abandoned, but larger parallel lines should be constructed. Existing easement widths may not be adequate for the new construction. The lines requiring increased capacity are as follows:

MAIN LINE UPGRADES				
Subarea Location	**Current Line Size**	**Proposed Line Size**	**Length**	**Location Description**
E1 & E2	10" & 8"	14"	6,600 LF	From WWTP to approx. 1,000' N. of Hagan Road
E17	10"	14"	4,700 LF	From WWTP to approx. 400' W. of Christopher Dr.
E4	8"	10"	5,200 LF	From approx. 1,000' N. of Hagan Rd. to FM 346

Opinions of probable costs for these three main line upgrades are presented in Exhibit 34. It was assumed that existing easement widths are sufficient to enable construction of the parallel lines and manholes. If not, additional costs will need to be budgeted for easement acquisition.

The line locations are shown in Exhibit 32. An implementation schedule is presented in Exhibit 36. The proposed 14" line in subarea E17 was considered a Tier II project; the others are considered Tier I projects because they are needed to accommodate the new high school.

5.10.3 Line Relocation

Due to the widening by TxDOT of FM 346 through Whitehouse, the City must move approximately 15,000 LF of 6" and 8" sewer main and 31 manholes. An opinion of probable cost for this project is included in Exhibit 34, and the line locations are indicated in Exhibit 32.

5.10.4 Collection System Extensions

In addition to the collection system improvements recommended for upgrading main lines to increase hydraulic capacities, extensions to the system are recommended to accommodate future growth, reduce long-term O&M costs, and enhance system reliability. These recommended line extensions and the benefit derived are listed below. They are also shown in Exhibit 32.

Project	Result	Priority Tier
Gravity Line "A"	Provide service to Quail Run	II
Gravity Line "B"	Provide service to Lost Creek	II
Gravity Line "C"	Provide service to Richland Hills	II
Gravity Line "D"	Provide service to Timberridge	I
Gravity Line "E"	Remove Lift Station No. 7 from service	III
Gravity Line "F"	Remove Lift Station No. 8 from service and provide service to concession area at Lake Tyler	III
Gravity Line "G"	Remove Lift Station No. 1, 4, and/or 5 from service	III
Gravity Line "H"	Remove Lift Station No. 4 and/or 5 from service	III
Gravity Line "I"	Remove Lift Station No. 4 from service	III
Gravity Line "J"	Remove Lift Station No. 5 from service	III
Gravity Line "K"	Remove Lift Station No. 1 from service	III

5.10.5 Lift Station Improvements

One of the eight (8) lift stations appears to be overloaded. This is the 30 gpm lift station #4 at Meadowlark and Robinwood. According to calculations, this station should have a capacity of 75 gpm. However, before upgrading the station, consideration should be given to eliminating it by constructing proposed gravity lines G, H, and I for gravity flow to Lift Station #6. The cost to construct the gravity lines should be compared with the cost to upgrade the lift station plus the long-term O&M costs to keep the station in service.

Also recommended is that auto dialers, elapsed (run) time meters, and site fencing be installed at each station. There are currently seven (7) stations without an auto dialer, four (4) stations without elapsed time meters, and three (3) stations without site fencing. Finally, if lift station #4 is upgraded, it should be furnished with a pump lifting device.

5.10.6 Collection System O&M

It is recommended that the City develop a Collection System O&M Manual with a maintenance management and/or records system covering preventive and corrective maintenance.

The basic features of this system will include the following:

- Equipment Record System
- Maintenance Planning and Scheduling
- Storeroom and Inventory System
- Maintenance Personnel and Organization
- Cost and Budgets for Maintenance Repairs

Details of each of these features should be included in the O&M Manual.

As the overall O&M system for the collection system is developed, it is recommended that the City budget an additional $50,000-$75,000 per year to provide personnel and equipment to perform cleaning of the lines, right-of-way maintenance, and routine collection system inspections. A minimum of two additional full-time personnel will be required for this and other routine wastewater duties. Line cleaning increases hydraulic capacity of the system thereby reducing the occurrence of sanitary sewer overflows (SSO's). Additionally, it is recommended that the City budget a minimum of $50,000 per year to perform ongoing repair by City personnel to reduce I/I. Significant repair work requiring outside contractors can be developed during the budget process so as not to require a budget amendment at mid-year.

In order to identify potential problems in the system, the City has already purchased a blower for performing smoke testing in the system and an inspection camera. Smoke testing assists in identifying wet weather inflow sources. The inspection camera enables City crews to identify and pin-point problem locations. These sources can be shown on the computerized city map to provide an accurate record of potential inflow sources in the collection system.

It is further recommended that the City develop a data management system, that will identify each line, manhole and lift station in town; any problems noted; and corrective measures performed. This should be a computerized data management system. It may, however, require personnel training to learn the software capabilities.

5.10.7 Grease Control

Grease build-up is a major problem in municipal sewer collection systems. Grease build-up reduces the hydraulic capacity of the system. It also results in degradation of the environment and unnecessary costs to the City.

Two things must be done to control the grease build-up in the collection system:

- Enforce the City's ordinance requiring the installation of a grease trap at all establishments discharging significant amounts of oil and grease, including the requirement for monthly cleaning and payment of fines for non-compliance. These fines are necessary for the City to recover the cost associated with cleaning grease from the lines, with treating the added BOD-loading at the plant caused by the grease, and with fines levied against the City by EPA and TNRCC for SSOs caused by grease build-up.

- Develop and implement a plan to provide routine maintenance of collection lines known to be susceptible to grease build-up. This program should be included in the scheduled maintenance program.

SECTION 6

CITY OF WHITEHOUSE
WATER & WASTEWATER FACILITIES PLANNING

SECTION 6.0 - IMPLEMENTATION PLAN

Implementation schedules with probable 2000 project costs for recommended water and wastewater facilities improvements are presented in Exhibits 35 and 36, respectively. Note that costs for projects implemented at a later date must be adjusted to include cost increases due to inflation.

6.1 Institutional and Legal Issues

6.1.1 Right-of-Way and Land Acquisition

Right of Way and land required for the recommended projects can be acquired by the City of Whitehouse via negotiations or eminent domain proceedings. There are no jurisdictional conflicts with the WWTP site or pipeline routes in the project area. Land acquisition will pose no developmental problems for any of the projects. Some of the affected property is outside the Whitehouse city limits in the Tyler ETJ or the Walnut Grove WSC certificated area. However, these present no jurisdictional conflicts.

6.1.2 Wastewater Permitting

The City will need to apply for a new or amended TPDES permit with the TNRCC, including relocation of its discharge point and increase of its permitted flow rate. There are no known obstacles to either the new discharge point or the increased flow. The proposed discharge will be in the same stream segment as the existing discharge point, just one mile further downstream. Plans for Lake Eastex show the proposed normal pool elevation to be 315.0, which will back up water in Mud Creek to approximately one half mile south of SH 110.[14] If the WWTP discharge point is within five (5) stream miles of the reservoir, then more stringent permit limits could possibly be applied.[15] Stream classification and permit concentration limits will be determined in the permitting process, but are not expected to be different from existing. There are no jurisdictional conflicts, environmental issues, or known precedents in the area to prevent a permit being issued.

6.1.3 Ownership, Management, and Billing Issues

There are no unique or contentious issues with the recommended water projects. The Tier III sewer projects are outside the Whitehouse city limits and there are opportunities for joint ownership with the City of Tyler. A lift station to serve the Lake Tyler concession area is one such opportunity. A gravity line to Lift Station #6 on Bascom Road is another.

The Tier II sewer projects are all in the Walnut Grove WSC service area. There are potential issues with Whitehouse providing sewer service to Walnut Grove WSC water customers. Sewer charges are often based on water usage. The WSC would therefore have to provide the City with water usage records if this billing method were used. However, equitable charges could also be developed on a set monthly fee basis.

Another potential problem is how to ensure payment of sewer bills. Water valves can be locked shut to force payment of water bills. Discontinuing sewer service is not as easy, since taps are usually much deeper with no valve. If the same entity owns both water and sewer systems, the two charges are combined and collection of sewer charges can be secured by having the ability to discontinue water service. This is not a problem without solutions. There are numerous instances around the State where water and sewer service to the same customer are by two separate entities. Some of the potential solutions are as follows:

1) Annexation and purchase of the affected portion of the WSC system by the City. This is the least complicated solution once it is completed and the purchase is closed. However, it can potentially be very complicated during the process.

   Recent legislation in Texas has attempted to establish a systematic and equitable procedure for annexations of WSC service areas by cities. However, the annexation process could involve a condemnation proceeding that can be very contentious and cost intensive if the WSC does not wish to sell any portion of its service area. The proceeding, while in form is designed to bring uniformity, has in many instances brought complication. This is especially true if the WSC has federal supported indentures or bonds. In such an instance, the condemnation process can be lengthy, with a year to eighteen months being a conservative estimate. Condemnation costs may be recaptured, usually over a period of three years through rate structures applicable to the subject area. For these particular projects, the procedure could cost in the range of $15,000.00 (for uncontested to minor contested), to $60,000.00 or more in the event of a contested procedure that results in a State District Court action.

   WSC's are member-owned corporations which are governed by a Board of Directors elected by the membership. They are not governed by the same laws and do not have the same rights and powers possessed by cities. They are not considered a political subdivision of the State. A WSC is not a tax-exempt entity and does not have access to subsidized loans and grant programs enjoyed by cities and districts. In order for the WSC to accept an offer to purchase by the City, it would have to ensure that the purchase would not adversely affect the value of the Corporation stock in terms of sunk costs, operating budget, ability to retire existing debt, and loss of future revenue. In addition, the City would have to factor the cost to provide fire protection to any annexed area within 2 ½ years,

since WSC systems are not typically designed for fire protection. Fire protection requires a minimum line size of 6".

2) Annexation and allow the WSC to continue to serve its customers in the affected area. This would not avoid the responsibility by the City to provide fire protection. It would provide the City control in maintaining its sewer and fire protection facilities in the area. There would need to be established a cooperation agreement between the City and the WSC regarding billings and discontinued service for nonpayment. The City may be able to charge the WSC a "franchise" fee similar to other utilities to help offset costs.

3) No annexation; city acquires easements and constructs facilities to provide service outside the city limits. This is similar to option 2 above, but leaves the City with less control to enforce ordinances and maintain its sewer facilities. It would, however, avoid having to provide fire protection. A portion of Quail Run is outside the City's ETJ, which could be an issue if Tyler were to annex further south and extend its ETJ.

4) No annexation; WSC constructs, owns, and operates sewer facilities. A WSC has the authority to provide sewer service as well as water service. The WSC could then contract with the City for treatment of the wastewater. This is a common practice around the State, where one entity owns and operates the collection system and contracts with another entity for treatment.

6.1.4 Inter-Governmental Contracting Methods

There is no limitation of any of the project participants for contracting for the purchase of untreated or treated water or for wastewater service. The most preferred contracting option is a water purchase or sewage treatment agreement and contract pledging revenue for debt service and operation and maintenance of the project(s). A "take or pay" contract can fully finance a project with revenues derived from rate payers. There are few if any limitations for contracting on any of the project participants.

6.1.5 Annexation Issues

Property annexations in Texas are governed by the Texas Municipal Annexation Act, Chapter 43, Texas Local Government Code. The 76th Texas Legislature adopted Senate Bill 89, which made substantial amendments to the Act, effective September 1, 1999.

The new law includes a transition period until December 31, 2002, during which a city may annex under the old law with a number of changes. After 2002, all annexations will be under the new law. The new law, including the transition period

changes, will have much greater impact on home rule cities than on general law cities.[24] The City of Whitehouse became a home rule city November 1995.

Due to the changes made by SB89, annexing an area without consent in the future will involve a complex procedure. Normally, before an area can be annexed under the new law, it must be included in an annexation plan which includes an inventory of services and facilities and a service plan. However, the new law also provides for several categories of annexations exempt from inclusion in the annexation plan.[24] Some of these exemptions may apply to the annexations under consideration by the City of Whitehouse, making the process less complex. The City should consult with its local legal counsel and become familiar with the SB89 changes before initiating annexation procedures.

6.2 Financial Plan

6.2.1 Projected Revenue

As the City's population increases, additional revenue will be generated by increased water and sewer service charges. The current water and sewer rate structure is as follows:

	Water	Sewer	Total
Minimum monthly charge (first 2,000 gallons)	$13.50	$12.00	$25.50
Additional charge (per 1,000 gallons)	$2.00	$0.90	$2.90
Maximum Cap	N/A	$19.20	N/A

The sewer cap of $19.20 is intended to prevent over-charging for sewer service during the summer months when much of the water used is for lawn watering.

The current annual average water use is 0.77 MGD for 2,100 customers, or 11,010 gallons per customer per month average. This results in a current average monthly water bill of $31.50 per customer and annual water revenue of $0.8 million. Likewise, the current average monthly sewer bill would be $19.20 per customer (due to cap on maximum sewer bill) and annual sewer revenue of $0.5 million.

As shown in Sections 4 and 5, the current O & M budgets for water and sewer are $0.4 million and $0.2 million, respectively. These budgets are expected to increase as water demand increases due to population growth. Therefore, the increased revenue must be discounted due to the increased O & M expenses in order to project the net revenue available for servicing the debt required to construct the recommended improvements.

The projected water and sewer revenue and net amounts available for debt service are presented in Exhibits 28 and 29. In developing these projections, the following assumptions were made:

1. Current water and sewer rate structure.

2. Projections based on population and average annual water use projections presented in Sections 3 and 4.

3. Current apparent excess revenue of $0.4 million for water and $0.3 million for sewer are obligated and will not be available for servicing new debt.

4. O & M expense = $1,400 per million gallons for water and $723 per million gallons for sewer.

Debt service requirements of 20 years at 7% interest were assumed for comparing with projected revenue. For the $9.66 million water system improvements, debt payments would be $0.90 million per year. For the $8.84 million sewer system improvements, debt payments would be $0.82 million per year. As shown in Exhibits 28 and 29, both water revenue and sewer revenue would not be sufficient to match debt service requirements at current rates. Therefore, additional revenue must be generated by increasing rates, assessing impact fees for new developments, or a combination of the two.

6.2.2 Development Impact Fees

The 70th Texas Legislature passed Senate Bill 336 (later codified as Chapter 395 of the Local Government Code) regulating various types of utility fees for governmental entities or political subdivisions, defined in the legislation as "impact fees".[16] Chapter 395 defines impact fees as follows:

> "Impact fee" means a charge or assessment imposed against new development in order to generate revenue for funding or recouping the costs of capital improvements or facility expansions necessitated by and attributable to the new development. The term includes amortized charges, lump-sum charges, impact fees, contributions in aid of construction, and any other fee that functions as described by this definition.

Many cities and WSC's assess impact fees for all new customers or developments to help offset the cost of providing service. This is one way to ensure that costs to upgrade and operate and maintain new water and sewer facilities are borne by the

new customers, not by the existing ones. Although there is some financial benefit to a city from new developments in terms of tax revenue, there are also new costs, including street maintenance, garbage collection, park maintenance, police and fire protection, etc. Tax revenue should not be used to subsidize water and sewer operations. They should be self-sufficient departments or accounts. In addition to increased debt service for capital expenditures to upgrade water and sewer system capabilities, the O&M costs will also increase. Impact fees are one proven way to maintain an equitable rate structure for both old and new customers.

6.2.3 Rate Study

In order to ensure equity of water and wastewater charges among customers and customer classes, a rate study is recommended for the City. The results of this study could be used to develop debt service strategies and establish equitable impact fees. It could also be useful in negotiating a new water purchase contract with the City of Tyler. Approximately $30,000 should be budgeted for the study.

6.2.4 Funding Mechanisms

Depending on the ownership and management option selected, each project could be funded by long-term debt secured by customer water or sewer rates, ad valorem taxes, or a combination of the two sources. Revenues secured from the levy of a tax supporting a general obligation issue can have the least effect on rates. Other funding programs, including those available through the Texas Water Development Board, may be available.

A pure revenue bond issue can be used to finance the projects with or without participation by a third party (i.e., Texas Water Development Board or others). This option will result, most probably, in greater debt service cost. This option may be preferred if increased taxation, or the potential for increased taxation, is determined not to be viable.

Purchase agreements with third party service providers (e.g., the City of Tyler) can also finance a project without the issue of debt. Overall increase in cost and lack of control over rates are issues of concern for this option.

CITY OF WHITEHOUSE
WATER & WASTEWATER FACILITIES MASTER PLAN

LIST OF EXHIBITS

No.	Description
1	Planning Area Map / CCNs
2	Average Monthly Precipitation vs. Average Monthly Gross Lake Surface Evaporation
3	Geologic Map and Cross-section, Smith County
4	City of Whitehouse Land Use Map
5	Map of Existing Water Facilities
6	Water Facilities: Data Sheets and Photographs
7	Population Projections and Water Demand Projections
8	Map of Existing Water Distribution System
9	Water Supply Contract Between Tyler and Whitehouse
10	Water Production and Sales (Self-Supplied v. Purchased)
11	Model Junction and Pipe Numbers Map
12	Summary of Modeling Results
13	Map of Proposed Transportation (TxDOT) Projects
14	Map of Recommended Water System Improvements
15	Water Distribution System Control Schematic Diagram
16	Map of Existing Wastewater Collection System
17	Wastewater Facilities: Data Sheets and Photographs
18	Wastewater Data – Compliance History • Flows • TSS • BOD_5 • D.O. • NH_3-N
19	Wastewater Discharge Permits
20	Wastewater Flow Projection
21	Wastewater Collection System Subarea Map and Schematic Diagram
22	Summary of Sewer Line Capacities

23 Existing WWTP Layout

24 Photographs of Existing WWTP

25 WWTP Expansion Option1: Expand On Existing Site

- Plant Layout
- Schematic Flow Diagram

26 WWTP Expansion Option 2: New Plant Downstream

- Plant Layout
- Schematic Flow Diagram

27 WWTP Expansion Option 3: Pump to Tyler Southside Plant

- Map of Proposed Force Main Route

28 Water Projection Revenues

29 Sewer Projection Revenues

30 Summary of Quail Run System Evaluation

- Manhole Visual Inspections
- TV Inspections
- System Data

31 Maps of Quail Run System Replacement Options

- Option 1 – Replace Lines at Existing Locations
- Option 2 – Relocate Lines to Road R.O.W.

32 Map of Recommended Wastewater System Improvements

33 Opinions of Probable Costs for Water System Improvements

34 Opinions of Probable Costs for Wastewater System Improvements

35 Implementation Schedule for Water System Improvements

36 Implementation Schedule for Wastewater System Improvements

37 TWDB Executive Administrator's Comments

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CITY OF WHITEHOUSE
WATER & WASTEWATER FACILITIES
MASTER PLAN

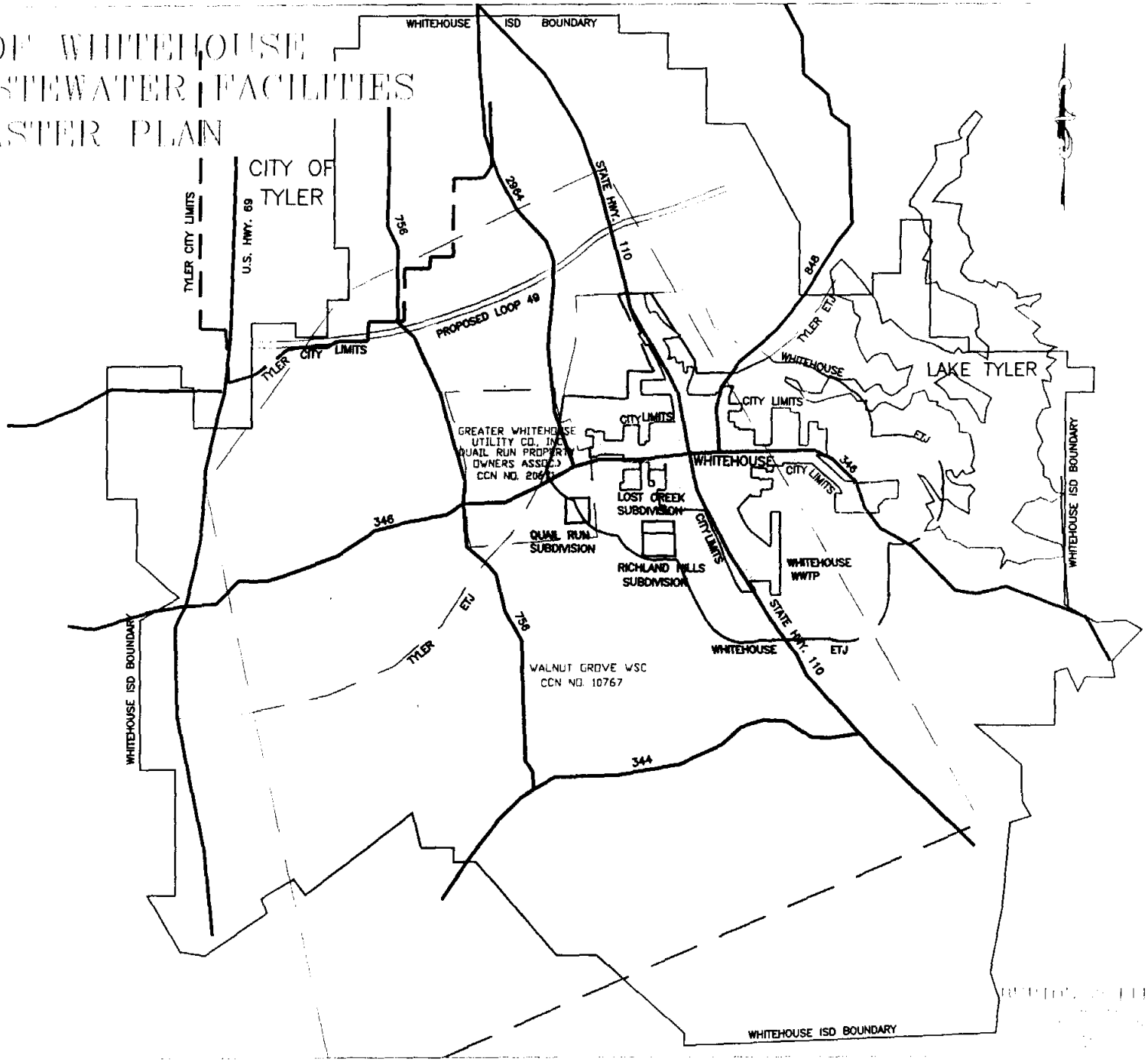
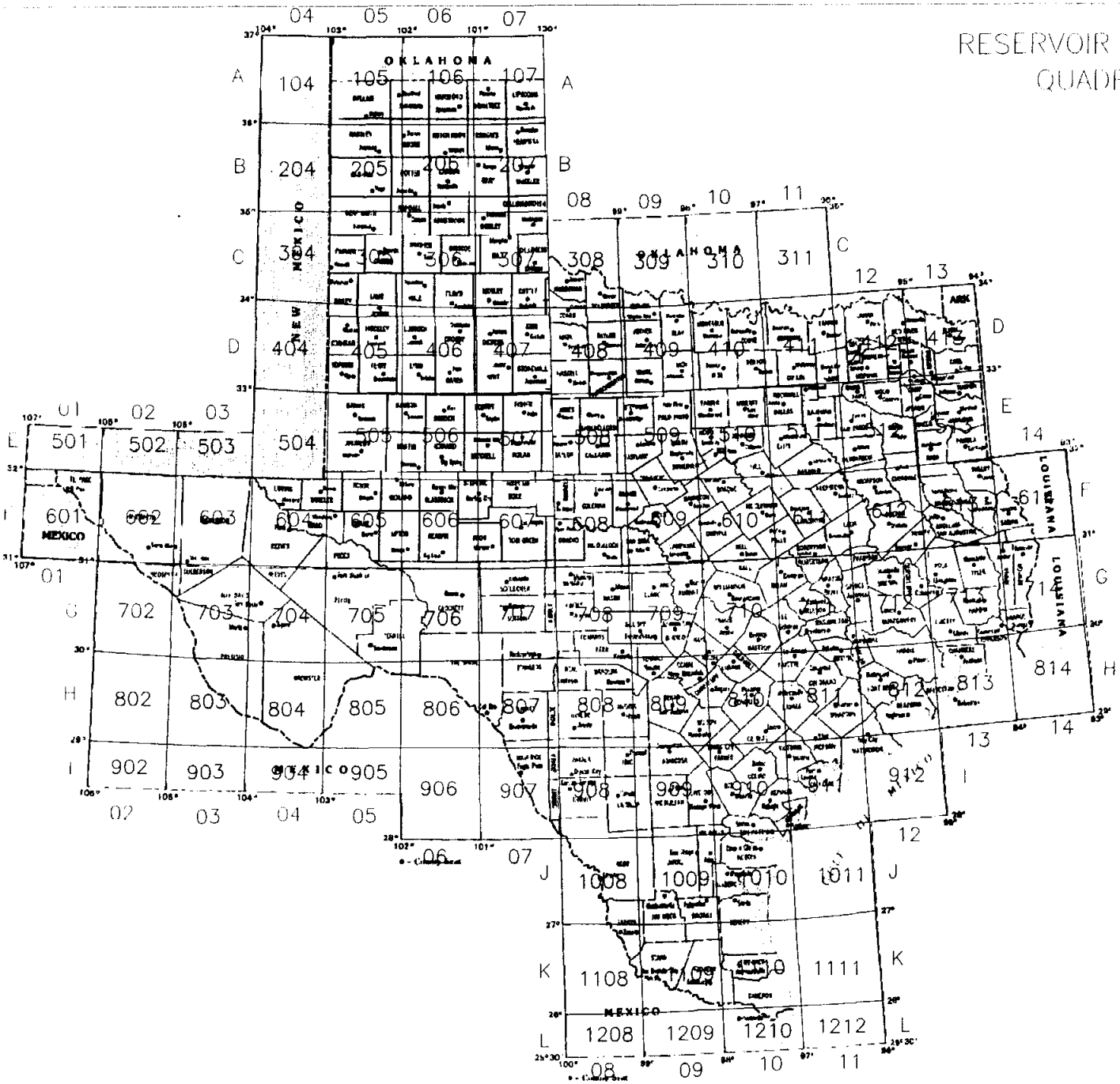


EXHIBIT 2

RESERVOIR EVAPORATION RATE
QUADRANGLE INDEX



SCALE: NONE

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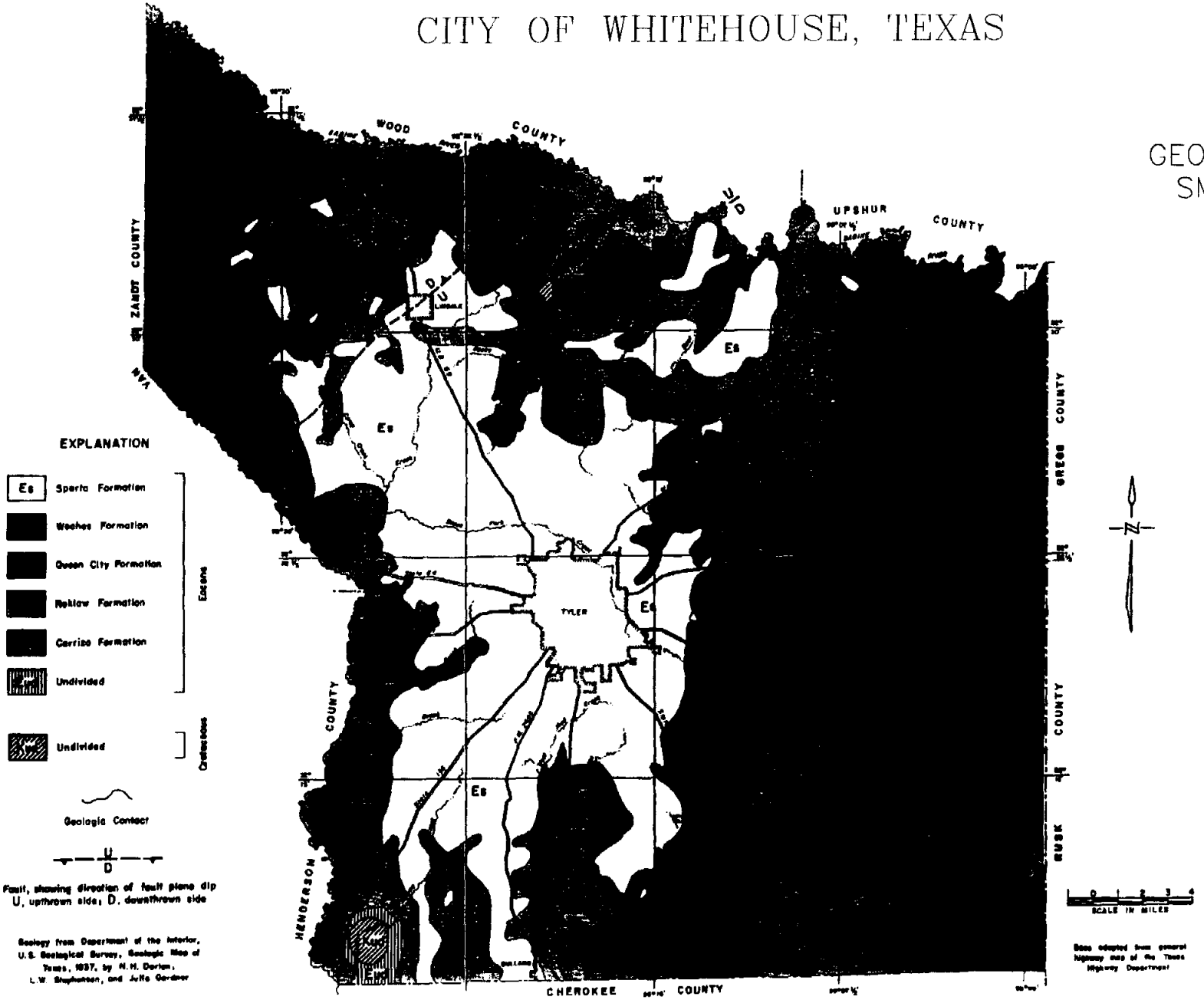
AVERAGE MONTHLY PRECITPITATION vs.
AVERAGE MONTHLY GROSS LAKE SURFACE EVAPORATION RATE
1940 – 1984

MONTHS	PRECIPITATION (IN.)	EVAPORATION (IN.)
January	3.1	2.0
February	4.6	2.3
March	3.4	3.1
April	4.8	3.5
May	5.2	4.6
June	3.4	5.5
July	2.7	6.8
August	2.5	7.2
September	3.7	6.0
October	3.3	5.2
November	3.8	3.6
December	3.8	2.5

Source: Texas Department of Water Resources, "Climatic Atlas of Texas," December 1983.

EXHIBIT 3

CITY OF WHITEHOUSE, TEXAS



GEOLOGIC MAP OF SMITH COUNTY

EXPLANATION

- Es — Sparta Formation
- Weches Formation
- Queen City Formation
- Reklaw Formation
- Carrizo Formation
- Undivided — Eocene
- Undivided — Cretaceous
- Geologic Contact
- Fault, showing direction of fault plane dip U, upthrown side; D, downthrown side

Geology from Department of the Interior, U.S. Geological Survey, Geologic Map of Texas, 1937, by N. H. Darton, L.W. Stephenson, and Julia Gardner

Base adapted from general highway map of the Texas Highway Department

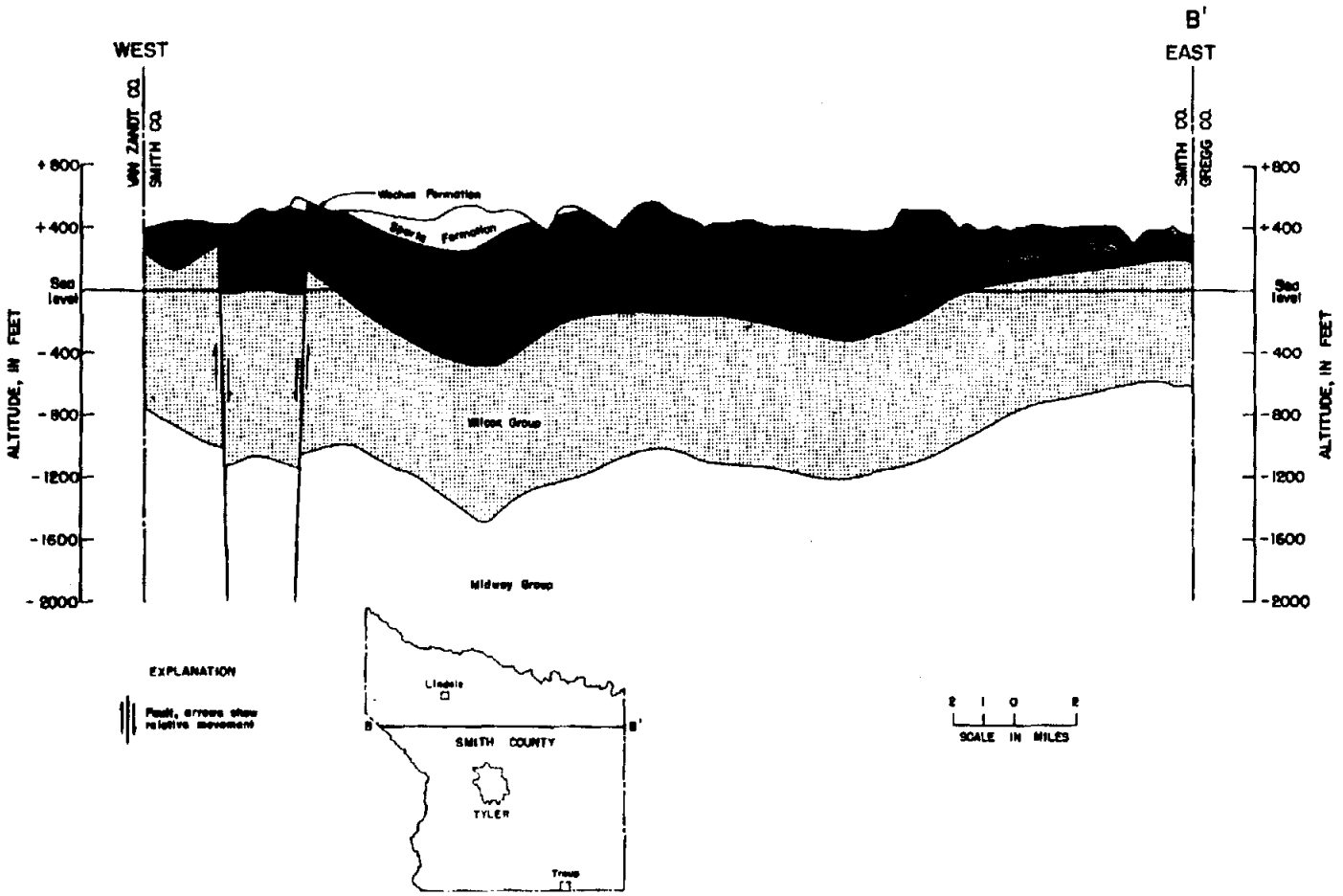
SOURCE:
TEXAS WATER COMMISSION, "AVAILABILITY OF GROUND WATER IN SMITH COUNTY, TEXAS," BULLETIN 6302, MAY 1963

BURTON & FLEDGE, INC.

CITY OF WHITEHOUSE, TEXAS

WEST–EAST (B–B') GEOLOGIC SECTION SMITH COUNTY

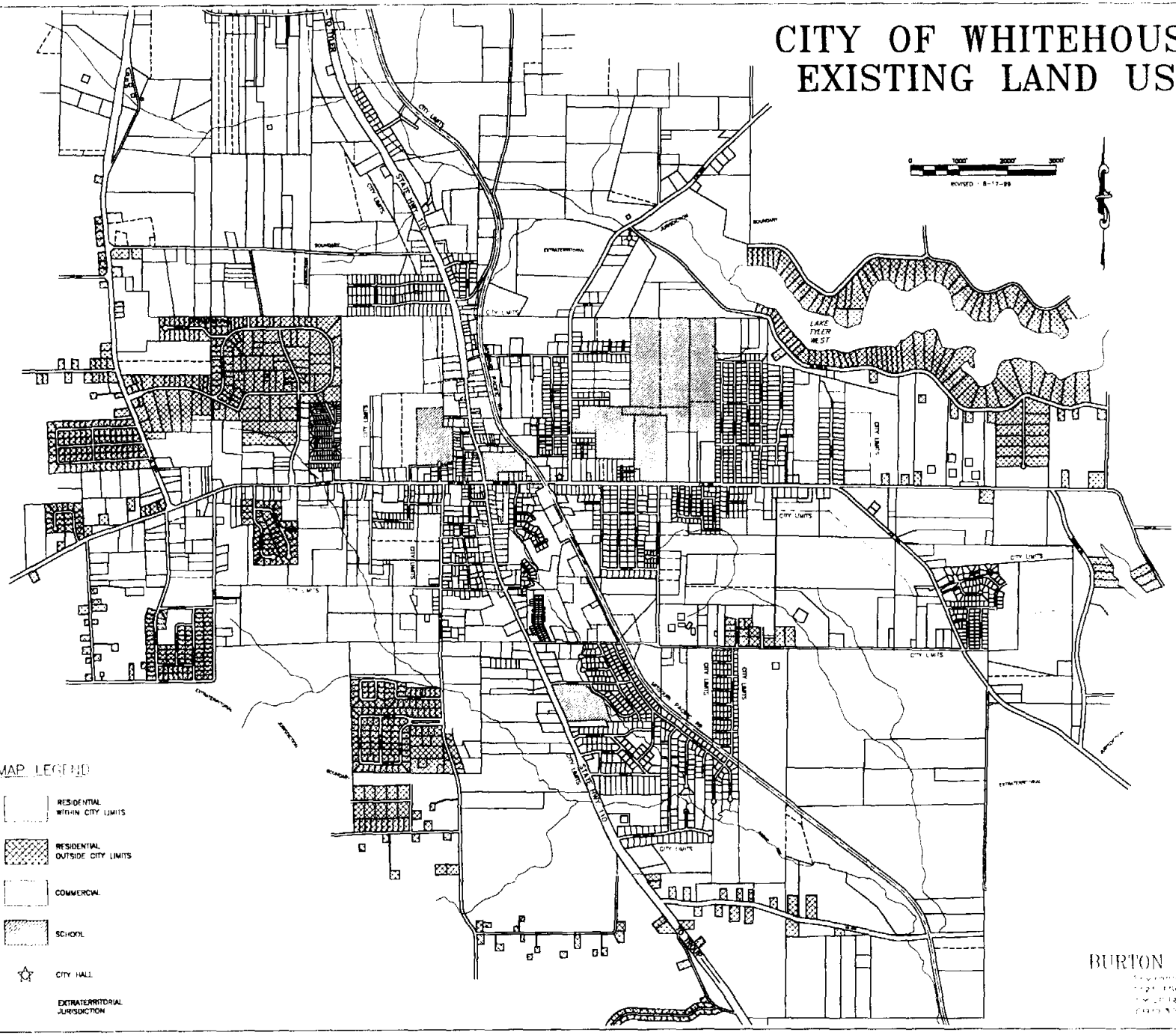
EXHIBIT 5



BURTON & ELLEDGE, P

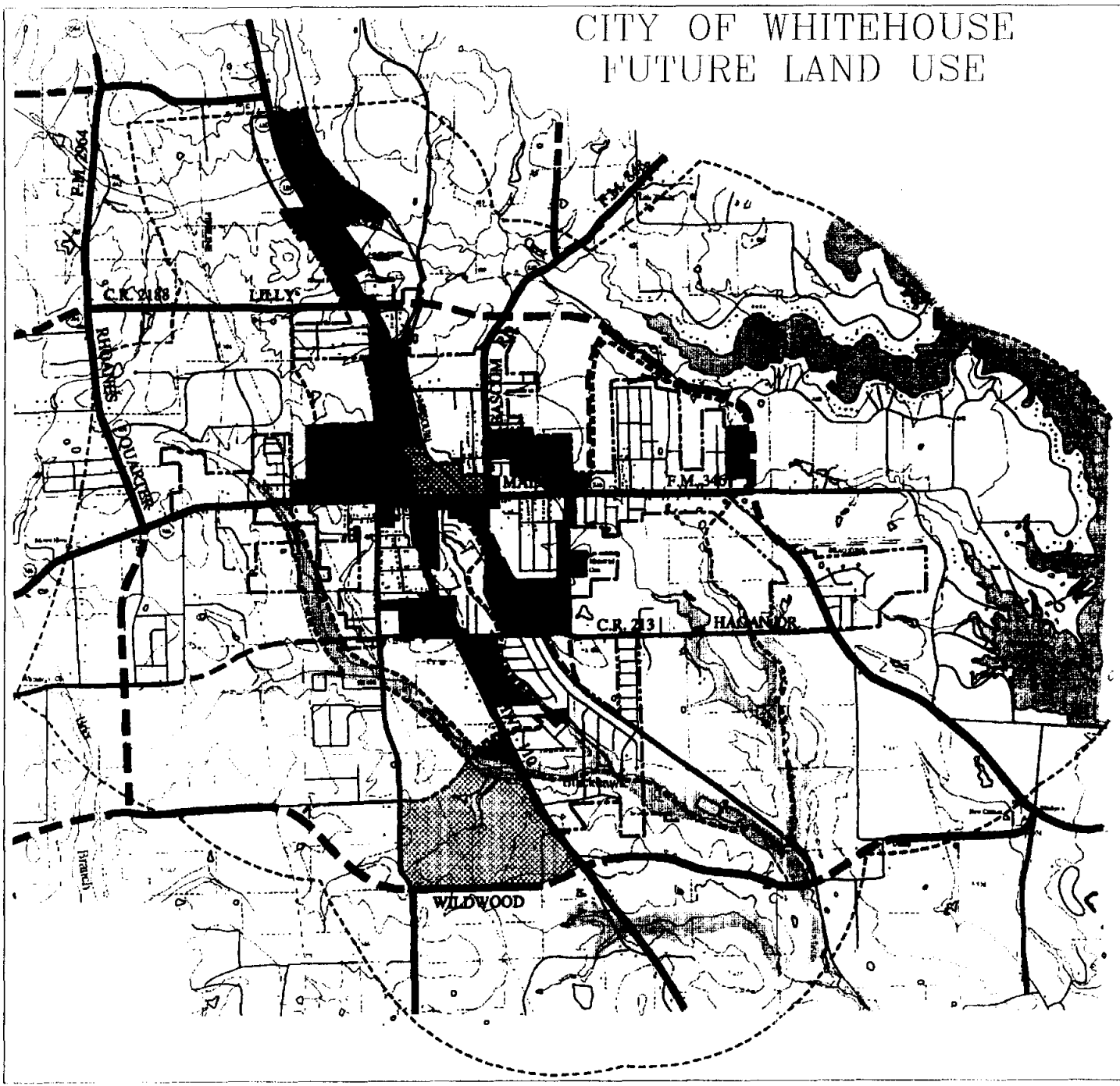
EXHIBIT 4

CITY OF WHITEHOUSE
EXISTING LAND USE



BURTON & ELLEDGE

CITY OF WHITEHOUSE
FUTURE LAND USE



City of Whitehouse, Texas

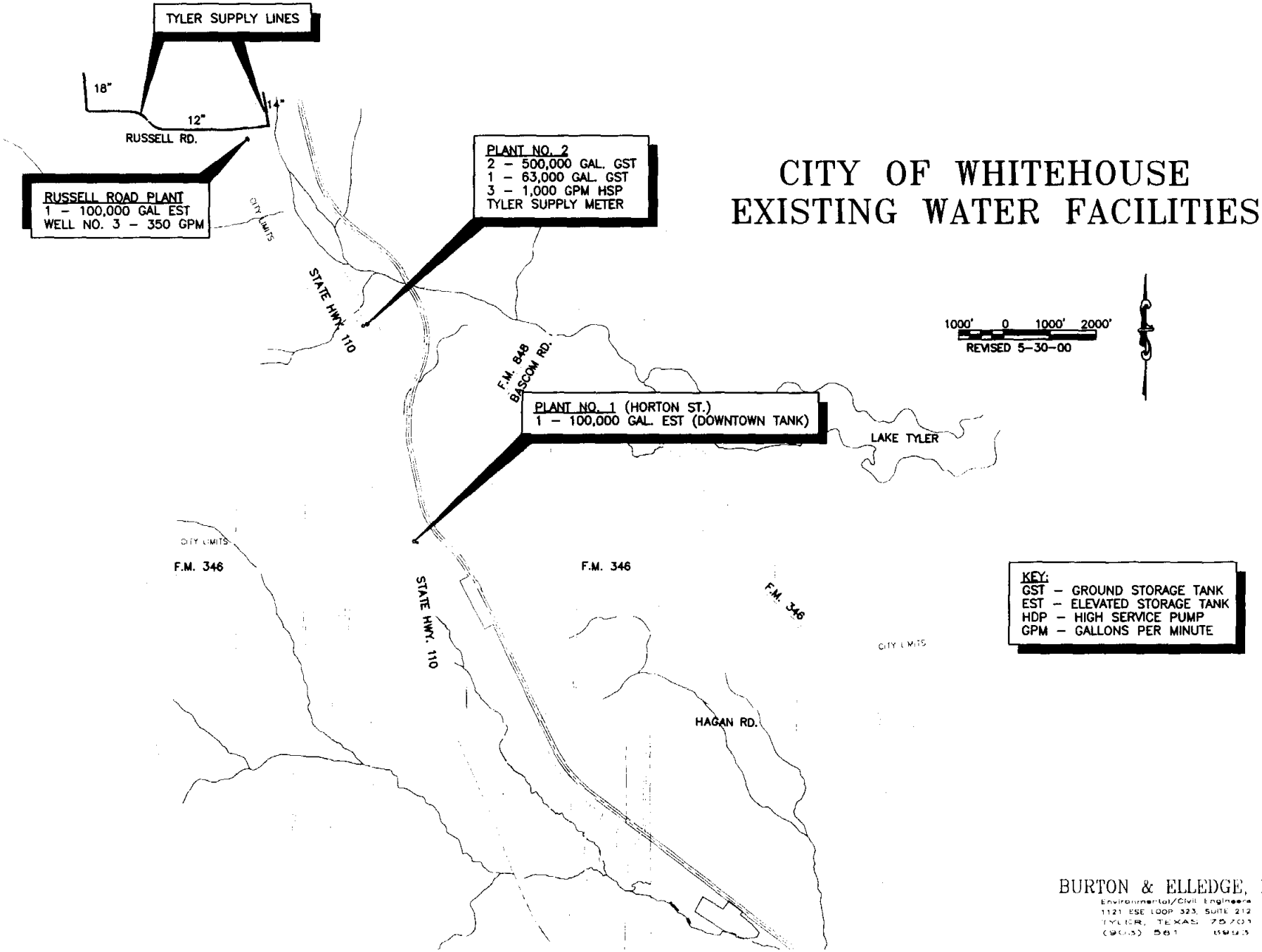
FUTURE LAND USE

- Low Density Residential
- High Density Residential
- Public & Semi-Public
- Parks & Open Space
- Pedestrian Trail
- Parkway Treatment
- Retail-Office / Personal Services
- Commercial / Warehouse
- Light Industrial
- Business Park
- Town Center

- Major Thoroughfare
- Minor Thoroughfare
- Whitehouse City Limits
- Whitehouse E.T.J.

EXHIBIT 5

CITY OF WHITEHOUSE
EXISTING WATER FACILITIES



BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 6563

EXHIBIT 6

CITY OF WHITEHOUSE
ELEVATED STORAGE TANK

Name: Downtown Tank

Location: Horton St.

Tank Type:

Volume 100,000 gal. Height 89.9'

Control Type:

Radio Signal

Features:

Alarm _____ Telemetry _____

Elapsed Time Meter _____ Auto Dialer _____

Site:

Fence Around Tank Only Maintenance Assistance _____

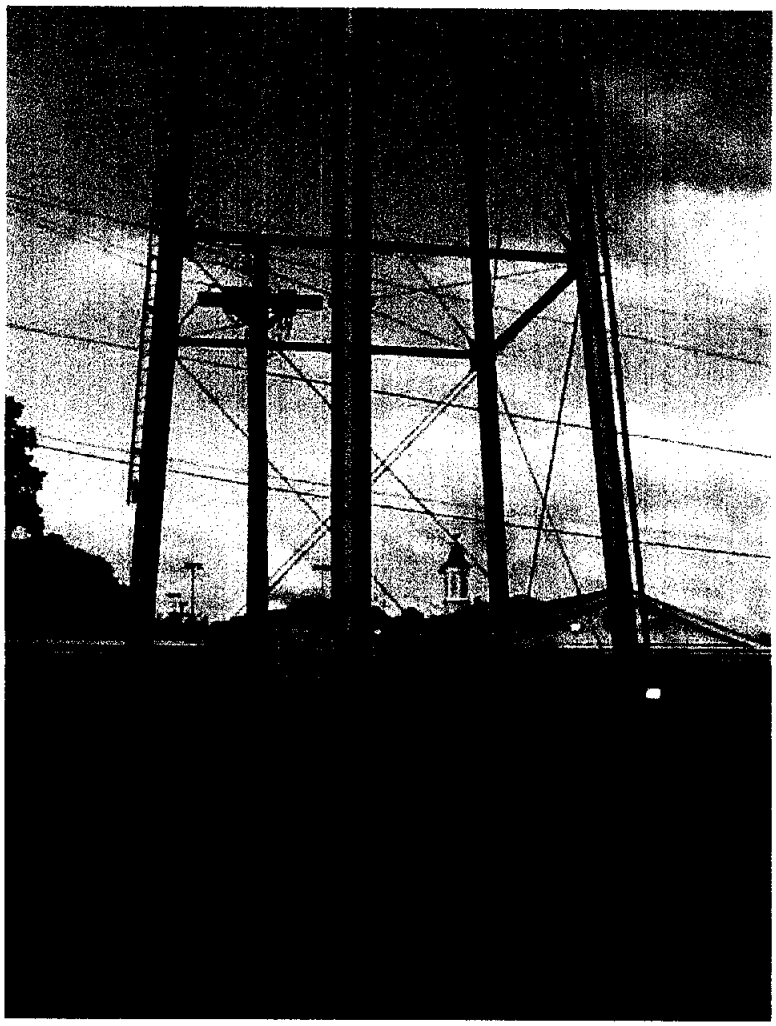
Access _____ Lighting No

Comments:

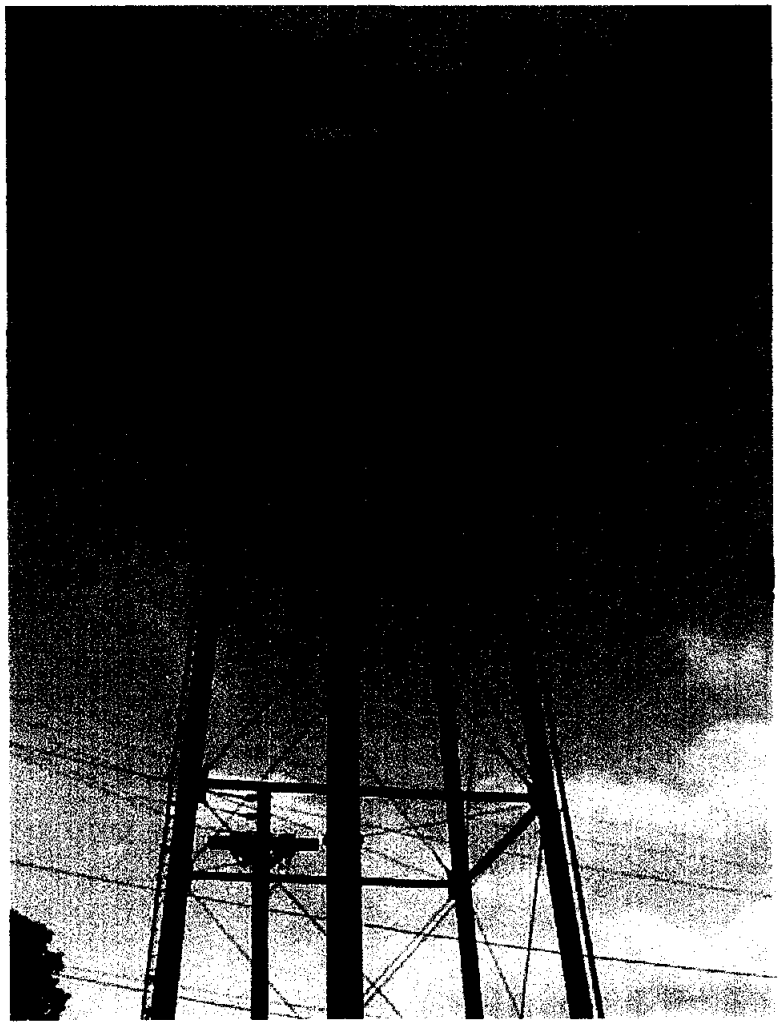
Condition Poor; needs structural repair and painting

Overflow _____

Other General Comments/Problems Well #1 abandoned in 2000. Tank referred to TNRCC enforcement for poor condition of tank coating.



Elevated Storage Tank
Near Well #1



Elevated Storage Tank
Near Well #1

Water Well #1

CITY OF WHITEHOUSE
WATER WELL FACILITIES

Name: Well #4 – Plant No. 2

Location SH 110 North

Well Pump:

Type Submersible
Motor HP 10
Manufacturer
RPM 3450
Yield

Storage Tanks:

Elevated Storage Volume
Ground Storage Volume 63,000 gal.

High Service Pumps:

Number of 1
Manufacturer US Electric Motors
Size (pumps & lines)
Model No. Hollow Shaft Motor
RPM 1800
Serial No.
Capacity 45 gpm @ TDH Motor HP 15

Control Type:

HS VP Thrust

Features:

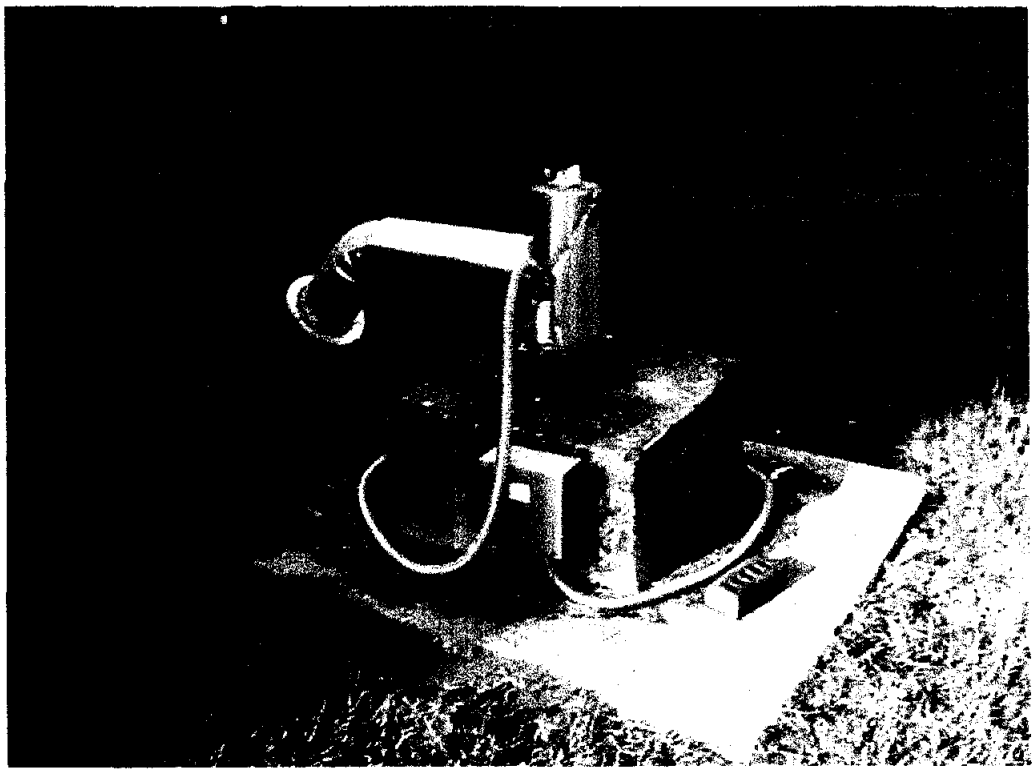
Alarm
Telemetry
Elapsed Time Meter
Auto Dialer Radio

Site:

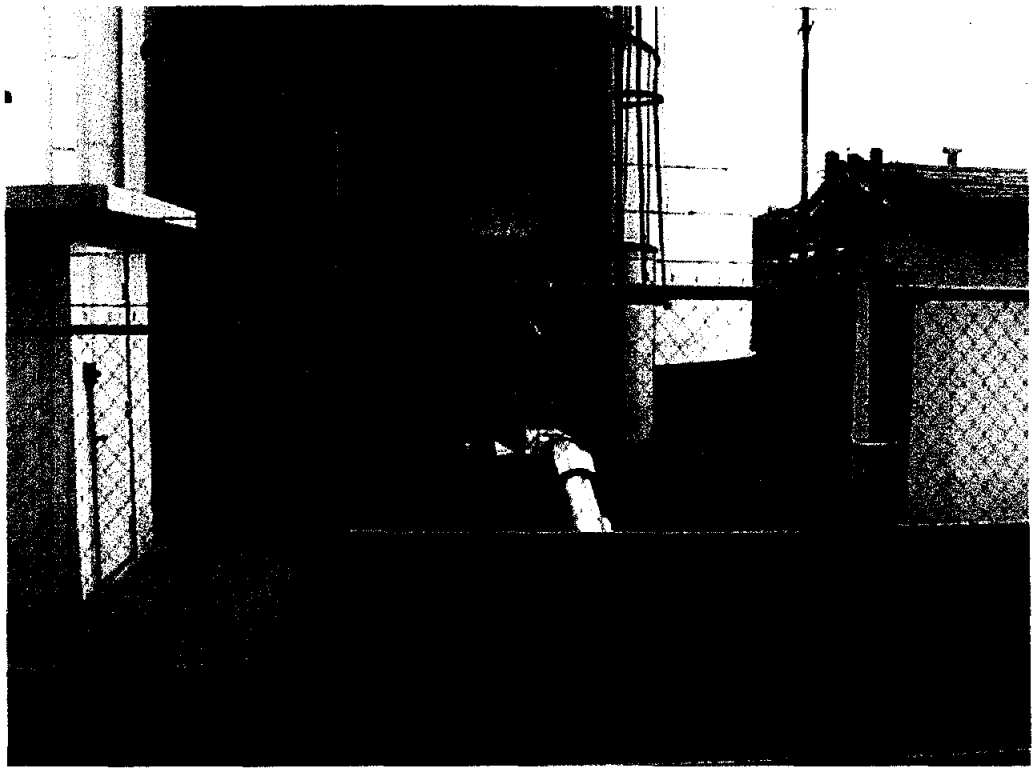
Fence X
Maintenance Assistance
Access X
Lighting X

Comments:

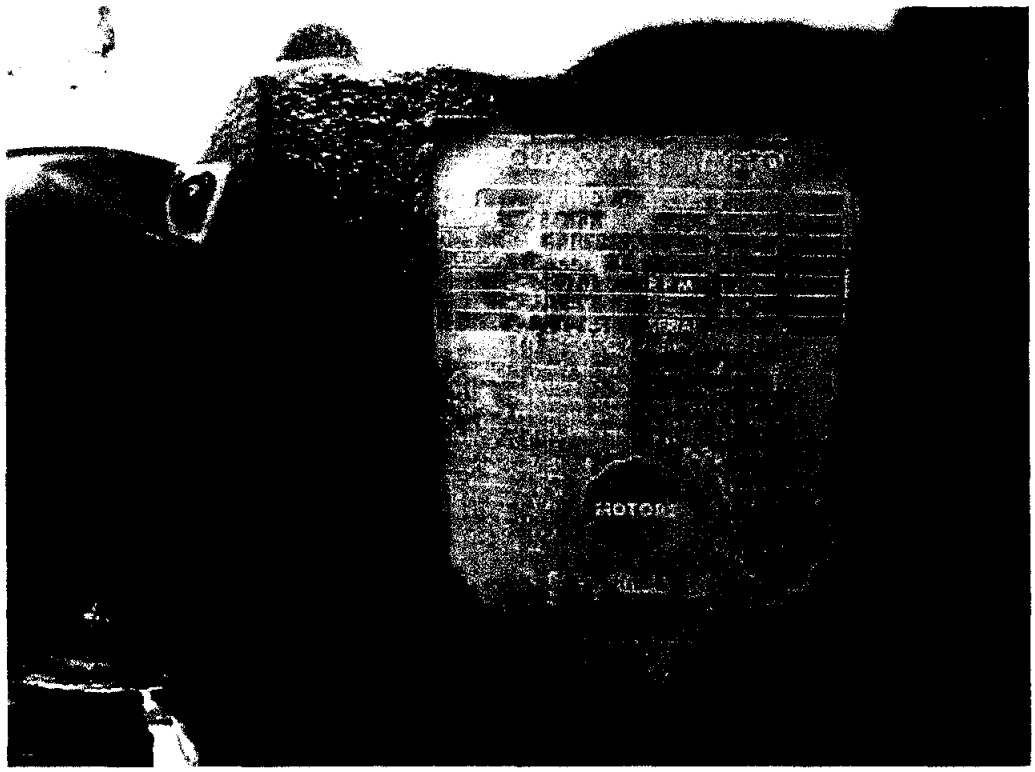
Condition Well #4 abandoned in 2000 to make room for 0.5 MG tank.
Other General Comments/Problems



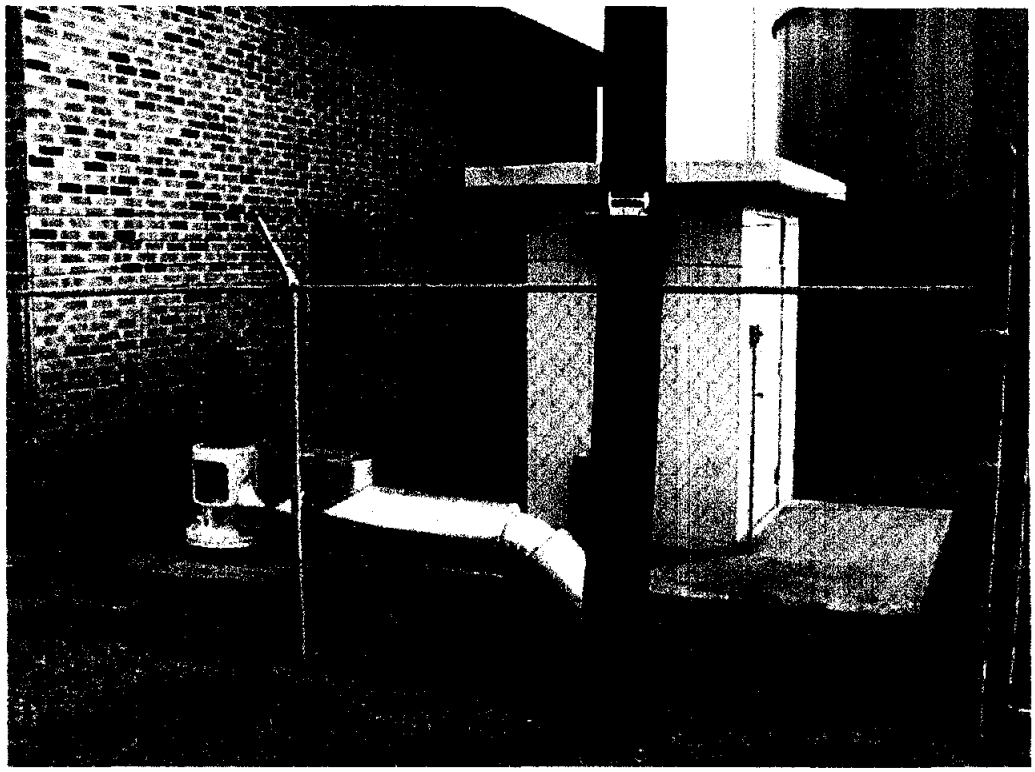
Water Well #4



Well #4
Booster Pump



Well #4
Booster Pump Plate



Chlorination Room

CITY OF WHITEHOUSE
WATER STORAGE & PUMPING FACILITIES

Name: Plant #2

Location: SH 110 North

Pump Data:

Number of 3 — Manufacturer Paco

Size (pumps & lines) 5 x 6 — Model No. 29-50158-040001

RPM _____ — Serial No. _____

Capacity 1000 gpm @ _____ TDH Motor HP 125

Ground Storage Volume: 2 @ 500,000 gal Type: Welded steel

Features:

Alarm _____ — Telemetry _____

Elapsed Time Meter _____ — Auto Dialer _____

Site:

Fence Building — Maintenance Assistance _____

Access _____ — Lighting _____

Comments:

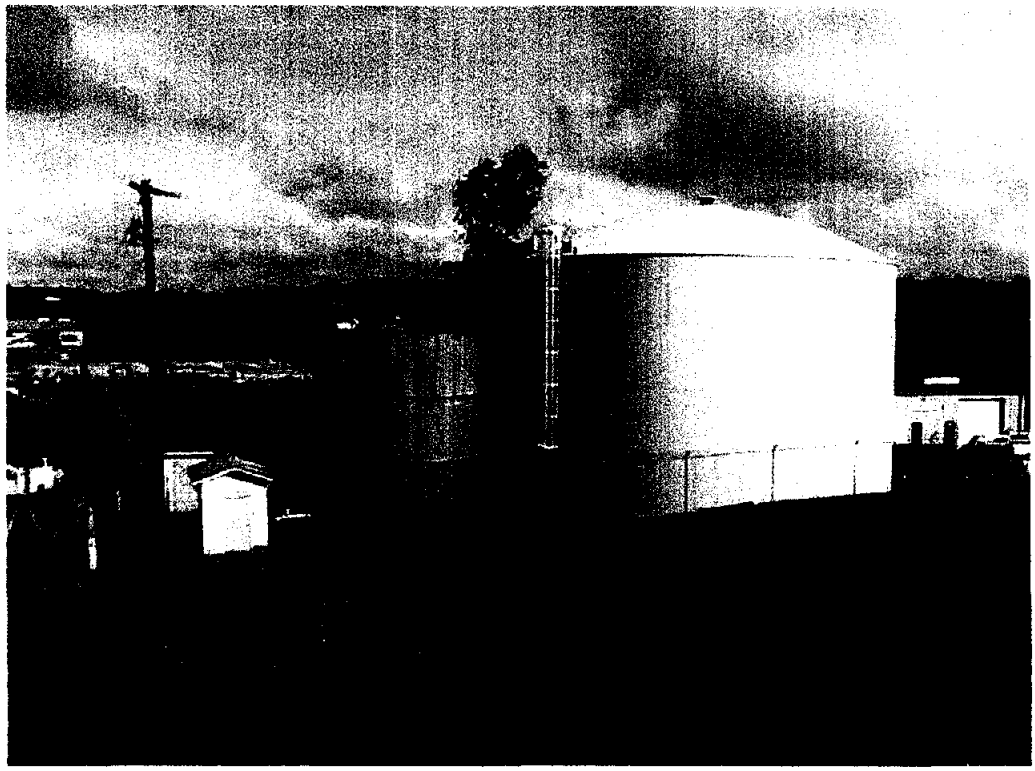
Condition Existing GST needs painting. Controls in fair condition.

Other General Comments/Problems a. Second 500,000 gal tank under construction as of 6/1/2000.

b. Need emergency generator and upgraded controls and instrumentation.

-

Plant #2
Service Pumps



Plant #2 Layout

CITY OF WHITEHOUSE
WATER WELL FACILITIES

Name: Well #3 – Plant #3

Location: Jim Russell Rd.

Well Pump:

Type Submersible
Motor HP
Manufacturer
RPM
Yield 350 gpm

Storage Tanks:

Elevated Storage Volume 100,000 gal.
Ground Storage Volume
Height 89.9'

High Service Pumps:

Number of
Manufacturer
Size (pumps & lines)
Model No.
RPM
Serial No.
Capacity gpm @ TDH Motor HP

Control Type: Well pump controlled by phone line from Plant #2. Elevated tank has electrodes for local control of well, for emergency use only.

Features:

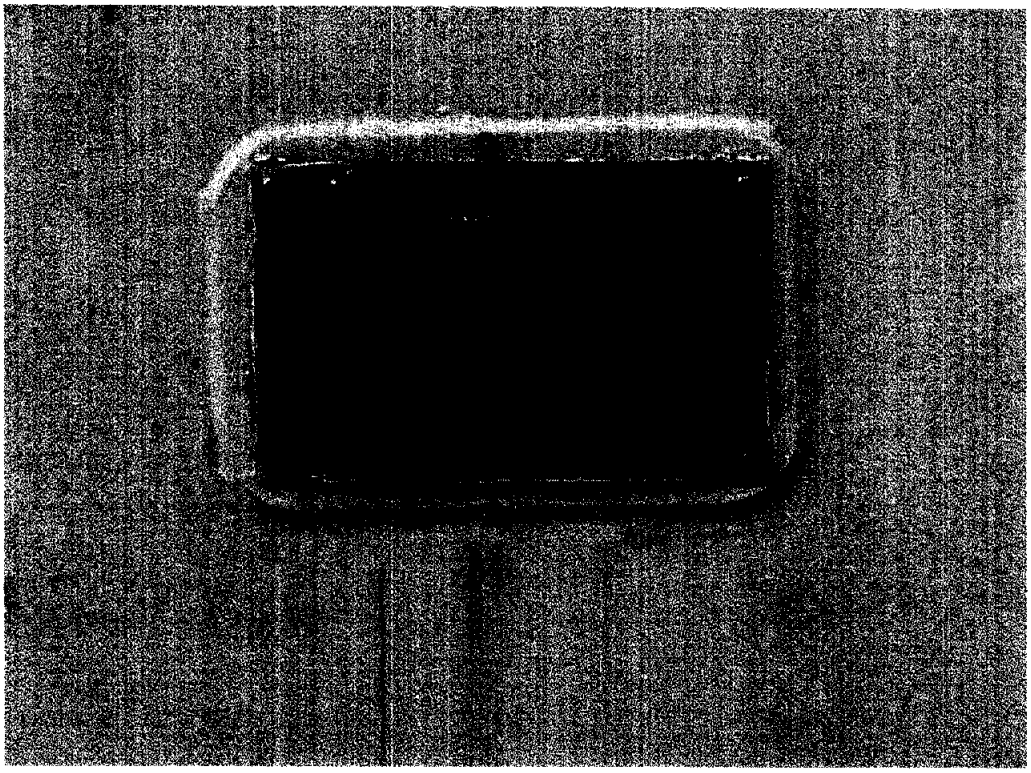
Alarm
Telemetry X
Elapsed Time Meter
Auto Dialer Radio

Site:

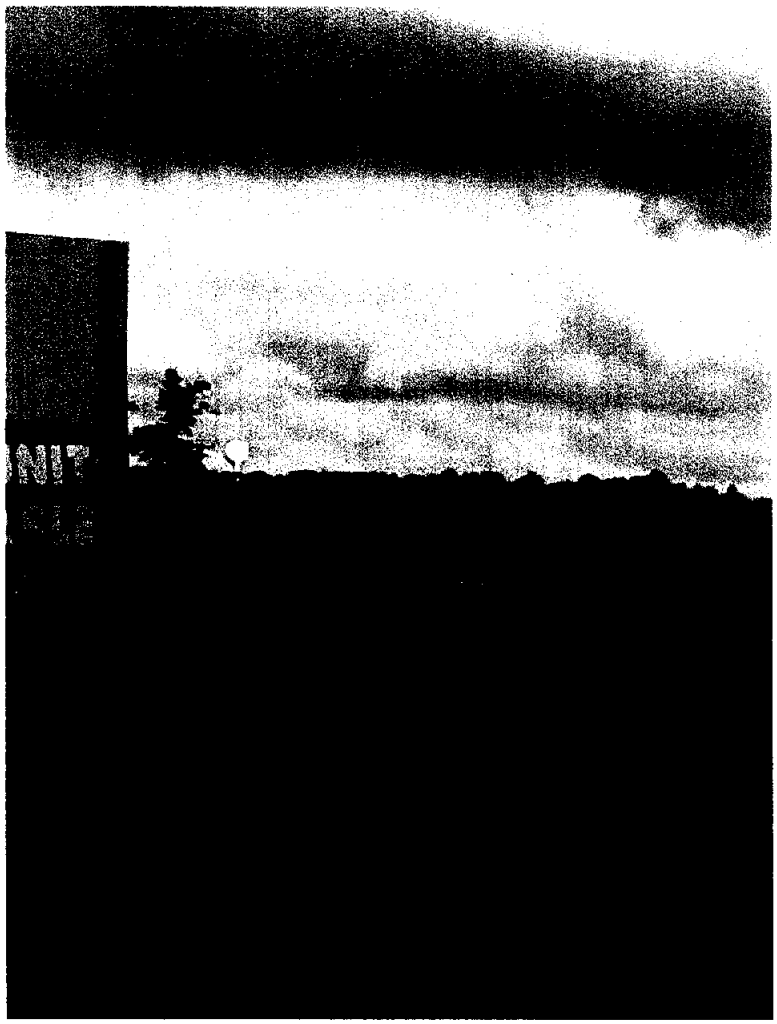
Fence X
Maintenance Assistance
Access
Lighting X

Comments:

Condition Tank painted in 1994.
Other General Comments/Problems Well re-worked and new pump installed in 2000.

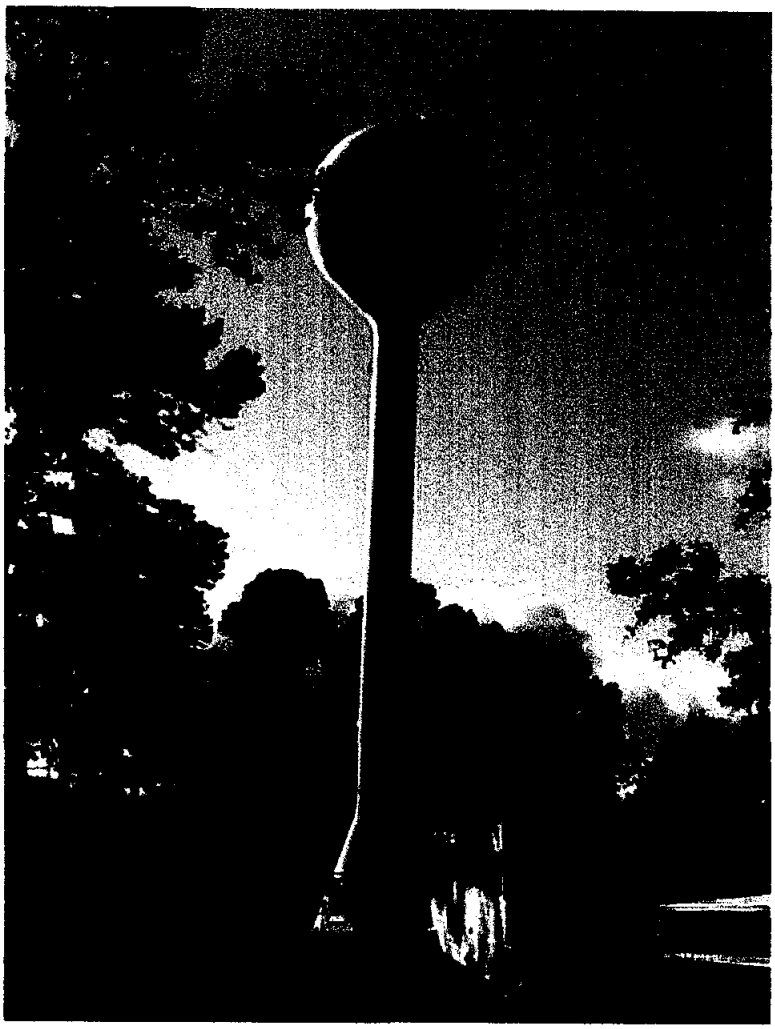


Plant #3
Elevated Storage Tank Plate

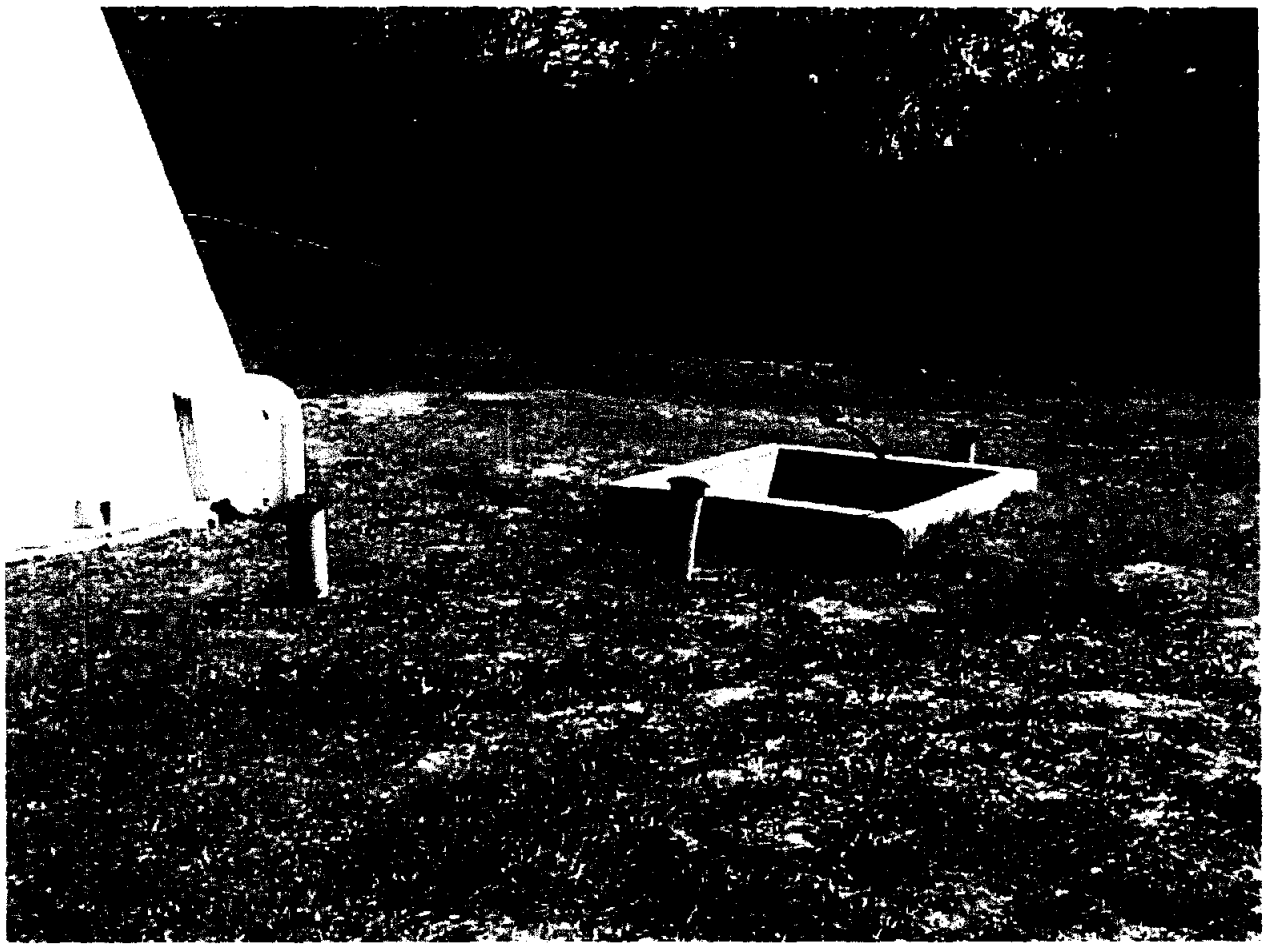


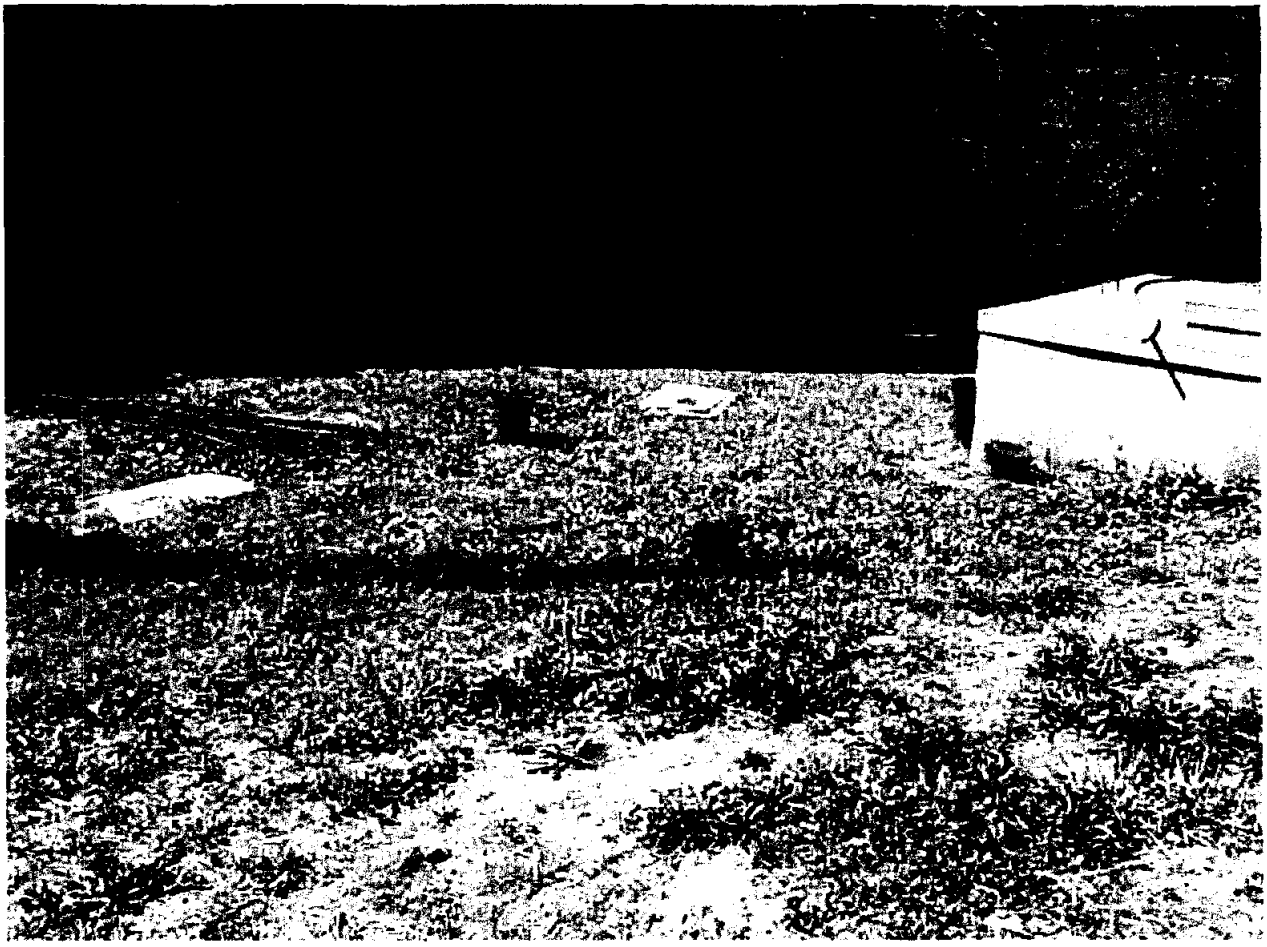
Plant #3
Horizon

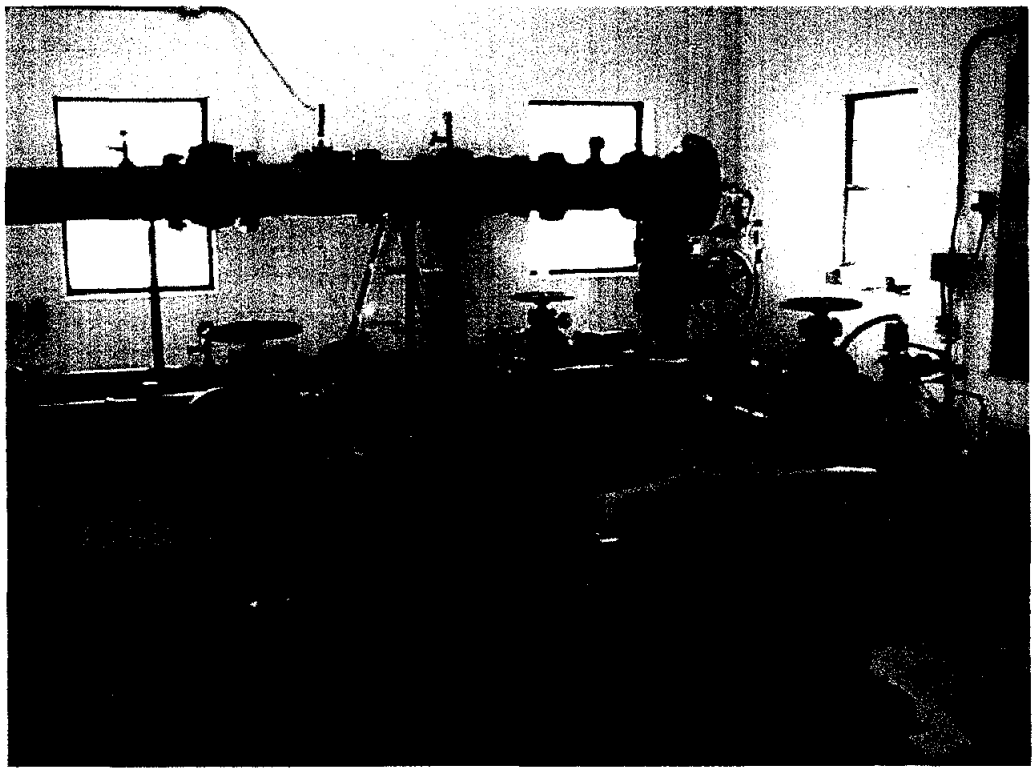
Plant #3
Layout



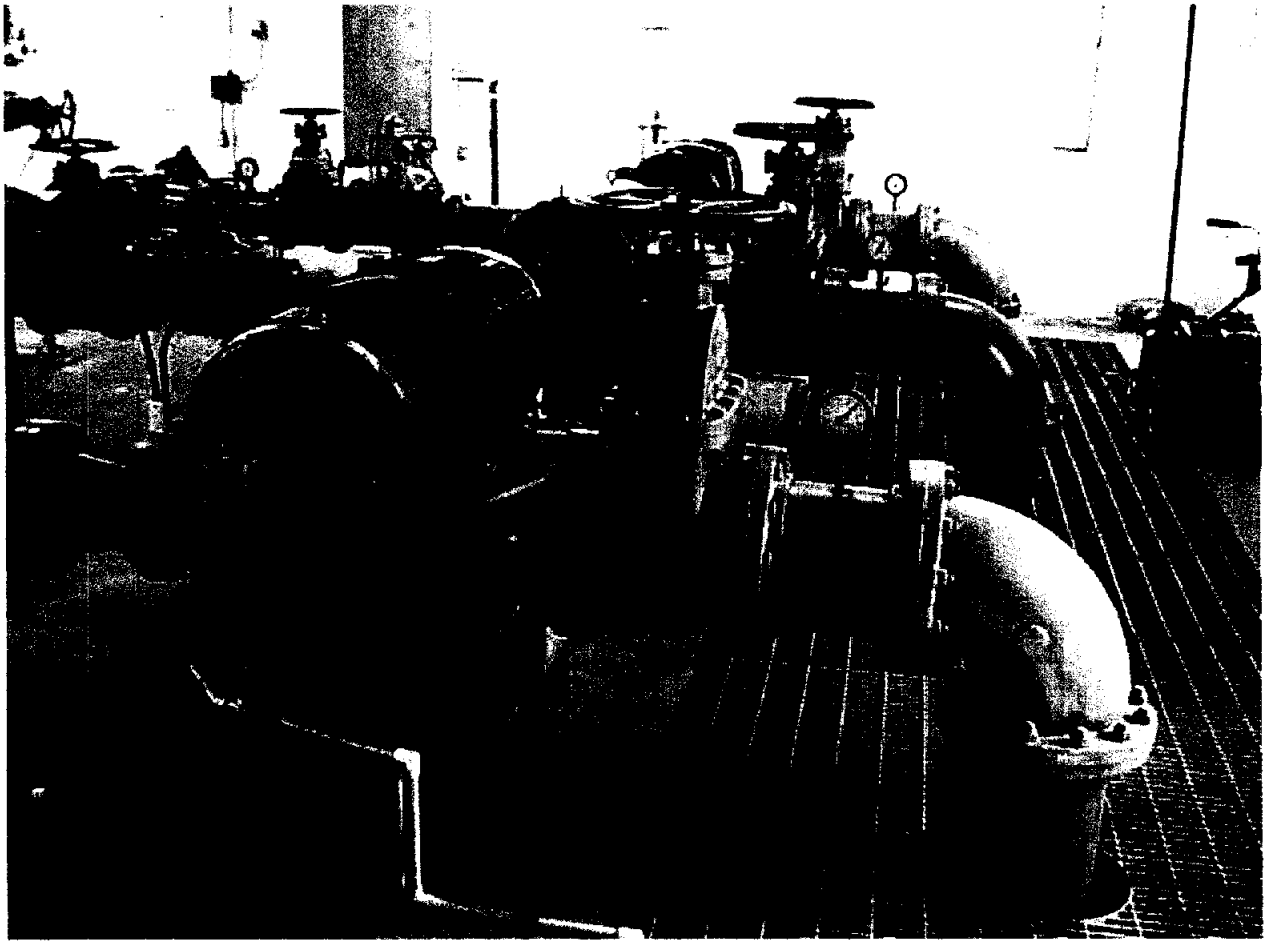
Plant #3
Elevated Storage Tank – Jim Russell Rd.

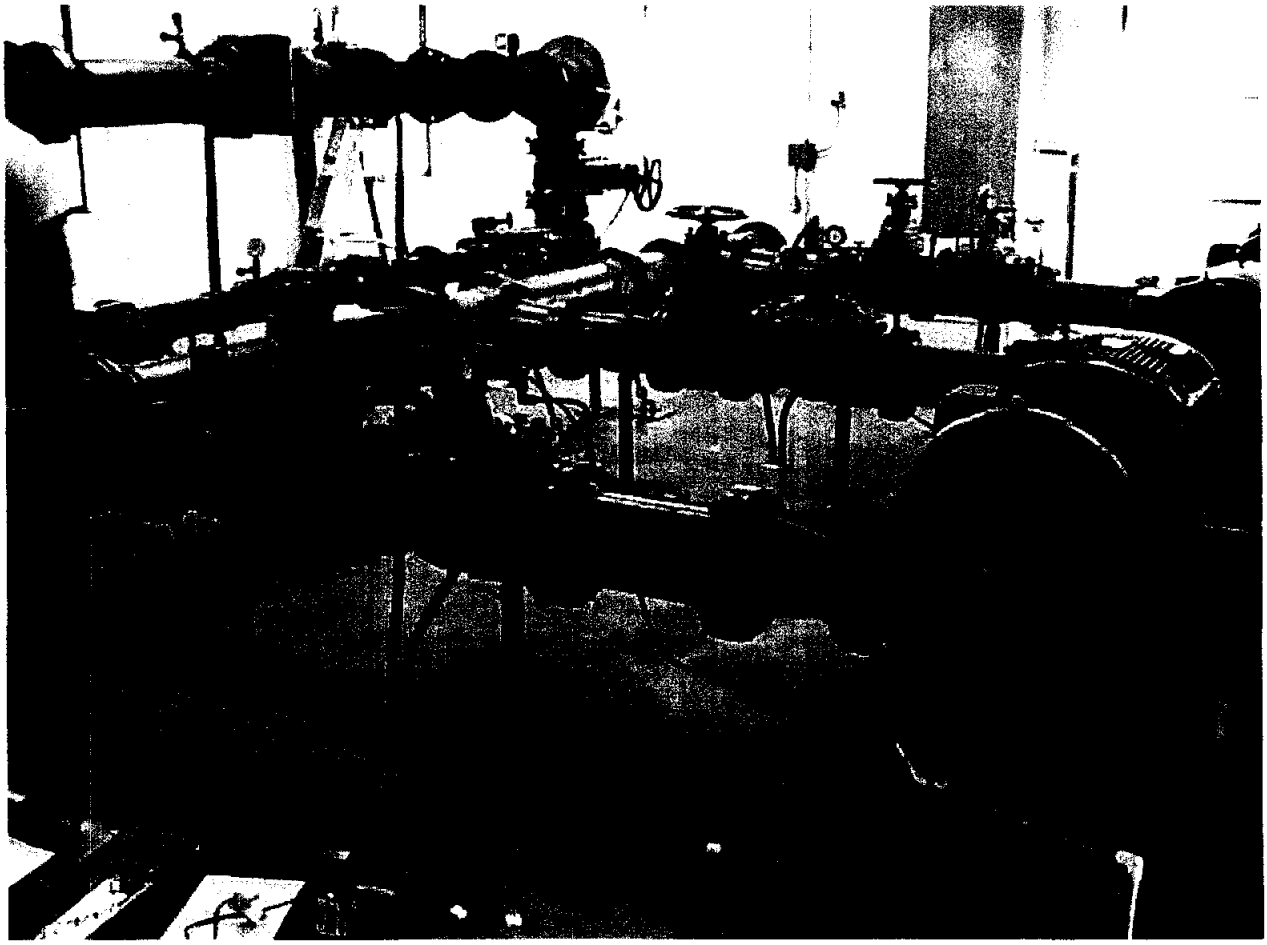


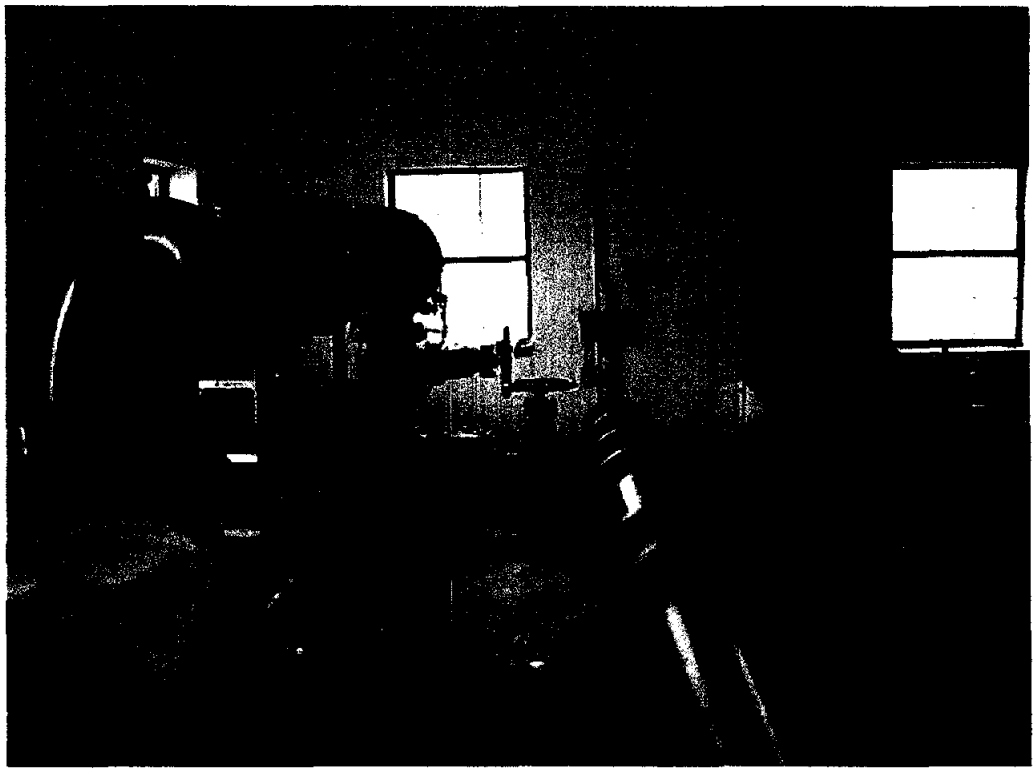




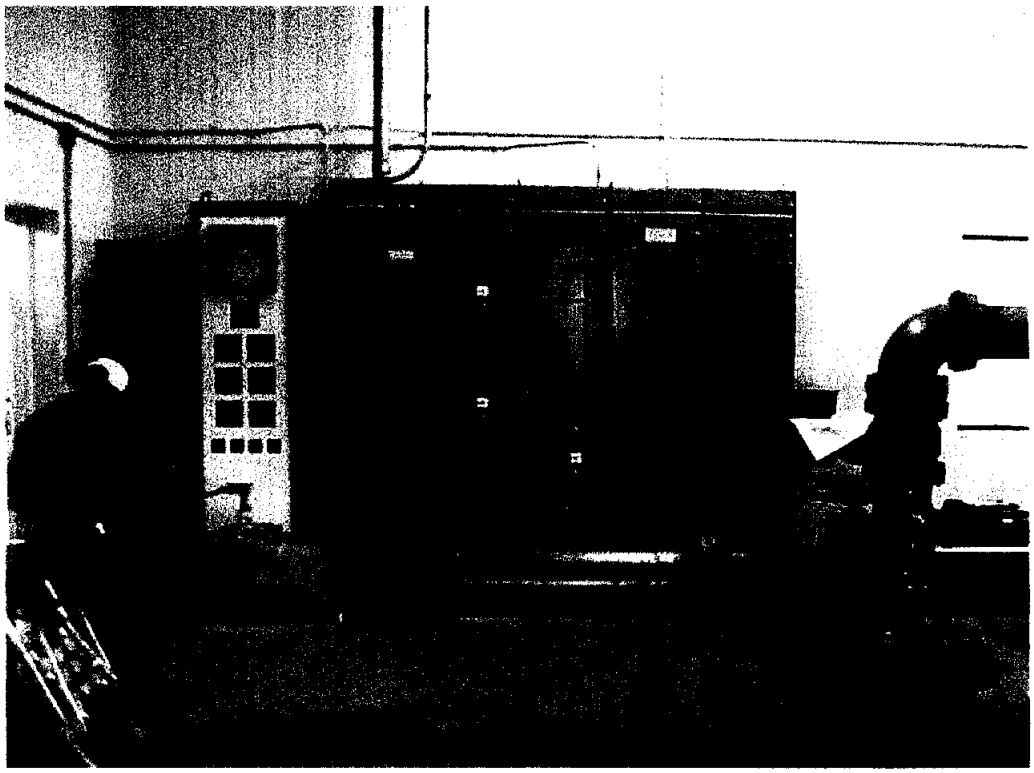
High Service Pump Building



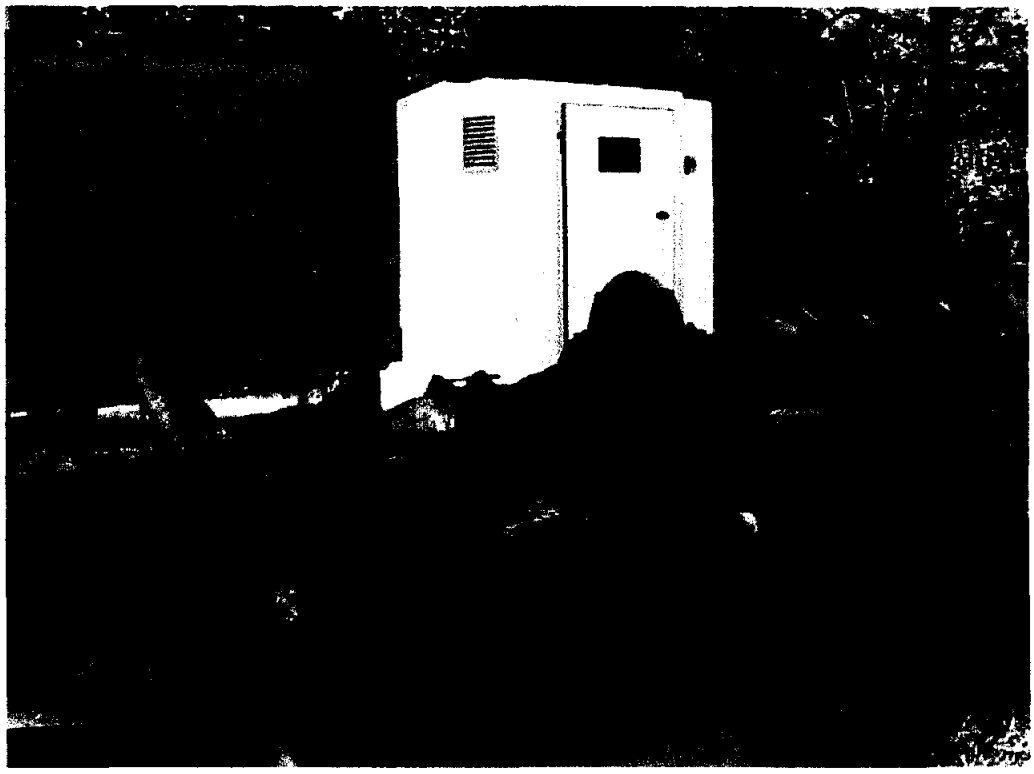




14" Supply Line from Tyler (left)
and
10" Pump Discharge Line (Right)



Motor Control Center



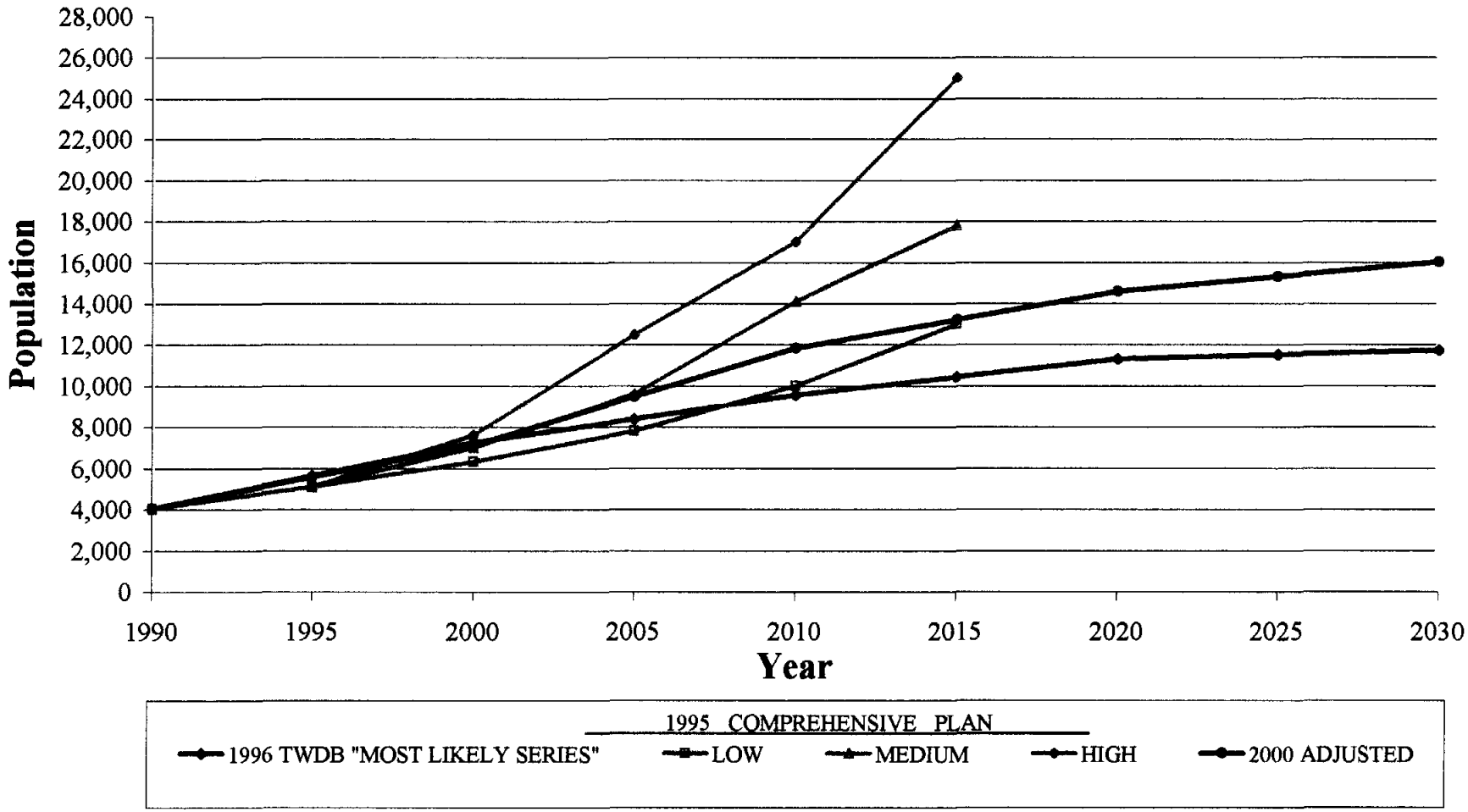
Well #3

EXHIBIT 7

CITY OF WHITEHOUSE: POPULATION PROJECTIONS

YEAR	1996 TWDB	1995 COMPREHENSIVE PLAN			2000
	"MOST LIKELY SERIES"	LOW	MEDIUM	HIGH	ADJUSTED
1990	4,032	4,032	4,032	4,032	4,032
1995	5,631	5,100	5,100	5,100	5,574
2000	7,230	6,300	7,000	7,600	7,115
2005	8,383	7,800	9,600	12,500	9,466
2010	9,535	10,000	14,100	17,000	11,818
2015	10,412	13,000	17,800	25,000	13,195
2020	11,289				14,572
2025	11,507				15,289
2030	11,724				16,007
2040	11,806				17,089
2050	11,889				18,172

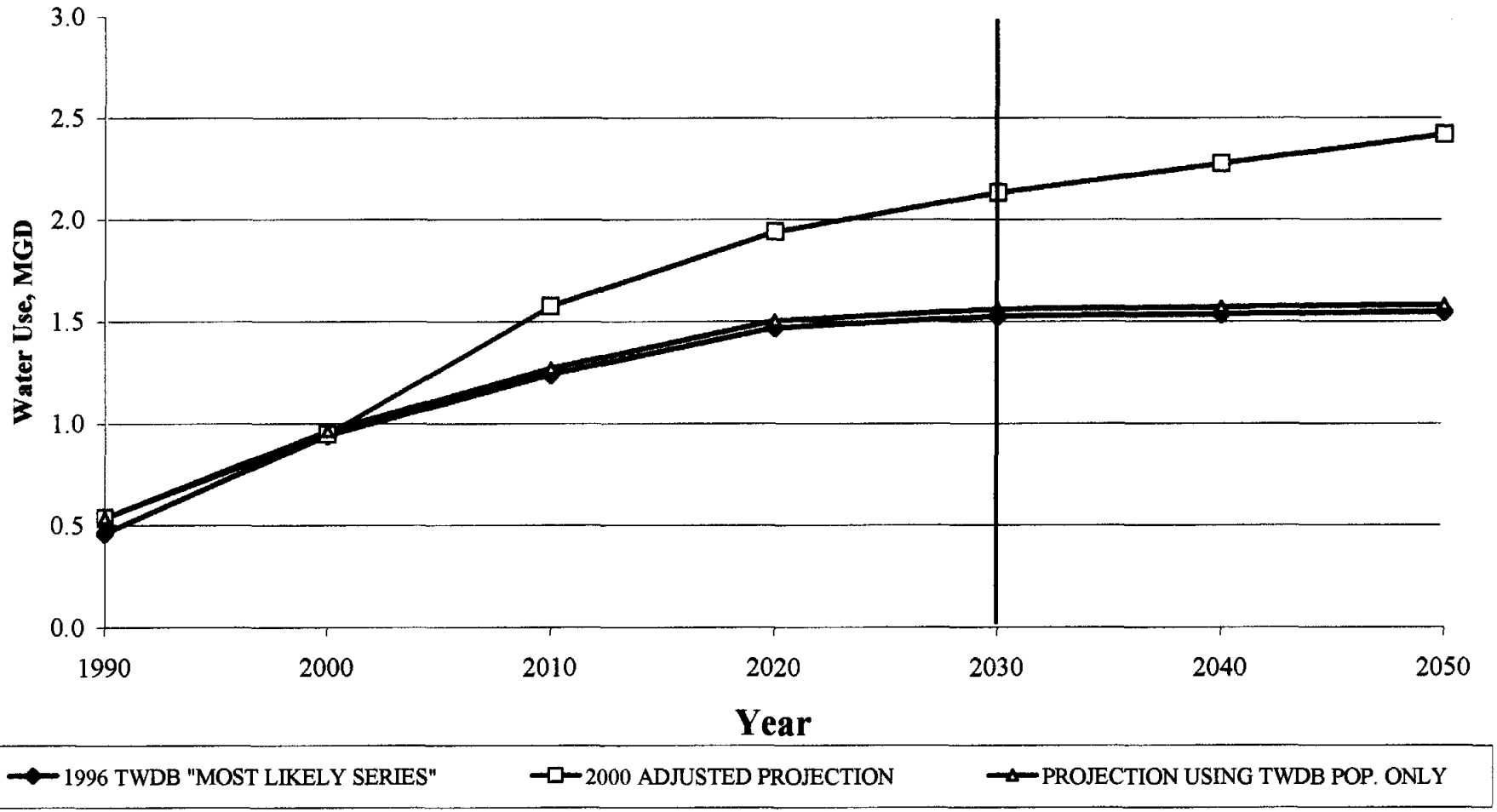
City of Whitehouse
Population Projections
Exhibit 7



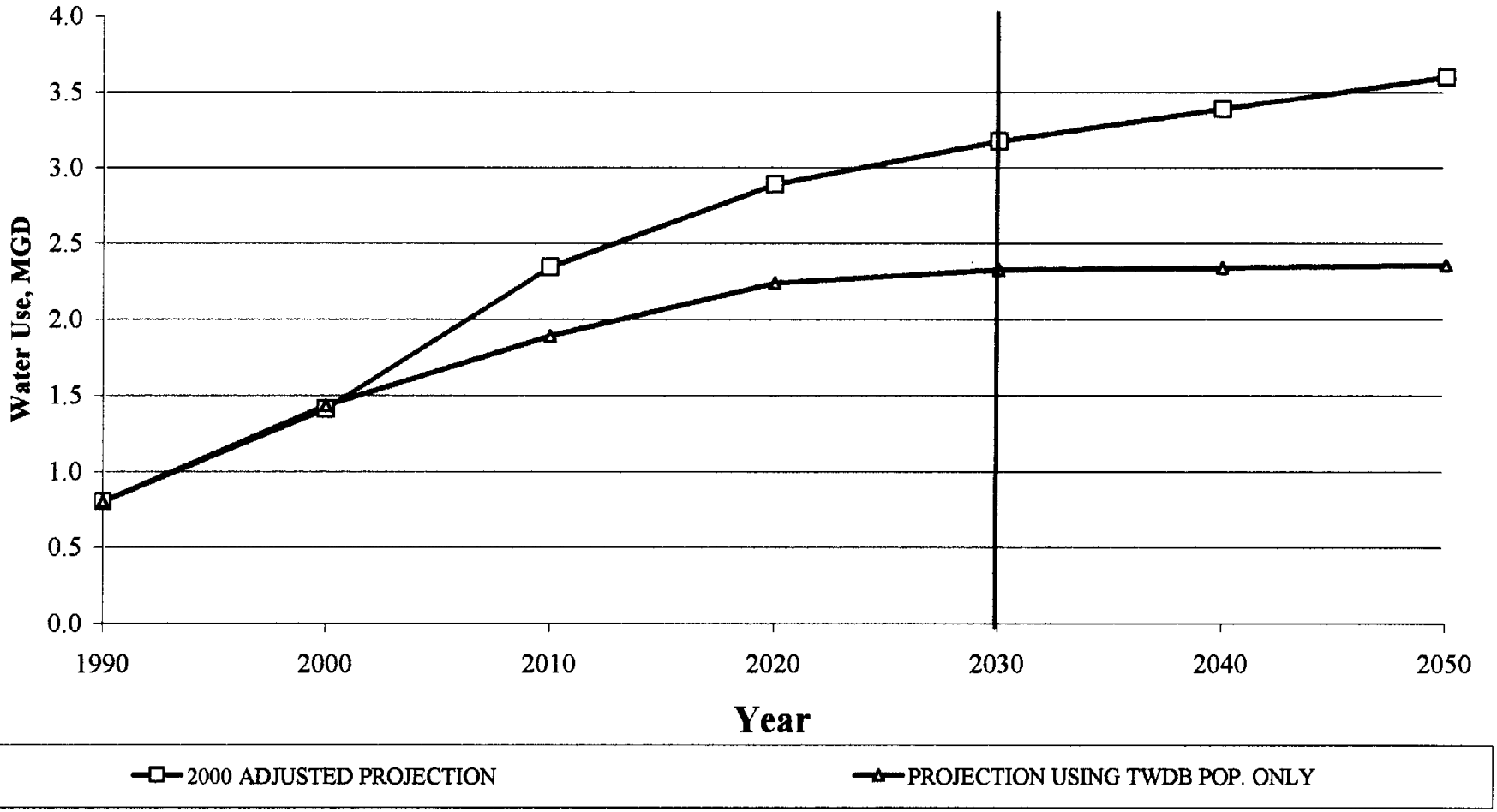
CITY OF WHITEHOUSE: WATER USE PROJECTIONS

YEAR	1996 TWDB "MOST LIKELY SERIES"		2000 ADJUSTED PROJECTION				PROJECTION USING TWDB POP. ONLY			
	ANN. AVG. (AC-FT)	ANN. AVG. (MGD)	ADJUSTED POPULATION	ANN. AVG (MGD)	MAX. MONTH (MGD)	MAX. DAY (MGD)	TWDB 1996 POP. PROJ.	ANN. AVG (MGD)	MAX. MONTH (MGD)	MAX. DAY (MGD)
1990	516	0.46	4,032	0.54	0.80	1.29	4,032	0.54	0.80	1.29
2000	1,053	0.94	7,115	0.95	1.41	2.28	7,230	0.96	1.43	2.32
2010	1,388	1.24	11,818	1.57	2.34	3.79	9,535	1.27	1.89	3.06
2020	1,644	1.47	14,572	1.94	2.89	4.68	11,289	1.50	2.24	3.62
2030	1,707	1.52	16,007	2.13	3.17	5.14	11,724	1.56	2.32	3.76
2040	1,719	1.53	17,089	2.27	3.38	5.49	11,806	1.57	2.34	3.79
2050	1,731	1.55	18,172	2.42	3.60	5.83	11,889	1.58	2.35	3.82

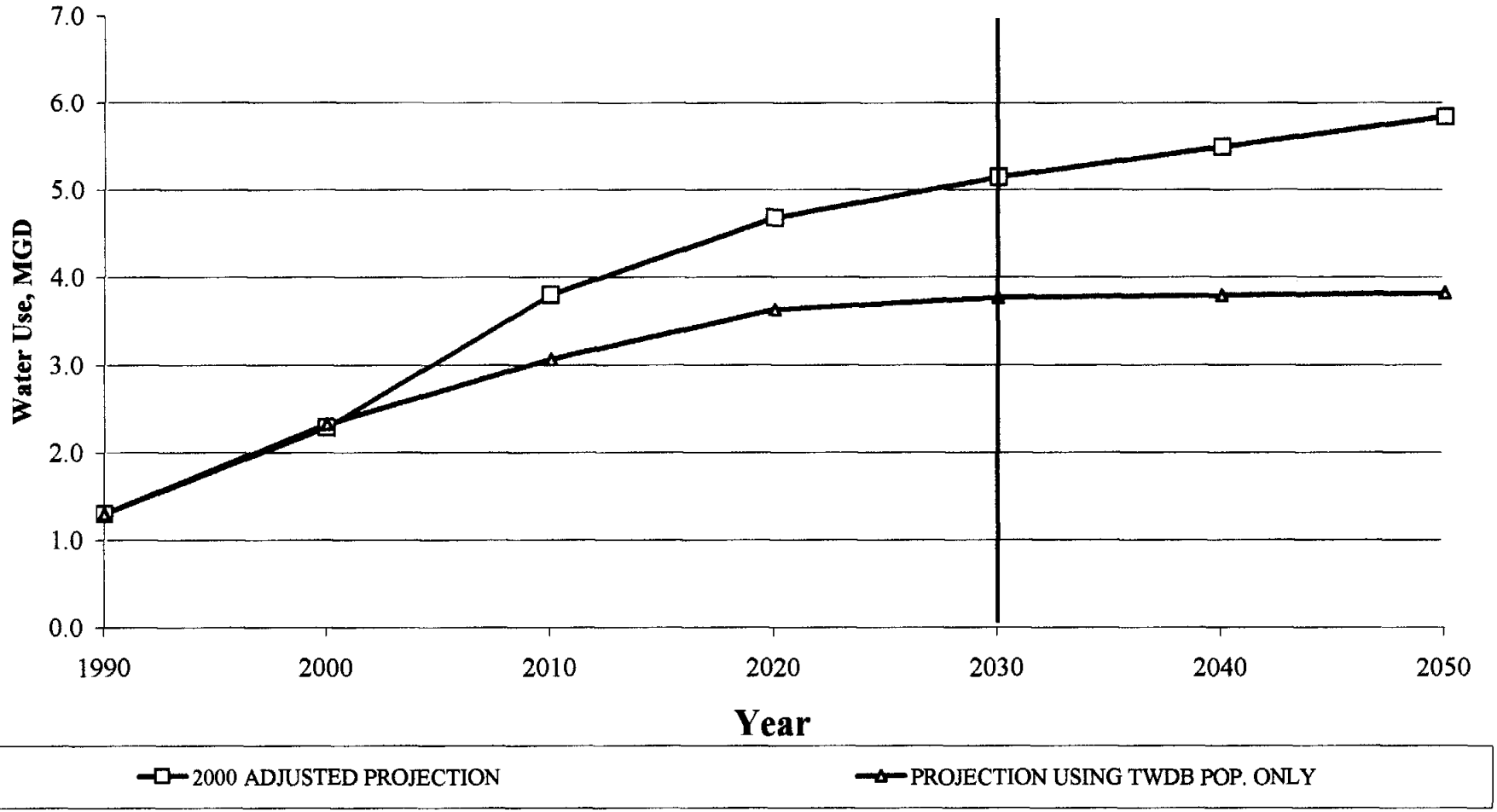
City of Whitehouse
Water Use Projections
Annual Average



City of Whitehouse
Water Use Projections
Maximum Month Average



City of Whitehouse
Water Use Projections
Maximum Day Average



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CITY OF TYLER

WHITEHOUSE WATER SALE CONTRACT

INDEX

CITY OF TYLER

WATER SUPPLY CONTRACT

THE STATE OF TEXAS §
KNOW ALL MEN BY THESE PRESENTS:
COUNTY OF SMITH §

THAT THE CITY OF TYLER, hereafter known as "Tyler" and the CITY OF WHITEHOUSE, hereafter known as "Whitehouse" have today September 3, 1985, entered into this contract for the sale and purchase of treated water. This contract sets out the terms and conditions under which Tyler would deliver treated water to a storage tank to be provided by Whitehouse from which water would be repumped by Whitehouse into the Whitehoue distribution system.

I. PURPOSE AND CONTEMPLATED FACILITIES

1.1. WATER FACILITIES PLAN. Whitehouse will pay for the construction of a fourteen (14) inch water main along State Highway 110 from Tyler's existing fourteen (14) inch water main near the Trane Plant southeast of Tyler to a storage tank near the northern city limits of Whitehouse. Treated water delivered through the pipeline would be metered before being discharged into the storage tank.

1.2. METERING FACILITIES. Whitehouse shall provide metering facilities capable of continuously recording and totalizing a discharge through a pipeline in order to identify each day's use. The metering facilities shall be installed, operated, and maintained by Whitehouse and approved by the City of Tyler. The City of Whitehouse shall pay for calibrating the metering facilities at least once a year by a calibrater acceptable to Tyler.

1.3. FOURTEEN (14") INCH PIPELINE. The fourteen (14) inch pipeline connecting the Whitehouse ground storage tank with the Tyler

distribution system is expected to be four (4) miles long. It shall be designed and constructed by firms acceptable to the City of Tyler. On completion, the pipeline shall be conveyed to Tyler. Tyler shall reimburse Whitehouse for the difference in cost between the fourteen inch pipeline and a ten inch pipeline. The extra capacity in the fourteen inch line, above that of a ten inch pipeline will be available for potential future customers of Tyler. The reimbursement of the difference in cost between a fourteen inch and ten inch line shall be paid by Tyler to Whitehouse in annual installments of $27,000 over twenty (20) years.

II. RATE BASE

2.1. COST. The cost to be recovered by Tyler in the sale of water shall be a proportionate cost of developing, operating, maintaining, and perpetuating the applicable portions of Tyler's water system. This includes generally the costs that are common to all customers, such as costs to water supply reservoirs, raw water pump stations, raw water transmission lines, water treatment plants, wells, booster pumping station, and storage tanks, but is limited to the costs of services and facilities allocated to base and extra capacity maximum day costs components. In addition, separate costs are allocated for the equivalent of a ten inch water treated transmission line from the Golden Road Water Treatment Plant to the beginning of the proposed new fourteen inch pipeline at State Highway 110 near the Trane Plant. There is also a payment made to the Tyler General Fund in lieu of a franchise tax of two percent (2%) of the revenue from the sale of water.

The base and extra capacity maximum day costs components used in this contract have been developed through a rate study using the utility method. Elements of these two cost components

include return on the rate base, depreciation, and operation and maintenance. The rate base has been developed using original costs of facilities, less depreciation, plus one-eighth (1/8) of applicable annual operation and maintenance expenses.

2.2. RATE OF RETURN. The rate of return is 13.13% which is the weighted average of the embedded interest rate of 8.107% on debt capital and 17.0% on equity capital. A tabulation of rate base value to cost components is shown in attachment "A".

2.3 INITIAL RATE. The initial annual rate to Whitehouse in 1985 will consist of the following components:

1. The combined unit rate, which consists of depreciation, operation and maintenance, and return on investment will be 0.65621 of a dollar per one thousand gallons;

2. The annual costs for the equivalent of a ten inch transmission line less the reimbursement by Tyler on the new fourteen inch main would be a net annual cost of $21,700.00 which will be constant for twenty years regardless of the amount of use; and

3. A payment in lieu of franchise tax in the amount of 2%. The annual costs for 1985 can be expressed by the formula:

$$\text{Annual Cost 1985} = \left[\left(\text{Gallons used} \times \frac{\$0.65621}{1{,}000 \text{ gallons}}\right) + 21{,}700\right] \times 1.02.$$

To this annual cost would be added any surcharges for excessive use.

2.4. FUTURE ADJUSTMENT TO UNIT COST. The parties intend that Whitehouse will share with Tyler increases in revenue requirements which are applicable to the Tyler system. Such increases may be caused by general cost escalation as well as additional expenses incurred for construction of major capital improvements needed to expand and update

the water system. A major element of these planned improvements is the Lake Palestine Water Treatment Plant and related transmission lines.

As a provision for future changes in revenue requirements, the unit charge for depreciation, operation, maintenance and return for water sold to Whitehouse shall be adjusted each year by the same percentage as that by which Tyler's overall water rates are changed and shall become effective on the same date at which changes in rates are applied to retail customers of the City of Tyler. The formula for water charges for subsequent years is:

$$\text{Annual Cost} = \left[\left(\text{gallons used} \times \frac{\text{Previous Year's Unit Charge}}{1{,}000 \text{ gallons}}\right) \times (\text{Adjustment Factor}) + \$21{,}700\right] \times 1.02.$$

2.5. FIVE YEAR RECALCULATION OF UNIT CHARGE FOR WATER. On the fifth anniversary of this contract and every five years thereafter, Tyler or Whitehouse may request a recalculation of the unit charge for water, taking into consideration the then applicable facilities and services costs. The costs for such recalculation shall be shared equally between Tyler and Whitehouse.

2.6. VOLUME AND DEMAND. The parties have assumed that Whitehouse intends to use the treated water supply from Tyler as its primary source of supply and that its existing well supply will be used to help meet peak hour demands and above average daily demands, so long as this use of well water is economically feasible. The parties estimated that approximately twenty percent of the annual supply for Whitehouse would come from wells.

In order for Tyler to continue to serve its customers adequately and facilitate the implementation of future water system improvements in a timely and economical manner, Tyler must know the peak

demand and the average demand that will placed upon its facilities throughout each year by the terms of this contract. The parties have therefore established a minimum take or pay volume of water per year; a minimum take or pay volume for each month; a surcharge applied to water taken above a maximum day volume.

2.7. MINIMUM ANNUAL TAKE OR PAY VOLUME. A minimum annual take or pay volume shall be established on or before January 15th of each year. The volume will be eighty percent of the highest total annual use, including well water, experienced by Whitehouse in the immediately proceeding five years.

2.8. MINIMUM TAKE OR PAY VOLUME MONTHLY. A minimum take or pay volume for each month will be five percent of the annual take or pay volume calculated in accordance with Paragraph 2.7 above.

2.9. MAXIMUM DAY VOLUME. A maximum day volume, up to 2.66 x the average daily take or pay volume calculated in accordance with Paragraph 2.7 above may be used without surcharge.

2.10. SURCHARGE FOR USE IN EXCESS OF MAXIMUM DAY RATE. If the maximum daily rate is exceeded, the water rate for the next twelve months will be increased by $0.0015 per one thousand gallons for each percent the allowable maximum daily rate was exceeded. When this occurs, the experienced maximum day rate will become the allowable maximum daily rate without penalty for the next twelve months unless a greater rate is allowed by Paragraph 2.7 above. For example:

Take or pay @ 80% of the previous max. year = 0.4 MGD

Allowable max. day @ 2.66 factor = 1.064 MGD

Peak day use = 1.25 MGD

% Allowable max. was exceeded = $\frac{1.25}{1.064} - 1 = 17.5\%$

Penalty = 17.5 x $0.0015 = $ 0/02625/1,000 gal.

If use for next 12 months averaged
0.4 MGD, penalty = $0.02625 x 146,000 = $3,832.50/yr.

III. GENERAL CONDITIONS

3.1. QUANTITY. During the first year of this contract, 1985, Tyler will make available for use 146 million gallons of treated water, adjusted to account for the first year fractional term.

3.2. TERM. The primary term of this agreement is twenty (20) years from the date of execution.

3.3. QUALITY. Quality of water delivered to Whitehouse shall be of the same quality supplied to customers of the City of Tyler from the Golden Road Water Treatment Plant.

3.4. FISCAL PERIODS, PRICE AND TERM. For the purpose of billing and accounting for water delivered hereunder, the billing month as used in this agreement shall begin at 9:00 a.m. on the first day of each calendar month and shall end at 9:00 a.m. on the first day of the succeeding calendar month. The fiscal year shall be the calendar year. The remainder of the first calendar year shall constitute a fractional calendar year. The base rate for each calendar year shall be calculated during the first week of January on that year. The rates are subject to change during the year, changes becoming effective on the same date at which changes of rates are applied to retail customers of the City of Tyler.

3.5 METER READING. The meter shall be read at least once a month and the Whitehouse Water Department will be notified of the meter reading prior to the time that it is read. Tyler shall bill Whitehouse monthly for water delivered during the proceeding billing month, which bill shall disclose the quantity of water delivered during such month and the amount charged to Whitehouse for such service. The bills shall

be delivered to Whitehouse within five (5) days after the end of the billing period and each bill shall be paid by Whitehouse on or before the fifteenth (15th) day of the calendar month in which the bill is received at the office of the City of Whitehouse. In the event that Whitehouse shall fail to make payment within the time specified in this subsection, interest on the bill shall accrue at the rate of 18% per annum from the date that such payment becomes due until paid in full with interest as specified. In the event such payment is not made within sixty (60) days from the date that such payment becomes due, Tyler may at its option, discontinue the delivery of water to Whitehouse until the amount then due Tyler is paid in full with interest, provided that such service shall not be discontinued until after thirty (30) days written notice to Whitehouse. On receipt of a notice that service will be discontinued, Whitehouse may request a public hearing to show cause why service shall not be discontinued. The request shall be made no later than five (5) days after issuance of the notice. The hearing shall be scheduled no earlier than five (5) days nor later than ten (10) after receipt by the City of Tyler of the request.

3.6. ACQUISITION OF FACILITIES. This contract requires construction of fourteen (14) inch water line from the City of Tyler line at the Trane Corporation Plant to the site for the Whitehouse storage tank. This line shall be constructed by Whitehouse in accordance with plans and specifications approved by Tyler. Tyler shall have the right to inspect construction while construction is in progress and final approval of the line shall depend on acceptance by Tyler. On completion of an acceptance of the line, Whitehouse will convey title to the line and right of way for maintenance of the line to Tyler. Tyler shall reimburse Whitehouse for the difference in cost between a ten (10)

inch line and a fourteen (14) inch line and have the right to use the capacity of the line exceeding ten (10) inches for service of Tyler customers.

3.7. FORCE MAJEURE. If by reason of force majeure either party hereto is rendered unable wholly or in part to carry out its obligations under this agreement, other than the obligation of Whitehouse to make payment required under the terms hereof, then if such party give notice and full particulars of such force majeure in writing to the other party within a reasonable time after occurrence of the event or cause relied on, the obligation of the party filing such notice, so far as is affected by such force majeure, shall be suspended during the continuance of the inability then claimed, but for no longer period, and any such party shall endeavor to remove or overcome such inability with all reasonable dispatch. The term "force majeure" as employed herein shall mean acts of God, strikes, lockouts or other industrial disturbances, acts of public enemy, war, orders of any kind of the government of the United States or the State of Texas or any civil or military authority, insurrections, riots, epidemics, landslides, lightning, earthquakes, fires, hurricanes, storms, floods, washouts, drought, restraints of government and people, civil disturbances, explosions, breakage or accidents to machinery, pipelines or canals, partial or entire failure of water supply, and inability on part of Tyler to deliver water hereunder, or of Whitehouse to receive water hereunder, on account of any other causes not reasonably within the control of the party claiming such inability.

3.8. NOTICES AND COMMUNICATIONS. All notices or communications provided herein shall be in writing and shall be either

delivered to the City Hall, the office of the City Manager of Tyler or the City Hall, office of City Secretary of the City of Whitehouse or if mailed shall be sent by certified mail, postage prepaid addressed to the City of Tyler, Texas, or to the City of Whitehouse, Texas.

3.9. INDUSTRIAL WATER SUPPLY USE. The purpose of this agreement is to supply water for normal domestic and commercial use within the City of Whitehouse. It is not the purpose and intent of this agreement to provide a supply of water for major new industrial development. Whitehouse agrees not to supply water in excess of 20,000 gallons per day to industrial users without the express written consent of the City Council of the City of Tyler.

IN WITNESS WHEREOF, the parties hereto, acting under authority of their respective governing bodies, have caused this agreement to be duly executed as of the day and year first written above.

ATTEST:

CITY SECRETARY

CITY OF TYLER, TEXAS

BY: MAYOR

APPROVED:

CITY MANAGER

APPROVED:

CITY ATTORNEY

ATTEST:

CITY SECRETARY

CITY OF WHITEHOUSE, TEXAS

BY: MAYOR

APPROVED:

ATTORNEY FOR CITY OF WHITEHOUSE, TEXAS

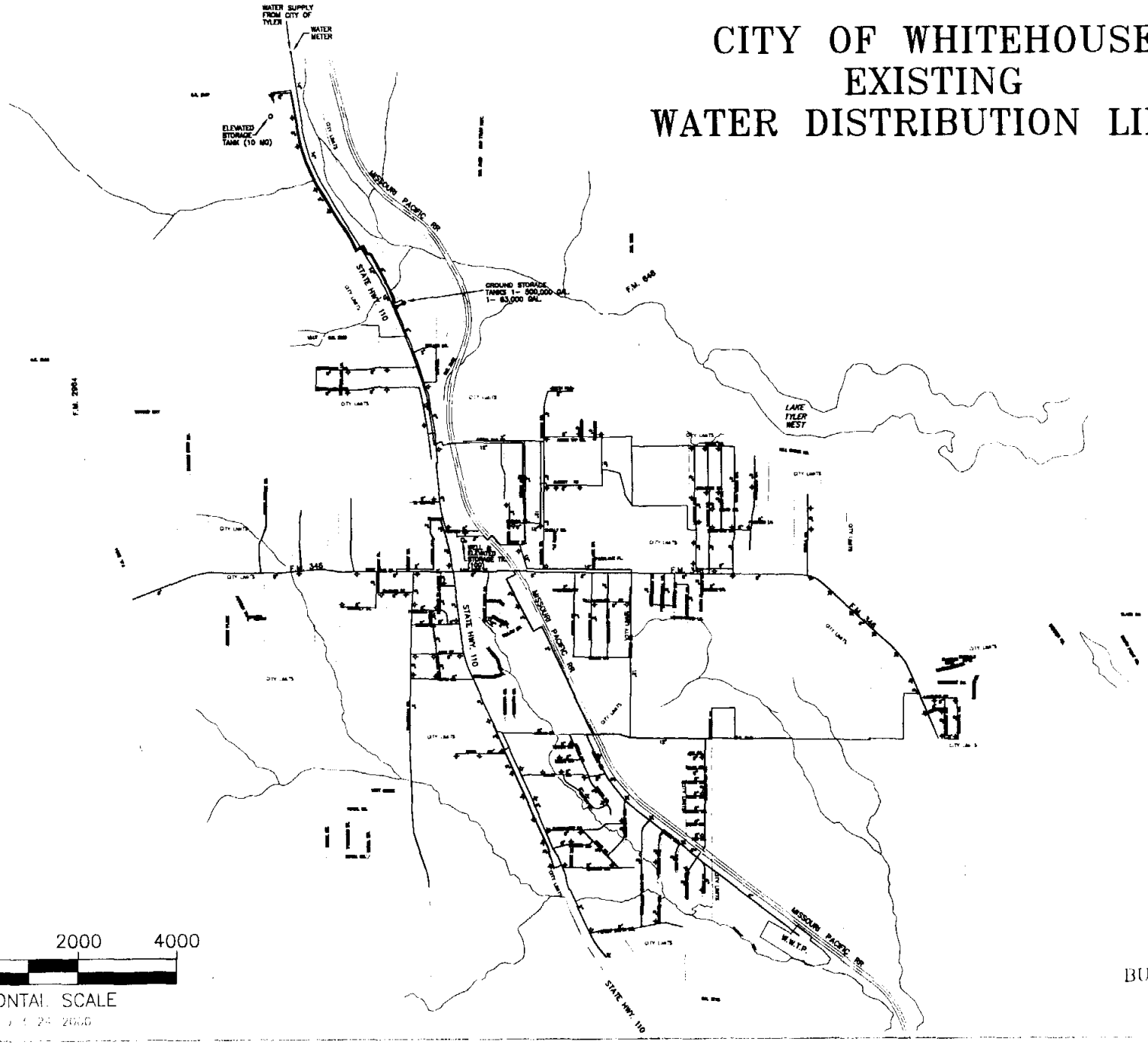
ATTACHMENT "A"

ALLOCATION OF RATE BASE VALUE
TO COST COMPONENTS
1985 STUDY YEAR

Item	Total Value $	Base $	Extra Capacity: Maximum Day $	Extra Capacity: Maximum Hour $	Customer $	Other $
Applicable Plant Value:						
Source of Supply Lake Tyler	1,221,883	1,221,883	-	-	-	-
Raw Water Pump Station	39,932	18,369	21,563	-	-	-
Raw Water Transmission Line	506,272	232,885	273,387	-	-	-
Water Treatment Plant	1,174,706	540,365	634,341	-	-	-
Distribution System						
Wells	144,364	66,407	77,957	-	-	-
Booster Pump Station	4,916	1,622	1,868	1,426	-	-
Storage	765,848	252,730	291,022	222,096	-	-
Subtotal Distrib. System	915,128	320,759	370,847	223,522	-	-
Subtotal Plant Value	3,857,921	2,334,261	1,300,138	223,522	-	-
Applicable Operation and Maintenance Expense:						
1/8 O & M	299,725	210,138	46,050	5,025	18,050	20,462
Total = Rate Base	4,157,646	2,544,399	1,346,188	288,547	18,050	20,462

EXHIBIT 9

CITY OF WHITEHOUSE
EXISTING
WATER DISTRIBUTION LINES



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HORIZONTAL SCALE

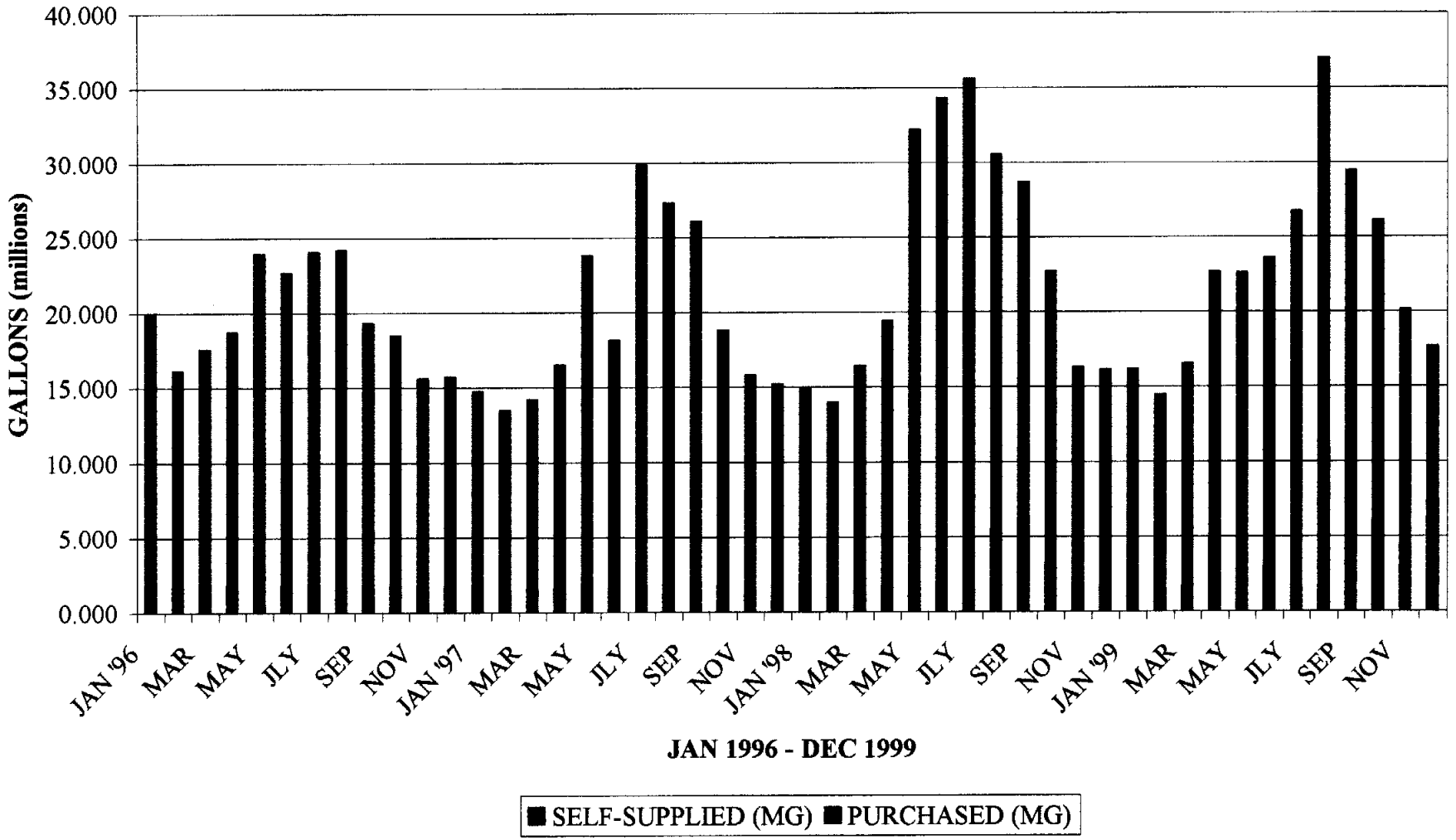
BURTON & ELLEDGE, INC.
Engineers and Civil Engineers
1121 ESE LOOP 323 SUITE 212
TYLER, TEXAS 75701
(903) 561-5465

EXHIBIT 10

CITY OF WHITEHOUSE: WATER PRODUCTION

DATE	SELF-SUPPLIED (MG)	PURCHASED (MG)	TOTAL PRODUCED (MG)
JAN '96	1.83	18.15	19.98
FEB	1.78	14.34	16.12
MAR	1.88	15.65	17.54
APR	1.81	16.87	18.67
MAY	0.56	23.37	23.94
JUN	1.88	20.77	22.65
JLY	1.81	22.21	24.02
AUG	1.85	22.32	24.17
SEP	1.81	17.46	19.27
OCT	1.85	16.63	18.47
NOV	1.75	13.85	15.60
DEC	1.81	13.89	15.70
YEARLY TOTALS	**20.62**	**215.50**	**236.12**
JAN '97	1.82	12.89	14.71
FEB	1.62	11.84	13.46
MAR (EST.)	1.80	14.00	15.80
APR	1.78	14.67	16.46
MAY	1.89	21.88	23.77
JUN	1.82	16.29	18.11
JLY	1.88	27.92	29.80
AUG	1.86	25.43	27.28
SEP	1.77	24.24	26.01
OCT	1.83	16.97	18.80
NOV	1.76	14.02	15.78
DEC	1.83	13.36	15.19
YEARLY TOTALS	**21.66**	**213.50**	**235.16**
JAN '98	1.86	12.97	14.83
FEB	1.65	12.30	13.95
MAR	1.86	14.53	16.39
APR	1.77	17.62	19.39
MAY	1.84	30.36	32.20
JUN	1.76	32.55	34.31
JLY	1.77	33.81	35.57
AUG	5.58	24.95	30.53
SEP	6.29	22.32	28.61
OCT	3.34	19.32	22.66
NOV	1.88	14.40	16.28
DEC	1.82	14.30	16.11
YEARLY TOTALS	**31.41**	**249.42**	**280.83**
JAN '99	1.89	14.28	16.17
FEB	1.58	12.86	14.43
MAR	1.76	14.76	16.52
APR	4.96	17.67	22.63
MAY	4.00	18.55	22.55
JUN	2.99	20.58	23.57
JLY	1.74	24.95	26.68
AUG	11.45	25.49	36.94
SEP	11.84	17.56	29.39
OCT	6.14	19.91	26.05
NOV	4.61	15.50	20.11
DEC	7.45	10.19	17.64
YEARLY TOTALS	**60.39**	**212.28**	**272.68**

CITY OF WHITEHOUSE
SELF-SUPPLIED + PURCHASED WATER PRODUCTION



CITY OF WHITEHOUSE: ESTIMATE OF WATER UNACCOUNTED FOR / WATER PRODUCTION AND SALES COMPARISON

DATE	TOTAL WATER PRODUCED (MGD)	TOTAL WATER SALES (MGD)	WATER UNACCOUNTED FOR (MGD)
JAN '96	19.98	10.67	9.31
FEB	16.12	10.07	6.05
MAR	17.54	13.15	4.39
APR	18.67	13.91	4.77
MAY	23.94	15.71	8.23
JUN	22.65	21.23	1.42
JLY	24.02	21.28	2.74
AUG	24.17	16.88	7.29
SEP	19.27	18.91	0.36
OCT	18.47	13.56	4.92
NOV	15.60	12.73	2.87
DEC	15.70	10.49	5.21
JAN '97	14.71	13.16	1.55
FEB	13.46	11.09	2.36
MAR	14.20	10.96	3.24
APR	16.46	14.30	2.16
MAY	23.77	14.54	9.22
JUN	18.11	16.86	1.24
JLY	29.80	29.00	0.80
AUG	27.28	27.00	0.28
SEP	26.01	26.00	0.01
OCT	18.80	14.94	3.86
NOV	15.78	12.66	3.12
DEC	15.19	13.21	1.99
JAN '98	14.83	12.08	2.75
FEB	13.95	12.00	1.95
MAR	16.39	11.54	4.84
APR	19.39	15.81	3.59
MAY	32.20	20.79	11.41
JUN	34.31	33.57	0.75
JLY	35.57	26.83	8.74
AUG	30.53	25.30	5.23
SEP	28.61	25.85	2.77
OCT	22.66	16.11	6.55
NOV	16.28	13.09	3.19
DEC	16.11	11.70	4.42
JAN '99	16.17	12.473	3.69
FEB	14.43	13.485	0.95
MAR	16.52	7.985	8.54
APR	22.63	15.004	7.63
MAY	22.55	15.835	6.72
TOTALS	**842.81**	**671.73**	**171.07**

CITY OF WHITEHOUSE
WATER PRODUCTION, WATER SALES

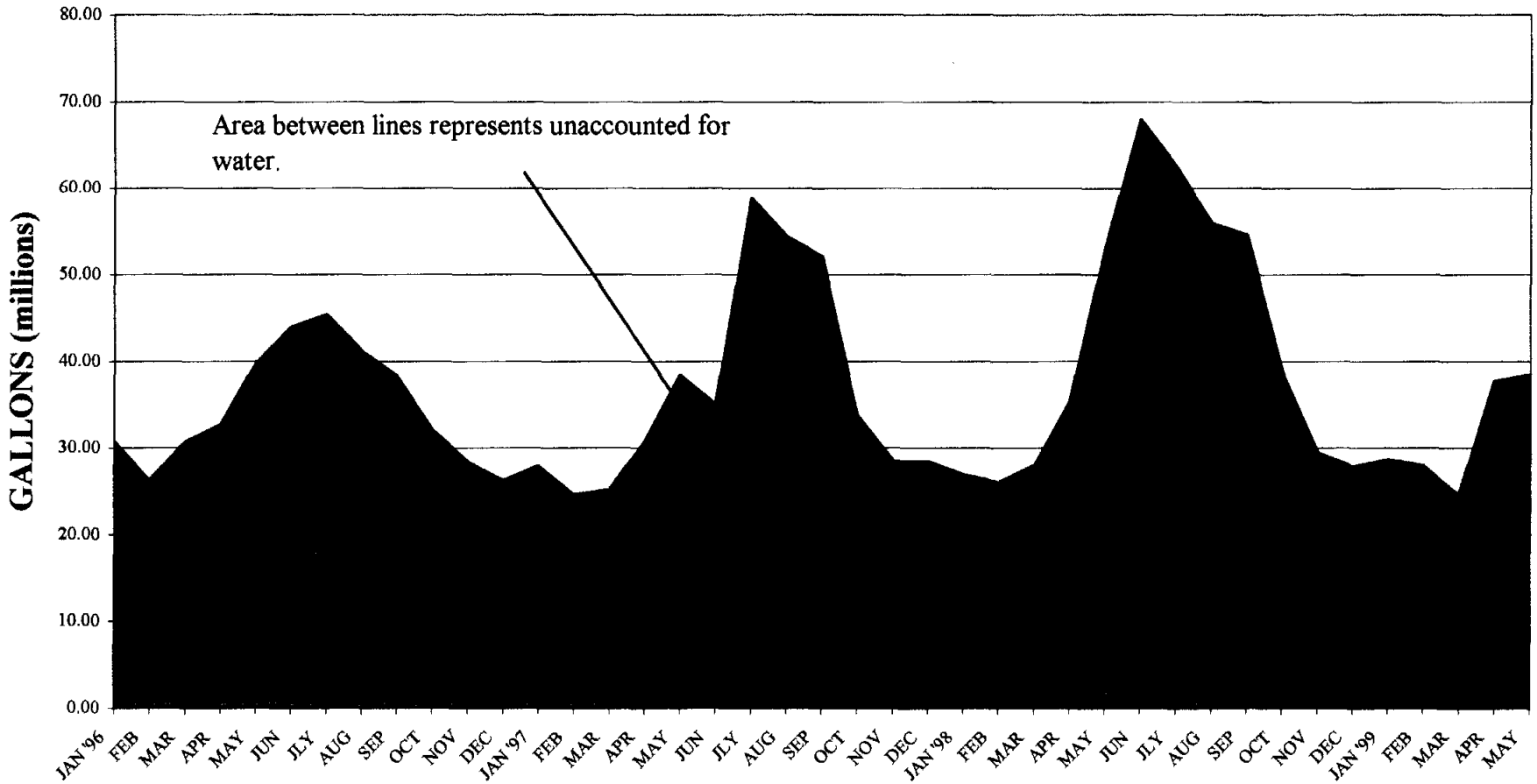
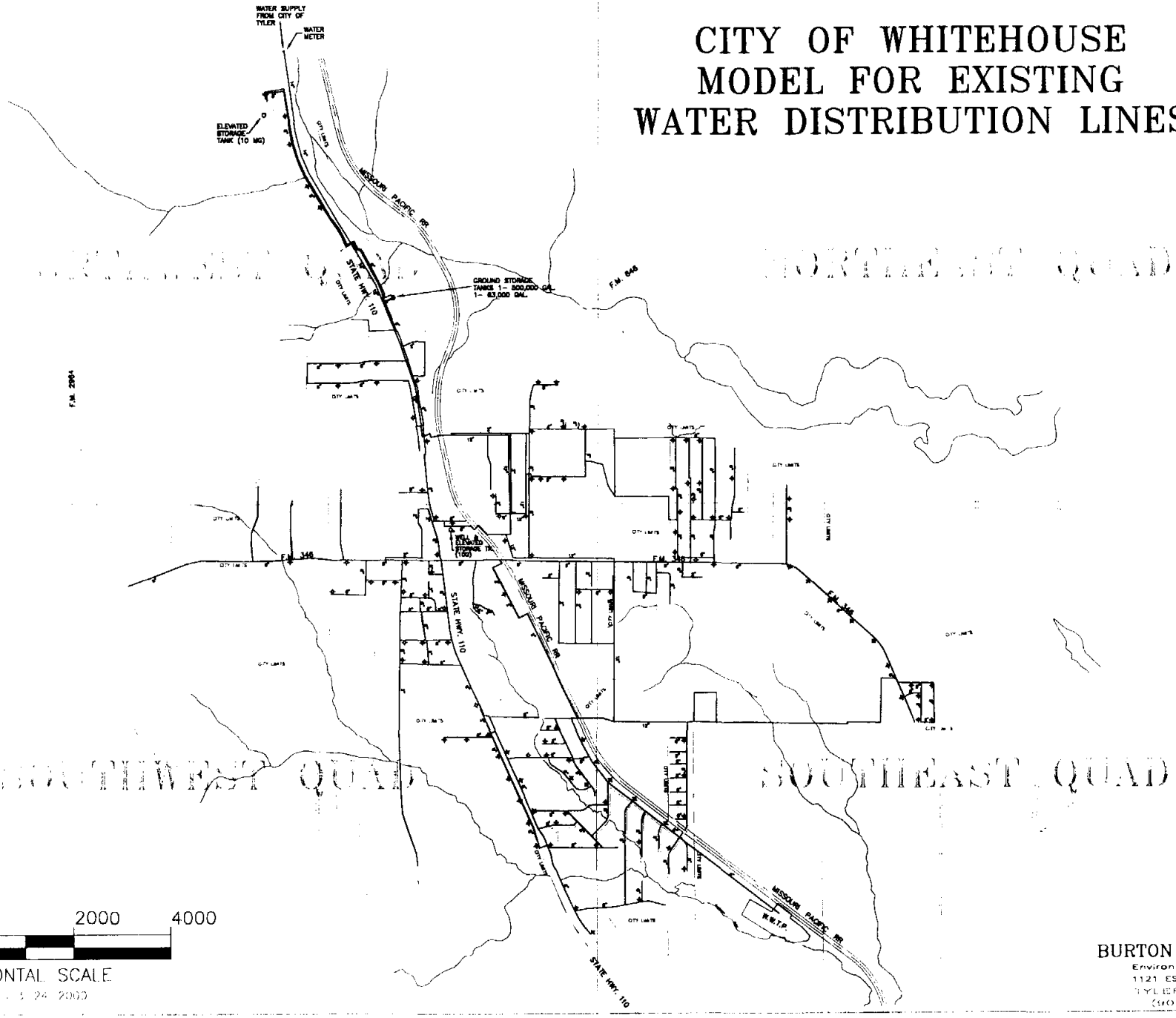


EXHIBIT 11

CITY OF WHITEHOUSE
MODEL FOR EXISTING
WATER DISTRIBUTION LINES



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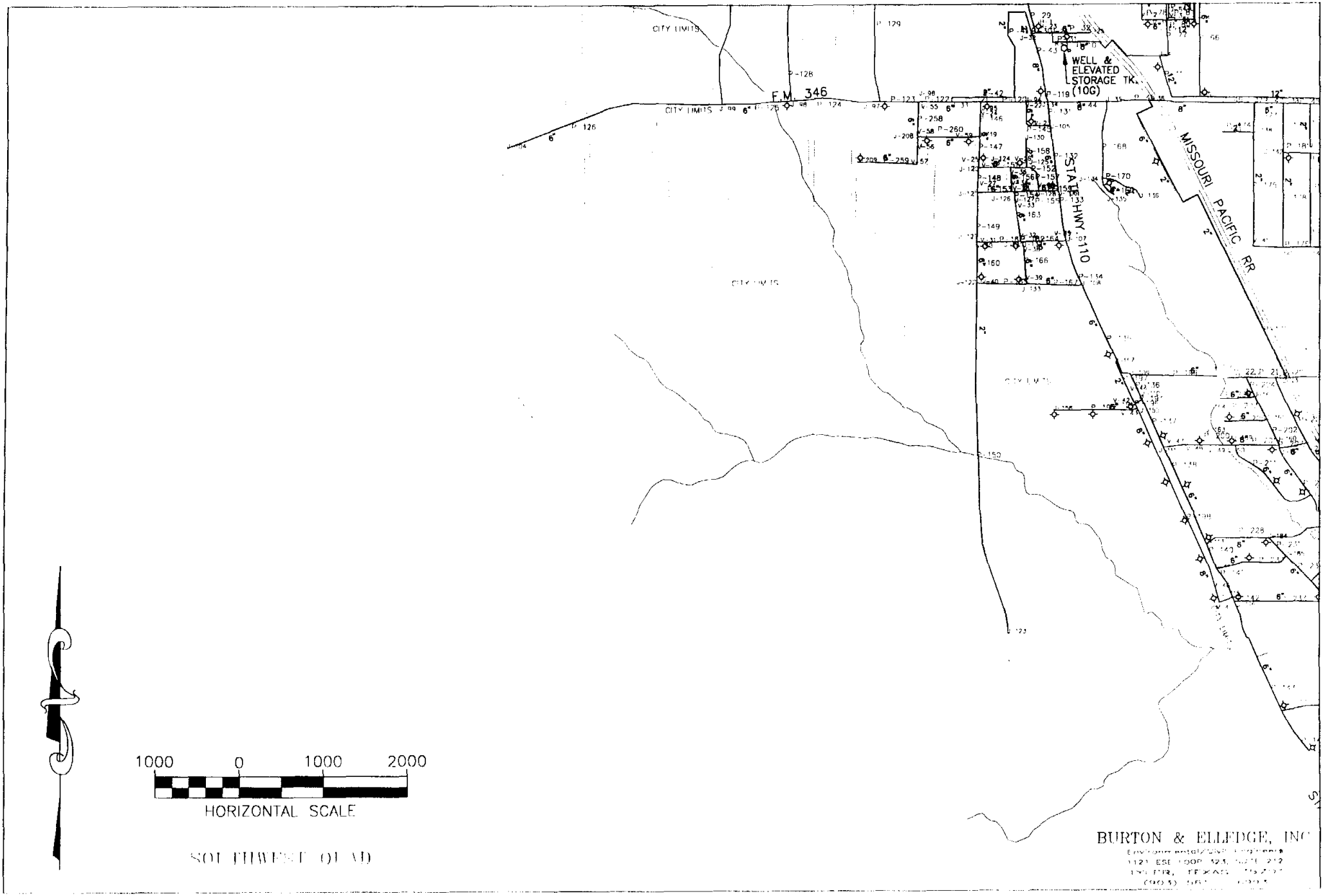
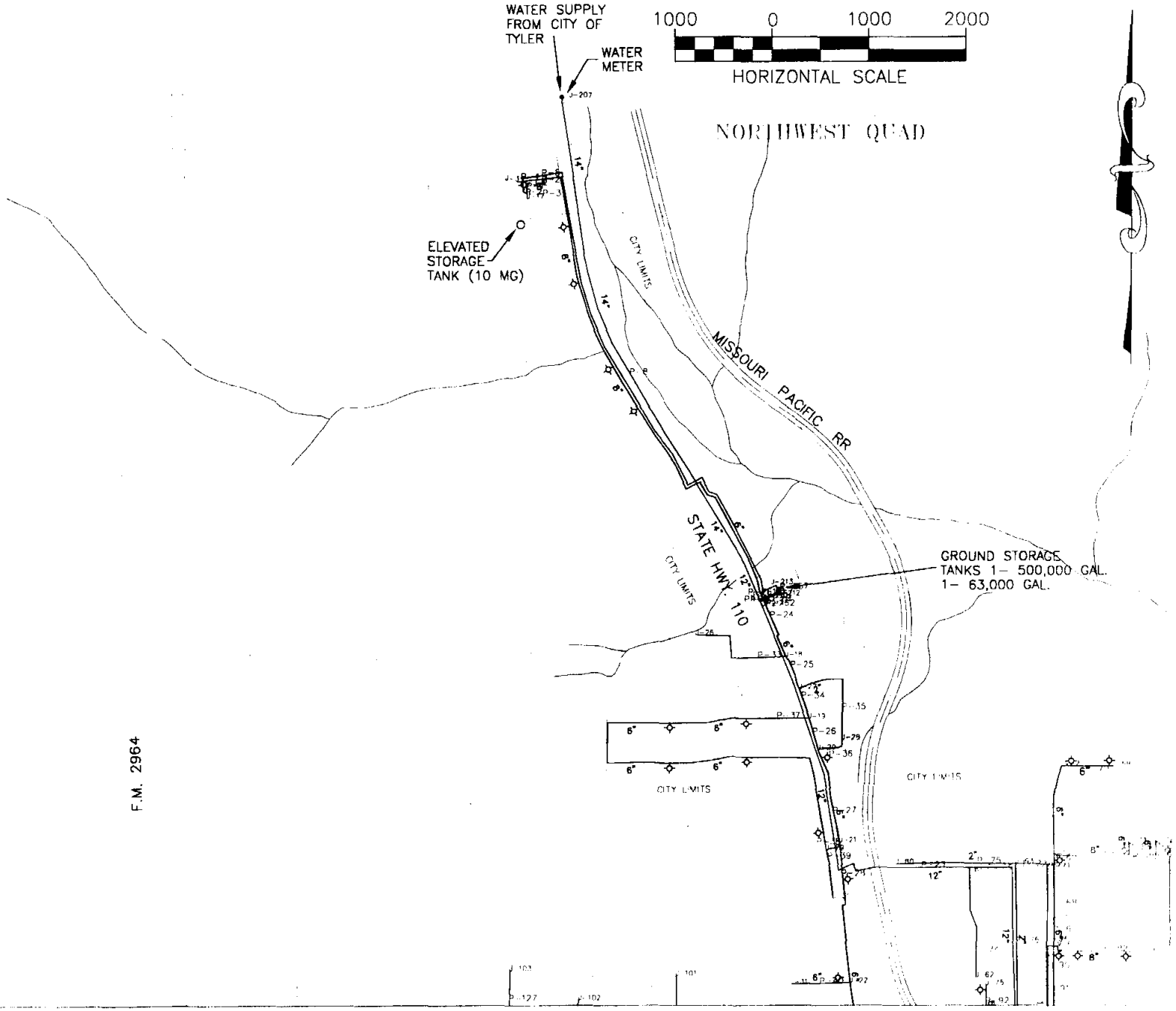
HORIZONTAL SCALE

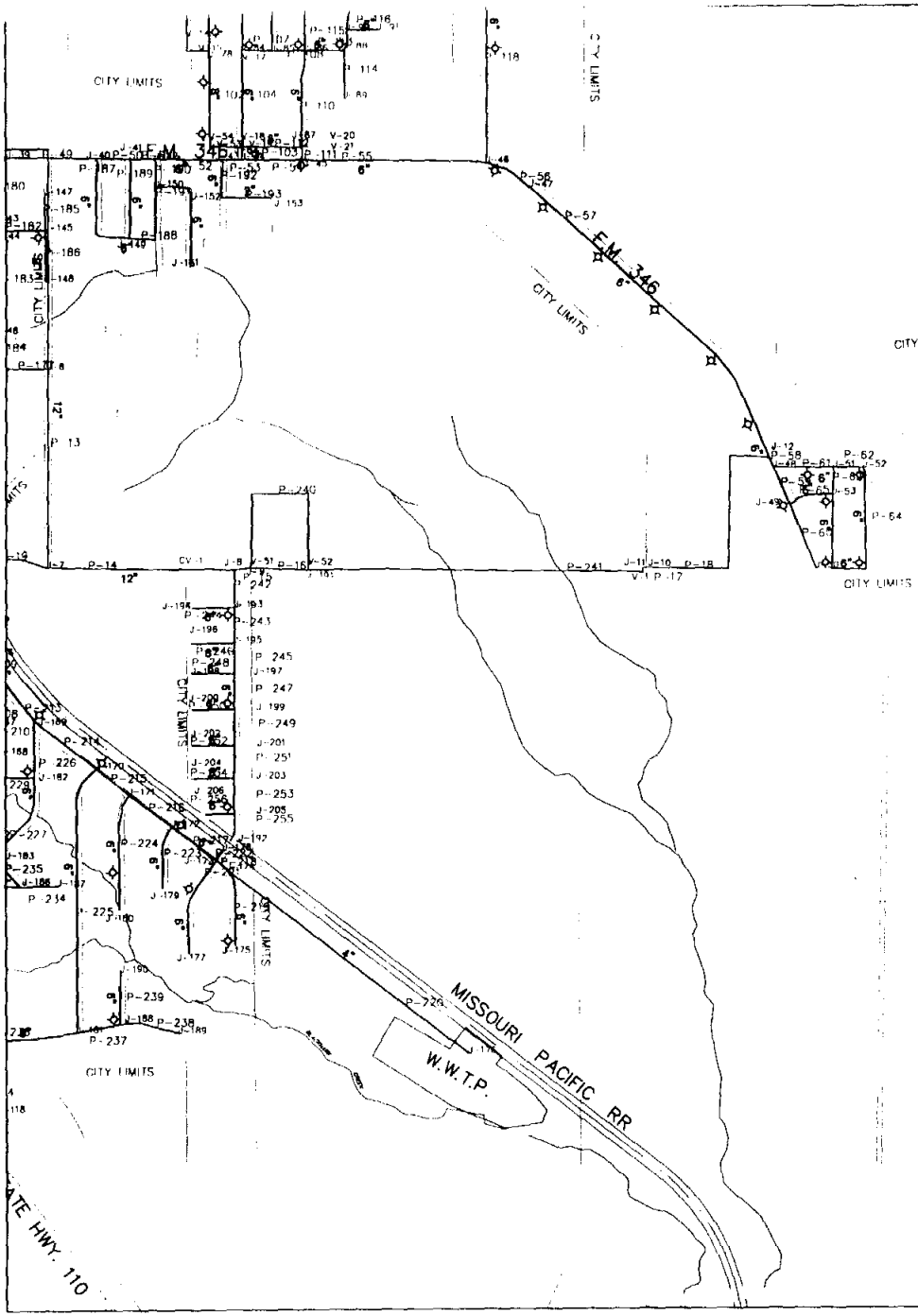
1" = 2000' - 5 24 2000

BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 - 6095


CITY LIMITS
F.M. 346
WELL & ELEVATED STORAGE TK. (10G)
STATE HWY. 6110
MISSOURI PACIFIC RR
1000 0 1000 2000
HORIZONTAL SCALE
BURTON & ELLEDGE, INC

BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 – 8993





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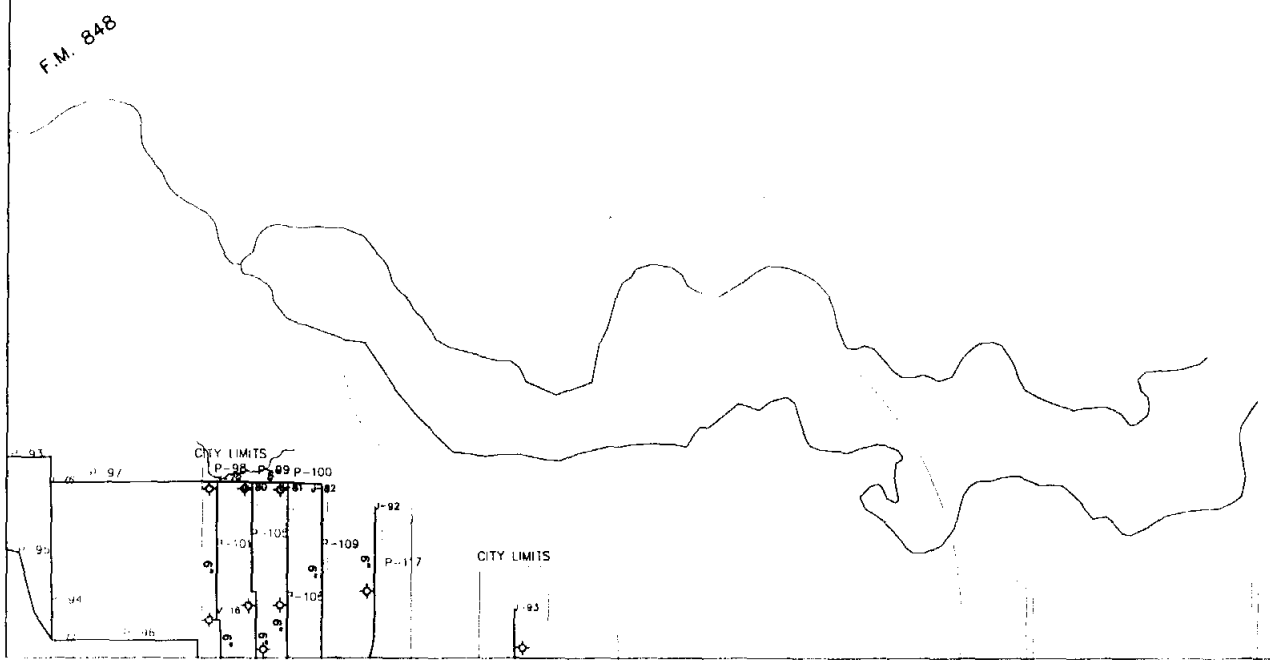
HORIZONTAL SCALE

SOUTHEAST QUAD

BURTON & ELLEDGE,
Environmental/Civil Engineers
1121 ESE Loop 323, Suite 21
TYLER, TEXAS 75701
(903) 561-6003



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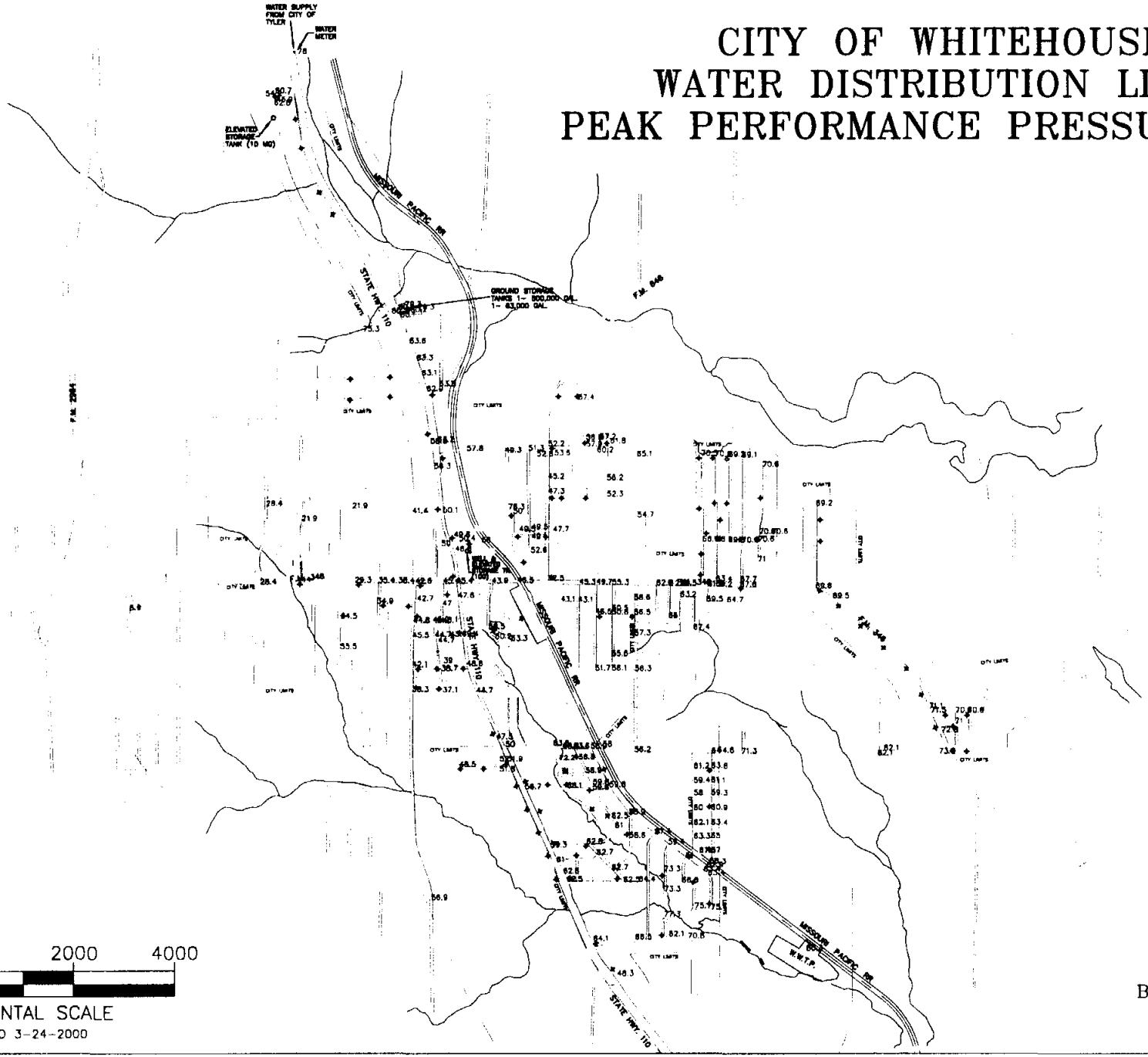
HORIZONTAL SCALE

NORTHEAST QUAD

BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 - 6993

EXHIBIT 12

CITY OF WHITEHOUSE
WATER DISTRIBUTION LINES
PEAK PERFORMANCE PRESSURE MAP



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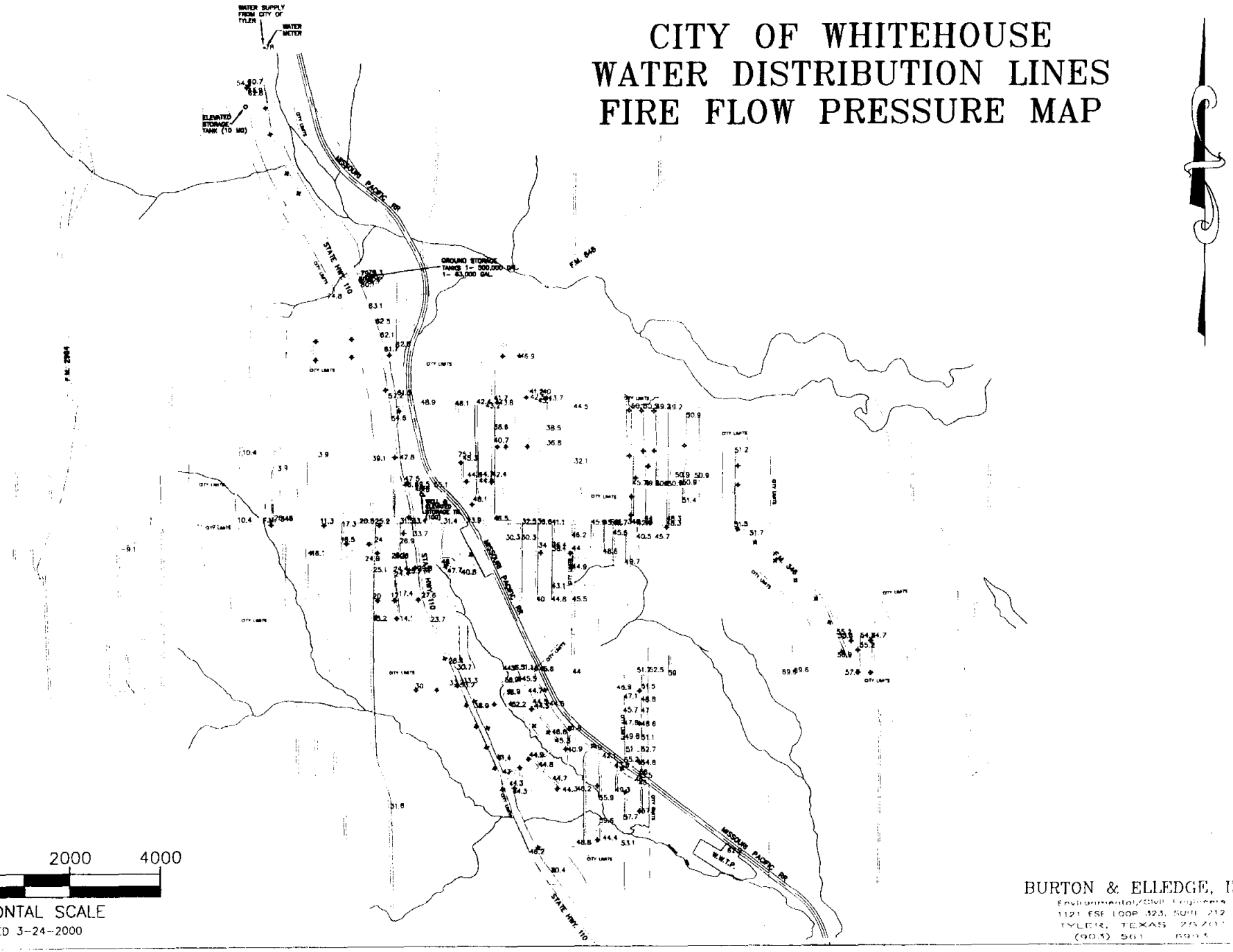
HORIZONTAL SCALE

REVISED 3-24-2000

BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 - 6993

CITY OF WHITEHOUSE
WATER DISTRIBUTION LINES
FIRE FLOW PRESSURE MAP



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HORIZONTAL SCALE

REVISED 3-24-2000

BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561-6911

MINIMUM AND MAXIMUM PRESSURE
COMPUTER MODEL RESULTS
TEN (10) MODIFICATIONS

Junction Number	Minimum Pressure (psi)		Junction Number	Maximum Pressure (psi)
R-6	39		J-176	93
J-31	44		J-190	90
J-104	45		J-175	87
R-2	46		J-177	87
J-55	47		J-214	87
R-3	47		Pump-2	87
J-54	49		J-180	86
J-74	49		J-10	85
J-133	50		J-11	85
J-225	50		J-227	84
J-122	50		J-189	83
J-131	50		J-94	82
			J-98	81
			J-26	81
			J-95	81
			Pump-1	81
			J-164	81
			J-163	80
			J-181	79
			J-159	79

MINIMUM AND MAXIMUM PRESSURE
COMPUTER MODEL RESULTS
TEN (10) MODIFICATIONS,
RESIDENTIAL AND COMMERCIAL FIRE FLOWS

Junction Number	Minimum Pressure (psi)		Junction Number	Maximum Pressure (psi)
J-31	35		J-176	90
R-6	39		J-190	88
J-104	41		J-175	85
J-55	43		J-177	85
J-22	43		J-10	84
J-133	45		J-11	84
J-54	45		J-214	83
J-225	45		J-180	83
J-74	45		Pump-2	83
J-131	46		J-189	83
J-122	46		J-227	81
R-2	46		J-164	80
			J-163	78
			J-94	78
			J-98	77
			J-95	77
			PUMP-1	77
			J-181	77
			J-159	76
			J-179	76

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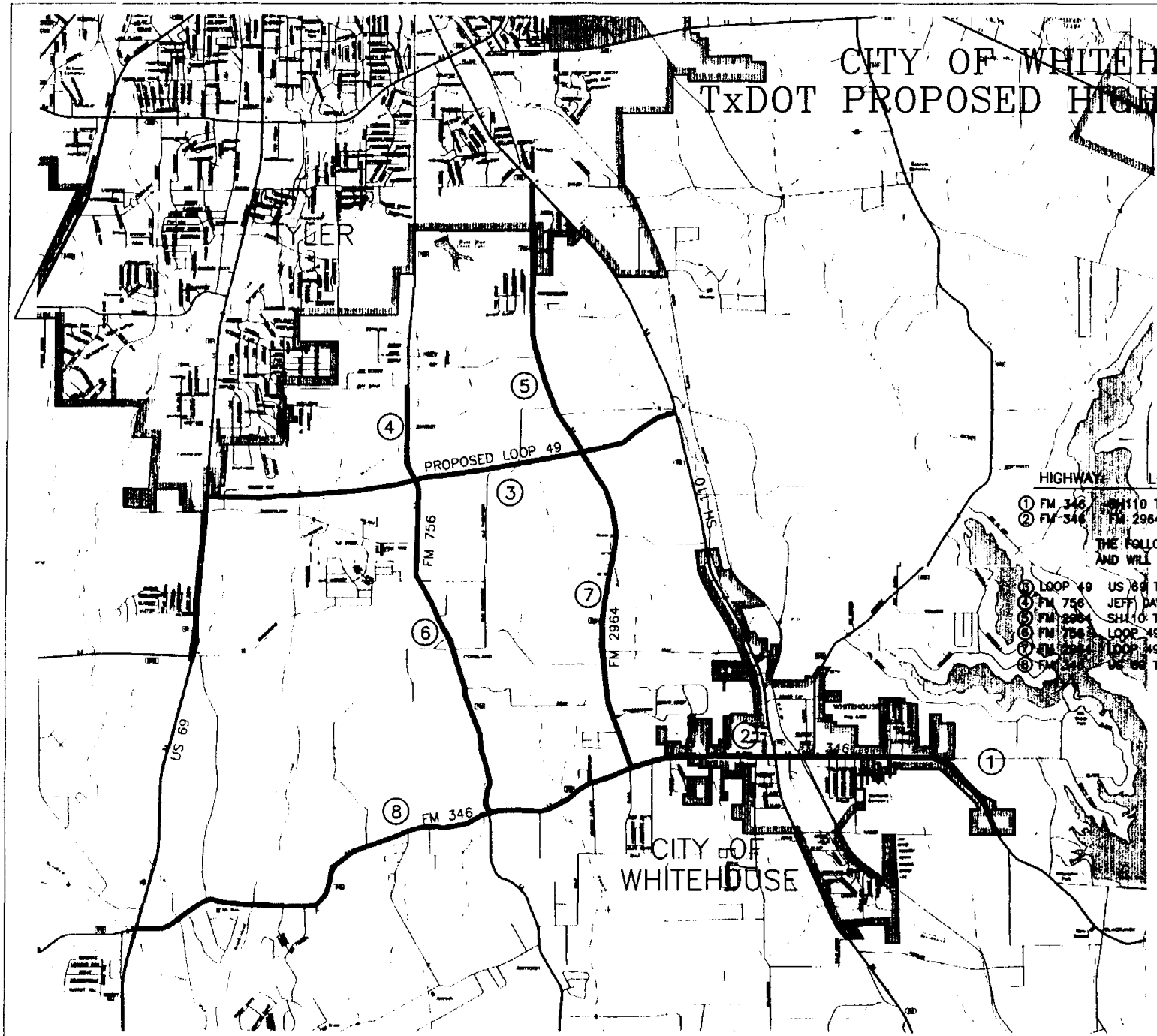
13

CITY OF WHITEHOUSE
TxDOT PROPOSED HIGHWAY PROJECTS



	HIGHWAY	LIMITS	IMPROVEMENTS	CSJ	LETTING YEAR
①	FM 346	SH 110 TO HAGAN RD	WIDEN TO 4-LANES	0492-05-014	2004
②	FM 346	FM 2964 TO SH 110	WIDEN TO 4-LANES	0492-04-020	2004

THE FOLLOWING PROJECTS ARE IN TxDOT LONG-RANGE PLANNING AND WILL BE LETTING MORE THAN 10 YEARS IN THE FUTURE:

⑤	LOOP 49	US 69 TO SH 110	NEW LOCATION HWY.	3487-02-001
④	FM 756	JEFF DAVIS TO LOOP 49	WIDEN TO 4-LANES	NO CSJ
③	FM 2964	SH110 TO LOOP 49	WIDEN TO 4-LANES	NO CSJ
⑥	FM 756	LOOP 49 TO FM 346	WIDEN TO 4-LANES	NO CSJ
⑦	FM 2964	LOOP 49 TO FM 346	WIDEN TO 4-LANES	NO CSJ
⑧	FM 346	US 69 TO FM 2964	WIDEN TO 4-LANES	NO CSJ

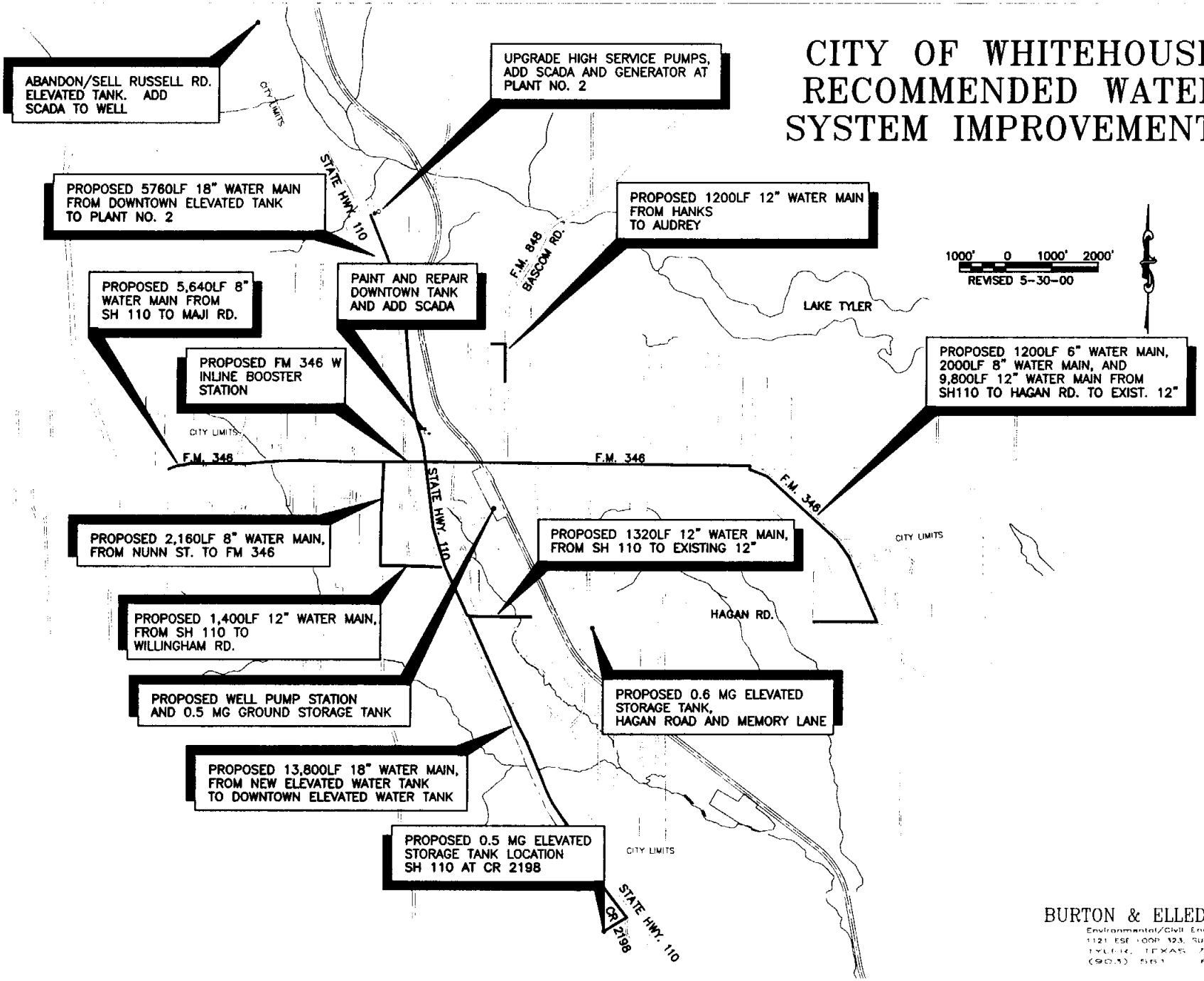
SOURCE:
TEXAS DEPARTMENT OF TRANSPORTATION, DISTRICT 10, TYLER

BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 - 6993

EXHIBIT

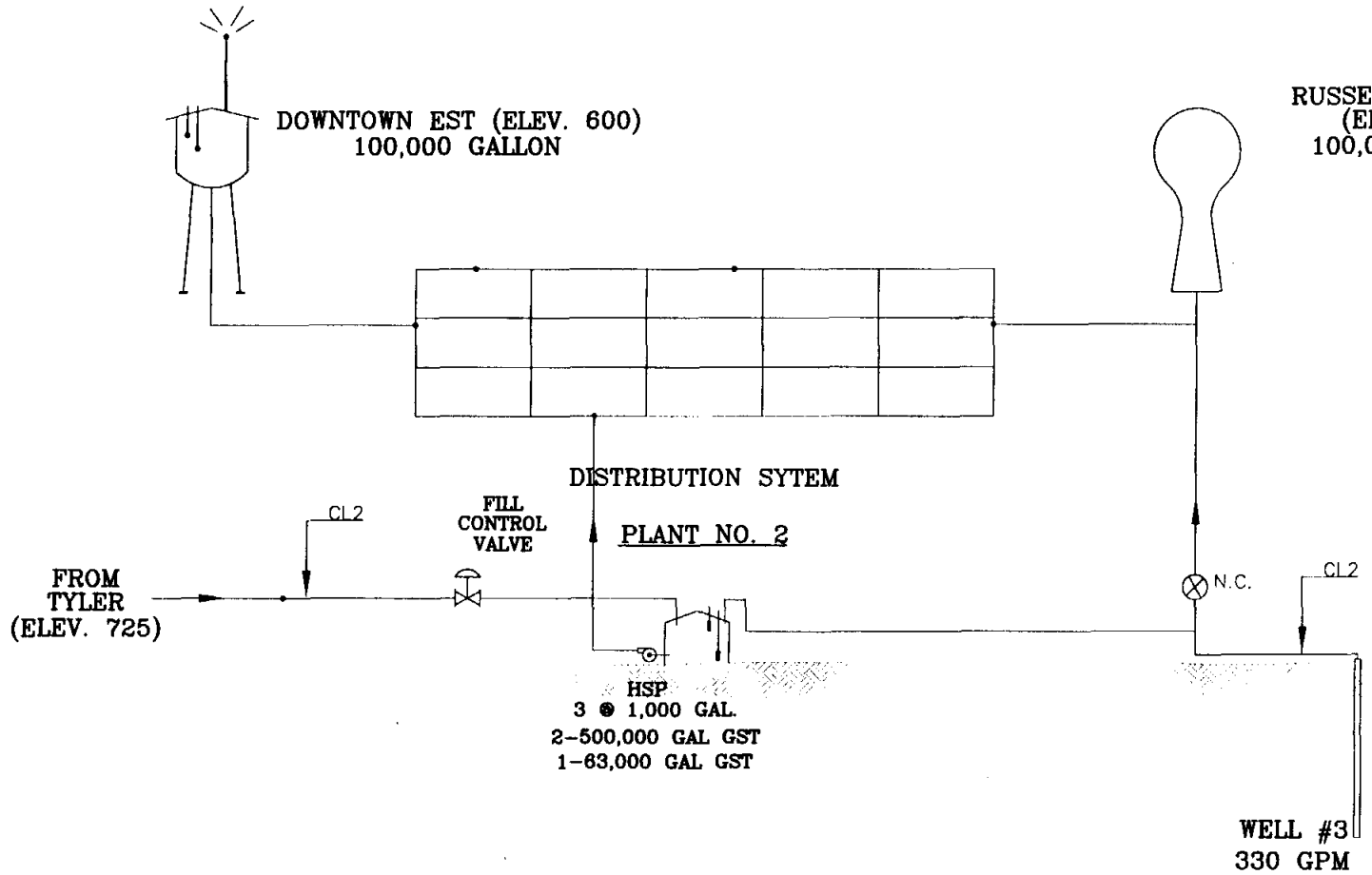
14

CITY OF WHITEHOUSE RECOMMENDED WATER SYSTEM IMPROVEMENTS



BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 6005

EXHIBIT 15



NOTES:

1. HIGH SERVICE PUMPS (HSPs) AT PLANT NO. 2 ARE CONTROLLED BY ELECTRODES IN THE DOWNTOWN ELEVATED STORAGE TANK (EST):
   -HSP "OFF" @ FULL EST
   -HSP "ON " @ 1/2 FULL EST.

2. SIGNAL TO HSPs FROM DOWNTOWN EST IS BY RADIO TELEMETRY NORMALLY, WITH TELEPHONE BACKUP.

3. SIGNAL TO WELL #3 FROM GSTs IS BY TELEPHONE LINE.

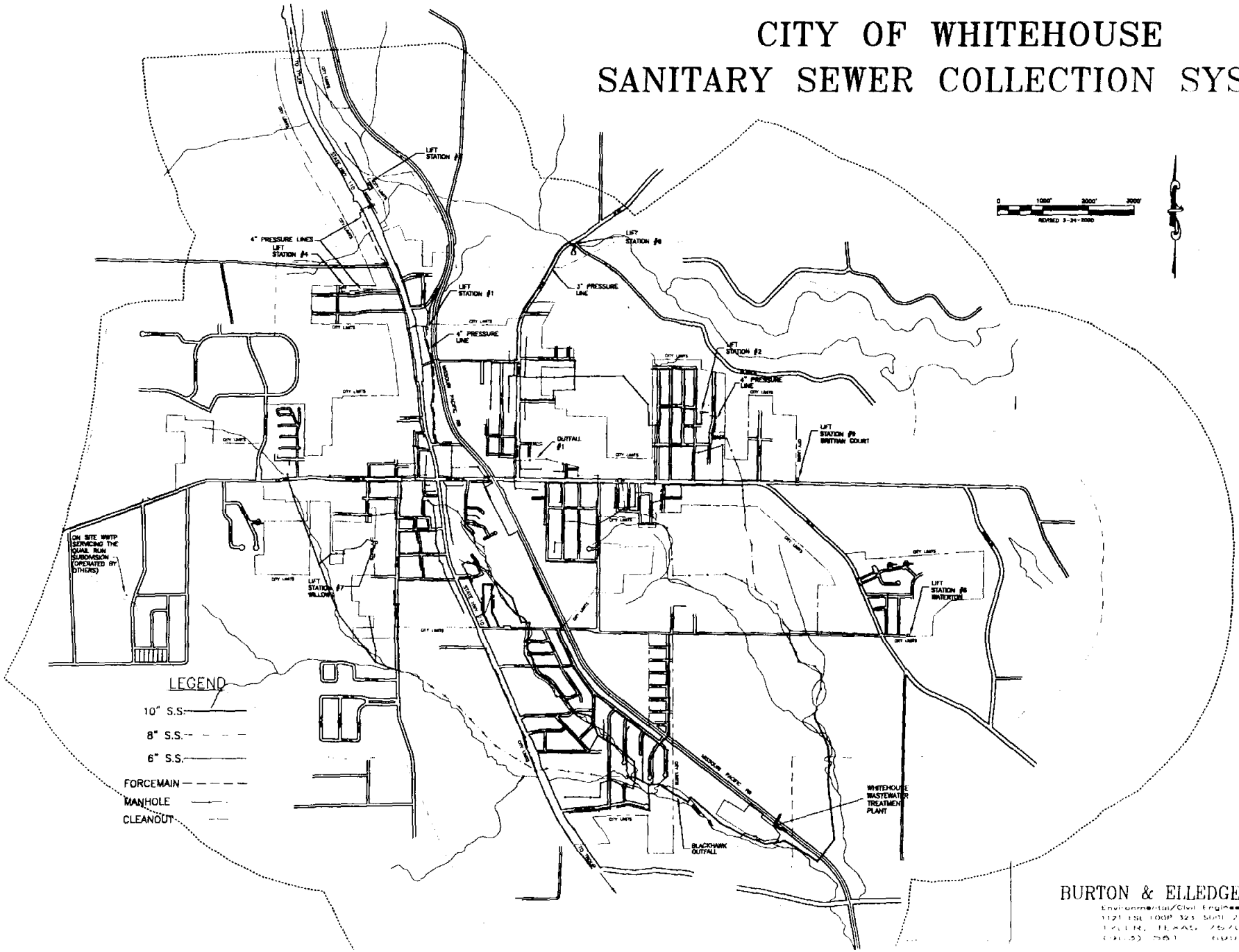
4. SIGNAL TO TYLER FILL CONTROL VALVE FROM GSTs IS BY CONTROL WIRE.

WHITEHOUSE WATER DISTRIBUTION SYSTEM CONTROL SCHEMATIC DIAGRAM

BURTON & ELLEDGE, INC
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561-6093

EXHIBIT 16

CITY OF WHITEHOUSE
SANITARY SEWER COLLECTION SYSTEM



BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323 SUITE 212
TYLER, TEXAS 75701
(903) 561-6041

EXHIBIT 17

CITY OF WHITEHOUSE
LIFT STATION FACILITIES

Name: Lift Station #1

Location: Hwy. 110 North at behind E.T.M.C.

Pump Type:

Submersible _____ Wet-Dry _____

Self-Priming X Pneumatic _____

Wet Well:

Depth 12'-6" Volume 4690 Gal.

Dimensions/Diameter 8' Dia. Service Area _____

Pump Data:

Number of 2 Manufacturer Gorman-Rupp

Size (pumps & lines) 3" Model No. T3A3-B

RPM _____ Serial No. 1172141 & 1172142

Capacity 150 gpm @ 100' TDH Motor HP 15

Control Type:

Float Switches Yes Other _____

Features:

Alarm High water – Light only Telemetry No

Elapsed Time Meter No Auto Dialer No

Site:

Fence No Maintenance Assistance No

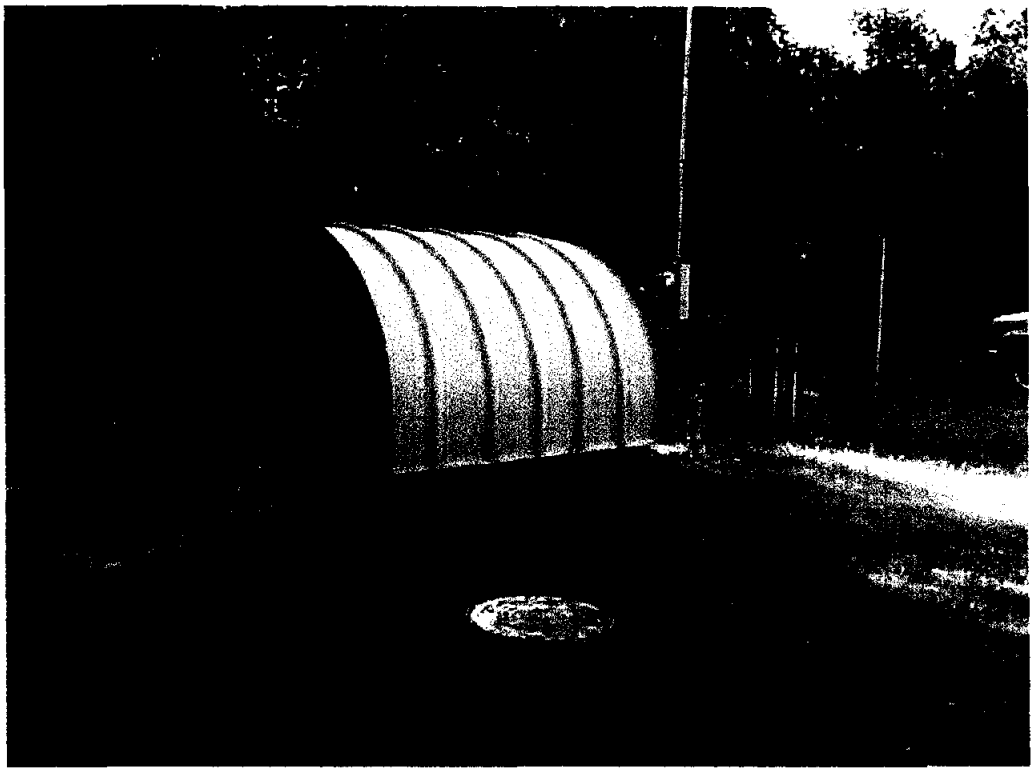
Access Hatch - Locked Lighting Yes

Comments:

Condition Good

Overflow No

Other General Comments/Problems New Pumps – Feb. '99



Lift Station #1

CITY OF WHITEHOUSE
LIFT STATION FACILITIES

Name: Lift Station #2

Location: David at Hillcreek

Pump Type:

Submersible _____ Wet-Dry _____

Self-Priming X Pneumatic _____

Wet Well:

Depth 17' Volume 2480 Gal.

Dimensions/Diameter 5' Service Area _____

Pump Data:

Number of 2 Manufacturer Gorman - Rupp

Size (pumps & lines) 4 Model No. T4A3-B

RPM _____ Serial No. 1150512 & 1150523

Capacity 150 gpm @ 20' TDH Motor HP 3

Control Type:

Float Switches Yes Other _____

Features:

Alarm High water alarm – Light only Telemetry No

Elapsed Time Meter _____ Auto Dialer No

Site:

Fence No Maintenance Assistance No

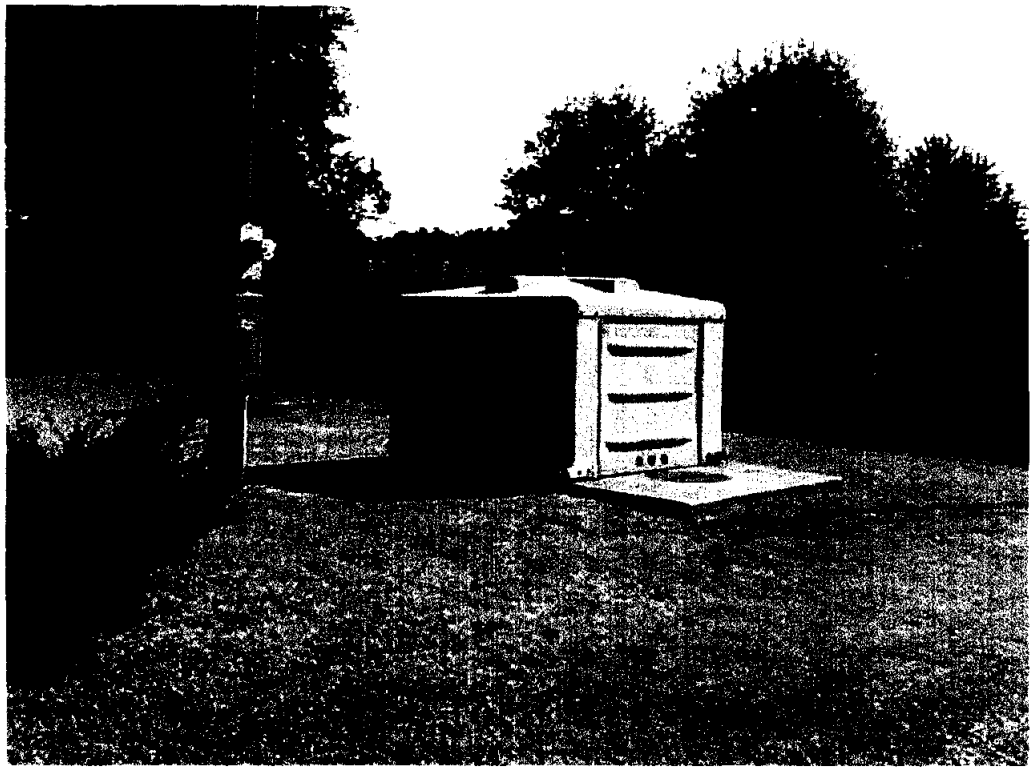
Access Hatch Lighting Yes

Comments:

Condition New – Pumps replaced Jan. '99

Overflow No

Other General Comments/Problems High grease content is an ongoing problem



Lift Station #2

CITY OF WHITEHOUSE
LIFT STATION FACILITIES

Name: Lift Station #4

Location: Meadow Lark at Robinwood

Pump Type:

Submersible X | Wet-Dry _____

Self-Priming _____ | Pneumatic _____

Wet Well:

Depth 8' – 8" | Volume 4050 Gal.

Dimensions/Diameter 3' | Service Area _____

Pump Data:

Number of 2 | Manufacturer Hydro-Matic

Size (pumps & lines) 4" | Model No. SPG200M2-2

RPM _____ | Serial No. 83-47906

Capacity _____ gpm @ _____ TDH Motor HP 2

Control Type:

Float Switches Yes | Other _____

Features:

Alarm High level water – Red light | Telemetry No

Elapsed Time Meter No | Auto Dialer No

Site:

Fence No | Maintenance Assistance No

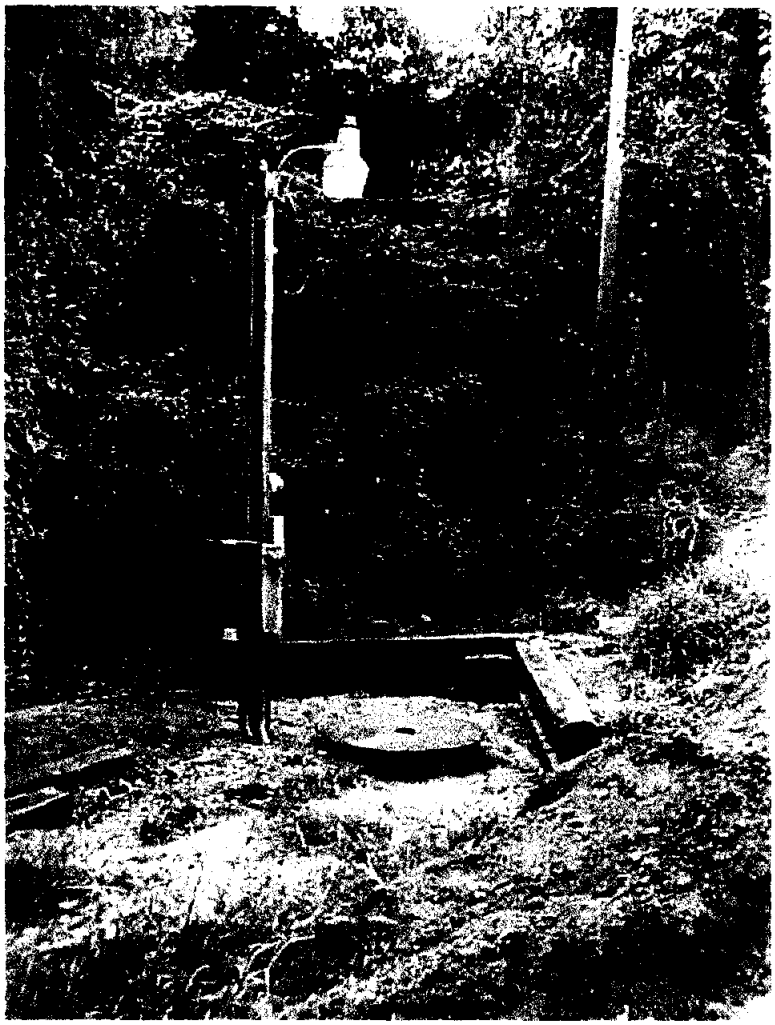
Access Hatch – No Lock | Lighting Yes

Comments:

Condition Good

Overflow No

Other General Comments/Problems Two new pumps '98. One motor burnt up and rebuilt



Lift Station #4

CITY OF WHITEHOUSE
LIFT STATION FACILITIES

Name: Hwy. 110 North L.S. #5

Location: Hwy. 110 North

Pump Type:

Submersible _____ Wet-Dry _____

Self-Priming X Pneumatic _____

Wet Well:

Depth 17' Volume 6400 gal.

Dimensions/Diameter 8' Dia. Service Area _____

Serial No. B0104DLF2UDP1

Pump Data:

Number of 2 Manufacturer Gorman - Rupp

Size (pumps & lines) 3X3 Model No. T3A3-B

RPM 1740 Serial No. 859945 & 1151666

Capacity _____ gpm @ _____ TDH Motor HP 10

Control Type:

Float Switches Yes Other gooseneck vent

Features:

Alarm Light only on high water Telemetry No

Elapsed Time Meter No Auto Dialer No

Site:

Fence 6' Chain link Maintenance Assistance No

Access 15' Double gate Lighting Yes

Comments:

Condition Good

Overflow No

Other General Comments/Problems None – New pumps Feb. '99

Lift Station #5

CITY OF WHITEHOUSE
LIFT STATION FACILITIES

Name: Lift Station #6

Location: FM 848, north at Hillcreek St.

Pump Type:

Submersible X
Wet-Dry
Self-Priming
Pneumatic

Wet Well:

Depth 19'1"
Volume
Dimensions/Diameter 5'
Service Area

Pump Data:

Number of 2
Manufacturer Flygt
Size (pumps & lines) 3"
Model No. M-3102, Imp #267
RPM 3450
Serial No.
Capacity 11 gpm @ 100' TDH Motor HP 3

Control Type:

Float Switches Yes
Other

Features:

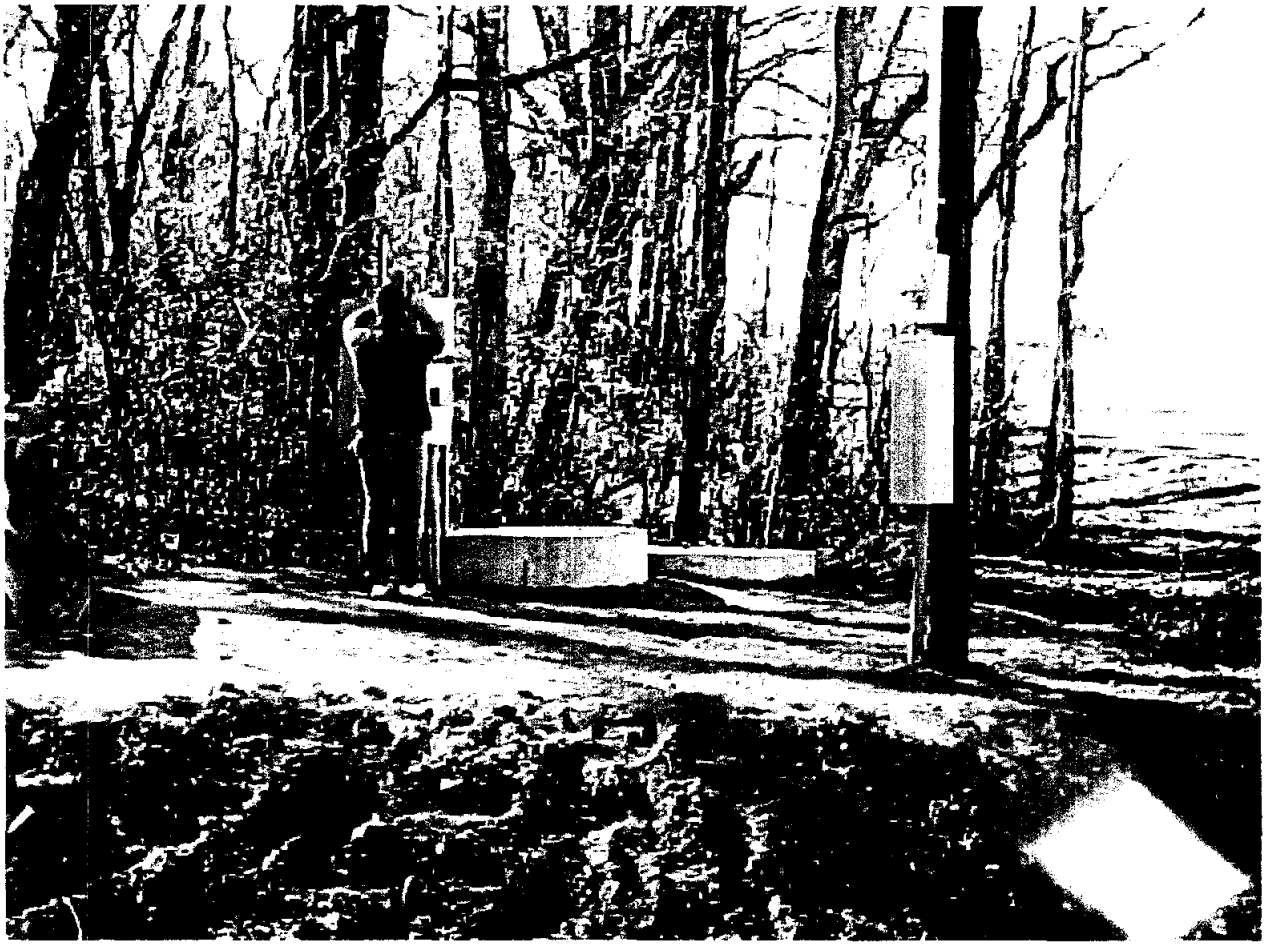
Alarm Yes, audio-visual
Telemetry No
Elapsed Time Meter
Auto Dialer Yes

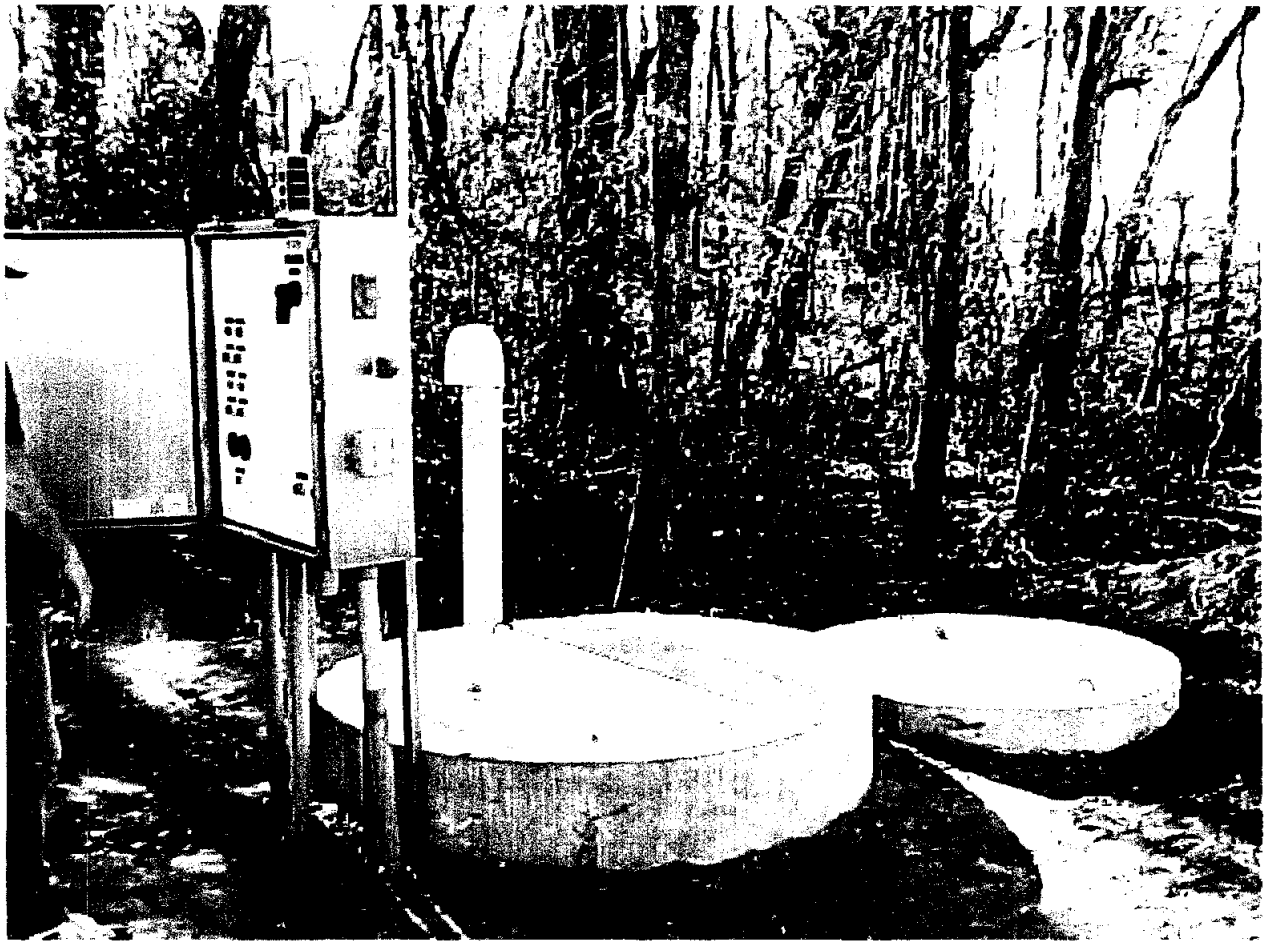
Site:

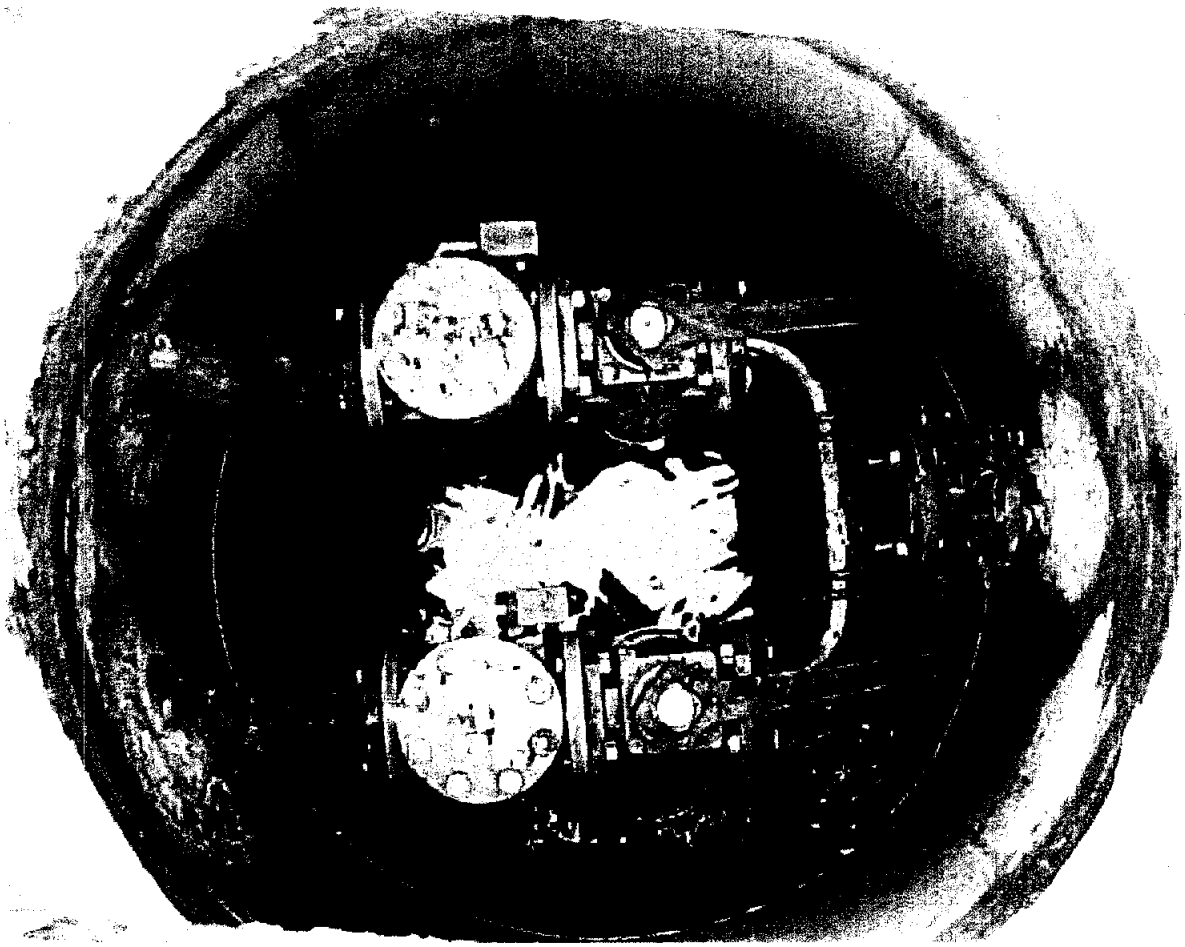
Fence
Maintenance Assistance entry hatch
Access
Lighting

Comments:

Condition Under construction, 1999
Overflow No
Other General Comments/Problems None







CITY OF WHITEHOUSE
LIFT STATION FACILITIES

Name: Lift station #7

Location: The Willows Subdivision – Off Azalea Trials

Pump Type:

Submersible X | Wet-Dry _____

Self-Priming _____ | Pneumatic _____

Wet Well:

Depth 14' | Volume 2050 Gal.

Dimensions/Diameter 5' | Service Area _____

Pump Data:

Number of 2 | Manufacturer Hydro-Matic

Size (pumps & lines) 4" | Model No. S4P500M24

RPM _____ | Serial No. 98-98625

Capacity 160 gpm @ 42' TDH Motor HP 5

Control Type:

Float Switches Yes | Other _____

Features:

Alarm High water – Light only | Telemetry No

Elapsed Time Meter No | Auto Dialer No

Site:

Fence 5' Chain link | Maintenance Assistance Davit with Hoist

Access Hatch | Lighting No

Comments:

Condition Good – New-1 year

Overflow No

Other General Comments/Problems Grease build-up on floats causes water alarm to trip

Lift Station #7

CITY OF WHITEHOUSE
LIFT STATION FACILITIES

Name: Lift Station #8

Location: End of Hagan St.

Pump Type:

Submersible X
Wet-Dry
Self-Priming
Pneumatic

Wet Well:

Depth 20' 5"
Volume 2900 Gal.
Dimensions/Diameter 5'
Service Area Waterton Subdivision

Pump Data:

Number of 2
Manufacturer Hydro-Matic
Size (pumps & lines) 4"
Model No. S4N300M2-4
RPM
Serial No. 97-93612
Capacity 135 gpm @ 17' TDH Motor HP 3

Control Type:

Float Switches Yes
Other

Features:

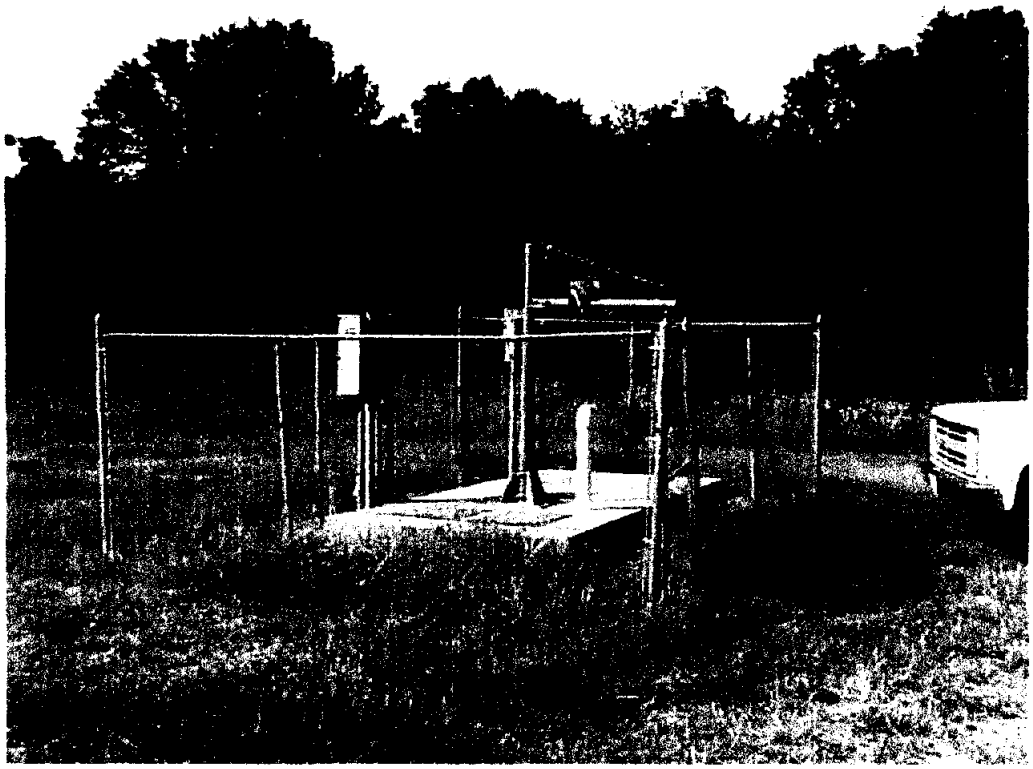
Alarm High water level – Light only
Telemetry No
Elapsed Time Meter
Auto Dialer No

Site:

Fence 5' Chain link
Maintenance Assistance Davit with hoist
Access Gate
Lighting No

Comments:

Condition Good
Overflow No
Other General Comments/Problems None



Lift Station #8

CITY OF WHITEHOUSE
LIFT STATION FACILITIES

Name: Lift Station #9

Location: Brittain Court Subdivision

Pump Type:

Submersible X | Wet-Dry

Self-Priming | Pneumatic

Wet Well:

Depth 17' | Volume

Dimensions/Diameter 5' | Service Area Brittain Court Subdivision

Pump Data:

Number of 2 | Manufacturer Flygt

Size (pumps & lines) 4" | Model No. CP3085, Imp. 436

RPM 1750 | Serial No.

Capacity 100 gpm @ 24' TDH Motor HP 2

Control Type:

Float Switches Yes | Other

Features:

Alarm Yes | Telemetry No

Elapsed Time Meter No | Auto Dialer Yes

Site:

Fence | Maintenance Assistance

Access Yes | Lighting Yes

Comments:

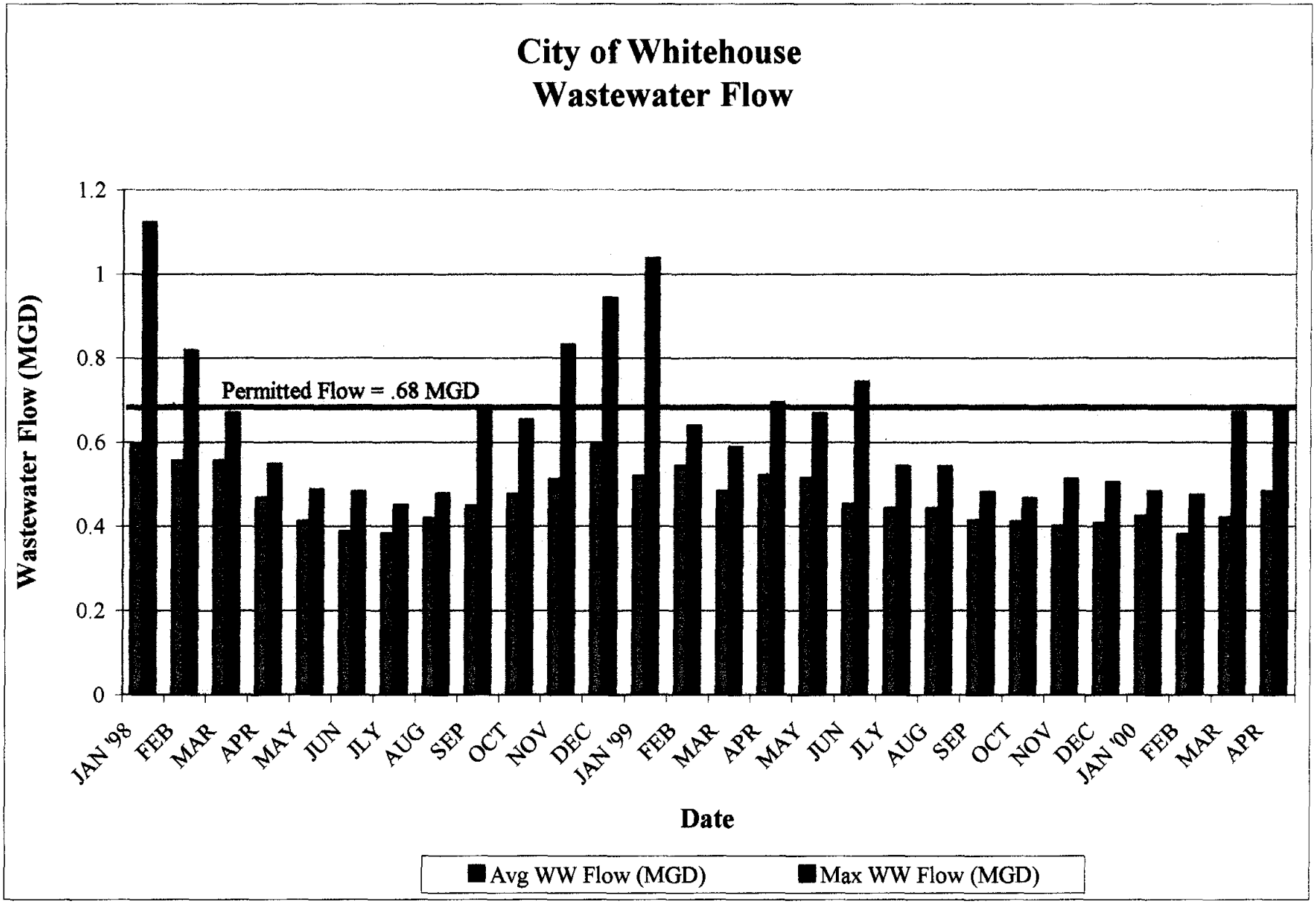
Condition Under construction,1999

Overflow No

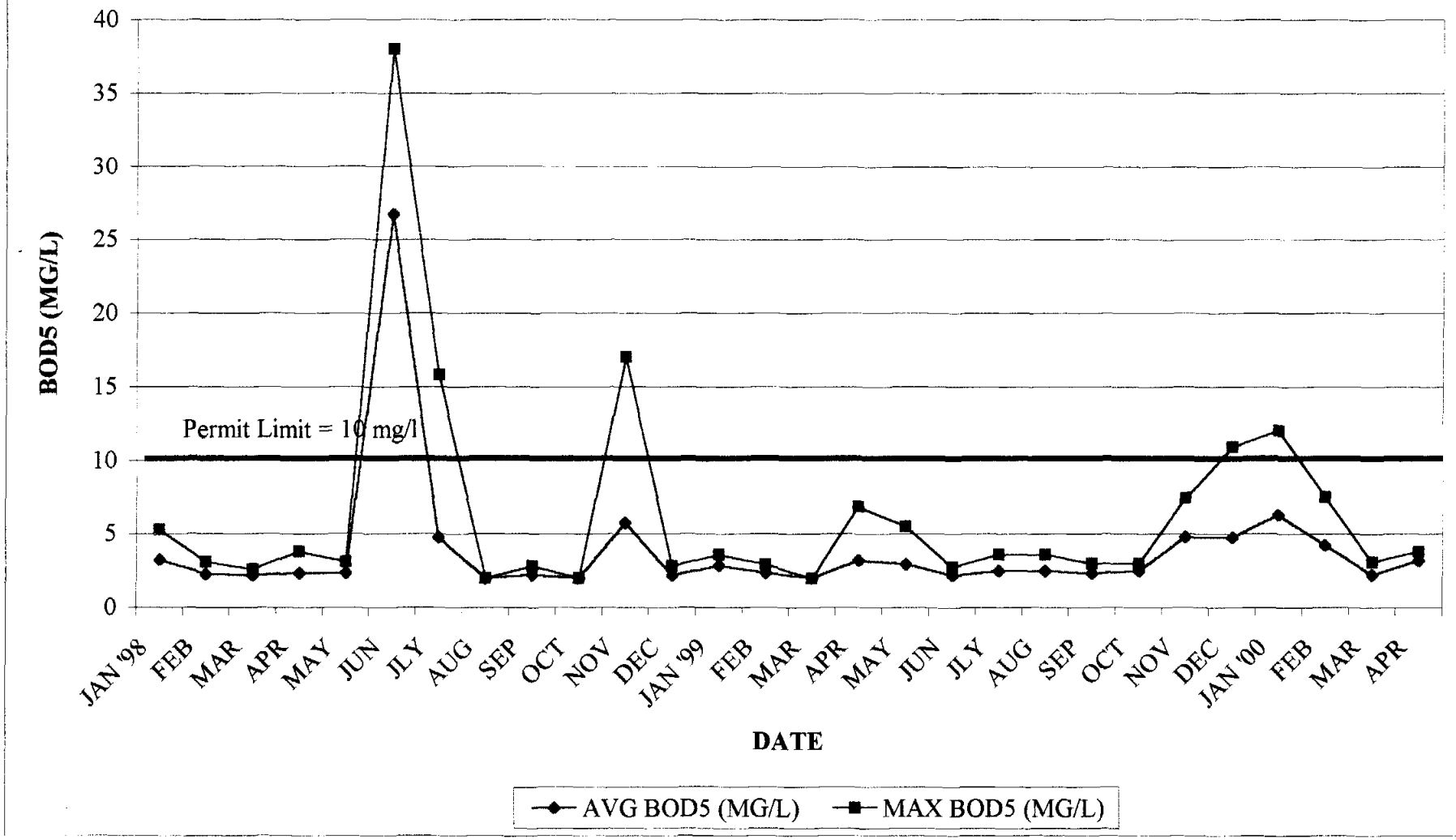
Other General Comments/Problems None


COURT

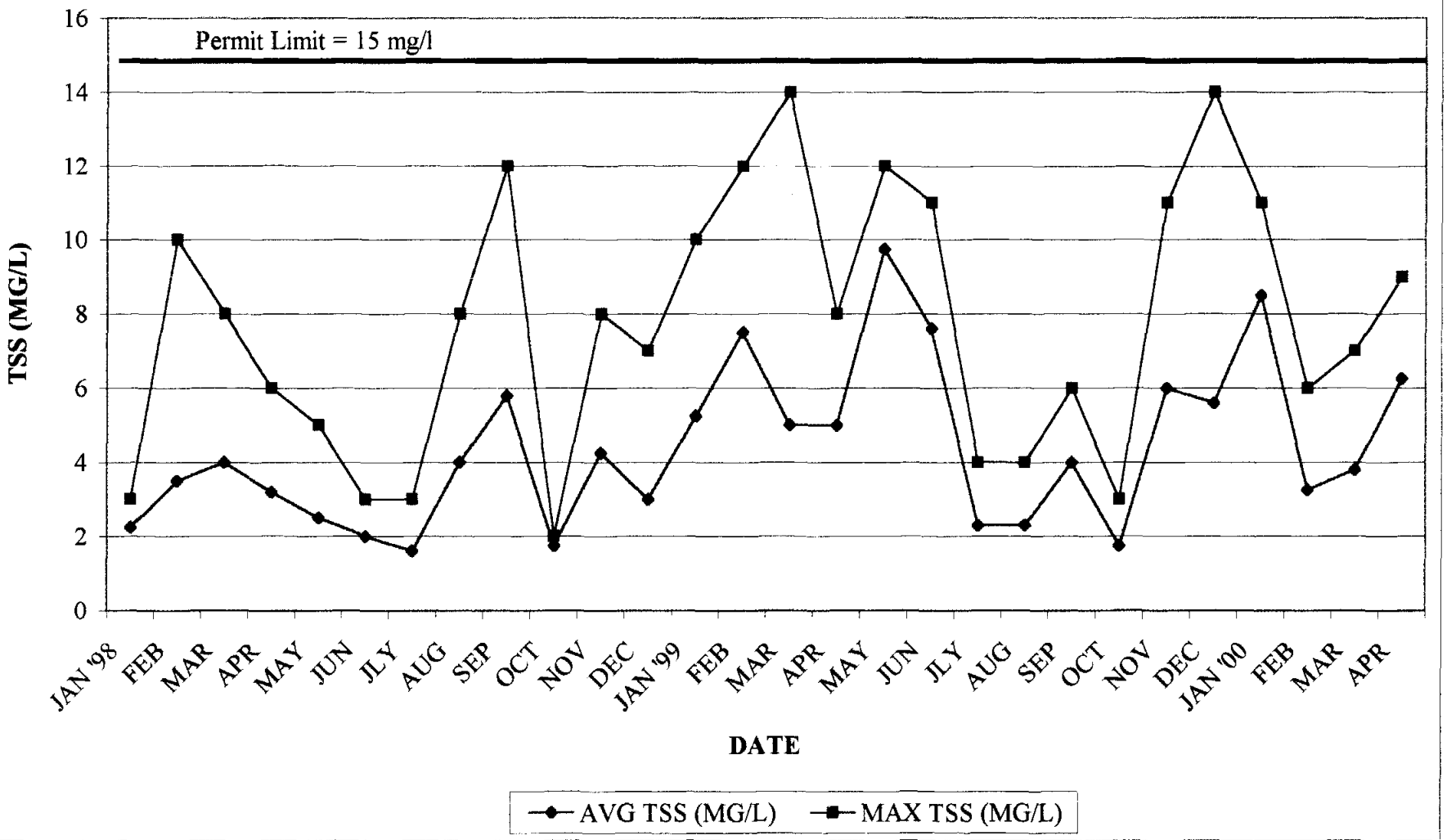
EXHIBIT 18

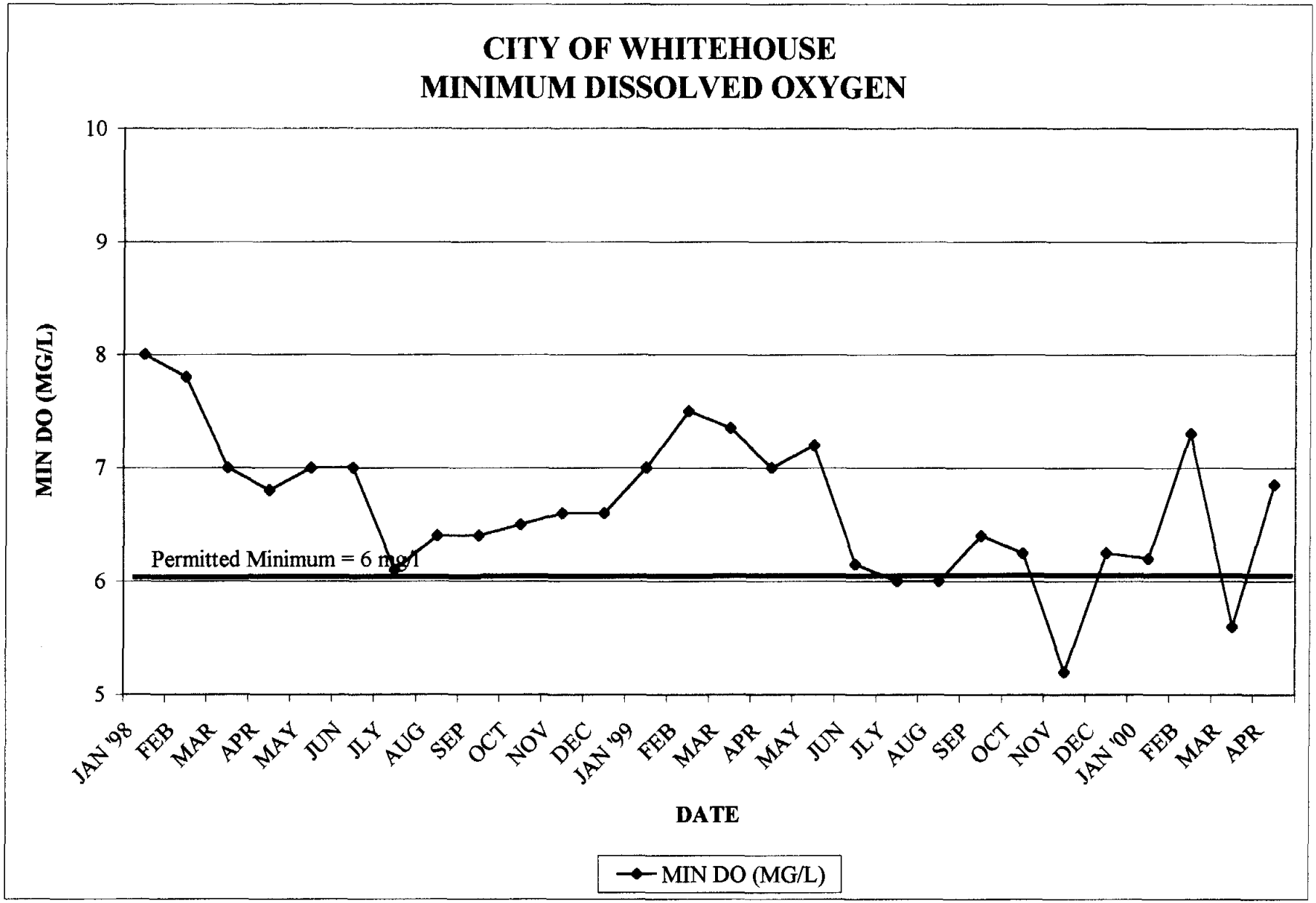

City of Whitehouse
Wastewater Flow
Wastewater Flow (MGD)
1.2
1
0.8
0.6
0.4
0.2
0
Permitted Flow = .68 MGD
JAN '98
FEB
MAR
APR
MAY
JUN
JLY
AUG
SEP
OCT
NOV
DEC
JAN '99
FEB
MAR
APR
MAY
JUN
JLY
AUG
SEP
OCT
NOV
DEC
JAN '00
FEB
MAR
APR
Date
Avg WW Flow (MGD)
Max WW Flow (MGD)

CITY OF WHITEHOUSE
BOD5



CITY OF WHITEHOUSE
TSS




CITY OF WHITEHOUSE
MINIMUM DISSOLVED OXYGEN
MIN DO (MG/L)
10
9
8
7
6
5
Permitted Minimum = 6 mg/l
JAN '98
FEB
MAR
APR
MAY
JUN
JLY
AUG
SEP
OCT
NOV
DEC
JAN '99
FEB
MAR
APR
MAY
JUN
JLY
AUG
SEP
OCT
NOV
DEC
JAN '00
FEB
MAR
APR
DATE
MIN DO (MG/L)

CITY OF WHITEHOUSE
FLOWRATE & EFFLUENT NH3-N CONC.

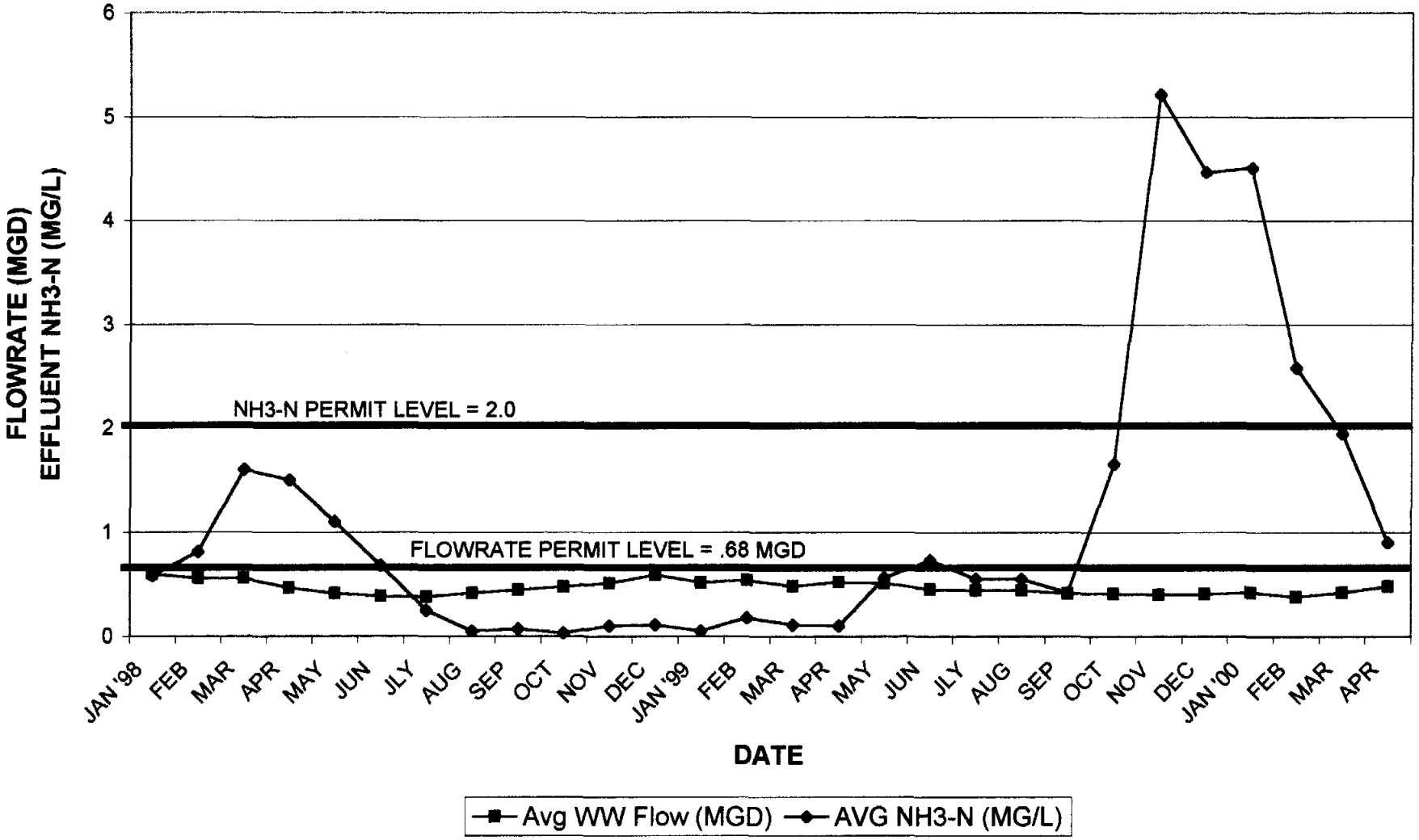


EXHIBIT 19

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

October 5, 1998

Thom Smyser, City Manager
City of Whitehouse
P.O. Box 776
Whitehouse, Texas 75791

RE: CITY OF WHITEHOUSE
Renewal of Permit No. 11222-001

Enclosed is a copy of the above referenced permit for a wastewater treatment facility issued pursuant to Chapter 26 of the Texas Water Code.

Self-reporting forms and instructions will be forwarded to you from the Water Quality Division so that you may comply with monitoring requirements. For existing facilities, revised self-reporting forms will be forwarded if monitoring requirements have changed.

Attached is a "Notification of Completion of Wastewater Treatment Facilities" form. Use this form when the facility begins to operate or goes into a new phase. The form notifies the agency when the proposed facility is completed or when it is placed in operation. This notification complies with the special provision incorporated into the permit.

Should you need additional information, please contact Mary Taylor of the Texas Natural Resource Conservation Commission's Wastewater Permitting Section (MC 148) at (512) 239-4570.

Sincerely,

Eugenia K. Brumm

Eugenia K. Brumm, Ph. D.
Chief Clerk

EKB/da

cc: TNRCC Region 5
Melinda Luxemburg, Staff Engineer, TNRCC Water Quality Division, Wastewater Permitting Section (MC 148)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
WATER QUALITY DIVISION

NOTIFICATION OF COMPLETION OF WASTEWATER TREATMENT FACILITIES

Water Quality Permit Number WQ_____-_____

Name of Permittee _____

Date facility was placed into operation or is estimated to be operational _____
(Month/Day/Year)

Volume (MGD) and phase in operation (Interim/Final) _____

Operator of the facility will be _____

Class of Operator Certificate (if applicable)_____

Operator Certificate Number (if applicable)_____

Operator employed by_____
(Name of Operations Company)

Responsible Official _____
(Name)

_____
(Title)

_____
(Phone Number)

_____ _____
(Signature) (Date)

If you have questions about completing the form, call (512)239-4570 for assistance. The form should be completed and returned to Texas Natural Resource Conservation Commission, Wastewater Data Management Team (MC 148), Water Quality Division, P. O. Box 13087, Austin, Texas 78711-3087. **Please note that this form should only be completed when a facility is first placed into operation or goes into a new phase in the permit. If the Wastewater Data Management Team has already been notified of the operational status, the form does not have to be completed.**

(Revised 5/97)

PERMIT NO. 11222-001
(corresponds to
NPDES PERMIT NO. TX0072770)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
P. O. Box 13087
Austin, Texas 78711-3087

This is a renewal of Permit No. 11222-001, approved May 8, 1992.

PERMIT TO DISPOSE OF WASTES
under provisions of Chapter 26
of the Texas Water Code

City of Whitehouse

whose mailing address is

P.O. Box 776
Whitehouse, Texas 75791

is authorized to treat and dispose of wastes from the Blackhawk Creek Wastewater Treatment Facilities

located on the east side of State Highway 110 approximately 900 feet north and 3300 feet east of the intersection of State Highway 110 and County Road 2175 and approximately 1.7 miles southeast of the City of Whitehouse in Smith County, Texas

to Blackhawk Creek; thence to Mud Creek; thence to the Angelina River Above Sam Rayburn Reservoir in Segment No. 0611 of the Neches River Basin

only in accordance with effluent limitations, monitoring requirements and other conditions set forth herein, as well as the rules of the Texas Natural Resource Conservation Commission ("Commission"), the laws of the State of Texas, and other orders of the Commission. The issuance of this Permit does not grant to the permittee the right to use private or public property for conveyance of wastewater along the herein described discharge route. This includes property belonging to but not limited to any individual, partnership, corporation or other entity. Neither does this Permit authorize any invasion of personal rights nor any violation of federal, state, or local laws or regulations. It is the responsibility of the permittee to acquire property rights as may be necessary to use the herein described discharge route.

This Permit and the authorization contained herein shall expire at midnight, August 1, 2001.

ISSUED DATE: SEP 14 1998

ATTEST: Eugenia K. Brumm

For the Commission

DEFINITIONS AND STANDARD PERMIT CONDITIONS

As required by Title 30 Texas Administrative Code (TAC) Chapter 305, certain regulations appear as standard conditions in waste discharge permits. 30 TAC §§305.121-305.129, Subchapter F, "Permit Characteristics and Conditions" as promulgated under the Texas Water Code, §§5.103 and 5.105, and §§361.017 and 361.024(a) of the Texas Solid Waste Disposal Act establish the characteristics and standards for waste discharge permits, including sewage sludge. The following text includes these conditions and incorporates them into this permit. All definitions contained in Section 26.001 of the Texas Water Code shall apply to this permit and are incorporated herein by reference. Additional definitions of words or phrases used in this permit are as follows:

1. Flow Measurements

   a. Daily average flow - the arithmetic average of all determinations of the daily discharge within a period of one calendar month. The daily average flow determination shall consist of determinations made on at least four separate days. If instantaneous measurements are used to determine the daily discharge, the determination shall be the arithmetic average of all instantaneous measurements taken during that month. Daily average flow determination for intermittent discharges shall consist of a minimum of three flow determinations on days of discharge.

   b. Instantaneous flow - the measured flow during the minimum time required to interpret the flow measuring device.

   c. 2-hour peak (domestic wastewater treatment plants) - the maximum flow sustained for a two-hour period during the period of daily discharge. Multiple measurements of instantaneous maximum flow within a two-hour period may be compared to the permitted 2-hour peak flow.

   d. Daily maximum flow - the highest total flow for any 24-hour period in a calendar month.

2. Concentration Measurements

   a. Daily average concentration - the arithmetic average of all effluent samples, composite or grab as required by this permit within a period of one calendar month, consisting of at least four separate representative measurements. When four samples are not available in a calendar month, the arithmetic average of the four most recent measurements or the arithmetic average (weighted by flow) of all values taken during the month shall be utilized as the daily average concentration.

   b. 7-day average concentration - the arithmetic average of all effluent samples, composite or grab, within a period of one calendar week, Sunday through Saturday, consisting of at least three separate measurements.

   c. Daily maximum concentration - the maximum concentration measured on a single day, by composite sample, unless otherwise specified elsewhere in this permit.

   d. Fecal Coliform bacteria - the number of colonies per 100 milliliters effluent.

3. Sample Type

   a. Composite sample - a sample made up of a minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow collected no closer than two hours for domestic sewage. For industrial wastewater a composite sample is a sample made up of a minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow collected no closer than one hour.

   b. Grab sample - an individual sample collected in less than 15 minutes.

4. Treatment Facility (facility) - wastewater facilities used in the conveyance, storage, treatment, recycling, reclamation and/or disposal of domestic sewage, industrial wastes, agricultural wastes, recreational wastes, or other wastes including sludge handling or disposal facilities under the jurisdiction of the Commission.

5. The term "sewage sludge" is defined as solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in 30 TAC Chapter 312. This includes the solids separated from wastewater by unit processes which have not been classified as hazardous waste.

MONITORING AND REPORTING REQUIREMENTS

1. Self-Reporting

   Monitoring results shall be provided at the intervals specified in the permit. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall conduct effluent sampling and reporting in accordance with 30 TAC §§319.4 - 319.12. Unless otherwise specified, a monthly effluent report shall be submitted each month by the 20th day of the following month for each discharge which is described by this permit whether or not a discharge is made for that month.

   As provided by State Law, the permittee is subject to administrative, civil and criminal penalties, as applicable, for negligently or knowingly violating the Clean Water Act, the Texas Water Code, Chapters 26, 27, and 28, and Texas

d. Any noncompliance other than that specified in this section, or any required information not submitted or submitted incorrectly, shall be reported to the Program Support Team of the Agriculture & Watershed Management Division as promptly as possible. This requirement means to report these types of noncompliance on the monthly self-report form.

8. Signatories to Reports

All reports and other information requested by the Executive Director shall be signed by the person and in the manner required by 30 TAC §305.128 (relating to Signatories to Reports).

PERMIT CONDITIONS

1. General

a. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in an application or in any report to the Executive Director, it shall promptly submit such facts or information.

b. This permit is granted on the basis of the information supplied and representations made by the permittee during the application process, relying upon the accuracy and completeness of that information and those representations. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked, in whole or in part in accordance with 30 TAC 305.61 - 305.62, during its term for cause including but not limited to, the following:

i. Violation of any terms or conditions of this permit;

ii. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

iii. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

c. The permittee shall furnish to the Executive Director, upon request and within a reasonable time, any information to determine whether cause exists for amending, revoking, suspending or terminating the permit. The permittee shall also furnish to the Executive Director, upon request, copies of records required by the permit.

2. Compliance

a. Acceptance of the permit by the person to whom it is issued constitutes acknowledgement and agreement that such person will comply with all the terms and conditions embodied in the permit, and the rules and other orders of the Commission.

b. The permittee has a duty to comply with all conditions of the permit. Failure to comply with any permit condition constitutes a violation of the permit and the Texas Water Code or the Texas Health and Safety Code, and is grounds for enforcement action, for permit amendment, revocation or suspension, or for denial of a permit renewal application or of an application for a permit for another facility.

c. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

d. The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal or other permit violation which has a reasonable likelihood of adversely affecting human health or the environment.

e. Authorization from the Commission is required before beginning any change in the permitted facility or activity that may result in noncompliance with any permit requirements.

f. A permit may be amended, suspended and reissued, or revoked for cause. The filing of a request by the permittee for a permit amendment, suspension and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

g. There shall be no unauthorized discharge of wastewater or any other waste. For the purpose of this permit, an unauthorized discharge is considered to be any discharge of wastewater into or adjacent to waters in the state at any location not permitted as an outfall or otherwise defined in the Other Requirements of this permit.

h. A temporary diversion of wastewater around a unit or units to a permitted outfall for the purposes of maintenance or repair is not a violation of this permit as long as the wastewater complies with all other standards, terms and conditions of this permit. Notice shall be provided to the Regional Office at least 24 hours in advance of any temporary diversion, where practical. Where prior notice for a temporary diversion is not practical, notice shall be provided to the Regional Office as soon as possible but at least within 24 hours after beginning the temporary diversion. Not withstanding any of the above, the Commission may require that an application be submitted for formal authorization.

3. Inspections and Entry

a. Inspection and entry shall be allowed as prescribed in the Texas Water Code, Chapters 26, 27, and 28, and Texas Health and Safety Code, Chapter 361.

OPERATIONAL REQUIREMENTS

1. The permittee shall at all times ensure that the facility and all its systems of collection, treatment, and disposal are properly operated. This includes the regular, periodic examination of wastewater solids within the treatment plant by the operator in order to maintain an appropriate quantity and quality of solids inventory as described in the various operator training manuals and according to accepted industry standards for process control such as the Commission's "Recommendations for Minimum Process Control Tests for Domestic Wastewater Treatment Facilities." Process control records shall be retained at the facility site and/or shall be readily available for review by a TNRCC representative for a period of three years.

2. Upon request of the Executive Director, the permittee shall take appropriate samples and provide proper analysis in order to demonstrate compliance with Commission rules. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall comply with all provisions of 30 TAC §312.1-§312.13 concerning sewage sludge use and disposal and §§319.21 - 319.29 concerning the discharge of certain hazardous metals.

3. Domestic wastewater treatment facilities shall comply with the following provisions:

   a. The permittee shall notify the Executive Director in care of the Commission Wastewater Permits Section, in writing of any closure activity or facility expansion at least 90 days prior to conducting such activity.

   b. Closure activities include those associated with any pit, tank, pond, lagoon, or surface impoundment regulated by this permit.

   c. As part of the notification, the permittee shall submit to the Municipal Wastewater Permits Team in Austin, a closure plan which has been developed in accordance with the "Closure Guidance Documents" available through Record System Services for the Office of Waste Management & Pollution Cleanup.

4. The permittee is responsible for installing prior to plant start-up, and subsequently maintaining, adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failures by means of alternate power sources, standby generators, and/or retention of inadequately treated wastewater.

5. Unless otherwise specified, the permittee shall provide a readily accessible sampling point and, where applicable, an effluent flow measuring device or other acceptable means by which effluent flow may be determined.

6. The permittee shall remit an annual waste treatment fee to the Commission as required by 30 TAC Chapter 305 (Subchapter M) and an annual water quality assessment fee to the Commission as required by 30 TAC Chapter 320. Failure to pay either fee may result in revocation of this permit.

7. Documentation

   For all written notifications to the Commission required of the permittee by this permit, the permittee shall keep and make available a copy of each such notification, upon the same basis as self-monitoring data are required to be kept and made available.

8. Facilities which generate domestic wastewater shall comply with these provisions; domestic wastewater treatment facilities at permitted industrial sites are excluded.

   a. Whenever flow measurements for any domestic sewage treatment facility reach 75 percent of the permitted average daily flow for three consecutive months, the permittee must initiate engineering and financial planning for expansion and/or upgrading of the domestic wastewater treatment and/or collection facilities. Whenever, the average daily flow reaches 90 percent of the permitted average daily flow for three consecutive months, the permittee shall obtain necessary authorization from the Commission to commence construction of the necessary additional treatment and/or collection facilities. In the case of a domestic wastewater treatment facility which reaches 75 percent of the permitted daily average flow for three consecutive months, and the planned population to be served or the quantity of waste produced is not expected to exceed the design limitations of the treatment facility, the permittee shall submit an engineering report supporting this claim to the Executive Director of the Commission. If in the judgement of the Executive Director the population to be served will not cause permit noncompliance, then the requirement of this section may be waived. To be effective, any waiver must be in writing and signed by the Manager, Water Section, Enforcement Division of the Commission or an authorized agent, and such waiver of these requirements will be reviewed upon expiration of the existing permit; however, any such waiver shall not be interpreted as condoning or excusing any violation of any permit parameter.

   b. The plans and specifications for domestic sewage collection and treatment works associated with any domestic permit must be approved by the Commission, and failure to secure approval before commencing construction of such works or making a discharge is a violation of this permit and each day is an additional violation until approval has been secured.

SLUDGE PROVISIONS

The permittee is authorized to dispose of sludge only at a Texas Natural Resource Conservation Commission (TNRCC) registered or permitted land application site, commercial land application site or co-disposal landfill. **The disposal of sludge by land application on property owned, leased or under the direct control of the permittee is a violation of the Permit unless the site is permitted or registered with the TNRCC. This provision does not authorize Distribution and Marketing of sludge. This provision does not authorize the permittee to land apply sludge on property owned, leased or under the direct control of the permittee.**

SECTION I. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE LAND APPLICATION

A. General Requirements

1. The permittee shall handle and dispose of sewage sludge in accordance with 30 TAC Chapter 312 and all other applicable state and federal regulations in a manner which protects public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants which may be present in the sludge.

2. In all cases, if the person (Permit holder) who prepares the sewage sludge supplies the sewage sludge to another person for land application use or to the owner or lease holder of the land, the Permit holder shall provide necessary information to the parties who receive the sludge to assure compliance with these regulations.

3. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permits Section (MC 148) of any change planned in the sewage sludge disposal practice.

B. Testing Requirements

1. Sewage sludge shall be tested once during the term of this Permit in accordance with the method specified in 40 CFR Part 261, Appendix II [Toxicity Characteristic Leaching Procedure (TCLP)] or other method, which receives the prior approval of the TNRCC. Sewage sludge failing this test shall be managed according to RCRA standards for generators of hazardous waste, and the waste's disposition must be in accordance with all applicable requirements for hazardous waste processing, storage, or disposal. Following failure of any TCLP test, the management or disposal of sewage sludge at a facility other than an authorized hazardous waste processing, storage, or disposal facility shall be prohibited until such time as the permittee can demonstrate the sewage sludge no longer exhibits the hazardous waste toxicity characteristics (as demonstrated by the results of the TCLP tests). A written report shall be provided to both the TNRCC Industrial and Hazardous Waste Division (MC 126) and the Regional Manager (MC Region 5) of the appropriate TNRCC field office within 7 days after failing the Toxicity Characteristic Leaching Procedure Test (TCLP). The report shall contain test results, certification that unauthorized waste management has stopped and a summary of alternative disposal plans that comply with RCRA standards for the management of hazardous waste. The report shall be addressed to: Director, Industrial and Hazardous Waste Division (MC 126), Texas Natural Resource Conservation Commission, P. O. Box 13087, Austin, Texas 78711-3087. In addition, the permittee shall prepare an annual report on the results of all sludge toxicity testing. This annual report shall be submitted to the TNRCC Agriculture & Watershed Management Division, Program Support Team (MC 158) and the Regional Office (MC Region 5) by September 1 of each year.

Alternative 3 - The sewage sludge shall be analyzed for enteric viruses prior to pathogen treatment. The limit for enteric viruses is less than one Plaque-forming Unit per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 30 TAC §312.82(a)(2)(C)(i-iii) for specific information. The sewage sludge shall be analyzed for viable helminth ova prior to pathogen treatment. The limit for viable helminth ova is less than one per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 30 TAC §312.82(a)(2)(C)(iv-vi) for specific information.

Alternative 4 - The density of enteric viruses in the sewage sludge shall be less than one Plaque-forming Unit per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed.

The density of viable helminth ova in the sewage sludge shall be less than one per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed.

Alternative 5 (PFRP) - Sewage sludge that is used or disposed of shall be treated in one of the processes to Further Reduce Pathogens (PFRP) described in 40 CFR Part 503, Appendix B.

Alternative 6 (PFRP Equivalent) - Sewage sludge that is used or disposed of shall be treated in a process that has been approved by the U. S. Environmental Protection Agency as being equivalent to those in Alternative 5.

b. Three alternatives are available to demonstrate compliance with Class B criteria for sewage sludge.

Alternative 1 -

i. A minimum of seven random samples of the sewage sludge shall be collected within 48 hours of the time the sewage sludge is used or disposed of during each monitoring episode for the sewage sludge.

ii. The geometric mean of the density of fecal coliform in the samples collected shall be less than either 2,000,000 MPN per gram of total solids (dry weight basis) or 2,000,000 Colony Forming Units per gram of total solids (dry weight basis).

Alternative 2 - Sewage sludge that is used or disposed of shall be treated in one of the Processes to Significantly Reduce Pathogens (PSRP) described in 40 CFR Part 503, Appendix B, so long as all of the following requirements are met by the generator of the sewage sludge.

i. Prior to use or disposal, all the sewage sludge must have been generated from a single location, except as provided in paragraph v. below;

ii. An independent Texas registered professional engineer must make a certification to the generator of a sewage sludge that the wastewater treatment facility generating the sewage sludge is designed to achieve one of the Processes to Significantly Reduce Pathogens at the permitted design loading of the facility. The certification need only be repeated if the design loading of the facility is increased. The certification shall include a statement indicating the design meets all the applicable standards specified in Appendix B of 40 CFR Part 503;

In addition, the following site restrictions must be met if Class B sludge is land applied:

i. Food crops with harvested parts that touch the sewage sludge/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of sewage sludge.

ii. Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of sewage sludge when the sewage sludge remains on the land surface for 4 months or longer prior to incorporation into the soil.

iii. Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of sewage sludge when the sewage sludge remains on the land surface for less than 4 months prior to incorporation into the soil.

iv. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of sewage sludge.

v. Animals shall not be allowed to graze on the land for 30 days after application of sewage sludge.

vi. Turf grown on land where sewage sludge is applied shall not be harvested for 1 year after application of the sewage sludge when the harvested turf is placed on either land with a high potential for public exposure or a lawn.

vii. Public access to land with a high potential for public exposure shall be restricted for 1 year after application of sewage sludge.

viii. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of sewage sludge.

ix. Land application of sludge shall be in accordance with the buffer zone requirements found in 30 TAC §312.44.

4. Vector Attraction Reduction Requirements

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site shall be treated by one of the following alternatives 1 through 10 for Vector Attraction Reduction.

Alternative 1 - The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38 percent.

Alternative 2 - If Alternative 1 cannot be met for an anaerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37 degrees Celsius. Volatile solids must be reduced by less than 17 percent to demonstrate compliance.

Alternative 3 - If Alternative 1 cannot be met for an aerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge with a percent solids of two percent or less aerobically in the laboratory in a bench-scale unit for 30 additional days at 20 degrees Celsius. Volatile solids must be reduced by less than 15 percent to demonstrate compliance.

C. Monitoring Requirements

Toxicity Characteristic Leaching Procedure (TCLP) Test - once during the term of this Permit

PCBs - once during the term of this Permit

All metal constituents and Fecal coliform or Salmonella sp. bacteria shall be monitored at the appropriate frequency shown below, pursuant to 30 TAC §312.46(a)(1):

Amount of sewage sludge (*) dry tons per 365 day period				Frequency
0	≤ Sludge	<	290	Once/Year
290	≤ Sludge	<	1,500	Once/Quarter
1,500	≤ Sludge	<	15,000	Once/Two Months
15,000	≤ Sludge			Once/Month

(*) The amount of bulk sewage sludge applied to the land (dry weight basis).

Representative samples of sewage sludge shall be collected and analyzed in accordance with the methods referenced in 30 TAC §312.7.

C. Management Practices

1. Bulk sewage sludge shall not be applied to agricultural land, forest, a public contact site, or a reclamation site that is flooded, frozen, or snow-covered so that the bulk sewage sludge enters a wetland or other waters in the State.

2. Bulk sewage sludge not meeting Class A requirements shall be land applied in a manner which complies with the Management Requirements in accordance with 30 TAC §312.44.

3. Bulk sewage sludge shall be applied at or below the agronomic rate of the cover crop.

D. Notification Requirements

1. If bulk sewage sludge is applied to land in a State other than Texas, written notice shall be provided prior to the initial land application to the permitting authority for the State in which the bulk sewage sludge is proposed to be applied. The notice shall include:

   a. The location, by street address, and specific latitude and longitude, of each land application site.

   b. The approximate time period bulk sewage sludge will be applied to the site.

   c. The name, address, telephone number, and National Pollutant Discharge Elimination System Permit number (if appropriate) for the person who will apply the bulk sewage sludge.

2. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permits Section (MC 148) of any change planned in the sewage sludge disposal practice.

E. Recordkeeping Requirements

The sludge documents will be retained on-site at the same location as other TNRCC records. The person who prepares bulk sewage sludge or a sewage sludge material shall develop the following information and shall retain the information on-site for five years. If the permittee supplies the sludge to another person who land applies the sludge, the permittee shall notify the land applier of the requirements for record keeping found in 30 TAC §312.47 for persons who land apply.

1. The concentration (mg/kg) in the sludge of each pollutant listed in Table 3 above and the applicable pollutant concentration criteria (mg/kg), or the applicable cumulative pollutant loading rate and the applicable cumulative pollutant loading rate limit (lbs/ac) listed in Table 2 above.

2. A description of how the pathogen reduction requirements are met (including site restrictions for Class B sludges, if applicable).

3. A description of how the vector attraction reduction requirements are met.

4. A description of how the management practices listed above in Section II.C are being met.

5. PCB concentration in sludge in mg/kg.

6. Date(s) of disposal.

7. Owner of disposal site(s).

8. Texas Natural Resource Conservation Commission registration number, if applicable.

9. Amount of sludge disposal dry weight (lbs/acre) at each disposal site.

10. The concentration (mg/kg) in the sludge of each pollutant listed in Table 1 (defined as a monthly average) as well as the applicable pollutant concentration criteria (mg/kg) listed in Table 3 above, or the applicable pollutant loading rate limit (lbs/acre) listed in Table 2 above if it exceeds 90% of the limit.

11. Level of pathogen reduction achieved (Class A or Class B).

12. Alternative used as listed in Section I.B.3.(a. or b.). Alternatives describe how the pathogen reduction requirements are met. If Class B sludge, include information on how site restrictions were met.

13. Vector attraction reduction alternative used as listed in Section I.B.4.

14. Annual sludge production in dry tons/year.

15. Amount of sludge land applied in dry tons/year.

16. The certification statement listed in either 30 TAC §312.47(a)(4)(A)(ii) or 30 TAC §312.47(a)(5)(A)(ii) as applicable to the permittee's sludge treatment activities, shall be attached to the annual reporting form.

17. When the amount of any pollutant applied to the land exceeds 90% of the cumulative pollutant loading rate for that pollutant, as described in Table 2, the permittee shall report the following information as an attachment to the annual reporting form.

    a. The location, by street address, and specific latitude and longitude.

    b. The number of acres in each site on which bulk sewage sludge is applied.

    c. The date and time bulk sewage sludge is applied to each site.

    d. The cumulative amount of each pollutant (i.e., pounds/acre) listed in Table 2 in the bulk sewage sludge applied to each site.

    e. The amount of sewage sludge (i.e., dry tons) applied to each site.

The above records shall be maintained on a monthly basis and shall be made available to the Texas Natural Resource Conservation Commission upon request.

F. Recordkeeping Requirements

The permittee shall develop the following information and shall retain the information for five years.

1. The description (including procedures followed and the results) of all liquid Paint Filter Tests performed.

2. The description (including procedures followed and results) of all TCLP tests performed.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Natural Resource Conservation Commission upon request.

G. Reporting Requirements

The permittee shall report annually to the TNRCC Agriculture & Watershed Management Division, Program Support Team (MC 158) and the Regional Office (MC Region 5) by September 1 of each year the following information:

1. Toxicity Characteristic Leaching Procedure (TCLP) results.

2. Annual sludge production in dry tons/year.

3. Amount of sludge disposed in a municipal solid waste landfill in dry tons/year.

4. Amount of sludge transported interstate in dry tons/year.

5. A certification that the sewage sludge meets the requirements of 30 TAC Chapter 330 concerning the quality of the sludge disposed in a municipal solid waste landfill.

6. Identity of hauler(s) and transporter registration number.

7. Owner of disposal site(s).

8. Location of disposal site(s).

9. Date(s) of disposal.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Natural Resource Conservation Commission upon request.

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

November 13, 1998

City of Whitehouse
PO Box 776
Whitehouse, TX 75791

Re: Texas Natural Resource Conservation Commission
(TNRCC) Permit No. WQ0011222-001

Dear Permittee:

Flow data that you have submitted to TNRCC shows that your wastewater treatment plant may need to be expanded or upgraded in order to assure that you will have adequate wastewater treatment capacity in the future. In this letter, TNRCC asks you to take certain actions and provide certain information so that we can work together to avoid exceeding your wastewater treatment capacity. TNRCC's authority to require this is in 30 Texas Administrative Code Section 305.126.

A review of your self-reported data was conducted for Jan 1998 through Mar 1998. These records showed that the daily average flow over three consecutive months has reached or exceeded 75% of your permitted average daily flow, as follows:

Months Reviewed	Reported Flow (MGD)
Jan 98	.594809
Feb 98	.552589
Mar 98	.552585

Since you have reached or exceeded 75 percent of the permitted average daily flow for three consecutive months, State law requires that you either: 1) initiate engineering and financial planning for expansion and/or upgrading of the wastewater treatment and/or collection facilities; or 2) seek a waiver of this requirement.

If, as we hope, you have already begun engineering and financial planning, please submit to us your schedule for obtaining funding and submitting engineering plans to TNRCC or other state agencies for approval. If you are under a court order, TNRCC order, or EPA order that requires you to expand and/or upgrade your facilities, please provide us with a copy of that order and your projected schedule for compliance.

If, however, you have not begun planning, you must do so right away. Again, please submit to us your schedule for obtaining funding and submitting engineering plans to TNRCC or other state agencies. Alternatively, you may ask the TNRCC to waive the requirement that you submit a schedule for obtaining funding and submitting engineering plans on the basis that the planned population to be served or the quantity of waste produced is not expected to exceed the design limitations of the treatment facility.

To support a request for waiver, you must submit an engineering report. We ask that the engineering report include the following:

a. estimated percentage of flow contributed by industrial, commercial, municipal (schools, convention centers, etc.) and residential users;

b. projected 30-day average influent flow rate to the treatment plant at the permit expiration date. This figure to be based on, but not limited to, the population projection, the anticipated addition and/or withdrawal of any industrial, commercial and/or municipal users to the service area over the duration of the permit;

c. 30-day average influent 5-day Biochemical Oxygen Demand and Total Suspended Solids concentration for each of the past 12 months;

d. number of unauthorized discharges from the sewage treatment plant for the past year, their estimated quantity and duration, and the circumstances surrounding each event;

e. schematic of the treatment plant showing its layout. This should also include the dimensions and design volumetric capacity of each treatment unit;

f. number of excursions for the past 24 months from the permitted parameters set forth in the permit;

g. age of the collection system and treatment plant;

h. any sewer system evaluation surveys (SSES) and/or infiltration and inflow (I/I) studies conducted during the past five years; and

I. future plans for the expansion/rehabilitation and/or construction of any new facilities including a timetable.

Please send your written response to the Database and Administration Team (MC 224), Enforcement Division, TNRCC, P.O. Box 13087, Austin, Texas 78711-3087, within 30 days after the date of this letter. Should you have any questions regarding this matter, please contact Ms. Cassandra Rosero of the Database and Administration Team at (512) 239-4754.

The Commission recognizes that the great majority of the regulated community wants to prevent pollution and to comply with environmental laws. It is our goal that you will be part of that majority by working with us on this matter.

Sincerely,

Jan Sills

Jan Sills
Database and Administration Team (MC 224)
Enforcement Division

cc: TNRCC Region 15

LAST TRANSACTION REPORT FOR HP FAX-700 SERIES VERSION: 01.03

FAX NAME: CITY OF WHITEHOUSE DATE: 19-NOV-98
FAX NUMBER: 903 839 9485 TIME: 14:49

DATE	TIME		REMOTE FAX NAME AND NUMBER	DURATION	PG	RESULT	DIAGNOSTIC
19-NOV	14:48	S	903 834 3174	0:00:48	1	OK	663840100188

S=FAX SENT
I=POLL IN(FAX RECEIVED)
O=POLLED OUT(FAX SENT)

TO PRINT THIS REPORT AUTOMATICALLY. SELECT AUTOMATIC REPORTS IN THE SETTINGS MENU.
TO PRINT MANUALLY. PRESS THE REPORT/SPACE BUTTON. THEN PRESS ENTER.

EXHIBIT

20

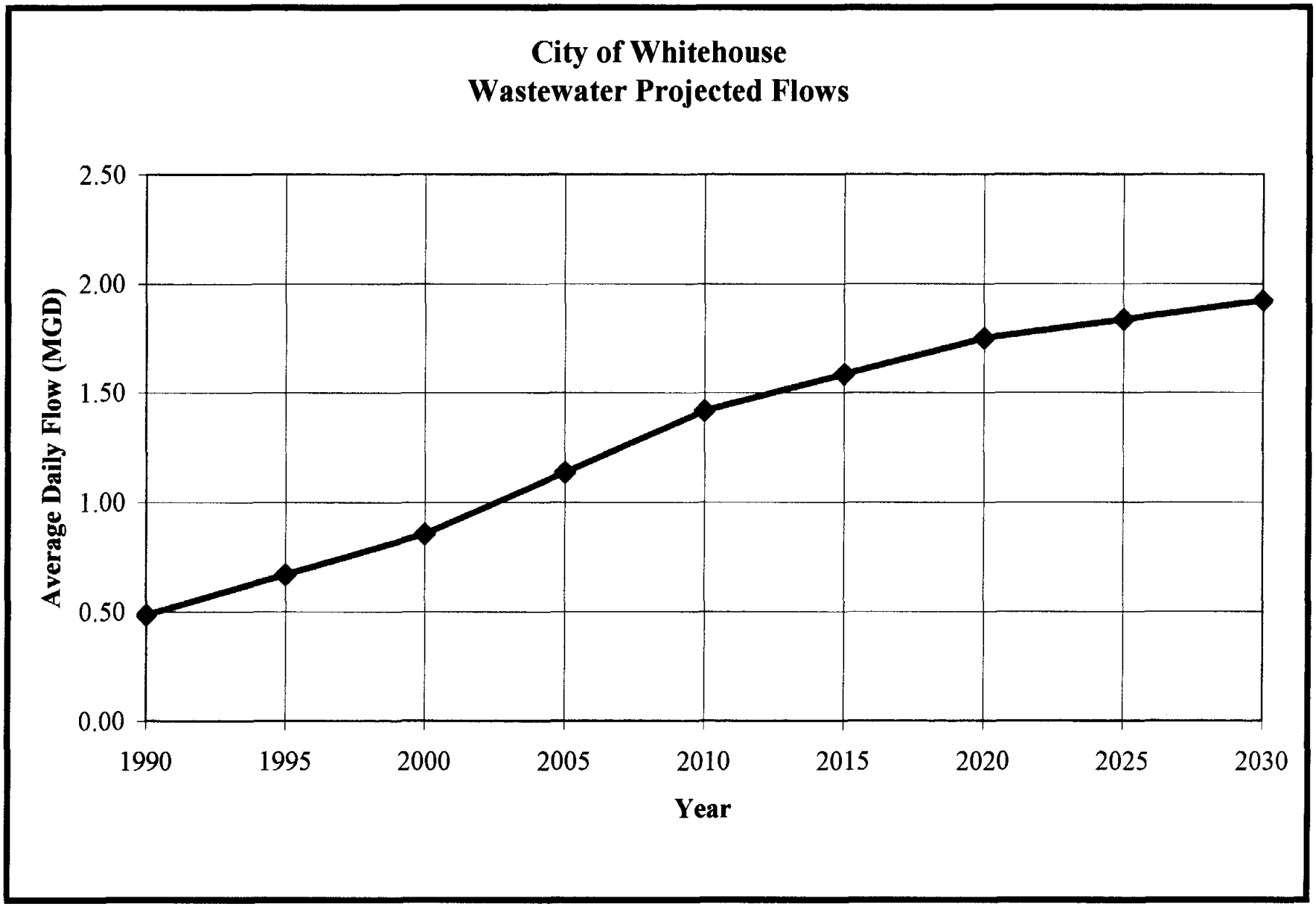
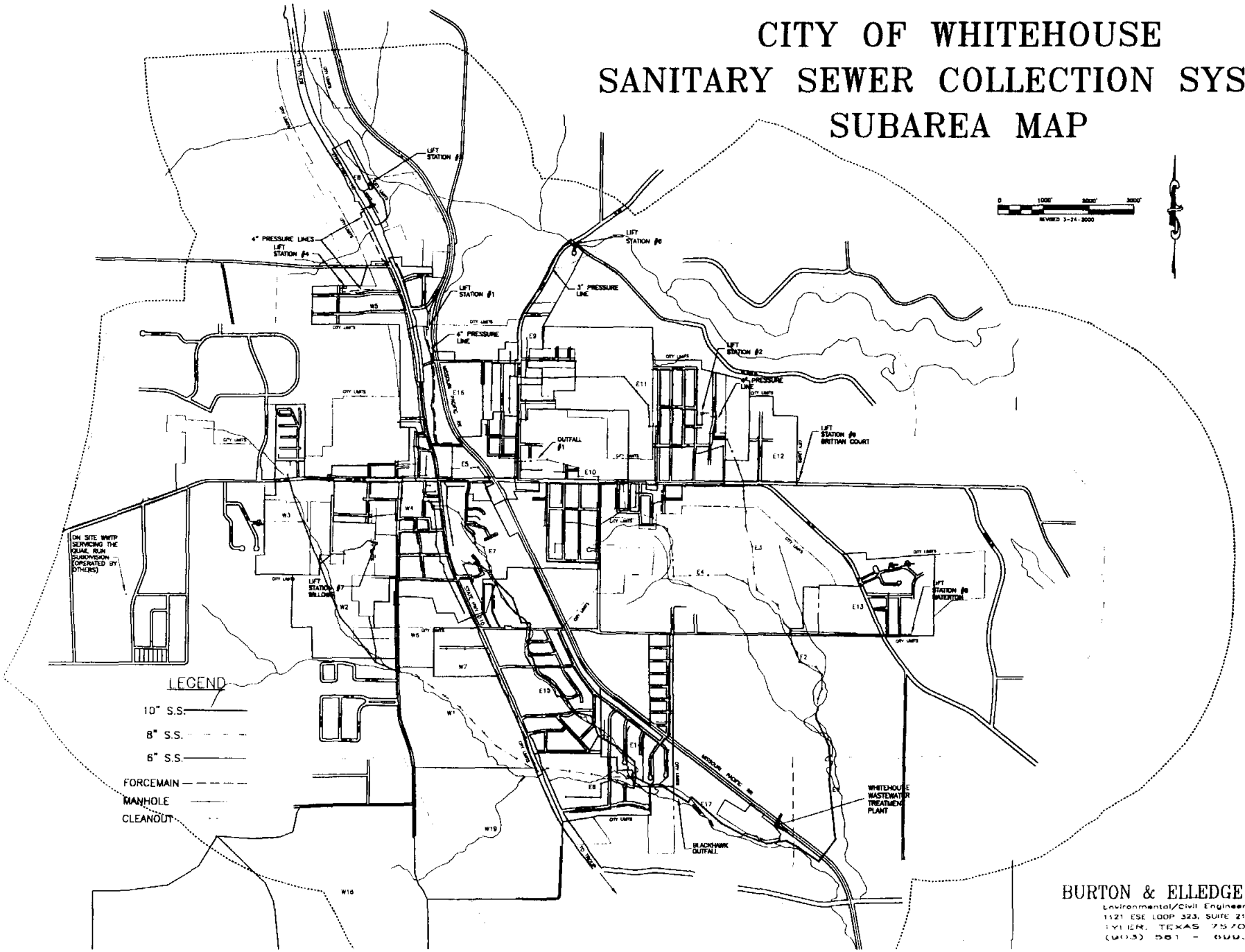
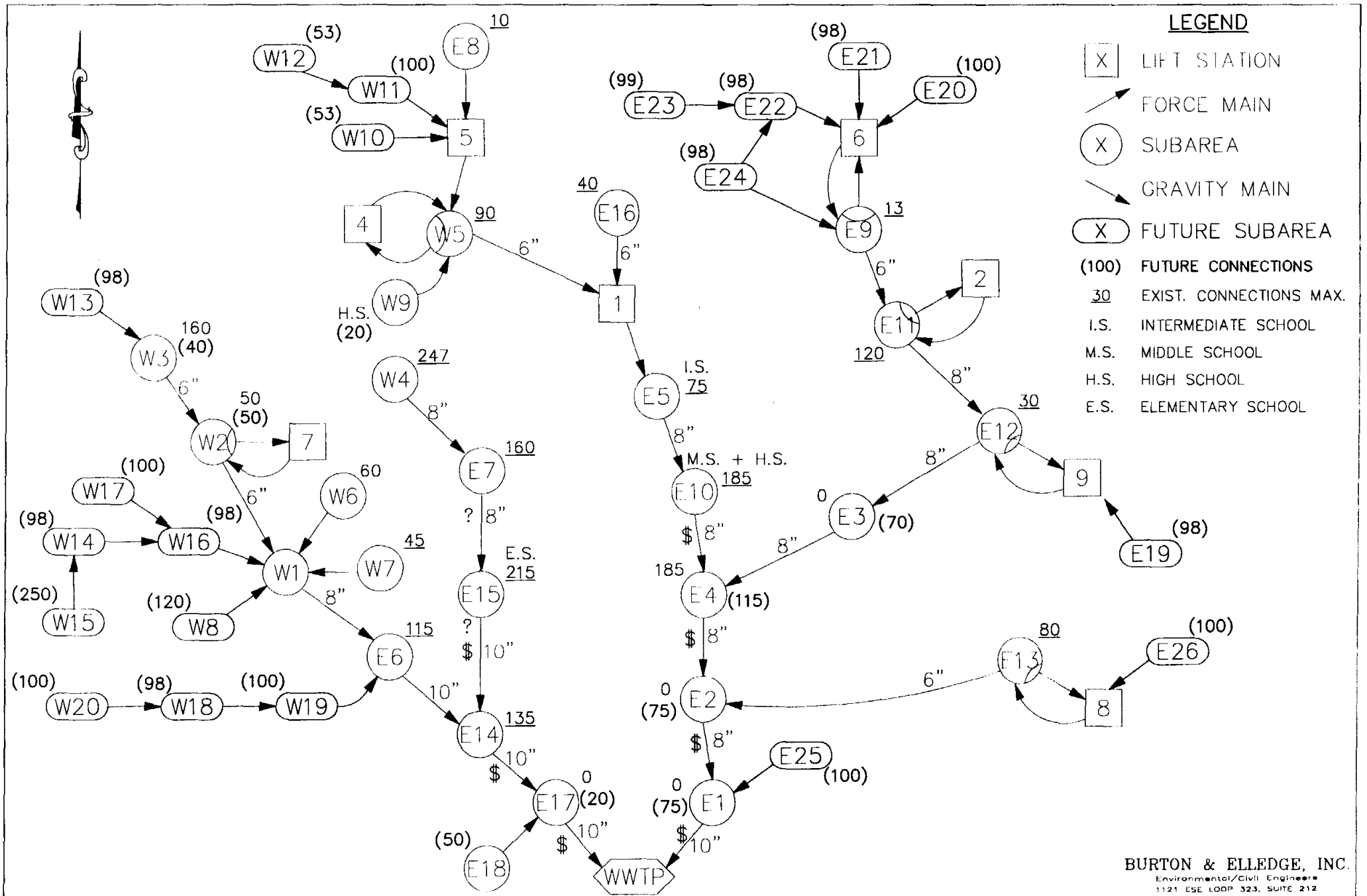

City of Whitehouse
Wastewater Projected Flows
Average Daily Flow (MGD)
2.50
2.00
1.50
1.00
0.50
0.00
1990
1995
2000
2005
2010
2015
2020
2025
2030
Year

EXHIBIT 21

CITY OF WHITEHOUSE
SANITARY SEWER COLLECTION SYSTEM
SUBAREA MAP



BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 581 - 6003



BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 - 6093

EXHIBIT 22

CITY OF WHITEHOUSE

WASTEWATER FACILITIES PLANNING

City of Whitehouse: Gravity Main Line Assessment - 6"				
Contributing Subareas	**Current Customers**	**Current Population**	**Current Required Capacity (gpm)**	**Current Available Capacity (gpm)**
E8, W5, W9	100	300	83	193
W3,W2	210	630	175	193
E9, E11	133	399	111	193
E12	30	90	25	193
E10, E4	370	1110	**308**	**193**
E16, E5	115	345	96	193
W4, E7	407	1221	**339**	**193**
E15, E14, E6 (6")	465	1395	**388**	**193**
W7	45	135	38	193
E2	0	0	0	193
E3	0	0	0	193
E1	0	0	0	193
E17	0	0	0	193
W1, E6 (8")	10	30	0	193
W6	60	180	50	193
E13	80	240	67	193
Total		6075		

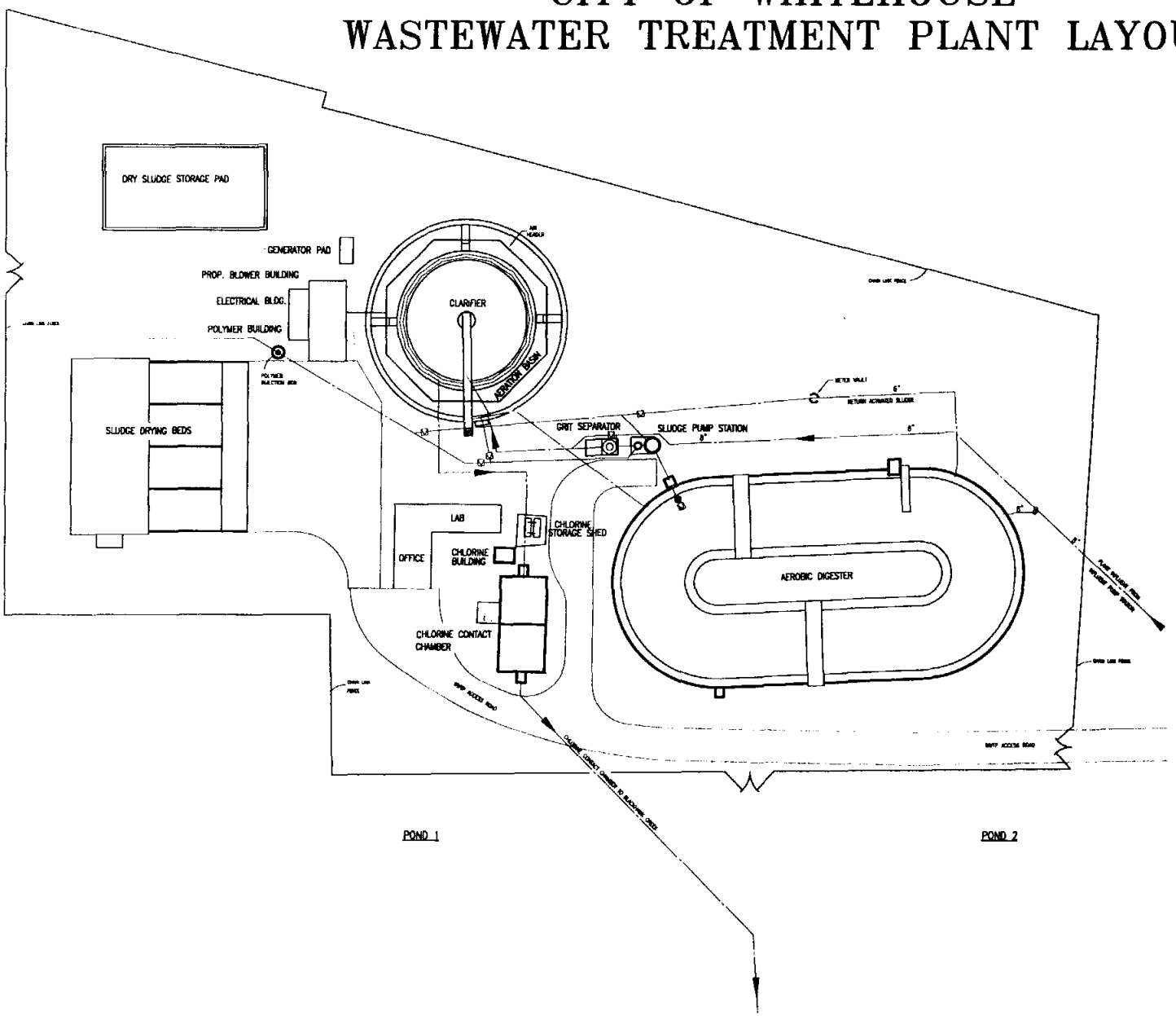
CITY OF WHITEHOUSE

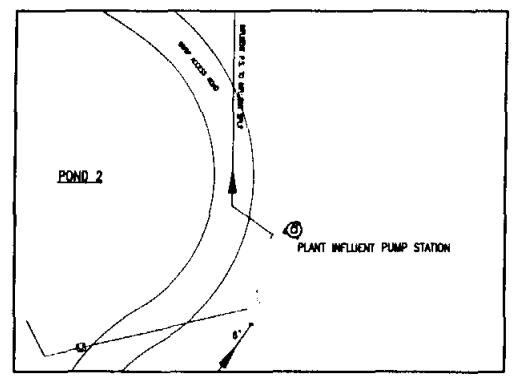
WASTEWATER FACILITIES PLANNING

City of Whitehouse: Gravity Main Line Assessment - 8"				
Subarea Unit	**Contributing Subareas**	**Current Population**	**Current Required Capacity (gpm)**	**Available Capacity (gpm)**
A	W3,W2,W1,E6,W6,W7	975	271	354
B	E8,W5,W9,E16,E5	645	179	354
C	E8,W5,W9,E16,E5,E10	1200 (+3 SCHOOLS)	**333 + SCHOOLS**	**354**
D	E8,W5,W9,E16,E5,E10,E4	1755	**488 + SCHOOLS**	**354**
E	E9,E11,E12,E3	489	136	354
F	***D + E***	2244	**623**	**354**
G	***E + D*** + E2 + E13	2484	**690**	**354**
H	W4,E7	1221	339	354
City of Whitehouse: Gravity Main Line Assessment - 10"				
I	***H*** + E15	1866	**518**	**477**
J	***I*** + E14 + ***A***	3246	**902**	**477**
K	***G*** + E1	2484	**690**	**477**

EXHIBIT 23

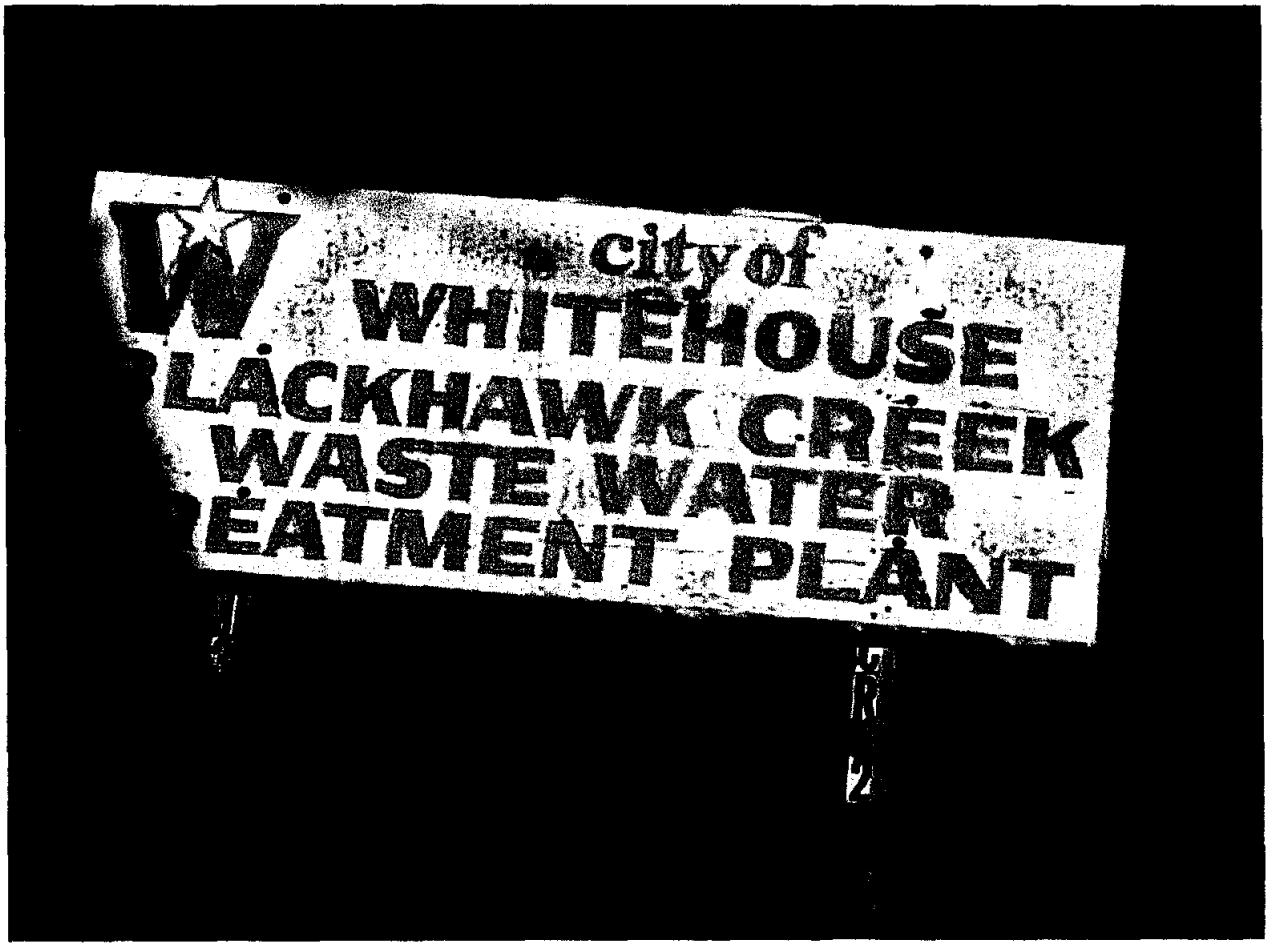
CITY OF WHITEHOUSE
WASTEWATER TREATMENT PLANT LAYOUT



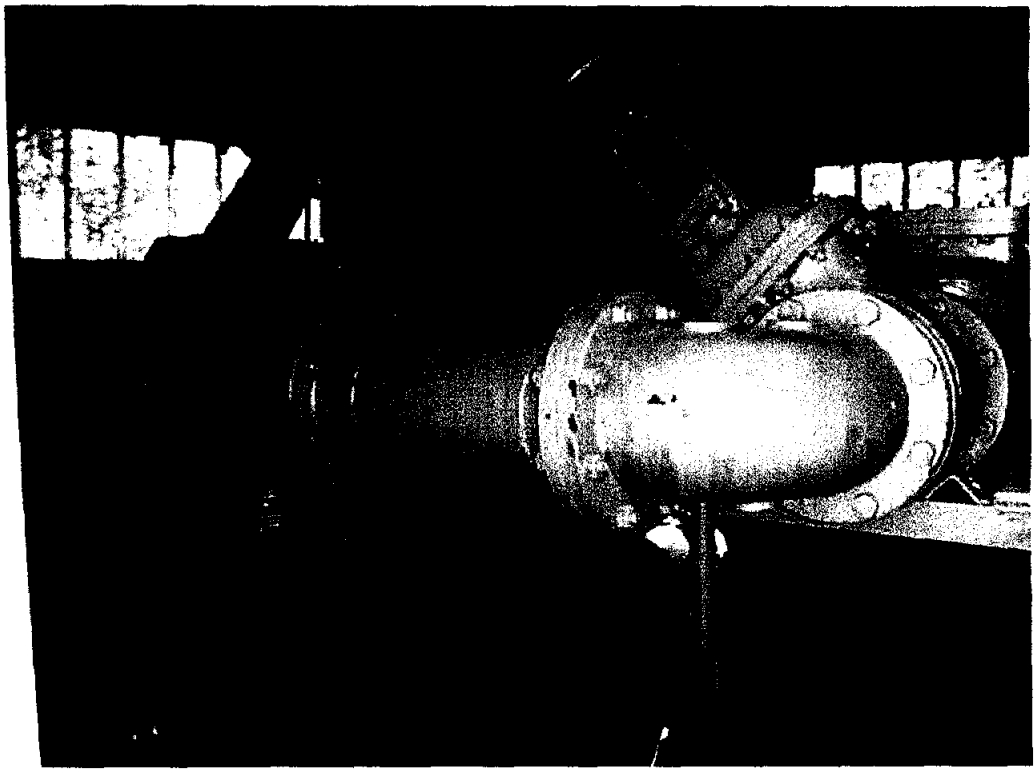


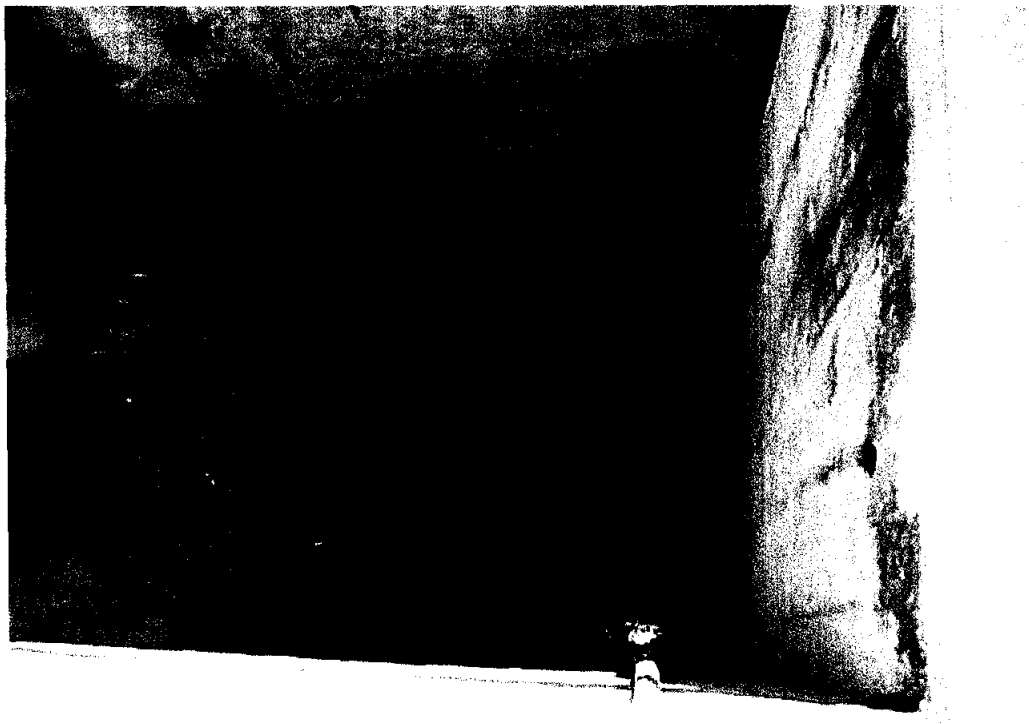
BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 LSE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 - 6903

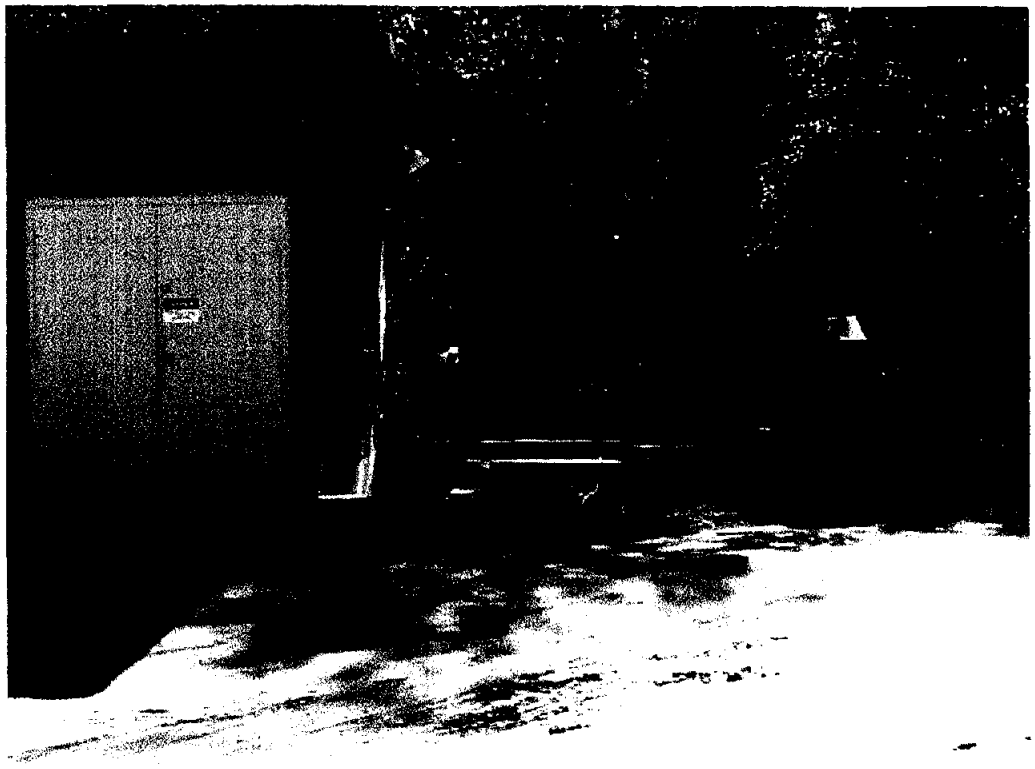
EXHIBIT 24


city of
WHITEHOUSE
LACKHAWK CREEK
WASTE WATER
EATMENT PLANT

INFLUENT PUMP STATION

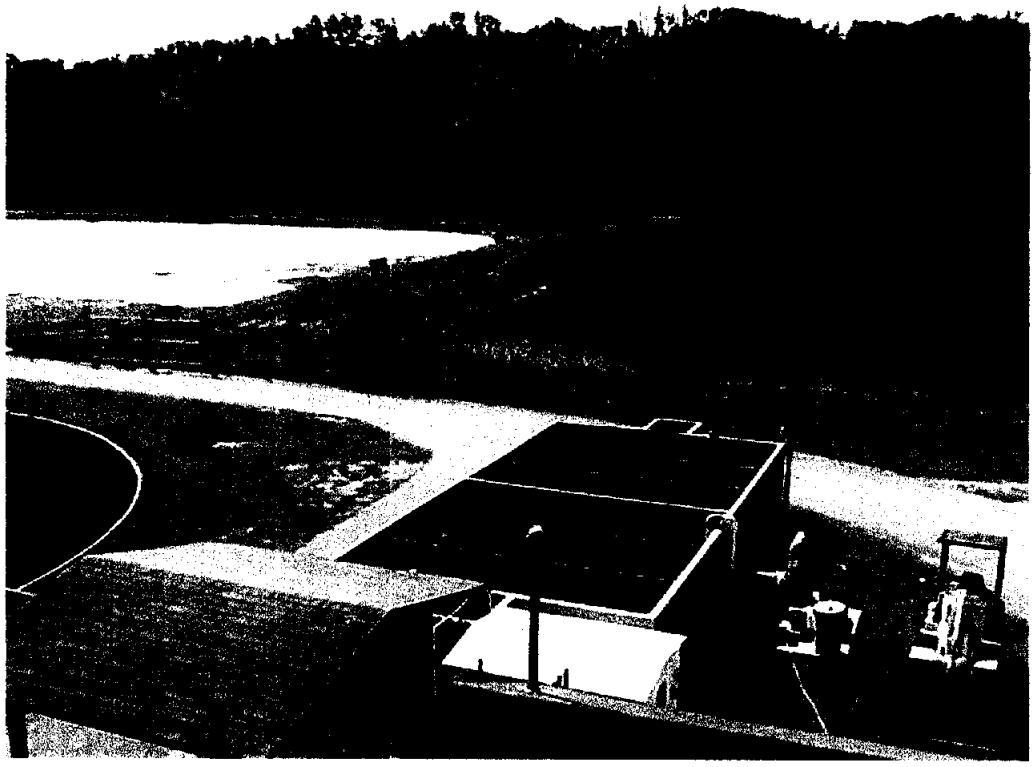


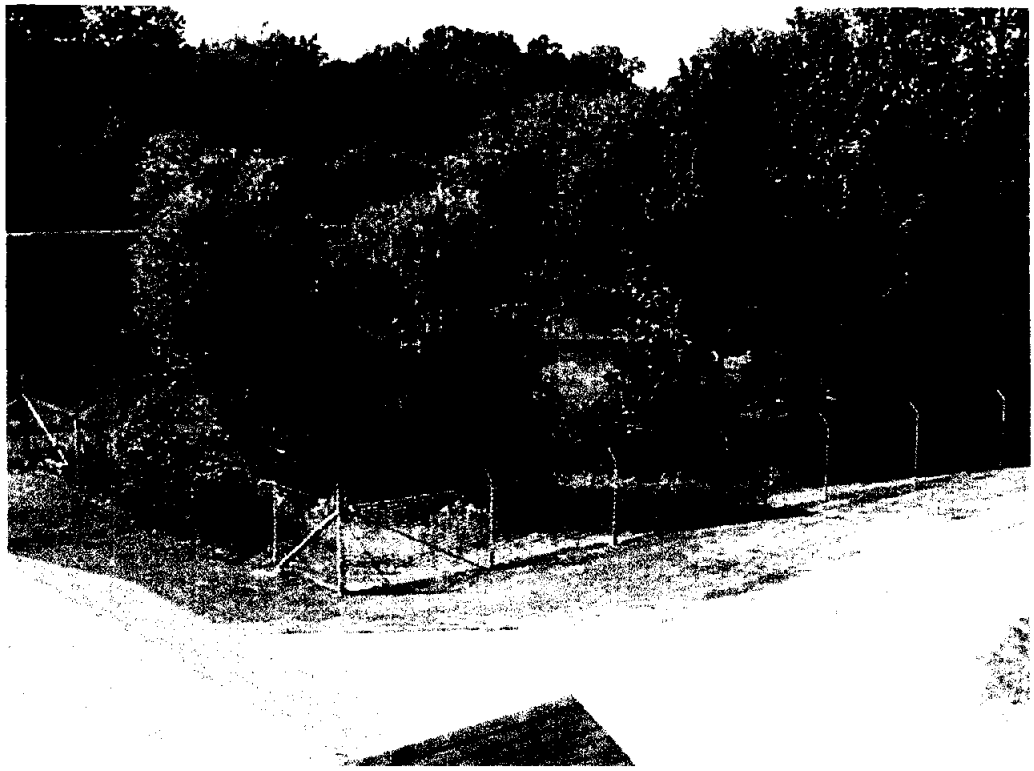




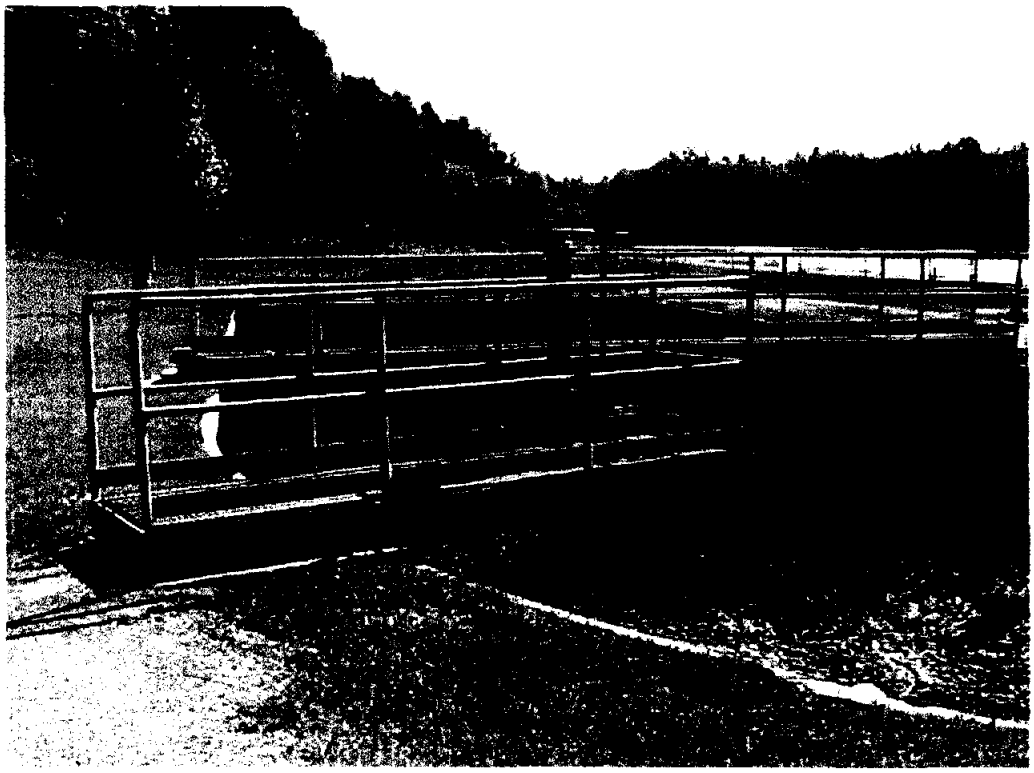
EFFLUENT (BLACKHAWK CREEK)
TO EFFLUENT DISCHARGE TO CREEK

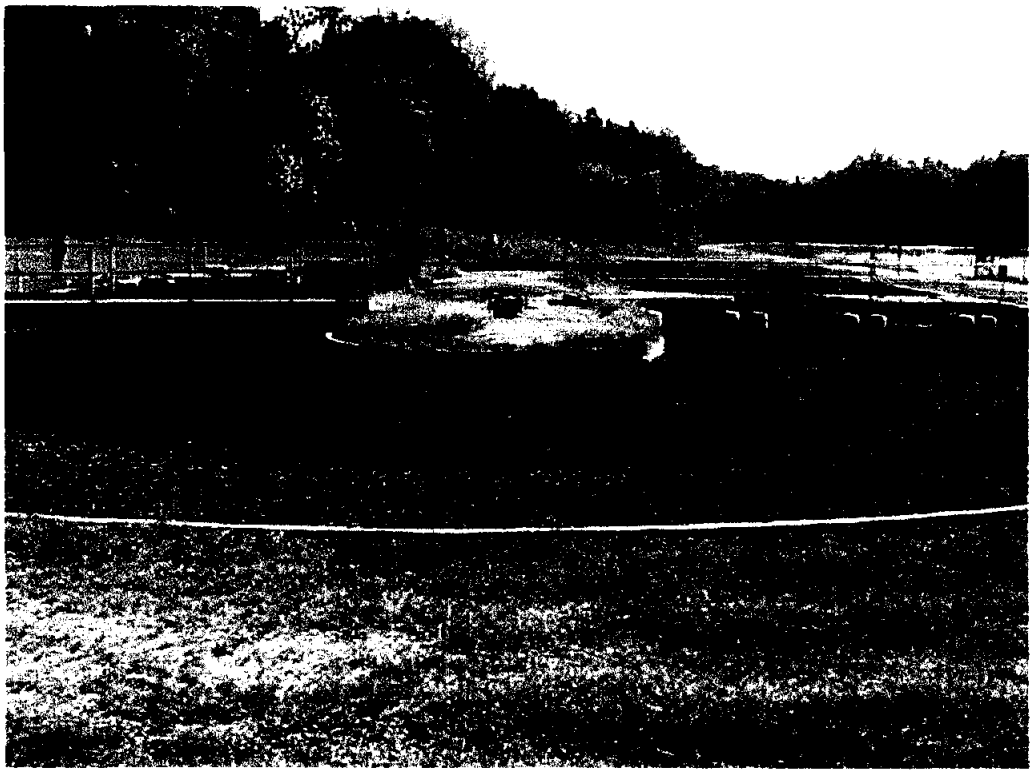
LAGOONS





OXIDATION DITCH





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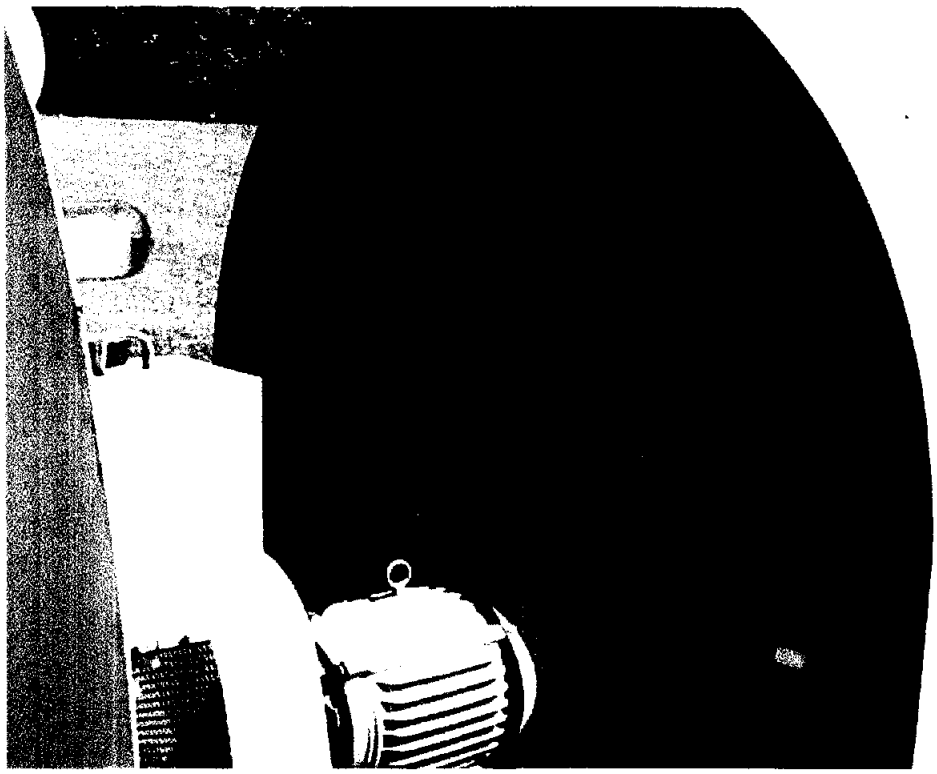
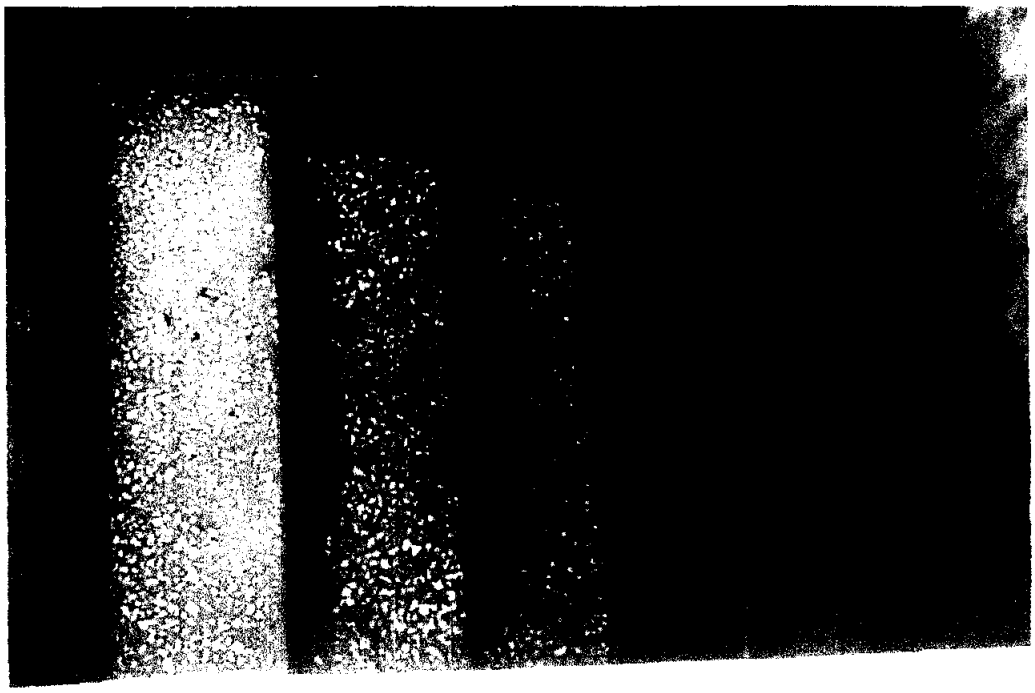
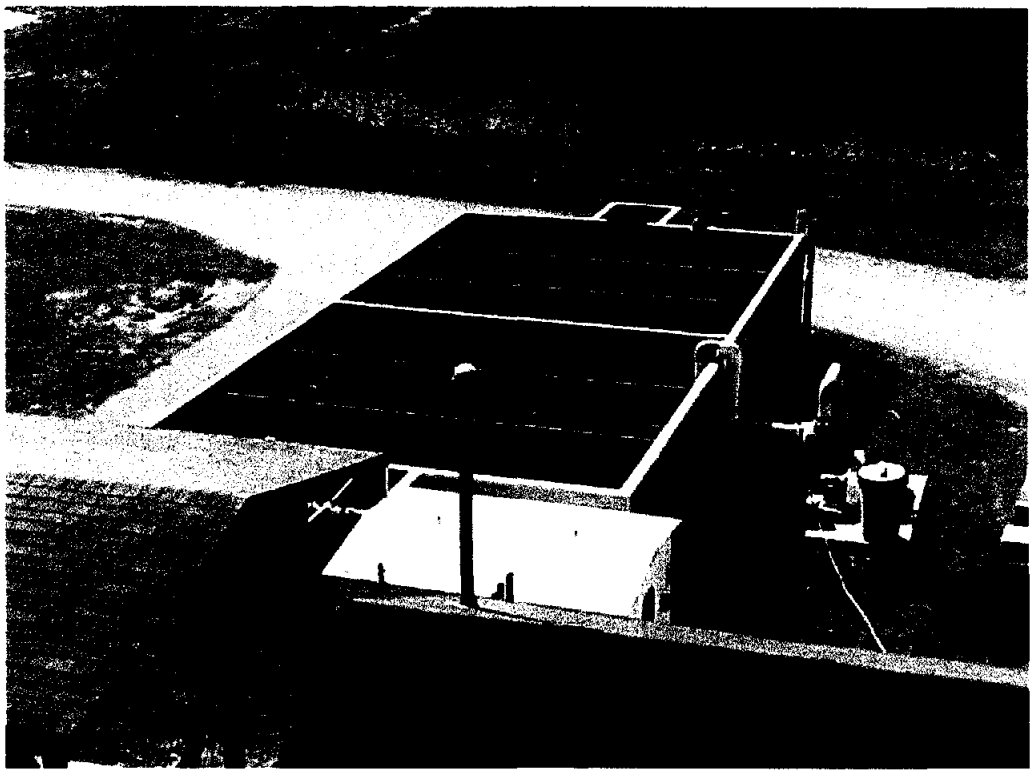
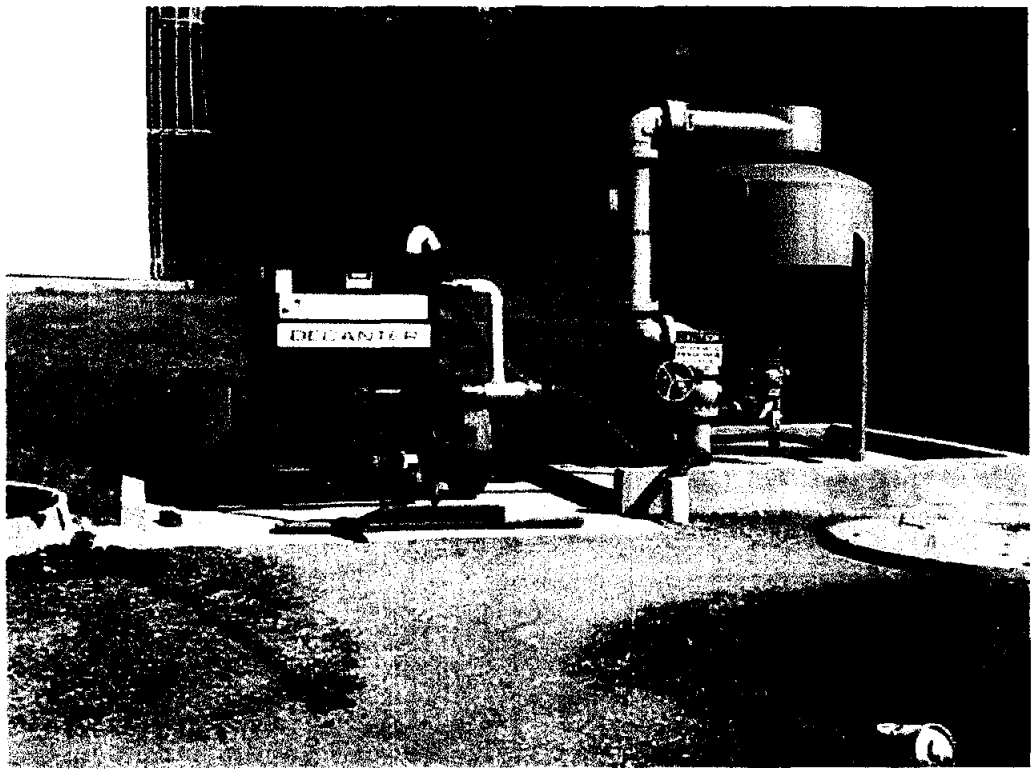


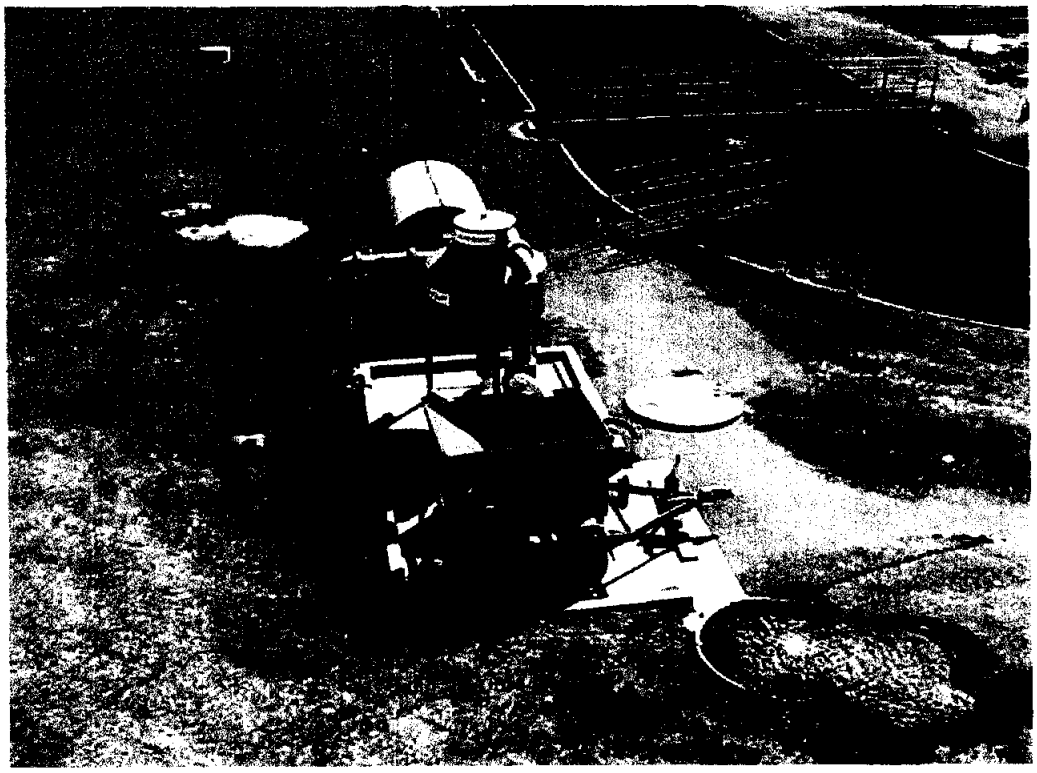
CHLORINE CONTACT CHAMBER



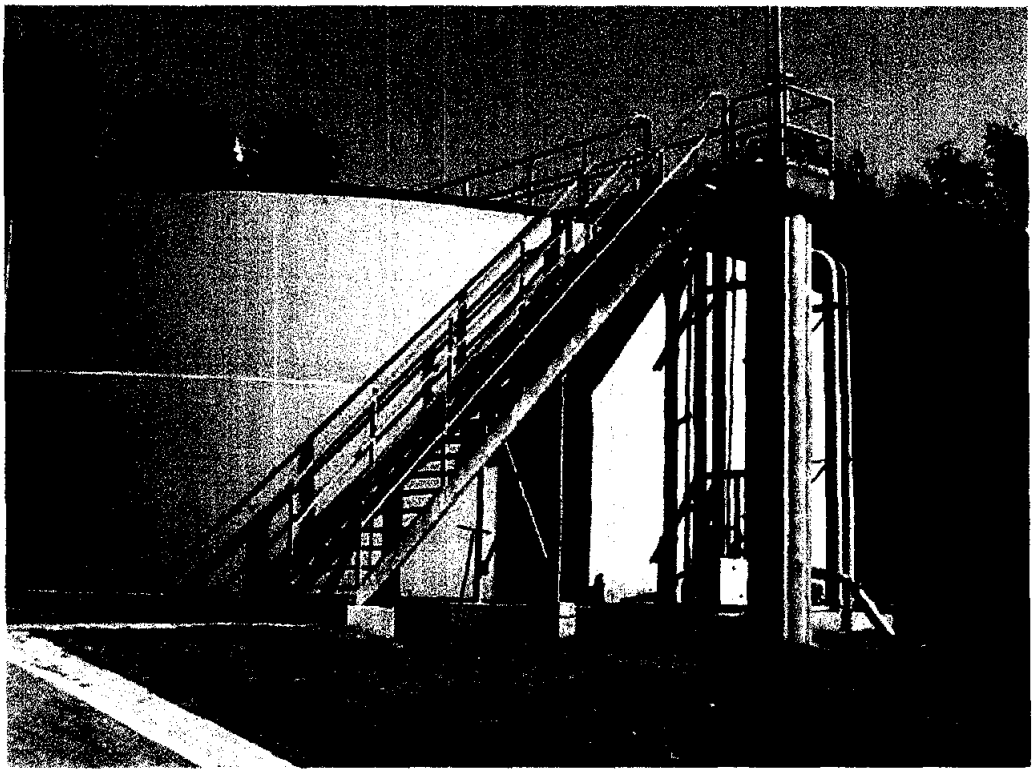


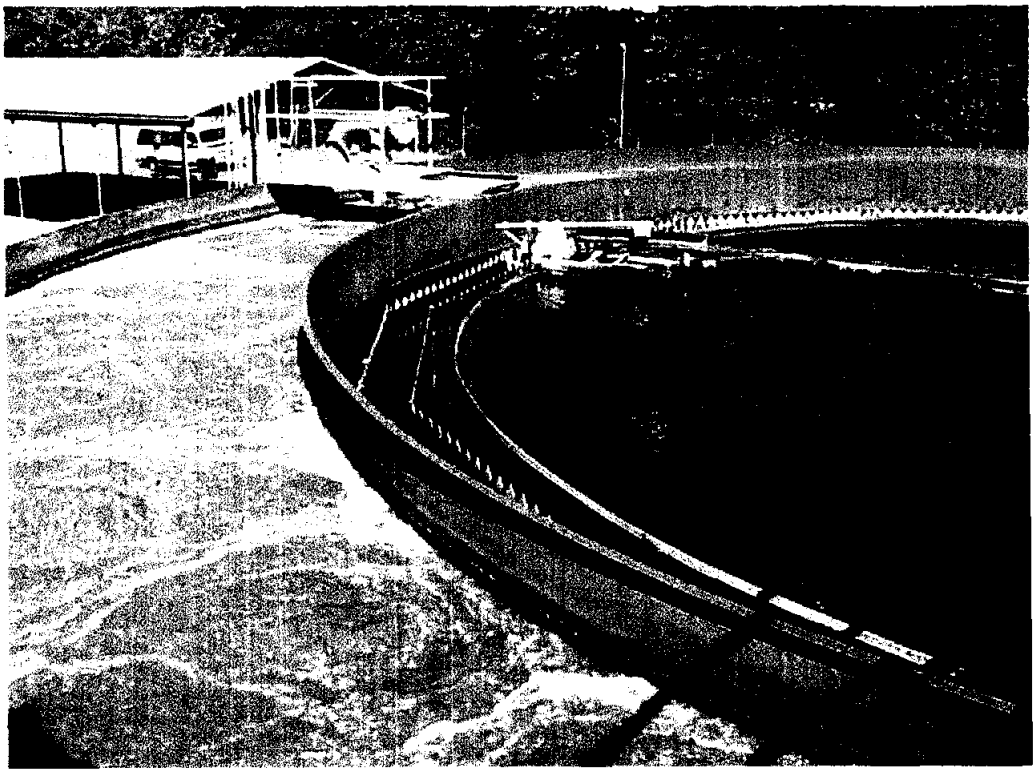
GRIT SEPARATOR

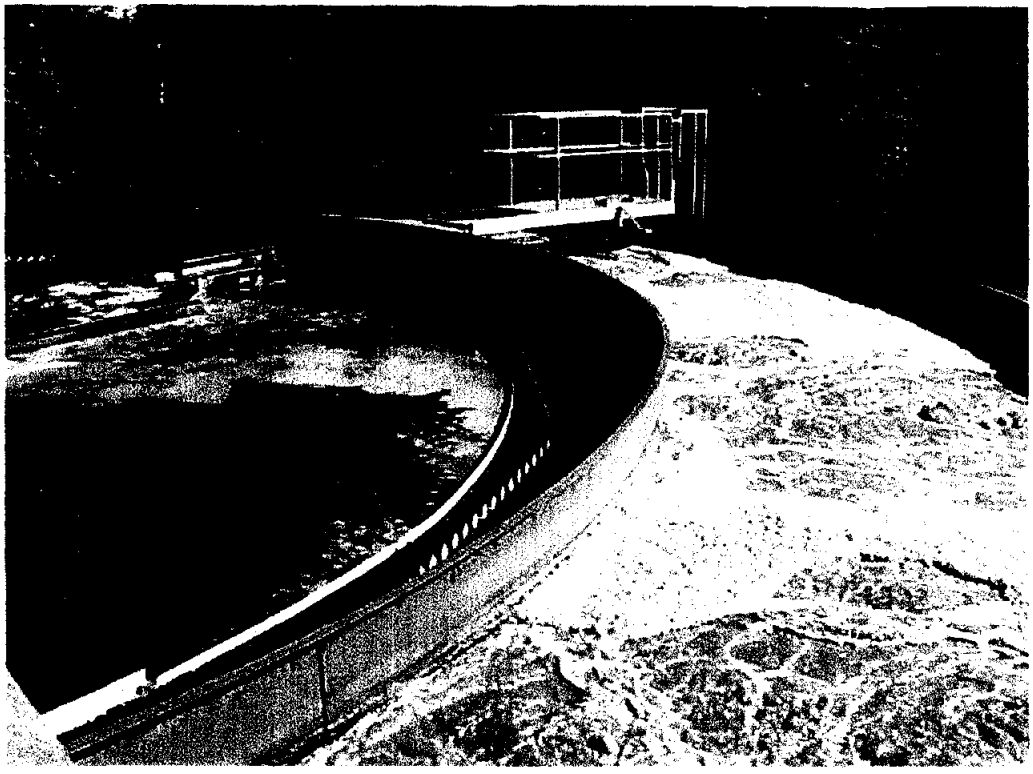




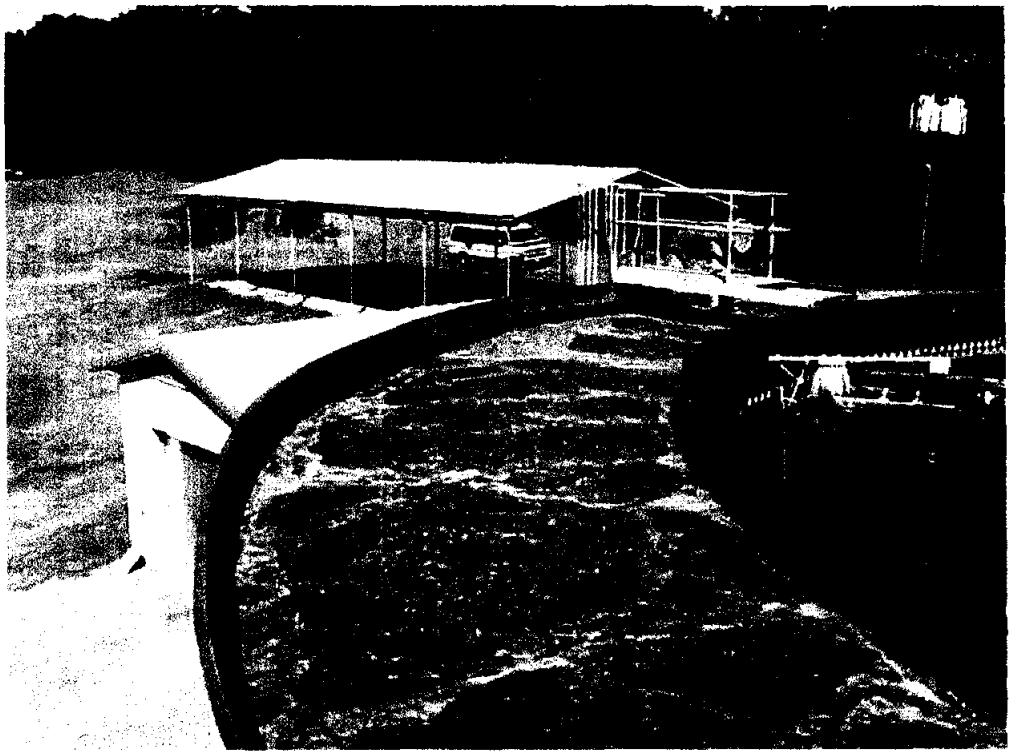
CLARIFIER / AERATION BASIN



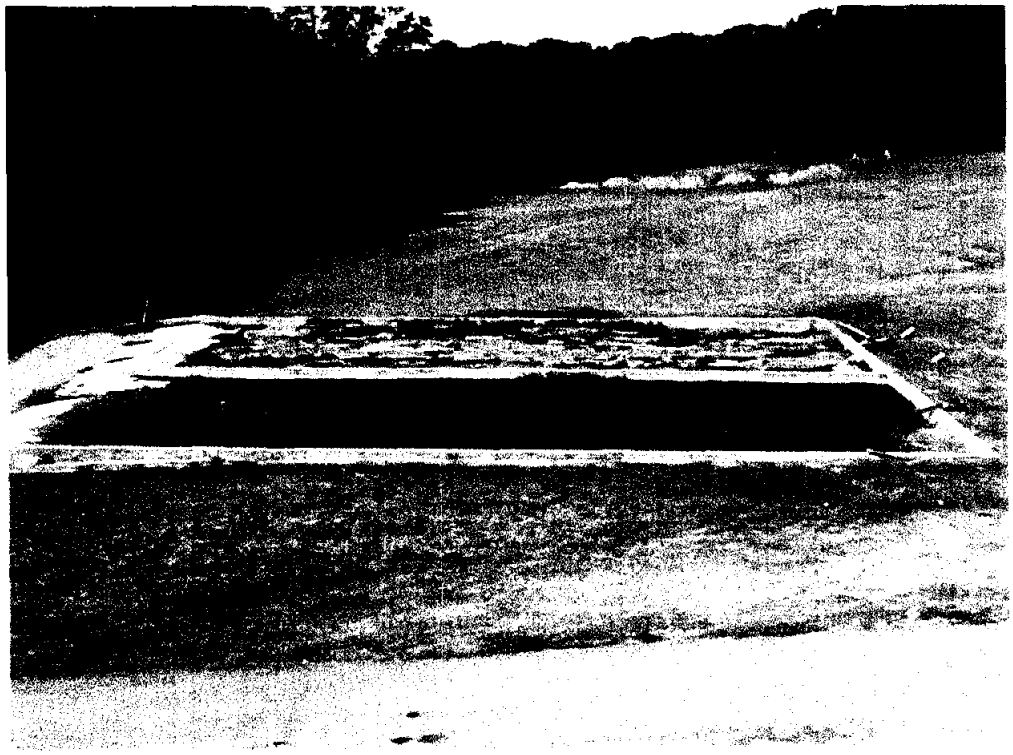


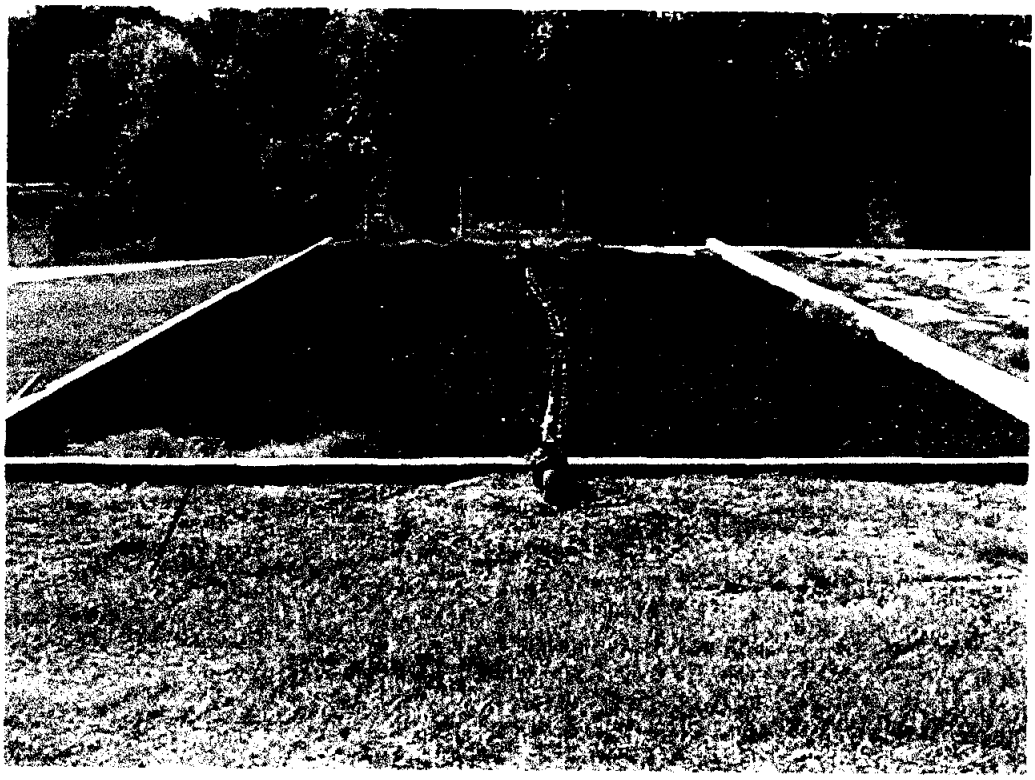


SLUDGE COVERED STORAGE

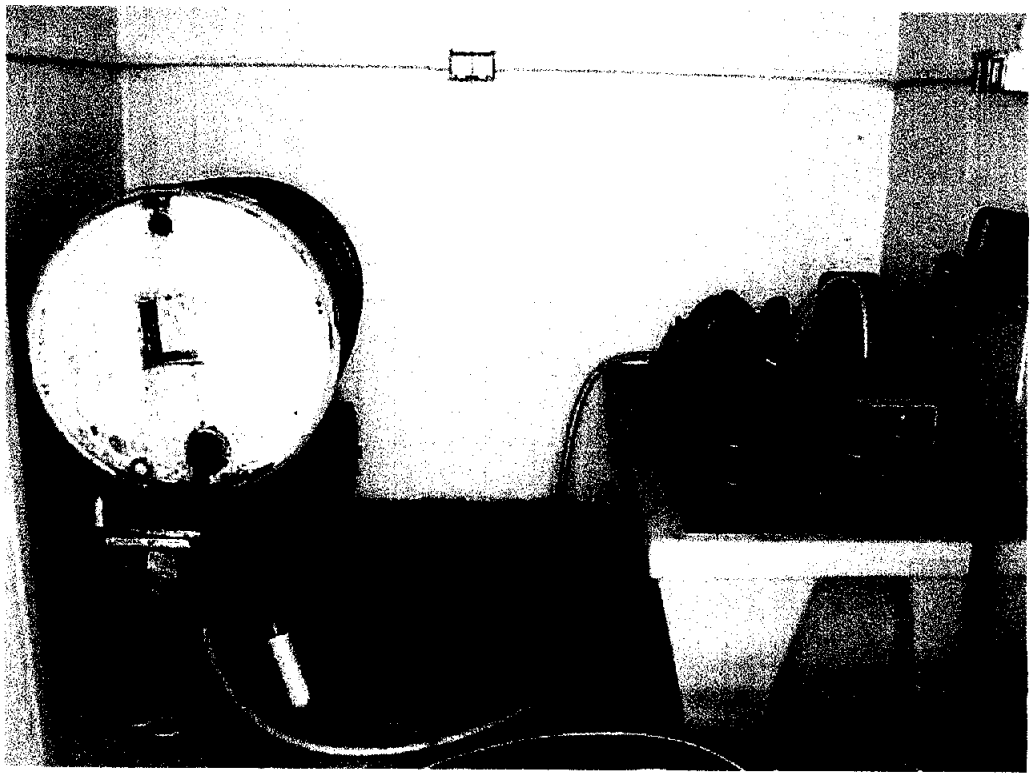


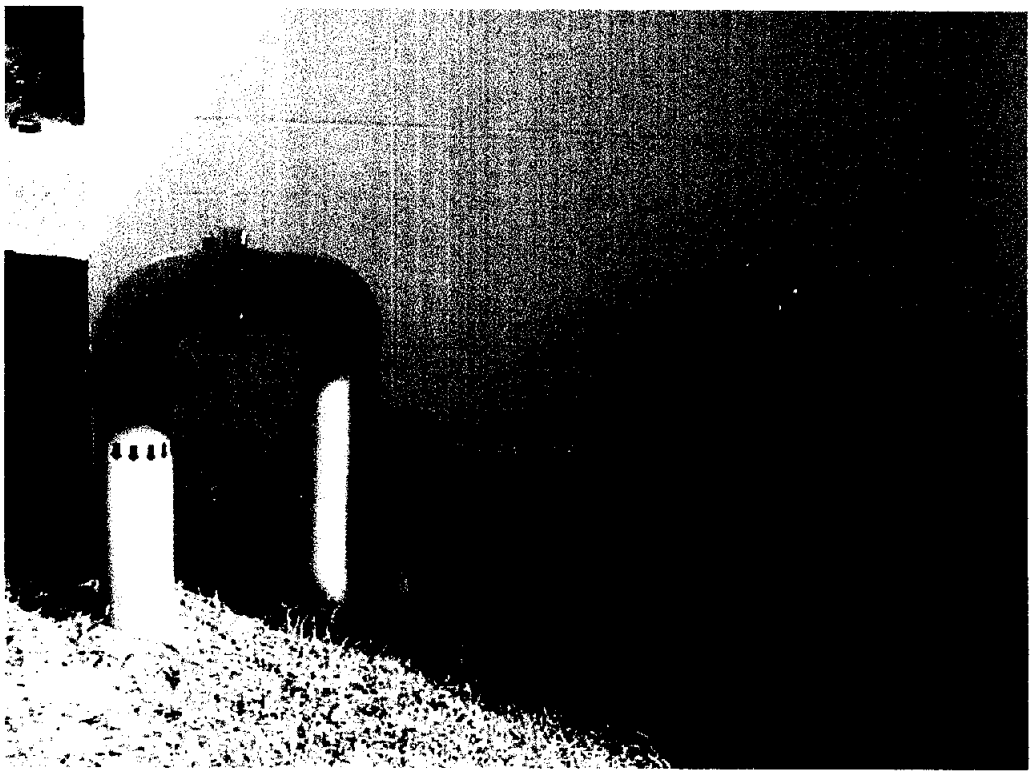
SLUDGE DRYING BED



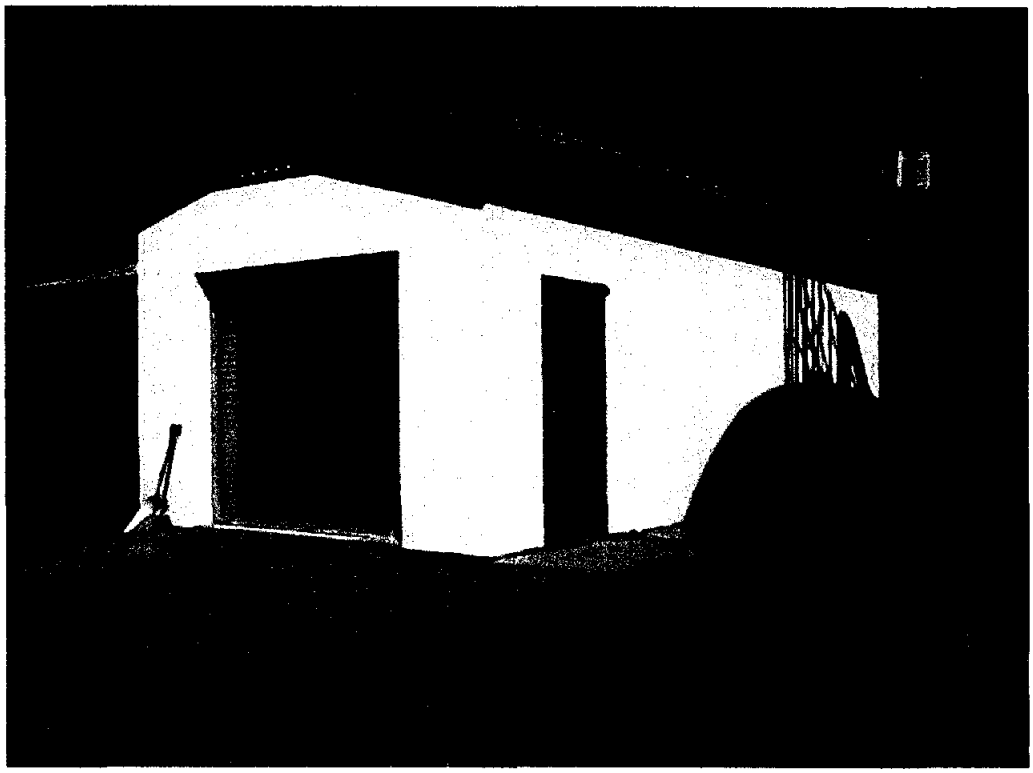


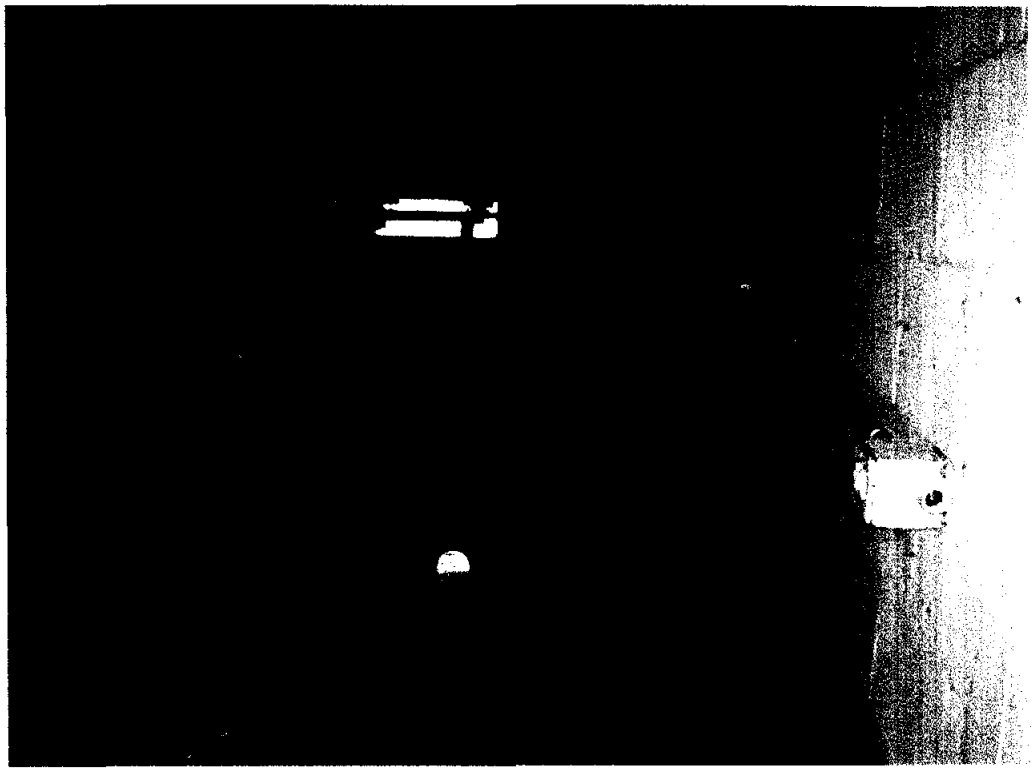
DESKINS SYSTEM



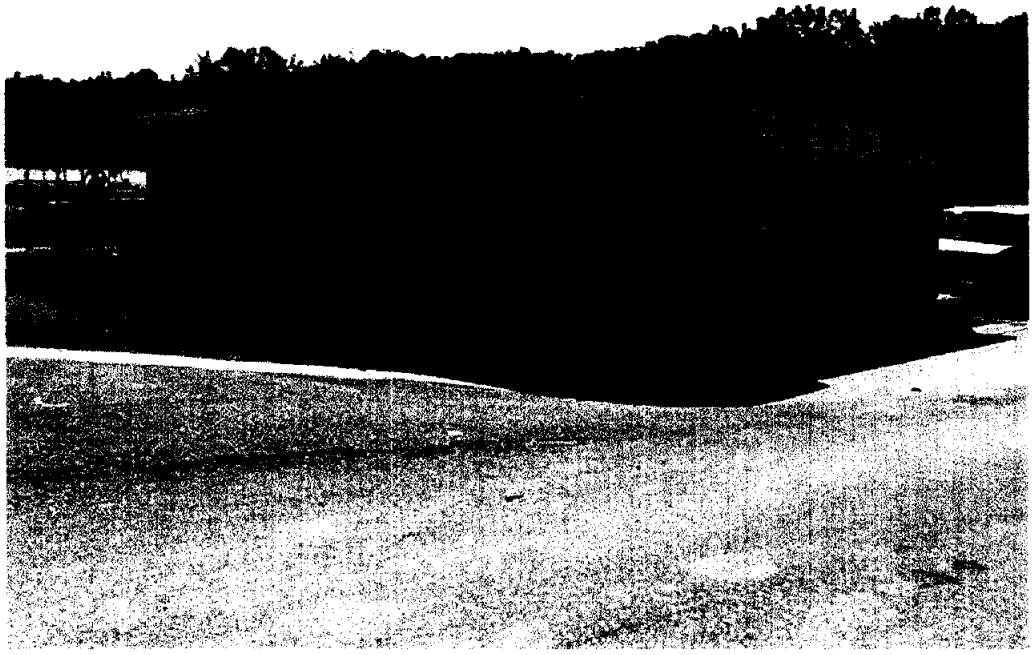


BLOWER BUILDING

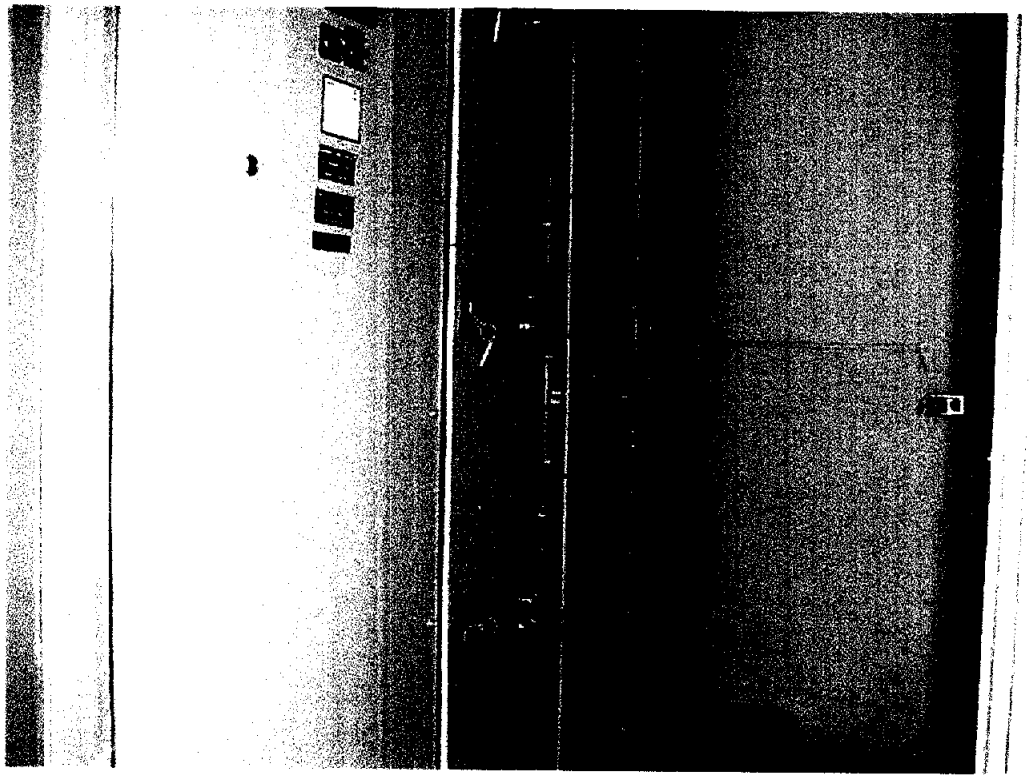


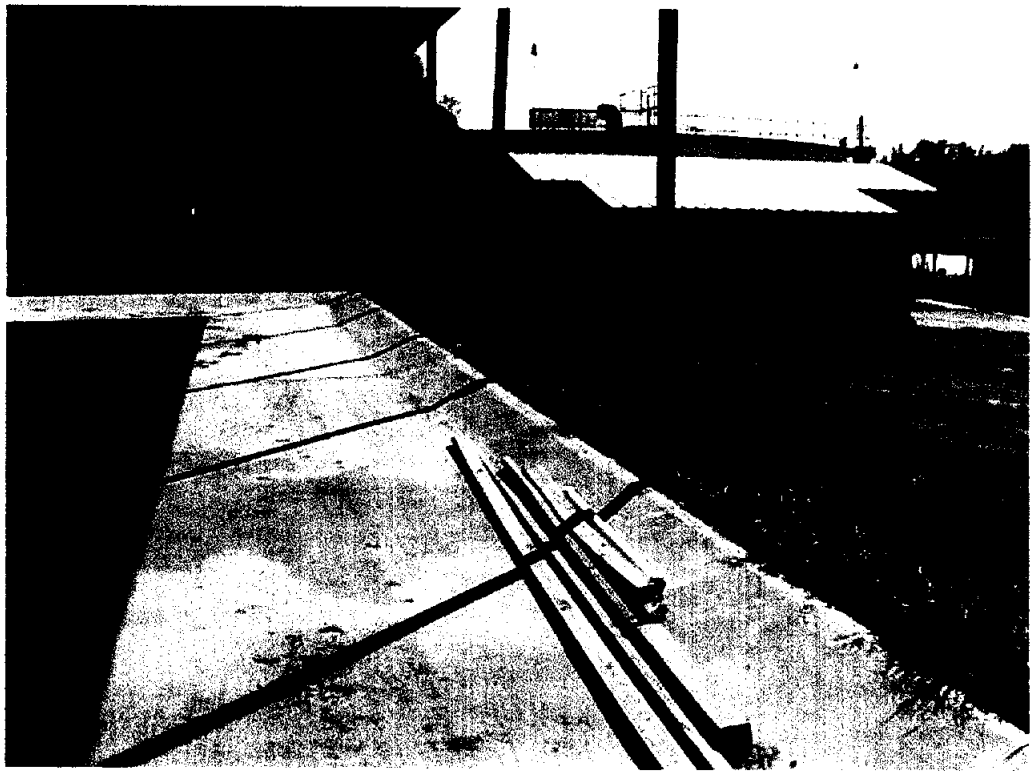


OFFICE

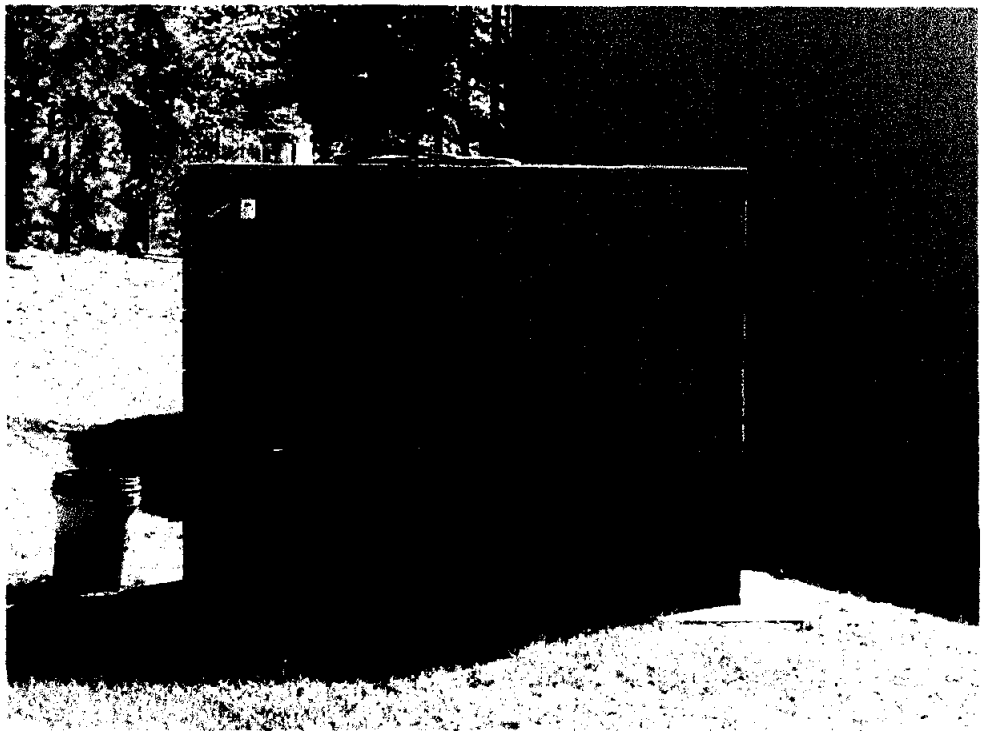


ELECTRIC BUILDING





GENERATOR



CHLORINE STORAGE SHED

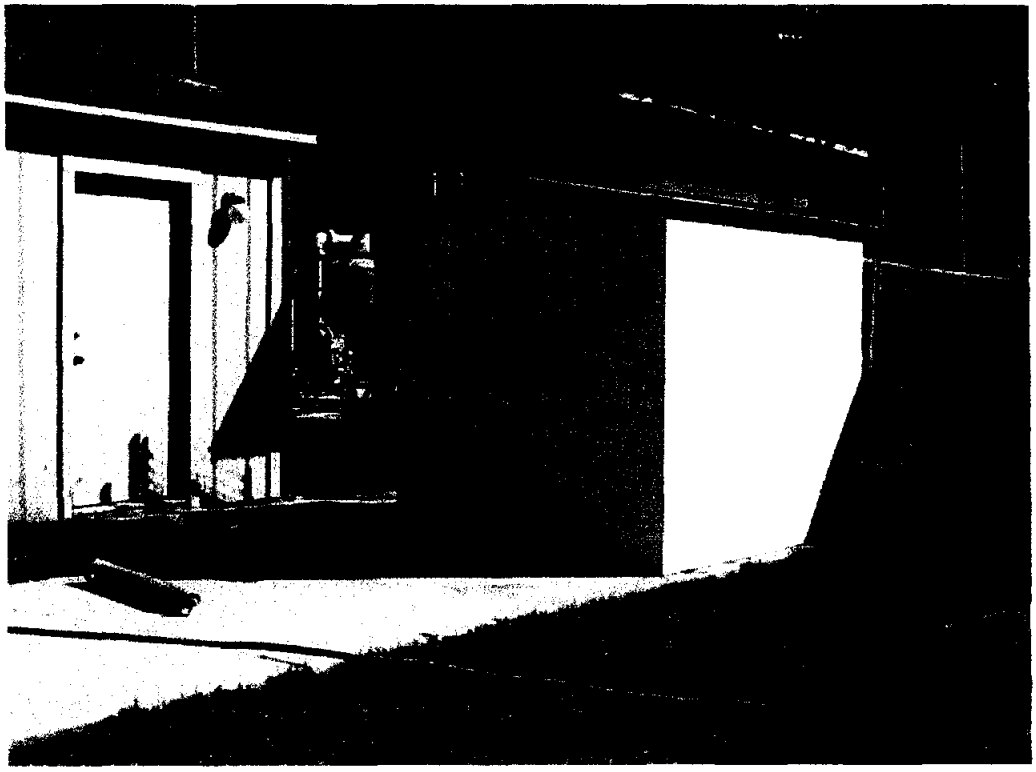
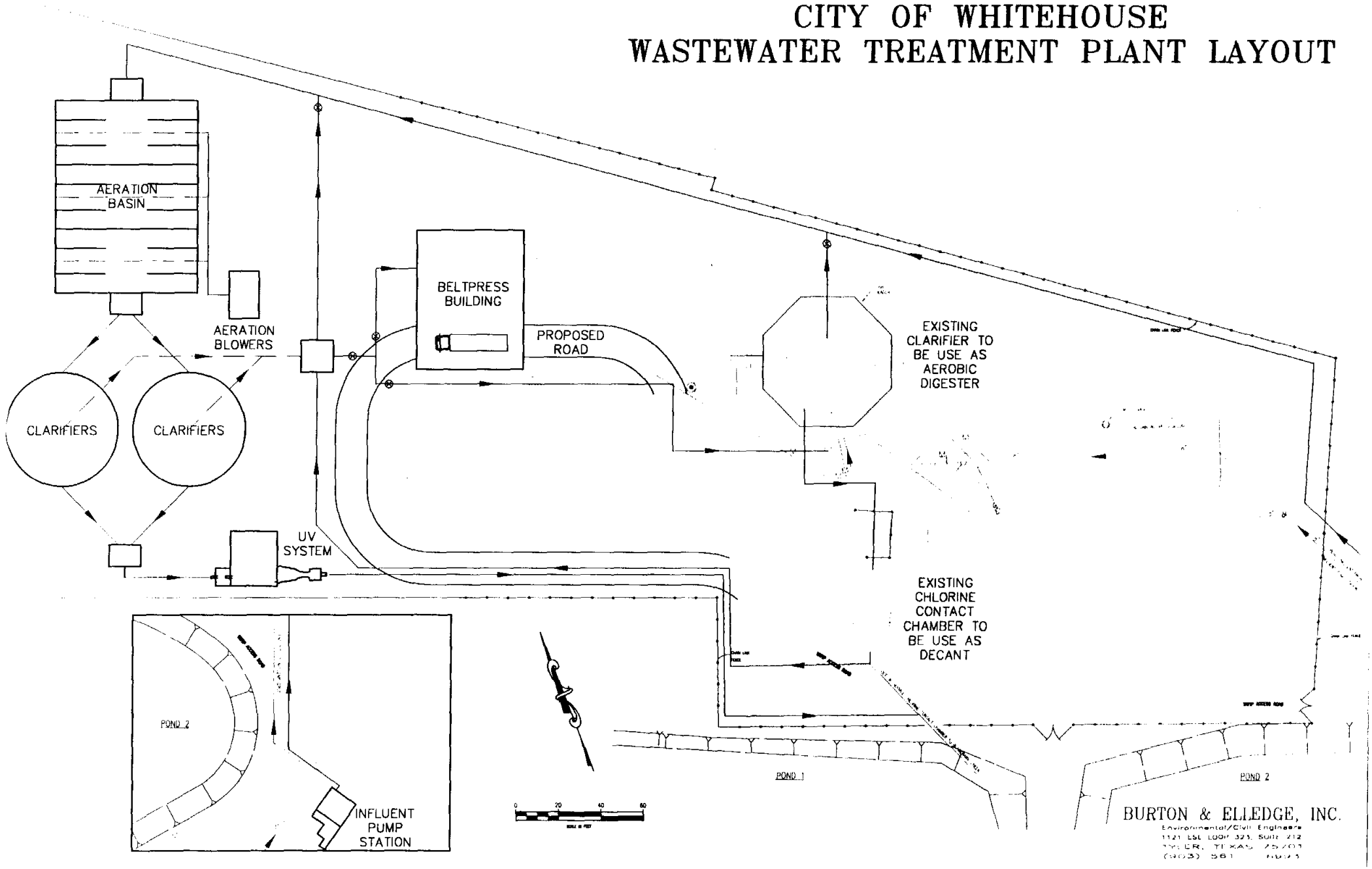


EXHIBIT 25

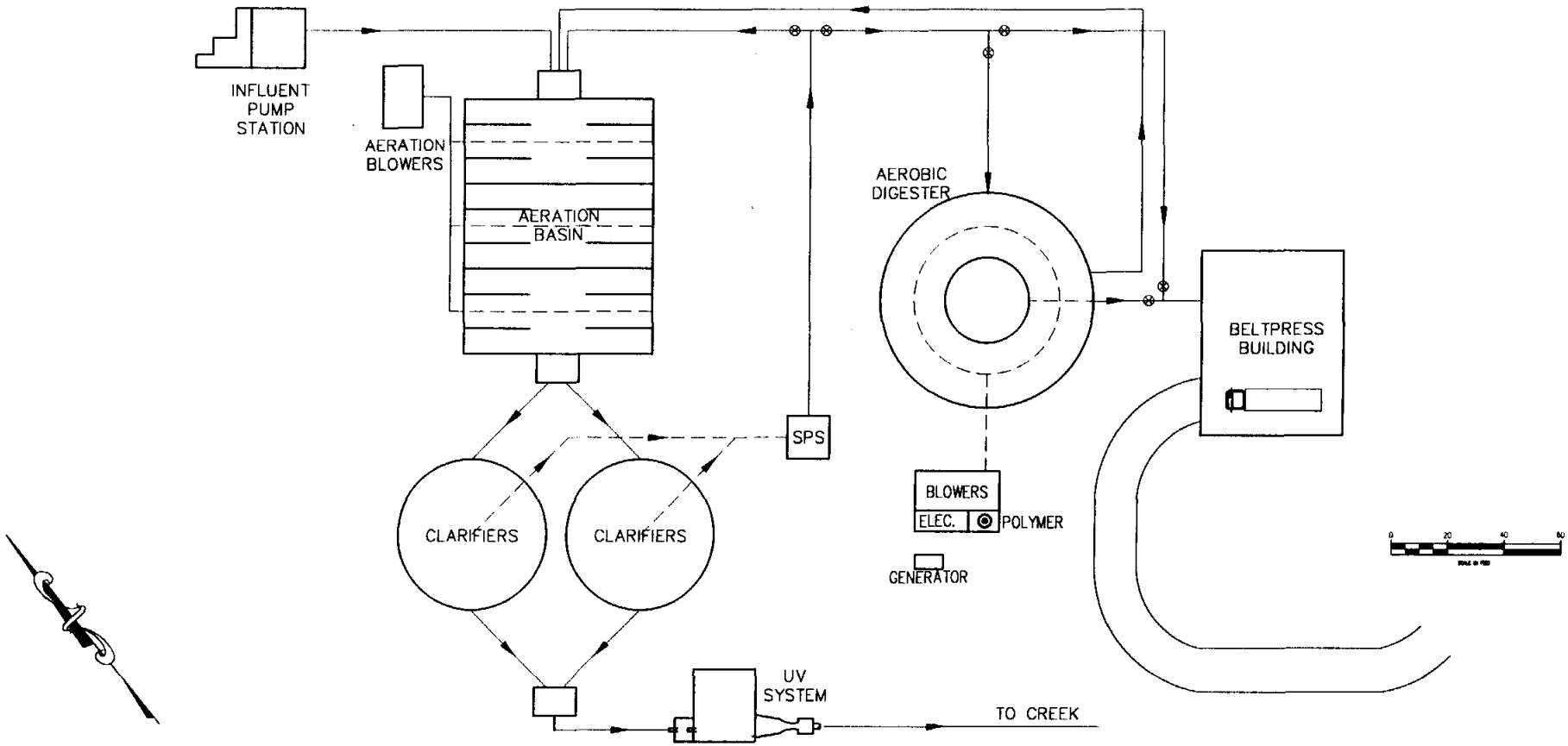
CITY OF WHITEHOUSE
WASTEWATER TREATMENT PLANT LAYOUT



BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 [illegible]

EXHIBIT 26

CITY OF WHITEHOUSE
PROPOSED WASTEWATER TREATMENT PLANT



BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561-6003

CITY OF WHITEHOUSE
PROPOSED LOCATION FOR
WASTEWATER TREATMENT PLANT

1000 0 1000 2000

SCALE FEET

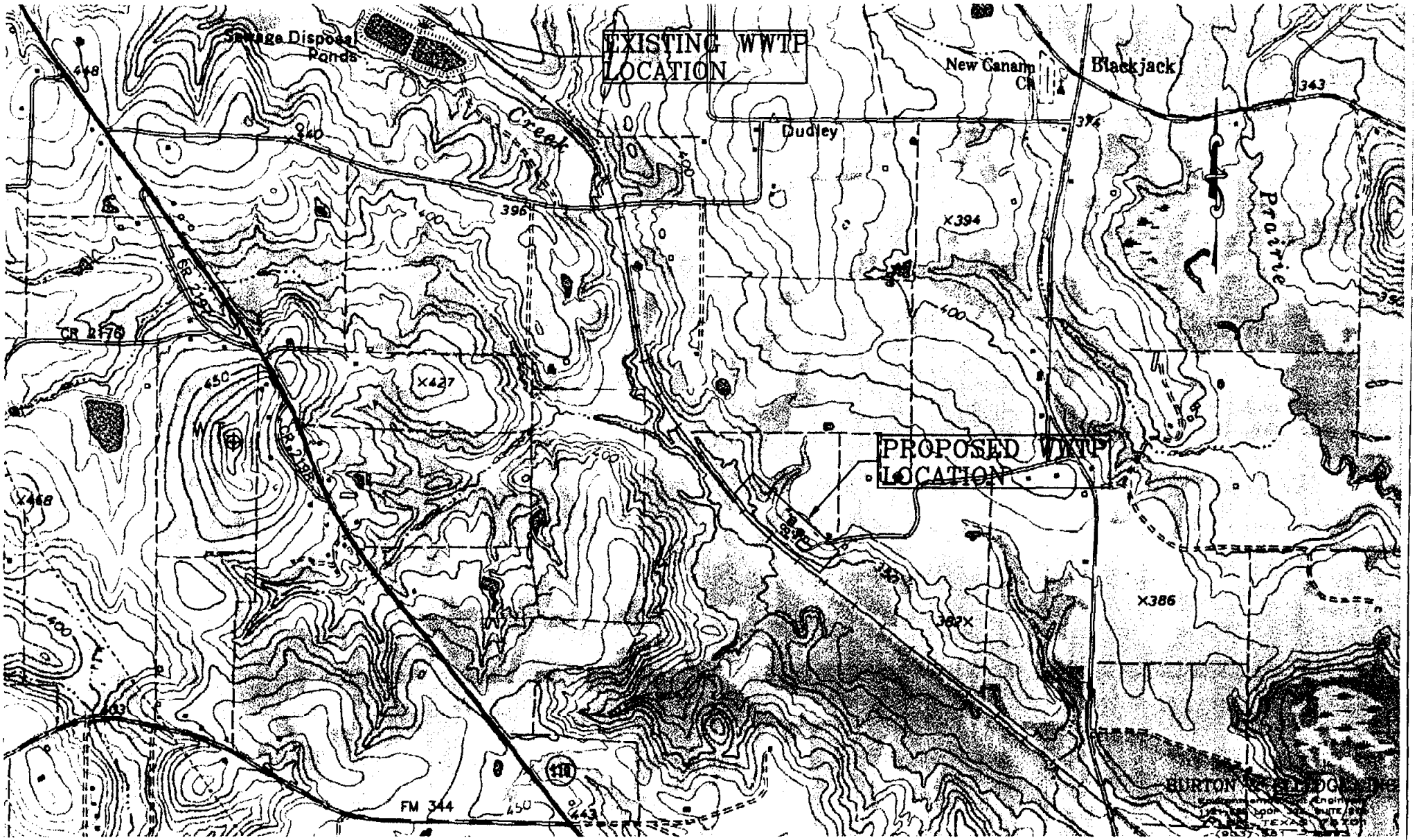
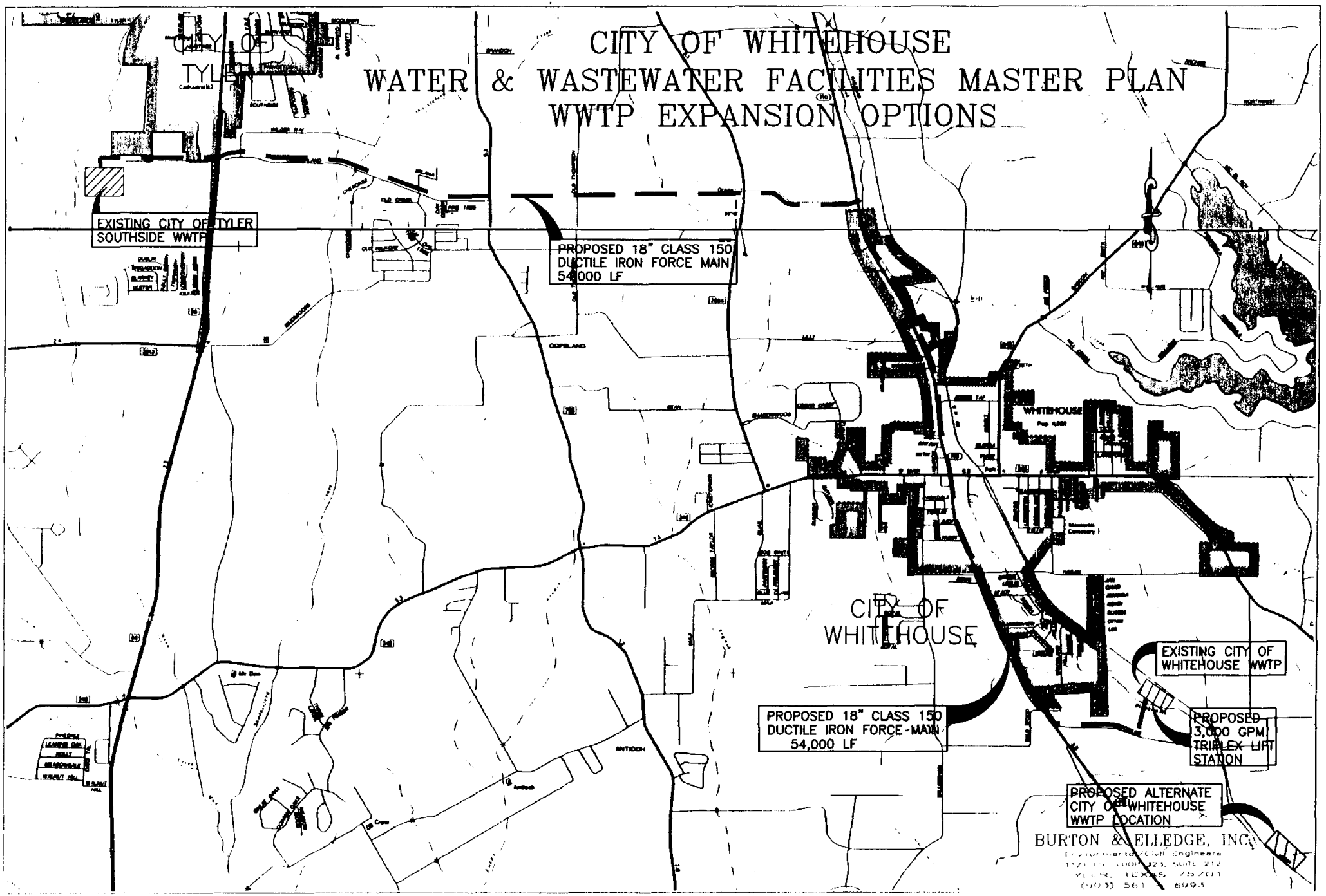


EXHIBIT 27


CITY OF WHITEHOUSE
WATER & WASTEWATER FACILITIES MASTER PLAN
WWTP EXPANSION OPTIONS
CITY OF TYLER
EXISTING CITY OF TYLER SOUTHSIDE WWTP
PROPOSED 18" CLASS 150 DUCTILE IRON FORCE MAIN 54,000 LF
CITY OF WHITEHOUSE
EXISTING CITY OF WHITEHOUSE WWTP
PROPOSED 18" CLASS 150 DUCTILE IRON FORCE MAIN 54,000 LF
PROPOSED 3,000 GPM TRIPLEX LIFT STATION
PROPOSED ALTERNATE CITY OF WHITEHOUSE WWTP LOCATION
BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE Loop 323, Suite 212
TYLER, TEXAS 75701
(903) 561-8995

EXHIBIT

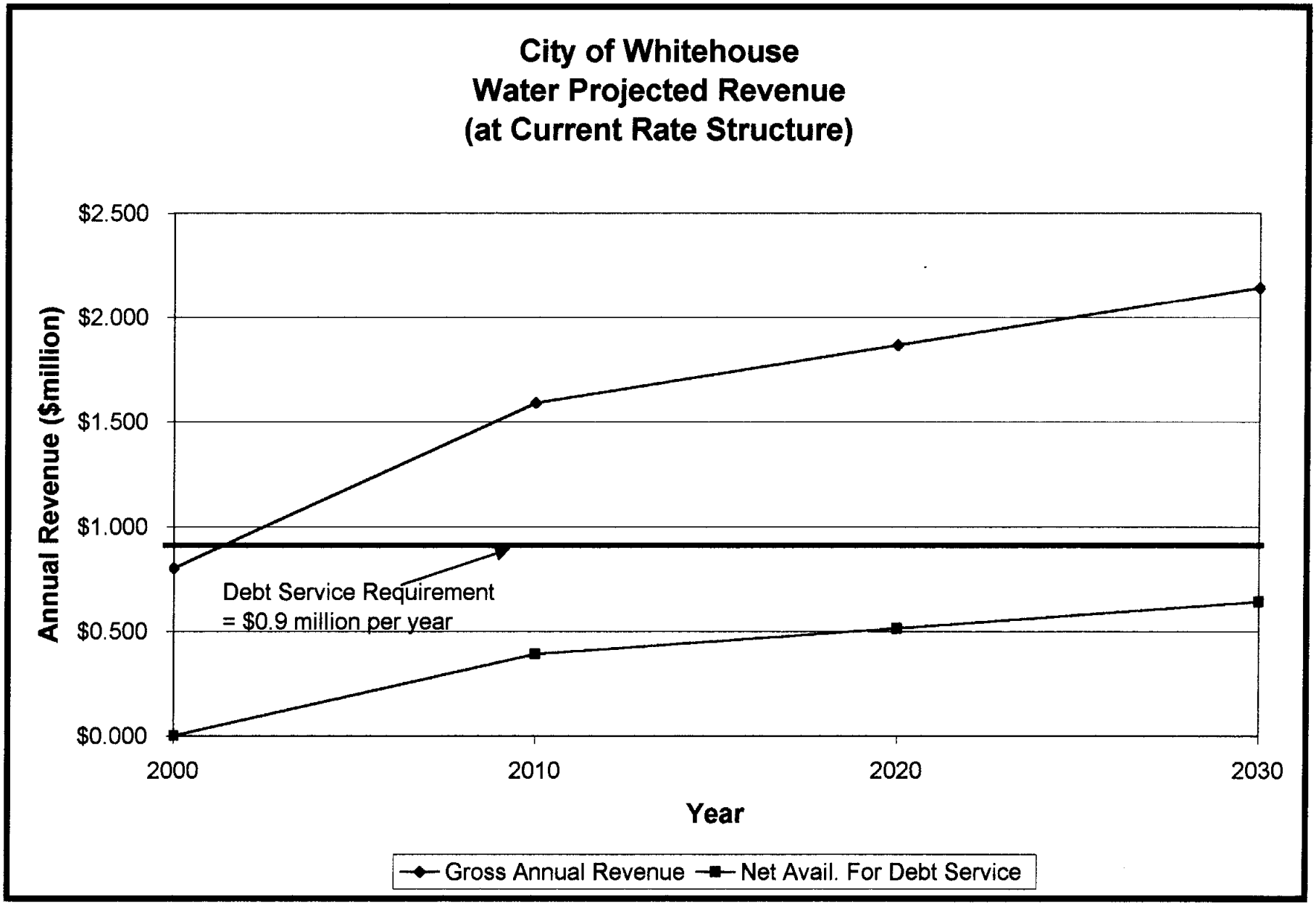
28

City of Whitehouse
Water Projected Revenues

Year	Gross Annual Revenue $mil	Current Water Budget $mil	Projected Add. O&M Expense $mil	Net Avail. For Debt Service $mil
2000	$0.800	$0.800	$0.000	$0.000
2010	$1.590	N/A	$0.800	$0.390
2020	$1.867	N/A	$0.954	$0.513
2030	$2.144	N/A	$1.104	$0.640

Assumptions:

1. Current water structure.
2. Projections based on population and average annual water use projections presented in Sections 3 and 4.
3. Current apparent excess revenue of $0.4 million are obligated and will not be available for servicing new debt.
4. O&M expense = $1,400 per million gallon.
5. Debt service requirements of 20 years at 7% interest on $9.66 million water improvements would be $0.90 million per year.


City of Whitehouse
Water Projected Revenue
(at Current Rate Structure)
$2.500
$2.000
$1.500
$1.000
$0.500
$0.000
Annual Revenue ($million)
Debt Service Requirement
= $0.9 million per year
2000
2010
2020
2030
Year
Gross Annual Revenue
Net Avail. For Debt Service

EXHIBIT

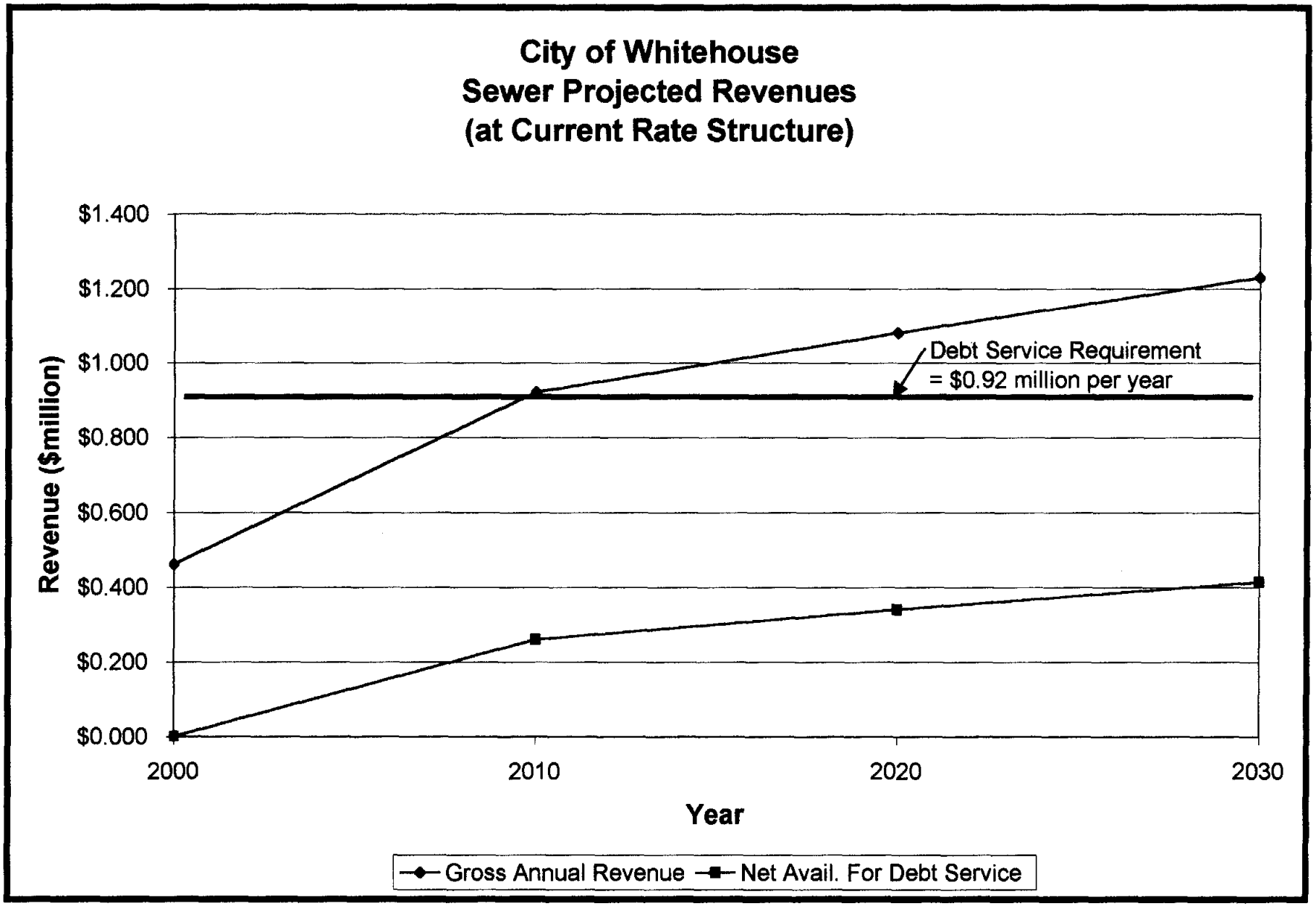
29

City of Whitehouse
Sewer Projected Revenues

Year	Gross Annual Revenue	Current Water Budget	Projected Add. O&M Expense	Net Avail. For Debt Service
	$mil	$mil	$mil	$mil
2000	$0.461	$0.461	$0.000	$0.000
2010	$0.922	N/A	$0.405	$0.260
2020	$1.080	N/A	$0.484	$0.339
2030	$1.230	N/A	$0.560	$0.413

Assumptions:

1. Current sewer structure.
2. Projections based on population and average annual water use projections presented in Sections 3 and 4.
3. Current apparent excess revenue of $0.257 million are obligated and will not be available for servicing new debt.
4. O&M expense = $723 per million gallon.
5. Debt service requirements of 20 years at 7% interest on $9.84 million sewer improvements would be $0.92 million per year.


City of Whitehouse
Sewer Projected Revenues
(at Current Rate Structure)
$1.400
$1.200
$1.000
$0.800
$0.600
$0.400
$0.200
$0.000
Revenue ($million)
Debt Service Requirement
= $0.92 million per year
2000
2010
2020
2030
Year
Gross Annual Revenue
Net Avail. For Debt Service

EXHIBIT

30

QUAIL RUN SUBDIVISION
SEWER SYSTEM EVALUATION

SUMMARY OF MANHOLE VISUAL INSPECTION

MH	CONSTRUCTION	INVERT DEPTH	CAN ACCOMMODATE TV CAMERA	COMMENTS
1	C.I.P. Concrete Base, Fiberglass Wall & Corbel	*10'-3"	No	Multiple lines at different depths
2	C.I.P. Concrete Base, Fiberglass Wall & Corbel	6'-4"	No	Offset ring & lid
3	C.I.P. Concrete Base, Fiberglass Wall & Corbel	*10'-1"	No	Medium grease & sand accumulation
4	C.I.P. Concrete Base, Fiberglass Wall & Corbel	6'-3½"	Yes	Medium grease & sand accumulation
5	C.I.P. Concrete Base, Fiberglass Wall & Corbel	7'-3½"	No	Medium grease accumulation
6	C.I.P. Concrete Base, Fiberglass Wall & Corbel	7'-10"	No	Medium root intrusion
7	UNABLE TO ACCESS			
8	C.I.P. Concrete Base, Fiberglass Wall & Corbel	3'-9½"	No	Heavy grease & sand; Concrete invert higher than flow line of mains
9	C.I.P. Concrete Base, Fiberglass Wall & Corbel	4'-4½"	No	Ring loose; Concrete invert higher than flow lines
10	C.I.P. Concrete Base, Fiberglass Wall & Corbel	5'-1"	No	Heavy sand & gravel accumulation
11	C.I.P. Concrete Base, Fiberglass Wall & Corbel	~6'-3½"	No	16-18" of standing water; Heavy accumulation of grease & debris
12	C.I.P. Concrete Base, Fiberglass Wall & Corbel	3'-3"	No	Heavy sand accumulation
13	C.I.P. Concrete Base, Fiberglass Wall & Corbel	3'-6"	Yes	

QUAIL RUN SUBDIVISION
SEWER SYSTEM EVALUATION

MH	CONSTRUCTION	INVERT DEPTH	CAN ACCOMMODATE TV CAMERA	COMMENTS
14	C.I.P. Concrete Base, Fiberglass Wall & Corbel	5'-6½"	No	
15	C.I.P. Concrete Base, Fiberglass Wall & Corbel	*6'-4"	Yes-Line #15 No-Line #16	Heavy grease accumulation
16	C.I.P. Concrete Base, Fiberglass Wall & Corbel	3'-4"	Yes	
17	C.I.P. Concrete Base, Fiberglass Wall & Corbel	7'-½"	No	Light grease accumulation

* Includes other lines @ different elevations.
See Manhole Visual Inspection Sheets.

QUAIL RUN SUBDIVISION
SEWER SYSTEM EVALUATION

SUMMARY OF LINE TV INSPECTION

LINE NO.	ABLE TO ACCESS ?	PLAN DISTANCE	DISTANCE INPSECTED	NO. OF TIMES UNDER WATER	AMOUNT OF LINE UNDER WATER
1A	No	438			
1B	No	440			
1C	No	300			
2	No	489			
3	Yes from MH #4 No from MH #3	292	145'-Obstruction from MH #4	1	74'
3A	No	85			
4	No from MH #5 Yes from MH #4	371	194'-Obstruction from MH #4	1	124'
5	No	557			
6	No	250			
7	No	253			
8	No	446			
9	No	168			
10	No	266			
11A	No	300			
11B	No	280			
11C	No	230			
12	Yes from MH #13 No from MH #12	292	209'-Obstruction from MH #13	2	91'
13	Yes	260	288'	5	107'
14	No	264			
15	Yes	415	100'-Obstruction from MH #15	1	65'
15A	No	60			
16	Yes	500	500'	8	235'
17	Yes from MH #16 No form MH #17	500	231'-Obstruction from MH #16	1	110'
TOTAL		7456'	1667'		806'

NOTE: Approximately 22% of the Total System was inspected with Video Camera. Of the line inspected, approximately 48% was standing in water due to either obstructions in the line or sags in the line.

EXHIBIT 31

OPTION 1
REPLACE SYSTEM AT
EXISTING LOCATION
EASEMENTS REQUIRED

DATE	REVISION

CITY OF WHITEHOUSE

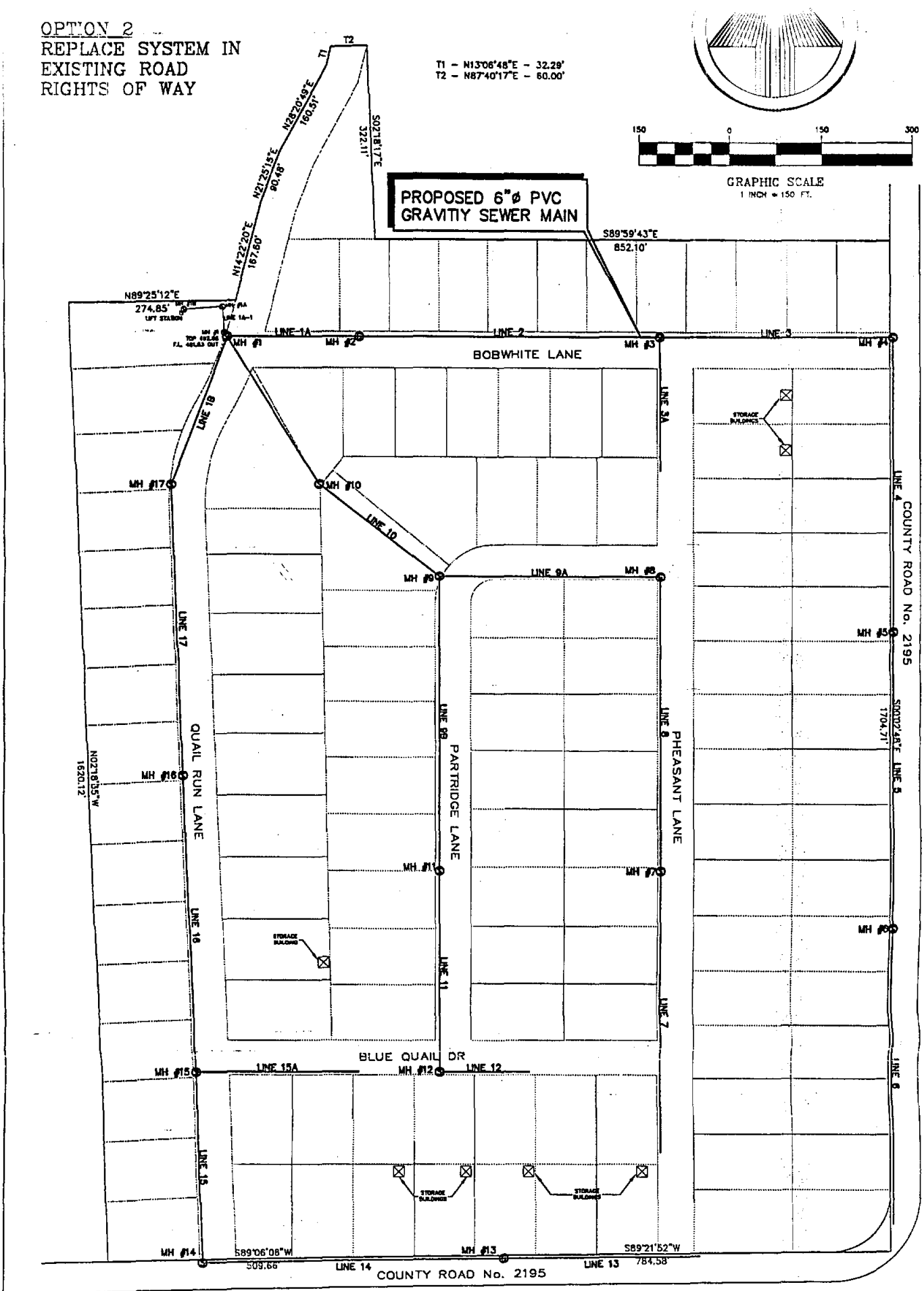
QUAIL RUN SUBDIVISION
SEWER SYSTEM EVALUATION

EXISTING SEWER SYSTEM

SHEET NO. 1

BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 - 6993

OPTION 2
REPLACE SYSTEM IN EXISTING ROAD RIGHTS OF WAY



DATE	REVISION

SHEET NO. 2

PROPOSED SEWER SYSTEM

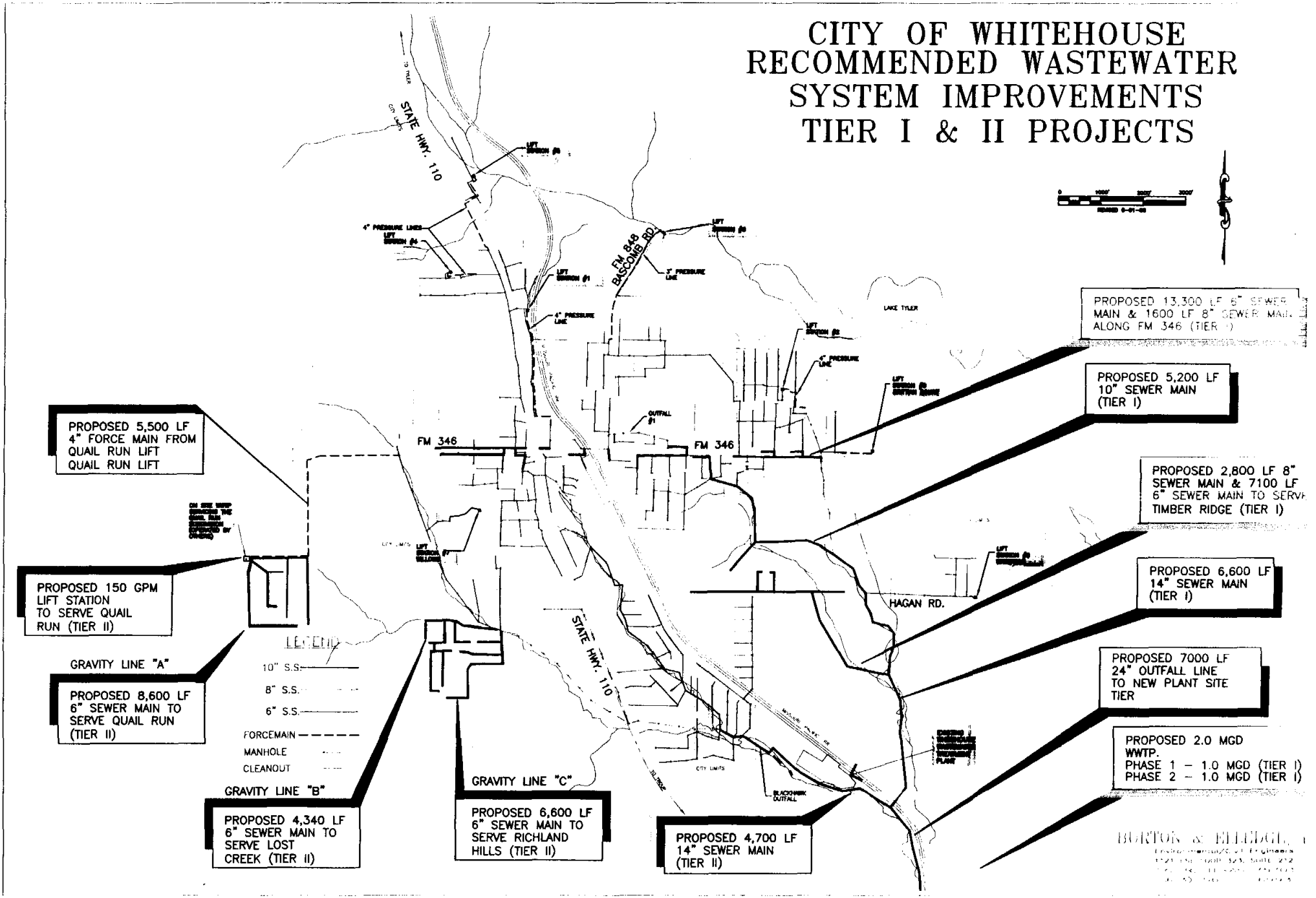
CITY OF WHITEHOUSE

QUAIL RUN SUBDIVISION
SEWER SYSTEM EVALUATION

BURTON & ELLEDGE, INC.
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 561 - 6993

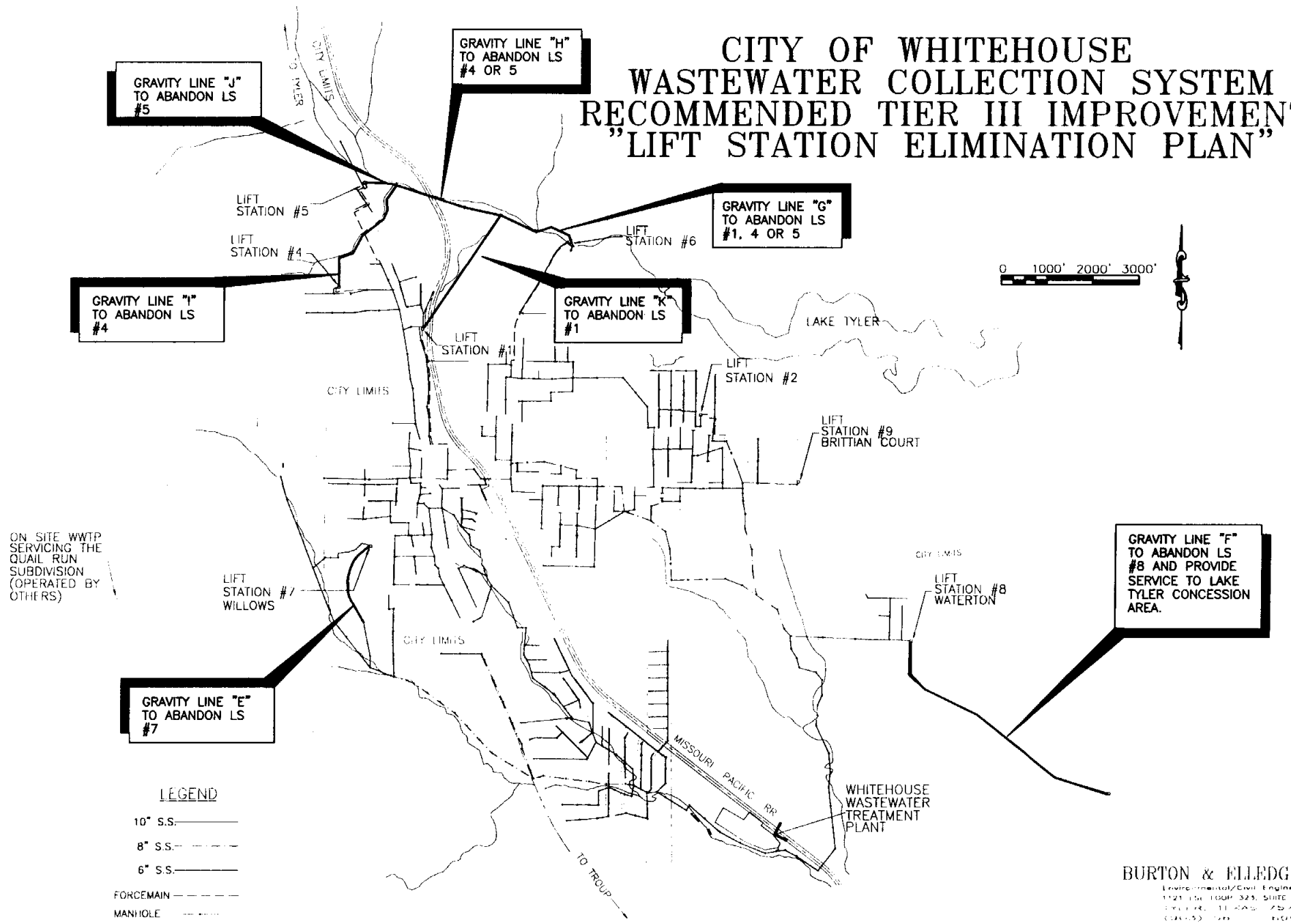
EXHIBIT 32

CITY OF WHITEHOUSE
RECOMMENDED WASTEWATER SYSTEM IMPROVEMENTS
TIER I & II PROJECTS



BURTON & ELLEDGE

CITY OF WHITEHOUSE
WASTEWATER COLLECTION SYSTEM
RECOMMENDED TIER III IMPROVEMENTS
"LIFT STATION ELIMINATION PLAN"



BURTON & ELLEDGE, I
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212
TYLER, TEXAS 75701
(903) 593-8005

EXHIBIT 33

CITY OF WHITEHOUSE
Regional Water and Wastewater Facilities Planning

As of 09/14/2000

I. WATER FACILITIES PLANNING PROJECTS	PROBABLE COST	PRIORITY TIER
A. Elevated Storage		
1. 0.5 MG Elevated Storage Tank, SH 110 @ CR 2198	$1,082,000	I
2. 0.6 MG Elevated Storage Tank, Hagan Road & Memory Lane	$1,202,000	II
3. Sell Russell Road Tank		II
B. Ground Storage		
1. New 0.5 MG Ground Storage Tank at Plant No. 2 *(under construction)*		I
2. New 0.5 MG Ground Storage Tank at new well location *(included in D3 below)*		I
C. Distribution Lines *(FM 346 Widening Requirements noted by *)*		
1. SH 110 18" Water Main - Elevated Tank to Downtown	$2,168,720	I
2. Hagan 12" Water Main - SH 110 East to Existing 12"	$175,462	II
3. Nunn St 12" Water Main - SH 110 to Willingham	$203,452	II
4. Willingham 8" Water Main - Nunn to FM 346 W	$164,500	II
* 5. FM 346 W 8" Water Main - SH 110 to Maji Road *(with booster station belo*	$391,404	I
6. SH 110 N 18" Water Main - Downtown Tank to Plant #2	$846,388	I
7. Acker Tap & Bascom Road 12" Water Main	$122,136	II
* 8. Water Main Relocation FM 346 - Upgrade	$1,567,580	I
D. Pump Stations		
1. Upgrade Existing Plant #2 Service Pumps	$114,000	I
* 2. FM 346 W Inline Booster Station	$79,800	I
3. New Pump Station at new Well Location *(not including well)*		
a. Pump Station, Ground Storage Tank, Site Work	$790,000	I
b. Water Well, including land and pump	$400,000	I
E. Controls		
1. SCADA & Emergency Generator	$250,000	I
F. Operations & Maintenance		
1. Tank Painting	$100,000	I
TOTAL PROBABLE COST OF WATER FACILITIES PLANNING	**$9,657,442**	

All probable project costs include construction labor and materials, bonds, contingencies, surveying, engineering, and professional construction observation. Projects I.A.1., A.2., and C.1. also include costs for land acquisition.

Total Tier I Water Projects	$7,789,892
Total Tier II Water Projects	*$1,867,550*

EXHIBIT 34

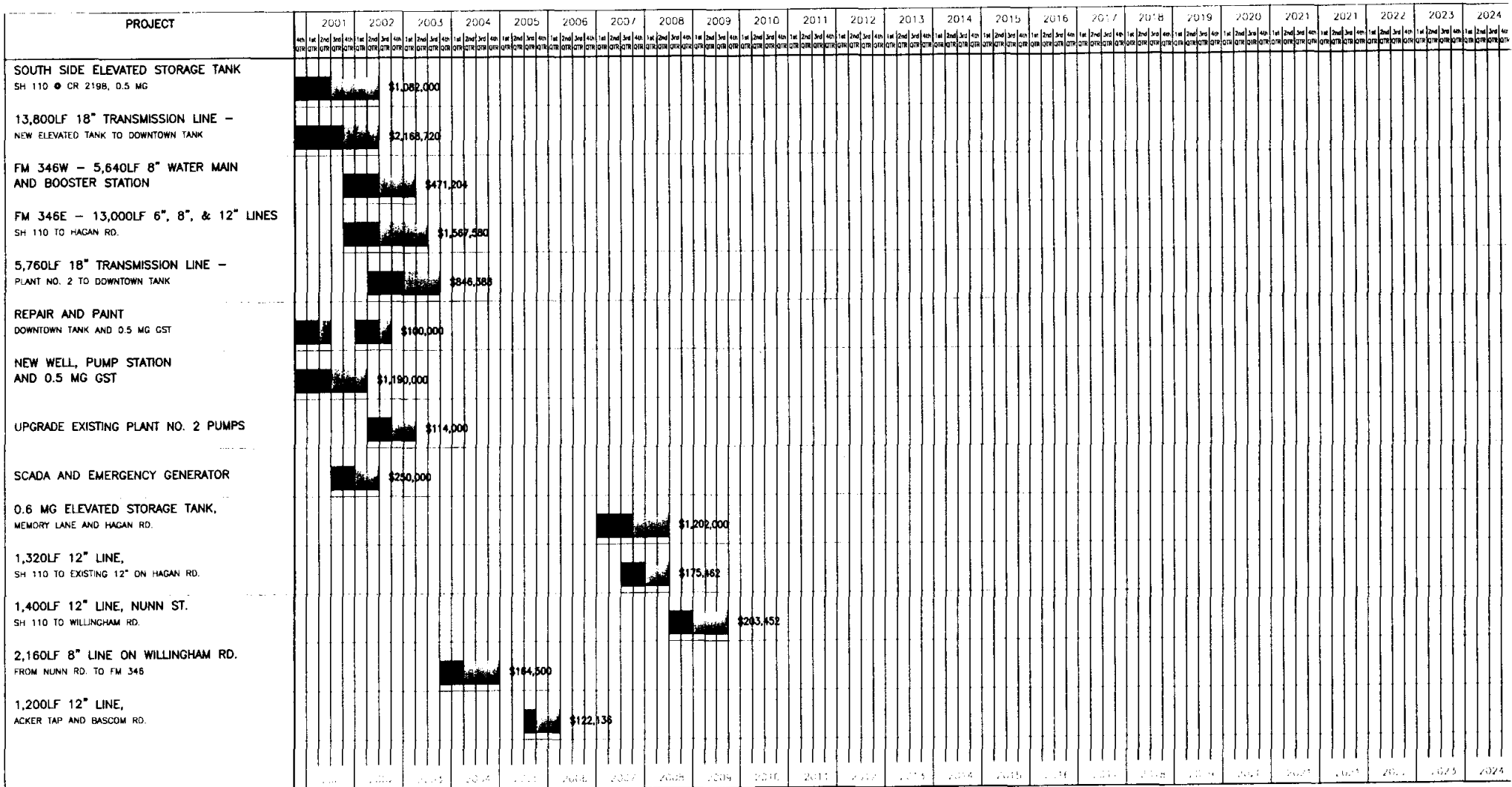
CITY OF WHITEHOUSE
Regional Water and Wastewater Facilities Planning

As of 09/14/2000

II. WASTEWATER FACILITIES PLANNING PROJECTS	PROBABLE COST	PRIORITY TIER
A. Sewer Main Upgrades		
1. New 14" Sewer Main in E1 & E2	$405,960	I
2. New 14" Sewer Main in E17	$292,560	II
3. New 10" Sewer Main in E4	$313,920	I
B. Sewer Main Relocation *(for FM 346 Widening)*		
* 1. Sewer Main Relocation FM 346 - Existing	$842,592	I
C. Service Extensions to Unserved Areas		
1. Quail Run Subdivision	$446,700	II
2. Lost Creek Subdivision Sewer Service	$260,884	II
3. Richland Hills Subdivision Sewer Service	$384,440	II
4. Timberridge / Hagan Road Sewer Service	$461,000	I
D. Treatment Alternatives		
1. Upgrade Existing WWTP	$4,850,000	
2. a. Build New WWTP - Phase 1	$3,250,000	I
- Phase 2	$1,900,000	II
b. Outfall to New WWTP	$1,279,000	I
3. WWTP Lift Station and 18" Force Main	$5,285,050	
E. Operations & Maintenance		I
TOTAL PROBABLE COST OF WASTEWATER FACILITIES PLANNING	**$9,837,056**	

All probable project costs include construction labor and materials, bonds, contingencies, surveying, engineering, and professional construction observation. Projects II.C.2., C.4., D.1., D.2., and D.3. also include costs for land/easement acquisition.

Total Tier I Wastewater Projects	*$6,552,472*
Total Tier II Wastewater Projects	*$3,284,584*



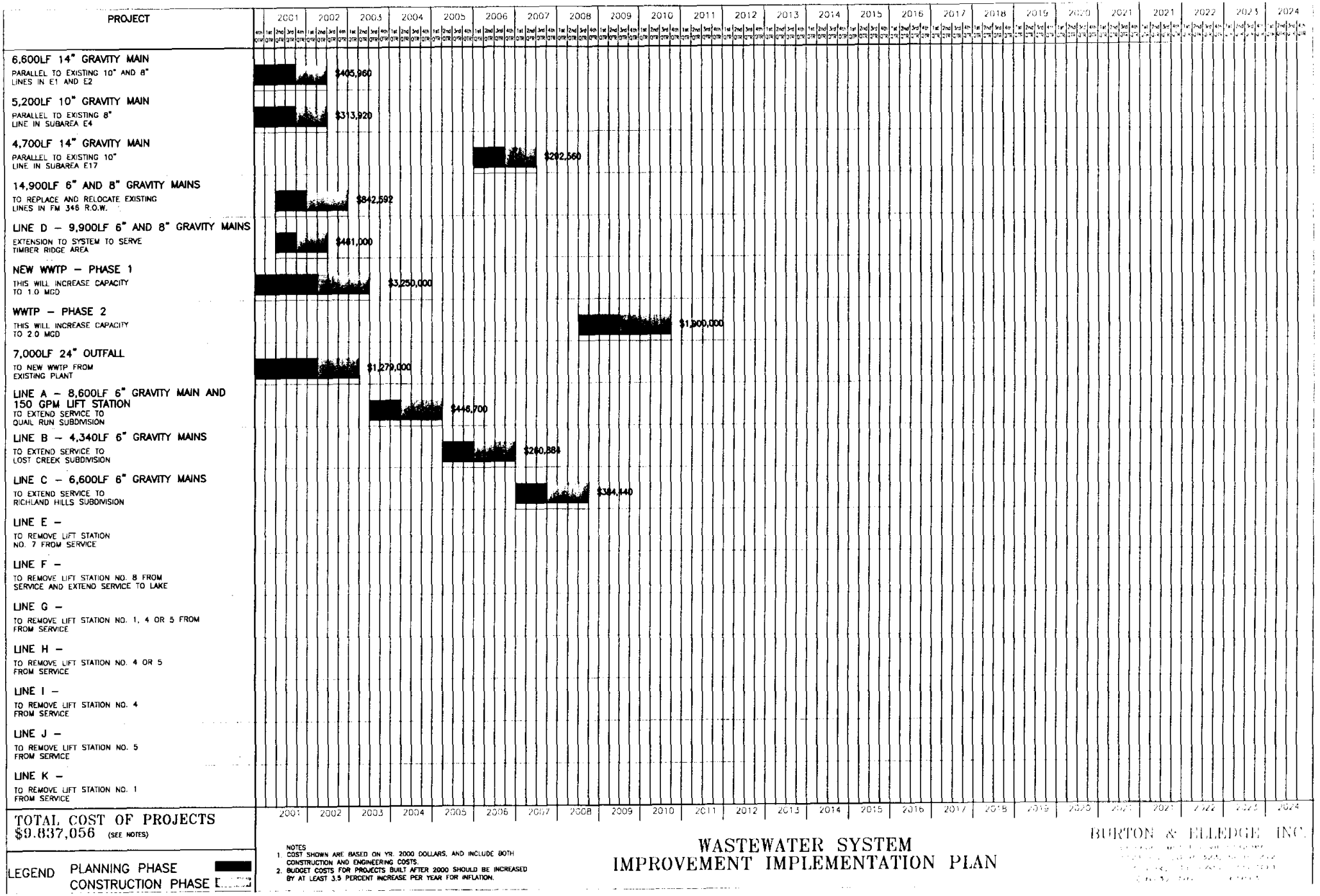
TOTAL COST OF PROJECTS
$9,657,442
(SEE NOTES)

WATER SYSTEM IMPROVEMENT IMPLEMENTATION PLAN

NOTE
1. THE CONSTRUCTION COST IS BASED ON YR. 2000 DOLLARS.
2. CONSTRUCTION COST AFTER 2000 CONSTRUCTION YEAR SHOULD INCLUDE AT LEAST 3.5 PERCENT INCREASE PER YEAR DUE TO INFLATION.

LEGEND
PLANNING PHASE
CONSTRUCTION PHASE

BURTON & ELLEDGE, INC
Environmental/Civil Engineers
1121 ESE LOOP 323, SUITE 212



TOTAL COST OF PROJECTS
$9,837,056 (SEE NOTES)

LEGEND PLANNING PHASE
CONSTRUCTION PHASE

NOTES
1. COST SHOWN ARE BASED ON YR. 2000 DOLLARS, AND INCLUDE BOTH CONSTRUCTION AND ENGINEERING COSTS.
2. BUDGET COSTS FOR PROJECTS BUILT AFTER 2000 SHOULD BE INCREASED BY AT LEAST 3.5 PERCENT INCREASE PER YEAR FOR INFLATION.

WASTEWATER SYSTEM IMPROVEMENT IMPLEMENTATION PLAN

BURTON & ELLEDGE INC.

EXHIBIT 36

EXHIBIT 37