CITY OF INGLESIDE
SAN PATRICIO COUNTY, TEXAS

# CITY-WIDE MASTER PLAN

# SUMMARY REPORT

Prepared through the cooperation of the Office of the Governor of the State of Texas.

The preparation of this report was financed in part through a Federal Assistance Grant under the COASTAL ENERGY IMPACT PROGRAM, National Oceanic and Atmospheric Administration.

U. S. Department of Commerce

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ORPUS CHRISTI, TEXAS

October 1979

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SAN PATRICIO COUNTY, TEXAS

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# SUMMARY REPORT

U.S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
2234 SOUTH HOBSON AVENUE
CHARLESTON, SC 29405-2413

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INTRODUCTION AND NARRATIVE

This report is to summarize the technical planning studies prepared under the ENERGY IMPACT PLANNING PROGRAM, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, and the cooperation Office of the Governor of the State of Texas.

The primary purpose of this planning program is to provide a practical framework for developing a healthy and desirable community, in light of the increase in growth caused by the effects of new and expanded coastal energy activities in the City of Ingleside and the surrounding areas.

This report is divided into four (4) major planning units, which include MASTER COMPREHENSIVE PLANS and PRELIMINARY COST ESTIMATES to update the following:

UNIT ONE: WATER STORAGE AND PUMPING FACILITIES

UNIT TWO: WATER DISTRIBUTION SYSTEM

UNIT THREE: SANITARY SEWER COLLECTION AND TREATMENT SYSTEM

UNIT FOUR: STREET AND DRAINAGE SYSTEM

This summary report addresses itself to answering the following questions for each of the four planning units:

A. How effective is the existing system?

B. What SHORT RANGE EXPANSION can the existing present system adequately handle in the immediate future?

C. What LONG RANGE EXPANSION can be incorporated with the present and SHORT RANGE EXPANSION?

# UNIT ONE

# WATER STORAGE
# AND
# PUMPING FACILITIES

## UNIT ONE:

### A. GENERAL COMMENTS AND RECOMMENDATIONS

Ingleside receives fresh water from the San Patricio Water District. The water is delivered to Ingleside ground storage facilities and pump station from a 12-inch lateral from an 18-inch main line that also serves the cities of Aransas Pass, Port Aransas, Rockport, etc.

The district has two (2) major transmission lines from City of Corpus Christi and Calallen Water Treatment Plant, one a 24-inch treated water line with a capacity of 8.5 million gallons per day and the other a 36-inch main water line with a capacity of 18 million gallons per day, in addition to the water treatment plant adjacent to Reynolds Metal Company that has a capacity of 3 million gallons per day.

The City of Ingleside has two pump stations with ground storage facilities and one elevated tank.

1. Pump Station No. 1: The older of the two, has a 400,000 gallon ground storage tank and a pump station that has two distribution pumps, one with a capacity of 500 gpm with 150 feet head and one with a capacity of 1,000 gpm with 160 feet head, with the differential in heads both pumps can not operate together. The operation of the pumps are controlled by a mercaroid pressure switch located at the elevated water storage tank and connected with a telephone line for transmission of the signal between the tank and the control panel of the pumps. This pump station is located at California and Waco Streets.

   RECOMMENDATION: That this pump station be renovated to include the installation of a new 2,500 gpm pump and complete overhaul of the two existing pumps to be utilized for low-flow or stand-by units.

   The installation of a control system linking this pump station with the elevated storage tank and pump station No. 2 to insure system-wide volume and pressure control response.

   Immediate initiation of an investigation to determine the feasibility of the supply lead and meter to be increased to a 10" minimum, incorporating volume/pressure automatic controls to insure minimum pressure drops or surges to the San Patricio Water District's system.

2. Station No. 2: The new station has been constructed in 1979 and consists of a 200,000 gallon ground storage tank, two pumps, one with a capacity of 500 gpm/160 feet head and the other with a capacity of 1,250 gpm/160 feet head complete with all necessary controls. This station has a 6-inch supply line from the district.

   RECOMMENDATION: Immediate initiation of a joint study with the San Patricio Water District to determine the short range feasibility to increase the supply lead and meter to a 12" minimum.

   To reserve the required land area at the present 20 acre City tract at Pump Station No. 2 to insure expansion in unit modules of the ground storage capacity.

   Initiate efforts to increase existing pumping capacity by utilizing an additional 2,500 gpm pumps.

3. Water Storage: The total water storage for the City consists of three tanks as follows:

   a. 400,000 gallon steel (ground) tank;

   b. 200,000 gallon steel (ground) tank;

   c. 250,000 gallon steel (elevated) tank;

   For a total storage capacity of 850,000 gallons. The San Patricio Water District requires a minimum total storage of the peak daily use and in Ingleside this would amount to a minimum of 1,500,000 gallons total ground and elevated storage.

   RECOMMENDATION: Initiate efforts to expand the ground storage at Pump Station No. 2 to 1.2 million gallons.

## UNIT ONE:

## B. DEVELOPMENT OF MASTER PLAN

The following are assumed guidelines used in formulating this Master Plan:

1. General: That the purpose of water storage in a distribution system is to increase the capacity and capability of the distribution system to:

   a. Meet the water demands required for fire fighting.

   b. Meet the maximum hour demands caused by summer peak consumption.

   c. Provide more uniform pressures 24 hours a day.

   d. Reduce the effects of water hammer and prevent the rupturing of mains and service due to excessive pressures.

   e. Provide water to meet the distribution system demands when source of supply is temporarily reduced for short periods of time.

   f. Make it possible to have more flexible operation in the system.

   Also, that storage requirements are influenced by four factors:

   a. By the ratio of maximum hour to the average day demand.

   b. The ratio of maximum hour to the maximum day demand.

   c. The amount of reserve storage recommended to be available to meet maximum fire flow requirements.

   d. The reliability of the supply and pumping equipment.

2. Short Range Expansion: That the San Patricio Water District has the capacity and distribution system to handle the expected flows.

   That the two existing pump stations can continue to be utilized and incorporated into the short range expansion.

   That the upgrading of the pumping facilities may be accomplished with no interruption of city-wide service.

   That the available sites of the present ground storage may be utilized to their optimum.

3. Long Range Expansion: That the San Patricio Water District will have the capacity and distribution system to handle the expected flows.

That the best arrangement is to have the source on one side of the system and the elevated storage on the opposite side. This, in effect, doubles the capacity of the system to meet maximum demands and provide water for fire fighting purposes.

That direct controls can be placed in all elevated storage so that the pumping equipment at the source can be operated entirely automatically as needed to supply the system.

That the required sites for the elevated storage can be acquired through normal land acquisition.

## UNIT ONE:

## C. PRIORITY SEQUENCE

## AND

## PRELIMINARY COST ESTIMATES

Immediate Up-Grading:

| | | |
|---|---|---|
| 1. | Renovation of the existing Pump Station No. 1 to include a new 2,500 gpm pump and complete overhaul of the two existing pumps and control system. | $ 45,000.00 |
| 2. | Master control system linking both pump stations to the elevated storage to insure volume and pressure control response. | $ 12,000.00 |
| 3. | Acquisition of required future elevated storage sites at the opposite sides of the system to insure optimum cost-effectiveness of system. | $ 20,000.00 |

Short Range Expansion:

| | | |
|---|---|---|
| 1. | Up-grading existing supply line and meter to Pump Station No. 1 to include 10" feeder line and meter, controls, connections, etc. | $ 15,000.00 |
| 2. | Up-grading existing supply line and meter service to Pump Station No. 2 to include 12" feeder line and meter, controls, connections, etc. | $150,000.00 |
| 3. | Expand existing ground storage at Pump Station No. 2 to include new 1,000,000 gallon storage tank, piping, controls, valves, etc. | $225,000.00 |
| 4. | Increasing pumping capacity of Pump Station No. 2 to include new 2,500 gpm pump, controls, piping, valves, connections, etc. | $ 15,000.00 |

Long Range Expansion:

| | | |
|---|---|---|
| 1. | Increase elevated storage with installation of new 500,000 gallon elevated storage tank at the extreme southeast sector of the system in the vicinity of the intersection of F.M. Highway #2725 and F.M. Highway #1069, including all connections, valves, fittings, etc. | $400,000.00 |
| 2. | Increase Pump Station No. 2 to include two 2,500 gpm, one-1,250 gpm, and one-600 gpm pump controls and additional 1,000,000 gallon ground storage piping, fittings, etc. | $500,000.00 |
| 3. | Increase elevated storage capacity with installation of new 500,000 gallon elevated storage tank at the extreme northeast sector of the system in the vicinity of Mooney Lane and present City limits, including all connections, valves, fittings, etc. | $400,000.00 |

# UNIT TWO

# WATER DISTRIBUTION SYSTEM

## UNIT TWO:

### A. GENERAL COMMENTS AND RECOMMENDATIONS

The City of Ingleside's Water Distribution System within the city limits is generally in fair condition, except for a few deficiencies as follows:

1. Highly populated areas presently with fire main pressure and volume, not having fire hydrant access.

   RECOMMENDATION: Immediate initiation of a FIRE HYDRANT SUPPLEMENTRY INSTALLATION PROGRAM to be incorporated with the City's normal operating budget.

   This program should be completed within the next two to four years.

2. Existing old cast iron and galvanize iron service lines which due to corrosion build-up and deteriorated condition are causing low volume and pressure in the distribution system network.

   RECOMMENDATION: Immediate initiation of a SERVICE LINE REPLACEMENT PROGRAM to be incorporated with the City's normal operating budget.

   This program should be completed within the next five to six years.

3. Existing service lines still in good condition but with low volume and pressure in the distribution system network.

   RECOMMENDATION: Initiate a MINOR LINE EXTENSION PROGRAM to extend and loop existing dead end service lines to be either incorporated in the City's normal operating budget or contracted out to private contractors.

   This program should be completed within the next two to three years.

## UNIT TWO:

## B. DEVELOPMENT OF MASTER PLAN

The following are assumed guidelines used in formulating this Master Plan:

1. GENERAL: The investigation of the present Water Distribution System consisted of first gathering any existing filed information and compiling the information into a system map. A comprehensive field verification effort with the aid of City Staff produced the existing Water Distribution Map of Ingleside.

   The distribution system was divided into sub-systems which could be studied for volume and pressure characteristics, where problem areas were isolated and identified.

   The distribution system Main lines were catergorized as to present pressure and volume capacity to determine if areas not presently under Fire Hydrant coverage could be up-graded to normal City standards.

2. SHORT RANGE EXPANSION:

   a. Extension of existing system may occur only if the supply, storage, and pumping facilities serving the proposed expansion have the capacity to handle the expected future flows.

   b. Major distribution loop lines (pressure and volume equalizers) will receive top priority, to insure maximum utilization of the existing supply and distribution system at minimal capital investment resulting in highest cost-effectiveness.

   c. The existing developed residential areas within the existing distribution system will receive priority over undeveloped industrial areas.

3. LONG RANGE EXPANSION:

   a. That all undeveloped areas within the City limits will have residential population density equivalence consumption.

   b. That major distribution trunk line (pressure and volume equalizers) to interconnect elevated and ground storage facilities will receive priority.

   c. That loop lines to minimize service interruption and low pressure and volume, will also receive top priority.

## UNIT TWO:

## C. PRIORITY SEQUENCE AND PRELIMINARY COST ESTIMATES

DEFICIENCY CORRECTION:

PHASE I: FIRE HYDRANT SUPPLEMENTRY INSTALLATION PROGRAM

1. Fire Hydrant assembly to be installed to the existing 8" A.C. line at the intersection of Humble and San Antonio.

2. Fire Hydrant assembly to be installed to existing 6" A.C. line at the intersection of Amarillo and San Angelo.

3. Fire Hydrant assembly to be installed to existing 6" A.C. line on Alley west of San Angelo and Mustang Street.

4. Fire Hydrant assembly to be installed to existing 6" C.I. line at intersection of Texas Ave. and San Angelo.

5. Fire Hydrant assembly to be installed to existing 6" C.I. line at intersection of Oklahoma and San Angelo.

6. Fire Hydrant assembly to be installed to existing 6" A.C. line at intersection of Avenue "E" and Sixth Street.

7. Fire Hydrant assembly to be installed to 6" A.C. line at intersection of W. Main and Ave. "B".

8. Fire Hydrant assembly to be installed to 6" A.C. line at intersection of Avenue "K" and Third Street.

9. Fire Hydrant assembly to be installed to existing 6" A.C. line at intersection of Avenue "K" and First Street.

10. Fire Hydrant assembly to be installed to 6" A.C. line at intersection of Buckeye Drive and Avenue "A".

11. Fire Hydrant assembly to be installed to existing 6" A.C. line at intersection of First Street and Shady Oak.

12. Fire Hydrant assembly to be installed to 6" A.C. line on First Street approximately 1680' west of Avenue "A".

13. Fire Hydrant assembly to be installed to existing 6" A.C. line on Fourth Street approximately 1760' west of Avenue "A".

PRELIMINARY COST ESTIMATE FOR PHASE I . . . . . $23,400.00

PHASE II: SERVICE LINE REPLACEMENT PROGRAM

1. Replace old 2" P.E. service line in Alley between Beaumont and Houston tying to existing 8" A.C. Main on Waco Street North on Alley to South of W. Main. (Including valves, corporation stops, and fittings).

2. Replace and loop old 2" P.E. and 4" C.I. service line in Alley between W. Main and Humble, tying to proposed 8"Main on California, East to Alley between Dallas Street & Ave. "B", South on Humble Street, tying to existing 8" A.C. Main. (Including valves, corporation stops, and fittings).

3. Replace 2" C.I. service line on East side of Beaumont Street and Amarillo Street, tying on West side of Street on Beaumont to existing 8" A.C. Main South of Waco Street. (Including valves, corporation stops, and fittings).

4. Replace 2" C.I. service line on Houghton Street, tying to existing 2" P.V.C. service line on Alley South of W. Humble and South on Houghton to Waco Street. (Including valves, corporation stops, and fittings).

5. Replace 4" C.I. service line on Amarillo Street, tying on existing 6" A.C. at intersection of San Angelo Street & Amarillo Street, East on Amarillo to Alley between Dallas & Ave. "B", tying to 2" P.V.C. line. (Including valves, corporation stops, and fittings).

6. Replace 2" C.I. service line on Alley between Ave. "B" and Dallas Street, tying to existing 8" A.C. on Humble Street South on Alley to Waco Street. (Including valves, corporation stops, and fittings).

7. Replace 1" C.I., 1½" C.I. and 2" C.I. service line on Alley between Ave. "B" and Ave. "C", starting on Eighth Street North on Alley to Alley South of Fifth Street, turning West to Ave. "B", tying to existing line. (Including valves, corporation stops, and fittings).

8. Replace 2" C.I. and 2" P.V.C. service line on Alley between Ave. "C" and Ave. "D", starting on Eighth Street North on Alley to Alley South on Fifth Street, turning West to Ave. "C", tying to existing 6" A.C. Main line. (Including valves, corporation stops, and fittings).

9. Replace 1" C.I. service line on Sixth Street connecting line No. 7 with line No. 8. (Including valves, corporation stops, and fittings).

10. Replace 2" C.I. and 1" C.I. service line on Second Street and Ave. "D", tying to existing 6" A.C. Main going West on Second Street to Alley between Ave. "C" and Ave. "D", turning South to Third Street and continuing South on Alley East of S. Main to Ave. "F" and tying to existing 6" A.C. Main. (Including valves, corporation stops, and fittings).

11. Replace 4" C.I. service line on Second Street and Ave. "D" going East to Alley between Ave. "D" and Ave. "E", turning South on Alley to Alley between Fourth and Fifth Street. (Including valves, corporation stops, and fittings.)

12. Replace 2" C.I. service line on Alley between Ave. "E" and Ave. "F" on Fourth Street, tying to existing 2" P.V.C. going North to Second Street turning East to Ave. "F" and tying onto existing 6" A.C. Main. (Including valves, corporation stops, and fittings).

13. Replace 2" C.I. service line on Fifth Street and Ave. "F", tying to existing 6" A.C. Main going West on Fifth Street to Ave. "E". (Including valves, corporation stops, and fittings).

14. Replace 1" C.I. service line on Fifth Street and Ave. "F", tying to existing 6" A.C. Main then going East on Alley to Ave. (Including valves, corporation stops, and fittings.

15. Replace 2" C.I. service line on Alley North of Fifth Street and Ave. "F", tying to existing 6" A.C. Main, then going East to Ave. "G". (Including valves, corporation stops, and fittings).

16. Replace " C.I. service line on Alley between Ave. "F" and Ave. "G" on Third Street, tying onto 6" A.C. Main, then going South on Alley, tying to existing 2" P.V.C. on Fourth Street. (Including valves, corporation stops, and fittings.

17. Replace 2" C.I. service line on Alley between Ave. "G" and Ave. "H" on Third Street, tying to existing 6" A.C. Main, then going North to First Street. (Including valves, corporation stops, and fittings).

18. Replace 2" C.I. service line on Alley between Ave. "H" and Ave. "I" on Third Street, tying to existing 6" A.C. Main, then going North to First Street. (Including valves, corporation stops, and fittings).

19. Replace 2" C.I. service line on Alley between Ave. "G" and Ave. "H" on Third Street, tying onto existing 6" A.C., then going South to Fourth Street, turning East to Alley between Ave. "H" and Ave. "I", then going North on Alley to t e onto existing 6" A.C. Main on Third Street. (Including valves, corporation stops, and fittings).

20. Replace 2" C.I. service line in Alley between Ave. "I" and Ave. "J" on Third Street, tying to existing 6" A.C. Main, then going South to Fourth Street, turning East to Alley between Ave. "J" and Ave. "K", then turning North on Alley to tie onto existing 6" A.C. Main on Third Street. (Including valves, corporation stops, and fittings).

21. Replace 2" C.I. service line in Alley between Ave. "I" and Ave. "J" on Third Street, tying to existing 6" A.C. Main, then going North on Alley in Alley South of First Street, turning East on Alley to tie onto existing 6" A.C. Main on Ave. "J". (Including valves, corporation stops, and fittings).

22. Replace 2" C.I. service line in Alley between Ave. "J" and Ave. "K" on Third Street, tying to existing 6" A.C. Main, then going North to Second Street, turning West to Ave. "J" and to existing 6" A.C. Main. (Including valves, corporation stops, and fittings).

23. Replace 2" C.I. service line in Alley between Poinsetta and Henrietta Streets on Fourth Street tying to existing 6" A.C. Main then going South in Alley to Sixth Street, turning West to Poinsettal and tying into existing 2" P.V.C. (Including valves, corporation stops, and fittings).

24. Replace 2" C.I. service line on Alley West of Capeheart on Hulgreen, tying to existing 6" A.C. Main, then going South to Belair, tying East to Alley between Capeheart and East Wind, turning North to Capeheart and then West on Hulgreen to tie into existing 6" A.C. on Capeheart. (Including valves, corporation stops, and fittings).

25. Replace 2" C.I. service line in Alley East of Big Oak and Sixth Streets (extended), tying into existing line and going South to a point approximately 500'. (Including valves, corporation stops, and fittings).

26. Replace 2" C.I. service line in Alley between Ave. "A" and Benito Juarez on Fourth Street, tying to existing 8" P.V.C. Main, then going South in Alley to Sixth Street. (Including valves, corporation stops, and fittings).

27. Replace 2" C.I. service line in Alley between Benito Juarez and Garza Avenue on Fourth Street, tying to existing 8" P.V.C. Main, then going South in Alley to Sixth Street. (Including valves, corporation stops, and fittings).

28. Replace 2" P.E. service line in Alley between Azalea and Honeysuckle Drive on First Street, tying to existing 6" C.I., then going approximately 430' North in Alley to tie into existing 2" P.V.C. (Including valves, corporation stops, and fittings).

29. Replace 2" C.I. service line in Alley between W. Ave. "D" and W. Ave. "E" on West Third Street, tying to existing 6" A.C. Main going North on Alley to W. Fifth, turning East on Second Street to Alley between Ave. "E" and Ave. "B", then South on Alley to tie into existing 6" A.C. Main on W. Third Street. (Including valves, corporation stops, and fittings).

30. Replace 2" C.I. and 4" C.I. service line on Alley between W. Ave. "D" and W. Ave. "E", tying to existing 6" A.C. Main, then going South to W. Second Street, turning East on Second Street to Alley between W. Ave. "E" and W. Ave. "B", then going North on Alley to W. Third Street and tying onto existing 6" A.C. Main. (Including valves, corporation stops, and fittings).

31. Replace 2" C.I. service line on Alley between First Street and Second Street on Ave. "F" (extended), tying to 6" A.C. Main, then going West on Alley to Alley between Ave. "C" and Ave. "B", turning South on Alley to Ave. "C".

32. Replace 2" C.I. service line on Second Street tying to existing 6" A.C. Main, then going North crossing Railroad Track to North First Street, tying to existing 6" A.C. Main. (Including valves, corporation stops, and fittings).

33. Replace 2" P.V.C. on N. First on Alley between Gussie and East Street (extended), tying to existing 6" A.C. Main, then going South to Alley South of Highway #361. (Including valves, corporation stops, and fittings).

34. Replace 2" P.V.C. service line on North side of Highway #361 in Alley between Ave. "B" and Gussie Street, East on Highway #361 to Alley between Gussie and East Street. (Including valves, corporation stops, and fittings).

35. Replace 2" C.I. services, line in Alley North of First Street and Secoy Street, then going East on Alley to Ave. "G". (Including valves, corporation stops, and fittings).

36. Replace 4" C.I. service line on South side of Highway #361 and tying onto existing 6" A.C. Main at Ave. "B" and continuing West to Alley and turning South to Railroad Track and turn West approximately 650'. (Including valves, corporation stops, and fittings).

PRELIMINARY COST ESTIMATE FOR PHASE II: . . $88,000.00

PHASE III: MINOR LINE EXTENSION PROGRAM

1. Loop 2" P.E. pipe on Arkansas to existing 6" A.C. pipe on Mustang.

2. Loop 2" P.V.C. pipe on Alley between Avenue "B" and Avenue "C" to existing 6" A.C. pipe on Avenue "C" at Alley north of Fifth Street.

3. Loop 2" P.V.C. pipe on Alley between S. Main to existing 6" A.C. pipe on Avenue "B".

4. Loop 2" P.V.C. pipe on Alley between S. Main to existing 6" A.C. pipe at intersection Ave. "C" and Fourth Street.

5. Loop 2" P.V.C. pipe on Alley between Avenue "D" and Avenue "E" to existing 6" A.C. pipe on Seventh Street.

6. Loop 2" P.V.C. pipe on Alley between Avenue "E" and S. Main to existing 8" A.C. pipe on Eight Street.

7. Loop 2" P.V.C. pipe on Alley between S. Main and Highway #1069 to 8" A.C. pipe on Eight Street.

8. Loop 2" P.V.C. pipe on Alley between Avenue "F" and Avenue "G" to 2" P.V.C. north of Fifth Street.

9. Loop 2" P.E. pipe on Alley west of Big Oak to 2" P.V.C. pipe east of Big Oak on Eight Street.

10. Loop 2" P.V.C. pipe on Poinsetta to existing 6" A.C. pipe on Fourth Street.

11. Loop 2" P.E. between Shady Oak and Big Oak Lane to existing 6" A.C. on First Street.

12. Loop 3" A.C. pipe on Buckeye Drive to existing 6" A.C. pipe on Avenue "A".

13. Loop 3" A.C. pipe on Penoak Avenue to existing 3" A.C. pipe on Hackberry along Highway #361.

PRELIMINARY COST ESTIMATE FOR PHASE III. . . . $20,000.00

SHORT RANGE EXPANSION:

1. Proposed 12" Main to be installed from existing Pump Station No. 2 South and connect to existing 8" P.V.C. line on Fourth Street. $ 42,000.00

2. Proposed 12" Main to be installed from the existing 6" A.C. line at the intersection of F.M. Highway #1069 and F.M. Highway #2725 and continue North along F.M. Highway #2725 to tie into the existing 8" P.V.C. Main on Fourth Street, including valves, fire hydrant assemblies, connections and appurtenances. $ 275,000.00

3. Proposed 8" Main to be installed from existing 8" A.C. line on Eighth Street and Ave. "E" and West on Eigtht Street at Ave. "B" and North to Waco Street West to tie into existing 8" on Beaumont and Waco Streets, including valves, fire hydrant assemblies, connections, and appurtenances. $ 130,000.00

4. Proposed 6" Main to be installed from existing 6" A.C. on First Street and Ave. "A" and So. along Avenue "A" to tie into existing 6" A.C. line at Chandler and Ave. "A" including valves, fire hydrants, connections, and appurtenances. $ 16,600.00

5. Proposed 6" Main to be installed from existing 6" A.C. line on First Street and Ave. "F" and continue East to tie into existing 6" A.C. at First Street and Ave. "J", including valves, fire hydrant assemblies, connections and appurtenances. $ 25,400.00

6. Proposed 6" Main to be installed from existing 6" A.C. line on Eighth and Poinsetta Streets, North on Poinsetta to Sixth Streets, East on Sixth Street to tie into existing 6" A.C. line to intersection of Henrietta And Sixth Street.

   Intersection of Sixth and Poinsetta Street, North on Poinsetta to Fourth Streets tying into existing 6" A.C. line.

   Thence, from intersection of Poinsetta and Rudolph Streets, East on Rudolph to tie into existing 6" A.C. line East of Big Oak Lane. $ 77,800.00

7. Proposed 6" Main to be installed from existing 8" A.C. line at intersection of Waco and California Streets, South on California to Mustang Streets, and East on Mustang Street to tie into existing 6" A.C. line. $ 24,800.00

8. Proposed 8" Main to be installed from existing 6" A.C. line at intersection of Ave. "B" and Tiner Lane and East on Tiner Lane to tie into existing 6" A.C. line at intersection of Lovers Lane and Tiner Lane. $ 92,600.00

9. Proposed 8" Main to be installed from existing 6" A.C. line at Fourth Street and Benito Juarez Ave. and then going South on Benito Juarez to Sixth Street and turning West on Sixth Street to end at intersection of Sixth Street and Ave. "A". $ 48,800.00

LONG RANGE EXPANSION:

1. Proposed 8" Main to be installed from existing 8" A.C. line at intersection of Ave. "B" and S. Main South on S. Main to Seventh Street, West on Seventh Street to tie into existing 8" line in Alley between Fogg Ave. and Ave. "E" at intersection of S. Main and Third Street East on Third Street to tie into existing 6" A.C. line at intersection of Third Street and Ave. "F", including valves, fire hydrant assemblies, connection and appurtenances. $118,000.00

2. Proposed 8" Main to be installed from existing 8" A.C. line at intersection of Waco and California Streets, North on California to Highway #361, East of Highway #361 to Ave. "B" to tie into existing 6" A.C. line, including valves, fire hydrant assemblies, connection and appurtenances. $103,000.00

3. Proposed 6" Main to be installed from existing 6" A.C. line at intersection of Big Oak Lane and Sixth Street, East on Sixth Street to intersection of Sixth Street and Ave. "A". $ 26,000.00

4. Proposed 6" Main to be installed from existing 6" A.C. line at intersection of Fourth Street and Big Oak Lane, North on Big Oak Lane to First Street and tying into existing 6" A.C. line, including valves, fire hydrant assemblies, connections, and appurtenances. $ 24,500.00

5. Proposed 12" Main to be installed from existing Pump Station No. 2, West approximately 800', then turning North past Highway #361, then going East and West. West along Highway #361 to intersection of Ave. "A", East along Highway #361 to Tiner Lane and turning North and tying into proposed elevated Water Storage Tank on Mooney Lane and proposed 6" to be tied onto 12" Main at Morgan Lane and continuing along Morgan Lane to a point to tie into existing 6" Main. $380,000.00

6. Proposed 12" Main to be installed from proposed elevated Water Tank, West to approximately 2,100' ± past Ave. "A" and connecting into proposed 8" Main which goes West to Highway #1069 (Ave."B"), then turns South and ties into existing 6" A.C. line at Ave. "B" and Morgan Lane. $322,400.00

7. Proposed 12" Main to be connected to existing 12" Main at intersection of F.M. Highway #361 and Ave. "A", then going West on Highway #361, past Lovers Lane and turning South across Highway #361, and continuing West on Highway #361 and tying into proposed 8" Main at Ave. "G" extended and Highway #361, and continuing on Highway #361 and tying into existing 6" A.C. at Ave. "B" and Highway #361, including valves, fire hydrant assemblies, connections and appurtenances. $168,800.00

8. Proposed 12" Main to be connected to proposed 12" Main at intersection Highway #361 and Ave. "G" extended, then to continue South on Ave. "G" down to a point past 8th Street tying into proposed 12" Main. Also 8" Main to be connected to proposed 12" Main at Ave. "G" and Sixth Street, then going East on Sixth and tying into existing 6" Main. Including valves, fire hydrant assemblies, connections and appurtenances. $186,200.00

9. Proposed 12" Main to be connected to existing 12" Main at a point South of Eighth Street and continued East to intersection of Eighth Street and Ave. "A" (extended) and then continuing along Eighth Street (extended) to cross Highway #2725 and tying into existing 12" Main. Also, proposed 6" Main to be connected to proposed 12" Main on South side of Eighth Street extended and Big Oak Lande and go along Big Oak Lane and tie into existing 6" A.C. line at Big Oak and Sixth Street, including valves, fire hydrant assemblies, connections and appurtenances. $348,400.00

10. Proposed 6" Main to be connected to existing 8" Main at Sixth Street and Benito Juarez Ave. and East along Sixth Street to Garza Ave. and turn North on Garza Ave. and tie into existing 8" P.V.C. on Fourth Street, including valves, fire hydrants assemblies, connections, and appurtenances. $ 33,600.00

11. 12" Main at Fourth Street just East of Hewett Drive, West to Hewett Drive and South along Hewett to connect with existing 12" Main on 8th Street extended, including valves, fire hydrant assemblies, connections, and appurtenances. $100,000.00

12. Proposed 16" Main to be installed from existing Ground Storage Tank East along First Street across Highway #2725 and tied into proposed 12" Main Line. $116,300.00

13. Proposed 12" Main to be installed from existing elevated Storage Tank, East along Mooney Lane, across Railroad tracks and turning South on Highway #2725 and tying onto existing 12" Main at Highway #2725 and Eighth Street extended. $413,000.00

14. Proposed 8" Main to be connected to existing 12" Main at Eighth Street (extended) and Ave. "A" (extended) and then continuing North along Ave. "A" and tying into proposed 6" Main at Sixth Street and continuing along Sixth Street and tying into existing 6" A.C. at Fourth Street and Ave. "A". $ 62,000.00

15. Proposed 6" Main to be connected to existing 8" P.V.C. at Fourth Street and Benito Juarez Ave. and continuing North on Benito Juarez (extended) and turning East at Chandler to a point and then turning North to tie into existing 6" A.C. line at First Street (extended) East of Honeysuckle. $ 22,400.00

16. Proposed 12" Main to be connected to existing 12" Main at a point West of Lovers Lane and on North side of Highway #361, and continuing North to Mooney Lane and tying into existing 12" Main. $204,000.00

17. Proposed 8" Main to be connected to existing 8" A.C. line at Highway #1069 and Sherry Ave. and continuing East on Sherry Ave. to a point East of Port Ave. and turning South and continuing along Port Ave. to a point past Vera Lane, then turning East to 2,700' $\pm$ from Port Ave., and tying into proposed 12" Main and then continuing North and tying into existing 12" Main. $208,000.00

18. Proposed 8" Main to be connected to existing 12" Main at a point West of Lovers Lane and on South side of Highway #361 and continuing along Highway #361 and continuing along Highway #361 to tie into existing 6" A.C. line at La Quinta and Highway #361. $ 32,400.00

| | | |
|---|---|---|
| 19. | Proposed 6" Main to be connected to existing 12" Main at Kenny Lane and a point West of Highway #361, then continuing West of Kenny Lane to Ave. "A", then tying onto existing 6" A.C. and continuing with proposed 8" Main along Kenny Lane to tie into existing 6" A.C. at Highway #1069 (Ave. "B") and Kenny Lane. | $203,000.00 |
| 20. | Proposed 6" Main to be connected to existing 12" Main at McCullough Lane and a point West of Highway #361, then continuing West on McCullough Lane to tie into existing 6" A.C. at Hackberry Ave. and McCullough Lane. | $ 37,200.00 |
| 21. | Proposed 6" Main to be connected to existing 12" Main at Highway #361 and Tiner Lane, then con tinuing along Tiner Lane to tie into existing 6" A.C. line at Hackberry Ave. and Tiner Lane. | $ 37,200.00 |
| 22. | Proposed 6" Main to be connected to existing 8" Main at Sherry Ave. and East side of Port Ave. and continuing along Port Ave. to tie into existing 6" A.C. line at Highway #1069 and Belair Ave., then tie proposed 6" Main to pro-posed 6" at Port Ave. and Baywood Drive and continuing along Baywood Drive to a point at Baywood Drive (extended) and East Wind (extended) and turn North and continuing at a point East of East Wind to Belair Ave. and turn West on Belair to East Wind Drive and turn North go along East Wind to a point to tie into existing 6" A.C. at Eighth Street and Poinsetta Street. | $127,200.00 |
| 23. | Proposed 6" Main to be connected to existing 6" A.C. at Highway #1069 and Sharon Street and continuing along South side of Sharon Street to Port Ave. and turn North on Port Ave. and tie into existing 8" Main at point between Vera Lane and Sharon Street. | $ 43,800.00 |
| 24. | Proposed 6" Main to be connected to existing 6" A.C. line at intersection of Sixth Street and Big Oak Lane, then going South on Big Oak Lane tying into proposed 12" Main South of Eighth, including valves, fire hydrant assemblies, connection and appurtenances. | $ 29,000.00 |

UNIT THREE

# SANITARY SEWER COLLECTION AND TREATMENT SYSTEM

## UNIT THREE:

### A. GENERAL COMMENTS AND RECOMMENDATIONS

1. The sanitary sewer collection system is overall in fair condition except for the following:

   a. Infiltration/inflow into the system causes surcharge conditions and treatment plant overloading during wet weather periods.

      RECOMMENDATION: Immediate initiation of a collection system investigation to locate and reduce infiltration/inflow during wet weather periods, including a Closed Circuit Television investigation of major 15" trunk lines of the following:

      1. Sixth Street from Avenue "D" to Avenue "B".

      2. Avenue "B" from Sixth Street to Seventh Street.

      3. San Angelo Street from Mustang Street to the lift station.

      4. Oklahoma Street from Avenue "B" to San Angelo Street.

      5. Trunk line south of Oklahoma Street from Avenue "B" to the lift station.

      Immediate initiation of cleaning wetwells and renovation of pumps and equipment in sub-lift station.

      Immediate initiation of cleaning and making necessary equipment repairs to treatment plant.

2. Only limited short range expansion can adequately be handled by the present sanitary sewer collection and treatment system if the deficiencies above are correct.

      RECOMMENDATION: Installation of new collector and lateral lines to provide immediate service to the following streets:

      PHASE I:

      1. Fourth Street east of Avenue "A".

      2. Alley between Avenue "A" and Benito Juarez south of Fourth Street.

3. Alley between Benito Juarez and Garza Avenue south of Fourth Street.

PHASE II:

1. First Street west of Avenue "A".

2. Buckeye west of Avenue "A".

3. Chandler Place east of Avenue "A".

4. Azalea Avenue north of First Street.

5. Honeysuckle Avenue north of First Street.

PHASE III:

1. Avenue "I" from Fourth Street to First Street.

2. Third Street east of Avenue "I".

3. Avenue "J" north of Fourth Street.

4. Avenue "K" north of Fourth Street.

5. Alley between First and Second Street east of Avenue "I".

6. First Street east of Avenue "I".

7. Buckeye Drive north of First Street.

PHASE IV:

1. Sixth Street from Poinsetta to just past Henrietta.

2. West of Henrietta from Sixth Street to Eighth Street.

3. East of Henrietta from Sixth Street to Eighth Street.

RECOMMENDATION: Installation of a 12" collector line from Eighth Street to serve area east of Belair Subdivision.

RECOMMENDATION: Installation of a 12" collector line on Sixth Street and a 10" collector line to serve an area between Big Oak and Avenue "A". Also an 8" lateral line on Greenbriar Drive from Sixth Street south to Eighth Street.

3. The long range expansion for providing sewer service to areas north of the Southern Pacific Railroad tracks can only be accompanied by the addition of a new wastewater treatment facility.

RECOMMENDATION: In reviewing studies and reports by others, a new wastewater treatment facility is more feasible than the proposed Land Treatment Method.

4. This preliminary investigation found that the existing treatment plant will not be able to handle future growth of the City, other than that shown for short range expansion. There are also some of the major collector lines already flowing at full capacity. There is no available land in the immediate area of the existing plant due to the increase in energy related industries.

The natural ground at the existing plant site is 10.0 feet above mean sea level to approximately 14.0 feet above mean sea level and the ground water table varies between 3 to 6 feet below natural grade.

The proposed treatment plant would be located south of Eighth Street between Avenue "B" and Avenue "G". This proposed site has ample room for expansion.

The proposed plant would be large enough to handle future growth and also to divert two-thirds of the existing flow through a 24-inch interceptor line. The proposed interceptor line would start at the new plant and go along Avenue "D" to Sixth Street and intercept and connect to the existing system.

## UNIT THREE:

## B. DEVELOPMENT OF MASTER PLAN

The following are assumed guidelines used in formulating this Master Plan:

THE COLLECTION SYSTEMS:

1. General: The investigation of the present Wastewater Collection System consisted of dividing the existing system into sub-systems which could be studied for maximum flow characteristics of the main collector lines, maximum flows expected and area served.

   The outer most system collectors were studied for depth for future extensions and for collector flow capacity limitations.

   Some of the sub-system collector lines that were found to be surcharged were hydraulically checked for maximum flow capacities.

2. Short Range Expansion:

   a. Extension of the existing system may occur only if collector lines, lift stations and treatment facilities serving the proposed expansion have the capacity to handle the expected future flows.

   b. The existing developed residential areas within the City limits and within or close to existing systems will receive top priority.

   c. No areas outside the City limits will be considered because of numerous areas within the City limits without sewer service.

3. Long Range Expansion:

   a. That all undeveloped areas will have residential population density equivalence or less, in order to estimate probable flow concentrations.

   b. The natural physical land limitation such as railroads, highways, natural slope of undeveloped land will have direct priority for sub-systems.

   c. That boundaries of each sub-system in undeveloped areas are subject to change depending on which area develops first and unforseen physical limitations, however, the total acreage of each sub-system should not be increased.

THE WASTEWATER TREATMENT FACILITIES:

1. General: The investigation of the present wastewater treatment facilities consisted of evaluating and studying existing reports and records and consultations with field personnel.

2. Short Range Expansion:

   a. The wastewater treatment capacity be reserved for existing residential areas not yet fully developed and for new sub-divided areas not yet fully occupied.

   b. That the present wastewater treatment complex be utilized to its ultimate efficiency by replacing old inefficient plant equipment with new equipment.

3. Long Range Expansion:

   a. That required land aquisitions, easements, and right-of-ways can be obtained through Owner negotiation and/or condemnation as needed.

   b. That all undeveloped areas will have residential population density equivalence or less, in order to estimate probable flow concentrations.

GENERAL DESIGN CRITERIA

1. Assume - 2.6 lots per acre

2. Assume - 3 persons per lot

3. Average domestic flow: 100 gallons per day per person
(based on Texas Department of Health Resources)
2.6 lots/acre x 3 persons/lot x 100 gallons/day/person = 780 gal./ac./day

4. Peak Factor: (Based on Texas Department of Health Resources)

   a. Lateral Lines (8" diameter) - Peak Factor = 4

   b. Main Lines (10" - 12" diameter) - Peak Factor = 3.5

   c. Collector Lines (15" - 18" diameter) - Peak Factor = 2.5

   d. System Trunk Lines (21" - 36" diameter) - Peak Factor = 2.0

5. Peak Domestic Flow:

   a. Lateral Lines (8"): 780 gal/ac/day x 4 = 3,120 gal/ac/day

   b. Main Lines (10" - 12"): 780 gal/ac/day x 3.5 = 2,730 gal/ac/day

   c. Collector Lines (15" - 18"): 780 gal/ac/day x 2.5 = *1,950 gal/ac/day

   d. System Trunk Lines (21" - 36"): 780 gal/ac/day x 2.0 = 1,560 gal/ac/day

   (*Also, value for lift station design)

6. Maximum Area to be Served:

   a. Lateral Lines (8" diameter)
   8" pipe @ 0.33% & n = 0.013
   Velocity = 2.0 fps & Discharge = 310 gpm or 446,440 gal/day
   446,400 gal/day ÷ 3,120 gal/ac/day = 143 acres

   b. Main Lines (10" - 12" diameter)
   10" pipe @ 0.25% & n = 0.013
   Velocity = 2.0 fps & Discharge = 490 gpm or 705,600 gal/day
   705,600 gal/day ÷ 2,730 gal/ac/day = 258 acres

   12" pipe @ 0.20% & n = 0.013
   Velocity = 2.0 fps & Discharge = 710 gpm or 1,022,400 gal/day
   1,022,400 gal/day ÷ 2,730 gal/ac/day = 374 acres

   c. Collector Lines (15" - 18" diameter)
   15" pipe @ 0.15% & n = 0.013
   Velocity = 2.0 fps & Discharge - 1,120 gpm or 1,612,800 gal/day
   1,612,800 gal/day ÷ 1,950 ga/ac/day = 827 acres

18" pipe @ 0.11% & n = 0.013
Velocity = 2.0 fps & Discharge = 1,590 gpm or 2,289,600 gal/day
2,289,600 gal/day ÷ 1,950 gal/ac/day = 1,174 acres

d. System Trunk Lines (21" - 36" diameter)
21" pipe @ 0.09% & n = 0.013
Velocity = 2.0 fps & Discharge = 2,160 gpm or 3,110,400 gal/day
3,110,400 gal/day ÷ 1,560 gal/ac/day = 1,994 acres

24" pipe @ 0.08% & n = 0.013
Velocity = 2.0 fps & Discharge = 2,900 gpm or 4,176,000 gal/day
4,176,000 gal/day ÷ 1,560 gal/ac/day = 2,677 acres

30 " pipe @ 0.055% & n = 0.013
Velocity = 2.0 fps & Discharge = 4,400 gpm or 6,336,000 gal/day
6,336,000 gal/day ÷ 1,560 gal/ac/day = 4,062 acres

36" pipe @ 0.045% & n = 0.013
Velocity = 2.0 fps & Discharge = 6,300 gpm or 9,072,000 gal/day
9,072,000 gal/day ÷ 1,560 gal/ac/day = 5,815 acres

MAXIMUM AREA TO BE SERVED
(Based on V = 2 fps & n = 0.013)

| Size | % Slope | Discharge | | *Maximum Area (Acres) |
|---|---|---|---|---|
| | | GPM | Gallons/Day | |
| 8" | 0.33 | 310 | 446,400 | 143 |
| 10" | 0.25 | 490 | 705,600 | 258 |
| 12" | 0.20 | 710 | 1,022,400 | 374 |
| 15" | 0.15 | 1,120 | 1,612,800 | 827 |
| 18" | 0.11 | 1,590 | 2,289,600 | 1,174 |
| 21" | 0.09 | 2,160 | 3,110,400 | 1,994 |
| 24" | 0.08 | 2,900 | 4,176,000 | 2,667 |
| 30" | 0.055 | 4,400 | 6,336,000 | 4,062 |
| 36" | 0.045 | 6,300 | 9,072,000 | 5,815 |

MAXIMUM AREA TO BE SERVED
(Based on V = 2 fps & n = 0.013)

| Size | % Slope | Discharge | | *Maximum Area (Acres) |
|---|---|---|---|---|
| | | GPM | Gallons/Day | |
| 8" | 0.33 | 310 | 446,400 | 143 |
| 10" | 0.25 | 490 | 705,600 | 258 |
| 12" | 0.20 | 710 | 1,022,400 | 374 |
| 15" | 0.15 | 1,120 | 1,612,800 | 827 |
| 18" | 0.11 | 1,590 | 2,289,600 | 1,174 |
| 21" | 0.09 | 2,160 | 3,110,400 | 1,994 |
| 24" | 0.08 | 2,900 | 4,176,000 | 2,667 |
| 30" | 0.055 | 4,400 | 6,336,000 | 4,062 |
| 36" | 0.045 | 6,300 | 9,072,000 | 5,815 |

## UNIT THREE:

## C. PRIORITY SEQUENCE AND PRELIMINARY COST ESTIMATES

### WASTEWATER SYSTEM DEFICIENCIES

Immediate initiation of a collection system field investigation to identify and reduce heavy infiltration/inflow during wet weather periods and including Closed Circuit Television of major 15-inch collector lines within the system.

Immediate initiation of cleaning wetwells and renovation of pumps and equipment in sub-lift stations.

Immediate initiation of cleaning and making necessary equipment repairs to the treatment plant.

IMMEDIATE EXPANSION

PHASE I: Provide

| | |
|---|---|
| Provide sewer service to Vista Hermosa Subdivision | |
| 950 L.F. - 10" Gravity Line & Manholes @ $35.00 L.F. | $ 33,250.00 |
| 2,600 L.F. - 8" Gravity Line & Manholes @ $25.00 L.F. | 65,000.00 |
| | $ 98,250.00 |

PHASE II:

| | |
|---|---|
| Provide sewer service to Rowland Woods Subdivision and Buckeye Subdivision. | |
| 2800 L.F. - 8" Gravity Line & Manholes @ $25.00 L.F. | $ 70,000.00 |

PHASE III:

| | |
|---|---|
| Provide sewer service to College Heights Area and Wendy Acres. | |
| 1,800 L.F. - 12" Gravity Line & Manholes @ $45.00 L.F. | $ 81,000.00 |
| 3,500 L.F. - 8" Gravity Line & Manholes @ $25.00 L.F. | $ 87,500.00 |
| | $168,500.00 |

PHASE IV:

| | |
|---|---|
| Provide sewer service to Henrietta Street. | |
| 1,800 L.F. - 12" Gravity Line & Manholes @ $45.00 L.F. | $ 81,000.00 |
| 1,300 L.F. 8" Gravity Line & Manholes @ $25.00 L.F. | $ 32,500.00 |
| | $113,500.00 |

SHORT RANGE EXPANSION
(Utilizing Existing Plant)

PHASE I:

| | |
|---|---|
| Providing sewer service to Greenbriar Drive. | |
| 500 L.F. - 12" Gravity Line & Manholes @ $45.00 L.F. | $ 22,500.00 |
| 1,300 L.F. - 8" Gravity Line & Manholes @ $25.00 L.F. | $ 32,500.00 |
| | $ 55,000.00 |

PHASE II:

| | |
|---|---|
| Providing sewer service to area east of Belair Subdivision | |
| 800 L.F. - 12" Gravity Line & Manholes @ $45.00 L.F. | $ 36,000.00 |

PHASE III:

| | |
|---|---|
| Providing sewer service to area east of Big Oak Lane. | |
| 1,250 L.F. - 12" Gravity Line & Manholes @ $45.00 L.F. | $ 56,250.00 |
| 2,600 L.F. - 10" Gravity Line & Manholes @ $35.00 L.F. | $ 91,000.00 |
| | $147,250.00 |

## LONG RANGE EXPANSION

### PHASE I:

| | |
|---|---|
| 1 M.G.D. Wastewater Treatment Plant (including concrete structures, pumps, motors, controls, aeration equipment, sludge handling, electrical, mechancial, site improvements, fence and all appurtenances), land (minimum 15 acres) | $1,250,000.00 |
| 2,300 L.F. - 24" Gravity Line & Manholes @ $105.00 L.F. = | $ 241,500.00 |
| | $1,491,500.00 |

### PHASE II:

| | |
|---|---|
| Lift Station No. 1 (including all appurtenances) | $ 275,000.00 |
| 7,300 L.F. - 12" Force Main @ $30.00 L.F. | $ 219,000.00 |
| 5,000 L.F. - 10" Gravity Line & Manholes @ $35.00 L.F. = | $ 175,000.00 |
| 9,600 L.F. - 8" Gravity Line & Manholes @ $25.00 L.F. = | $ 240,000.00 |
| | $ 909,000.00 |

### PHASE III:

| | |
|---|---|
| Lift Station No. 2 (including all appurtenances) | $ 55,000.00 |
| 600 L.F. - 6" Force Main @ $15.00 L.F. = | $ 9,000.00 |
| 1,300 L.F. - 21" Gravity Line & Manholes @ $95.00 L.F. = | $ 123,500.00 |
| 3,000 L.F. -15" Gravity Line & Manholes @ $65.00 L.F. = | $ 195,000.00 |
| 2,600 L.F. - 12" Gravity Line & Manholes @ $45.00 L.F. = | $ 117,000.00 |
| 10,200 L.F. - 10" Gravity Line & Manholes @ $35.00 L.F. = | $ 357,000.00 |
| 2,700 L.F. - 8" Gravity Line & Manholes @ $25.00 L.F. | $ 67,500.00 |
| | $. 924,000.00 |

PHASE IV:

| | |
|---|---|
| Lift Station No. 3 (including all appurtenances) | $ 55,000.00 |
| 750 L.F. - 6" Force Main @ $15.00 L.F. = | $ 11,250.00 |
| 1,300 L.F. - 15" Gravity Line & Manholes @ $65.00 L.F. = | $ 84,500.00 |
| 1,300 L.F. - 12" Gravity Line & Manholes @ $45.00 L.F. = | $ 58,500.00 |
| 5,900 L.F. - 10" Gravity Line & Manholes @ $35.00 L.F. = | $206,500.00 |
| 2,700 L.F. - 8" Gravity Line & Manholes @ $25.00 L.F. = | $ 67,500.00 |
| | $483,250.00 |

PHASE V:

| | |
|---|---|
| 1,300 12" Gravity Line & Manholes @ $45.00 = | $ 58,500.00 |
| 11,000 L.F. - 10" Gravity Line & Manholes @ $35.00 L.F. = | $385,000.00 |
| 1,500 L.F. - 8" Gravity Line & Manholes @ $25.00 L.F. = | $ 37,500.00 |
| | $481,000.00 |

PHASE VI:

| | |
|---|---|
| Lift Station No. 4 (including all appurtenances) | $150,000.00 |
| 2,900 L.F. - 8" Force Main @ $20.00 L.F. = | $ 58,000.00 |
| 2,900 L.F. - 12" Gravity Line & Manholes @ $45.00 L.F. = | $130,500.00 |
| 8,000 L.F. - 10" Gravity Line & Manholes @ $35.00 L.F. = | $280,000.00 |
| | $618,500.00 |

# UNIT FOUR

# STREET AND DRAINAGE SYSTEM

## UNIT FOUR:

## A. GENERAL COMMENTS AND RECOMMENDATIONS

(Street Segment)

The street segment of this report focused on two objectives, one, the development of a transporation and circulation plan for traffic flow and two, the development of a Seal and Reconstruction Street Program.

### TRANSPORATION AND CIRCULATION PLAN:

The development of an effective traffic system has been hampered by the limited public right-of-way widths within the City and surrounding areas.

RECOMMENDATION: Immediate iniation of a State, County and Local effort to acquire additional right-of-way now, prior to any additional private build-up along proposed routes.

### SEAL AND RECONSTRUCTION STREET PROGRAM:

Under normal circumstances where the condition of the street system varies from excellent, good, fair, needing repiar, to needing reconstruction of a Short Range Improvement and Maintenance Program may be outlined in a manner that the City can incorporate it as an ordinary budget item over a sequence of years to emcompass the entire City street system. But when the entire street system is in such a deteriorate stage needing immediate city-wide repair, it is impossible to prioritize any program in a logical order. Therefore, only a phase grouping of streets have been outlined, and this phase grouping should not be confused as a priority list at this time.

RECOMMENDATION: Immediate intiation of Seal and Reconstruction of streets in areas where simple drainage has been provided, to insure optimum cost-effectiveness of work.

## UNIT FOUR:

## B. DEVELOPMENT OF MASTER PLAN

## (Street Segment)

The following are assumed guidelines used in formulating this segment of the Master Plan:

TRANSPORTATION AND CIRCULATION PLAN:

1. General: In most basic classification system for design work, streets and highways are grouped into four (4) general classifications, (a) highways, (b) thoroughfares, (c) collector streets, and (d) local or minor streets. These classifications usually carry with them a set of suggested design standards which are in keeping with the importance of this system, and are governed by specific transportation service the system is designed to perform.

   The four (4) basic types of urban street classification systems as discussed above are outlined in greater detail as follows:

   a. Highways: Provides for expeditious movement of large volumes of traffic between areas and across the city.

   b. Thoroughfares: Provide for the through traffice movement between areas and across the City, and incorporate direct access to abutting property within the system.

   c. Collector streets: Provides for traffic movement between thoroughfares and local streets, as well as direct access to abutting property.

      Collector streets normally collect the majority of traffic originating within the residential areas and distribute this traffice to various points along the route, or channelize it to a major thoroughfare.

   d. Local or Minor Streets: Provide direct acess to abutting land and for local traffic movements.

      An important function of the minor street is that it services a group of residential units with limited traffic demands and should not be considered nor utilized in a collector capacity to channel traffic to other land use areas.

2. SHORT RANGE EXPANSION:

The following assumed guidelines were utilized:

a. That street condition of existing minor streets shall basically be improved within the next five (5) years.

b. That adequate drainage will accompany the street condition reconstruction.

c. That adjacent land required for additional right-of-way can be obtained to normal channels, with minimum delays.

3. LONG RANGE EXPANSION:

The following assumed guidelines were utilized:

a. That traffic flow would continue to increase at normal national averages in similar land use.

b. That State, County, and Local governments would joint efforts and formulate a detailed segmented traffic flow and arterial systems to complement this basic plan.

SEAL AND RECONSTRUCTION STREET PROGRAM:

1. General: Due to the severe damage the city-wide street system encountered during the September 1979 major flooding. The only factor considered were as follows:

   a. Complete budgeted normal seal coating and reconstruction of pre-scheduled streets.

   b. To begin and reconstruct isolated sections of town in order to give maximum relief to populated areas.

   c. To group schedule reconstruction of streets in order to complete city areas in the most cost-effective manner.

2. This segment addresses itself only to suggesting phases of work groupings to be reconstructed in a short range improvement program for Seal and Street Reconstruction.

   No other short or long range construction programs were formulated under the scope of this report.

## UNIT FOUR:

### C. PRIORITY SEQUENCE AND PRELIMINARY COST ESTIMATES

(Street Segment)

The Preliminary Cost Estimate to correct the deteriorated condition of the existing streets within the City of Ingleside as a direct or indirect result of the September 1979 Major Street Damage due to the prolong flooding experienced at the time is as listed below:

The intent of this phase sequence and preliminary cost ranges is to set a base as to the magnitude of the required seal or reconstruction program.

| | |
|---|---|
| PHASE I | $250,000 to Approx. $300,000 |
| PHASE II | $175,000 to Approx. $225,000 |
| PHASE III | $125,000 to Approx. $175,000 |
| PHASE IV | $150,000 to Approx. $200,000 |
| PHASE V | $250,000 to Approx. $300,000 |

It is beyond the scope of this report to itemize the program any further due to the urgency of the needed repairs.

## UNIT FOUR:

### A. GENERAL COMMENTS AND RECOMMENDATIONS

(Drainage Segment)

The City of Ingleside's present drainage system can be evaluated as highly lacking the necessary capability to carry off storm run-off effectively as was noted during the recent September 1979 Major Flooding.

The San Patricio Drainage District provides the main outfall systems to the City of Ingleside. There are two main outfall systems presently utilized by the City of Ingleside and they are:

1. The McCampbell Slough Outfall: This District's outfall system has recently been improved in depth and capacity. The system provides outfall drainage to the McCampbell Slough Water Shed which includes most of the northern land area of the city.

2. The Kinney Bayou Outfall: This District's outfall system is presently been processed for improvements, with Corps of Engineers clearance only final right-of-way acquisition remains. The system provides outfall drainage to the Kinney Bayou Water Shed which includes most of the original populated southern section of the City.

There are a variaty of existing deficiencies which need concentrated joint State, County, and Local efforts in order to effectively provide an acquireable solution to the lack of drainage relief to the City of Ingleside.

McCampbell Slough Water Shed:

The recent improvements to the lower sections of the outfall for this water shed has made it obvious that efforts should be concentrated on improving the remainder of the main outfall collector system.

RECOMMENDATION: Immediate initiation of concentrated joint effort to reduce the hydraulic head cost and improve the volume capacity of the F.M. Highway #1069 and F.M. Highway #361 highway structures.

Also, concurrent initiation of land right-of-way acquisition vital to the upstream extension of the present outfall system.

That a time table be coordinated jointly with the Texas Department of Highways and Public Transportation, San Patricio Drainage District and the City of Ingleside to insure a timely positive continuous effort towards a workable solution.

Kinney Bayou Water Shed:

The poor unconfined drainage unit, on the lower outfall system and coupled with the highly inefficient highway crossing of F.M. Highway #1069 and Ave. "G", and heavily vegetated ditch section along Ave. "G" makes this water shed system function in its poorist state.

RECOMMENDATION: Also, immediately initiate a concentrated effort to assist in the acquisition of the much needed drainage right-of-ways south of Eighth Street.

To join together with the San Patricio Drainage District and the Texas Department of Highways and Public Transportation to improve the flow and hydraulic characteristics of the Highway crossing at Ave. "G" and F.M. Highway #1069.

## UNIT FOUR:

## B. DEVELOPMENT OF MASTER PLAN

## (Drainage Segment)

The following are assumed guidelines used in formulating this Master Plan:

1. GENERAL: That the purpose of a well defined drainage system is to allow relief to existing flood prone areas and to allow initial development on well drained land.

   That outfall systems under the jurisdiction of the San Patricio Drainage District would be phased to coincide with the overall system.

   That the Texas Department of Highways and Public Transportation would also join efforts, along with the City of Ingleside and the San Patricio Drainage District, to insure proper drainage systems within the study area.

2. SHORT RANGE EXPANSION: That through the joint efforts of the State, County, and City, meaningfull up-grading of the outfall systems would occur as soon as possible.

   That hydraulic gradiant elevations would be set to insure that the water level of the system remained below natural ground where ever possible to minimize wide-spread flooding.

   That the City and County would acquire the necessary drainage right-of-ways through normal procedures with little time delays.

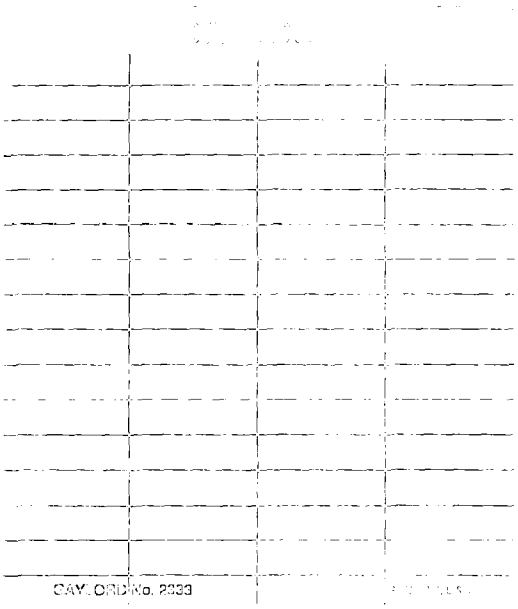
   That minor existing system laterals may be up-graded to include re-grading and maintenance to insure proper drainage as the outfall system is completed.

3. LONG RANGE EXPANSION: That when proper drainage facilities are constructed along with initial development, the systems are usually simple and inexpensive.

   That bad drainage increases the cost of street maintenance, as standing water or prolonged periods of flooding conditions causes extensive damage to base and apshaltic surfaces of streets.

   That bad drainage also tends to overload the sewage collection system and the sewage treatment plant.

   That natural drainage flow direction would take priority were ever possible.

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