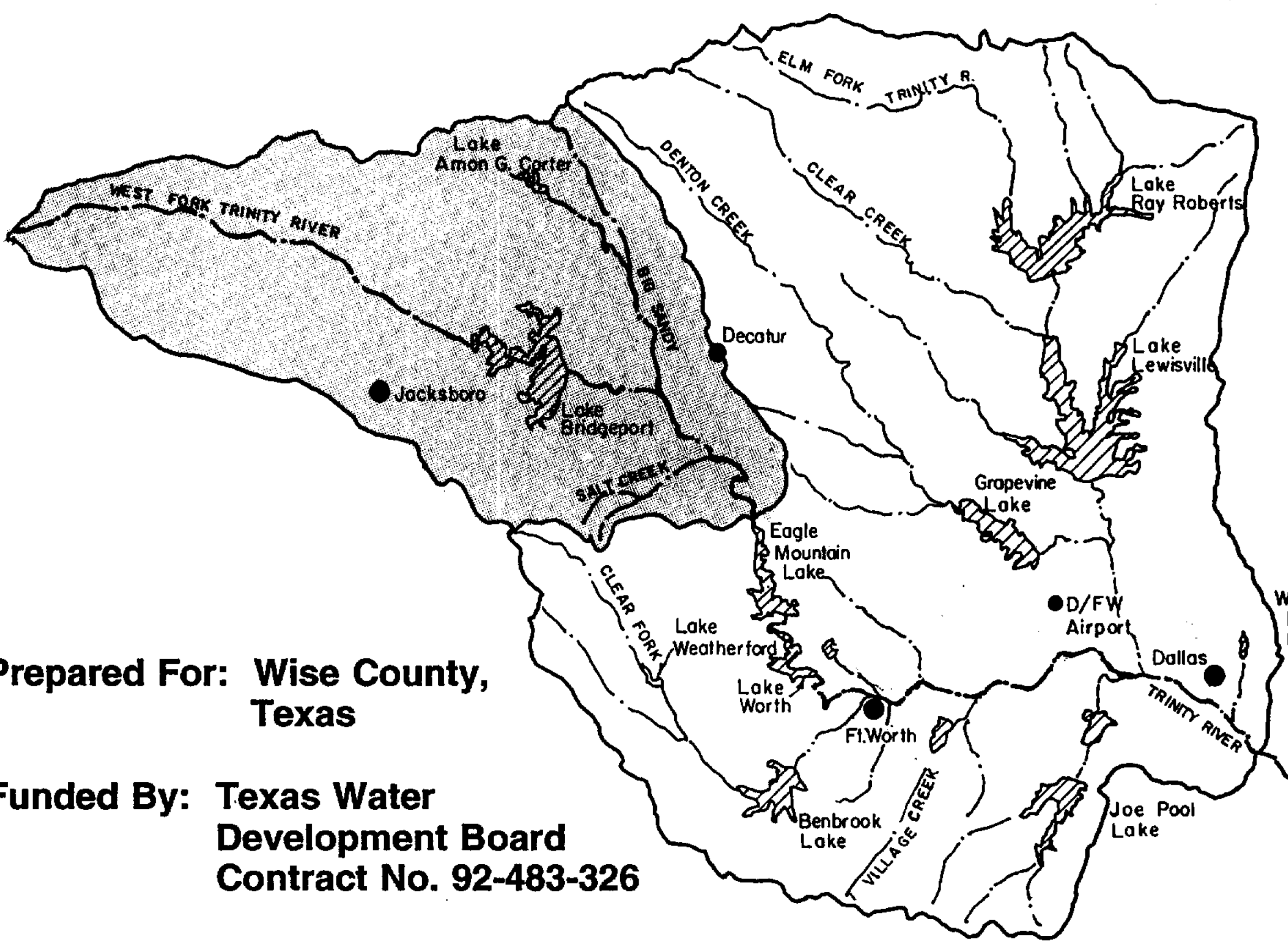
Rec'd 1-27-94

FLOOD PROTECTION PLAN FOR THE WEST FORK OF THE TRINITY RIVER ABOVE EAGLE MOUNTAIN LAKE

MAIN REPORT



Prepared For: Wise County, Texas

Funded By: Texas Water Development Board Contract No. 92-483-326

Prepared By: Shawn Engineering/Environmental Corp. (SEE Corp.)
With The Assistance Of:
- O'Brien Engineering
- Eichert Engineering

FINAL REPORT

January, 1994

WISE COUNTY COMMISSIONERS COURT

L.B. McDonald, County Judge
Kyle Stephens, Precinct #1
Vernon Clower, Precinct #2
Ken Steel, Precinct #3
Bryan Farris, Precinct #4

STEERING COMMITTEE

Mayor Mike Richardson
Mayor Clay Dent
Joe Jackson
Wanda Dixon
Mayor Bobby Williams
Lou Vee Bridges
Clayton Wood
Gary Bates
L.B. McDonald
Bryan Farris
Ken Steel

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Al Scott
Bill Lewis
Tommy Hays
Lewis Kirk
Edgar Cowling

Prepared By:
Shawn Engineering/Environmental Corp. (SEE Corp.)
With The Assistance Of:

- O'Brien Engineering
- Eichert Engineering

SHAWN ENGINEERING / ENVIRONMENTAL CORP.

L.B. McDonald
County Judge
Wise County
P.O. Box 393
Decatur, Texas 76234

January 25, 1994

Dear Judge McDonald:

The project team of Shawn Engineering/Environmental Corporation (SEE Corp.) and O'Brien Engineering is pleased to present the "Flood Protection Plan for the West Fork of the Trinity River above Eagle Mountain Lake". This Plan is intended to serve as a guide in developing a long term flood management system for the upper portion of the West Fork of the Trinity River. Benefits from this system will be enjoyed by all areas of the West Fork and downstream areas of the Trinity River.

The Plan has been developed with the guidance of the County appointed Steering Committee and Technical Advisory Committee. Without their assistance, it would not have been possible to develop the Plan. Invaluable assistance was provided by Mr. Bill S. Eichert, P.E. of Eichert Engineering in preparing the technical aspects of the Plan.

We especially would like to thank Al Scott, Bill Lewis, Tommy Hays, Lewis Kirk, and Edgar Cowling of the Technical Advisory Committee and Mr. Curtis Johnson of the Texas Water Development Board for the many hours they spent giving us guidance in development of the Plan. Without their assistance a viable plan would not have been possible.

The Plan is intended to provide multiple benefits to the West Fork area above Eagle Mountain Lake and drainage related benefits to downstream areas. The flexible nature of the Plan makes it possible to virtually immediately start making physical improvements and for the area to start receiving benefits.

Sincerely,

Shawn Engineering/Environmental Corp.

Bob Shawn

Bob Shawn, P.E.
President

Stephen A. Gude

Stephen A. Gude, P.E.
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EXECUTIVE SUMMARY

INTRODUCTION

The West Fork Watershed above Eagle Mountain Lake has experienced periodic flooding from the West Fork of the Trinity River and its tributaries. This flooding has resulted in financial hardship to watershed residents, due to the devastation of crops, interruption to commercial enterprises and mineral production, and damages to physical property.

In January 1992, Wise County made an application to the Texas Water Development Board for a Flood Control Planning Grant. The purpose of the grant was to perform a flood control planning study on the West Fork of the Trinity River above Eagle Mountain Lake, including those portions of Archer, Clay, Jack, Montague, Wise, and Young Counties within the drainage area of the West Fork Basin. The plan is to provide flood protection for the Upper West Fork Watershed including Tarrant County and "have a significant positive effect on land use and water quality by helping to control flooding, erosion, and sedimentation within the basin".

This study was authorized by Texas Water Development Board (TWDB) Contract Number 92-483-326 between the TWDB and Wise County, Texas. Wise County subsequently sub-contracted with Shawn Engineering/Environmental Corp. (SEE Corp.) to perform the study.

HISTORY OF WATERSHED MANAGEMENT

Watershed management in the study area has evolved from being virtually non-existent in the early 1900's to consisting of a variety of watershed features today. These watershed management features include flood control, water supply, sediment load reduction, and stream channelization.

The chief supporter of watershed management improvements in the study area has been the SCS. A multitude of SCS projects have been constructed to date, including grade stabilization structures, stream channelization, and 71 lakes. The relatively small SCS lakes reduce sediment loads to downstream reservoirs and afford limited flood protection to adjacent downstream areas.

Other watershed features include Lake Bridgeport and Lake Amon G. Carter. Lake Bridgeport is a major water supply reservoir located on the West Fork and is operated by Tarrant County Water Control and Improvement District Number One (TCWCID No.1). Although the release of water from Lake Bridgeport is controllable, the lake does not presently operate with significant flood control ability. The lake has, however, reduced peak flood flows below those that would have naturally occurred without the lake. Lake Amon G. Carter, located on Big Sandy Creek, serves as a water supply for, and is operated by, the City of Bowie. This lake has no controlled outlet works and is therefore not effective in substantially reducing peak flows.

CRITERIA FOR THE PLAN

The criteria for the plan was formulated through meetings with the Steering Committee, Technical Advisory Committee, and the public. Based on these meetings, the following criteria were established:

1. The plan must provide facilities and procedures that will improve flood protection for the West Fork of the Trinity River Basin (including Salt and Big Sandy Creeks) above Eagle Mountain Lake.
2. The plan must provide facilities that will be multi-functional, which includes:
    a. Flood Storage -
    b. Water Supply Storage -
    c. Sedimentation Control -
    d. Erosion Control -
    e. Aesthetic Features -
    f. Improved Water Quality -
    g. Wildlife and Fisheries Preservation -
    h. Wetlands Enhancement -
    i. Recreational Uses -
3. The plan must address local needs
4. The plan must be economically feasible
5. The plan must be environmentally sensitive
6. The plan must provide for cost sharing by those that benefit
7. The plan must provide a mechanism for operation and maintenance
8. The plan must provide for preservation of historical sites
9. The plan must consider private property rights
10. The plan must provide for maintenance of the local property tax base
11. The plan must be beneficial for areas upstream and downstream of Eagle Mountain Lake
12. The plan must consider operational features of existing and future lakes
13. The plan must consider local land uses
14. The plan must contribute to the local economic base
15. The plan must provide for implementation

STUDY PROCEDURES

After criteria for the Plan were established, SEE Corp. and the Technical Advisory Committee generated numerous candidate alternatives. Additional alternatives for consideration were submitted by other interested parties. The candidate alternatives were first analyzed for their merit in meeting the criteria established for the Plan. Those candidate alternatives which met the criteria were then studied in greater detail for technical feasibility. The results of preliminary technical analysis were presented to the Technical Advisory Committee and a proposed alternative was selected for further study. The proposed alternative was then mathematically modelled in order to study it in greater detail. This task was accomplished by utilizing computer programs written by, among others, the US Army Corps of Engineer Hydrologic Engineering Center. These computer programs included HEC-1, HEC-2, HEC-5, PRECIP, and HECDSS. Environmental considerations were addressed by collecting data from numerous government agencies with interests in the study area.

PROPOSED ALTERNATIVE

The proposed alternative consists of one or more Major-multi purpose lakes, a series of minor multi-purpose lakes, and operational changes to Lake Bridgeport. A hypothetical location map of the proposed lakes is shown on plate E.1.

The plan, when implemented, will control approximately 73% of the watershed above Eagle Mountain Lake for the 100-year flood volume and will substantially reduce peak flows on the tributary streams, and on the West Fork. In addition, plan implementation will substantially reduce the volume of water controlled by existing structures. The reduction of flows and attenuation of volumes would result in decreased damages for the study area and areas downstream. Reduction of sediment load into existing structures would also be achieved. The proposed alternative represents a flexible plan, designed to benefit not only the study area, but areas downstream also. The flexibility of the plan is dependent on the inter-relation of the major and minor multi-purpose lakes.

Tables E.1 - E.3 (scenarios A0, A1 and A2) summarize the existing and proposed conditions results for the study area above Eagle Mountain Lake. The proposed conditions results assume that all minor lakes are in place and a single major lake located just above Lake Bridgeport is in place. Significant reductions in flows, volumes, and elevation were obtained throughout the study area for all events considered. The 25%(+ or -) reduction in peak flows indicate that only the minor multi-purpose lakes will affect the peaks for those control points, while reductions greater than 25% indicate the combined affect of both the major and minor multi-purpose lake(s).

For upper basin and basin wide storms, upstream improvements can provide a substantial benefit to the areas downstream. Tables E.4 and E.5 summarize the results of the proposed upstream improvements on areas downstream of the study area for the 1989 and 1990 flood events. Flow reductions were realized for the entirety of the West Fork and main stem of the Trinity River for these events. The peak flow reductions were due to the decreased volumes that had to be managed by the downstream reservoirs (Eagle Mountain Lake and Lake Worth) and the associated timing of those releases relative to the other reservoirs in the system.

STUDY NOTE: The models used to evaluate downstream impacts were obtained from the 1992 TWC/TRA study. The only changes made by SEE Corp. were to reflect proposed improvements. No attempt was made to assess the accuracy of the models. Discrepancies between Eagle Mountain Lake releases and Lake Worth releases were noted, however, especially for the 1989 storm. These discrepancies may have masked the actual flow reductions realized for areas downstream of Lake Worth.

TABLE E.1

SUMMARY OF RESULTS - 1990 FLOOD

CONTROL POINT # (SHEF CODE)	LOCATION	OBSERVED RELEASES		HEC-5 RELEASES			DIFFERENCE (%)
		OBSERVED	CALIBRATED	AO	A1	A2	(A1-A2)/A1
1	WEST FORK AT HWY 148	-	12,000	12,000	12,000	9,000	25.0
2 (JAKT2)	WEST FORK NEAR JACKSBORO	18,300	18,300	18,300	18,300	13,700	25.1
3	WEST FORK ABOVE LK BRDGPRT	-	19,100	19,100	19,100	5,000	73.8
4 (BPRT2)	LAKE BRIDGEPORT INFLOW	27,900	27,300	27,500	27,500	14,100	48.7
	" OUTFLOW	16,200	16,200	13,400	13,400	5,000	62.7
	" ELEVATION (msl)	844.36	844.09	842.78	842.78	840.18	-
6 (BRPT2)	BIG SANDY CREEK AT HWY 380	18,000	18,000	18,000	18,000	13,500	25.0
7	WEST FORK - BIG SANDY CONFL.	-	30,500	35,500	35,500	17,200	51.5
8 (BOYT2)	WEST FORK AT BOYD	41,800	48,300	43,900	43,900	32,900	25.1
	LK BRDGPRT INFLOW VOLUME (acre-ft)				365,100	125,400	65.7
	WEST FORK AT BOYD VOLUME (acre-ft)				575,900	301,200	47.7

A0 = EXISTING - HEC-5 RELEASES; A1 = EXISTING COND. - TOP OF CONS. (BASELINE); A2 = PROPOSED COND. - TOP OF CONS.

NOTE: VOLUME REPRESENTS TOTAL VOLUME FOR THE 567 hour (23DAYS) SIMULATION

TABLE E.2

SUMMARY OF RESULTS - 1981 FLOOD

CONTROL POINT # (SHEF CODE)	LOCATION	OBSERVED RELEASES		HEC-5 RELEASES			DIFFERENCE (%)
		OBSERVED	CALIBRATED	AO	A1	A2	(A1-A2)/A1
1	WEST FORK AT HWY 148	-	17,700	17,700	17,700	13,300	24.9
2 (JAKT2)	WEST FORK NEAR JACKSBORO	27,000	27,000	27,000	27,000	20,250	25.0
3	WEST FORK ABOVE LK BRDGPRT	-	41,600	41,600	41,600	1,400	96.6
4 (BPRT2)	LAKE BRIDGEPORT INFLOW	68,200	68,200	68,200	68,200	22,200	67.4
	" OUTFLOW	4,950	4,950	3,400	21,600	5,000	76.9
	" ELEVATION(msl)	836.41	836.40	837.2	847.06	841.37	--
6 (BRPT2)	BIG SANDY CREEK AT HWY 380	45,000	45,000	45,000	45,000	33,750	25.0
7	WEST FORK - BIG SANDY CONFL.	-	54,500	53,600	56,300	40,200	28.6
8 (BOYT2)	WEST FORK AT BOYD	60,400	60,000	59,000	61,000	44,300	27.4
	LK BRDGPRT INFLOW VOLUME (acre-ft)				306,300	80,800	73.6
	WEST FORK AT BOYD VOLUME (acre-ft)				478,900	206,400	56.9

A0 = EXISTING - HEC-5 RELEASES; A1 = EXISTING COND. - TOP OF CONS. (BASELINE); A2 = PROPOSED COND. - TOP OF CONS.

NOTE: VOLUME REPRESENTS TOTAL VOLUME FOR THE 336 hour (14DAY) SIMULATION

TABLE E.3

SUMMARY OF RESULTS FOR THE SYNTHETIC STORMS

CONTROL POINT # (SHEF CODE)	LOCATION	10YR		DIFF	50 YR		DIFF	100 YR		DIFF
		EXISTING	PROPOSED	%	EXISTING	PROPOSED	%	EXISTING	PROPOSED	%
1	WEST FORK AT HWY 148	14,900	11,100	25.5	40,100	30,000	25.2	52,400	39,200	25.2
2 (JAKT2)	WEST FORK NEAR JACKSBORO	19,000	14,300	24.7	48,500	36,300	25.2	68,300	51,100	25.2
3	WEST FORK ABOVE LK BRDGPRT	21,400	5,000	76.6	52,100	5,000	90.4	70,300	5,000	92.9
4 (BPRT2)	LAKE BRIDGEPORT INFLOW	35,100	17,900	49.0	70,900	44,700	37.0	85,100	51,100	40.0
	" ELEVATION(msl)	842.41	839	-	849.39	840.55	-	852.09	841.24	-
	" OUTFLOW	13,300	5,000	62.4	22,700	5,000	78.0	31,000	5,000	83.9
6 (BRPT2	BIG SANDY CREEK AT HWY 380	18,300	13,700	25.1	45,900	34,400	25.1	64,400	48,200	25.2
7	WEST FORK - BIG SANDY CONFL.	23,900	17,900	25.1	58,000	43,300	25.3	81,500	61,100	25.0
8 (BOYT2)	WEST FORK AT BOYD	25,200	21,400	15.1	66,200	49,300	25.5	85,800	64,100	25.3
	LK BRDGEPRT INFLOW VOLUME (acre-ft)	215,050	66,178	69.2	328,200	80,300	75.5	383,500	84,300	78.0
	WEST FORK AT BOYD VOLUME (acre-ft)	315,600	154,300	51.1	488,100	217,300	55.5	573,300	246,400	57.0

NOTE: VOLUME REPRESENTS TOTAL VOLUME FOR THE 300 HR SIMULATION

TABLE E.4
PEAK FLOW COMPARISON FOR SELECTED LOCATIONS
1989 FLOOD - DAILY HEC-5 MODEL

LOCATION	STREAMFLOWS OR RESERVOIR OUTFLOWS (cfs)			
			DIFFERENCE	
	EXISTING *	PROPOSED *	(cfs)	%
LAKE BRIDGEPORT ON WEST FORK	13800	5100	-8700	-63.0
BOYD ON WEST FORK	13600	4000	-9600	-70.6
EAGLE MOUNTAIN LAKE ON WEST FORK	16500	13500	-3000	-18.2
LAKE WORTH ON WEST FORK	13500	8200	-5300	-39.3
FT. WORTH ON WEST FORK ABOVE CLEAR FORK	16800	12000	-4800	-28.6
FT. WORTH ON WEST FORK	23400	20200	-3200	-13.7
GRAND PRAIRIE ON WEST FORK	35100	31900	-3200	-9.1
GRAND PRAIRIE ON MOUNTAIN CK.	6800	6800	0	0.0
GRAPEVINE RESERVOIR ON DENTON CK.	5600	5600	0	0.0
CARROLLTON ON ELM FORK	16700	15600	-1100	-6.6
DALLAS ON TRINITY RIVER	52000	48700	-3300	-6.3
CRANDALL ON EAST FORK	28600	28600	0	0.0
ROSSER ON TRINITY RIVER	70200	66900	-3300	-4.7
TRINIDAD ON TRINITY RIVER	65500	62800	-2700	-4.1
OAKWOOD (LONG LAKE) ON TRINITY	69500	68800	-700	-1.0
CROCKETT ON TRINITY	56500	51700	-4800	-8.5
UPPER LAKE LIVINGSTION	51800	47500	-4300	-8.3
LIVINGSTON RESERVOIR	64800	59400	-5400	-8.3
GOODRICH ON TRINITY RIVER	71000	65100	-5900	-8.3
HIGHWAY 162 ON TRINITY RIVER	72500	63200	-9300	-12.8
LIBERTY ON TRINITY RIVER	68500	58900	-9600	-14.0

* BASED ON MODEL FROM THE GENERAL REPORT - FLOOD PREVENTION AND CONTROL FOR THE TRINITY RIVER BASIN(1992) - MODIFIED BY SEE CORP. TO REFLECT PROPOSED IMPROVEMENTS(1993)

TABLE E.5
PEAK FLOW COMPARISON FOR SELECTED LOCATIONS
1990 FLOOD - DAILY HEC-5 MODEL

LOCATION	STREAMFLOWS OR RESERVOIR OUTFLOWS (cfs)			
			DIFFERENCE	
	EXISTING *	PROPOSED *	(cfs)	%
LAKE BRIDGEPORT ON WEST FORK	13400	5200	-8200	-61.2
BOYD ON WEST FORK	17000	5600	-11400	-67.1
EAGLE MOUNTAIN LAKE ON WEST FORK	23800	16000	-7800	-32.8
LAKE WORTH ON WEST FORK	23900	15400	-8500	-35.6
FT. WORTH ON WEST FORK ABOVE CLEAR FORK	24300	17300	-7000	-28.8
FT. WORTH ON WEST FORK	30700	21800	-8900	-29.0
GRAND PRAIRIE ON WEST FORK	48700	40100	-8600	-17.7
GRAND PRAIRIE ON MOUNTAIN CK.	4600	4600	0	0.0
GRAPEVINE RESERVOIR ON DENTON CK.	11200	10900	-300	-2.7
CARROLLTON ON ELM FORK	36200	35900	-300	-0.8
DALLAS ON TRINITY RIVER	83000	74100	-8900	-10.7
CRANDALL ON EAST FORK	61100	58500	-2600	-4.3
ROSSER ON TRINITY RIVER	118700	106400	-12300	-10.4
TRINIDAD ON TRINITY RIVER	107200	92100	-15100	-14.1
OAKWOOD (LONG LAKE) ON TRINITY	108500	93400	-15100	-13.9
CROCKETT ON TRINITY	116400	101500	-14900	-12.8
UPPER LAKE LIVINGSTION	91000	76300	-14700	-16.2
LIVINGSTON RESERVOIR	95600	80600	-15000	-15.7
GOODRICH ON TRINITY RIVER	98000	82200	-15800	-16.1
HIGHWAY 162 ON TRINITY RIVER	97100	81300	-15800	-16.3
LIBERTY ON TRINITY RIVER	95600	80500	-15100	-15.8

* BASED ON MODEL FROM THE GENERAL REPORT - FLOOD PREVENTION AND CONTROL FOR THE TRINITY RIVER BASIN(1992) - MODIFIED BY SEE CORP. TO REFLECT PROPOSED IMPROVEMENTS(1993)

ECONOMIC ANALYSIS OF PROPOSED ALTERNATIVE

The criteria established for the Plan require that the Plan "must be economically feasible" and "must provide for cost sharing by those that benefit".

Benefits

Many economical and intangible benefits will be realized by implementing the proposed alternative. Benefits were estimated for Wise County and other areas where data was available.

1. Benefits Included in Analysis

   (a) Flood loss (damage) reduction - Wise County on Lake Bridgeport (peak elevation only)
   (b) Sedimentation reduction - Lake Bridgeport and Eagle Mountain Lake
   (c) Flood loss reduction - Wise County on the West Fork below Lake Bridgeport (peak flow only) Table E.6 compares calculated damages for existing and proposed conditions for areas in Wise County above Eagle Mountain Lake for historical storm events and for the 10, 50, and 100 year frequency events.
   (d) Flood loss (property damage) reduction - Eagle Mountain Lake and Lake Worth (peak elevation only)

TABLE E.6

Estimated Flood Damages[1]
Wise County - Total Damages Included in Analysis

Event	DAMAGES ($1,000) Existing Conditions	Proposed Conditions	Reduction ($)	Reduction (%)
1981[2]	1,842	1,778	64	3
10 Year	2,962	2,012	950	32
1990	3,261	2,471	790	24
1981 top CP[3]	3,611	2,614	997	28
50 Year - Ex	3,867	2,588	1,279	33
100 Year - Ex	4,127	2,694	1,433	35
50 Year-Dev[3]	9,239	2,588	6,651	72
100 Year-Dev[3]	14,872	2,694	12,178	82

(1) Damages include: (a) estimated property damages around Lake Bridgeport (peak elevation only) and (b) property value reduction along West Fork (peak flow only)
(2) Starting Lake Bridgeport at 1981 actual elevation
(3) Starting Lake Bridgeport at normal conservation pool (elevation 836)
(4) Assuming continued development between elevation 844 and 851

2. Benefits and Other Factors Not Included in Analysis

Many of the anticipated economic and intangible benefits of the proposed alternative could not be accurately determined due to the contractually limited scope of this report and the lack of available data. Following is a partial listing and discussion of these additional benefits.

(a) Damage reduction downstream of Lake Worth - Tarrant and Dallas Counties and other areas along the Trinity River
   1) agricultural damage reduction
   2) urban damage reduction
      - physical (property) damage
      - income loss
      - emergency costs

   A damage comparison for the 1990 storm event between existing and proposed conditions was made based on computer models generated for the TWC/TRA 1992 "Flood Prevention and Control for the Trinity River Basin" study. Table E.7 is a summary of these results. Figure E.1 is a graphical representation of Table E.7 for selected damage centers. Note that this comparison is for a single event storm and does not necessarily represent a comparable ratio for average annual benefits.
(b) Flood duration damage reduction
(c) Flood loss (damage) reduction - Archer, Clay, Jack, Montague, Wise, and Young Counties
(d) Stream erosion reduction - Archer, Clay, Jack, Montague, Wise, and Young Counties
(e) Municipal, industrial and agricultural water supply - Archer, Clay, Jack, Montague, Wise, and Young Counties
(f) Sediment reduction - Lake Jacksboro and Lake Amon G. Carter
(g) Attenuation of flood volume
(h) Improved water quality
(i) Recreation
(j) Environmental enhancement including:
   - preservation of State of Texas Significant Stream Segments
   - creation of wetlands
   - wildlife and fisheries preservation
   - creation of new fish and wildlife habitats
(k) Increased land values
(l) Utilization of unemployed and/or underemployed labor resources
(m) Other benefits and factors

TABLE E.7

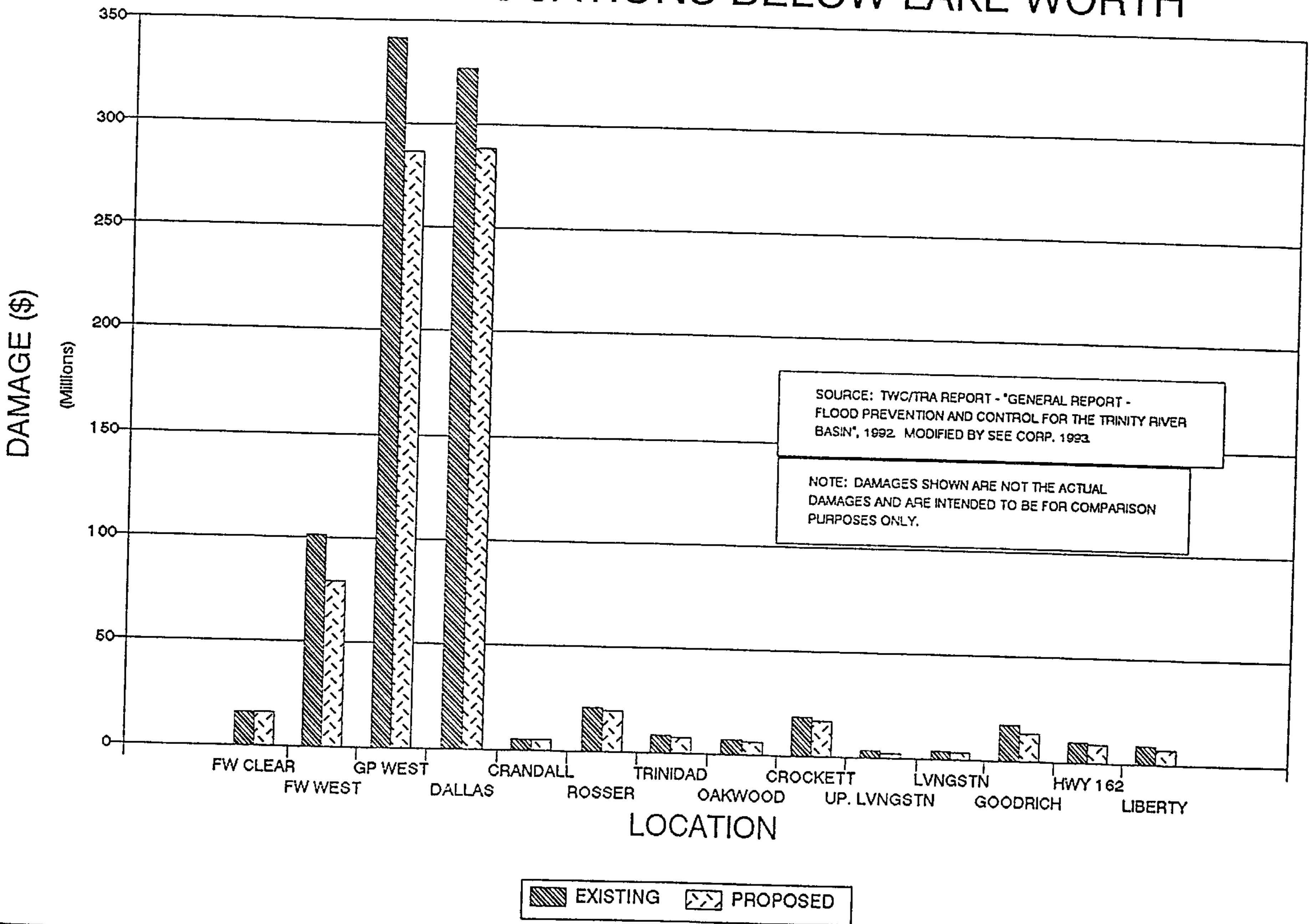
1990 FLOOD - DAMAGE COMPARISON FOR INDEX LOCATIONS BELOW LAKE WORTH

DAMAGE INDEX LOCATION	REGULATED DAMAGES ($1,000.00)			
	EXISTING*	PROPOSED*	DIFFERENCE ($1000)	DIFFERENCE %
BENBROOK ON CLEAR FORK	0	0	0	0.0
FT. WORTH ON CLEAR FORK	15956	15633	-323	-2.0
FT. WORTH ON WEST FORK	101626	79247	-22379	-22.0
GRAND PRAIRIE ON WEST FORK	341172	286838	-54334	-15.9
GRAND PRAIRIE ON MOUNTAIN CK.	42	42	0	0.0
GRAPEVINE RESERVOIR ON DENTON CK.	347	345	-2	-0.6
CARROLLTON ON ELM FORK	71317	70563	-754	-1.1
DALLAS ON TRINITY RIVER	327195	288550	-38645	-11.8
CRANDALL ON EAST FORK	5173	5008	-165	-3.2
ROSSER ON TRINITY RIVER	20676	19096	-1580	-7.6
TRINIDAD ON TRINITY RIVER	8362	7263	-1099	-13.1
RICHLAND ON RICHLAND CK.	1494	1494	0	0.0
BARDWELL LAKE	0	0	0	0.0
OAKWOOD (LONG LAKE) ON TRINITY	6314	5612	-702	-11.1
CROCKETT ON TRINITY	18252	16596	-1656	-9.1
UPPER LAKE LIVINGSTION	2839	1421	-1418	-49.9
LIVINGSTON RESERVOIR	3784	3097	-687	-18.2
GOODRICH ON TRINITY RIVER	17172	13022	-4150	-24.2
HIGHWAY 162 ON TRINITY RIVER	9458	8451	-1007	-10.6
LIBERTY ON TRINITY RIVER	8561	3940	-4621	-54.0
TOTAL	959740	826218	-133522	-13.9

* BASED ON MODEL FROM THE GENERAL REPORT - FLOOD PREVENTION AND CONTROL FOR THE TRINITY RIVER BASIN(1992) - MODIFIED BY SEE CORP. TO REFLECT PROPOSED IMPROVEMENTS(1993)

FIG E.1

1990 FLOOD DAMAGE COMPARISON FOR INDEX LOCATIONS BELOW LAKE WORTH



3. Benefits Summary

Table E.8 is a summary of total average annual benefits included in the analysis.

The Net Present Value of benefits included in the analysis was calculated based on the following assumptions:

1. A project life of 100 years (to correspond with the design life).

2. A nominal (current dollar) interest rate of 8.25%. This rate corresponds to the discount rate currently used by the USACE in economic analysis.

3. Benefits increase in value at the rate of inflation.

4. Annual inflation rate of 6%.

5. At real (constant dollar) interest rate of 2.12%, which is (1 + nominal rate) / (1 + inflation) - 1 = 1.0825/1.06 - 1. Since average annual benefits are stated in real (constant) dollar terms, they are discounted by the real (constant dollar) interest rate of 2.12%.

TABLE E.8

Summary of Benefits Included in Analysis

		Average Annual Benefit
1.	Wise County damage reduction	
	a. Lake Bridgeport	$ 110,500[4]
	b. West Fork	$ 182,500
	TOTAL WISE COUNTY	$ 293,000
2.	Property damage reduction on Eagle Mountain Lake and Lake Worth[1]	$ 3,000,000
	TOTAL E.M.L. & L.W.	$ 3,000,000
3.	Sediment reduction[2]	
	a. Lake Bridgeport (446.5 ac.ft./year)	$ 8,930,000
	b. Eagle Mountain Lake (125.4 ac.ft./year)	$ 2,508,000
	TOTAL SEDIMENT REDUCTION E.M.L. & LAKE B.P.	$ 11,438,000
	TOTAL AVERAGE ANNUAL BENEFITS INCLUDED IN ANALYSIS	$ 14,731,000
	NET PRESENT VALUE OF BENEFITS:	
	NET PRESENT VALUE OF BENEFITS INCLUDED IN ANALYSIS - 100[5] YEARS OF OPERATION[3]	$ 609,048,000

Notes:

(1) Based on information from US Army COE and TCWCID No. 1.

(2) Cost based on dredging cost of $20,000/ac.ft. as estimated by TCWCID No. 1. This cost includes disposal of dredged materials.

(3) Assuming value of benefits received increase at the rate of inflation (assumed 6%) and a discount rate of 8.25%.

(4) Annual flood loss reduction is estimated at $517,300 if current trend of constructing between elevation 844 and 851 continues.

(5) Corresponds to the design life of 100 years.

B. Costs

Two general categories of cost need to be considered in evaluating the proposed alternative. These categories are project implementation costs and operations and maintenance costs.

1. Project Implementation Costs

Costs under this general category include all costs required to attain operational structures in-place, including the following:

a. Planning and Design
b. Construction
c. Interest During Construction
d. Administration
e. Fish and Wildlife Mitigation
f. Relocations
g. Land, Water, and Mineral Rights
h. Historical and Archeological Salvage
i. Other Construction Related Costs

Average project implementation cost per acre-foot of volume contained within the 100 year sediment storage, conservation pool, and 100 year flood storage volume was estimated for two size ranges; the minor multi-purpose lakes and the major multi-purpose lakes.

Average project implementation cost for the minor multi-purpose lakes was estimated based on the average cost for recently completed SCS lakes in the Big Sandy Creek Watershed.

Average project implementation cost for the major multi-purpose lakes was estimated based on the costs for three recently completed U.S. Army Corps of Engineers' lakes (Joe Pool Lake, Lake Ray Roberts, and Cooper Lake) and one recently completed TCWCID No. 1 lake (Richland Chambers).

2. Operation and Maintenance Costs

Operation and maintenance costs include all costs required to keep the facilities operating as designed over the life of the project. These costs include operation, maintenance, repair, and replacement. Estimated operation and maintenance costs for the project are $1.5 million per year for flood control only based on USACE estimates for recently completed projects. Operation and maintenance costs for water supply, recreation, or other uses were not included in the cost analysis. The purpose for their exclusion is twofold: (1) the uncertainty of the actual function other than flood control for each of the structures and (2) operation and maintenance costs for any use needs to be justifiable based on the utility of the use and paid for directly by those that benefit from that use.

The analysis assumes that operation and maintenance costs will increase at the same rate as inflation.

3. Costs and Factors Not Included in Analysis

Several costs and factors not included in the economic analysis are:

a. possible loss of property tax base from lake areas
b. possible loss of productive farm and/or ranch land
c. possible loss of oil and/or gas production areas
d. possible roadway re-routing and public inconvenience
e. cost of special lake features (eg. recreational facilities, wildlife habitats, water supply intake structures, etc.)

These costs were not included in the analysis due to (1) their dependence on specific locations and (2) the uncertainty of actual functionality of the lakes for other than flood control/erosion control purposes. These costs should be considered when specific locations and other uses are selected for each lake.

4. Cost Summary

Tables E.9A and E.9B are summaries of the project costs included in the analysis for Scenarios "A" and "B", respectively. Scenario "A" is based on a single major multi-purpose lake with no minor multi-purpose lakes above Lake Bridgeport. Scenario "B" is based on major multi-purpose lake(s) and minor multi-purpose lakes above Lake Bridgeport.

The Net Present Values were calculated based on the assumptions listed in the "Benefits Summary" section and the following additional assumptions:

1. Operation and maintenance costs increase at the rate of inflation.
2. Annualized project implementation costs are expressed in nominal (current) dollars and are therefore discounted at the nominal (current dollar) rate of 8.25%.
3. O & M costs are expressed in real (constant) dollars and are therefore discounted at the real (constant) rate of 2.12%.

TABLE E.9A

SUMMARY OF COSTS INCLUDED IN ANALYSIS - SCENARIO "A"[(1)]

Lake	Storage[3] Volume (ac.ft.)	Estimated Cost[4] per ac.ft.	Total Estimated[(5)] cost
Minor Multi-Purpose Lakes	219,440	$850	$186,524,000
Major Multi-Purpose Lake(s)	677,270	$600	$406,362,000
TOTAL PROJECT IMPLEMENTATION COST			$592,886,000
Interest & Amortization of Project Implementation Cost at 8-1/4% for 50 Years			$ 54,525,750/year

PRESENT VALUE OF TOTAL COST

Net Present Value of Project Implementation Cost	$648,365,000
Net Present Value of Operation and Maintenance, 100 years at $1,200,000/year[(6)]	$ 49,613,000
Net Present Value of COSTS INCLUDED IN ANALYSIS 100 years of operation[(7)]	$642,499,000

Notes:

1. Based on a single major multi-purpose lake and no minor multi-purpose lakes above Lake Bridgeport.
2. Based on 1993 dollars
3. Includes 100 year sedimentation volume, conservation pool, and 100 year flood storage volume
4. Includes all direct costs (including interest during construction) except for O & M and interest.
5. Excludes costs not considered.
6. Assuming O & M costs for flood control only. Also assuming O & M costs increase at the rate of inflation (assumed 6%) and a discount rate of 8.25%.
7. Corresponds to design life of 100 years; 50 additional years of O & M costs added.

TABLE E.9B

SUMMARY OF COSTS INCLUDED IN ANALYSIS - SCENARIO "B"[1]

Lake	Storage[3] Volume (ac.ft.)	Estimated Cost[4] per ac.ft.	Total Estimated[5] cost
Minor Multi-Purpose Lakes	430,440	$850	$365,874,000
Major Multi-Purpose Lake(s)	476,260	$600	$285,756,000
TOTAL PROJECT IMPLEMENTATION COST			$651,630,000
Interest & Amortization of Project Implementation Cost at 8-1/4% for 50 Years			$ 54,800,320/year

PRESENT VALUE OF TOTAL COST

Net Present Value of Project Implementation Cost	$651,630,000
Net Present Value of Operation and Maintenance, 100 years at $1,500,000/year[6]	$ 62,017,000
Net Present Value of COSTS INCLUDED IN ANALYSIS 100 years of operation[7]	$713,647,000

Notes:

1. Based on major multi-purpose lake(s) and minor multi-purpose lakes above Lake Bridgeport.
2. Based on 1993 dollars
3. Includes 100 year sedimentation volume, conservation pool, and 100 year flood storage volume
4. Includes all direct costs (including interest during construction) except for O & M and interest.
5. Excludes costs not considered.
6. Assuming O & M costs for flood control only. Also assuming O & M costs increase at the rate of inflation (assumed 6%) and a discount rate of 8.25%.
7. Corresponds to design life of 100 years; 50 additional years of O & M costs added.

C. Benefit Cost Comparison:

Tables E.10A and E.10B are summaries of the Net Present Value of costs and benefits included in the analysis assuming a 100 year operating period for Scenarios "A" and "B", respectively. In order for the plan to be feasible, the benefits must outweigh the costs. An economically feasible project will therefore have a benefit/cost (B/C) ratio equal to or greater than one.

Table E.10A shows a limited B/C ratio of 0.02 for Scenario "A" when only Wise County area benefits are included. Adding in the benefits of sediment load reductions into Lake Bridgeport and Eagle Mountain Lake and property damage reduction around Eagle Mountain Lake and Lake Worth, a limited B/C ratio of 0.95 is achieved for this scenario. Table IX.8B shows a limited B/C ratio of 0.02 for Scenario "B" when only Wise County area benefits are included. Adding in the benefits of sediment load reductions into Lake Bridgeport and Eagle Mountain Lake and property damage reduction around Eagle Mountain Lake and Lake Worth, a limited B/C ratio of 0.85 is achieved for Scenario "B". Although these B/C Ratios would indicate that the plan is not feasible, it should be noted that not all factors have been considered. It is anticipated that the project will be feasible if downstream flood reduction benefits are included in the analysis.

Not all benefits and costs could be determined under the scope of the TWDB Planning Grant. Insufficient data was available for determining an accurate B/C ratio. The benefits and costs not included in this analysis which were discussed in this report should be examined in greater detail and a revised B/C ratio should be calculated. **Areas which appear to benefit most from flood reduction afforded by the Plan are those downstream of Lake Worth through Fort Worth , the mid-cities, and Dallas (D/FW area).** Table E.6 shows damage reduction in Wise County to be $790,000 for the 1990 storm event. Table E.7 shows damage reduction in the D/FW area to be $116,437,000 for the same storm event. **Based on these preliminary estimates, the D/FW area would received $147 in flood reduction benefits for every $1 of flood reduction benefits received in Wise County for the single storm event studied. Note that a comparison of <u>average annual benefits</u> for the two areas considered may be more or less than the $147 to $1 benefit calculated for the 1990 event.** This preliminary comparison should be examined in more detail in order to more accurately determine the beneficiaries of the Plan.

TABLE E.10A

LIMITED BENEFIT COST COMPARISON LAKE WORTH AND ABOVE
SCENARIO "A"
100 YEAR OPERATING PERIOD

	Net Present Value of Costs Considered	Net Present Value of Benefits Considered	Cumulative Net Present Value of Benefits Considered	Cumulative Benefit/Cost Ratio
Wise County Damage Reduction	$642,499,000	$12,114,000	$12,114,000	0.02
Eagle Mountain Lake & Lake Worth Damage Reduction	$642,499,000	$124,034,000	$136,148,000	0.21
Eagle Mountain Lake & Lake Bridgeport Sediment Reduction	$642,499,000	$472,900,000	$609,048,000	0.95
Other Benefits*	$642,499,000	unknown	unknown	>0.95

* This would include benefits in the areas downstream of Eagle Mountain Lake.

TABLE E.10B

LIMITED BENEFIT COST COMPARISON LAKE WORTH AND ABOVE
SCENARIO "B"
100 YEAR OPERATING PERIOD

	Net Present Value of Costs Considered	Net Present Value of Benefits Considered	Cumulative Net Present Value of Benefits Considered	Cumulative Benefit/Cost Ratio
Wise County Damage Reduction	$713,647,000	$12,114,000	$12,114,000	0.02
Eagle Mountain Lake & Lake Worth Damage Reduction	$713,647,000	$124,034,000	$136,148,000	0.19
Eagle Mountain Lake & Lake Bridgeport Sediment Reduction	$713,647,000	$472,900,000	$609,048,000	0.85
Other Benefits*	$713,647,000	unknown	unknown	>0.85

* This would include benefits in the areas downstream of Eagle Mountain Lake.

RECOMMENDATIONS

This "Flood Protection Plan for the West Fork of the Trinity River Above Eagle Mountain Lake" can serve as the first step toward development of a method of managed floods for the Trinity River. This plan is intended as a planning document to be used as a guide for future implementation steps. Based on this study, Shawn Engineering/Environmental Corporation (SEE Corp.) makes the following recommendations regarding proposed actions and additional data development:

Recommended Actions

1. A voluntary organization of governmental and private interest (herein referred to as the West Fork Commission) should be formed.

2. A policy for membership and fees for membership in the WFC should be established.

3. The "Flood Protection Plan for the West Fork of the Trinity River Above Eagle Mountain Lake" should be adopted as a planning guide by the WFC.

4. The WFC should develop a policy for determining who benefits and how much they benefit from proposed multi-purpose lakes.

5. This plan should be considered in the Upper Trinity River Feasibility Study which is currently being developed by the North Central Texas Council of Governments and the US Army Corps of Engineers.

6. WFC should work with the North Central Texas Council of Governments and the NORTEX Regional Planning Commission to establish a method for WFC to review and comment on projects subject to NCTCOG and NTRPC review.

7. WFC should initiate a plan for installing additional rainfall gages and stream gaging stations that can be remotely read and recorded. This data should be incorporated into the area wide emergency action plans.

8. WFC should initiate discussing to develop agreement(s) with water rights holders for volume transfers to multi-purpose lakes.

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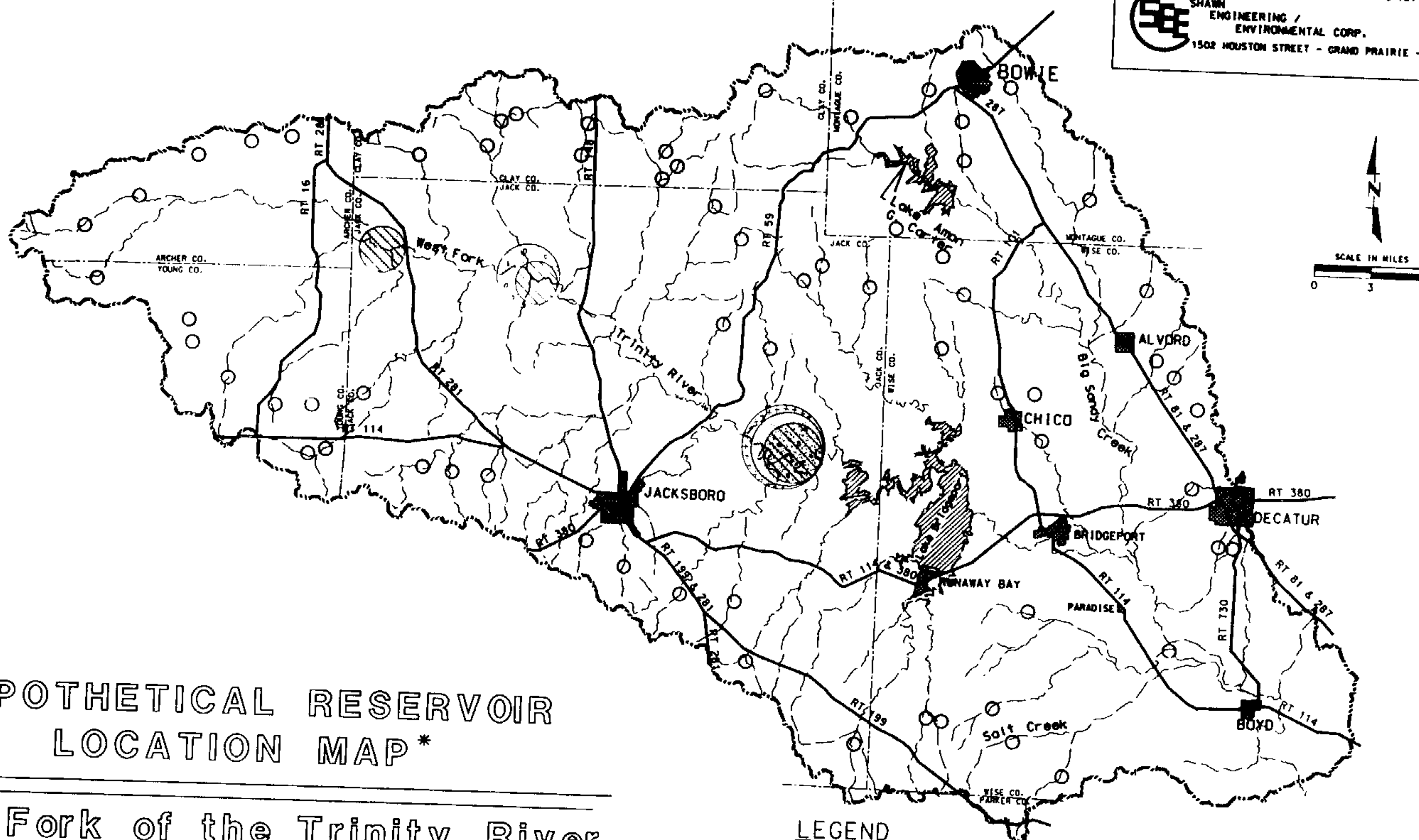


HYPOTHETICAL RESERVOIR LOCATION MAP*

West Fork of the Trinity River Above Eagle Mountain Lake

* NOTE: THE LOCATION OF ALL RESERVOIRS, WHILE HYPOTHETICAL, IS GENERALLY REPRESENTATIVE OF THEIR GEOGRAPHICAL PLACEMENT. ACTUAL LOCATIONS WILL NEED TO BE DETERMINED DURING THE PLANNING / DESIGN PHASE FOR EACH INDIVIDUAL STRUCTURE.

LEGEND

- Minor Multi-Purpose Lake
- Major Multi-Purpose Lake - Combination No. 1
- Major Multi-Purpose Lake - Combination No. 2
- Major Multi-Purpose Lake - Combination No. 3
- Major Multi-Purpose Lake - Combination No. 4

PLATE E.1

I. INTRODUCTION

I. INTRODUCTION

A. Authorization and Purpose of Study

In January 1992, Wise County, Texas made application to the Texas Water Development Board for a Flood Control Planning Grant. The purpose of the grant was to perform a flood control planning study on the West Fork of the Trinity River above Eagle Mountain Lake, including those portions of Archer, Clay, Jack, Montague, Wise, and Young Counties within the river basin drainage area.

This study was authorized by Texas Water Development Board (TWDB) Contract Number 92-483-326 between the TWDB and Wise County, Texas. Wise County subsequently sub-contracted with Shawn Engineering/ Environmental Corporation (SEE Corp.) to perform the study.

The following excerpt from the grant application summarizes the need for and purpose of the study:

"Wise County has experienced periodic flooding within the West Fork Basin along the Trinity River and its tributaries. This flooding devastates crop production and interrupts commercial enterprises and mineral production causing financial hardship to the county residents. The proposed study would explore how the present watershed is being managed and make recommendations for more efficient management of the watershed with a view toward alleviating the present flooding problems.

The proposed Upper West Fork study, including Salt Creek, will address the above issues by examining how the Upper West Fork Watershed as presently developed has been and is being managed, with emphasis on collection, retention, and release rates, and the timing thereof, from existing structures, river and stream flow rates and levels within the study area and will make recommendations for improvements thereof as well as exploration of the feasibility of a series of smaller upstream detention facilities on the Trinity and its tributaries, or any other alternatives that would improve current watershed management. Such improved watershed management would provide an element of flood protection for Wise and Tarrant Counties and have a significant positive effect on land use and water quality by helping to control flooding, erosion, and sedimentation within the basin."

B. Description of Study Area

The study area consists of all land draining into the West Fork of the Trinity River and its tributaries upstream of Eagle Mountain Lake. The drainage basin contains approximately 1,770 square miles in portions of Archer, Clay, Jack, Montague, Parker, Wise, and Young Counties as shown on Plate I.1.

The population within the study area is approximately 37,200. Major land uses within the area include farming, dairy farming, livestock production, oil and gas exploration, drilling and processing, mining of limestone, sand, and gravel, and manufacturing.

C. History of Watershed Management

For the West Fork of the Trinity Above Eagle Mountain Lake, watershed management has evolved from being virtually non-existent in the early 1900's to consisting of a variety of watershed management features today. Watershed management features have involved flood control, water supply, sediment load reduction, and stream channelization, among others. Even with such management features, the watershed still experiences significant flooding and erosion.

The chief supporter of watershed management improvements has been the Soil Conservation Service(SCS). They have assisted in the planning and construction of numerous small lakes, grade stabilization structures, and channelization improvements. These small uncontrolled lakes, typically located in the upper reaches of a drainage basin, serve the dual purpose of flood control and sediment reduction. Although the SCS lakes have relatively small flood pools, only a few of the lakes have exceeded design limits for flood storage, thus benefiting the immediate downstream areas greatly. While these lakes exist to benefit the adjacent downstream reaches, it can be argued they have and still do provide a small amount of regional flood protection. They have also reduced the sediment load to downstream reservoirs and made possible the cultivation of downstream reaches.

Significant sediment reduction has also been achieved through the implementation of agricultural best management practices to reduce erosion from cultivated farm land. The grade stabilization structures do not function for flood control, but have served as a repair for stream segments suffering from severe erosion or other damage and as a sediment load reduction mechanism.

Channelization improvements have been made on many of the stream courses in the study area with varying degrees of success.

In addition to the SCS improvements, other structures such as Lake Bridgeport and Amon Carter Lake also serve to improve watershed management. Lake Bridgeport is a major water supply reservoir located on the West Fork and Amon Carter Lake is a small water supply lake located on Big Sandy Creek.

As mentioned above, significant flooding still exists in the study area resulting from (1) much of the watershed being uncontrolled and (2) reservoir releases. The SCS structures although numerous, control too small of a drainage area to reduce peak flows and/or volumes substantially. Flooding on the West Fork is partially controlled by Lake Bridgeport. Lake Bridgeport, which has a total drainage area of 1100 mi^2, is controlled but was not designed for flood control; however, a small amount of storage is utilized for temporary flood storage. Even though Lake Bridgeport is only able to effectively control a small percentage of the area above it, the utilization of the temporary flood storage has effectively reduced flows below those which would have naturally occurred.

Lake Bridgeport releases, although lower than the corresponding natural flows, still contribute to downstream flooding especially when combined with the uncontrolled flows from Big Sandy Creek. Big Sandy Creek, the majority of which is uncontrolled, is prone to flash flooding and produces high peak flows. Amon Carter Lake drains 100 mi^2 of the upper Big Sandy watershed, but being uncontrolled is not effective in reducing the peak flows substantially. Big Sandy Creek flows account for the majority of the high peak flood flows below the confluence with the West Fork of the Trinity River during most storm events, however, Lake Bridgeport releases tend to dominate the non-peak flows below the confluence.

D. Input from Interested Parties

The Texas Water Development Board grant was administered by Wise County. Under the County's direction, a Steering Committee and a Technical Advisory Committee were established. The Steering Committee is composed of elected and appointed officials from the study area. This committee provided program guidance and policy direction over the activities of the Technical Advisory Committee. The Technical Advisory Committee consists of professional/technical individuals appointed by the Steering Committee. The Technical Advisory Committee both guided and reviewed the efforts of SEE Corp. in preparing the Plan with an emphasis toward identification of mutual watershed concerns, common drainage policies, technical advice and guidance, and plan implementation.

Public meetings were held in both Jack and Wise Counties. In addition, a meeting was held with federal, state, county, city, and area government agencies. The purpose of these meetings was to obtain input from the various parties on plan formulation and implementation.

Other input from interested parties included 538 separate letters sent to the North Central Texas Council of Governments (NCTCOG) by the Big Sandy Watershed group and copied to SEE Corp. In addition, SEE Corp received a petition signed by or on behalf of 35 members of the Big Sandy Water Authority Concerned Citizens Group . A summary of the contents of the letters and the petition are located in Appendix 2.

E. Criteria for Plan

The criteria for the plan was formulated through meetings with the Steering Committee, Technical Advisory Committee, and the public. Based on these meetings, the following criteria were established:

1. The plan must provide facilities and procedures that will improve flood protection for the West Fork of the Trinity River Basin (including Salt and Big Sandy Creeks) above Eagle Mountain Lake.

2. The plan must provide facilities that will be multi-functional, which includes:
    a. Flood Storage -
    b. Water Supply Storage -
    c. Sedimentation Control -
    d. Erosion Control -
    e. Aesthetic Features -
    f. Improved Water Quality -
    g. Wildlife and Fisheries Preservation -
    h. Wetlands Enhancement -
    i. Recreational Uses -

3. The plan must address local needs

4. The plan must be economically feasible

5. The plan must be environmentally sensitive

6. The plan must provide for cost sharing by those that benefit

7. The plan must provide a mechanism for operation and maintenance

8. The plan must provide for preservation of historical sites

9. The plan must consider private property rights

10. The plan must provide for maintenance of the local property tax base

11. The plan must be beneficial for areas upstream and downstream of Eagle Mountain Lake

12. The plan must consider operational features of existing and future lakes

13. The plan must consider local land uses

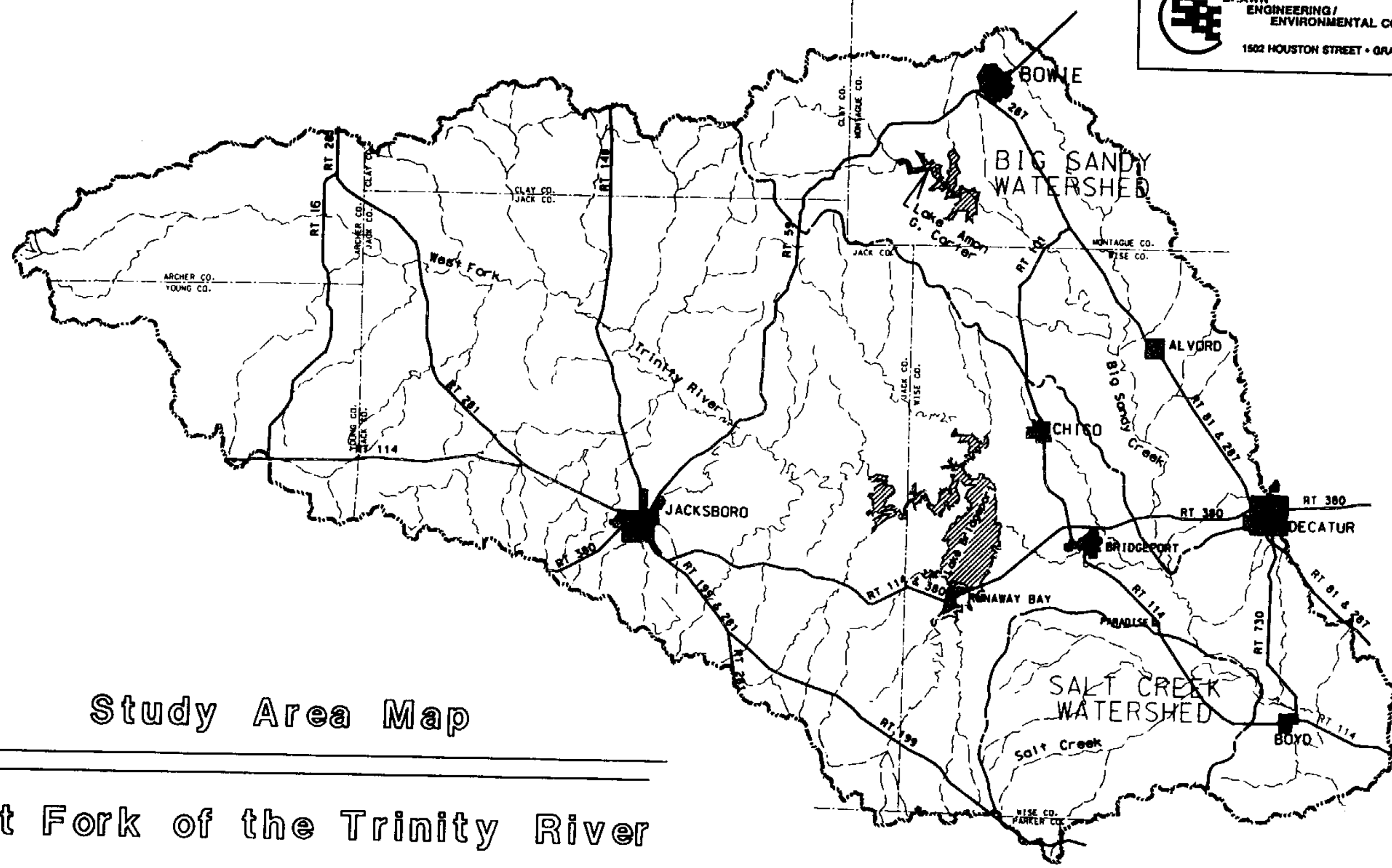
14. The plan must contribute to the local economic base

15. The plan must provide for implementation

F. Regulatory Constraints

The implementation of virtually any modification to floodplains, channels or wetlands requires a number of governmental approvals. Federal, state and local agencies regulate various aspects of development for many purposes including conservation of natural resources and protection of the environment and human population. Consequently, a considerable part of the implementation process for any such modification will be consumed with satisfying numerous regulations pursuant to obtaining agency approvals.

Some of the agencies which have interests in the drainage basin with regard to the projects proposed herein are: US Army Corps of Engineers (USACE), US Environmental Protection Agency (EPA), Federal Emergency Management Agency (FEMA), USDA Soil Conservation Service (SCS), US Fish and Wildlife, Texas Water Development Board (TWDB), Texas Water Commission (TWC), Texas Parks and Wildlife Department, Trinity River Authority (TRA), North Central Texas Council of Governments (NCTCOG), NORTEX Regional Planning Commission (NTRPC), Tarrant County Water Control and Improvement District (TCWCID No. 1), Wise County Water Control and Improvement District (WCWCID No. 1), Local County Commissioners Courts, and Local City Councils and Zoning Boards.



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Study Area Map

West Fork of the Trinity River Above Eagle Mountain Lake

LEGEND

- Drainage Basin Boundary
- Drainage Watershed Boundary

PLATE I.1

II. STUDY PROCEDURES

II. STUDY PROCEDURES

Numerous phases were involved in the execution of this study. Figure II.1 represents, in flow chart form, the procedure followed in conducting the major components of work.

With the many stated objectives of the study, the first step was to identify and acquire, as much as possible, any related study, computer model, mapping, observed recorded data, and the like. Although a substantial amount of data was amassed, comprehensive computer modeling of the basin had yet to be established in regard to hydraulics, hydrology and reservoir operations. The models that have been developed were either established on a daily time basis or lack the detail required in this portion of the drainage basin for the purposes of this study.

The primary tool for testing flood control alternatives on a basin-wide scale is the reservoir operations model. The USACE, Hydrologic Engineering Center, has developed a program named **HEC-5** (which has been substantially enhanced by Bill Eichert of Eichert Engineering) for this purpose. Using the Eichert version of HEC-5, an hourly time increment model was established for the West Fork of the Trinity River above Eagle Mountain Lake. Requiring large arrays of time series data, much of the input to the HEC-5 model was developed primarily through the use of three other programs, each also developed by the USACE, Hydrologic Engineering Center: **HEC-1** - used to simulate the rainfall/runoff process, **HEC-2** - used for modeling channel and floodplain backwater, and **PRECIP** - used for interpolating observed rainfall distributions between two or more recording stations in a given area.

Having established an hourly reservoir operations model, a considerable amount of time was next occupied in calibrating to several discrete historical floods by adjusting model parameters to achieve a reasonable correlation between the observed flows and predicted flows. A data base, consisting primarily of local incremental flows between control points, was ultimately generated by this procedure. With these flows and the calibrated model, flood reduction alternatives could be tested for their hypothetical effect on known historical storms in the basin.

The calibrated model was also used to test the potential effect of synthetic storms (10, 50, and 100 year storms) on the considered alternatives. A HEC-1 model was calibrated for the basin by adjusting model parameters such as loss rates, hydrograph peaking factors, and routing parameters. This model was then used to develop the synthetic local flows for the HEC-5 model necessary for testing frequency storms.

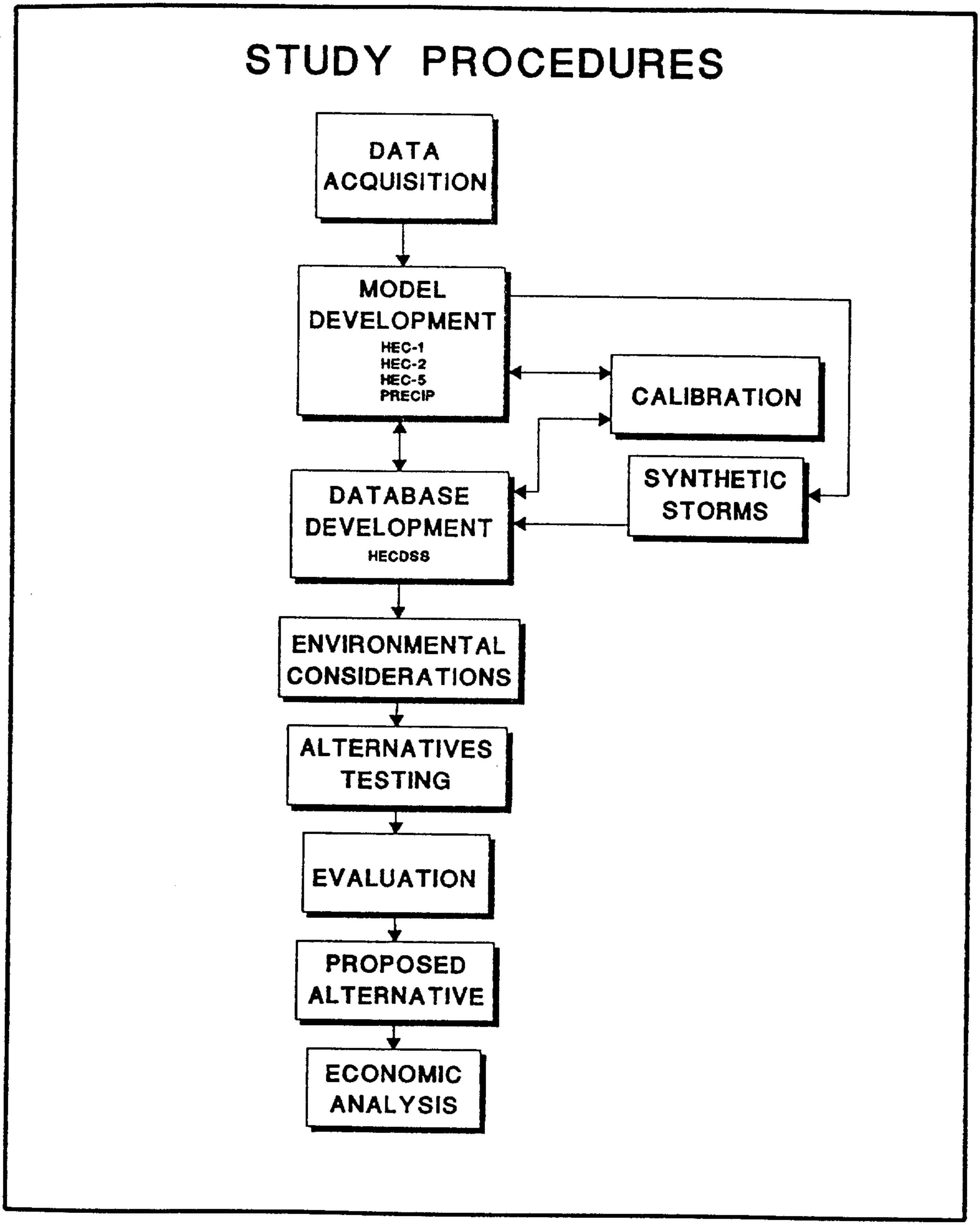
Consideration was given to the effect that any alternative might have on the local and basin-wide environment. Much data was compiled in this regard so that alternatives could be developed which would accomplish the project goals with no net adverse impact on the environment.

The alternatives considered can be categorized as either structural or non-structural. Structural measures included channel modifications, modification of the dams and/or spillways of Lake Bridgeport and Amon Carter Lake, and construction of new lakes both large and small. Non-structural measures included changing the operating policy of Lake Bridgeport, pre-release, and dredging of captured sediment in Lake Bridgeport and Eagle Mountain Lake.

Each alternative was evaluated against the project objectives. Alternatives which did not adequately satisfy these objectives were either removed from consideration or amended to be compliant. Ultimately, the proposed alternative was tested in the operations model for the 1981 and 1990 storms and for the 10, 50, and 100 year storms to estimate it's overall impact on flooding. Finally, a benefit/cost analysis of the proposed alternative was conducted in order to evaluate it's economic feasibility.

This study provides a multi-faceted plan for controlling flooding in the Trinity River basin. It sheds light on several previously unconsidered alternatives. It also provides a basis for further in-depth analyses of similar basin-wide improvements.

FIGURE II.1


STUDY PROCEDURES
DATA ACQUISITION
MODEL DEVELOPMENT
HEC-1
HEC-2
HEC-5
PRECIP
CALIBRATION
SYNTHETIC STORMS
DATABASE DEVELOPMENT
HECDSS
ENVIRONMENTAL CONSIDERATIONS
ALTERNATIVES TESTING
EVALUATION
PROPOSED ALTERNATIVE
ECONOMIC ANALYSIS

III. DATA ACQUISITION

III. DATA ACQUISITION

A. Mapping

SEE Corp. obtained the most current United States Geological Survey (USGS) 7.5 minute topographic quadrangle maps. These maps were updated from various information sources to reflect current land uses and additional roads, pipelines, lakes, and other features not reflected on the current USGS maps. The updated USGS topographic maps are on file at SEE Corp.'s office and reduced copies of these maps are included in Appendix 1. Update information sources included the following:

1. County Maps of Texas, prepared by the State Department of Highways and Public Transportation (Texas Department of Transportation) Transportation Planning Division in cooperation with the U.S. Department of Transportation Federal Highway Administration, dated 1990.

2. "As-Built" construction plans for recently constructed USDA Soil Conservation Service (SCS) lakes.

3. Field observations conducted by SEE Corp. (aerial and on-the-ground).

Plate III.1 shows the location of USGS 7.5 minute topographic maps covering the study area. Table III.1 is an index to Plate III.1.

The updated USGS maps were the basis for delineating the contributory drainage areas for stream basins in the study area.

B. Related Studies

Many studies have been completed for the subject area or a portion thereof. Information from these studies has been incorporated where applicable. The following is a partial list of completed and/or concurrent studies:

- Upper Trinity River Reconnaissance Report - USACE, Ft. Worth.

  This study, completed in 1990, identified water and related land resource needs for the upper Trinity River Basin. The main objective was to develop and evaluate the feasibly of different flood control measures.

- Flood Prevention and Control for the Trinity River Basin (Senate Bill 1543). - Trinity River Authority/Texas Water Commission.

  Complete in 1992, this study examined flooding problems and solutions related to the complete Trinity River system. Five non-structural alternatives were evaluated for their effectiveness in reducing damage for four historical storms; 1973, 1979, 1989, and 1990. A Real-time model was developed and recommendations for improving real-time data collection were devised.

- Soil Conservation Service Flood Control Work Plans for Big Sandy Creek, Salt Creek, and the West Fork Watershed above Bridgeport.

  These plans developed flood prevention programs consisting of upper reach structural and land treatment measures for their respective watersheds.

- Bridgeport Dam, Eagle Mountain Dam Gate Operation Policy - Freese and Nichols, Inc.

  Developed recommended gate operation policies for both Lake Bridgeport and Eagle Mountain Lake.

- Upper Trinity River Feasibility Study - USACE, Ft. Worth and NCTCOG.

  Ongoing study to perform detailed evaluations of the recommendations of the 1990 Reconnaissance Study.

- Final Regional Environmental Impact Statement - Trinity River and Tributaries, USACE, Fort Worth District

C. Field Observations

Prior to constructing any of the mathematical models used in the analysis, the entirety of Salt Creek, Big Sandy Creek, and the West Fork of the Trinity River above Eagle Mountain Lake were videotaped and observed aerially. Additional areas which were observed and taped included the perimeters of Lake Bridgeport and Amon Carter Lake.

With the videotape completed, aerial views were correlated to USGS quadrangle maps. Some of the information obtained from the aerial tape footage included floodplain roughness coefficients, new road crossings, locations of structures around the lakes, and new developments within the floodplain.

In addition to the aerial reconnaissance, SEE Corp. made field trips to various bridge crossings and stream gaging stations.

D. Soils Information

Information on the various soil types and their properties used in hydrologic modeling was obtained from SCS soil surveys for the various counties in the study area. For the purpose of this study, generalized soil map units were used. Where applicable, the various properties of each general soil map unit were estimated by weight averaging the properties of the detailed soil map units contained within the general map unit. Plate III.2 is a Generalized Soils Map. Table III.2 is an index to the map.

E. Rain Gaging

Rainfall information was obtained from the National Weather Service (NWS) for rainfall gages located in the vicinity of the study area. Plate III.3 shows the locations and table III.3 gives a description of the gages used in this study. Of the 29 gages, 14 report hourly and 15 report daily. Recently installed gages by TCWCID No. 1 were not utilized as they were not in service for the storms considered.

F. Streamflow Gaging

Hourly streamflow was obtained from the United States Geological Survey (USGS) and TCWCID No. 1 for the three streamflow gaging stations located in the study area. Hourly reservoir elevations were obtained from TCWCID No. 1 for the lake gage located at Lake Bridgeport Dam. Plate III.4 shows the locations of these gages. Daily data for these gages was also available, but was used only as a supplement to the hourly data when required.

G. Computer Models

Various computer models such as HEC-1 and HEC-5 models, have been developed for the study area. These models were obtained from the respected parties and incorporated as required.

H. Other Data

Other data collected for this study will be discussed in the following sections of the report.

TABLE III.1

USGS 7.5 Minute Series Quadrangle Map Index

GRID #	QUADRANGLE
2	ARCHER CITY EAST, TX
3	WINDTHORST, TX
4	SCOTLAND, SE, TX
5	JOY, TX
6	VASHTI, TX
7	BRUSHY MOUND, TX
8	BOWIE, TX
9	SALONA, TX
12	BOBCAT BLUFF, TX
13	PRICKLY PEAR, TX
14	DARNELL BRANCH, TX
15	ANTELOPE, TX
16	POSTOAK, TX
17	NEWPORT, TX
18	SELMA, TX
19	SUNSET, TX
20	SMYRNA, TX
23	TRUE, TX
24	LOVING, TX
25	MARKLEY, TX
26	LYNN CREEK, TX
27	JOHNSON LAKE, TX
28	CUNDIFF, TX
29	CRAFTON, TX
30	CHICO, TX
31	ALVORD, TX
32	PECAN CREEK, TX
36	BRYSON, TX
37	SENATE, TX
38	JACKSBORO, TX
39	JACKSBORO, NE, TX
40	WIZARD WELLS, TX
41	BRIDGEPORT, WEST, TX
42	BRIDGEPORT, EAST, TX
43	DECATUR, TX
44	BLUETT, TX
49	BARTONS CHAPEL, TX
50	PERRIN, TX
51	GIBTOWN, TX
52	BOONSVILLE, TX
53	COTTONDALE, TX
54	BOYD, TX
55	RHOME, TX
62	ADELL, TX
63	POOLVILLE, TX
64	SPRINGTOWN, TX
65	AZEL, TX
66	AVONDALE, TX

TABLE III.2

GENERAL SOIL MAP UNIT INDEX

Map Unit No.	County	Description
A1	Archer	Kamay - Bluegrove - Deandale
A2	Archer	Owens - Vernon
A3	Archer	Bluegrove - Renfrow - Waurika
A4	Archer	Tillman - Vernon - Hollister
A6	Archer	Bontin - Windthorst - Truce
C1	Clay	Stoneburg - Anocon - Kirkland
C2	Clay	Kamay - Bluegrove - Deandale
C3	Clay	Bonti - Windthorst - Truce
C4	Clay	Renfrow - Bluegrove - Waurika
J1	Jack	Bonti - Cona - Truce
J2	Jack	Lindy - Hensley - Yates
J3	Jack	Gowen - Pulexas
J4	Jack	Thurber - Hassee
J5	Jack	Windthorst - Duffau
M1	Montague	Windthorst - Duffau
M2	Montague	Renfrow - Stoneburg - Anacon
M3	Montague	Bonti - Cona - Truce
M4	Montague	Aledo - Venus - Bolar
M5	Montague	Pulexas - Gowen
M6	Montague	Bastrop - Tellor
P1	Parker	Windthorst - Duffau - Weatherford
P2	Parker	Chaney - Truce - Bonti
P4	Parker	Aledo - Venus - Bolar
W1	Wise	Duffau - Keeter - Weatherford

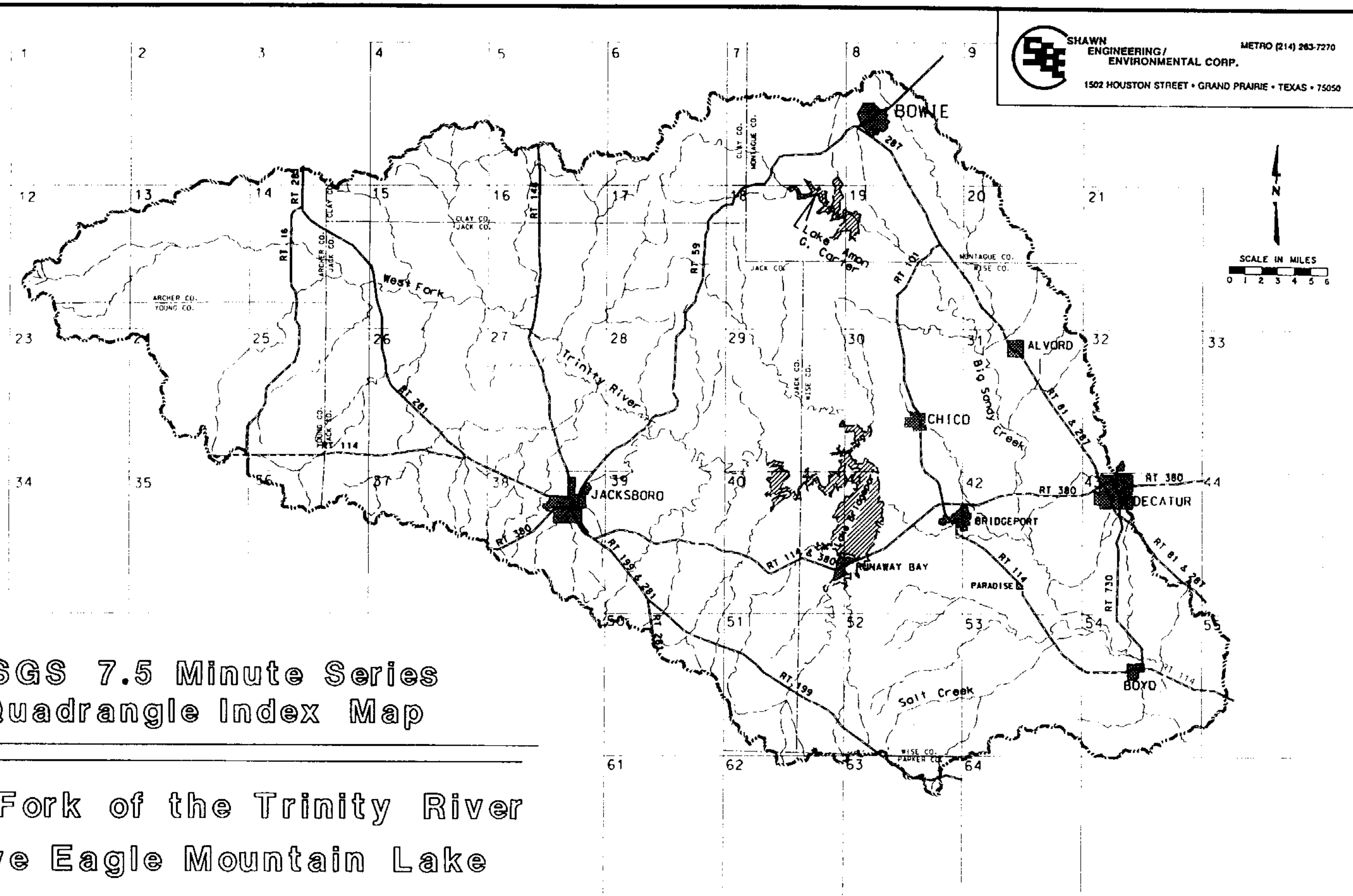
Map Unit No.	County	Description
W2	Wise	Windthorst - Chaney - Selden
W3	Wise	Truce - Cona
W4	Wise	Bastil - Silawa
W5	Wise	Sanger - Purves - Somervell
W6	Wise	Venus - Aledo - Somervell
W7	Wise	Palopinto - Hensley - Lindy
W8	Wise	Pulexas - Balsora - Deleon
W9	Wise	Frio - Trinity
Y1	Young	Bonti - Truce Association
Y2	Young	Renfrow - Bluegrove Association
Y3	Young	Abilene - Tillman Association
Y4	Young	Lindy - Yates Association

TABLE III.3

RAINFALL GAGING STATIONS

Rain Gage Station Name	SHEF Code	Reporting Frequency
ALVORD 4NE	AVOT2	HOURLY
ANTELOPE	ANLT2	DAILY
ARCHER CITY	ACIT2	DAILY
BONITA	BTAT2	HOURLY
BOWIE	BOWT2	DAILY
BOYD	BYOT2	DAILY
BRIDGEPORT	BRIT2	DAILY
BRIDGEPORT DAM	BPRT2	HOURLY
DECATUR	DECT2	DAILY
DENTON 2SE	DTNT2	HOURLY
FORESTBURG	FBTT2	DAILY
GAINSVILLE	GAIT2	HOURLY
GRAHAM	GHMT2	DAILY
JACKSBORO	JSBT2	DAILY
JACKSBORO 1-NNE	JKBT2	HOURLY
JUSTIN	JSTT2	HOURLY
LAKE KEMP	KEMP	HOURLY
MINERAL WELLS FAA	MWFT2	DAILY
MINERAL WELLS 1-SSW	MWLT2	HOURLY
MUENSTER	MUTT2	DAILY
NEWPORT	NEPT2	DAILY
OLNEY	OLNT2	DAILY
OLNEY 5NNW	OLYT2	DAILY
RENO	RENT2	HOURLY
SLIDELL	SLIT2	DAILY
SPRINGTOWN 4S	SGTT2	HOURLY
WEATHERFORD	WTFT2	HOURLY
WICHITA FALLS WSO AP	SPST2	HOURLY
WOODSON	WDSON*	HOURLY

* Assumed SHEF Code

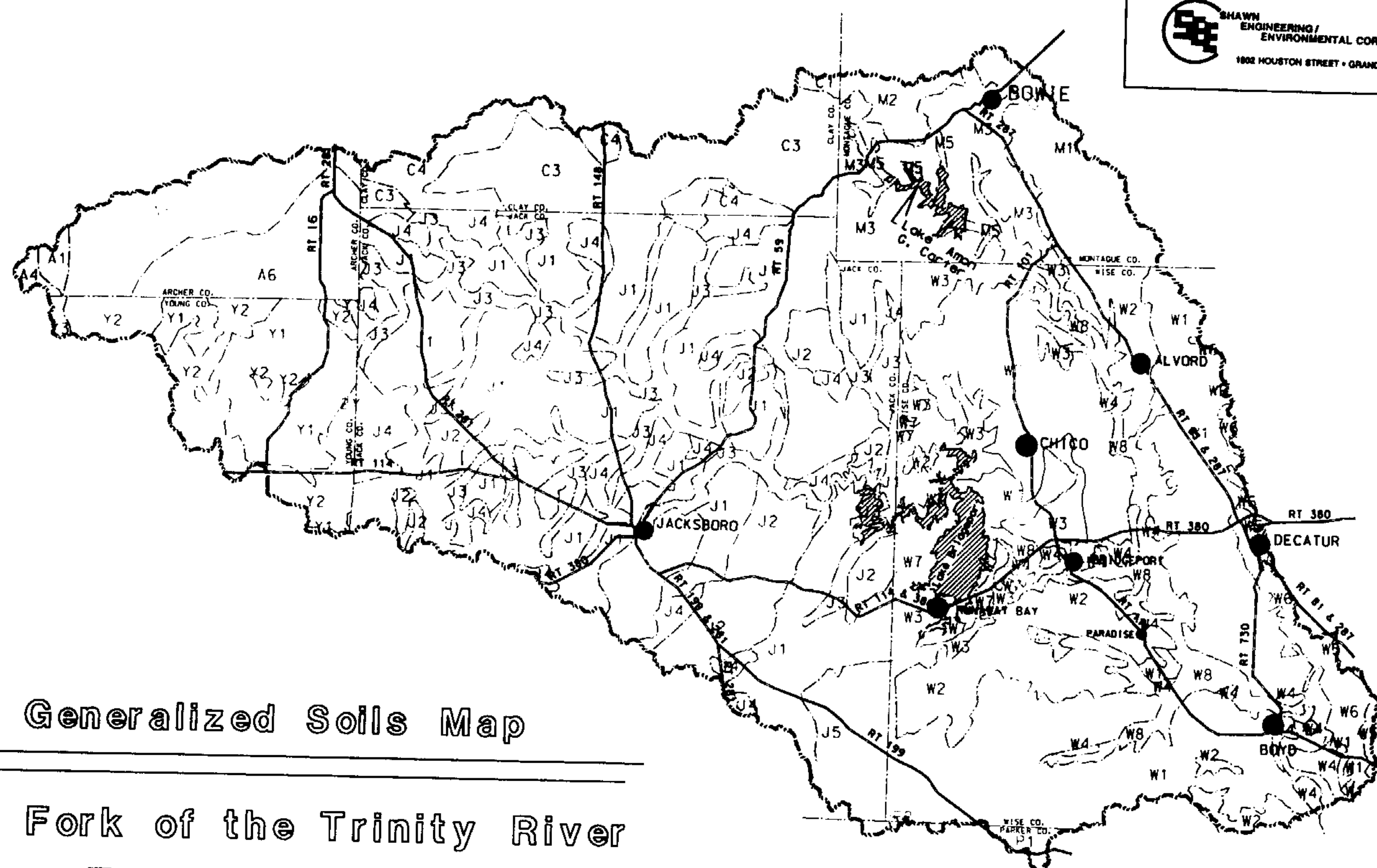


USGS 7.5 Minute Series Quadrangle Index Map

West Fork of the Trinity River Above Eagle Mountain Lake

Note: See Table III.1 for Index to Quadrangle Names

PLATE III.1



Generalized Soils Map

West Fork of the Trinity River Above Eagle Mountain Lake

Source: USDA Soil Conservation Service Soil Surveys for Archer, Clay, Jack, Montague, Parker, Wise and Young Counties

LEGEND

- General Soil Map Unit Boundary

J1 - General Soil Map Unit Number (See Table III.2 for Index to Soil Map Units

SHAWN ENGINEERING/ ENVIRONMENTAL CORP.
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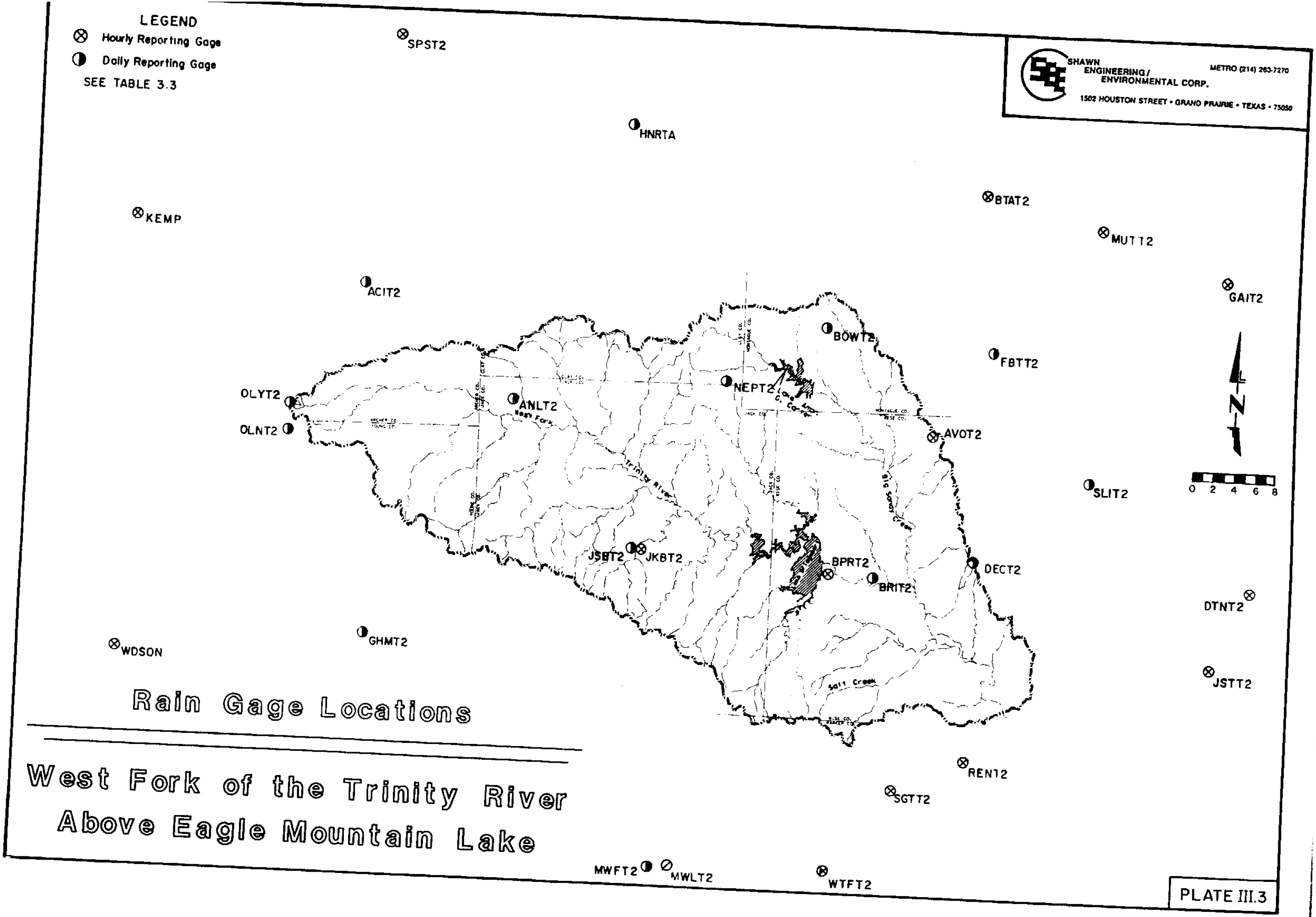
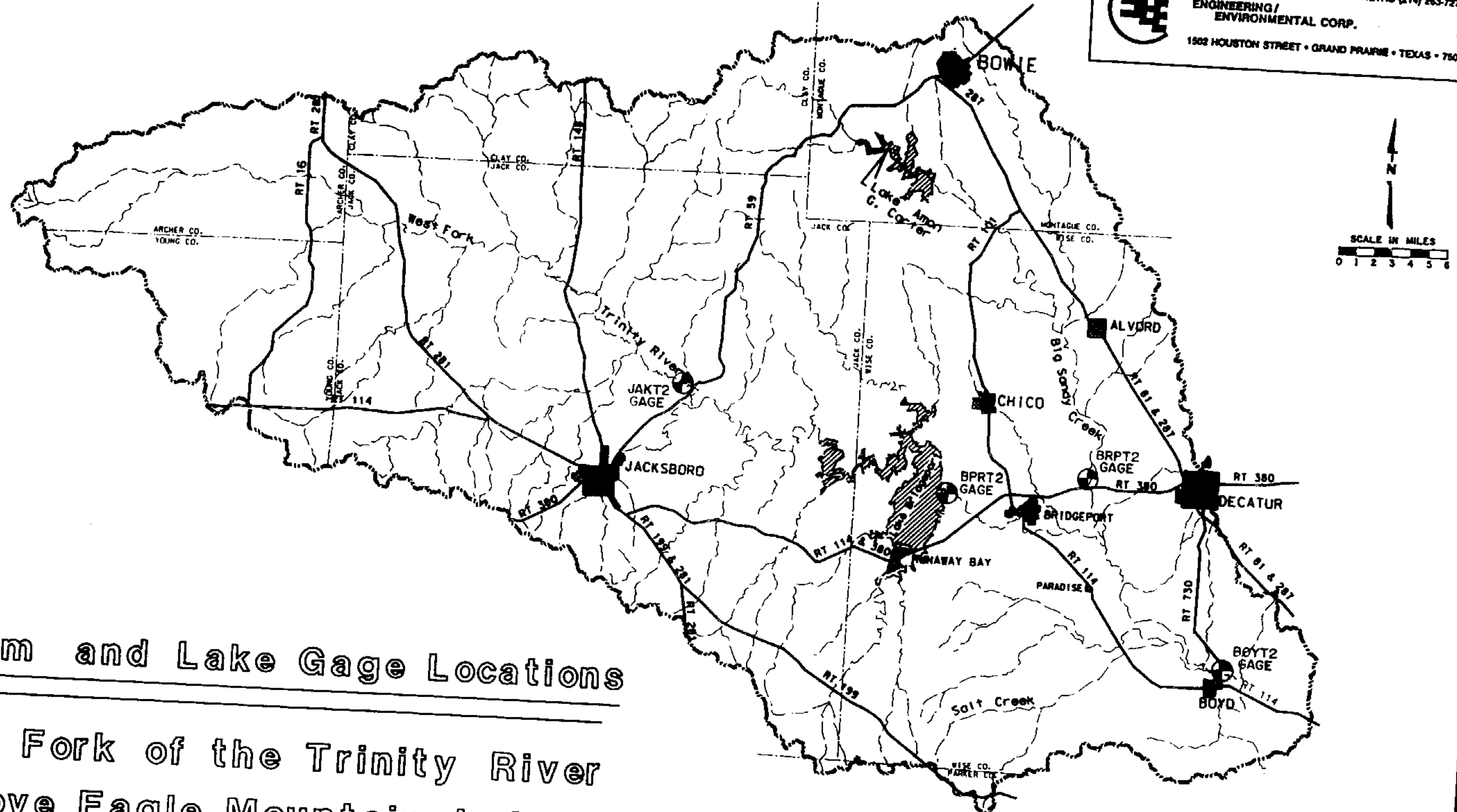
PLATE III.2



Rain Gage Locations

West Fork of the Trinity River Above Eagle Mountain Lake

PLATE III.3



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Stream and Lake Gage Locations

West Fork of the Trinity River Above Eagle Mountain Lake

PLATE III.4

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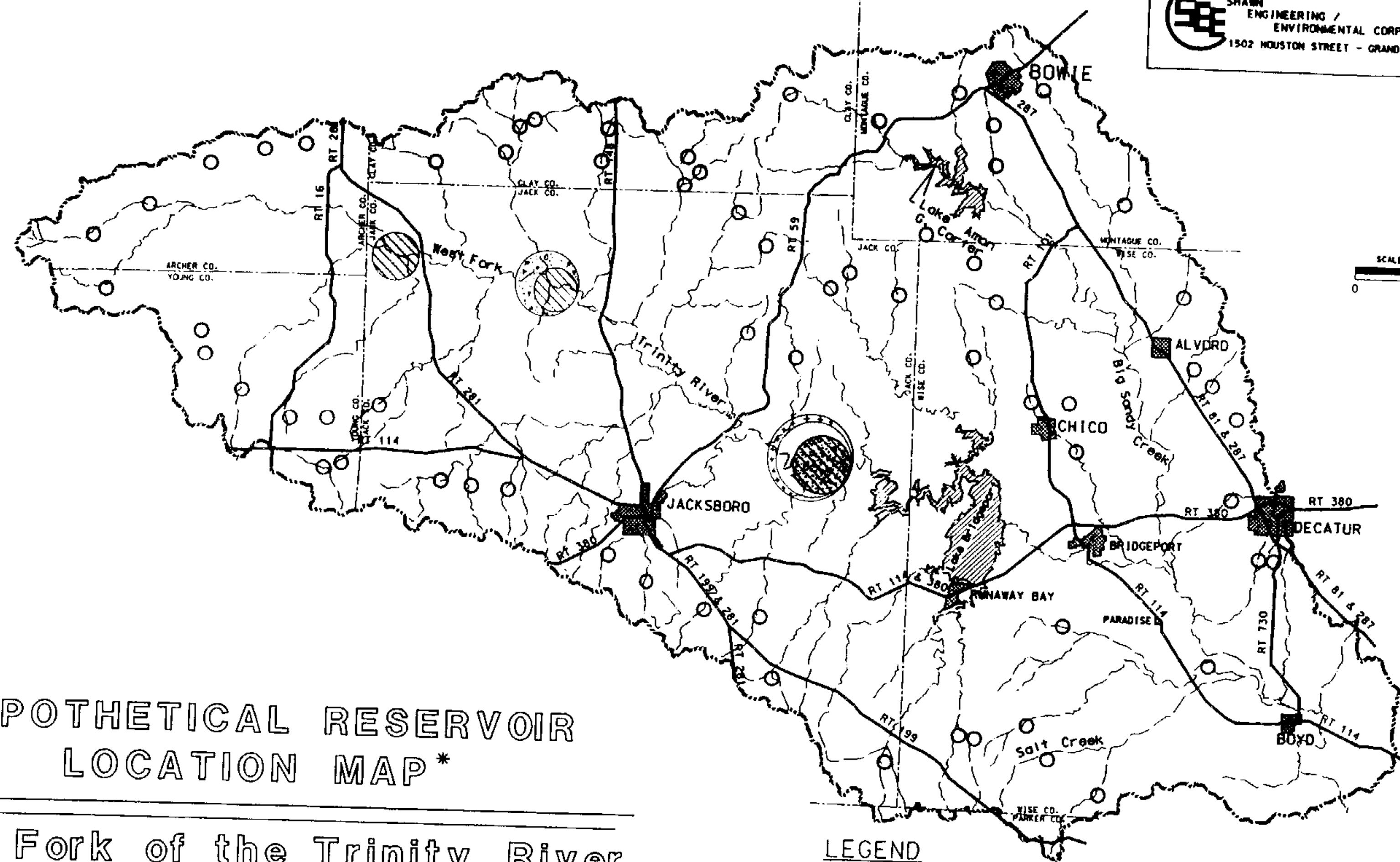

HYPOTHETICAL RESERVOIR LOCATION MAP*

West Fork of the Trinity River Above Eagle Mountain Lake

* NOTE: The Location of All Reservoirs is Schematically Represented Only. Actual Location Will Need to Be Determined During The Planning/Design Phase For Each Individual Structure.

LEGEND

- Minor Multi-Purpose Lake
- Major Multi-Purpose Lake - Combination No. 1
- Major Multi-Purpose Lake - Combination No. 2
- Major Multi-Purpose Lake - Combination No. 3
- Major Multi-Purpose Lake - Combination No. 4

PLATE VIII.1

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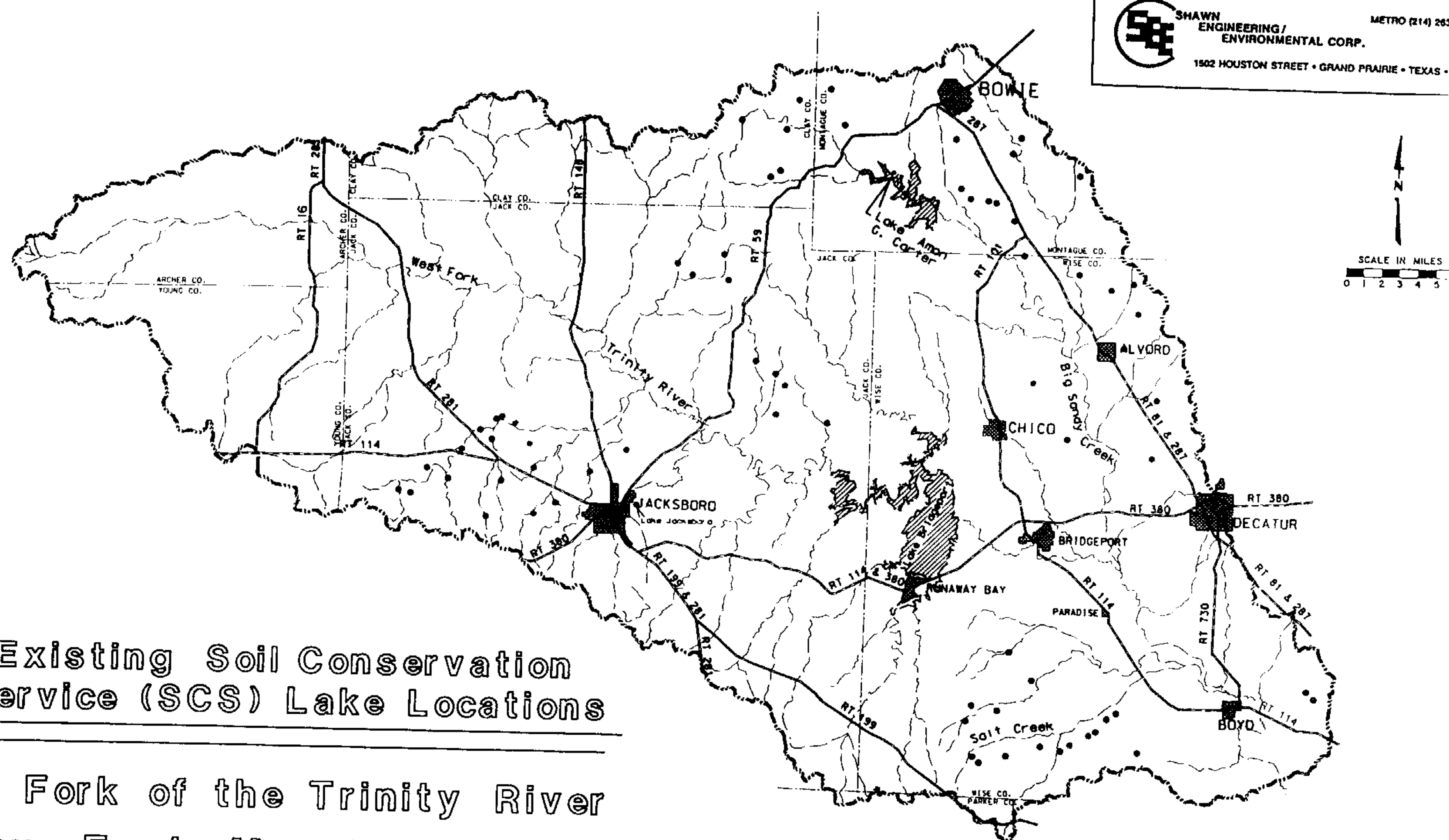


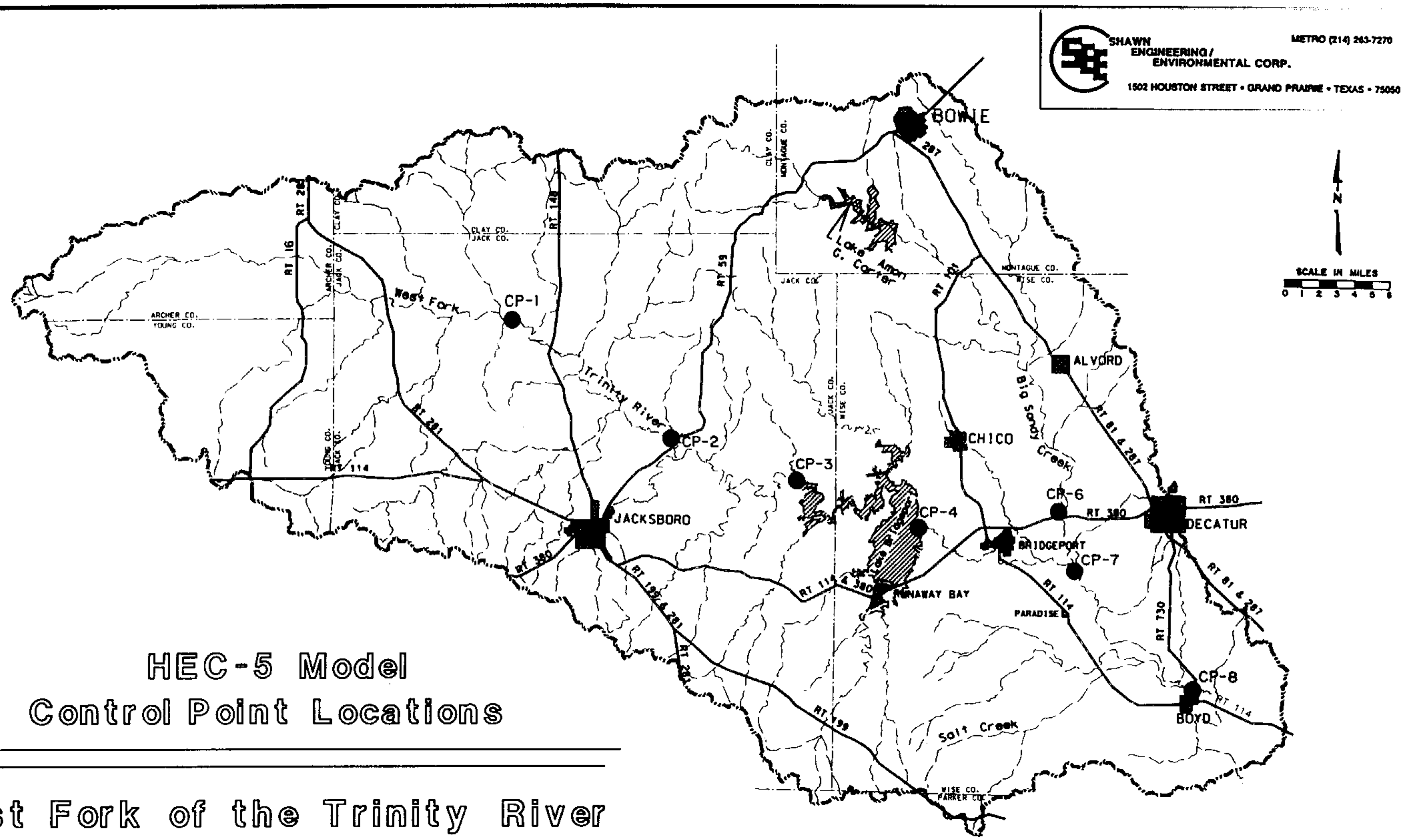
Existing Soil Conservation Service (SCS) Lake Locations

West Fork of the Trinity River Above Eagle Mountain Lake

LEGEND

● - Existing SCS Lake

PLATE VII.1



HEC-5 Model
Control Point Locations

West Fork of the Trinity River
Above Eagle Mountain Lake

LEGEND

● - Control Point Locations

CP-1 - Control Point Number

PLATE VI.1

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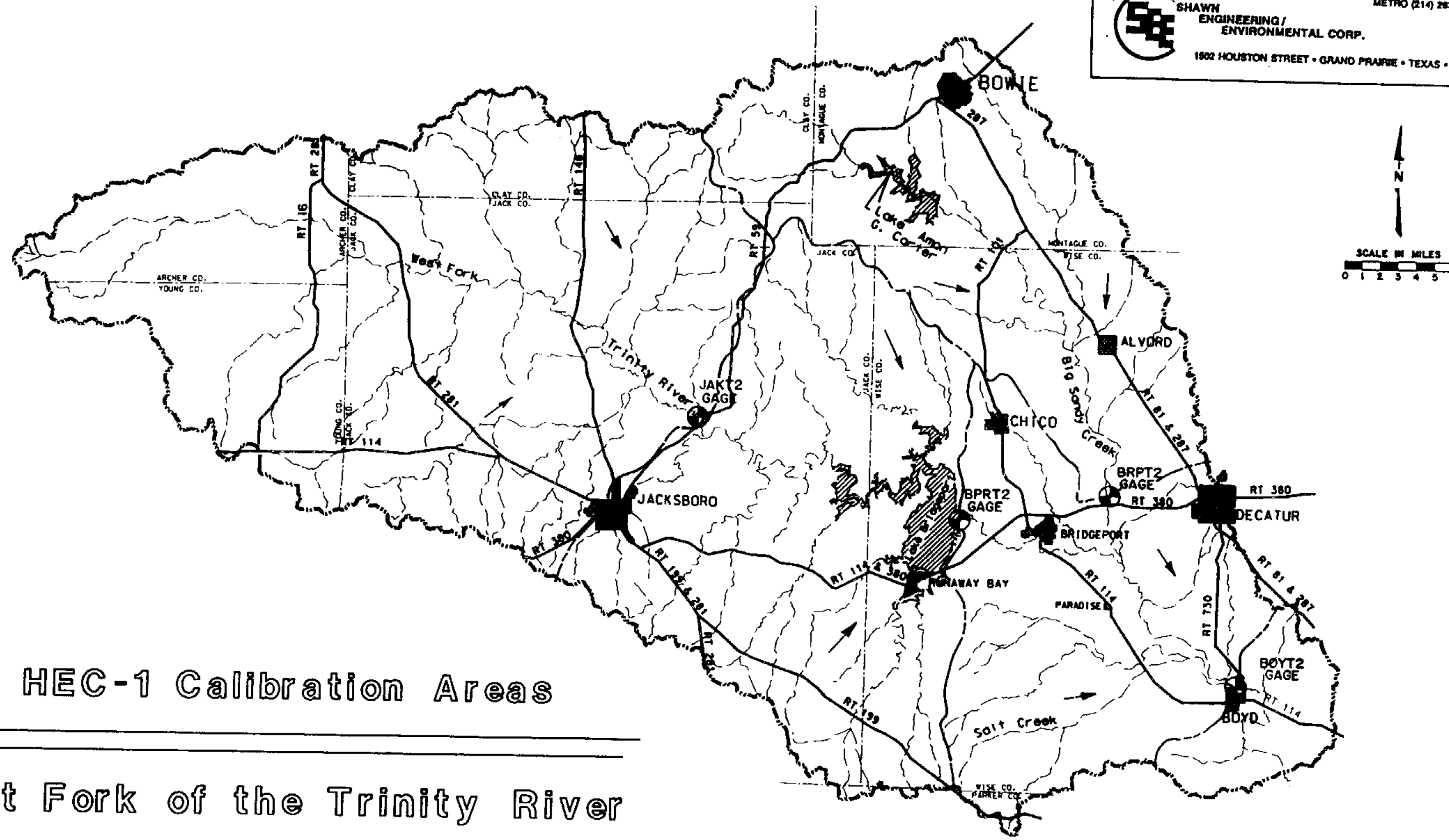


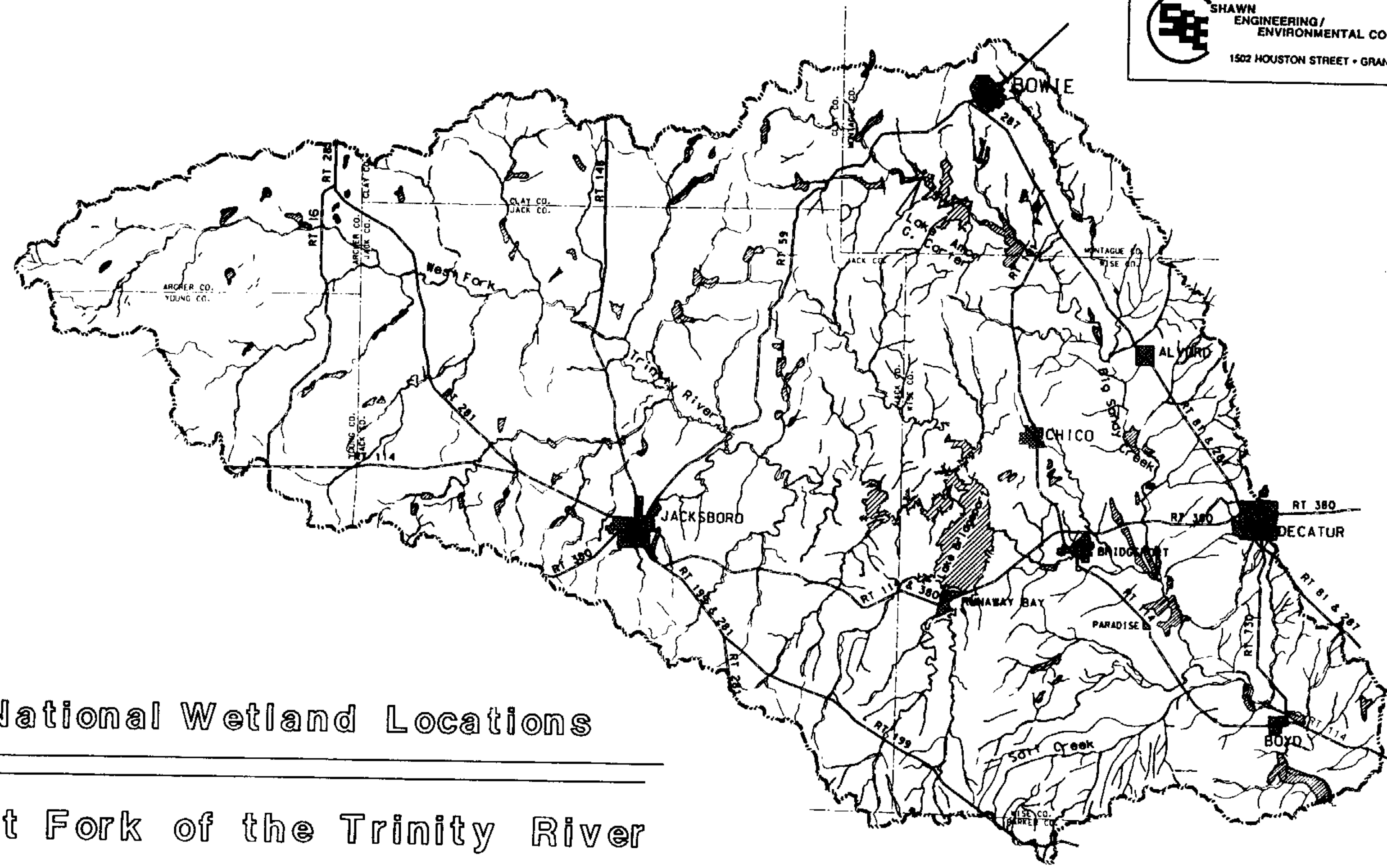
HEC-1 Calibration Areas

West Fork of the Trinity River Above Eagle Mountain Lake

LEGEND

- HEC-1 Calibration Area Boundary
- Gage Location
- Direction of Flow

PLATE V.1



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National Wetland Locations

West Fork of the Trinity River Above Eagle Mountain Lake

Note: Only National Wetland Areas approximately 10 acres or larger are shown.

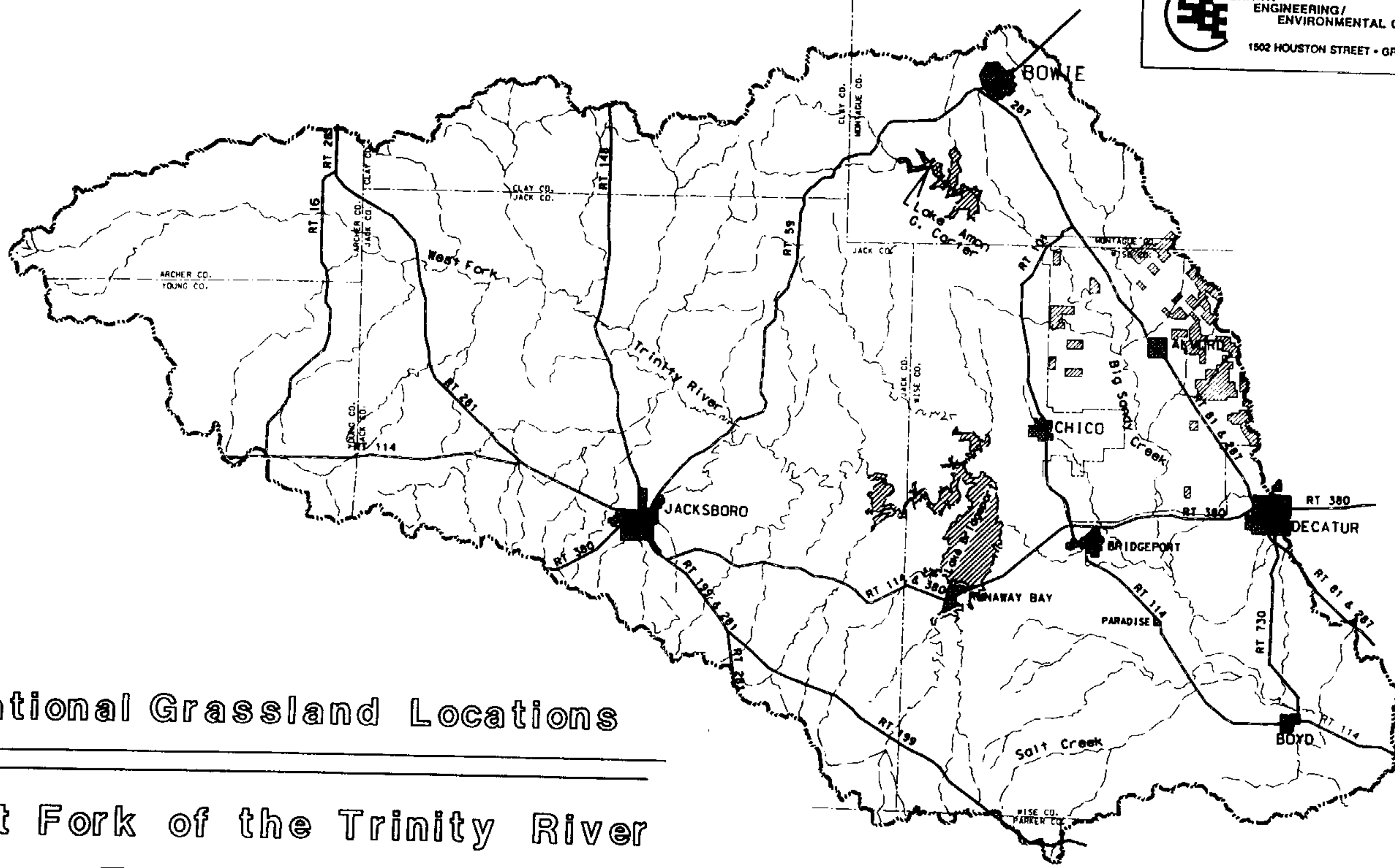
Source: USGS National Wetlands Inventory Maps

LEGEND

- National Wetland approximately 10 acres or larger

- LINEAR DEEPWATER HABITAT

PLATE IV.9



National Grassland Locations

West Fork of the Trinity River Above Eagle Mountain Lake

Source: USDA Forest Service Map "The Caddo and Lyndon B. Johnson National Grasslands" dated 1983

LEGEND

- National Grasslands
- National Grassland Boundary

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PLATE IV.8

SHAWN ENGINEERING/ ENVIRONMENTAL CORP.
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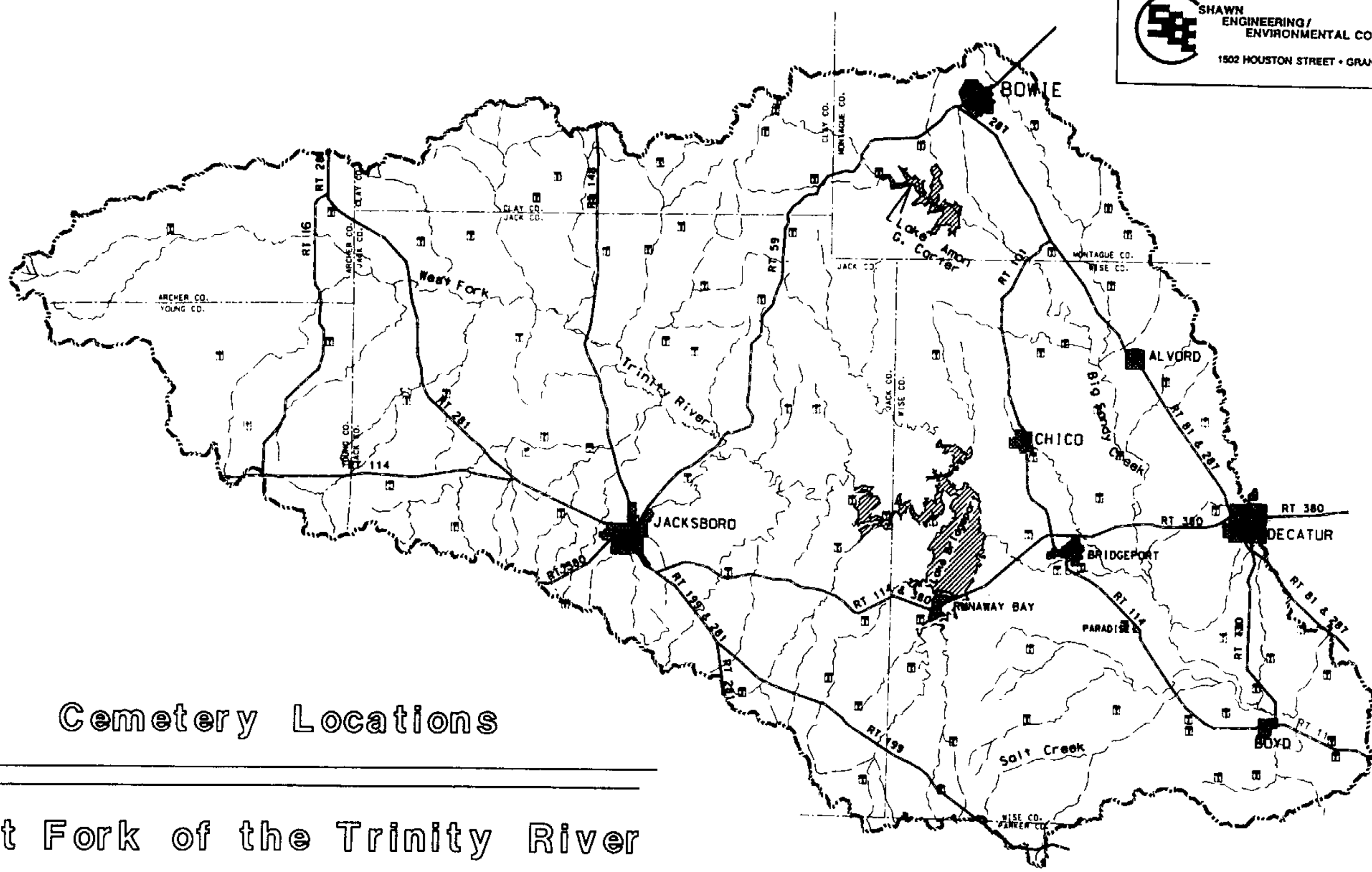

Cemetery Locations

West Fork of the Trinity River Above Eagle Mountain Lake

LEGEND

▣ - Cemetery

Source: USGS 7.5 Minute Series Topographic Maps

PLATE IV.7

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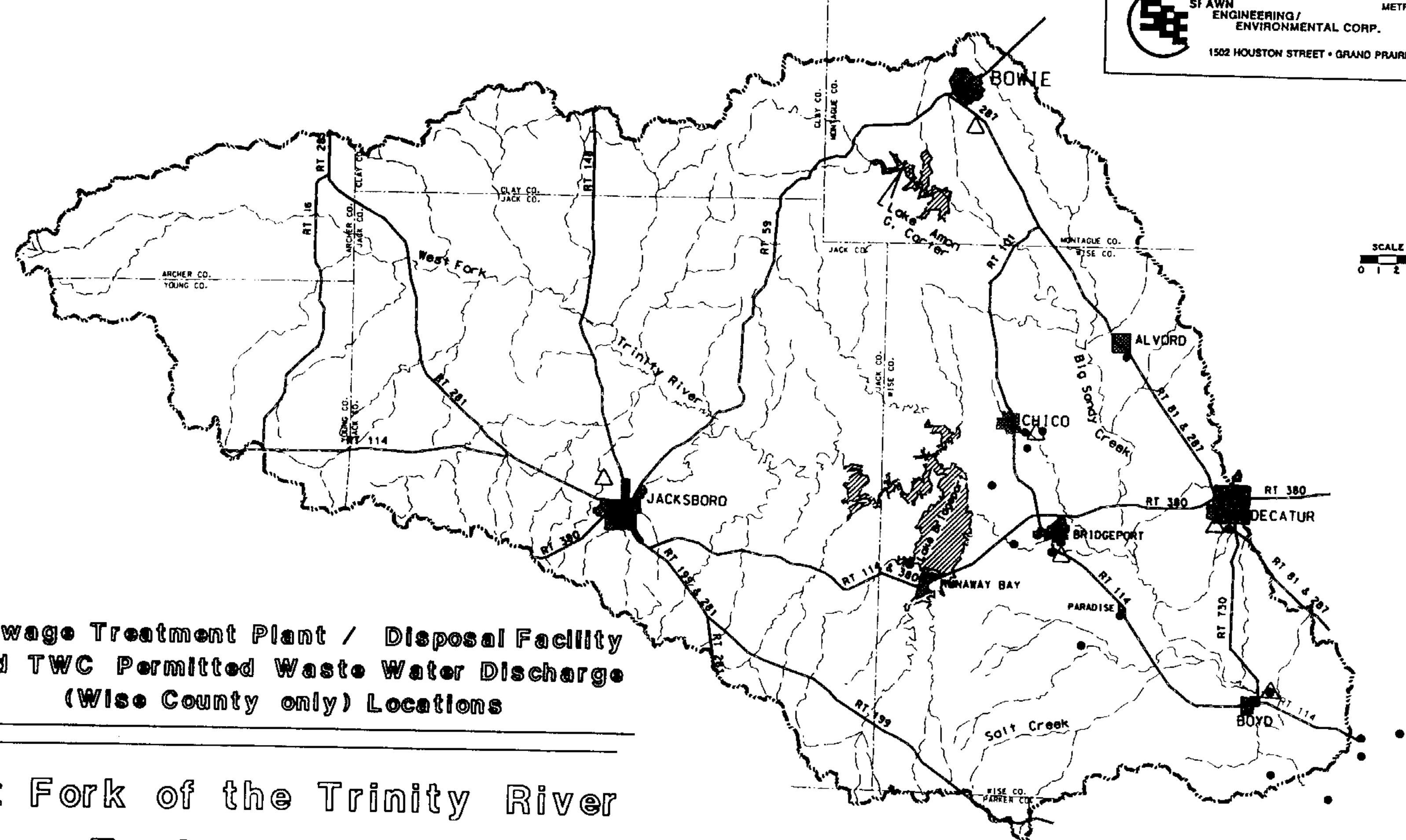

Sewage Treatment Plant / Disposal Facility and TWC Permitted Waste Water Discharge (Wise County only) Locations

West Fork of the Trinity River Above Eagle Mountain Lake

Sources: 1.) USGS 7.5 Minute Series Topographic Maps
2.) North Central Texas Council of Governments

LEGEND

△ - Sewage Treatment Plant/Disposal Facility

● - TWC Permitted Waste Water Discharge (Wise County Only)

PLATE IV.6

SHAWN ENGINEERING/ ENVIRONMENTAL CORP.
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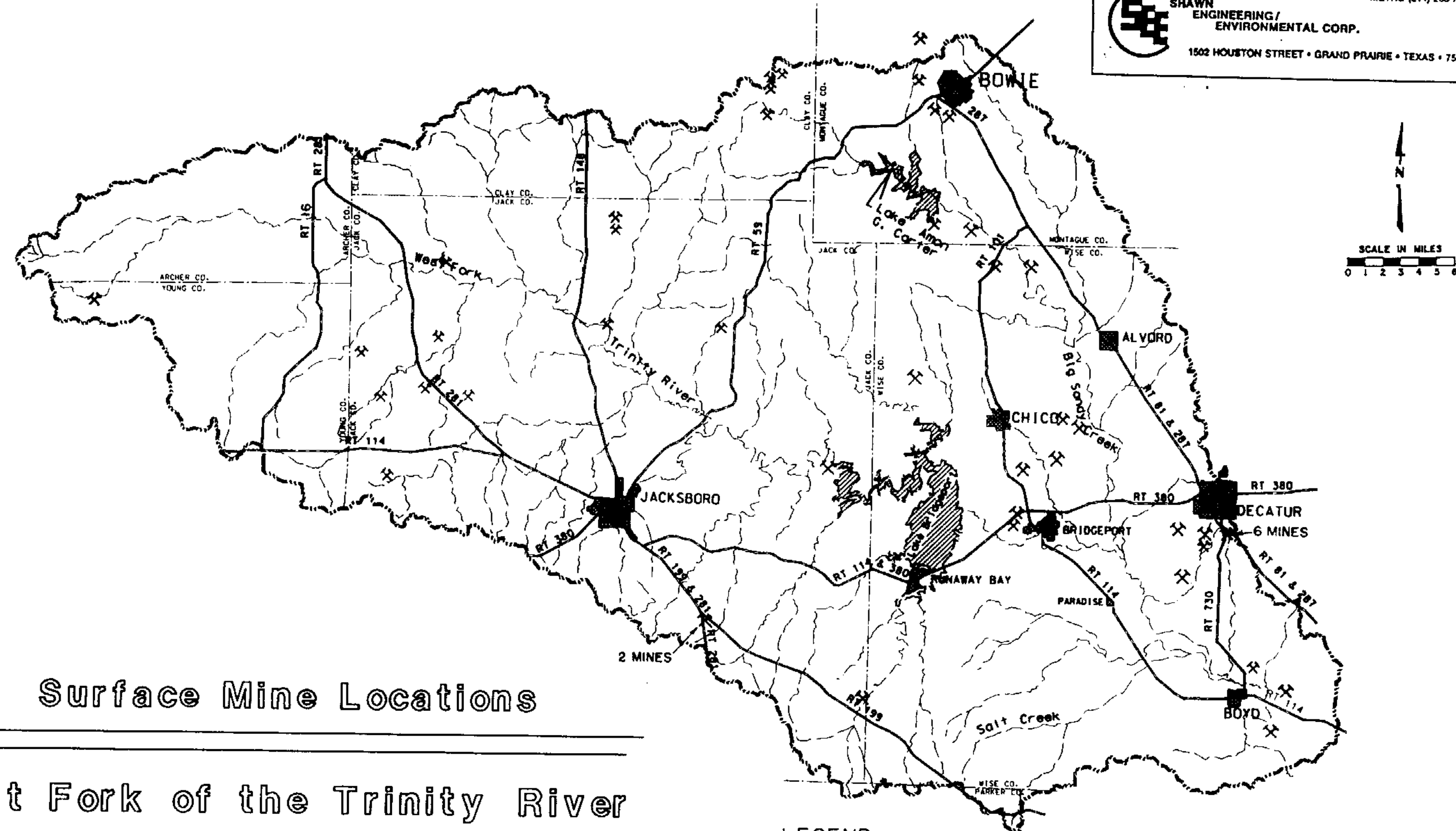


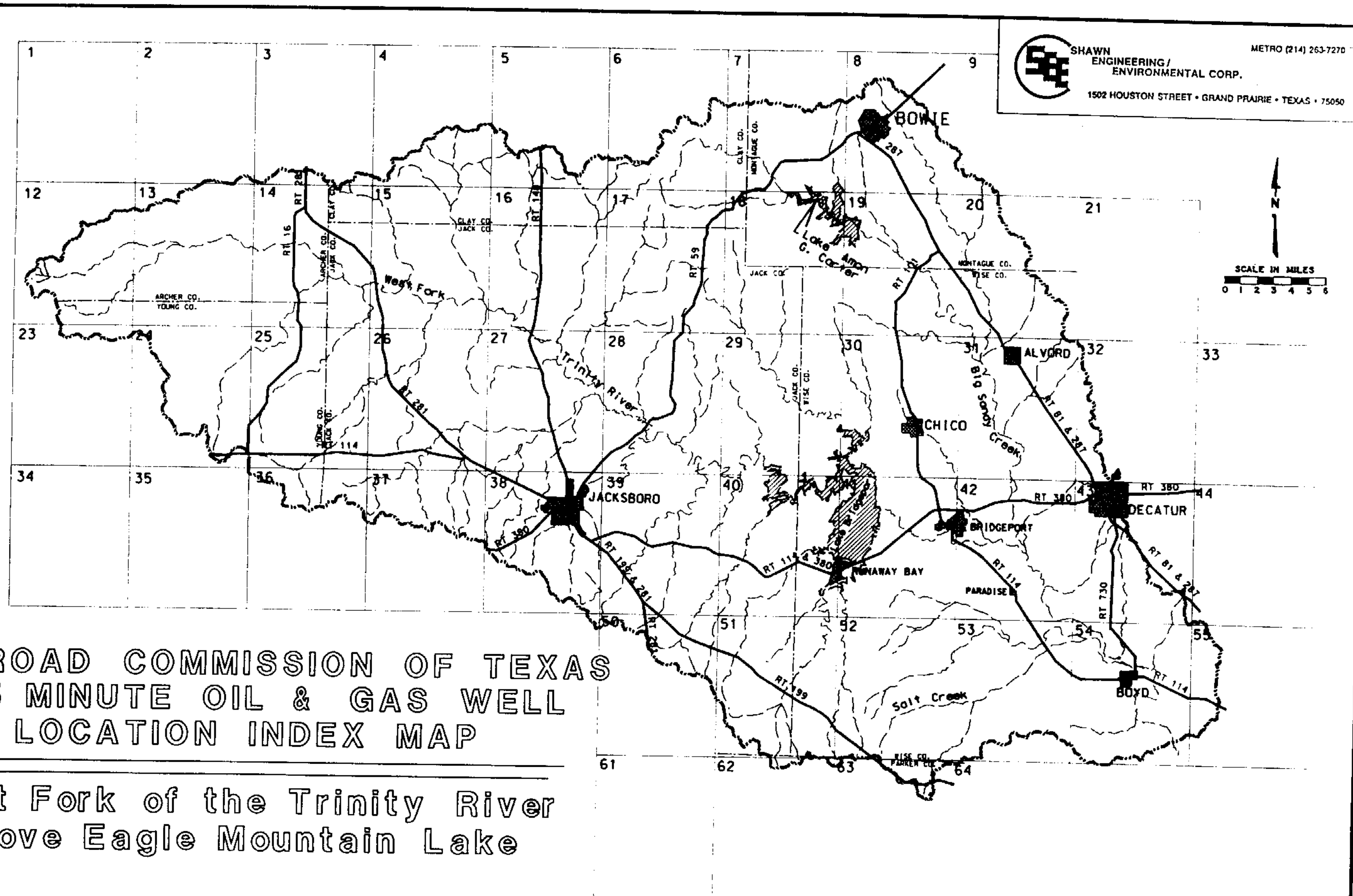
Surface Mine Locations

West Fork of the Trinity River Above Eagle Mountain Lake

LEGEND
✕ - Mine Locations

Source: USGS 7.5 Minute Series Topographic Maps

PLATE IV.5



RAILROAD COMMISSION OF TEXAS 7.5 MINUTE OIL & GAS WELL LOCATION INDEX MAP

West Fork of the Trinity River Above Eagle Mountain Lake

Note: See Table III.1 for Index to Quadrangle Names

PLATE IV.1

IV. ENVIRONMENTAL CONSIDERATIONS

IV. ENVIRONMENTAL CONSIDERATIONS

A. Purpose

Environmental considerations are important in the implementation of the plan. The criteria states that "the plan must be environmentally sensitive". Any environmentally sensitive area must be either avoided or, if adversely impacted, must be repaired or mitigated.

Other environmental considerations are cost and liability. If a facility is constructed in a contaminated area, then the cost of remediation will increase construction costs. Any contamination not discovered and/or remediated will potentially cause legal and/or economic liabilities.

B. Scope of Investigations

As will be discussed in section VIII, the proposed alternative includes many structural facilities. The proposed flood protection plan allows for flexibility in the location of individual flood control projects. The exact location of these facilities will need to be determined under further study. Site specific environmental information, including RCRA, UST, LPST, CERCLA, landfill, surface mine, and other environmental listings, cannot be analyzed in detail at this time since no exact locations have been selected. Site specific information should be gathered and complied in an Environmental Site Assessment after a specific site is proposed for a project.

Many inquiries were made to local, state, and federal groups and agencies in order to obtain data for the study. Much of the data has been mapped in this report. The balance of the information is available in reports and/or computerized data bases gathered and/or catalogued by SEE Corp. Appendix 3 contains contact names and selected correspondence.

C. Results of Investigation

1. RCRA SITES

The Resource Conservation and Recovery Act (RCRA) is an EPA administered Federal legislation aimed at controlling the generation, treatment, storage, transportation, and disposal of hazardous wastes. The EPA's RCRA record center has provided a letter and list of RCRA facilities from its data base for the seven project area counties (see Appendix 3). The facilities are listed by address.

The number of sites listed in each county is as follows. Note that some of these sites may fall outside of the study area. Note also that only those sites which have registered with the EPA are listed. There may be additional sites which have not registered with the EPA and/or have registered after the time of SEE Corp.'s request for the information.

County	Number of RCRA Sites
Archer	17
Clay	9
Jack	16
Montague	14
Parker	46
Wise	157
Young	44

The report codes give information as sub-codes and are labeled as follows:

- LQG = Large Quantity Generator
- SQG = Small Quantity Generator
- CEG = Very Small Quantity Generator
- NRG = Generator RCRA Regulatory Status Condition
- TRS = Engaged in Transportation of Hazardous Waste
- TSD = Engaged in Transportation of Storage or Disposal of Hazardous Waste
- NRT = TSD RCRA Regulatory Status Description
- UIC = Underground Injection Control Indicator
- OSF = Markets or Burns Off-Spec Used Oil Fuel
- SOF = Specification Used Oil Marketing Indicator
- B/B = Burner/Blender Indicator
- PER = Permitted (Y/N)
- SRC = Source of Information
- COM = Commercial Facility, Off-Site Waste Receipt
- TYP = Type of Owner/Operator

Similar RCRA information along with spill incidents and underground storage tank data is commercially available from Agency Information Consultants in Austin, Texas. It is usually arranged by zip code and county. Additionally, State information should be available from the TWC.

2. CERCLA SITES

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) was passed by Congress in 1980. This Act established the Superfund and authorized the EPA to draw from the fund to pay for the cleanup of hazardous waste sites. The EPA CERCLIS (CERCLA information system) listing of superfund sites that are in the seven counties of the project area was obtained by Freedom of Information request. In responding to the request, the EPA does not make "any judgement as to the presence or absence of any hazardous material, waste, substance, or condition at, or adjacent to, sites in this report". Additional information will be required for each site for further evaluation. The number of sites in each county is as follows. Some of these sites may fall outside of the study area.

	County	Number
1.	Montague	2
2.	Clay	2
3.	Young	5
4.	Jack	1
5.	Parker	6
6.	Archer	0
7.	Wise	4

Table IV.1 is a reproduction of the CERCLIS for the subject counties.

TAB.)IV.1

CERCLIS SITES-COUNTY SEQUENCE BY STATE
02/16/1993

EPA ID NUMBER	FACILITY NAME	FACILITY LOCATION	FACILITY CITY	COUNTY NAME
TXD008411100	COOKS OIL CO INC	FM 730 N	BOYD	WISE
TXD154711667	NGPL #155	P.O. BOX 66	CHICO	WISE
TXD988000527	SCOTT'S FARM SUPPLY	HIGHWAY 114 0.1 MI.S OF JUNCTION FM 1658	BRIDGEPORT	WISE
TXD980625925	WESTERN OIL TRANSPORT CO CHICO SHOP	3.2 MI N OF CHICO ON HWY 1810	CHICO	WISE
TXD980699383	BALLARD FAMILY PROP.	13 FORT WORTH HWY	WEATHERFORD	PARKER
TXD982291700	MAGNESIUM FIRE/ UNIDENTIFIED DUMP	1.5 MI ESE OF POOLVILLE	POOLVILLE	PARKER
TXD988039947	PARKER CO DRUMS	1885 NEW OF TON RD	WEATHERFORD	PARKER
TXD981048713	REDS HELICOPTER SERVICE	FM113-3 MI N OF FM 11 3 & I-20 X	MILLSAP	PARKER
TXD980513931	SANI-SERVICE	MAIN ST	WEATHERFORD	PARKER
TXD980697817	WEST SIDE SANITARY LANDFILL INC	3500 LINKCREST DR	ALEDO	PARKER
TXD987979051	BRYSON PLACE APTS	U.S.HWY 380 (P.O.B OX 183)	BRYSON	JACK
TXD021930342	AG SPRAYERS	US380,.3 E OF INT.W/ JACKSON HWY (FM2179)	GRAHAM	YOUNG
TXD981048242	EVANSON AVIATION	P.O. BOX 416/OLNEY A IRPORT	OLNEY	YOUNG
TXD980625099	GRAHAM REFINERY	6 MI SOUTHEAST OF GRAHAM	GRAHAM	YOUNG
TXD981524135	OATMAN FERTILIZER CO	S HWY 114 0.5 MI W O F CITY	LOVING	YOUNG
TXD093197028	OLNEY AVIATION	FM 3366 INT OF HWY 2 10	OLNEY	YOUNG
TXD069003044	HAGER FLYING SERVICE	5 MI N&W OF BYERS	BYERS	CLAY
TXD981154115	SUREKILL	APPROX. 1 MI SE OF HWY 287 & FM 1288	BELLEVUE (NEAR)	CLAY
TXD091980839	BOWIE MILLING CO. (NOR-TEX)	INTERSEC. OF MASON & MONTAGUE	BOWIE	MONTAGUE
TXD980697916	NOCONA CITY OF LANDFILL	2 MI SW OF NOCONA	NOCONA	MONTAGUE

3. OIL AND GAS WELLS AND PIPELINES

The map department of the Oil and Gas Division of the Railroad Commission of Texas (RRC) has compiled individual well reports and computer generated maps with the locations and status of oil wells (both plugged and active), gas wells and dual oil and gas wells. These maps consist of individual well sites plotted on 7.5 minute USGS quadrangle maps. Thirty-nine of the forty-one quadrangles in the study area are currently in the RRC data base. The Bowie and Salina quadrangles are not currently in the RRC data base. Xerox reductions of the RRC maps are included in Appendix 4. Plate IV.1 is an index map for locating the maps in the appendix.

Oil and gas pipelines in the study area are quite numerous due to the high activity of oil and gas production. Pipelines locations are indicated on USGS topographical maps in Appendix 1.

4. MUNICIPAL LANDFILLS AND OTHER PERMITTED FACILITIES

An internal list of files kept at the district TWC office in Duncanville is available. It shows the permit numbers and cities where Texas Municipal solid waste facilities are located (see Table IV.2). State-wide numbered locations are shown on maps for Operating and/or Permitted Hazardous Waste Disposal Facilities (Plate IV.2), Interim Status and Permitted Hazardous Waste Storage/Treatment Facilities (Plate IV.2), and Hazardous Waste Incineration Facilities (Plate IV.3).

The TWC's Austin Bureau of Solid Waste Management will provide a computer diskette of (1) landfills permitted and/or those that requested a permit in Texas. Their status and a description is also categorized. (2) Specific permits issued to sludge sites, transfer stations, tire sites, medical waste sites, recycling facilities, and related transporters and processors. No data is readily available on sites where waste was buried before the permit process began.

Wise and Parker Counties are members in the North Central Texas Council of Government. An NCTCOG map entitled "Solid Waste Management Facilities in the NCTCOG Region" dated 08/01/92 shows three landfill in the study area as follows: (1) Gafton landfill marked as active but under closure (2) the proposed Balsora site and (3) a permitted potential landfill south of Decatur.

NORTEX Regional Planning Commission has no similar published map. NTRPC does have some individual reports, aerial photographs, and county road maps with locations from a 1968 survey.

TABLE IV.2
TEXAS MUNICIPAL SOLID WASTE FACILITIES

PERMIT NO.	COUNTY	APPLICANT	CITY	OWNER
00493	ARCHER	HOLLIDAY CITY OF	HOLLIDAY	HOLLIDAY CITY OF - P O BOX 506 HOLLIDAY 76366
00552	ARCHER	NEGARGEL CITY OF	NEGARGEL	NEGARGEL CITY OF - P O BOX 31 NEGARGEL 76370
00911	ARCHER	ARCHER CITY OF	ARCHER CITY	ARCHER CITY OF - P O BOX 367 ARCHER CITY 76351
01103	ARCHER	W T WAGGONER ESTATE	VERNON	W T WAGGONER ESTATE - P O BOX 2130 VERNON 76384
01128	ARCHER	WICHITA FALLS CITY OF	WICHITA FALLS	WICHITA FALLS CITY OF - 1300 7th ST WICHITA FALLS 76301
01458	ARCHER	NEGARGEL CITY OF	NEGARGEL	GAIL GARDNER - NEGARGEL 76370
40008	ARCHER	ARCHER CITY OF	ARCHER CITY	
00487	CLAY	HENRIETTA CITY OF	HENRIETTA	HENRIETTA CITY OF - BOX 409 HENRIETTA 76365
00595	CLAY	PETROLIA CITY OF	PETROLIA	BOB BROWN - GENERAL DELIVERY PETROLIA 76377
00857	CLAY	HENRIETTA CITY OF	HENRIETTA	HENRIETTA CITY OF - BOX 409 HENRIETTA 76365
01104	CLAY	BYERS CITY OF	BYERS	BYERS CITY OF - BOX 16 BYERS 76357
01129	CLAY	WICHITA FALLS/L ARROWHD E	WICHITA FALLS	WICHITA FALLS CITY OF - 1300 7th ST WICHITA FALLS 76301
01130	CLAY	WICHITA FALLS/L ARROWHD W	WICHITA FALLS	WICHITA FALLS CITY OF - 1300 7th ST WICHITA FALLS 76301
01702	CLAY	HENRIETTA CITY OF	HENRIETTA	HENRIETTA CITY OF - 115 N MAIN HENRIETTA 76365
00381	JACK	BRYSON CITY OF	BRYSON	BRYSON CITY OF - P O BOX 245 BRYSON 76027
00746	JACK	JACKSBORO CITY OF	JACKSBORO	JACKSBORO CITY OF - 111 E. ARCHER ST JACKSBORO 76056
0110	JACK	BRYSON CITY OF	BRYSON	BRYSON CITY OF - P O BOX 245 BRYSON 76027
02108	JACK	BRYSON CITY OF	BRYSON	BRYSON CITY OF - P O BOX 219 BRYSON 76027
00192	MONTAGUE	MOCONA CITY OF	MOCONA	MOCONA CITY OF - P O BOX 508 MOCONA 76255
00391	MONTAGUE	BOWIE CITY OF	BOWIE	BOWIE CITY OF - 115 E TARRANT BOWIE 76230
00765	MONTAGUE	SAINT JO CITY OF	SAINT JO	SAINT JO CITY OF - BOX 186 SAINT JO 76265
00919	MONTAGUE	ATEINSON JIM	MOCONA	
01007	MONTAGUE	SAINT JO CITY OF	SAINT JO	VINCENT FORESTER - ROUTE 1 FORESTBURG 76239
01265	MONTAGUE	MONTAGUE COUNTY PCT 2	BOWIE	MONTAGUE CO PCT 2 - CLAN STREET BOWIE 76230
01321	MONTAGUE	MONTAGUE COUNTY	MONTAGUE	
01341	MONTAGUE	MOCONA CITY OF	MOCONA	
01479	MONTAGUE	MONTAGUE COUNTY	FORESTBURG	J CAMPBELL, A BLAYLOCK-EAST BRIN STREET SUNSET 75160
01498	MONTAGUE	MONTAGUE COUNTY/SUNSET	MONTAGUE	MONTAGUE COUNTY/SUNSET/P #1 SUNSET 76270

NO.	PERMIT COUNTY	APPLICANT	CITY	OWNER
01564	MONTAGUE	BOWIE CITY OF	BOWIE	HAROLD HATLE - P O BOX 1303 BOWIE 76230
01639	MONTAGUE	SAINT JO CITY OF	SAINT JO	SAINT JO CITY OF - P O BOX 186 SAINT JO 76265
02129	MONTAGUE	JAKSE JEFF	MONTAGUE	JEFFREY A JAKSE - ROUTE 1 BOX 78A MONTAGUE 76251
00047	PARKER	WEATHERFORD CITY OF	WEATHERFORD	WEATHERFORD CITY OF-119PALOPINTO WEATHERFORD76086
00048	PARKER	WEATHERFORD CITY OF	WEATHERFORD	WEATHERFORD CITY OF - P O BOX 255 WEATHERFORD 76086
00754	PARKER	GRAY CONTAINER SER INC	AZLE	
00031	WISE	WISE COUNTY PCT 1 & 3	DECATUR	HERALD D GILLESPIE - ROUTE 2 DECATUR 76234
00032	WISE	WISE CO PCT 2 CRAFTON	DECATUR	MELVIN RIDDLE - ROUTE 1 CHICO 76030
00438	WISE	DECATUR CITY OF	DECATUR	C L GAGE - ROUTE 1 DECATUR 76234
00575	WISE	NEWARK CITY OF	NEWARK	
00768	WISE	ALVORD CITY OF	ALVORD	C L HARRISON - 6217 ELLSWORTH DALLAS 75214
00780	WISE	WISE COUNTY PCT 1 & 3	DECATUR	W T GERON - GENERAL DELIVERY BOYD 76023
00926	WISE	BRIDGEPORT CITY OF	BRIDGEPORT	JEFF LEE & L W LEE FM HIGHWAY 2123 BRIDGEPORT 76026
01026	WISE	WISE COUNTY PCTS 1 & 3	DECATUR	DARLENE ZASKODA - 5201 WADDELL FORT WORTH 76114
01484	WISE	WISE COUNTY BOYD	DECATUR	ALVIN BAKER - ROUTE 1 BOYD 76023
01559	WISE	WISE COUNTY BALSORA	DECATUR	V A WINDGATE - BALSORA ROAD BRIDGEPORT 76026
01715	WISE	WISE COUNTY PRECINCT 1 & 2	DECATUR	GOYLEN WILSON
01814	WISE	WISE COUNTY	DECATUR	W T GERON - BOYD
01850	WISE	WISE COUNTY SANITATION	DECATUR	J C SAMPLER - 601 W WALNUT DECATUR 76234
02096	WISE	SMITH ROBERT T	BRIDGEPORT	ROBERT T SMITH - P O BOX 42 ROUTE 2 BRIDGEPORT 76026
00231	YOUNG	GRAHAM CITY OF	GRAHAM	HUGH FORD ST AL - 1213 STEPHENS DRIVE HOBBS NW
00962	YOUNG	NEWCASTLE CITY OF	NEWCASTLE	H C NYERS - NEWCASTLE 76372
01010	YOUNG	OLNEY CITY OF	OLNEY	OLNEY CITY OF - 113 EAST MAIN ST OLNEY 76374
01087	YOUNG	GRAHAM CITY OF	GRAHAM	GRAHAM CITY OF - P O BOX 690 GRAHAM 76046
01242	YOUNG	GRAHAM CITY OF	GRAHAM	BEVERLY W KING, JR - NEWCASTLE HIGHWAY GRAHAM 76046
01536	YOUNG	OLNEY CITY OF	OLNEY	WADE FIKES - P O BOX 307 OLNEY 76374
01632	YOUNG	NEW CASTLE CITY OF	NEW CASTLE	ROBERT & CATHRINE BAILEY - NEWCASTLE 76372
02132	YOUNG	GRAHAM CITY OF	GRAHAM	KING VENTURES INC - FIRST NATIONAL BANK BLDG GRAHAM 76046
02165	YOUNG	GRAHAM CITY OF	GRAHAM	JANES E & WILLIE B PARKER - 1210 DIXIE GRAHAM 76046

5. SURFACE MINES

Plate IV.5 is a compilation of mining operations as identified on USGS 7.5 minute topographic quadrangle maps. Additional data on mining operations is available in the Texas Mine Inventory. The Inventory is the result of a program that was conducted jointly by the Bureau of Economic Geology and the Railroad Commission of Texas to research and codify the locations of present and historical sites (state-wide) greater than two (2) acres in size. These sites are of mined lands and non-energy mineral mining operations. The data is available in ASCII format on computer diskettes. Sites are located by latitude and longitude. Information from the inventory was not included on Plate IV.5.

Two additional references are also available to aid in further data acquisition:

- Historical Coal Mines in Texas -- an annotated bibliography by RRC of Texas, 46 pages. The rational and utility of this document is taken from it and reprinted below. It was mandated under the Texas Surface Coal Mining and Reclamation Act of 1979.

  "This document will serve as an initial survey of coal mines in the State of Texas. Each site has been or will be located and evaluated in terms of potential hazards and environmental degradation occurring as a result of past mining. In many instances, subsidence has provided current landowners with much desired stocktanks. Some areas have been re-vegetated naturally and provide habitat for wildlife or, when inundated, aquatic species. Others are unproductive and unsightly and require that measures be taken to abate damages sustained by landowners and the community at large. For example, roads may be undercut by headward migration of gullies. Cattle have been lost in pastures where shafts and tunnels continue to cave-in. It is the intent of the Railroad Commission to assess the relative value of all sites that can be located and determine which areas can and should be reclaimed, so that a satisfactory level of productivity of the land may be reestablished in accordance with the desires of the landowners."

- Mined Land Inventory, Industrial Minerals, East Texas Interagency Cooperation Contract number IAC (90-91)-0492 October 1990, Bureau of Economic Geology. This document includes as appendices the following:

1. Mined Land Inventory Form
2. Texas Mined Lands Data Base Manual
3. Texas Mined Lands Data Base (on floppy disk described above)
4. U.S. Geological Survey Topographic Maps and Index for East Texas
5. Priority Site Ownership

6. SEWAGE TREATMENT PLANTS/DISPOSAL FACILITIES AND TWC PERMITTED WASTEWATER DISCHARGES

Sewage Treatment plants and disposal facilities in the study area are shown on Plate IV.6. The basis of this figure is USGS 7.5 minute topographic quadrangle maps. Plate IV.6 also shows the location of TWC permitted wastewater discharges in Wise County. This information was taken from an NCTCOG map dated 02/06/92.

7. CEMETERIES

Cemeteries are environmentally and socially sensitive areas. Plate IV.7 is a compilation of cemetery location in the study area taken from USGS 7.5 minute quadrangle topographic maps.

8. NATIONAL GRASSLANDS

Approximately one half of the 20,324 acre LBJ National grasslands are located within the study area in Wise and Montague Counties. Plate IV.8 shows the location of these grasslands in the study area. Following is an excerpt from a USDA Forest Service southern region map entitle "The Caddo - Lyndon B. Johnson National Grasslands" dated 1983:

> "Before they were purchased by the federal government in the late 1930's, these Grasslands were mostly abandoned farms and ranches suffering severe soil erosion from poor agricultural practices. Since 1970, the National Grasslands in Texas, along with the National Forests, have been managed by the USDA, Forest Service.

The National Grasslands in Texas are sparsely forested, and do not yield much in the way of wood products. However, they do provide grazing lands for privately-owned livestock. The National Grasslands also provide recreation areas and lakes for public enjoyment, hunting and fishing for sportsmen, and habitat for wildlife. Primary management emphasis on the Caddo and LBJ Grasslands concerns restoration of the land and conservation of soil and watershed resource values. Grass is the most visible resource on the National Grasslands and is the source of much of the income derived from grazing permits. The Caddo and LBJ National grasslands provide forage for more than 1,584 head of cattle on 3,050 acres of improved pasture and 19,600 acres of native unimproved pasture."

9. NATIONAL WETLANDS

The United States Department of the Interior Fish and Wildlife Service has prepared a National Wetlands Inventory. SEE Corp. obtained draft copies of 7.5 minute series maps (date 10/27/87) of the National Wetlands Inventory which shows wetlands as delineated from stereoscopic analysis of high altitude aerial photographs. Areas are classified on the National Wetlands Inventory by system, subsystem, class, subclass, and water regime. Due to the inherent error in delineating areas from aerial photographs and their interpretation, a detailed on-the-ground survey would be necessary for better determining the actual extent of wetlands.

Plate IV.9 is a compilation of the National Wetlands Inventory maps showing those wetland areas approximately 10 acres or more in size and stream segments identified as "linear deepwater habitats".

A detailed study of the location and extent of wetlands will be needed prior to implementation of the proposed alternatives in this report due to strict federal regulation regarding wetlands.

The National Wetland Inventory maps may be obtained by calling the U.S. Geological Survey - E.S.I.C. at 1-800-872-6277.

For specific information on individual wetlands contact (1) the Fort Worth District Corps of Engineers, Permits Section, SWFOD-0, P.O. Box 17300, Fort Worth, Texas 76102-0300.

10. STATE OF TEXAS SIGNIFICANT STREAM SEGMENTS

Plate IV.10 is a reproduction of the Texas Parks and Wildlife Department's map of Significant Stream Segments along the Trinity River Watershed. The Department has identified two significant stream segments in the study area. These segments are (1) TRQ3 (TWC segment identification #0810) which is along the West Fork of the Trinity River and is the Lake Bridgeport trailrace to Eagle Mountain Lake. The justification for this segment being identified is its classification as "unique, pristine." (2) TRQ4, which is along Big Sandy Creek and is the Amon G. Carter Reservoir trailrace to the West Fork of the Trinity River. This segment is also considered "unique, pristine."

11. FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

The U.S. Fish and Wildlife Service in Arlington, Texas provides a list of endangered species known to occur in three (3) of the seven (7) counties in the study area as:

Species	Habitats In
Whooping Crane	Archer and Clay Counties
Bald Eagle	Clay and Montague Counties
Interior Least Tern	Clay and Montague Counties

According to the United States Department of the Interior Fish and Wildlife Service:

> "Other federally listed threatened and endangered species whose migratory corridor includes Texas or parts of Texas are the American peregrine falcon (Falco peregrinue anatum), aplomado falcon (Falco femoralis septentrionalis), and the arctic peregrine falcon (Falco peregrinus tundrius). No federally listed species are documented to inhabit Jack, Parker, Wise, and Young Counties; however, any of the above mentioned species may migrate through or occupy suitable habitat anywhere in north central Texas."

12. STATE OF TEXAS LISTED THREATENED, ENDANGERED, AND SENSITIVE SPECIES

The Texas Natural Heritage Program (TPWD) information is a broad overview of plantlife and wildlife from five (5) of the seven (7) counties requested. Their computer tracked retrieval listed the Texas Kangaroo Rat as a Federal "Candidate, Category 2" and has "State Threatened" status. The Comanche Peak Prairie-Clover is listed as a Federal "Candidate, Category 2".

Additionally, natural communities included Little Bluestem-Indiangrass Series, Texas Oak Series, and Ashe Juniper-Oak Series of grassland, woodland, and shrubland communities. Many of these occur in the managed LBJ National Grasslands areas.

Bird Rookeries are reported from 1990 at Sand Valley Ranch and at Ball Ranch from 1975 for the Great Blue Heron (see their attachment 1 to the letter dated 02/10/93 in Appendix 3). Further assessments should be made by qualified biologist on-site for confirmation and follow the TPWD suggested guidelines for preparation of environmental assessment documents.

13. HISTORICAL SITES

Congress passed Section 106 of the National Historical Preservation Act of 1966 (NHPA) to protect historic properties that were being harmed by federal activities. Section 106 review is the "Federal review process designed to ensure that historic properties are considered during federal project planning and execution". The review process is administered by the Advisory Council on Historic Preservation (ACHP). An ACHP document entitled "A Five Minute Look at Section 106 Review" states:

> "The National Register is this country's basic inventory of historic resources and is maintained by the Secretary of the Interior. The list includes buildings, structures, objects, sites, districts, and archeological resources. The listed properties are not just of nationwide importance; most are significant primarily at the State or local level. It is important to note that the protection of Section 106 extends to properties that possess significance but have not yet been listed or formally determined eligible for listing. Even properties that have not yet been discovered (such as

archeological properties), but that possess significance, are subject to Section 106 review."

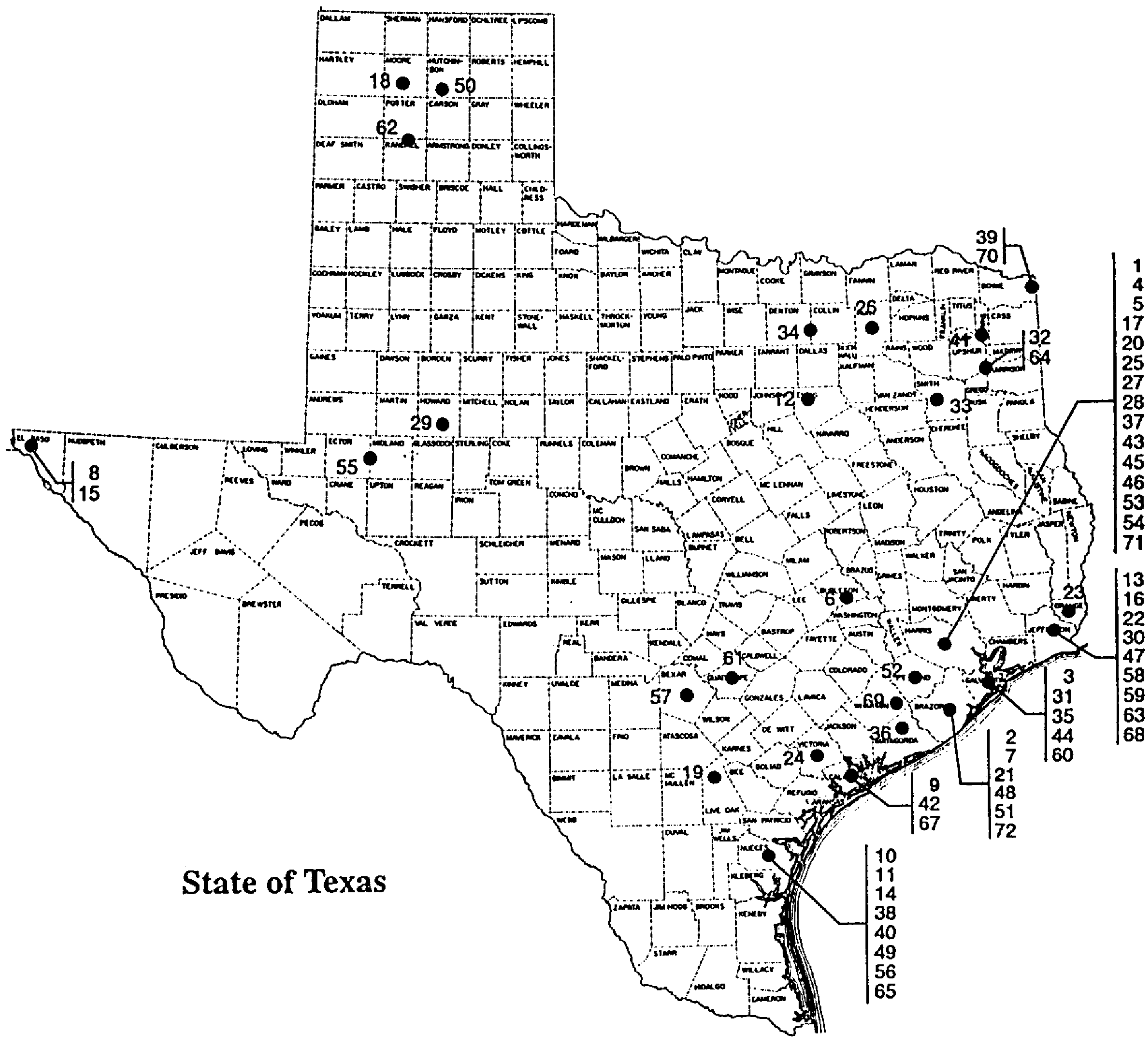
SEE Corp. contacted the Texas Historical Commission (THC) Department of Antiquities Protection regarding historical sites in the study area. The THC has asked that inquires be directed first to the appropriate federal or state agency. Either agency will then consult directly with the THC. SEE Corp. was not provided with data on Parker County. Of the remaining six counties in the study area, the THC indicated that there are no sites that are currently determined eligible to the National Register. Those sites that are listed as National Register (LNR) sites and/or State Archeological Landmarks (SAL) included:

• Archer County Courthouse	LNR/SAL
• Archer County Jail	LNR/SAL
• Clay County Courthouse and Jail	LNR/SAL
• Fort Richardson-41JA2 (Jack Co.)	LNR/SAL
• Knox, J.W., House (Jack Co.)	LNR
• Spanish Fort-41MU12 (Montague Co.)	LNR
• Wise County Courthouse (Wise Co.)	SAL

D. Limitations

As stated, environmental information is site specific. The data presented and referenced will need to be taken into account when selecting locations for the various proposed facilities. An Environmental Impact Statement should be prepared for the plan. In addition, an environmental site assessment should be performed on each site considered for proposed facilities in order to determine site specific constraints and any necessary remedial actions.

Operating and/or Permitted Hazardous Waste Disposal Facilities



State of Texas

PLATE IV.2

Operating and/or Permitted Hazardous Waste Disposal Facilities

	Facility	Location
1.	Air Products & Chemicals*	Pasadena
2.	Amoco Chemicals Co.	Alvin
3.	Amoco Oil Co.	Texas City
4.	ARCO Petrochemicals	Channelview
5.	Armco Steel*	Houston
6.	Atchison, Topeka & Santa Fe R.R.	Somerville
7.	BASF Inmont Corp.	Freeport
8.	Border Steel Mills*	El Paso
9.	BP Chemicals	Port Lavaca
10.	Celanese Engineering Resins	Bishop
11.	Champlin Petroleum Co.	Corpus Christi
12.	Chaparral Steel Co.	Midlothian
13.	Chemical Waste Management	Port Arthur
14.	Chemical Waste Management	Corpus Christi
15.	Chevron U.S.A.	El Paso
16.	Chevron U.S.A.	Port Arthur
17.	Crown Central Petroleum Corp.	Pasadena
18.	Diamond Shamrock	McKee
19.	Diamond Shamrock	Three Rivers
20.	Disposal Systems, Inc.	Deer Park
21.	Dow Chemical	Freeport
22.	DuPont de Nemours	Beaumont
23.	DuPont de Nemours	Orange
24.	DuPont de Nemours	Victoria
25.	EMPAK, Inc.	Deer Park
26.	E-Systems Inc.	Greenville
27.	Ethyl Corp.	Pasadena
28.	Exxon Co.	Baytown
29.	Fina Oil & Chemical Co.	Big Spring
30.	Fina Oil & Chemical Co.	Port Arthur
31.	GAF Corp.	Texas City
32.	Garland Creosoting*	Longview
33.	Gibraltar Chemical Resources	Tyler
34.	GNB Batteries Inc.	Frisco
35.	Gulf Coast Waste Disposal Authority	Texas City
36.	Hoechst Celanese Corp.	Bay City
37.	Hoechst Celanese Corp.	Pasadena
38.	Hoechst Celanese Corp.	Corpus Christi
39.	Kerr-McGee Chemical Corp.	Texarkana
40.	Koch Refining Co.	Corpus Christi
41.	Lone Star-Rotac, Inc.	Lone Star
42.	Lone Star Waste Disposal Service, Inc.	Calhoun County
43.	Lyondell Petrochemical	Houston
44.	Malone Service Co.	Texas City
45.	Merichem	Houston
46.	Mobay Corp.	Baytown
47.	Mobil Oil Corp.	Beaumont
48.	Monsanto Co.	Alvin
49.	OxyChem	Corpus Christi
50.	Phillips Petroleum Co.	Borger
51.	Phillips Petroleum Co.	Sweeny
52.	Quanex Corp.	Rosenberg
53.	Rollins Environmental Services	Deer Park
54.	Shell Oil Co.	Deer Park
55.	Shell Oil Co.	Odessa
56.	Southwestern Refining	Corpus Christi
57.	Standard Industries	San Antonio
58.	Star Enterprise	Port Arthur
59.	Star Enterprise	Port Neches
60.	Sterling Chemicals	Texas City
61.	Structural Metals	Seguin
62.	Texaco Refining & Marketing	Amarillo
63.	Texaco Refining & Marketing	Port Arthur
64.	Texas Eastman Co.	Longview
65.	Texas Ecologists	Robstown
66.	Tyler Pipe Industries	Tyler
67.	Union Carbide	Port Lavaca
68.	Union Oil of California	Nederland
69.	United Resource Recovery	Boling
70.	U.S. Army Red River Army Depot	Texarkana
71.	USX Corp.	Baytown
72.	Wastewater, Inc.	Brazoria
73.	WITCO	Marshall

*Permit for post-closure care only

Interim Status and Permitted Hazardous Waste Storage/Treatment Facilities

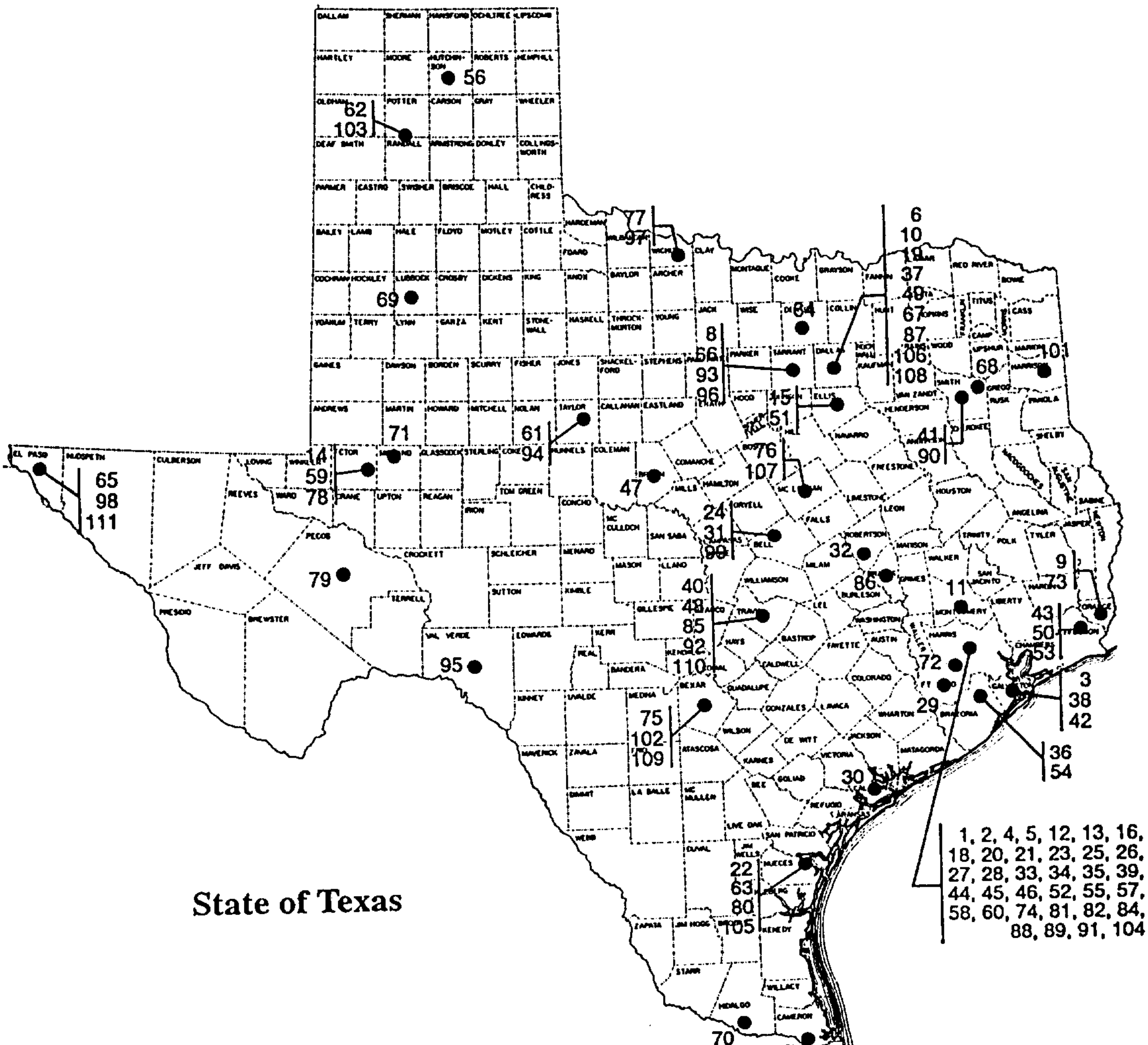
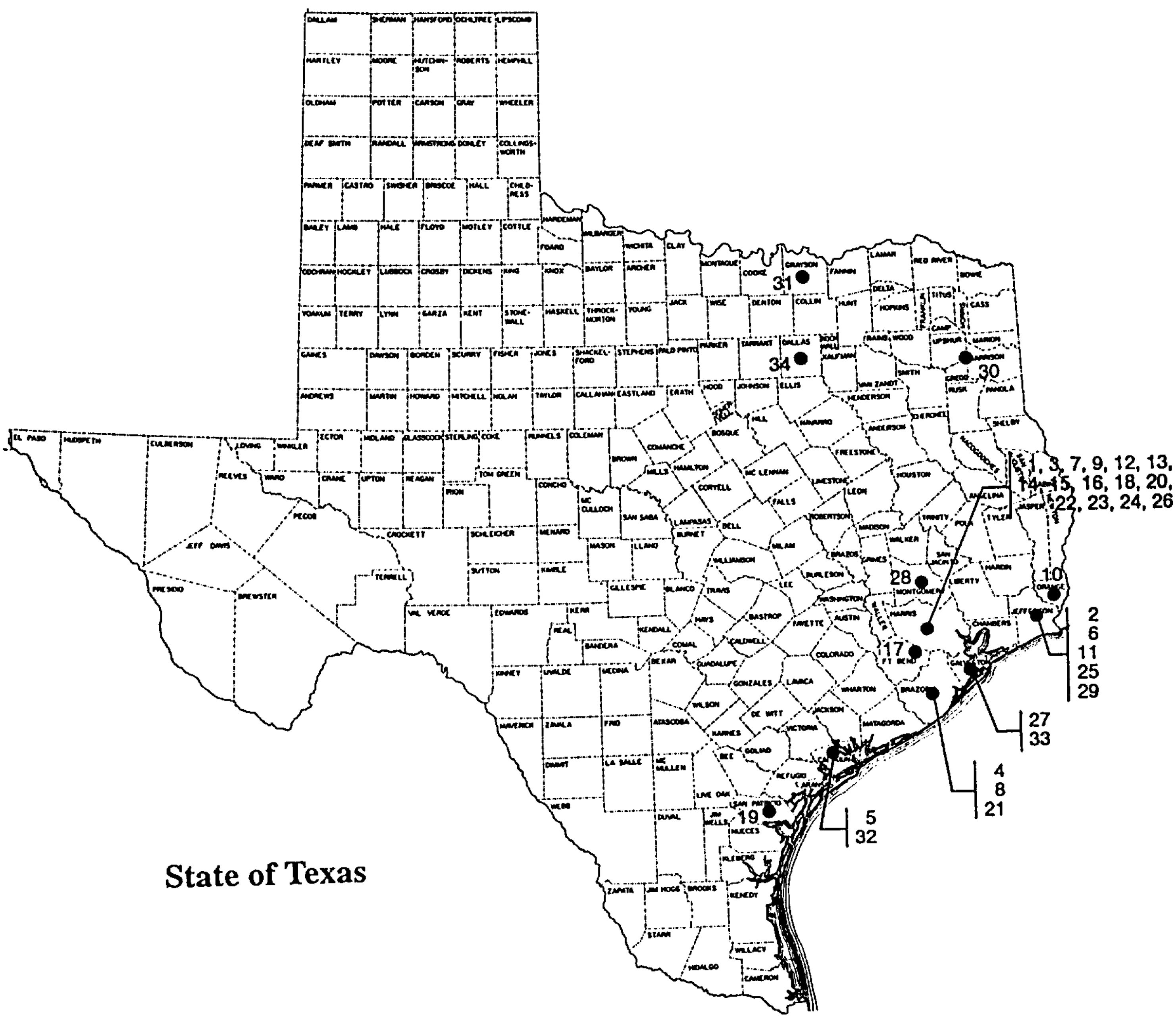


PLATE IV.3

Interim Status and Permitted Hazardous Waste Storage/Treatment Facilities

	Facility	Location
1.	Akzo Chemicals Inc.	Pasadena
2.	Alpha Omega Recycling, Inc.	Longview
3.	Amoco Oil Co.	Texas City
4.	Arco Chemical Co.	Pasadena
5.	Arco Chemical Co.	Channelview
6.	Ashland Chemical Co.	Garland
7.	Avvcorp, Ltd.	Brownsville
8.	Bell Helicopter Textron	Fort Worth
9.	Betz Laboratories Inc.	West Orange
10.	Betz Laboratories Inc.	Garland
11.	Betz Laboratories Inc.	The Woodlands
12.	Betz Laboratories Inc.	Houston
13.	Calgon Corp.	Pasadena
14.	CECOS	Odessa
15.	Chemical Reclamation Services	Avalon (Ellis)
16.	Chemical Waste Management	Baytown
17.	Detrex Chemical Industries Inc.	Arlington
18.	Disposal Systems Inc.	Deer Park
19.	Dixie Metals Co.	Dallas
20.	Eltex Chemical & Supply Co.	Houston
21.	EMPAK Inc.	Deer Park
22.	Encycle Texas Inc.	Corpus Christi
23.	Environ Tech, Inc.	Houston
24.	Eticam-Temple, Inc.	Temple
25.	Exxon Chemical Americas	Houston
26.	Exxon Research and Engineering	Baytown
27.	Fermenta Plant Protection	Houston
28.	Force, Inc.	Houston
29.	Force Road Oil and Vacuum Truck Co.	Arcola (Ft. Bend)
30.	Formosa Plastics	Point Comfort
31.	GATX	Temple
32.	General American Trans. Corp.	Hearne
33.	Georgia Gulf Corp.	Pasadena
34.	Global Fuel Inc.	Houston
35.	Goodyear Tire & Rubber Co.	La Porte
36.	Gulf Chemical & Metallurgical	Freeport
37.	Heat Energy Advanced Technology	Dallas
38.	IMRON Refining	San Leon
39.	Industrial Metal Finishing Co.	Houston
40.	International Business Machine Corp.	Austin
41.	La Gloria Oil and Gas Co.	Tyler
42.	Lowry-Unitank	Texas City
43.	Lubrizol Corp.	Port Arthur
44.	Lubrizol Corp.	Deer Park
45.	Lyondell Polymers	Pasadena
46.	Marathon Petroleum Co.	Texas City
47.	Minnesota Mining & Mfg. Co. (3M Co.)	Brownwood
48.	Motorola Inc.	Austin
49.	National Waste Co.	Dallas
50.	Neches River Treatment Corp.	Beaumont
51.	North Texas Cement Co. (Gifford-Hill)	Midlothian
52.	NSSI/Recovery Services	Houston
53.	Olin Corp.	Beaumont
54.	Oxy Petrochemicals	Alvin
55.	Paktank Inc.	Deer Park
56.	Phillips 66 Co. - Philtex	Borger
57.	PPG Industries Inc.	La Porte
58.	PPG Industries Inc.	Houston
59.	Rexene Products Co.	Odessa
60.	Rohm & Haas Bayport Inc.	La Porte
61.	Safety-Kleen Corp.	Abilene
62.	Safety-Kleen Corp.	Amarillo
63.	Safety-Kleen Corp.	Corpus Christi
64.	Safety-Kleen Corp.	Denton
65.	Safety-Kleen Corp.	El Paso
66.	Safety-Kleen Corp.	Haltom City
67.	Safety-Kleen Corp.	Irving
68.	Safety-Kleen Corp.	Longview
69.	Safety-Kleen Corp.	Lubbock
70.	Safety-Kleen Corp.	McAllen
71.	Safety-Kleen Corp.	Midland
72.	Safety-Kleen Corp.	Missouri City
73.	Safety-Kleen Corp.	Orange
74.	Safety-Kleen Corp.	Pasadena
75.	Safety-Kleen Corp.	San Antonio
76.	Safety-Kleen Corp.	Waco
77.	Safety-Kleen Corp.	Wichita Falls
78.	Sandhills Industries	Odessa
79.	Schlumberger Well Services	Fort Stockton
80.	SDC Services Inc.	Corpus Christi
81.	Shell Development Co.	Houston
82.	Shell Oil Co.	Houston
83.	Southern California Chemical Co.	Garland
84.	Technical Environmental Systems	La Porte
85.	Texaco Chemical Co.	Austin
86.	Texas A&M University	College Station
87.	Texas Instruments	Dallas
88.	Thornhill-Carver Co.	Houston
89.	Torque Petroleum Products	Houston
90.	Trane CAC Inc.	Tyler
91.	Treatment One	Houston
92.	U.S. Air Force Bergstrom AFB	Austin
93.	U.S. Air Force Carswell AFB	Fort Worth
94.	U.S. Air Force Dyess AFB	Abilene
95.	U.S. Air Force Laughlin AFB	(Val Verde)
96.	U.S. Air Force General Dynamics	Fort Worth
97.	U.S. Air Force Sheppard AFB	Wichita Falls
98.	U.S. Army Fort Bliss	El Paso
99.	U.S. Army Fort Hood	Killeen
100.	U.S. Army Lone Star AAP	Texarkana
101.	U.S. Army Longhorn AAP	Karnack
102.	U.S. Defense Logistics Agency DRMO	San Antonio
103.	U.S. Dept. of Energy Pantex	Amarillo
104.	U.S. NASA LBJ Space Center	Houston
105.	U.S. Navy Corpus Christi NAS	Corpus Christi
106.	U.S. Navy Dallas NAS	Dallas
107.	U.S. Navy Hercules	McGregor
108.	U.S. Navy Aerospace	Dallas
109.	USPCI	San Antonio
110.	U.T. Balcones Research Center	Austin
111.	Why Wastewater? Inc.	El Paso

Hazardous Waste Incineration Facilities



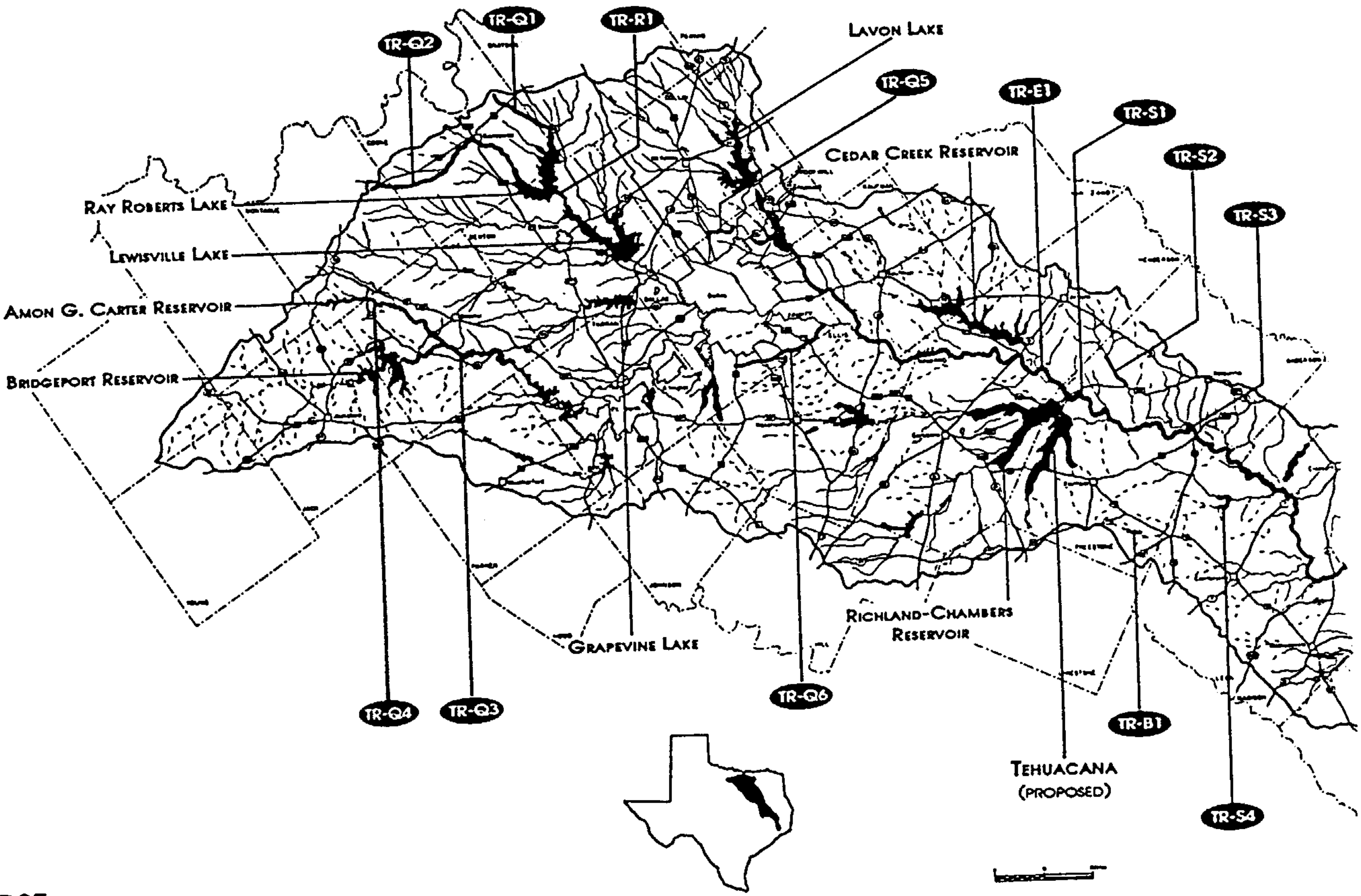
State of Texas

PLATE IV.4

Hazardous Waste Incineration Facilities

	Facility	Location
1.	American Envirotech*	Houston
2.	Atochem North America, Inc.	Beaumont
3.	Atochem North America, Inc.	Houston
4.	BASF Inmont Corp.	Freeport
5.	BP Chemicals	Port Lavaca
6.	Chemical Waste Management	Port Arthur
7.	Dow Chemical Co.	La Porte
8.	Dow Chemical Co.	Freeport
9.	DuPont de Nemours & Co.	La Porte
10.	DuPont de Nemours & Co.	Orange
11.	DuPont de Nemours & Co.	Beaumont
12.	FMC Corp.	Pasadena
13.	Hoechst Celanese Corp.	Pasadena
14.	Hoechst Celanese Corp.	Seabrook (Harris Co.)
15.	Houston Chemical Services	Pasadena
16.	Lyondell Petrochemical Corp.*	Channelview
17.	Nalco Chemical Co.	Sugar Land
18.	Occidental Chemical Corp.	Deer Park
19.	Occidental Chemical Corp.*	Gregory
20.	Parkans International	Houston
21.	Phillips 66 Co.*	Sweeny (Brazoria Co.)
22.	Quantum Chemicals	Deer Park
23.	Rhone-Poulenc Chemical Co.	Houston
24.	Rollins Environmental Services	Deer Park
25.	Sandoz Crop Protection	Beaumont
26.	Shell Oil Co.	Deer Park
27.	Sterling Chemicals, Inc.	Texas City
28.	Texaco Chemical Co.	Conroe
29.	Texaco Chemical Co.	Port Neches
30.	Texas Eastman Co.	Longview
31.	Texas Instruments*	Sherman
32.	Union Carbide Corp.*	Port Lavaca
33.	Union Carbide Corp.	Texas City
34.	U.T. Southwestern Medical Center	Dallas

*proposed facility



SOURCE:
TEXAS PARKS AND WILDLIFE DEPT.

STATE OF TEXAS SIGNIFICANT STREAM SEGMENTS-
UPPER TRINITY RIVER BASIN

PLATE IV.10

V. HYDROLOGY

V. HYDROLOGY

A. Purpose

The basic approach for quantifying the rainfall/runoff process is through hydrologic modeling. Modeling provides a means of accounting for the many variables in this process including rainfall, evaporation, infiltration, evapo-transpiration, depression storage, detention/retention due to lake or floodplain storage, stormwater runoff travel distance and time, and basin factors such as area, shape and slope. Many other factors contribute to the process but they tend to be minor in comparison to those noted and are generally accounted for by being lumped (grouped) together in one or more parameters within the model.

Hydrologic modeling provides a tool for testing alternative floodplain and channel modifications to estimate their potential impact on the basin. In this study it was also used to quantify storm flows at various points in the basin assuming 10, 50, and 100 year storm events. These flows, in turn were input into the reservoir simulation model to predict reservoir operations and resulting basinwide effects corresponding to each specific flood.

B. Model Development

The hydrologic modeling program, HEC-1, developed by USACE, was used in modeling the rainfall/runoff process for various storms in this study. HEC-1 is a versatile program which provides numerous methods for calculating rainfall losses, flood hydrograph translation and attenuation, and detention/retention. The basic elements of the model include parameters to define: rainfall distribution and amount, basin drainage area, rainfall losses, hydrograph peaking factor, channel routing, and reservoir routing.

Specific flood historical data is available on an hourly basis for only four points in the study area as shown on Plate V.1. These four points are: Lake Bridgeport spillway, Jacksboro gage, Big Sandy gage, and Boyd gage. The data recorded for the spillway location includes lake elevation and spillway release rate. The other three locations, which are stream gages, record only the stage. From the recorded data, flow is determined for the stream gages and reservoir storage and release rate is determined for the lake. The study area was divided into four subbasins (see Plate V.1) using each of the gage locations as the downstream point of the drainage area.

USGS 7½ minute quadrangle maps and 1:250,000 scale maps were obtained for the entire study area. Basin and subbasin drainage areas were delineated on the small scale map and digitized into Microstation PC so that areas and other factors could more readily be determined. Area delineations were also transferred to the quadrangle maps which contain a significant amount of information considered in the evaluation of study alternatives.

Recorded hourly rainfall data corresponding to each of the floods analyzed is available for a limited number of gages in the study area, as shown on Plate III.3. The rainfall pattern used for each subbasin should represent the combined effect of the actual rainfall throughout that subbasin as seen from the centroid of the area. Due to the sparseness of rainfall gages, it was necessary to interpolate historical data at the desired point in the basin. This was accomplished through the use of the program PRECIP, as developed by USACE.

C. Calibration

To be consistent with previous hydrologic studies of the area, Synder's Unit Hydrograph method and the initial and constant loss rate method were used to model the hydrologic response of the subbasins. Snyder's Unit Hydrograph is a lumped parameter method that defines the unit hydrograph (unit response of watershed to unit amount of runoff) based on two parameters - the lag time and the peaking coefficient. The lag time is related to the shape and timing of the basin and is directly related to time of concentration, length to the centroid of the basin, and the slope of the basin. The peaking coefficient represents the storage capacity and "other" runoff conditions of the basin. The initial and constant loss rate method attempts to account for the rainfall that reaches the ground but does not contribute to runoff directly (lost rainfall may appear as base flow later in time).

Initial estimates for lag time were taken from regional curves developed by Paul K. Rodman of the USACE. For the study area there are two types of curves representing sandy loam and clay soils. The sandy loam curves were derived from watersheds with predominately cross timbers sandy loam soils and the clay curves were derived from watersheds with predominately Blackland Prairie and Grand Prairie clay type soils. Use of these curves required the following parameters: length of watershed, length to centroid of area, slope of the watershed, and percent of watershed representing clay and sandy soils. In watersheds with both soil types, composite lag times were used. Initial estimates for the peaking coefficient were taken from the USACE supplied HEC-1 models for the study area.

Estimates for constant loss rates were taken from a method found in the Placer County Stormwater Management Manual that was developed by the

Soil Conservation Service. Constant loss rates are given which are a function of Hydrologic Soil Group (HSG), cover type, and quality of cover. The method is analogous to the curve number method. Using the SCS generalized soil maps for each county (Plate III.2) and the associated HSG for each soil type, a weighted average of the constant losses, based on HSG, was determined for each subbasin. Initial loss rate estimates were taken from the USACE supplied HEC-1 models where available or default values for the area were used.

Once initial parameters had been specified for the hydrologic model, the process of parameter optimization was begun. Basin peaking factors, loss rates and routing parameters were adjusted in order to correlate the interpolated rainfall distribution to the observed runoff. Calibrated parameters and calculated versus observed hydrograph plots are included in Appendix 5.

In several instances, the recorded rainfall volumes from hourly gages couldn't substantiate the observed runoff volumes. In most of these cases, however, recorded rainfall data from daily gages within the same basin confirmed the quantity of recorded runoff. Obviously, however, daily records lack the definition inherent in hourly data, resulting in poorer correlation between the shape of observed hydrographs and modeled hydrographs. This underscores the need for additional hourly rainfall gages, regularly distributed throughout the basin.

D. Synthetic Storms

Through model calibration, basin parameter averages were derived. The 10, 50, and 100 year synthetic storms were then modeled based on a 48 hour rainfall pattern. Rainfall amounts were determined from National Weather Service publications TP-40 (for 30 minutes through 24 hour durations of the 1 year through 100 year storms) and TP-49 (for 2 day through 10 day duration of the 2 year through 100 year storms).

E. Program (HEC-1) Capabilities and Limitations

Each subbasin of the watershed is modeled with a single set of parameters to simulate the runoff process. Although ideally, the modeling parameters for a given subbasin may be constant, numerous unspecified factors must be accounted for in the parameters given, resulting in the need for them to be somewhat variable. This phenomenon was apparent for the historical storms of this study, given the duration of significant runoff for each flood. For instance, the 1990 flood spanned 567 hours, the 1989 flood lasted over 1,300 hours and the 1981 flood lasted nearly 340 hours. During such periods, countless factors in the drainage basin may change considerably resulting in an apparent change of modeling parameters such as uniform loss rate, peaking factor and lag time.

HEC-1 has the capability of modeling a maximum of 300 hydrograph ordinate points. This is inadequate for an hourly model with the durations noted previously. However, most of floods studied consisted of multiple peaks as a result of discrete consecutive storms in the basin. Therefore, calibration could be accomplished by isolating significant portions of each storm. An alternative would be to use one of the commercially available versions of HEC-1 which has the capacity for additional data points. This parameter becomes increasingly important with the addition of basin reservoirs and the expansion of the model to include other parts of the Trinity River basin.

F. Model Capabilities and Limitations

Due to the simplification of the modeling process (ie. few parameters accounting for many factors) the application of any calibrated model will be somewhat limited to the range of flows for which it is calibrated. However, a basis is provided for comparing the effects of a given storm before and after a considered alternative.

VI. RESERVOIR OPERATIONS

VI. RESERVOIR OPERATIONS

A. Purpose

The purpose of the Reservoir Operation portion of this study was to develop an hourly reservoir simulation model which could be used to evaluate both current and historic reservoir operations and to analyze the effects of proposed improvements that might be added to the system. An hourly time period was selected by the study team so that the timing characteristics of the study area would be better represented. The tool chosen for the reservoir operation portion of this study was the computer software package HEC-5 originally developed by the USACE; however, the HEC-5 program actually used was a modified version by Bill Eichert P.E. of Eichert Engineering. This modified model was further enhanced during this study to reduce the study costs and to reflect more accuracy for needed program options. All references to HEC-5 in this report refer to the Eichert Engineering version of HEC-5.

The HEC-5 package consists of two separate programs, HEC-5A and HEC-5B. HEC-5A simulates the sequential operation of a specified reservoir system. The system can be of any of a number of configurations as long as certain dimension limits are satisfied. Reservoir operations can be optimized for conservation, flood control, and hydropower or any combination of the three. Reservoir release decisions are governed by standard operational "rules"; some of which can be changed to allow for user or system specific operations. In addition to the reservoir operation routines, the program's main function is to route and combine hydrographs using incremental local flows (flows between control points) as input. HEC-5B consists of economic evaluation routines and also serves as an output processor. HEC-5B is capable of assessing average annual flood damages or single event damages and can incorporate the associated costs of proposed projects in order to determine benefit cost ratios. Both HEC-5 programs utilize the same input file and therefore, later references to HEC-5 will not distinguish between the two.

Required input into HEC-5 includes local incremental flows (or total flows), reservoir outlet works information, reservoir operational criteria, and stream routing criteria. For calibration purposes, observed reservoir outflows and either reservoir elevations or storages are also required.

Historical verification (model calibration) was performed on two specific flood events; the April-June 1990 flood and the October 1981 flood event. The April-June 1990 flood event was selected because it provided large runoff volumes and had readily available hourly data. The 1981 flood was chosen because it was the largest historical storm of record (peak flow) in the study area.

B. Data Sources

Many different entities contributed to the data required to develop and calibrate the reservoir operation models used for this report. The following is a list of contributors and the data supplied.

1. United States Geological Survey (USGS) - provided hourly stream flow and stage information for three stream gages in the study area. The USGS has recently installed eight new stream gages in the area; however, they were not in place during the events selected.

2. Tarrant County Water Control & Improvement District No.1 (TCWCID No. 1) - provided hourly stream flow information; hourly and daily reservoir inflows, outflows, and elevations; reservoir operation procedures and guidelines; channel carrying capacities.

3. United States Army Corps of Engineers (USACE) - storm reproduction data which included hourly stream flow, reservoir outflow and elevation; flood frequency curves; daily HEC-5 models for 1981 storm; preliminary data for possible reservoir sites.

4. Flood Prevention and Control for the Trinity River Basin (Senate Bill 1543) - daily HEC-5 models for 1990, 1989, 1979, and 1973; hourly HEC-5 and HEC-1 models for 1989; HEC-DSS files for all above events.

C. Model Development

1.1 General

Development of a reservoir simulation model involves selection of model points, configuration of the system, and selection of appropriate routing criteria. Control points are specific points in a study area where either data is available or information is desired. Examples of control points are reservoirs, stream gaging stations, or other locations where damage or stream flow information is needed.

Configuration of a system is composed of several steps. The first step involves selection of appropriate control point locations for a given level of detail. Secondly, the control points are sequenced in such a way that the flows at all downstream points are known.

Thirdly, control point data is selected and input so that the system will operate as desired. Control point data, such as channel capacities, reservoir operation levels, maximum allowable outflows, etc., is used by the program in making reservoir release decisions.

HEC-5 incorporates five different hydrologic routing methods and thus, selection of an appropriate method is usually determined through calibration and/or availability of data.

1.2 Model Configuration

There are two major reservoirs - Lake Bridgeport and Amon Carter - which are located in the West Fork watershed above Eagle Mountain Lake. Lake Bridgeport, owned and operated by the TCWCID No. 1, was the only reservoir included in the reservoir operation study. Amon Carter, owned by the City of Bowie, was excluded because it contains no flood control storage and lacks available hourly data. Non-reservoir control points were located at USGS gaging stations, at locations of proposed reservoirs, and at locations where damage information was desired. Seven control points were determined to be adequate for this study. Control point locations are shown on Plate VI.1.

Routing criteria for the initial models was taken from the Corps of Engineers' HEC-5 models and from the TWC/TRA study models. Given the variability of routing between and within storm events, the above routing criteria was supplemented as required by calibration to match the observed flow events.

D. Calibration

1.1 General

Calibration is an integral part in the development of any numerical simulation model. Calibration, or historical verification, is a procedure by which the unknown model parameters are established based on historical conditions. In general this procedure follows the premise that, given the system input and system output, the inverse problem of determining the model parameters or characteristics can be established. Model calibration establishes a confidence that the results obtained for proposed conditions will be consistent with respect to historical conditions modeled.

For the reservoir simulation model HEC-5, calibration consists of basically two processes. The first process involves establishing routing methods and parameters which provide for proper hydrograph attenuation and timing. The main objective is to match both in magnitude and timing all observed stream flow peaks, reservoir inflow peaks, and peak reservoir elevations and/or storages. The second process attempts to verify the program's reservoir release routines by allowing the program to make release decisions. These releases are then compared with the observed reservoir releases.

1.2 Verification of Routing Routines

Verification of the routing criteria is dependent upon the selection of an appropriate routing method, the associated parameters and the calculation of acceptable incremental local flows, among other factors.

Based on previous studies in the study area, the Muskingum routing method was used for all stream reaches. Parameters for the Muskingum method were derived from extensive analysis of observed hydrographs for the selected storm events. Where analysis of observed hydrographs did not produce acceptable parameters, the parameters were derived from empirical methods. Some adjustment to the initial parameters was required, however, in order to reproduce peak flows and to develop acceptable incremental local flows.

1.3 Incremental Local Flow Derivation

Incremental local flows, defined as the flows between adjacent control points, are the flows used by HEC-5 for flood simulation and reservoir operation. Using observed flows, HEC-5 calculates incremental local flows by subtracting the total upstream routed flows from the total flows (observed or calculated) at the current downstream control point. The user has the option of allowing the negative flows or requiring the program to equate all negatives to zero, prorating all positive flows to offset the resulting volume difference. Negative incremental local flows may result when upstream routed flows exceed downstream observed flows. This is a reflection of the inability to calculate accurate observed flows, estimate routing criteria, and using steady state hydrologic routing methods where unsteady conditions exist.

HEC-5 uses the incremental local flows along with the assumed routing criteria to route and combine the local flows to produce the total flows at all control points. Erroneous routing criteria or incremental local flow computation can have a substantial impact on the accuracy of computed flows and resulting reservoir operation (when the program is allowed to make release decisions); thus a large portion of this study was devoted to the development of incremental local flows and appropriate routing parameters. For all of the models used in this study, incremental local flows were developed from observed or calculated total flows at all control points and were computed allowing only positive local flows.

1.3a Derivation of Unknown Flows

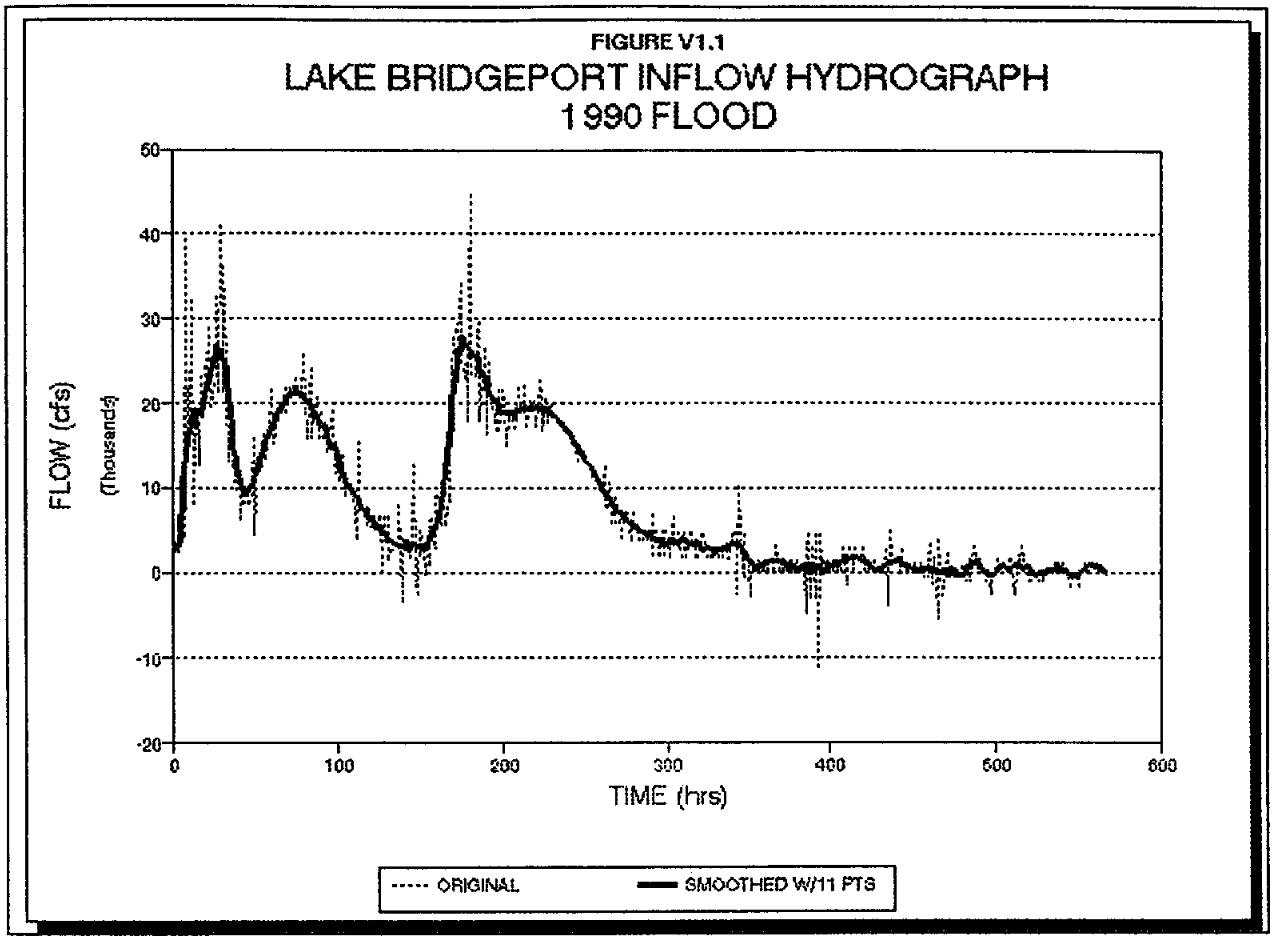
Flows for three control points (1, 3, & 7) were unknown and had to either be calculated or patterned after flows at another location. HEC-5 has an option to establish flows at one location based on the pattern of flows at the same or another location. A new option was added to the HEC-5 program for this study which allowed the use of two or three locations that could be used as pattern flows with the ability to add or subtract as desired. These "pattern" flows can also be multiplied by a factor or lagged in time forward or backward. This option was used at two control points, 1 and 7.

1.3b Calculation of Reservoir Inflows

Reservoir inflows were calculated using observed outflows and elevations/storages. For the hourly models, major fluctuations in inflows were observed. These fluctuations were a result of calculated inconsistent changes in reservoir elevations/storages between time periods which in turn corresponded to large variations in inflows. To resolve this problem, a new option was added to HEC-5 which smoothed the inflow hydrograph based on the linear average of a user specified number of ordinates. Figure VI.1 shows the inflow hydrograph for the 1990 storm using the observed hourly elevations and the smoothed inflow hydrograph using the added HEC-5 option.

1.4 Verification of HEC-5's Reservoir Release Routines

Satisfied with the calibration results, insofar as reproduction of historical peaks, the next step was to allow HEC-5 to make the reservoir release decisions. The same historical input, adjusted through the calibration process, was used in this step to insure that



the only differences would be due to the reservoir release decisions. Tables VIII.5 - VIII.6 (columns 4 & 5) show that HEC-5 release decisions compare favorably with the observed releases.

1.5 Calibration of the 1990 Storm

Hourly reservoir elevations and outflows for Lake Bridgeport were obtained from TCWCID No. 1. Hourly stream gage measurements were obtained from the USGS for the three stream gages in the study area: West Fork at Boyd, Big Sandy Creek near Bridgeport, and West Fork near Jacksboro. The gage heights as provided were direct readings and needed to be adjusted for shift variation. Stream flows were then obtained from a rating table which correlated adjusted gage height to flow for each specific location. All data to be used was then input into HEC-DSS. The simulation was limited to

567 time periods(approximately 23 days) due to hourly data limitations for Lake Bridgeport.

Using the observed hourly streamflows and the observed reservoir releases, the program was executed to obtain incremental local flows. However, a number of HEC-5 runs were required to develop acceptable incremental local flows. Each run required a detailed evaluation of HEC-5 computed output, with checks made to insure proper timing and attenuation, volume conservation, and historical peak reproduction. Routing criteria had to be adjusted for several locations to preserve the timing of the observed hydrographs and associated peaks.

A review of local flows at location 8(Boyd Gage) revealed periods of sustained negative flows of appreciable magnitude. This problem was encountered for all storms considered and is believed to be caused by routing and/or gage inconsistencies. Analysis of the routed upstream hydrographs as compared with the observed hydrograph at location 8 revealed a discrepancy of approximately 20% for all storms. Therefore, the observed flows at location 8 were multiplied by 1.2 to compensate for the inconsistencies.

The calibration results for the 1990 storm are shown in table VIII.5 and were computed using the incremental local flows developed and observed reservoir releases, except as noted.

1.4 Calibration of the 1981 Storm

Observed hourly streamflow, reservoir outflow, and reservoir elevations were obtained from the USACE. In order to increase the length of simulation, the data obtained from the USACE was supplemented with hourly streamflow from the USGS and daily reservoir data from TCWCID No. 1. The daily reservoir data had to be transformed to hourly data using a special program called *INCARD*, developed by the HEC and modified for this purpose by Eichert Engineering.

Calibration of the 1981 storm proceeded in a manner similar to that of the 1990 storm. HEC-5 was executed using observed flows and observed reservoir outflows to develop incremental local flows at all control points. Development of incremental local flows at location 8 was accomplished without the inclusion of location 7 in the model.

This was done to model the effect of variable routing times between location 4 and location 6 with location 8.

The calibration results are shown in table VIII.6.

E. Synthetic Storms

Synthetic storm events for the 10, 50, and 100-year floods were modeled using HEC-5. A composite HEC-5 model, based on the final calibrated HEC-5 models, was used to analyze the reservoir operations and to develop streamflow hydrographs for the synthetic storms. Incremental local flows for all control points were developed in a calibrated HEC-1 model and input into DSS. The synthetic flood event peaks were calculated assuming all the reservoirs were at top of conservation pool at the beginning of the event. The results of this process are shown in table VIII.7. The computed synthetic flood peaks were then compared with USACE supplied flood frequency curves for each gage. If the computed peaks did not relatively match the peaks associated with the frequency curves, adjustments were made to the HEC-1 model and the process repeated until acceptable results were achieved.

F. Program (HEC-5) Capabilities and Limitations

HEC-5 is an extremely versatile program. The Eichert version of HEC-5 as developed and offered by Mr. Bill Eichert, has been enhanced considerably beyond the version available from the USACE or the National Technical Information Service (NTIS). Additionally, the services of Mr. Eichert were utilized to further adapt the program to the specific needs of this study.

Where calibration is performed, HEC-5 must be executed in multiple passes since the database for a completed model must be developed in stages. The process is often cumbersome when observed streamflow data or reliable routing criteria are not available at all locations. Thus the calibration process always requires careful attention to intermediate data generated as well as to the final results.

HEC-5 presently has many useful capabilities. The progression of development within the basin will generate an increase in the potential for application of the model to provide for sound planning and design of flood management structures and policies. Continued development and expansion of HEC-5 is, therefore, highly desirable.

G. Study HEC-5 Data Model Capabilities and Limitations

The HEC-5 data model developed for this study is a powerful tool for basin-wide planning with regard to stormwater management. Also due to the capabilities of the program, the model is also a substantial foundation for other applications, including specific yield management and flood damages management.

The precision of a model is highly dependent on the data used for calibration. As additional data is obtained for future storms in the basin, this model should be further enhanced with that information. This will ensure it's accuracy at various levels of flooding in the basin.

The model presented herein, was developed for the specific purposes of the study. Changes to the model may be required in order to test additional alternatives, depending on the location and configuration of the considered alternatives. However, the model is very adaptable and will provide a good foundation for this purpose.

VII. ALTERNATIVES CONSIDERED

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Working closely with the Technical Advisory Committee, the study team developed alternatives to be considered. Alternatives considered were both structural and non-structural, including modification of existing structures and/or the operations thereof. Alternatives were evaluated for compliance with the criteria established at the onset of this study and technical feasibility.

Table VII.1 lists data pertinent to Lake Bridgeport and will be referenced when discussing the advantage/disadvantage of any alternatives considered for Lake Bridgeport.

Note: Lake Bridgeport area-capacity data obtained from TCWCID No. 1.
Note: Frequency-storage relations obtained from USACE.

A. Non-Structural

1.1 Lowering Conservation Level of Lake Bridgeport

Lowering the conservation level of a lake will afford increased flood control storage but at the expense of a reduction in the yield provided by the lake. Lake Bridgeport could gain much needed flood control volume by lowering the conservation level, provided an agreement could be worked out with the current water rights holder for transferring some of the water rights volume to other structures. Table VII.1 shows that even if Lake Bridgeport conservation pool was lowered to elevation 826 ft, a gain of only 117,000 acre-feet (AF) of flood control storage would be realized. With this modification Lake Bridgeport would still be incapable of adequately handling even the 10 year flood. Therefore, this alternative would not be feasible by itself but would need to be incorporated with other upstream alternatives.

1.2 Use of Total Flood Control Easement of Lake Bridgeport

Lake Bridgeport has a flood control easement to elevation 851. However, it is currently operated to limit flood control storage to an elevation of 839.5 except under extreme flooding situations. Utilization of the total easement between current conservation pool level of 836 and 851 would provide approximately 223,000 AF of additional storage. This would still not provide any desired flood frequency protection but would afford the lake operators greater flexibility in flood control operations.

TABLE VII.1
LAKE BRIDGEPORT PERTINENT DATA

ELEV.	CONDITION
826	Original Conservation Pool
832	4 ft. below present Conservation Pool
834	2 ft. below present Conservation Pool
836	Present Conservation Pool
840	Highway 380 Elevation
841	Top of Gates
844	Technical Advisory Committee Set Maximum Elevation
851	Limits of Easement

ADDITIONAL STORAGE (A.F.)

LAKE ELEV.	826	832	834	836	840	841	844	851
826	0	67,000	91,000	117,000	170,000	185,000	228,000	339,000
832	---	0	24,000	50,000	104,000	118,000	161,000	272,000
834	---	---	0	25,000	79,000	93,000	137,000	248,000
836	---	---	---	0	54,000	68,000	112,000	223,000
840	---	---	---	---	0	14,000	58,000	169,000
841	---	---	---	---	---	0	44,000	155,000
844	---	---	---	---	---	---	0	111,000
851	---	---	---	---	---	---	---	0

Release rate of 5,000 c.f.s. - 9,917 A.F./day

Release rate of 3,000 c.f.s. - 5,950 A.F./day

Storm Frequency	Total Run Off (in.)	Volume Produced (A.F.)
10 yr	6.6"	387,200
25 yr	7.8"	457,600
50 yr	8.9"	522,100
100 yr	10.15"	595,500

Consideration of any adjustments to Lake Bridgeport operations, especially an increase in maximum flood control elevation, must include consideration of the development that exists around the lake. Significant commercial and residential development exists between elevations 836 and 851. Current local controls (City of Runaway Bay ordinance) restrict development below elevation 844.5 msl, although numerous structures were constructed below elevation 844.5 before the ordinance went into effect. Paramount to the consideration given to development, dam safety and the ability to safely pass the PMF are most important when considering raising the top of the flood control pool.

Given the lack of any desired frequency protection and the significant development that exists, the use of the total flood control easement was not considered feasible. Raising the maximum desired flood control elevation to an elevation below 844 was considered to be feasible, but only if it can be incorporated with other structural alternatives or a corresponding lowering of the conservation pool as discussed above. Note that dam safety and the ability to pass the PMF were not analyzed as part of this study.

1.3 Pre-release from Lake Bridgeport

Pre-release is defined as the release of stored water from a reservoir within a specified forecast period given the ability to forecast that the reservoir would otherwise exceed the allowable maximum elevation. Pre-release is based on the premise that adequate forecast time exists upstream of a reservoir to allow for a significant amount of water to be released from the reservoir.

In addition to forecast time constraints many other considerations, including timing and the possibility of erroneous forecasts, are associated with pre-release. Timing of pre-release in relation to downstream hydrograph peaks could actually increase downstream flooding and erroneous forecasts could result in compromising the conservation storage.

Currently, the ability to forecast inflows into Lake Bridgeport is the chief obstacle. Even with this ability, the forecast time is approximately two days. This time period is insufficient for releasing enough water to provide a substantial benefit without causing flooding downstream. Table VII.1 shows that if a pre-release was made at the downstream channel capacity of 5,000 cfs, only 9,920 AF per day could be evacuated. The two day pre-released volume of 19,840 AF might have merit with smaller storms, but not for larger storms. Also, if any structures were located upstream of Lake Bridgeport, the forecast time would be reduced, making pre-release an even less effective option. Based on inadequate forecast time and inability to make adequate releases, the pre-release option was not considered a feasible alternative.

1.4 Restriction of Development in Flood Control Easement

As discussed previously, significant development exists in the flood control easement around Lake Bridgeport. It is recommended therefore, that an ordinance be established for the entirety of the Lake Bridgeport perimeter area that is similar to the Runaway Bay ordinance restricting development below elevation 844.5 msl. If current trends continue, damages from large flood events would be increased greatly. Development restrictions would obviously not increase flood control storage, but would reduce damages incurred when flood waters are stored such as to not exceed elevation 844.

1.5 Dredging of Captured Sediment (Eagle Mountain Lake & Lake Bridgeport)

Reservoirs act as a huge settling basin for the streams that flow into them. Over time, accumulation of significant sediment volumes can threaten the ability of the reservoir to serve the purpose(s) for which it was originally designed. At some point in time, the lost storage must be reclaimed. Dredging of the captured sediment, although expensive, is sometimes the only option.

For reservoirs containing both conservation and flood control storage, dredging will only reclaim lost conservation storage and will not result in an increase in available flood control storage. Since this study seeks to alleviate flooding, dredging was not considered.

B. Structural

1.1 Channel Enlargement

Channel enlargement would allow increased flows to be carried within the channel and would alleviate lower flow flooding in areas containing the enlargement. Areas upstream and/or downstream would not benefit from the enlargement and could very likely realize an increase in damages. Channel enlargement also disturbs the pristine features associated with an undisturbed natural channel.

The attributes of channel enlargement violate the study criteria and, therefore, channel enlargement was not included in the selected alternative.

1.2 Channel Clearing

Channel clearing is needed along much of the watercourses in the study area. Log jams and other debris block flow, resulting in backwater and erosion problems. Since channel clearing will not increase the capacity of the natural unblocked channel, it is not effective as a flood control option. However, channel clearing should be a normal maintenance procedure to prevent the creek from loosing what capacity it has.

1.3 Raising and Enlargement of Roadway Structures

Roadway structures such as bridges and culverts that constrict flow and cause backwater would need to be enlarged and/or raised so as to effectively convey larger flows. Major structures are located along the main channels of the West Fork and Big Sandy Creek, and smaller structures are located throughout the basin on tributary streams.

The Highway 380 bridge over Lake Bridgeport could be raised above the present elevation of 839.5, preferably above elevation 844. This would give the reservoir operator more flexibility in making releases with less risk of interrupting vehicular traffic across the lake.

1.4 Amon Carter Lake

Amon Carter Lake outlet works consist of a riser pipe service spillway at elevation 820 and an uncontrolled emergency spillway at elevation 827. Being uncontrolled, operational changes were not considered. Structural changes were ruled out because Amon Carter Lake lacks adequate flood storage capacity between elevations 820 and 827 to provide any substantial benefit.

1.5 SCS Lakes

Presently there are 71 SCS Lakes in the study area. They have an average drainage area of 2.6 mi^2 and are located in three major sub-watersheds; Big Sandy Creek, Salt Creek, and the West Fork Above Bridgeport. Specific locations are shown on plate VII.1. In general, a SCS lake has a sediment pool, conservation pool, and a flood control pool. The flood control pool is typically small in relation to the upstream drainage area and is able to control a rainfall of approximately 4 inch depth over the drainage area. SCS lakes are uncontrolled structures with outlet works consisting of a riser pipe at the top of conservation pool and an uncontrolled emergency spillway at the top of the flood control pool. Given the limited flood control pool, relatively small drainage area coverage, and lack of spillway control the SCS structures were not considered consistent with the study criteria.

1.6 "Boyd", "Big Sandy Creek", and "Bear Knob" Detention Structures

According to the study criteria, any "multi-purpose" structure would be required to have at a minimum (1) a permanent conservation pool, (2) 100 year sediment storage, and (3) 100 year flood storage. While the Boyd, Big Sandy, and Bear Knob structures would be multi-purpose, at this time they are not being designed by the USACE to contain a permanent conservation pool and would only have a 50 year sediment and flood control pool. Thus these structures as designed by the USACE would not satisfy the study criteria's definition of a multi-purpose structure. Remembering that the impetus of the study was to develop a flood protection plan for the Upper West Fork Watershed above Eagle Mountain Lake and areas below, the following is a list of additional reasons why the Boyd and Big Sandy structures were not analyzed as part of the study:

1. The Boyd structure would not provide flood control or protection for the Upper West Fork Watershed. In fact it would flood a major portion of Wise County.
2. The Big Sandy structure would only afford limited flood protection for the Upper West Fork Watershed and would provide no flood protection for Big Sandy Creek itself of which there is much local concern.
3. The Big Sandy structure would negate the effects of many SCS structures by flooding the land they were meant to benefit. Both Wise County and TCWCID have invested a lot of time and money into these structures.
4. The Boyd and Big Sandy structures would not provide any flood protection to Lake Bridgeport, thus would not improve dam safety.
5. The Boyd and Big Sandy structures would not provide flood protection for the areas around the perimeter of Lake Bridgeport.

6. The Boyd and Big Sandy structures would not provide for sediment control or water quality improvement into Lake Bridgeport, and only limited sediment control and water quality improvements for Eagle Mountain Lake.

1.7 Major Multi-Purpose Lake(s) located on the West Fork of the Trinity River Above Lake Bridgeport

Major multi-purpose lake(s) located on the West Fork of the Trinity River above Lake Bridgeport were considered feasible alternatives. Such structures would be multi-functional, providing for water supply, recreation, sediment storage, etc., but would also provide ample flood control storage. Water supply storage if utilized, would require an agreement with the current water rights holder(s). Local use of water could also be possible. Ample flood control storage would be present to provide for 100-year flood storage requirements and passage of the probable maximum flood (PMF). These structures would be controlled when below the top of the 100-year flood pool, only releasing to fill downstream channel capacities. Above the 100-year flood control pool, releases would be uncontrolled.

1.8 Minor Multi-Purpose Lakes

Minor multi-purpose lakes, located in the upper reaches of tributary watersheds, were considered as feasible alternatives. These lakes would be downsized versions of the Major multi-purpose lakes, controlling a much smaller drainage area (approximately 10 sq. miles each). These minor multi-purpose lakes will provide sedimentation storage, water supply storage, 100-year flood storage, and provisions to pass the PMF.

VIII. PROPOSED ALTERNATIVE

VIII. PROPOSED ALTERNATIVE

After considerable analysis and evaluation of the numerous alternatives, the study team together with the Technical Advisory Committee have recommended an alternative. The proposed alternative consists of one or more Major-multi purpose lakes, a series of minor multi-purpose lakes, and operational changes to Lake Bridgeport. A hypothetical location map of the proposed reservoirs is shown on plate VIII.1.

The plan, when implemented, will control approximately 73% of the watershed above Eagle Mountain Lake for the 100-year flood volume and will substantially reduce peak flows on the tributary streams and on the West Fork. In addition, plan implementation will substantially reduce the volume of water controlled during peak runoff periods by existing structures. The reduction and attenuation of both flows and volumes would result in decreased damages for the study area and areas downstream. Reduction of sediment load into existing structures would also be achieved. The proposed alternative represents a flexible plan, designed to benefit not only the study area, but areas downstream also. The flexibility of the plan, as will be explained below, is dependent on the inter-relation of the major and minor multi-purpose lakes.

The emphasis of this plan on the inter-relationship between the minor and major multi-purpose structures is based on providing benefits which are both local and regional in impact. The minor multi-purpose lakes address the need for local flood protection, water supply, and other benefits while additionally providing for regional and system-wide benefits. Major multi-purpose structures, while generally less expensive per unit of flood control volume than minor structures, do not benefit areas upstream in regard to flood control. Without local benefits this plan would not accomplish the tasks for which it was conceived and would not receive local support. Without regional (downstream) benefits, the plan would have little chance of success as these benefits are of the greatest magnitude.

A. Description of Improvements

1.1 Minor Multi-Purpose Lakes

1.1a General

The objective of the minor multi-purpose lakes is to provide regional flood protection by controlling the runoff locally where it originates and thus provide benefits to a much larger area. In order to accomplish the objective, the minor multi-purpose lakes are proposed to control 100% of the 100-year flood for 30% of the drainage area. The controlled area would be located in the upper reaches of tributary watersheds throughout the study area. Based on the 30% area criteria, approximately 50 to 74 minor multi-purpose lakes would be required. The number of structures is based on an average drainage area controlled of 10 mi^2. While no attempt was made as part of this study to analyze site locations, the locations shown on Plate VIII.1, while hypothetical, are generally representative of the geographical placement of the minor multi-purpose lakes. Locations of actual sites is a design issue and would be the responsibility of the organization charged with implementing this proposed plan. It is likely that the number of preferable sites would exceed the number of minor lakes required, thereby, affording flexibility in their actual locations.

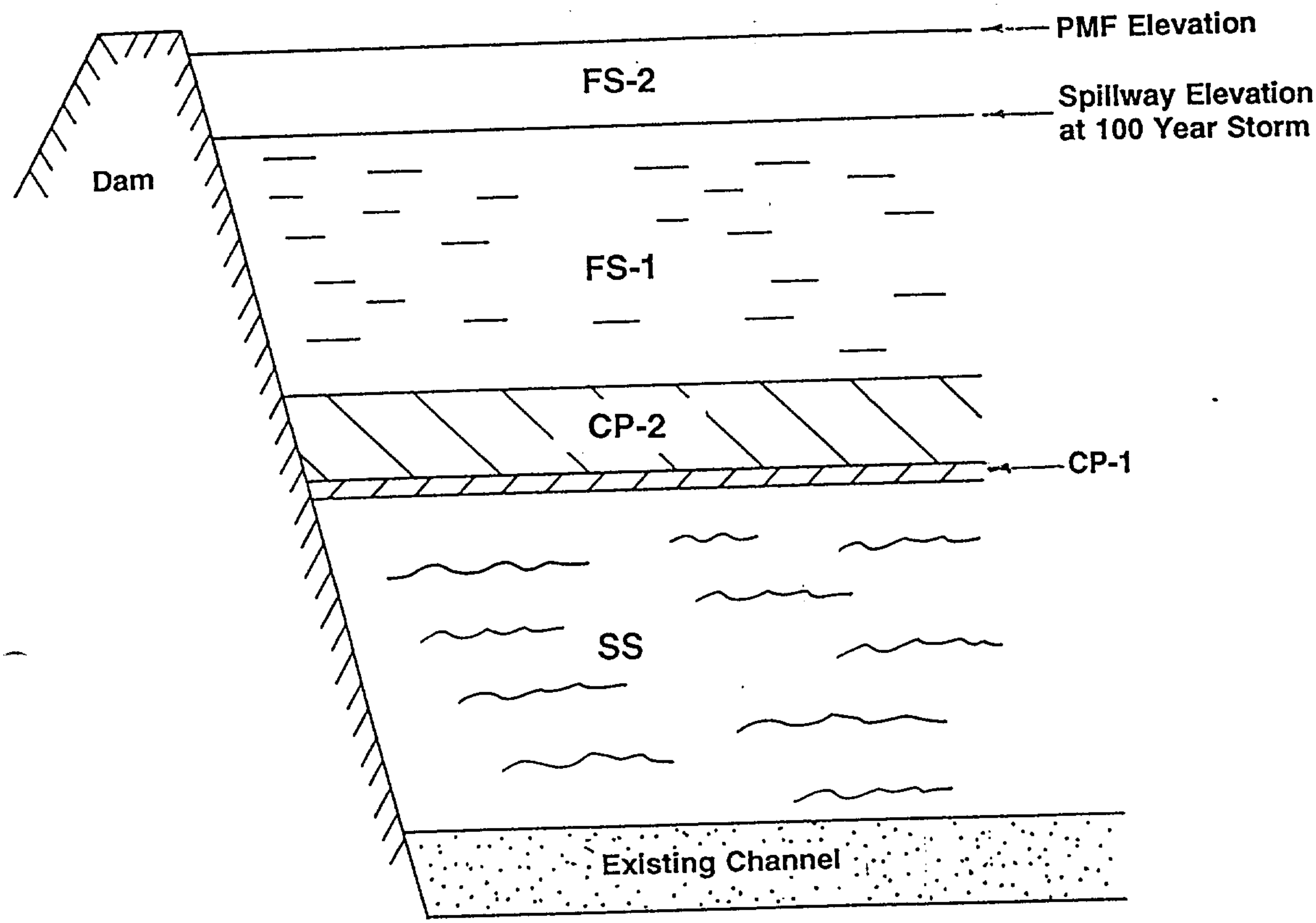
1.1b Configuration

The minor lakes would provide for 100-year sediment storage, a permanent conservation pool, and 100-year flood control storage. Figure VIII.1 is a schematic of a typical proposed minor multi-purpose lake along with the approximate storages for each pool. Table VIII.1 gives the definition of the designations used in the schematic and table VIII.2 lists the physical properties for a typical minor multi-purpose lake under <u>assumed</u> conditions. The SS pool is the sedimentation pool for capturing the 100-year sediment load. The conservation pool would be composed of two levels, CP-1 and CP-2. The 1st level, CP-1, would be established for transfer of water by an existing water rights holder. CP-2 would serve as a protection pool for CP-1, protecting against evaporation, seepage, and stream transfer losses. Protection of CP-1 is required because the water must be available to the water rights holder if necessary. Local use of the CP-1 water would be possible providing an agreement could be negotiated with the water rights holder(s). Note that the actual combined CP-1 and CP-2 volumes would need to be determined from a yield analysis.

The flood control pool would also be composed of two levels, FS-1 and FS-2. FS-1 is the primary flood control pool, providing for complete storage of the 100-year storage volume. FS-2 would allow for surcharge storage used in passing the PMF. FS-1 might also be used as a seasonal storage for excess flood waters that could be utilized for

FIGURE VIII.1

TYPICAL MINOR MULTI-PURPOSE LAKE
(For 10 Square Miles of Drainage Area)



SS	-	Sediment Storage (100 yr)	-	890 A.F.
CP-1	-	Conservation Water Supply Pool	-	200 A.F. (assumed)
CP-2	-	Protection Pool for CP-1	-	1,000 A.F. (assumed)
FS-1	-	100 Year Flood Storage	-	6,350 A.F.
FS-2	-	PMF Flood Storage	-	3,000 A.F. (assumed)
				11,440 A.F.

Approximate Lake Volume to Contain 100 Year Storm	-	8,440 A.F.
Surface Area at Spillway (100 Year Storm) Elevation, 20 Foot Average Depth	-	422 Acres

TABLE VIII.1

TERMS USED FOR MULTI-PURPOSE CONTROL LAKES

SS (Sedimentation Storage)

- Volume needed in lake for storage of 100 years of sediments, based on 0.89 acre feet of storage per square mile per year.

CP-1 (Conservation Pool No. 1)

- Volume is a transfer by an existing water rights holder to the Minor Multi-Purpose Lakes.
- Volume might be used as a pre-release volume for Lake Bridgeport and Eagle Mountain Lake.
- Volume might be used locally as a water supply by an agreement with the water rights holder.

CP-2 (Conservation Pool No. 2)

- Volume needed to offset lake evaporation and stream losses in transfer of CP-1 to Lake Bridgeport or Eagle Mountain Lake and for other possible uses.
- Volume might be used to maintain Eagle Mountain Lake and Lake Bridgeport at a more constant level.
- Volume might be used for recreational and environmental purposes.

FS-1 (Flood Storage No. 1)

- Volume needed to contain the 100 year storm event with releases at a slow rate during non-flooding periods downstream.
- Volume might be used for agricultural and commercial purposes.
- Volume might be used to maintain Eagle Mountain Lake and Lake Bridgeport at a more constant level.
- Volume might be used for recreational and environmental purposes.

FS-2 (Flood Storage No. 2)

- Volume is needed to store excess water from the PMF (probable maximum flood) that cannot be passed through the spillway without overtopping the dam.

TABLE VIII.2

PROPERTIES OF TYPICAL MINOR MULTI-PURPOSE LAKE

Example of Minor Multi-Purpose Lakes 10 Sq.Mi. Drainage Area*

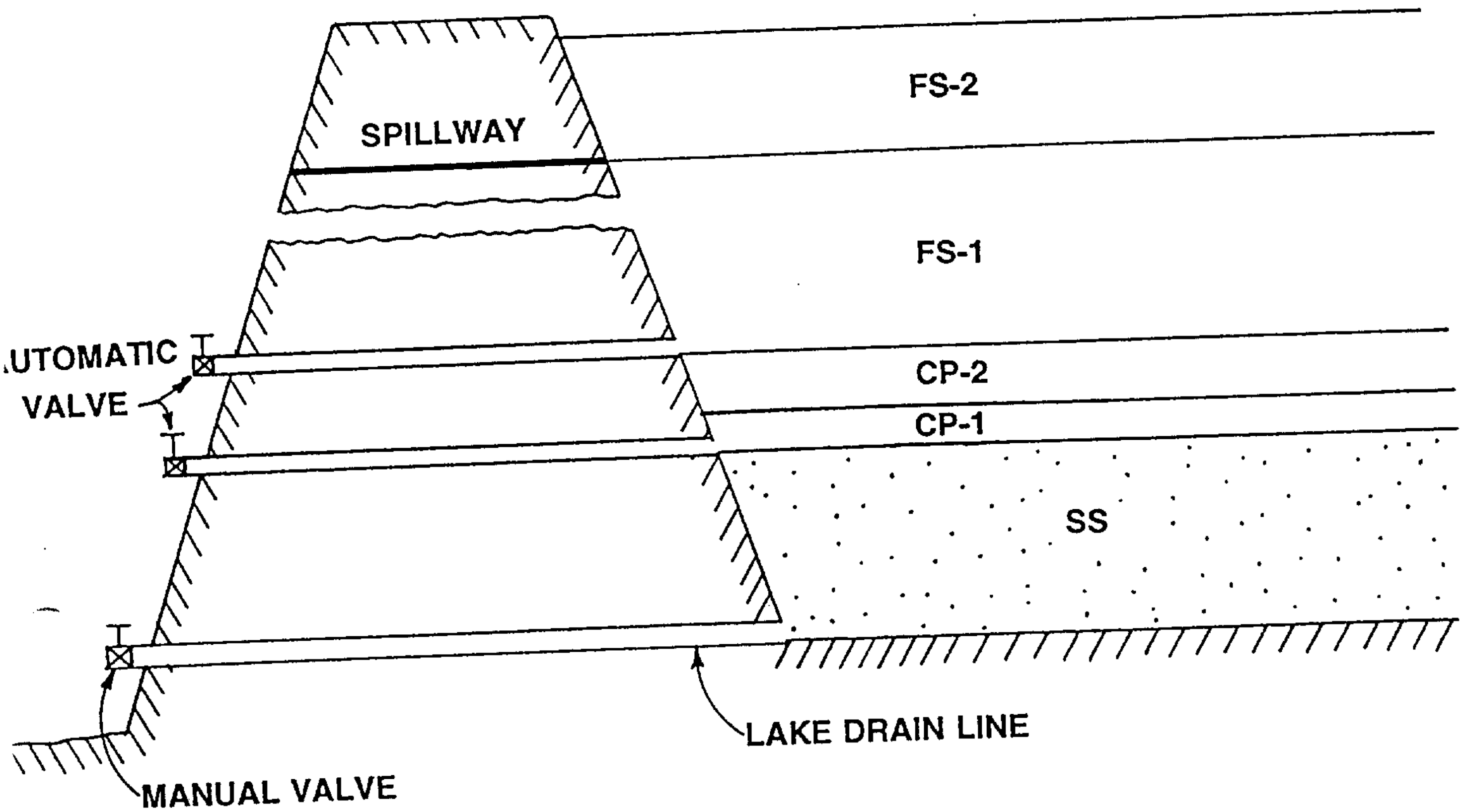
Revised 06/08/93

Condition	Volume (Ac.Ft.)	Cumulative Volume (Ac.Ft.)	Cumulative Maximum Depth** (Ft.)	Cumulative Average Depth (Ft.)	Cumulative Area (Acres)
SS (Sediment Storage)	890	890	19	9.5	94
CP-1 (Assumed)	200	1,090	20	10	108
CP-2 (Assumed)	1,000	2,090	25	12.5	166
FS-1	6,350	8,440	40	20	422
FS-2 (Assumed)	3,000	11,440	45	22.5	514

* Assumes land slopes at 2% grade and stream slopes at 0.44% grade.

** Excludes channel depth.

FIGURE VIII.2
SCHEMATIC LAYOUT



FEATURES OF MULTI-PURPOSE LAKE

- LAKE DRAIN LINE WITH MANUAL VALVE
- LAKE RELEASE LINE WITH AUTOMATIC REMOTELY CONTROLLED VALVE
- RAINFALL GAGE - REMOTELY READ
- LAKE LEVEL GAGE - REMOTELY READ
- SPILLWAY SET TO CONTAIN THE 100 YEAR STORM EVENT AND PASS PMF
- SPILLWAY SIZED TO PASS PROBABLE MAXIMUM FLOOD (PMF) WITHOUT OVERTOPPING OF DAM
- REMOTE CENTRAL LOCATION FOR DETERMINATION OF VOLUME RELEASES

agricultural or commercial purposes. Seasonal storage would only be allowed in dry seasons and if all downstream water rights were provided for. Seasonal storage or temporary utilization of flood storage volume is consistent with the practice of seasonal rule curve operation (Carriere & Wurbs 1992).

The minor multi-purpose lake would have controlled releases when below the top of FS-1, with lake elevations and releases monitored and controlled remotely. The releases would be limited to downstream channel capacities with consideration given to other reservoirs' releases. Above FS-1, releases would be uncontrolled. A schematic of the outlet works is given in figure VIII.2.

The water to be stored in the minor lakes would be composed of captured excess flood waters that would normally pass through the system unused. These waters when captured by the minor lakes would then be able to be utilized as mentioned above. As an example, consider the 1989, 1990, and 1991 floods. Lake Bridgeport passed 377,000, 530,000, and 135,000 AF of excess flood water, respectively, through its spillway. The combined volumes represent a volume that is more than two and one half times the conservation volume of Lake Bridgeport. Note that all of this water traveled downstream causing extensive damage and ended up lost in the Gulf of Mexico.

1.2 Major Multi-Purpose Lake(s)

The largest benefit for the West Fork system as a whole would be gained from Large major multi-purpose lake(s). Working in complement with the minor lakes, the large lakes would control runoff from the uncontrolled area below the minor lakes for the area above Lake Bridgeport. Therefore, large major multi-purpose lake(s) are proposed to be located on the West Fork above Lake Bridgeport. There are four combinations of major lakes that could be built. The 1st combination is a single lower lake. The 2nd combination consists of two lakes: a middle lake and a lower lake. The 3rd combination includes three lakes: lower, middle, and upper. The 4th and final combination also consists of two lakes: an upper and lower. Given that only one of the above combinations will need to be built, the actual locations of the major lake(s) have not been determined.

However, there is not as much flexibility in location as with the minor lakes.

The major lakes will consist of the same pool levels as the minor lakes, but will control a much larger drainage area. 100% of the 100-year storage requirement will be available at each major lake(s) for the drainage area controlled. Therefore, the size of each lake(s) will be dependent on the presence, if any, of other structures upstream. The largest lake would result if combination #1 were implemented and if minor lakes were not built above it.

Table VIII.3 gives a comparison of a single lower major lake, both with and without minor lakes upstream. As can be seen, a single lower lake has the storage capacity to function the same as all combinations of proposed alternatives. Downstream of the lower major lake, flow and volume reductions would be basically identical, whether or not any structures were placed upstream. The underlying premise is that 100% of the 100-year flood will be controlled for the total area above the lower major lake for all combinations of major and/or minor lakes.

1.3 Lake Bridgeport Operations

1.3a Current Operational Procedures

TCWCID No. 1 has not adopted a formal operation policy for releases from Lake Bridgeport, but they do have guidelines that are followed in flooding situations. These guidelines seek to minimize downstream damages by utilizing the temporary flood control pool as effectively as possible. Release decisions consider the rate of inflow, downstream conditions, and the weather. They also try to let the Trinity River recede before making major releases from Lake Bridgeport. In 1987 Freese and Nichols, Inc. developed a gate regulation policy which made optimal use of the temporary flood control pool while making minimum releases. This policy, as mentioned above, has not been formally adopted, but is followed when conditions allow.

1.3b Proposed Operational Changes

The proposed operational changes to Lake Bridgeport assume that all improvements have been implemented upstream (ie. at least combination #1 and minor lakes located in the uncontrolled area between the single lower major lake and Lake Bridgeport). The

TABLE VIII.3
SIZE COMPARISON FOR SINGLE MAJOR MULTI PURPOSE LAKE

LEVEL	"A" WITHOUT MINOR MULTI PURPOSE LAKES (D.A. = 840 S.M.)				"B" WITH MINOR MULTI PURPOSE LAKES (D.A. = 590 S.M.)			
	STORAGE VOLUME (ACRE-FEET)	ELEV (msl)	SURFACE AREA (ACRES)	AVG DEPTH (FT)	STORAGE VOLUME (ACRE-FEET)	ELEV (msl)	SURFACE AREA (ACRES)	AVG DEPTH (FT)
SS	74,803	884			52,510	877		
CP1 (Varies)								
CP2 (Varies)	< 104,467				< 74,467			
TOTAL TO TOP OF CP2	179,270	902	8,088	22.2	126,977	895	6,080	20.9
FS-1 (100YR FLOOD CONTROL)	498,000				349,280			
TOTAL TO SPILLWAY ELEV.	677,270	934	24,756	27.4	476,257	925	18,780	25.4
FS-2 (Assumed)	493,127				348,000			
TOTAL TO TOP OF DAM	1,170,397	950	37,032	31.6	824,257	839	28,900	28.5

NOTE: IF "B" IS BUILT BEFORE MINOR MULTI-PURPOSE LAKES ARE BUILT,
THEN "B" WILL ONLY CAPTURE 18YR STORM.

objectives of the proposed operational changes are to limit the maximum outflow to the downstream channel capacity and to reduce the amount of damage around Lake Bridgeport by limiting the maximum elevation attained.

Specifically, a storage band of approximately 120,000 AF would be required to store the 100-year flood volume and reduce the outflow to be equal to the downstream channel capacity of 5000 cfs. At present, TCWCID No. 1 utilizes approximately 46,000 AF for temporary flood storage. The increased flood control storage could be attained by an optimal combination of lowering the conservation pool and/or raising the top of the temporary flood control pool. As an example, operating between elevation 834 and 843 would provide 122,000 AF. Protection of the Lake Bridgeport's yield would require transferring the lost conservation storage to upstream lakes and a negotiated agreement with TCWCID No. 1.

In addition to the above operational changes, it is recommended that provisions be adopted to restrict development below elevation 844.5 for the entire Lake Bridgeport perimeter.

NOTE: Any operational changes should be fully coordinated with TCWCID No. 1 and should carefully consider dam safety and the effects on dam gates.

B. Modeling Procedures/Limitations

1.1 General

Proposed improvements were modeled using the HEC-5 and HEC-1 software packages. Existing conditions models were modified so that all reservoirs were at top of conservation level prior to the start of the flood event. Top of conservation level was used in order to provide a consistent reference point for comparison purposes. The proposed improvements were modeled for the study area based on both the calibrated and synthetic events. Downstream effects of the proposed improvements were modeled using the same 1992 HEC-5 program and modified versions of HEC-5 data models obtained from the 1992 TWC/TRA full Trinity River Study for the 1990 and 1989 floods.

Damages were computed for the study area and flood damage analysis was performed on the various flood events using HEC-5B. Flood damages for areas downstream of the study area were computed using the damage information provided in the TWC/TRA study models. Specific results of the damage analysis are given in section IX.

Note: Impacts of the recommended plan on water supply were not evaluated as part of this study. It is possible that the structures recommended (particularly the minor multi-purpose lakes) could adversely affect the yield during critical dry period, if they were operated independently and not as a portion of an overall operational plan. Further analysis of the water supply impacts of site specific minor multi-purpose lakes under an operational plan is warranted.

1.2 Major Multi-Purpose Lake(s)

Following the premise that all combinations of major and minor lakes will produce similar results downstream of location 3, only one major lake was modeled. The major lake modeled was the lower major lake located immediately upstream of Lake Bridgeport. The proposed lake was operated to limit discharge so as not to exceed downstream channel capacity and to hold all floodwaters without making releases until Lake Bridgeport emptied its flood control pool.

1.3 Minor Multi-Purpose Lakes

Given the number of minor lakes required and the time and effort required to include each one in a HEC-5 model, the study team chose to use HEC-1 in determining the affects of these structures. Using HEC-1 on six representative tributary basins and assuming that similar basins produce similar hydrologic responses, the study team developed average reductions in flows and volumes. Since peak flow reductions ranged from 19% to over 30%, an average of 25% reduction was used.

Modeling the minor lakes in HEC-5 required using a option to multiply all local flows by 75%. Although a 25% average reduction in peak flow does not imply a consistent reduction over the entire hydrograph, the differences were found to be minor. Volume reductions would likely be more consistent than peak reduction since volume is directly proportional to drainage area (assuming a uniform rainfall distribution).

1.4 Lake Bridgeport Operation

Modeling the increased flood control storage was accomplished by setting the top of flood control pool to elevation 842 and the top of conservation pool at elevation 836. These elevations were used purely for modeling purposes and, in no way, do they imply recommended elevations. Outflow reduction was accomplished by changing the operational channel capacity downstream of Lake Bridgeport to 5000 cfs. Changing the target operational channel capacity does not guarantee that releases will be limited to 5000 cfs, but it does allow greater releases to be made provided flood storage is still available and sufficient capacity exists in the downstream channel. Lake Bridgeport flood control releases were given priority over upstream releases by changing the HEC-5 index levels to assign them a higher priority.

1.5 Downstream Effects

Downstream effects of the proposed improvements were modeled using the 1989 and 1990 daily HEC-5 models obtained from the 1992 TWC/TRA study modified to reflect proposed conditions. The modified models were tested against the original models for existing conditions, ensuring that consistent results were obtained and any differences would be the result of the proposed improvements only. All proposed conditions, although incorporated into the existing conditions models, were negated for these comparisons. Table VIII.4 gives the results of the existing conditions comparison runs.

In using the models obtained from the 1992 TWC/TRA study, the only changes made by SEE Corp. were to reflect proposed improvements. No attempt was made to change incremental flows or assess the accuracy of the models. Discrepancies between Eagle Mountain Lake releases and Lake Worth releases were noted, however, especially for the 1989 storm. These discrepancies may have masked the actual flow reductions realized for areas downstream of Lake Worth.

TABLE VIII.4

COMPARISON OF EXISTING CONDITIONS FLOWS FOR 1989 & 1990 FLOODS

LOCATION	1990 FLOOD		1989 FLOOD	
	TWC/TRA EXISTING(cfs) *	SEE CORP. EXISTING(cfs) #	TWC/TRA EXISTING(cfs) *	SEE CORP. EXISTING(cfs) #
LAKE BRIDGEPORT ON WEST FORK	13,400	13,400	13,800	13,800
BOYD ON WEST FORK	17,000	17,000	13,600	13,600
EAGLE MOUNTAIN LAKE ON WEST FORK	23,800	23,800	16,500	16,500
LAKE WORTH ON WEST FORK	23,900	23,900	13,400	13,500
FT. WORTH ON WEST FORK ABOVE CLEAR FORK	24,300	24,300	16,800	16,800
FT. WORTH ON WEST FORK	30,700	30,700	23,400	23,400
GRAND PRAIRIE ON WEST FORK	48,700	48,700	35,100	35,100
GRAND PRAIRIE ON MOUNTAIN CK.	4,600	4,600	6,800	6,800
GRAPEVINE RESERVOIR ON DENTON CK.	11,200	11,200	5,600	5,600
CARROLLTON ON ELM FORK	36,200	36,200	15,700	16,700
DALLAS ON TRINITY RIVER	83,100	83,000	52,000	52,000
CRANDALL ON EAST FORK	61,100	61,100	28,600	28,600
ROSSER ON TRINITY RIVER	118,800	118,700	70,200	70,200
TRINIDAD ON TRINITY RIVER	107,300	107,200	65,500	65,500
OAKWOOD (LONG LAKE) ON TRINITY	108,500	108,500	69,400	69,500
CROCKETT ON TRINITY	116,400	116,400	56,500	56,500
UPPER LAKE LIVINGSTION	91,000	91,000	51,800	51,800
LIVINGSTON RESERVOIR	95,600	95,600	64,800	64,800
GOODRICH ON TRINITY RIVER	98,000	98,000	71,000	71,000
HIGHWAY 162 ON TRINITY RIVER	97,100	97,100	72,500	72,500
LIBERTY ON TRINITY RIVER	95,600	95,600	68,500	68,500

* BASED ON MODEL FROM THE TWC/TRA GENERAL REPORT - FLOOD PREVENTION AND CONTROL FOR THE TRINITY RIVER BASIN(1992).
# MODIFIED BY SEE CORP. TO REFLECT PROPOSED IMPROVEMENTS(1993)

C. Results

1.1 Study Area

Tables VIII.5 - VIII.7 (scenarios A1 and A2) summarize the proposed conditions results for the study area above Eagle Mountain Lake. Significant reductions in flows, volumes, and elevation were obtained throughout the study area for all events considered.

Flow reductions were at least 25% for all control points, except at location 8 for the 10-yr storm. The lesser reduction at location 8 for the 10 year storm was due to the inability to produce consistent flood frequency peaks at all locations concurrently and the timing of the HEC-5 releases from Lake Bridgeport.

Significant reductions of Lake Bridgeport inflow and the 5000 cfs outflow objective were realized for all events. Flows at location 8 were only reduced approximately 25%, indicating that peak flows at Boyd are predominately the result of Big Sandy Creek and/or Salt Creek flows. The 25%(+ or -) reduction in peak flows indicate that only the minor multi-purpose lakes will affect the peaks for those control points, while reductions greater than 25% indicate the combined affect of both the major and minor multi-purpose lake(s). Flows at locations 1 and 2 were only reduced 25% due to only modeling the single major multi-purpose lake. Greater reductions at locations 1 and 2 would be possible depending on which combination of major multi-purpose lakes was modeled. The affect of the major multi-purpose lake(s) is shown in the volume reductions at both location 4 (Lake Bridgeport) and location 8 (Boyd Gage). Inflow volumes into Lake Bridgeport were reduced at least 66%, while the volume at the Boyd gage was reduced at least 48%. The significant volume reductions were responsible for the reduced outflows and elevations at Lake Bridgeport; however, the effect of these reductions would propagate downstream, affording downstream reservoir operators greater flexibility in their release decisions also.

Substantial elevation reductions on Lake Bridgeport were attained for all events modeled, albeit with varying magnitude. The maximum elevation in Lake Bridgeport for all storms modeled under existing conditions (scenario A1) was 852.09 (for the 100-year flood). Under proposed conditions (scenario A2) the maximum lake elevation for all storms modeled was 841.37 (for the 1981 flood). Based on these results, the improvements upstream of Lake Bridgeport provide much greater flexibility of lake operations.

TABLE VIII.5

SUMMARY OF RESULTS - 1990 FLOOD

CONTROL POINT # (SHEF CODE)	LOCATION	OBSERVED RELEASES		HEC-5 RELEASES			DIFFERENCE (%)
		OBSERVED	CALIBRATED	AO	A1	A2	(A1-A2)/A1
1	WEST FORK AT HWY 148	-	12,000	12,000	12,000	9,000	25.0
2 (JAKT2)	WEST FORK NEAR JACKSBORO	18,300	18,300	18,300	18,300	13,700	25.1
3	WEST FORK ABOVE LK BRDGPRT	-	19,100	19,100	19,100	5,000	73.8
4 (BPRT2)	LAKE BRIDGEPORT INFLOW	27,900	27,300	27,500	27,500	14,100	48.7
	" OUTFLOW	16,200	16,200	13,400	13,400	5,000	62.7
	" ELEVATION (msl)	844.36	844.09	842.78	842.78	840.18	-
6 (BRPT2)	BIG SANDY CREEK AT HWY 380	18,000	18,000	18,000	18,000	13,500	25.0
7	WEST FORK - BIG SANDY CONFL.	-	30,500	35,500	35,500	17,200	51.5
8 (BOYT2)	WEST FORK AT BOYD	41,800	48,300	43,900	43,900	32,900	25.1
	LK BRDGPRT INFLOW VOLUME (acre-ft)				365,100	125,400	65.7
	WEST FORK AT BOYD VOLUME (acre-ft)				575,900	301,200	47.7

A0 = EXISTING - HEC-5 RELEASES; A1= EXISTING COND. - TOP OF CONS. (BASELINE); A2 = PROPOSED COND. - TOP OF CONS.

NOTE: VOLUME REPRESENTS TOTAL VOLUME FOR THE 567 hour (23DAYS) SIMULATION

TABLE VIII.6

SUMMARY OF RESULTS - 1981 FLOOD

CONTROL POINT # (SHEF CODE)	LOCATION	OBSERVED RELEASES		HEC-5 RELEASES			DIFFERENCE (%)
		OBSERVED	CALIBRATED	AO	A1	A2	(A1-A2)/A1
1	WEST FORK AT HWY 148	-	17,700	17,700	17,700	13,300	24.9
2 (JAKT2)	WEST FORK NEAR JACKSBORO	27,000	27,000	27,000	27,000	20,250	25.0
3	WEST FORK ABOVE LK BRDGPRT	-	41,600	41,600	41,600	1,400	96.6
4 (BPRT2)	LAKE BRIDGEPORT INFLOW	68,200	68,200	68,200	68,200	22,200	67.4
	" OUTFLOW	4,950	4,950	3,400	21,600	5,000	76.9
	" ELEVATION(msl)	836.41	836.40	837.2	847.06	841.37	--
6 (BRPT2)	BIG SANDY CREEK AT HWY 380	45,000	45,000	45,000	45,000	33,750	25.0
7	WEST FORK - BIG SANDY CONFL.	-	54,500	53,600	56,300	40,200	28.6
8 (BOYT2)	WEST FORK AT BOYD	60,400	60,000	59,000	61,000	44,300	27.4
	LK BRDGPRT INFLOW VOLUME (acre-ft)				306,300	80,800	73.6
	WEST FORK AT BOYD VOLUME (acre-ft)				478,900	206,400	56.9

A0 = EXISTING - HEC-5 RELEASES; A1= EXISTING COND. - TOP OF CONS. (BASELINE); A2 = PROPOSED COND. - TOP OF CONS.

NOTE: VOLUME REPRESENTS TOTAL VOLUME FOR THE 336 hour (14DAY) SIMULATION

TABLE VIII.7

SUMMARY OF RESULTS FOR THE SYNTHETIC STORMS

CONTROL POINT # (SHEF CODE)	LOCATION	10YR		DIFF	50 YR		DIFF	100 YR		DIFF
		EXISTING	PROPOSED	%	EXISTING	PROPOSED	%	EXISTING	PROPOSED	%
1	WEST FORK AT HWY 148	14,900	11,100	25.5	40,100	30,000	25.2	52,400	39,200	25.2
2 (JAKT2)	WEST FORK NEAR JACKSBORO	19,000	14,300	24.7	48,500	36,300	25.2	68,300	51,100	25.2
3	WEST FORK ABOVE LK BRDGPRT	21,400	5,000	76.6	52,100	5,000	90.4	70,300	5,000	92.9
4 (BPRT2)	LAKE BRIDGEPORT INFLOW	35,100	17,900	49.0	70,900	44,700	37.0	85,100	51,100	40.0
	" ELEVATION(msl)	842.41	839	-	849.39	840.55	-	852.09	841.24	-
	" OUTFLOW	13,300	5,000	62.4	22,700	5,000	78.0	31,000	5,000	83.9
6 (BRPT2	BIG SANDY CREEK AT HWY 380	18,300	13,700	25.1	45,900	34,400	25.1	64,400	48,200	25.2
7	WEST FORK - BIG SANDY CONFL.	23,900	17,900	25.1	58,000	43,300	25.3	81,500	61,100	25.0
8 (BOYT2)	WEST FORK AT BOYD	25,200	21,400	15.1	66,200	49,300	25.5	85,800	64,100	25.3
	LK BRDGEPRT INFLOW VOLUME (acre-ft)	215,050	66,178	69.2	328,200	80,300	75.5	383,500	84,300	78.0
	WEST FORK AT BOYD VOLUME (acre-ft)	315,600	154,300	51.1	488,100	217,300	55.5	573,300	246,400	57.0

NOTE: VOLUME REPRESENTS TOTAL VOLUME FOR THE 300 HR SIMULATION

1.2 Downstream

The results of the proposed improvements using the TWC/TRA daily models for 1989 and 1990 are given in tables VIII.8 - VIII.9. Flow reductions were realized for the entirety of the West Fork and main stem of the Trinity River. The peak flow reductions, as mentioned above, were due to the reduced volumes that had to be managed by the downstream reservoirs (Eagle Mountain Lake, Lake Worth, and Lake Livingston), thus allowing those reservoirs to make smaller releases. The timing of the reduced flows from upstream improvements and the subsequent operational flexibility afforded to other reservoirs in the system (reduced outflows and time difference of releases) were responsible for the reduction below Dallas. Flow reductions on the tributaries of the Trinity River were partly due to the reduced flows in the main stems. However, the main cause was the difference in timing of the flows.

For the 1989 and 1990 storms the proposed improvements show significant downstream flow reductions. However, such reductions may be larger or smaller for other flood events. Storm location, storm path, and the timing of upstream releases are but a few of the many different factors that would affect the influence of upstream improvements on downstream flows.

Large historical storms, such as the 1989 and 1990 storms, which produced large runoff volumes and high peak flows in the upper Trinity River Basin above Dallas have often been limited to the upper basin (ie. little or no rainfall in the lower basin). For upper basin storms, upstream improvements can provide a substantial benefit to the areas downstream as can be seen by the results of the limited analysis of downstream impacts. Further study should be conducted, however, to expand this conclusion.

STUDY NOTE: The models used to evaluate downstream impacts were obtained from the 1992 TWC/TRA study. The only changes made by SEE Corp. were to reflect proposed improvements. No attempt was made to assess the accuracy of the models. Discrepancies between Eagle Mountain Lake releases and Lake Worth releases were noted, however, especially for the 1989 storm. These discrepancies may have masked the actual flow reductions realized for areas downstream of Lake Worth.

TABLE VIII.8
PEAK FLOW COMPARISON FOR SELECTED LOCATIONS
1989 FLOOD - DAILY HEC-5 MODEL

LOCATION	STREAMFLOWS OR RESERVOIR OUTFLOWS (cfs)			
	EXISTING *	PROPOSED *	DIFFERENCE (cfs)	DIFFERENCE %
LAKE BRIDGEPORT ON WEST FORK	13800	5100	-8700	-63.0
BOYD ON WEST FORK	13600	4000	-9600	-70.6
EAGLE MOUNTAIN LAKE ON WEST FORK	16500	13500	-3000	-18.2
LAKE WORTH ON WEST FORK	13500	8200	-5300	-39.3
FT. WORTH ON WEST FORK ABOVE CLEAR FORK	16800	12000	-4800	-28.6
FT. WORTH ON WEST FORK	23400	20200	-3200	-13.7
GRAND PRAIRIE ON WEST FORK	35100	31900	-3200	-9.1
GRAND PRAIRIE ON MOUNTAIN CK.	6800	6800	0	0.0
GRAPEVINE RESERVOIR ON DENTON CK.	5600	5600	0	0.0
CARROLLTON ON ELM FORK	16700	15600	-1100	-6.6
DALLAS ON TRINITY RIVER	52000	48700	-3300	-6.3
CRANDALL ON EAST FORK	28600	28600	0	0.0
ROSSER ON TRINITY RIVER	70200	66900	-3300	-4.7
TRINIDAD ON TRINITY RIVER	65500	62800	-2700	-4.1
OAKWOOD (LONG LAKE) ON TRINITY	69500	68800	-700	-1.0
CROCKETT ON TRINITY	56500	51700	-4800	-8.5
UPPER LAKE LIVINGSTION	51800	47500	-4300	-8.3
LIVINGSTON RESERVOIR	64800	59400	-5400	-8.3
GOODRICH ON TRINITY RIVER	71000	65100	-5900	-8.3
HIGHWAY 162 ON TRINITY RIVER	72500	63200	-9300	-12.8
LIBERTY ON TRINITY RIVER	68500	58900	-9600	-14.0

* BASED ON MODEL FROM THE GENERAL REPORT - FLOOD PREVENTION AND CONTROL FOR THE TRINITY RIVER BASIN(1992) - MODIFIED BY SEE CORP. TO REFLECT PROPOSED IMPROVEMENTS(1993)

TABLE VIII.9
PEAK FLOW COMPARISON FOR SELECTED LOCATIONS
1990 FLOOD - DAILY HEC-5 MODEL

LOCATION	STREAMFLOWS OR RESERVOIR OUTFLOWS (cfs)			
			DIFFERENCE	
	EXISTING *	PROPOSED *	(cfs)	%
LAKE BRIDGEPORT ON WEST FORK	13400	5200	-8200	-61.2
BOYD ON WEST FORK	17000	5600	-11400	-67.1
EAGLE MOUNTAIN LAKE ON WEST FORK	23800	16000	-7800	-32.8
LAKE WORTH ON WEST FORK	23900	15400	-8500	-35.6
FT. WORTH ON WEST FORK ABOVE CLEAR FORK	24300	17300	-7000	-28.8
FT. WORTH ON WEST FORK	30700	21800	-8900	-29.0
GRAND PRAIRIE ON WEST FORK	48700	40100	-8600	-17.7
GRAND PRAIRIE ON MOUNTAIN CK.	4600	4600	0	0.0
GRAPEVINE RESERVOIR ON DENTON CK.	11200	10900	-300	-2.7
CARROLLTON ON ELM FORK	36200	35900	-300	-0.8
DALLAS ON TRINITY RIVER	83000	74100	-8900	-10.7
CRANDALL ON EAST FORK	61100	58500	-2600	-4.3
ROSSER ON TRINITY RIVER	118700	106400	-12300	-10.4
TRINIDAD ON TRINITY RIVER	107200	92100	-15100	-14.1
OAKWOOD (LONG LAKE) ON TRINITY	108500	93400	-15100	-13.9
CROCKETT ON TRINITY	116400	101500	-14900	-12.8
UPPER LAKE LIVINGSTION	91000	76300	-14700	-16.2
LIVINGSTON RESERVOIR	95600	80600	-15000	-15.7
GOODRICH ON TRINITY RIVER	98000	82200	-15800	-16.1
HIGHWAY 162 ON TRINITY RIVER	97100	81300	-15800	-16.3
LIBERTY ON TRINITY RIVER	95600	80500	-15100	-15.8

* BASED ON MODEL FROM THE GENERAL REPORT - FLOOD PREVENTION AND CONTROL FOR THE TRINITY RIVER BASIN(1992) - MODIFIED BY SEE CORP. TO REFLECT PROPOSED IMPROVEMENTS(1993)

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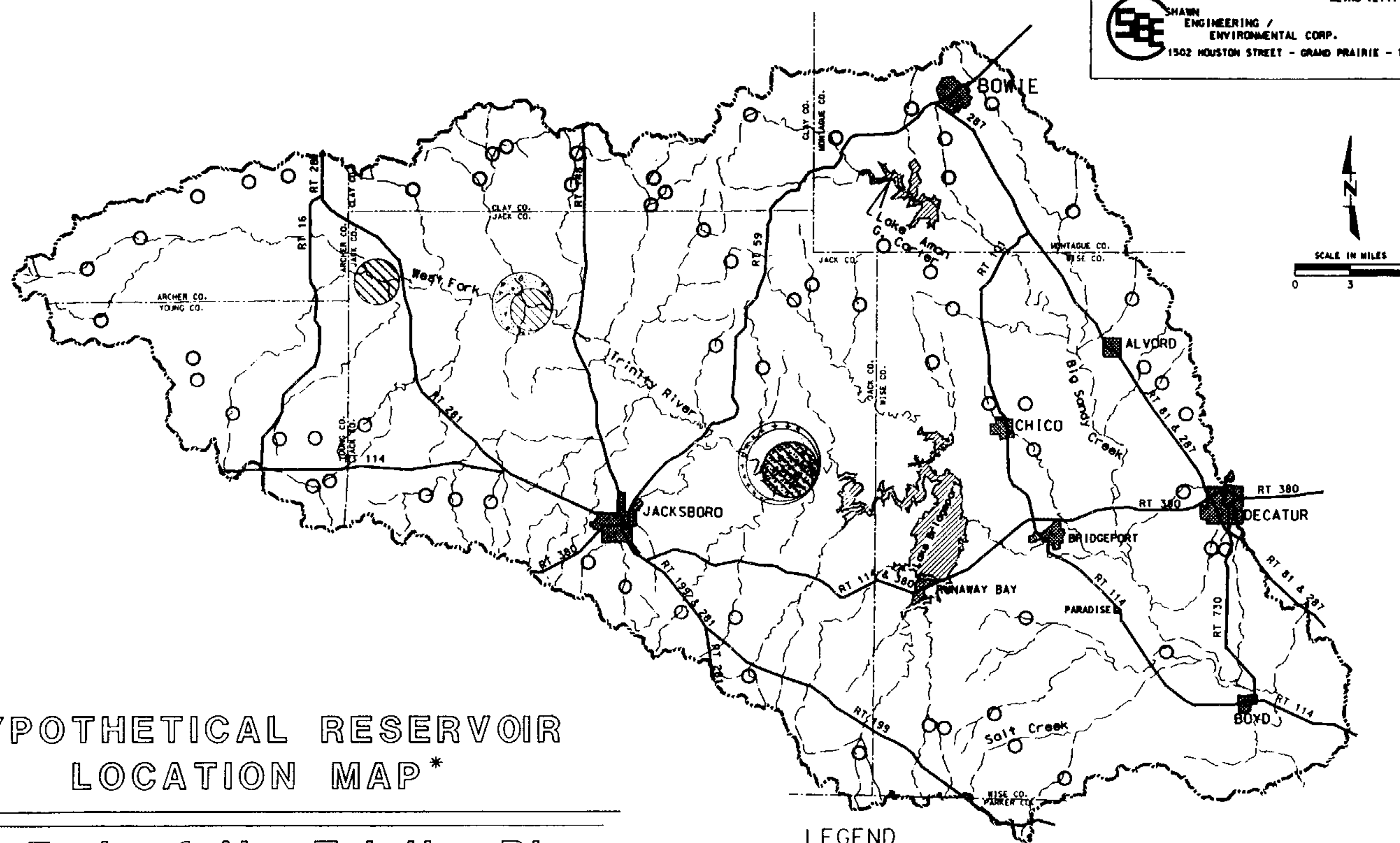


HYPOTHETICAL RESERVOIR LOCATION MAP*

West Fork of the Trinity River Above Eagle Mountain Lake

* NOTE: The Location of All Reservoirs is Schematically Represented Only. Actual Location Will Need to Be Determined During The Planning/Design Phase For Each Individual Structure.

LEGEND

- Minor Multi-Purpose Lake
- Major Multi-Purpose Lake - Combination No. 1
- Major Multi-Purpose Lake - Combination No. 2
- Major Multi-Purpose Lake - Combination No. 3
- Major Multi-Purpose Lake - Combination No. 4

PLATE VIII.1

IX. ECONOMIC ANALYSIS OF SELECTED ALTERNATIVE

IX. ECONOMIC ANALYSIS OF SELECTED ALTERNATIVE

The criteria established for the Plan require that the Plan "must be economically feasible" and "must provide for cost sharing by those that benefit". This section of the report will: (1) examine the economic feasibility of the proposed alternative; (2) identify additional benefits and costs not included in the analysis; and (3) recommend considerations for further analysis.

A. Benefits

Many economical and intangible benefits will be realized by implementing the proposed alternative. Benefits were estimated for Wise County and other areas where data was available.

Note that not all anticipated benefits have been included in this analysis due to a lack of available data and the limited scope of this study. These and other reasons for the exclusion of anticipated benefits in the economic analysis will be discussed in greater detail.

1. Benefits Included in Analysis

Average annual benefits from flood reduction were estimated by utilizing the HEC-5B computer model. Anticipated damages over a range of flood stages were determined and input into the model. The model output damage values based on the effects of reservoir operations. Damage values for each probable storm (up to the 100 year event) were then multiplied by the corresponding probability of that storm's occurrence. Average annual damages were calculated by summing up the product from the previous step for all probable storms up to the 100 year event. Note that storms with less probability of occurrence then the 100 year storm (ie., the 101 year storm, the SPF, the 1,000 year storm, etc.) were not included in the calculations due to the limited scope of this report. The exclusion of these storms from the analysis results in the value of average annual benefits being understated. This might amount to a significant understatement of benefits for the Trinity River due to the high value of land and improvements located behind levees throughout the Dallas/Fort Worth area. This is because the proposed alternative could prevent overtopping of the levees, and therefore, reduce damage for the storms excluded from the analysis.

Following is a listing of benefits accounted for in the economic analysis of the proposed alternative. Methodologies used for determining benefits other than flood reduction are included in the listing.

(a) **Flood loss (damage) reduction - Wise County on Lake Bridgeport (peak elevation only).** Damage estimations for this area are based on Wise County Appraisal District damage estimates for the April-May 1990 storm, general flooding information provided by the TCWCID No.1, and topographic maps. Additional study, including a topographic survey of structure elevations, is needed for a more accurate estimate of anticipated damages for different flood stages.

(b) **Sedimentation reduction - Lake Bridgeport and Eagle Mountain Lake.** Average annual sediment volume transport into Lake Bridgeport and Eagle Mountain Lake was provided by TCWCID No.1. This information was based on lake topographic surveys performed in 1948 and 1988. The average annual sediment deposited into Lake Bridgeport and Eagle Mountain Lake was 590 acre-feet and 610 acre feet, respectively. Neither lake was originally designed with sacrificial sediment volume. The basis of economic benefit used in this analysis is the cost of dredging to remove the average annual sediment. Note that the current annual sediment volume may be lower than the 50 year average due to the numerous lakes, grade stabilization structures, and other improvements installed by the USDA SCS and others during the period. This 50 year average is the most current physical estimate of sediment volume available, however. Whereas a current estimate of annual sediment volume could be made by use of a computer model, the results of said model would be questionable given the lack of additional historical sediment deposition data necessary for model calibration.

The $20,000 per acre foot of dredging cost used in the analysis was given to SEE Corp. by TCWCID No. 1 based on their recent inquiries to dredging contractors and includes disposal costs. The USACE used a cost of approximately $15,000 per acre foot of dredging in their 1990 Reconnaissance Report.

Other possible alternatives to dredging the lakes include abandoning Eagle Mountain Lake and Lake Bridgeport when they are full and building elsewhere, controlling sediment at the source or raising the height of the dams. Each of these methods has potential legal, health, safety, ecological, and/or other costs associated with it that will increase its cost above physical implementation costs. An in-depth study of these and other alternatives would be required in order to determine the most feasible and most likely solution to sedimentation of the lakes. Such an in-depth study is well beyond the scope of this report. Note that, if a more economical method than dredging can be implemented, then the benefit of sediment reduction will be lower than that shown in this report.

(c) Flood loss reduction - Wise County on the West Fork below Lake Bridgeport (peak flow only) SEE Corp performed an extensive search for published historical damage information among many federal, state, and local government agencies, insurance companies, and private corporations. Although obtainable, data was insufficient for crop, ranch, oil and gas, public operations, and other flood damages from these sources. The economic benefit used in this analysis is based on the difference in the value of floodplain and non-floodplain property along the West Fork and adjacent portions of Big Sandy and Salt Creeks below Lake Bridgeport. Property values were based on Wise County Appraisal District records. Although this method allows for a comparison of alternatives, future studies should budget for an in depth damage analysis, including field surveys, inventories, and appraisals.

Tables IX.1, IX.2, and IX.3 compare calculated damages for existing and proposed conditions for areas in Wise County above Eagle Mountain Lake for historical storm events and for the 10, 50, and 100 year frequency events.

TABLE IX.1

Estimated Flood Damages[1]
Wise County - Area Around Lake Bridgeport

Event	DAMAGES ($1,000) Existing Conditions	Proposed Conditions	Reduction ($)	(%)
1981[2]	0	0	0	0
10 Year	891	576	315	35
1990	1,028	821	207	20
1981 top CP[3]	1,236	836	400	32
50 Year - Ex	1,482	795	686	46
100 Year - Ex	1,619	831	788	49

TABLE IX.2

Estimated Flood Damages[1]
Wise County - West Fork and Adjacent Portions of Big Sandy and Salt Creeks Below Lake Bridgeport

Event	DAMAGES ($1,000) Existing Conditions	Proposed Conditions	Reduction ($)	(%)
1981[2]	1,842	1,778	64	3
10 Year	2,071	1,436	635	31
1990	2,233	1,650	583	26
1981 top CP[3]	2,375	1,778	597	25
50 Year - Ex	2,385	1,793	592	25
100 Year - Ex	2,508	1,863	645	26

(1) Damages include: (a) estimated property damages around Lake Bridgeport (peak elevation only) and (b) property value reduction along West Fork (peak flow only)
(2) Starting Lake Bridgeport at 1981 actual elevation
(3) Starting Lake Bridgeport at normal conservation pool (elevation 836)

TABLE IX.3

Estimated Flood Damages[1]
Wise County - Total Damages Included in Analysis

	DAMAGES ($1,000)			
	Existing	Proposed	Reduction	
Event	Conditions	Conditions	($)	(%)
1981[2]	1,842	1,778	64	3
10 Year	2,962	2,012	950	32
1990	3,261	2,471	790	24
1981 top CP[3]	3,611	2,614	997	28
50 Year - Ex	3,867	2,588	1,279	33
100 Year - Ex	4,127	2,694	1,433	35

(1) Damages include: (a) estimated property damages around Lake Bridgeport (peak elevation only) and (b) property value reduction along West Fork (peak flow only)

(2) Starting Lake Bridgeport at 1981 actual elevation

(3) Starting Lake Bridgeport at normal conservation pool (elevation 836)

(d) **Flood loss (property damage) reduction - Eagle Mountain Lake and Lake Worth (peak elevation only)** According to TCWCID No.1 sources, there are currently about 1,000 homes in the flood easement around Eagle Mountain Lake (elevation 668). Additionally, Eagle Mountain Lake and Lake Worth experience high water about once every 8 years, affecting approximately 250 homes on Eagle Mountain Lake and 80 homes on Lake Worth.

The proposed alternative allows for flood elevation reduction on Eagle Mountain Lake and Lake Worth by attenuating and controlling the flood inflow volumes into the lakes. The anticipated damage reduction is based on information obtained from TCWCID No.1 and from the 1990 Trinity River Reconnaissance study by the USACE. The HEC-5 model developed for the study did not include these two lakes. Additional study will therefore be required to more accurately determine the extent of damage reduction around the lakes.

2. Benefits and Other Factors Not Included in Analysis

Future studies should budget for an in-depth economic analysis in order to determine total benefits of, and identify the parties that benefit from, the proposed alternative. Many of the anticipated economic and intangible benefits of the proposed alternative could not be accurately determined due to the contractually limited scope of this report and the lack of available data. Following is a partial listing and discussion of these additional benefits.

(a) **Damage reduction downstream of Lake Worth - Tarrant and Dallas Counties and other areas along the Trinity River** Probably the single highest source of economic benefit which can be realized by implementation of the proposed plan is in this category. As discussed in Section VIII, the proposed alternative significantly reduces peak flows through the referenced areas. Some of the benefits which are anticipated for these areas include:

1) agricultural damage reduction
2) urban damage reduction
   - physical (property) damage
   - income loss
   - emergency costs

The 1992 "Flood Prevention and Control for the Trinity River Basin" study included a damage analysis for the entire Trinity Basin for various historical storms, including the May-June 1989 and April-May 1990 flood events. Damage data for the study, which was based on USACE information, was reportedly limited in scope and accuracy. The damage data does allow for comparative analysis, however. The referenced report includes a discussion on how the damage information was compiled.

As discussed in Section VIII of the current study, a daily time step model for the entire Trinity River basin was developed to include the proposed alternative by combining the HEC-5 models from the current and referenced studies. Section VIII of the current report discusses the process for combining these two models.

After the HEC-5B models were compiled and executed for the 1989 and 1990 flood events, a damage comparison was made between existing and proposed conditions. Tables IX.4 and IX.5 are summaries of the results for the comparison. Figures IX.1 and IX.2 are graphical representations of selected damage centers from Tables IX.4 and IX.5. Note that these anticipated damage reductions are for the referenced storms only. Anticipated average annual damage reductions cannot be estimated at this time due to a lack of frequency storm information, including a comprehensive HEC-5 storm frequency model.

The USACE, in conjunction with NCTCOG and under the Upper Trinity River Feasibility Study, is currently preparing more in-depth discharge/damage relationships for the areas in the NCTCOG region. Average annual damage reductions should be determined for the proposed alternative after these USACE discharge/damage relationships and HEC-5 storm frequency models are developed.

(b) **Flood duration damage reduction** The amount of damages to a property which results from flooding may be dependent on the length (duration) of its submergence. The damage analyses presented in this and previously referenced flood studies are based on peak elevation only. Although this method allows for a comparison of alternatives, it does not fully account for damages.

(c) **Flood loss (damage) reduction - Archer, Clay, Jack, Montague, Wise, and Young Counties** Flood damages in the referenced counties will decrease by implementation of the proposed alternative. Peak flows (and, subsequently peak elevations) will be reduced at locations downstream of a lake with dedicated flood control volume as proposed. The percentage of this reduction will decrease as the ratio of uncontrolled drainage area to total drainage area decreases. The further a location is downstream from a lake, the lower the ratio of uncontrolled to total drainage area and, subsequently, the lower the reduction in peak flow. In addition, since the timing of flooding events will be attenuated by the proposed alternative, duration damages caused by backwater will decrease.

(d) **Stream erosion reduction - Archer, Clay, Jack, Montague, Wise, and Young Counties**

TABLE IX.4

1989 FLOOD - DAMAGE COMPARISON FOR INDEX LOCATIONS BELOW LAKE WORTH

DAMAGE INDEX LOCATION	REGULATED DAMAGES ($1,000.00)			
			DIFFERENCE	
	EXISTING*	PROPOSED*	($1000)	%
BENBROOK ON CLEAR FORK	0	0	0	0.0
FT. WORTH ON CLEAR FORK	7,548	7,548	0	0.0
FT. WORTH ON WEST FORK	83,211	75,270	(7,941)	-9.5
GRAND PRAIRIE ON WEST FORK	254,762	233,919	(20,843)	-8.2
GRAND PRAIRIE ON MOUNTAIN CK.	212	212	0	0.0
GRAPEVINE RESERVOIR ON DENTON CK.	236	235	(1)	-0.4
CARROLLTON ON ELM FORK	30,772	30,653	(119)	-0.4
DALLAS ON TRINITY RIVER	208,355	197,706	(10,649)	-5.1
CRANDALL ON EAST FORK	2,786	2,786	0	0.0
ROSSER ON TRINITY RIVER	10,805	9,789	(1,016)	-9.4
TRINIDAD ON TRINITY RIVER	4,199	3,834	(365)	-8.7
RICHLAND ON RICHLAND CK.	1,575	1,565	(10)	-0.6
BARDWELL LAKE	0	0	0	0.0
OAKWOOD (LONG LAKE) ON TRINITY	4,059	4,011	(48)	-1.2
CROCKETT ON TRINITY	10,434	9,766	(668)	-6.4
UPPER LAKE LIVINGSTION	295	240	(55)	-18.6
LIVINGSTON RESERVOIR	2,689	2,483	(206)	-7.7
GOODRICH ON TRINITY RIVER	7,225	4,312	(2,913)	-40.3
HIGHWAY 162 ON TRINITY RIVER	7,951	7,044	(907)	-11.4
LIBERTY ON TRINITY RIVER	5,982	5,233	(749)	-12.5
TOTAL	643,096	596,606	(46,490)	-7.2

* BASED ON MODEL FROM THE GENERAL REPORT - FLOOD PREVENTION AND CONTROL FOR THE TRINITY RIVER BASIN(1992) - MODIFIED BY SEE CORP. TO REFLECT PROPOSED IMPROVEMENTS(1993)

TABLE IX.5
1990 FLOOD - DAMAGE COMPARISON FOR INDEX LOCATIONS BELOW LAKE WORTH

DAMAGE INDEX LOCATION	REGULATED DAMAGES ($1,000.00)			
			DIFFERENCE	
	EXISTING*	PROPOSED*	($1000)	%
BENBROOK ON CLEAR FORK	0	0	0	0.0
FT. WORTH ON CLEAR FORK	15956	15633	-323	-2.0
FT. WORTH ON WEST FORK	101626	79247	-22379	-22.0
GRAND PRAIRIE ON WEST FORK	341172	286838	-54334	-15.9
GRAND PRAIRIE ON MOUNTAIN CK.	42	42	0	0.0
GRAPEVINE RESERVOIR ON DENTON CK.	347	345	-2	-0.6
CARROLLTON ON ELM FORK	71317	70563	-754	-1.1
DALLAS ON TRINITY RIVER	327195	288550	-38645	-11.8
CRANDALL ON EAST FORK	5173	5008	-165	-3.2
ROSSER ON TRINITY RIVER	20676	19096	-1580	-7.6
TRINIDAD ON TRINITY RIVER	8362	7263	-1099	-13.1
RICHLAND ON RICHLAND CK.	1494	1494	0	0.0
BARDWELL LAKE	0	0	0	0.0
OAKWOOD (LONG LAKE) ON TRINITY	6314	5612	-702	-11.1
CROCKETT ON TRINITY	18252	16596	-1656	-9.1
UPPER LAKE LIVINGSTION	2839	1421	-1418	-49.9
LIVINGSTON RESERVOIR	3784	3097	-687	-18.2
GOODRICH ON TRINITY RIVER	17172	13022	-4150	-24.2
HIGHWAY 162 ON TRINITY RIVER	9458	8451	-1007	-10.6
LIBERTY ON TRINITY RIVER	8561	3940	-4621	-54.0
TOTAL	959740	826218	-133522	-13.9

* BASED ON MODEL FROM THE GENERAL REPORT - FLOOD PREVENTION AND CONTROL FOR THE TRINITY RIVER BASIN(1992) - MODIFIED BY SEE CORP. TO REFLECT PROPOSED IMPROVEMENTS(1993)

FIGURE IX.1

1989 FLOOD DAMAGE REDUCTIONS INDEX LOCATIONS BELOW LAKE WORTH

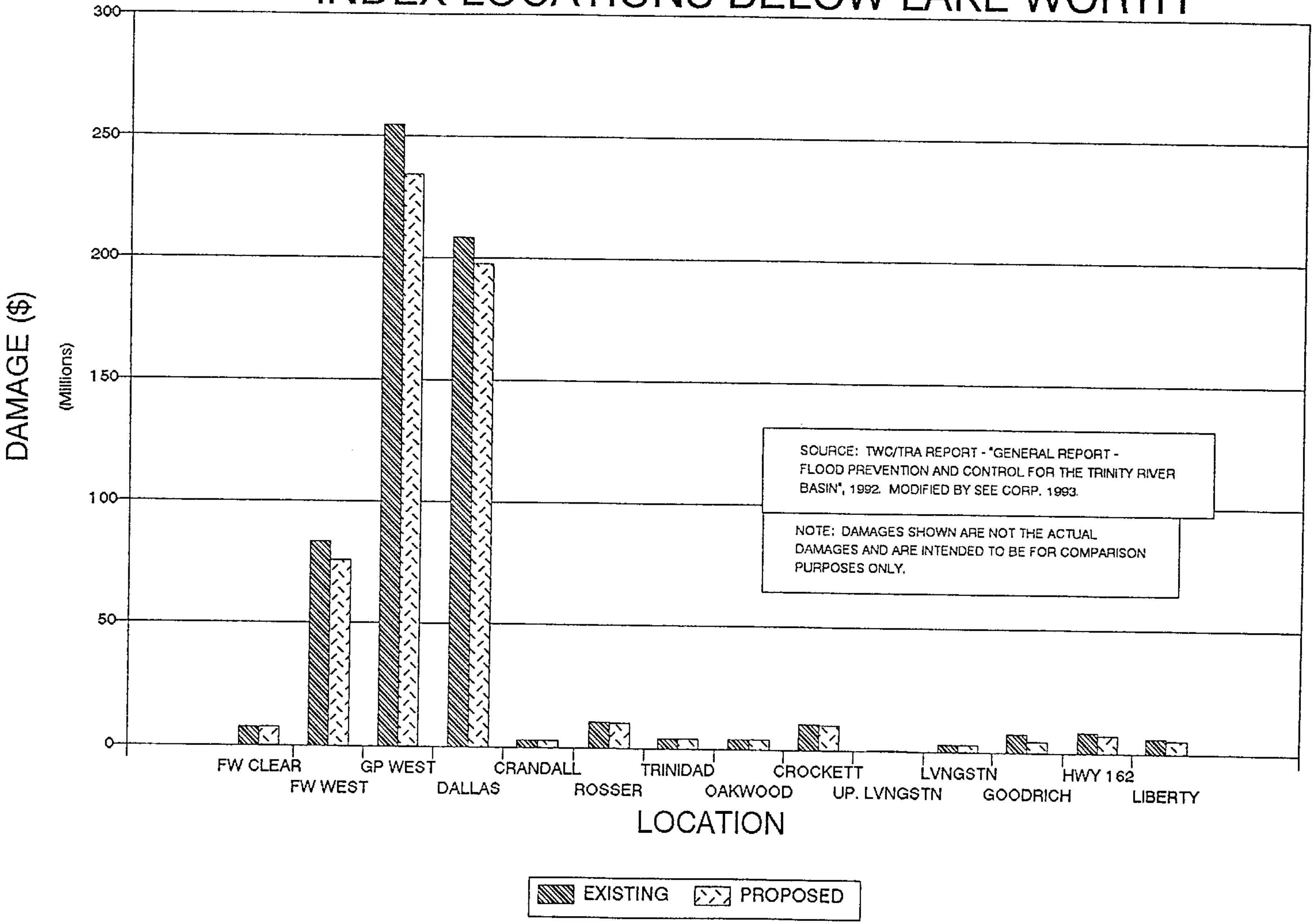
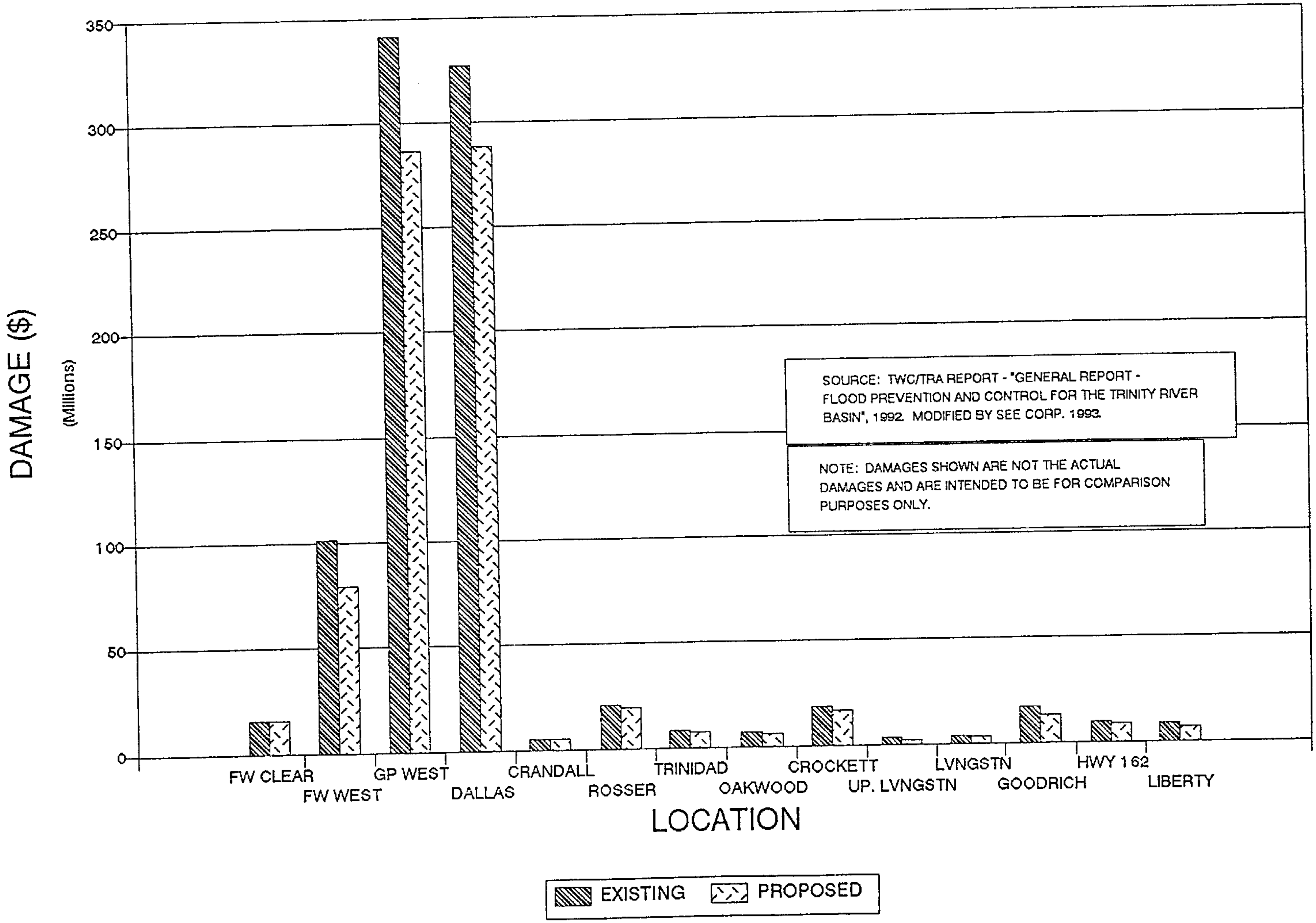


FIGURE 12

1990 FLOOD DAMAGE COMPARISON FOR INDEX LOCATIONS BELOW LAKE WORTH



(e) **Municipal, industrial and agricultural water supply - Archer, Clay, Jack, Montague, Wise, and Young Counties**

(f) **Sediment reduction - Lake Jacksboro and Lake Amon G. Carter** Minor multipurpose lakes located above these existing lakes will capture sediment that would have otherwise been deposited into the lakes. Plan implementation will increase the life of the existing lakes. In addition, the smaller lakes can be drained to remove sediment, whereas the larger lakes may need to be dredged due to potential water supply interruption. Draining a lake and removing sediment with scrapers can be approximately 1/5 the cost of removal by dredging.

(g) **Attenuation of flood volume** Additional benefits of attenuated flood volume which were not discussed above include more constant base flows throughout the basin.

(h) **Improved water quality** The proposed lakes will improve water quality in the basin, especially the existing upstream lakes (Lake Bridgeport and Eagle Mountain Lake) by acting as settling basins for sediment and chemicals from agricultural and other uses.

(i) **Recreation** Benefits for this use include the intangible benefit of recreational uses by a lake owner(s) as well as the economic benefit derived from admittance fees and any associated rental/retail sales.

(j) **Environmental enhancement** Another intangible benefit of the proposed alternative is its ability to provide areas for environmental enhancement and/or mitigation, including:

- preservation of State of Texas Significant Stream Segments
- creation of wetlands
- wildlife and fisheries preservation
- creation of new fish and wildlife habitats

(k) **Increased land values** Due to the decreases in peak flows throughout the Trinity River basin afforded by the proposed alternative, the width of the 100 year floodplain will be narrower. Land situated outside of (above) the 100 year floodplain is normally valued higher than adjacent land in the floodplain. The increased value of the land reclaimed by implementation of the proposed alternative is therefore a definite economic benefit of the plan.

(l) **Utilization of unemployed and/or underemployed labor resources**

(m) **Other benefits and factors** There are a multitude of other economic and intangible benefits which will be realized by implementation of the proposed alternative. Further study is recommended in order to determine the magnitude of these benefits and identify those parties that will benefit in order to determine an equitable distribution of cost sharing.

3. Benefits Summary

Table IX.6 is a summary of total average annual benefits included in the analysis.

The Net Present Value of benefits included in analysis was calculated based on the following assumptions:

1. A project life of 100 years (to correspond with the design life).

2. A nominal (current dollar) interest rate of 8.25%. This rate corresponds to the discount rate currently used by the USACE in economic analysis.

3. Benefits increase in value at the rate of inflation.

4. Annual inflation rate of 6%.

5. At real (constant dollar) interest rate of 2.12%, which is (1 + nominal rate) / (1 + inflation) - 1 = 1.0825/1.06 - 1. Since average annual benefits are stated in real (constant) dollar terms, they are discounted by the real (constant dollar) interest rate of 2.12%.

TABLE IX.6

Summary of Benefits Included in Analysis

		Average Annual Benefit
1.	Wise County damage reduction	
	a. Lake Bridgeport	$ 110,500[4]
	b. West Fork	$ 182,500
	TOTAL WISE COUNTY	$ 293,000
2.	Property damage reduction on Eagle Mountain Lake and Lake Worth[1]	$ 3,000,000
	TOTAL E.M.L. & L.W.	$ 3,000,000
3.	Sediment reduction[2]	
	a. Lake Bridgeport (446.5 ac.ft./year)	$ 8,930,000
	b. Eagle Mountain Lake (125.4 ac.ft./year)	$ 2,508,000
	TOTAL SEDIMENT REDUCTION E.M.L. & LAKE B.P.	$ 11,438,000
	TOTAL AVERAGE ANNUAL BENEFITS INCLUDED IN ANALYSIS	$ 14,731,000

NET PRESENT VALUE OF BENEFITS:

NET PRESENT VALUE OF BENEFITS INCLUDED IN ANALYSIS - 100[5] YEARS OF OPERATION[3]	$ 609,048,000

Notes:

(1) Based on information from US Army COE and TCWCID No. 1.

(2) Cost based on dredging cost of $20,000/ac.ft. as estimated by TCWCID No. 1. This cost includes disposal of dredged materials.

(3) Assuming value of benefits received increase at the rate of inflation (assumed 6%) and a discount rate of 8.25%.

(4) Annual flood loss reduction will increase if current trend of constructing between elevation 844 and 851 continues.

(5) Corresponds to the design life of 100 years.

B. Costs

Two general categories of cost need to be considered in evaluating the proposed alternative. These categories are project implementation costs and operations and maintenance costs.

1. Project Implementation Costs

Costs under this general category include all costs required to attain operational structures in-place, including the following:

a. Planning and Design
b. Construction
c. Interest During Construction
d. Administration
e. Fish and Wildlife Mitigation
f. Relocations
g. Land, Water, and Mineral Rights
h. Historical and Archeological Salvage
i. Other Construction Related Costs

Project implementation costs will vary for each structure depending on size, location (accessibility, regulatory requirements, land rights, etc.), and timing (regulatory requirements, economic environment, etc.). As stated earlier, the exact location and timing of each proposed structure will need to be determined by further feasibility studies. For the current study average costs were estimated in 1993 dollars, based on the size (volume) range of the proposed structures.

Average project implementation cost per acre-foot of volume contained within the 100 year sediment storage, conservation pool, and 100 year flood storage volume was estimated for two size ranges; the minor multi-purpose lakes and the major multi-purpose lakes.

1.1 Average project implementation cost for the minor multi-purpose lakes was estimated based on the average cost for recently completed SCS lakes in the Big Sandy Creek Watershed (lake designation numbers 24A, 24D, 25A, 28, and 32). The average P.L. 534 expenditure for these five structures was $685.50 per acre-foot of volume contained below the flood storage elevation. This average cost was increased by approximately 24% to $850.00 per acre-foot for the minor multi-purpose lakes in order to account for: (1) increases in unit cost due to inflation, more technologically advanced features, and additional costs not included in P.L. 534 funding; and (2) decreases in unit cost due to relatively larger size of lake.

1.2 Average project implementation cost for the major multi-purpose lakes was estimated based on the costs for three recently completed U.S. Army Corps of Engineers' lakes (Joe Pool Lake, Lake Ray Roberts, and Cooper Lake) and one recently completed TCWCID No. 1 lake (Richland Chambers). The cost per acre-foot of volume contained below the flood storage elevation (below conservation pool for Richland Chambers) was determined for each lake and adjusted to 1993 dollars by assuming a constant inflation rate of 6% per year. The average estimated cost in 1993 dollars determined by this method is $600.00 per acre-foot of volume below the flood elevation.

2. Operation and Maintenance Costs

Operation and maintenance costs include all costs required to keep the facilities operating as designed over the life of the project. These costs include operation, maintenance, repair, and replacement. Estimated operation and maintenance costs for the project are $1.5 million per year for flood control only based on USACE estimates for recently completed projects. Operation and maintenance costs for water supply, recreation, or other uses were not included in the cost analysis. The purpose for their exclusion is twofold: (1) the uncertainty of the actual function other than flood control for each of the structures and (2) operation and maintenance costs for any use needs to be justifiable based on the utility of the use and paid for directly by those that benefit from that use.

The analysis assumes that operation and maintenance costs will increase at the same rate as inflation.

3. Costs and Factors Not Included in Analysis

Several costs and factors not included in the economic analysis are:

a. possible loss of property tax base from lake areas
b. possible loss of productive farm and/or ranch land
c. possible loss of oil and/or gas production areas
d. possible roadway re-routing and public inconvenience
e. cost of special lake features (eg. recreational facilities, wildlife habitats, water supply intake structures, etc.)

These costs were not included in the analysis due to (1) their dependence on specific locations and (2) the uncertainty of actual functionality of the lakes for other than flood control/erosion control purposes. These costs should be considered when specific locations and other uses are selected for each lake.

4. Cost Summary

Tables IX.7A and IX.7B are summaries of the project costs included in the analysis for Scenarios "A" and "B", respectively. Scenario "A" is based on a single major multi-purpose lake with no minor multi-purpose lakes above Lake Bridgeport. Scenario "B" is based on major multi-purpose lake(s) and minor multi-purpose lakes above Lake Bridgeport.

The Net Present Values were calculated based on the assumptions listed under Section IX.A.3 and the following additional assumptions:

1. Operation and maintenance costs increase at the rate of inflation.

2. Annualized project implementation costs are expressed in nominal (current) dollars and are therefore discounted at the nominal (current dollar) rate of 8.25%.

3. O & M costs are expressed in real (constant) dollars and are therefore discounted at the real (constant) rate of 2.12%.

TABLE IX.7A

SUMMARY OF COSTS INCLUDED IN ANALYSIS - SCENARIO "A"(1)

Lake	Storage[3] Volume (ac.ft.)	Estimated Cost[4] per ac.ft.	Total Estimated(5) cost
Minor Multi-Purpose Lakes	219,440	$850	$186,524,000
Major Multi-Purpose Lake(s)	677,270	$600	$406,362,000
TOTAL PROJECT IMPLEMENTATION COST			$592,886,000
Interest & Amortization of Project Implementation Cost at 8-1/4% for 50 Years			$ 54,525,750/year

PRESENT VALUE OF TOTAL COST

Net Present Value of Project Implementation Cost	$648,365,000
Net Present Value of Operation and Maintenance, 100 years at $1,200,000/year(6)	$ 49,613,000
Net Present Value of COSTS INCLUDED IN ANALYSIS 100 years of operation(7)	$642,499,000

Notes:

1. Based on a single major multi-purpose lake and no minor multi-purpose lakes above Lake Bridgeport.
2. Based on 1993 dollars
3. Includes 100 year sedimentation volume, conservation pool, and 100 year flood storage volume
4. Includes all direct costs (including interest during construction) except for O & M and interest.
5. Excludes costs not considered.
6. Assuming O & M costs for flood control only. Also assuming O & M costs increase at the rate of inflation (assumed 6%) and a discount rate of 8.25%.
7. Corresponds to design life of 100 years; 50 additional years of O & M costs added.

TABLE IX.7B

SUMMARY OF COSTS INCLUDED IN ANALYSIS - SCENARIO "B"[1]

Lake	Storage[3] Volume (ac.ft.)	Estimated Cost[4] per ac.ft.	Total Estimated[5] cost
Minor Multi-Purpose Lakes	430,440	$850	$365,874,000
Major Multi-Purpose Lake(s)	476,260	$600	$285,756,000
TOTAL PROJECT IMPLEMENTATION COST			$651,630,000
Interest & Amortization of Project Implementation Cost at 8-1/4% for 50 Years			$ 54,800,320/year

PRESENT VALUE OF TOTAL COST

Net Present Value of Project Implementation Cost	$651,630,000
Net Present Value of Operation and Maintenance, 100 years at $1,500,000/year[6]	$ 62,017,000
Net Present Value of COSTS INCLUDED IN ANALYSIS 100 years of operation[7]	$713,647,000

Notes:

1. Based on major multi-purpose lake(s) and minor multi-purpose lakes above Lake Bridgeport.
2. Based on 1993 dollars
3. Includes 100 year sedimentation volume, conservation pool, and 100 year flood storage volume
4. Includes all direct costs (including interest during construction) except for O & M and interest.
5. Excludes costs not considered.
6. Assuming O & M costs for flood control only. Also assuming O & M costs increase at the rate of inflation (assumed 6%) and a discount rate of 8.25%.
7. Corresponds to design life of 100 years; 50 additional years of O & M costs added.

C. Benefit Cost Comparison:

Tables IX.8A and IX.8B are summaries of the Net Present Value of costs and benefits included in the analysis assuming a 100 year operating period for Scenarios "A" and "B", respectively. In order for the plan to be feasible, the benefits must outweigh the costs. An economically feasible project will therefore have a benefit/cost (B/C) ratio equal to or greater than one.

Table IX.8A shows a limited B/C ratio of 0.02 for Scenario "A" when only Wise County area benefits are included. Adding in the benefits of sediment load reductions into Lake Bridgeport and Eagle Mountain Lake and property damage reduction around Eagle Mountain Lake and Lake Worth, a limited B/C ratio of 0.95 is achieved for this scenario. Table IX.8B shows a limited B/C ratio of 0.02 for Scenario "B" when only Wise County area benefits are included. Adding in the benefits of sediment load reductions into Lake Bridgeport and Eagle Mountain Lake and property damage reduction around Eagle Mountain Lake and Lake Worth, a limited B/C ratio of 0.85 is achieved for Scenario "B". Although these B/C Ratios would indicate that the plan is not feasible, it should be noted that not all factors have been considered. It is anticipated that the project will be feasible if downstream flood reduction benefits are included in the analysis.

Not all benefits and costs could be determined under the scope of the TWDB Planning Grant. Insufficient data was available for determining an accurate B/C ratio. The benefits and costs not included in this analysis which were discussed in this report should be examined in greater detail and a revised B/C ratio should be calculated. **Areas which appear to benefit most from flood reduction afforded by the Plan are those downstream of Lake Worth through Fort Worth , the mid-cities, and Dallas (D/FW area).** Table IX.3 shows damage reduction in Wise County to be $790,000 for the 1990 storm event. Table IX.5 shows damage reduction in the D/FW area to be $116,437,000 for the same storm event. **Based on these preliminary estimates, the D/FW area would received $147 in flood reduction benefits for every $1 of flood reduction benefits received in Wise County for the single storm event studied. Note that a comparison of average annual benefits for the two areas considered may be more or less than the $147 to $1 benefit calculated for the 1990 event.** This preliminary comparison should be examined in more detail in order to more accurately determine the beneficiaries of the Plan.

TABLE IX.8A

LIMITED BENEFIT COST COMPARISON LAKE WORTH AND ABOVE
SCENARIO "A"
<u>100 YEAR OPERATING PERIOD</u>

	Net Present Value of Costs Considered	Net Present Value of Benefits Considered	Cumulative Net Present Value of Benefits Considered	Cumulative Benefit/Cost Ratio
Wise County Damage Reduction	$642,499,000	$12,114,000	$12,114,000	0.02
Eagle Mountain Lake & Lake Worth Damage Reduction	$642,499,000	$124,034,000	$136,148,000	0.21
Eagle Mountain Lake & Lake Bridgeport Sediment Reduction	$642,499,000	$472,900,000	$609,048,000	0.95
Other Benefits	$642,499,000	unknown	unknown	>0.95

TABLE IX.8B

LIMITED BENEFIT COST COMPARISON LAKE WORTH AND ABOVE
SCENARIO "B"
<u>100 YEAR OPERATING PERIOD</u>

	Net Present Value of Costs Considered	Net Present Value of Benefits Considered	Cumulative Net Present Value of Benefits Considered	Cumulative Benefit/Cost Ratio
Wise County Damage Reduction	$713,647,000	$12,114,000	$12,114,000	0.02
Eagle Mountain Lake & Lake Worth Damage Reduction	$713,647,000	$124,034,000	$136,148,000	0.19
Eagle Mountain Lake & Lake Bridgeport Sediment Reduction	$713,647,000	$472,900,000	$609,048,000	0.85
Other Benefits	$713,647,000	unknown	unknown	>0.85

X. PLAN IMPLEMENTATION

X. PROPOSED PLAN IMPLEMENTATION

A. Introduction

Implementation of the "Flood Protection Plan for the West Fork of the Trinity River Above Eagle Mountain Lake" is proposed by the creation of an "organization" that will represent the interest of all those that benefit. This organization should provide a method for evaluating benefits, funding the proposed facilities, and sharing costs. For purposes of this report this organization will be referred to as the "West Fork Commission" (WFC).

B. Purpose of West Fork Commission

It is proposed that the WFC be a voluntary association of governmental and private interest with the purpose being to encourage the improvement of drainage, water quality, water resources, environment and economic development of the West Fork of the Trinity River.

C. Entities Involved

It is proposed that the WFC be open to all governmental and private interest that have a direct concern with the purpose of the commission. At this time those with apparent concern included:

<u>County Governments</u>
Wise County
Jack County
Montague County
Young County
Clay County
Archer County
Parker County
Dallas County
Tarrant County

<u>City Governments (by stream segments)</u>
Area 1 (south Dallas County line, upstream through the City of Dallas)
- City of Seagoville
- City of Wilmer
- City of Hutchins
- City of Dallas

Area 2 (mid-cities)
- City of Irving
- City of Grand Prairie

City of Arlington
Area 3 (Fort Worth to south Wise County line)
City of Fort Worth
City of Westworth Village
City of River Oaks
City of Lake Worth
City of Lakeside
Area 4 (south Wise County line to Lake Bridgeport)
City of Boyd
City of Paradise
City of Bridgeport
City of Rhome
City of Newark
Area 5 (Big Sandy Creek)
City of Bowie
City of Alvord
City of Decatur
City of Chico
Area 6 (Lake Bridgeport and areas above in the West Fork Basin)
City of Lake Bridgeport
City of Runaway Bay
City of Jacksboro
City of Antelope

State Agencies
Texas Water Development Board
Texas Water Commission
Texas Department of Health
Texas Department of Parks and Recreation
Texas Railroad Commission
Texas Department of Transportation
Wise County SWCD
Upper West Fork SWCD
Dalworth SWCD
Jack County SWCD
Young County SWCD
Parker County SWCD
Little White SWCD
Upper Red SWCD
Little Wichita SWCD

Federal Agencies
U.S. Army Corps of Engineers
Federal Emergency Management Agency

Soil Conservation Service
Environmental Protection Agency
U.S. Fish and Wildlife
U.S. Forest Service
Federal Highway Administration
Farms Home Administration

<u>Area Agencies</u>
Trinity River Authority
TCWCID No.1
WCWCID No.1
JCWCID No.1
North Central Texas Council of Governments
NORTEX Regional Planning Commission

<u>Environmental Interest</u>
Any recognized environmental organization that has a purpose of environmental protection and improvement.

<u>Economic Interest</u>
Any individual, organization, or corporation that has an economic interest in the West Fork of the Trinity River or any of its tributaries.

D. Planning Function of WFC

The planning function of the WFC would be to plan the general locations and timing of multi-purpose lakes and to evaluate the multi-purpose needs of each lake. This planning function should be performed in cooperation with local agencies and property owners.

E. Technical Function of WFC

The WFC should have the technical ability to evaluate the benefits created by each of the multi-purpose lakes. It is not proposed that the WFC actually build, operate, or maintain any of the multi-purpose facilities, but it should be able to develop policies for building, operating, and maintaining the multi-purpose lakes for the overall benefit of the West Fork Basin.

F. Fiscal Function of WFC

It is proposed that the WFC have the ability to finance itself from member fees and funds from programs of area, state, and federal agencies. The WFC's fiscal responsibility for the construction and maintenance for the multi-purpose lakes would consist of:

1. Encouraging local, area, state and federal agencies, and private interest to assist in the construction cost, operation, and maintenance of the multi-purpose lakes.
2. Development of an equitable policy for sharing of construction, operation, and maintenance cost by those that benefit from the multi-purpose lakes.

G. Proposed Organizational Structure of the West Fork Commission

It is proposed that the West Fork Commission (WFC) be composed of all interested entities as discussed in Section C above. The proposed WFC would consist of a 15 member Board of Directors with 7 members being voting members and 8 members being non-voting. It is proposed that the directors of the WFC be as follows:

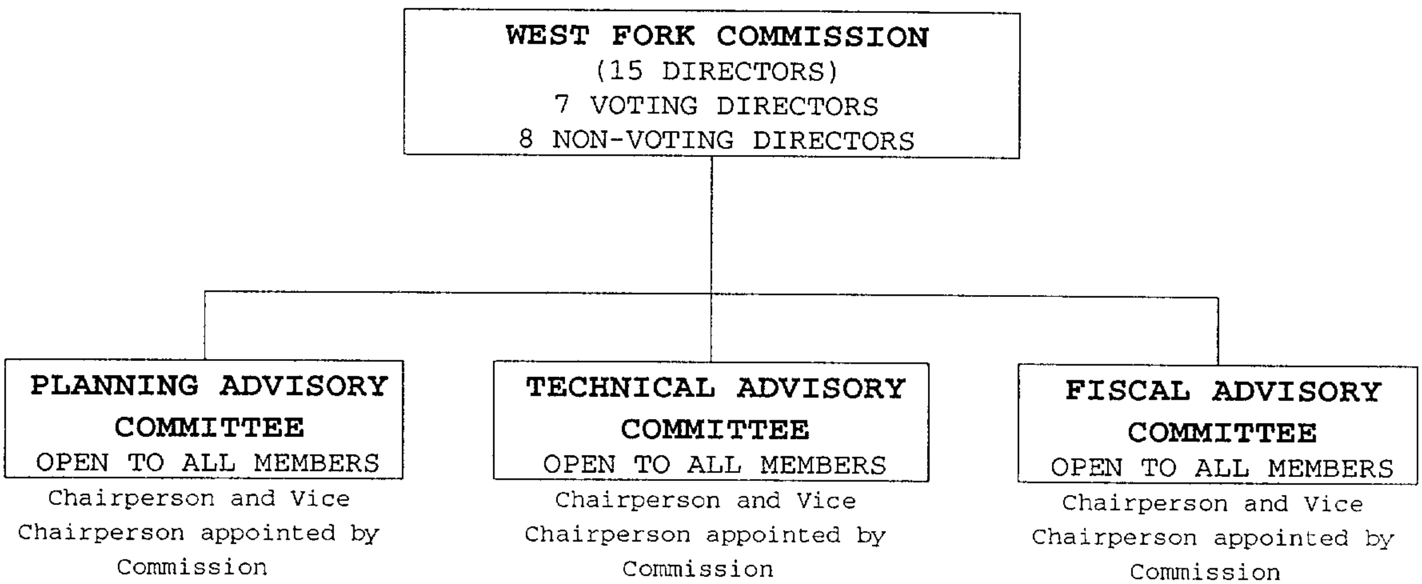
<u>Proposed West Fork Commission Directors</u>

- Counties (one voting director selected by 9 counties involved, director must represent private economic interest)
- West Fork Area 1 (Dallas and Below - one voting director)
- West Fork Area 2 (Mid Cities Area - one voting director)
- West Fork Area 3 (Fort Worth to South Wise County Line - one voting director)
- West Fork Area 4 (South Wise County Line to Lake Bridgeport - one voting director)
- West Fork Area 5 (Big Sandy Area - one voting director)
- West Fork Area 6 (Lake Bridgeport and Area Above - one voting director)
- State Agencies (2 Directors - non voting)
- Federal Agencies (2 Directors - non voting)
- Area Agencies (2 Directors - non voting)
- Private Interest (Environmental - one director - non voting)
- Private Interest (Economic - one director - non voting)

In addition to the directors of the WFC it is proposed there be a Planning Advisory Committee, a Technical Advisory Committee, and a Fiscal Advisory Committee that would assist the commission. The chairperson and vice-chairperson of each committee are proposed to be appointed by the directors of the commission. Membership on any or all of the three commissions is proposed to be open to all members. This proposed organizational structure is shown on Figure X.1.

FIGURE X.1

PROPOSED ORGANIZATIONAL STRUCTURE
WEST FORK COMMISSION



XI. RECOMMENDATIONS

XI. RECOMMENDATIONS

This "Flood Protection Plan for the West Fork of the Trinity River Above Eagle Mountain Lake" can serve as the first step toward development of a method of managed floods for the Trinity River. This plan is intended as a planning document to be used as a guide for future implementation steps. Based on this study, Shawn Engineering/Environmental Corporation (SEE Corp.) makes the following recommendations regarding proposed actions and additional data development:

Recommended Actions

1. A voluntary organization of governmental and private interest (herein referred to as the West Fork Commission) should be formed.

2. A policy for membership and fees for membership in the WFC should be established.

3. The "Flood Protection Plan for the West Fork of the Trinity River Above Eagle Mountain Lake" should be adopted as a planning guide by the WFC.

4. The WFC should develop a policy for determining who benefits and how much they benefit from proposed multi-purpose lakes.

5. This plan should be considered in the Upper Trinity River Feasibility Study which is currently being developed by the North Central Texas Council of Governments and the US Army Corps of Engineers.

6. WFC should work with the North Central Texas Council of Governments and the NORTEX Regional Planning Commission to establish a method for WFC to review and comment on projects subject to NCTCOG and NTRPC review.

7. WFC should initiate a plan for installing additional rainfall gages and stream gaging stations that can be remotely read and recorded. This data should be incorporated into the area wide emergency action plans.

8. WFC should initiate discussions to develop agreement(s) with water rights holders for volume transfers to multi-purpose lakes.

<u>Recommended Additional Studies</u>

1. A flood frequency analysis (10, 50, 100 year, Standard Project and PMF) on an hourly basis should be made to incorporate areas downstream of Wise County.

2. A study should be made of the probability of multiple floods as they relate to multi-purpose lakes.

3. A study should be made using current (updated) rainfall data to establish "firm yields" on the West Fork.

4. Based on economic data developed in the Upper Trinity River Feasibility Study, detail benefit/cost determinations should be made for the multi-purpose lakes.

5. Floodway and floodplains should be studied for those portions of Wise, Jack, Montague, Archer, Young, Clay, and Parker Counties in the West Fork basin that have not been studied and FEMA maps revised to include new base flood elevations.

6. An environmental analysis should be made of the possible effects of multi-purpose lakes on downstream areas of the West Fork and the Trinity River.

7. A study should be made to establish a plan for controlling releases from multi-purpose lakes and for coordination of releases with other lakes in the West Fork and lakes within the remainder of the Trinity River Basin.

8. A detailed study should be made of possible site(s) for the major multi-purpose lakes on the West Fork above Lake Bridgeport.

9. A detailed study should be made of possible site(s) for minor multi-purpose lakes.

XII. ACKNOWLEDGEMENTS

ACKNOWLEDGMENTS

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Citizens of Wise County

Citizens of Jack County

Big Sandy Water Authority
    Concerned Citizens Group
    Mr. Edward L. Green

Federal Emergency Management Agency
    Mr. Jack Quarlei

Jack County
    Judge Mitchell Davenport

Montague County
    Judge Jack Wind

North Central Texas Council of Governments
    Mr. Chris Brooks
    Mr. John Promise
    Mr. Mike Simms
    Mr. John E. Tidwell, Jr.

Tarrant County Water Control and Improvement District Number One
    Mr. Richard Ellis
    Mr. Mark Ernst
    Mr. David Geary
    Mr. David Marshall
    Mr. Wayne Owen
    Mr. Steve Sieja
    Mr. Jim Oliver
    Mr. George Shannon

Texas Water Commission
    Mr. Warren Samuelson

Texas Department of Transportation

Mr. Shiraz Dhanani (Fort Worth)
Mr. Richard Steger (Wichita Falls)

Texas Water Development Board

Mr. Curtis Johnson
Mr. Bill Moltz
Mr. Scot Sullivan
Mr. Dwayne Thomas
Mr. Bob Wear

USDA Soil Conservation Services

Mr. Howard Barton
Mr. Gary Bates
Mr. Bede
Mr. Ronald Colburn
Mr. Gary Conner
Mr. Tony Dean
Mr. Larry Gertz
Mr. James Haley
Mr. Ronald Herring
Mr. Doug Johnson
Mr. Dennis Medlin
Mr. John Paclick
Mr. Mark Walker

U.S. Army Corps of Engineers, Fort Worth District

Mr. Steve Dempsey
Ms. Becky Griffith
Mr. Craig Loftin
Mr. Steve Pilney
Mr. Gene Rice
Mr. Paul Rodman
Mr. Peter Shaw

U.S. Geological Survey

Mr. Harry McWreath
Mr. Ralph Ollman
Mr. Timothy Raines

Wise County Appraisal District

Mr. Todd Buckner
Mr. Mickey Hand

Wise County Water Control and Improvement District
Mr. Rollins Bilby
Ms. Lou Bridges

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REFERENCES

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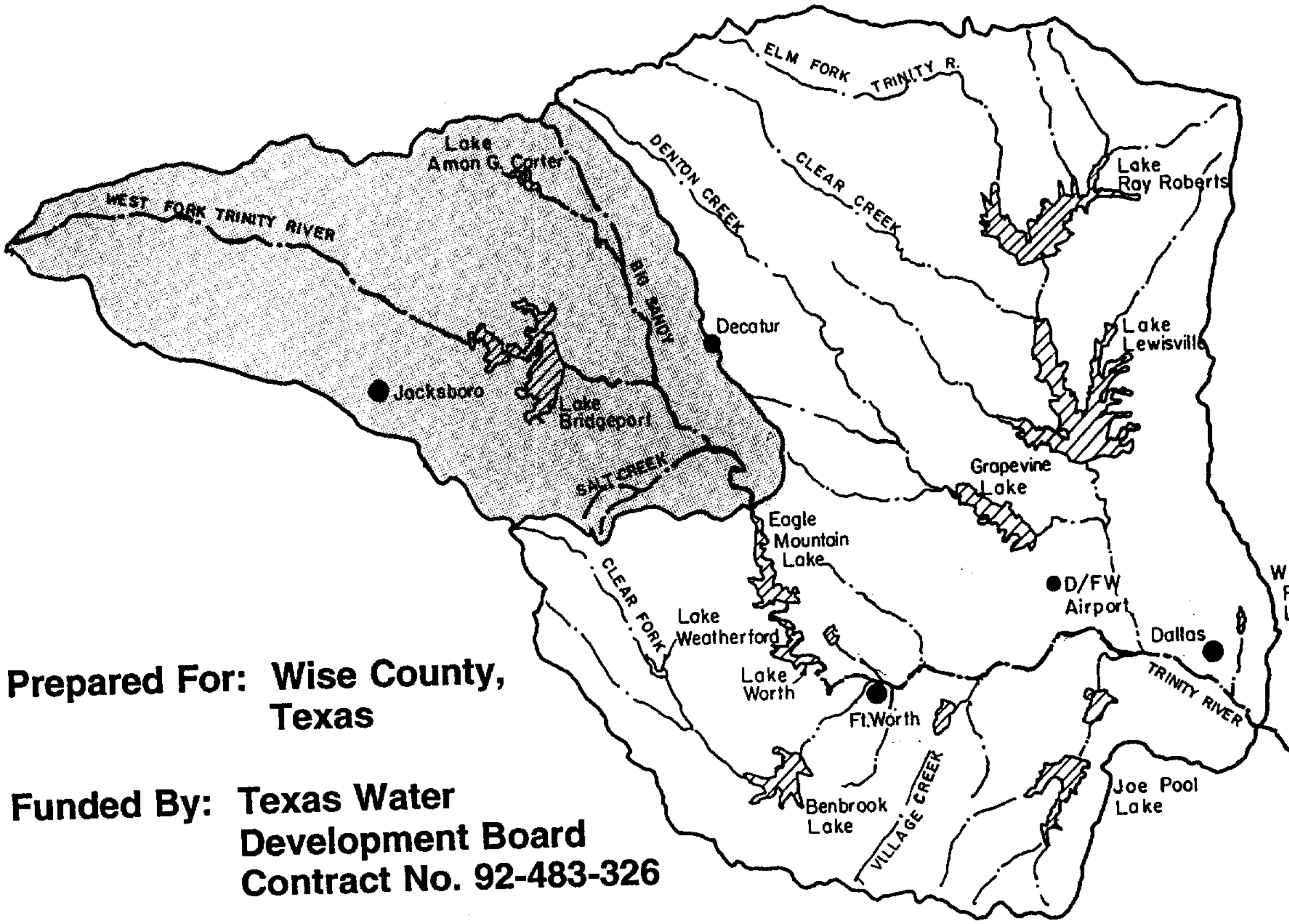
FLOOD PROTECTION PLAN FOR THE WEST FORK OF THE TRINITY RIVER ABOVE EAGLE MOUNTAIN LAKE

APPENDICES



Prepared For: Wise County, Texas

Funded By: Texas Water Development Board
Contract No. 92-483-326

Prepared By: Shawn Engineering/Environmental Corp. (SEE Corp.)
With The Assistance Of:
- O'Brien Engineering
- Eichert Engineering

FINAL REPORT

January, 1994

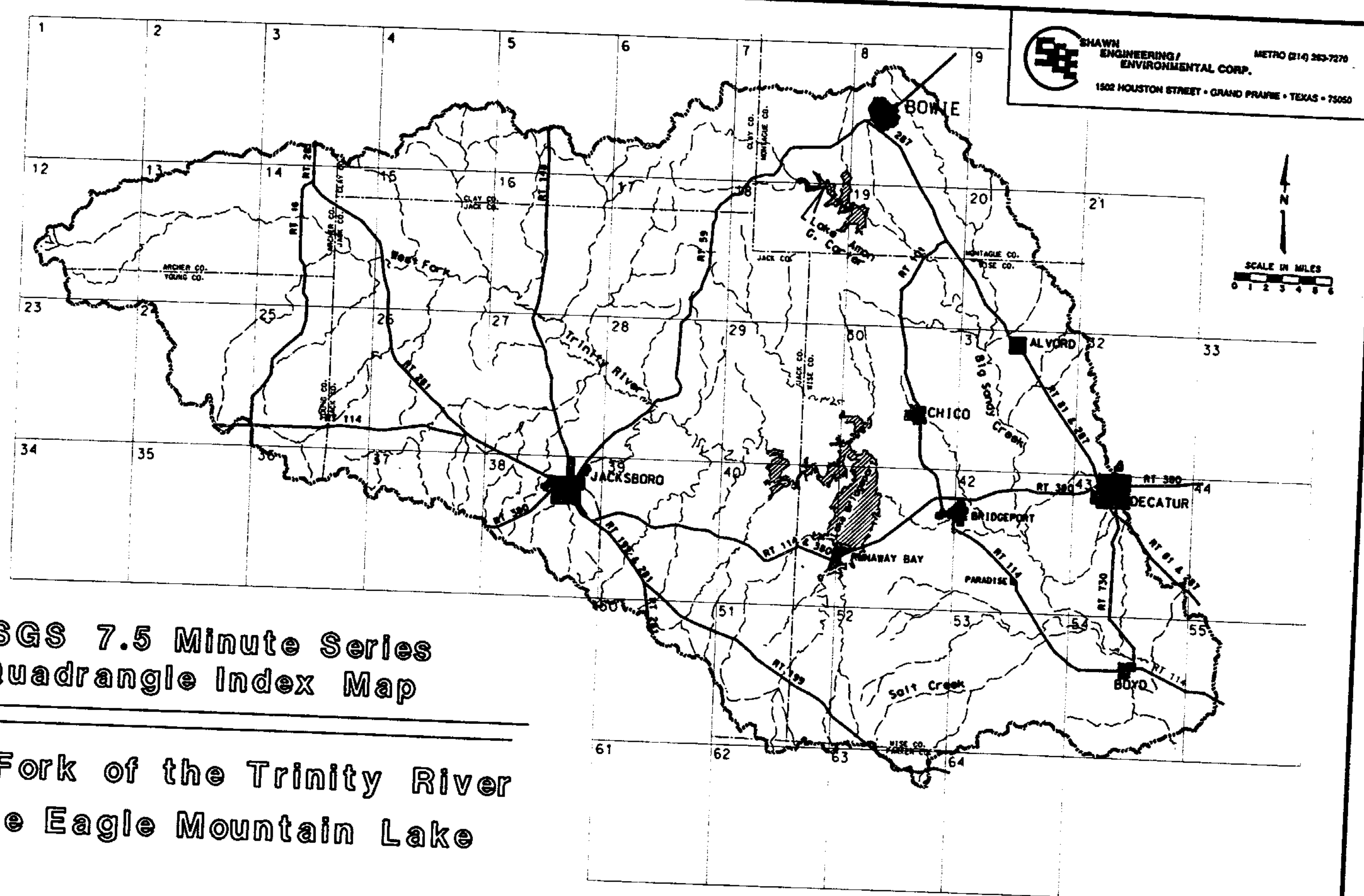
TABLE OF CONTENTS

APPENDIX 1

UPDATED USGS 7.5 MINUTE SERIES TOPOGRAPHIC QUADRANGLE MAPS

USGS 7.5 Minute Series Quadrangle Map Index

GRID #	QUADRANGLE
2	ARCHER CITY EAST, TX
3	WINDTHORST, TX
4	SCOTLAND, SE, TX
5	JOY, TX
6	VASHTI, TX
7	BRUSHY MOUND, TX
8	BOWIE, TX
9	SALONA, TX
12	BOBCAT BLUFF, TX
13	PRICKLY PEAR, TX
14	DARNELL BRANCH, TX
15	ANTELOPE, TX
16	POSTOAK, TX
17	NEWPORT, TX
18	SELMA, TX
19	SUNSET, TX
20	SMYRNA, TX
23	TRUE, TX
24	LOVING, TX
25	MARKLEY, TX
26	LYNN CREEK, TX
27	JOHNSON LAKE, TX
28	CUNDIFF, TX
29	CRAFTON, TX
30	CHICO, TX
31	ALVORD, TX
32	PECAN CREEK, TX
36	BRYSON, TX
37	SENATE, TX
38	JACKSBORO, TX
39	JACKSBORO, NE, TX
40	WIZARD WELLS, TX
41	BRIDGEPORT, WEST, TX
42	BRIDGEPORT, EAST, TX
43	DECATUR, TX
44	BLUETT, TX
49	BARTONS CHAPEL, TX
50	PERRIN, TX
51	GIBTOWN, TX
52	BOONSVILLE, TX
53	COTTONDALE, TX
54	BOYD, TX
55	RHOME, TX
62	ADELL, TX
63	POOLVILLE, TX
64	SPRINGTOWN, TX
65	AZEL, TX
66	AVONDALE, TX



USGS 7.5 Minute Series Quadrangle Index Map

West Fork of the Trinity River Above Eagle Mountain Lake

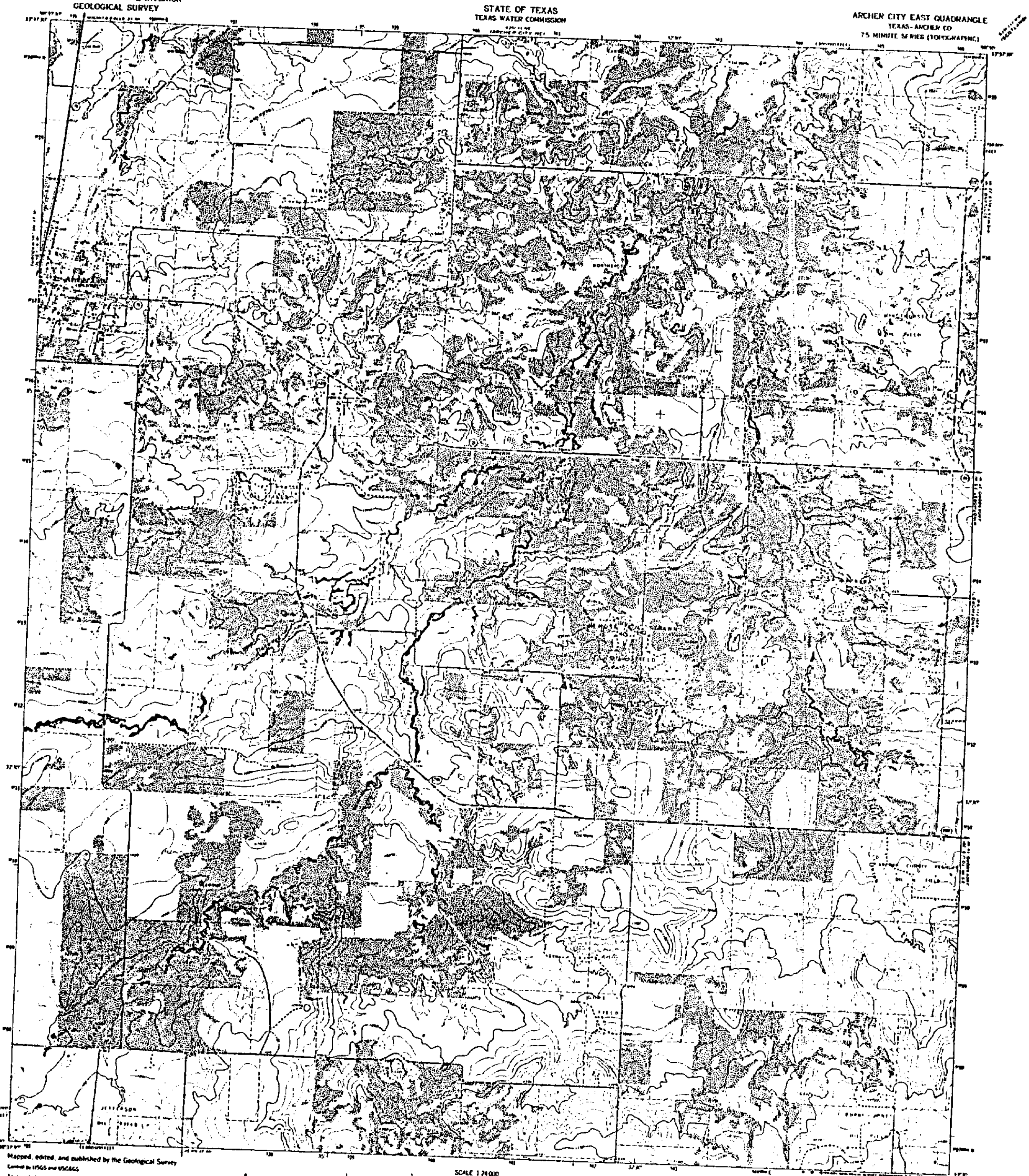
Note: See Table III.1 for Index to Quadrangle Names

PLATE III.1

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TEXAS
TEXAS WATER COMMISSION

ARCHER CITY EAST QUADRANGLE
TEXAS-ARCHER CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1963

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D.C.

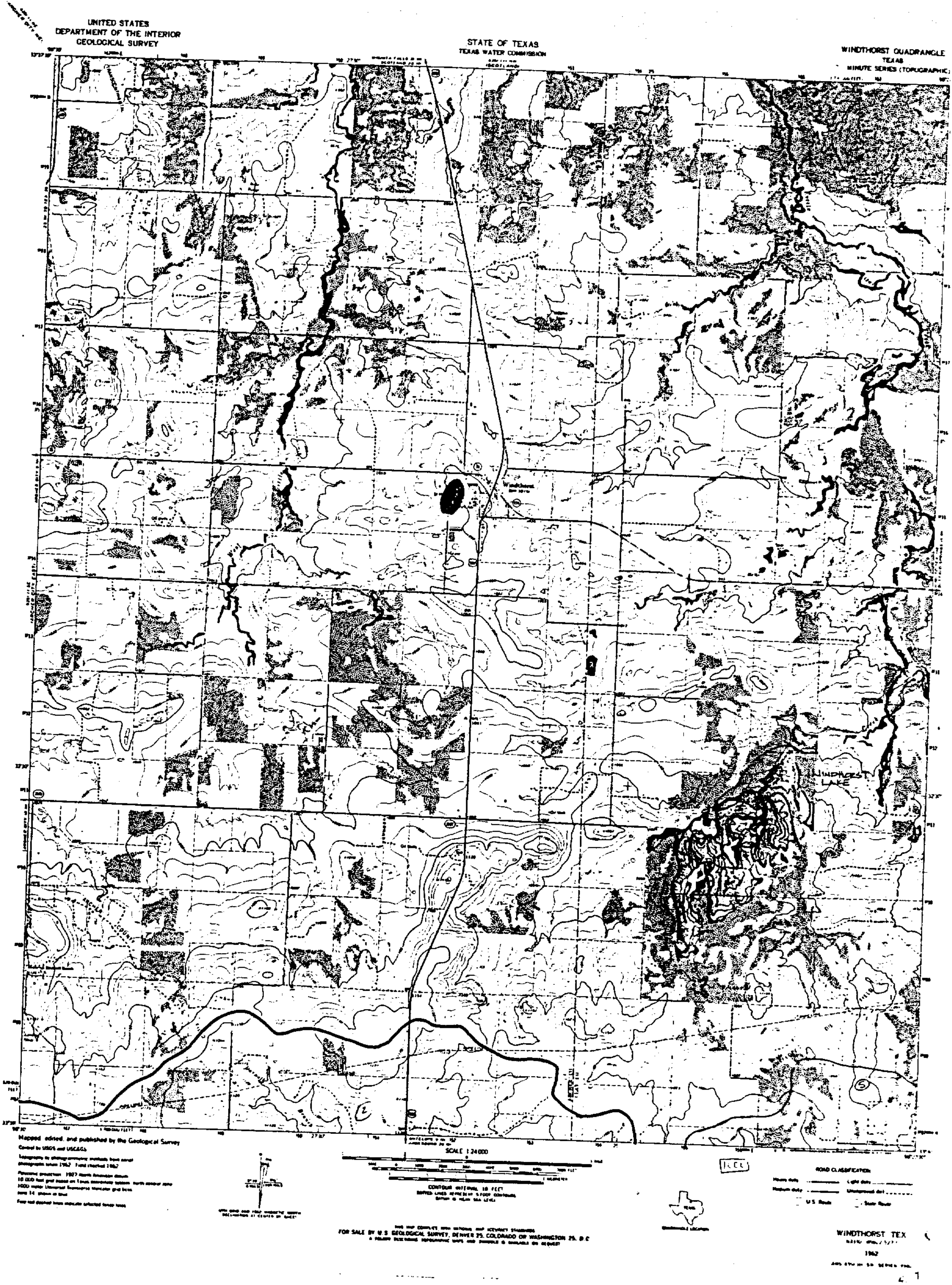
ROAD CLASSIFICATION

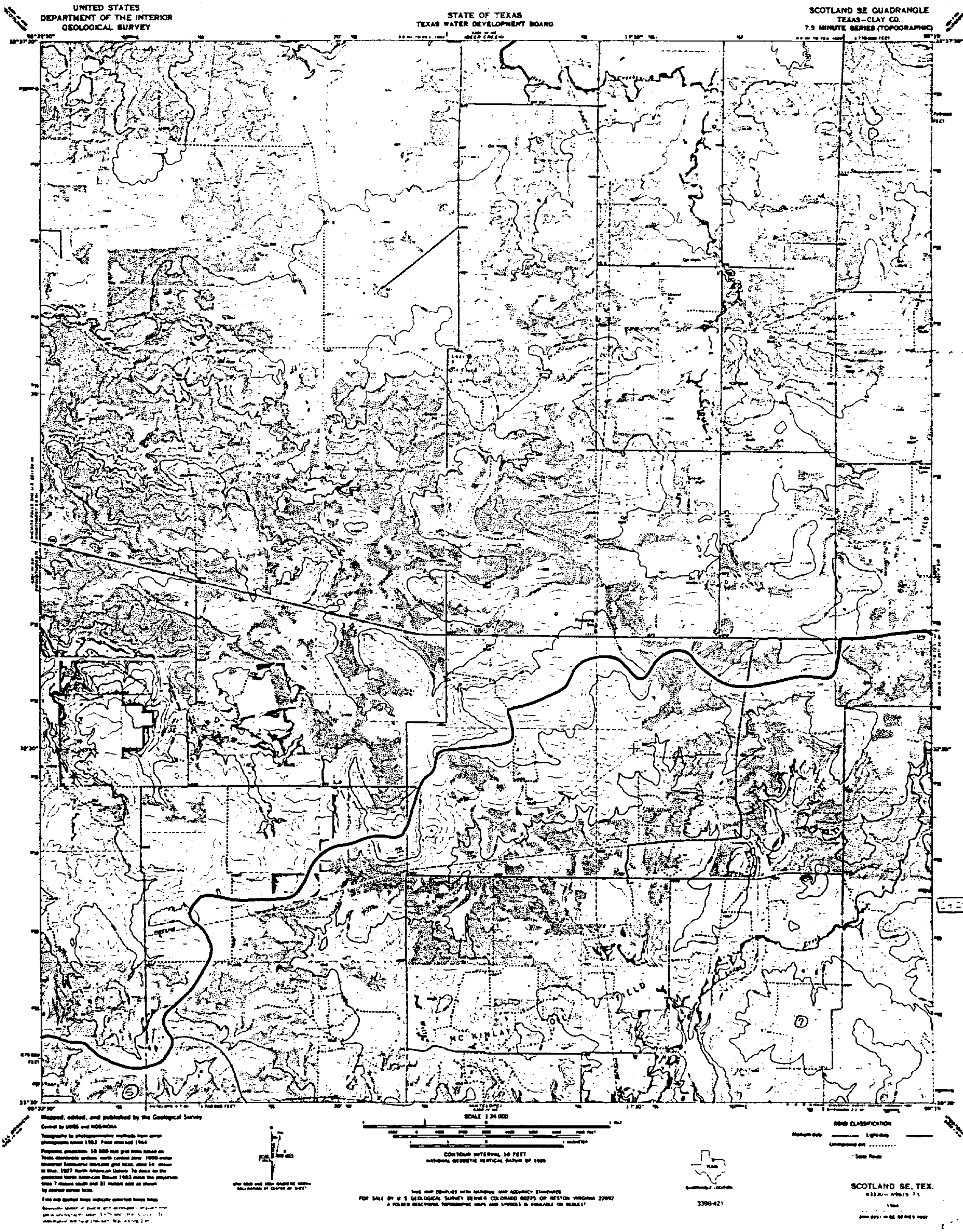
Heavy duty
Light duty
Medium duty
Unimproved dirt
State Route

QUADRANGLE LOCATION

ARCHER CITY EAST, TEX

1963


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF TEXAS
TEXAS WATER COMMISSION
WINDTHORST QUADRANGLE
TEXAS
MINUTE SERIES (TOPOGRAPHIC)
Windthorst
WINDTHORST LAKE
Mapped, edited, and published by the Geological Survey
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D.C.
ROAD CLASSIFICATION
U.S. Route
State Route
WINDTHORST, TEX.
1962

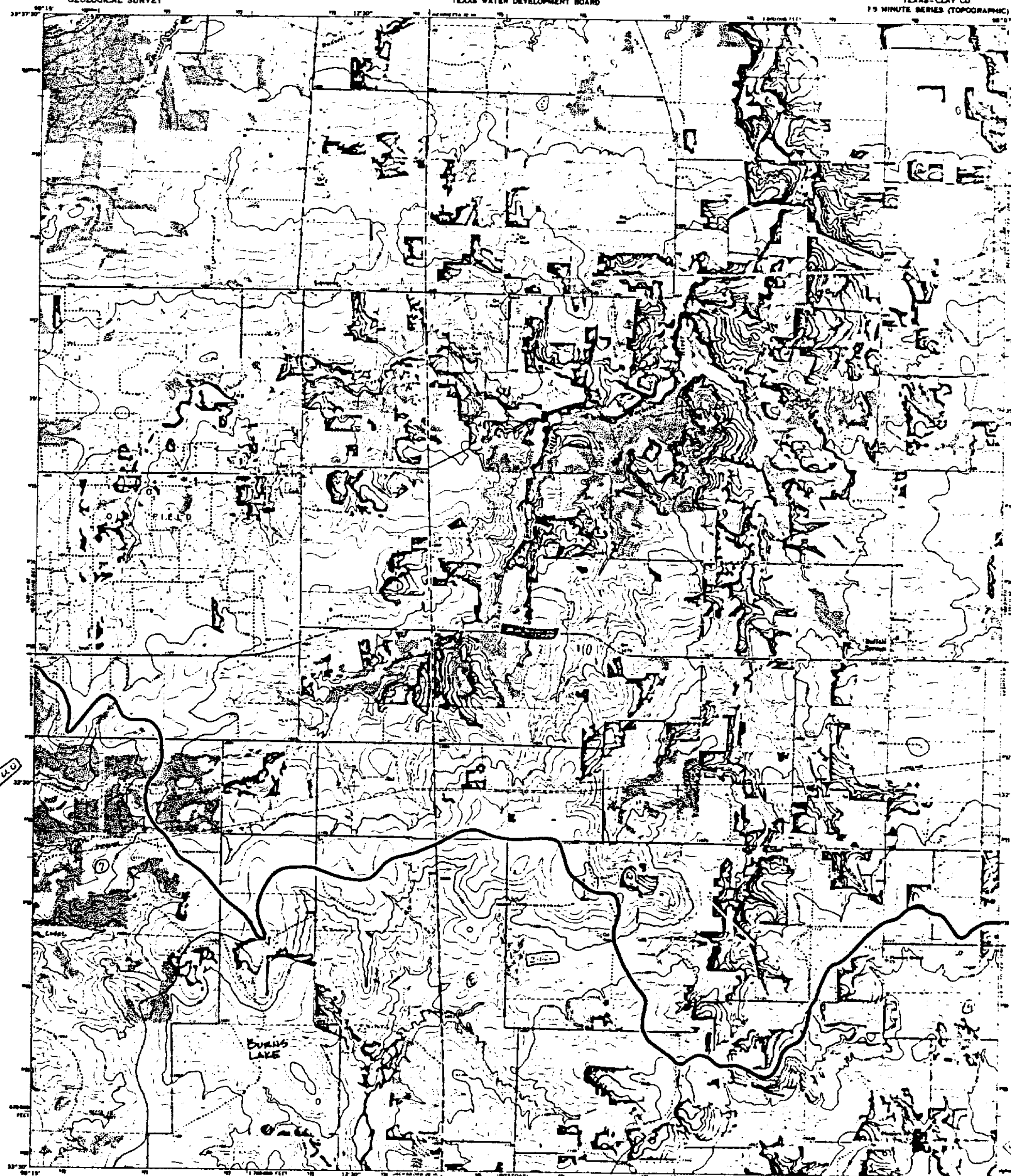

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD
SCOTLAND SE QUADRANGLE
TEXAS-CLAY CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
MC KINLAY
FIELD
Mapped, edited, and published by the Geological Survey
Control by USGS and NOS/NOAA
Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
Medium-duty
Light-duty
Unimproved dirt
State Route
QUADRANGLE LOCATION
3398-421
SCOTLAND SE, TEX.
1964

4

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD

JOY QUADRANGLE
TEXAS–CLAY CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Texas coordinate system, north central zone
1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue

Fine red dashed lines indicate selected fence lines

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

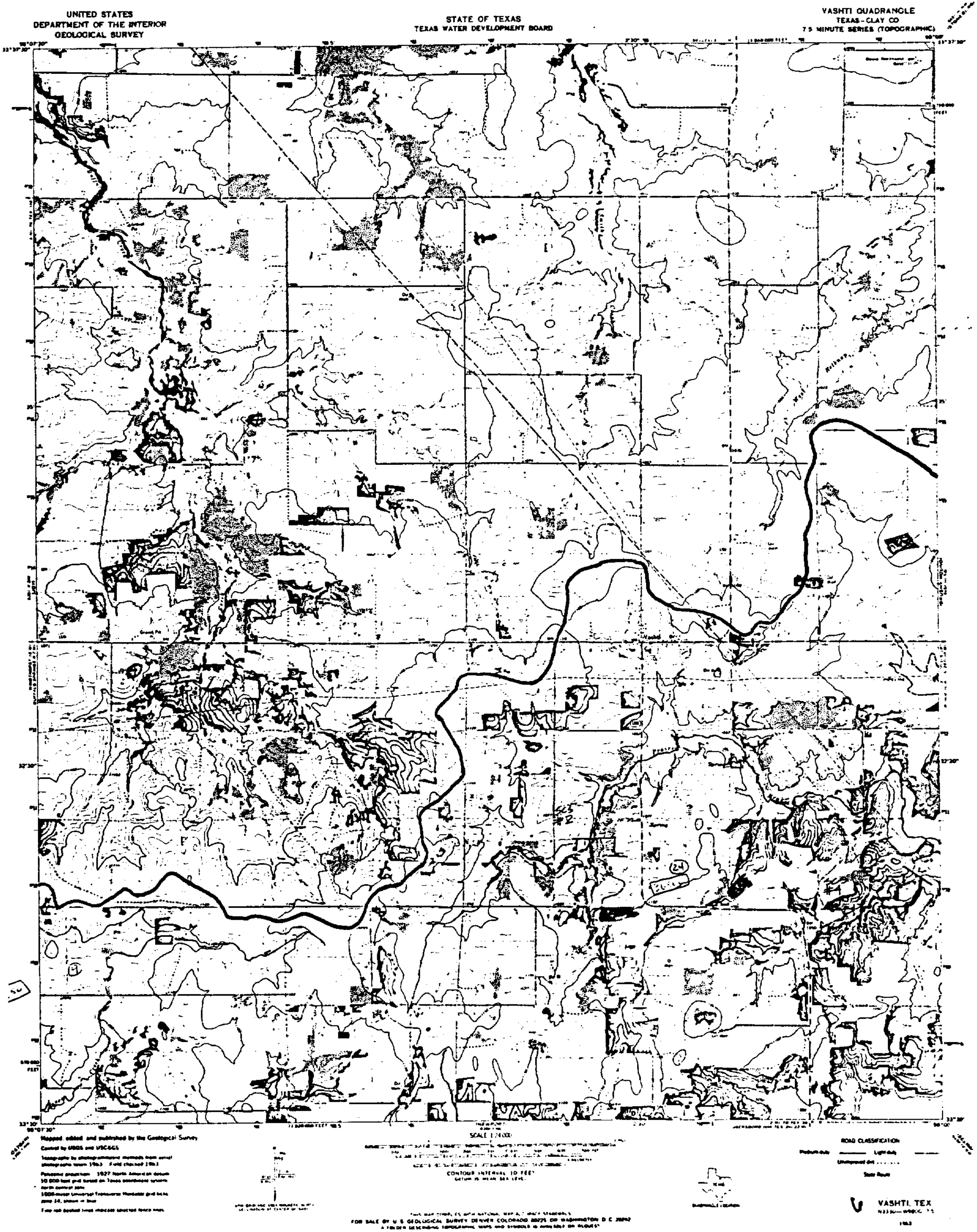
ROAD CLASSIFICATION
Medium-duty ——— Light-duty ———
Unimproved dirt - - - - -
State Route

QUADRANGLE LOCATION

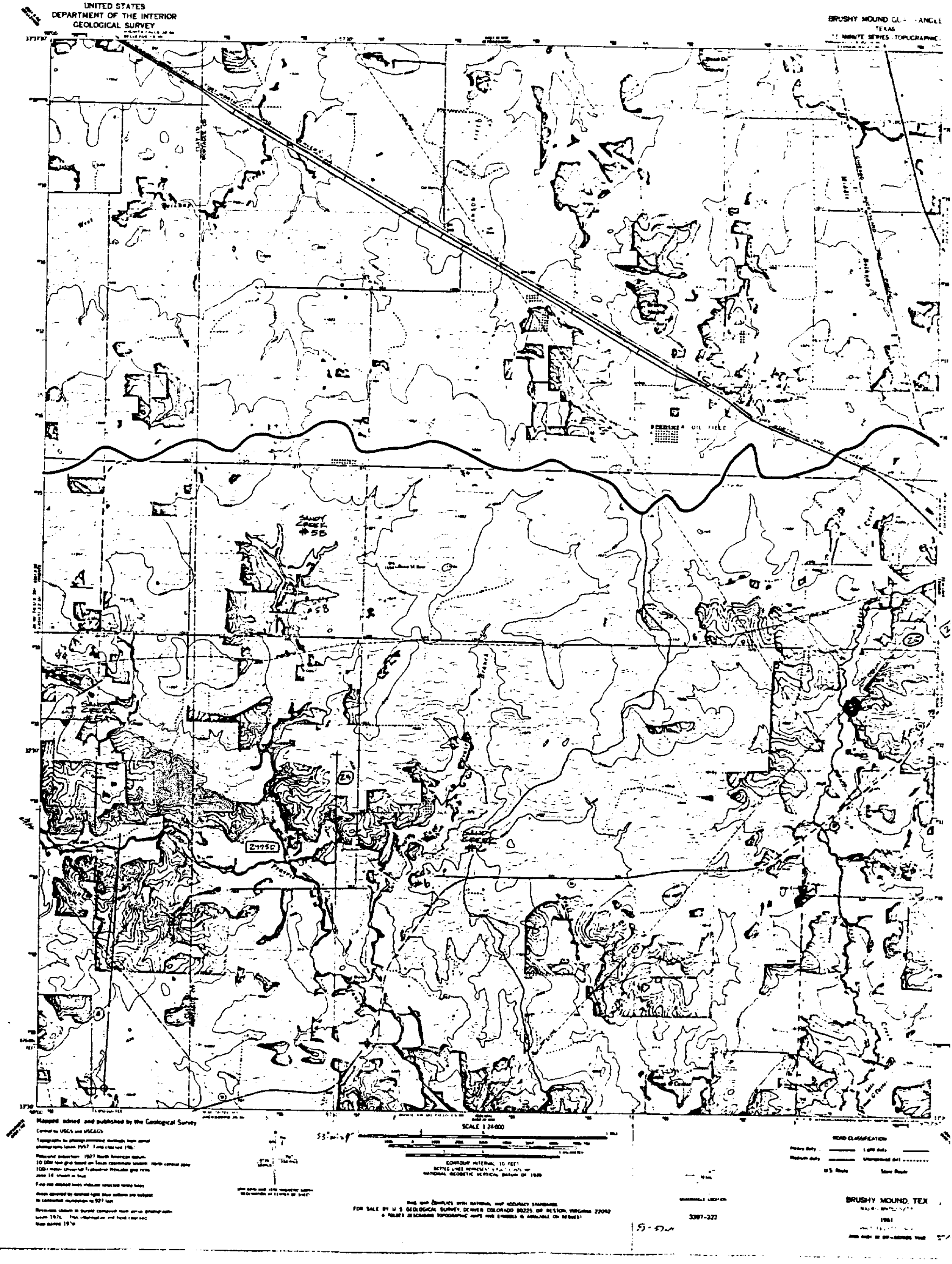
JOY, TEX.
N3330—W9807.5/7.5

1964

AMS 6351 II SW—SERIES V882

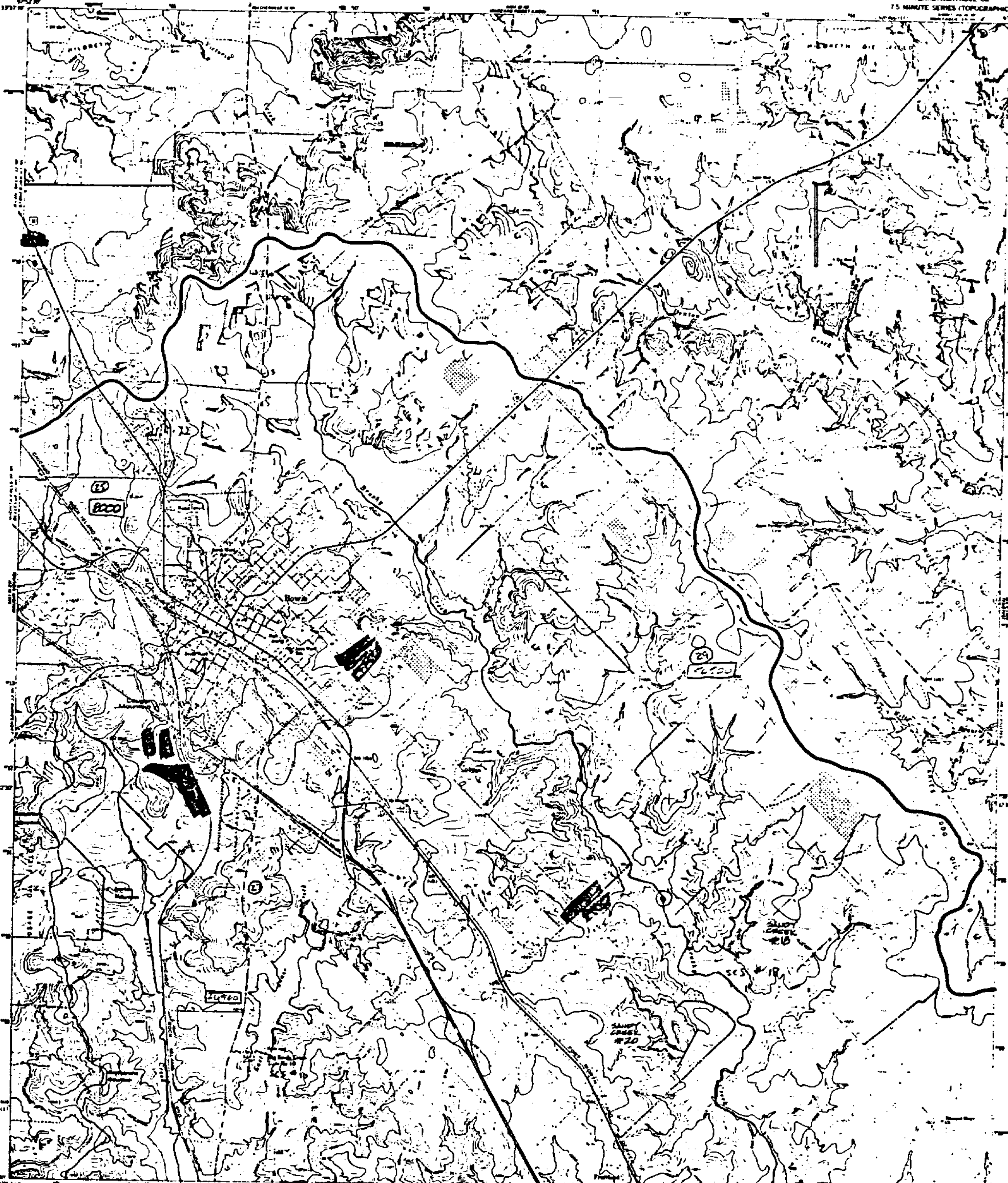

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD
VASHTI QUADRANGLE
TEXAS-CLAY CO
7.5 MINUTE SERIES (TOPOGRAPHIC)
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225 OR WASHINGTON, D. C. 20242
ROAD CLASSIFICATION
State Route
VASHTI, TEX.
1963

6


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SANDY CREEK #55
58
SANDY CREEK #5A
29
Z-775D
OIL FIELD
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
ROAD CLASSIFICATION
U.S. Route
State Route
3387-322
BRUSHY MOUND, TEX.
1961
7

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BOWIE QUADRANGLE
TEXAS-MONTAGUE CO
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

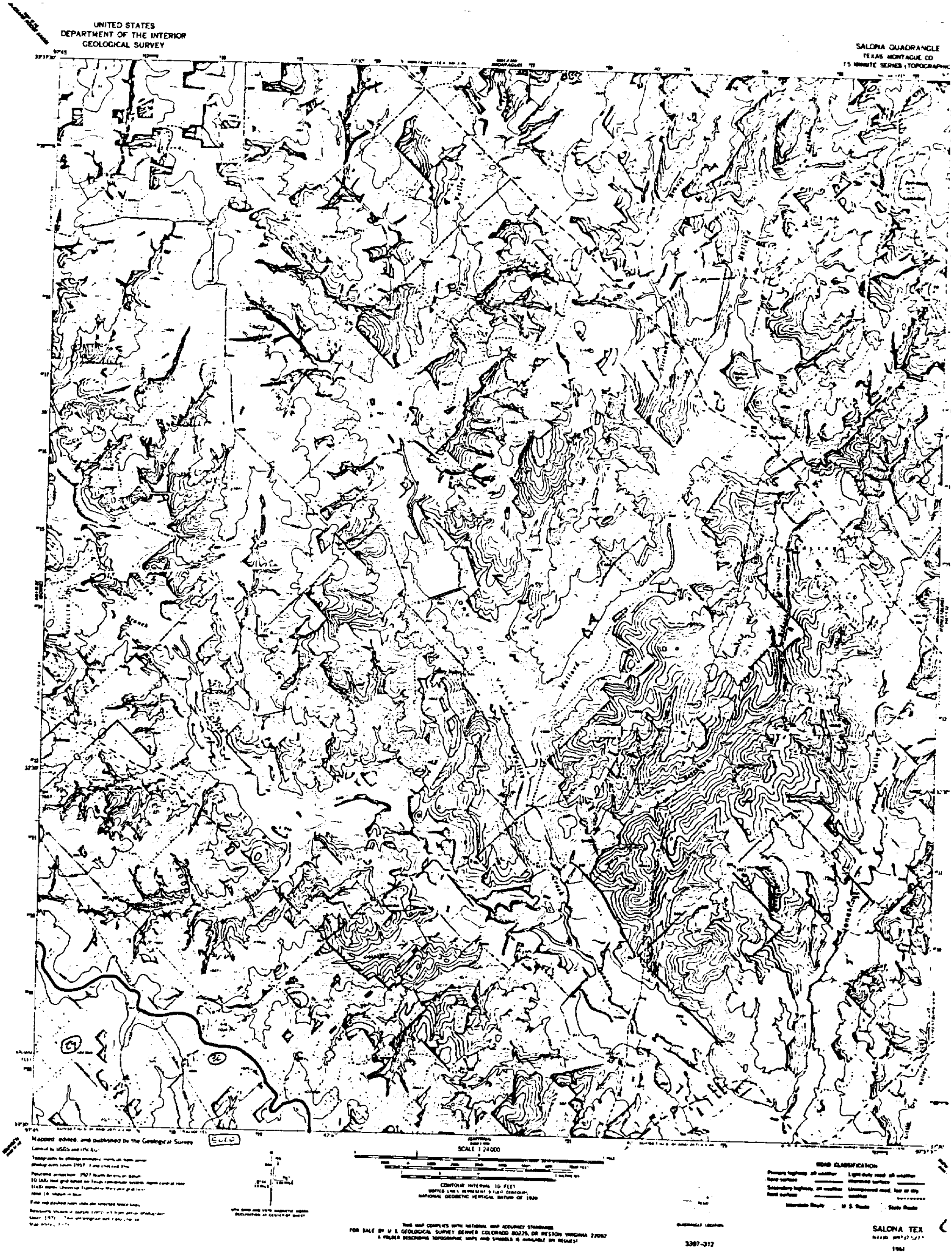
U.S. Route

State Route

3387-321

BOWIE, TEX.

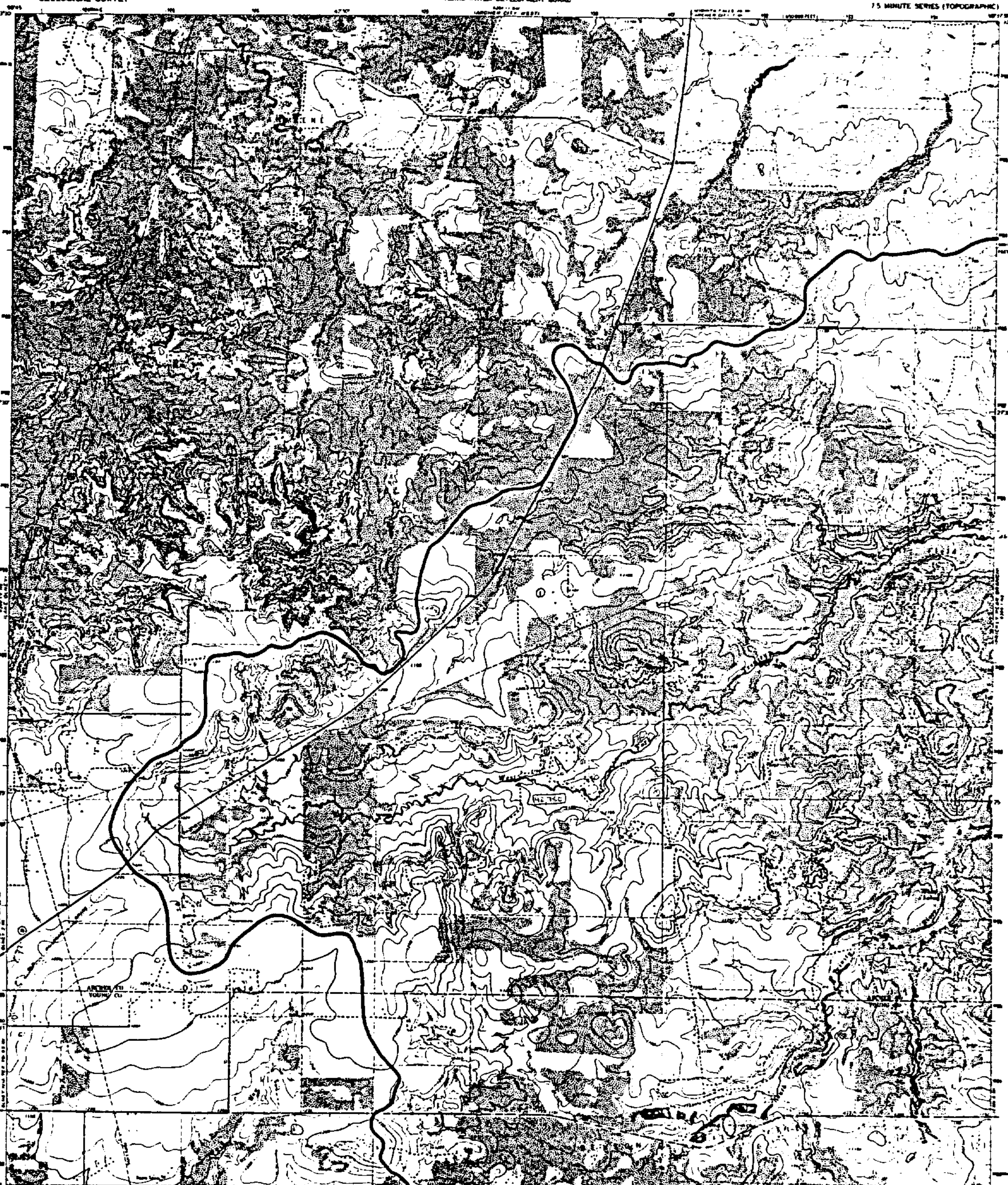
1961


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SALONA QUADRANGLE
TEXAS MONTAGUE CO
7.5 MINUTE SERIES (TOPOGRAPHIC)
Mapped, edited, and published by the Geological Survey
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ROAD CLASSIFICATION
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
3387-312
SALONA, TEX.
1961

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD

BOBCAT BLUFF QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

SCALE 1:24 000

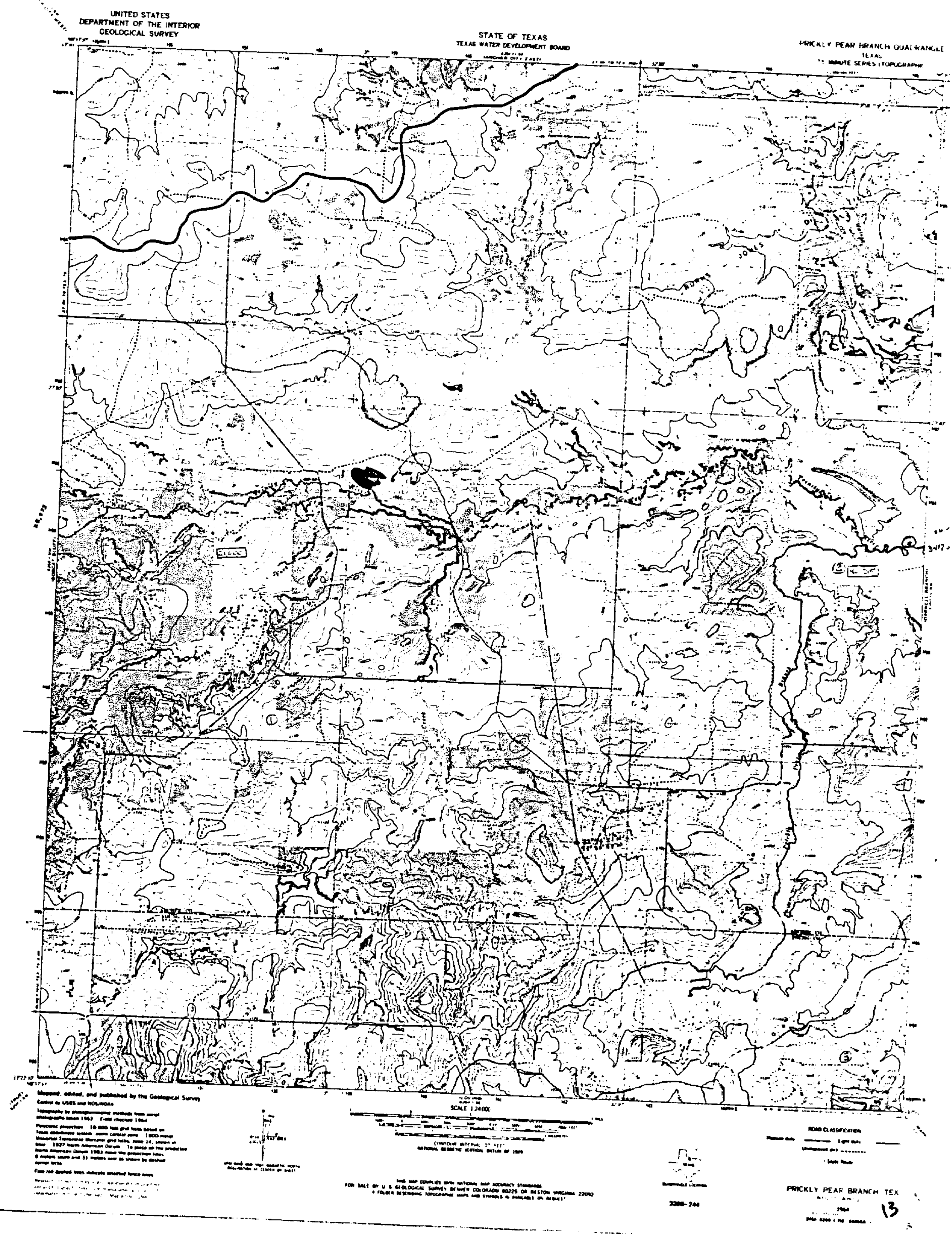
CONTOUR INTERVAL 10 FEET

ROAD CLASSIFICATION

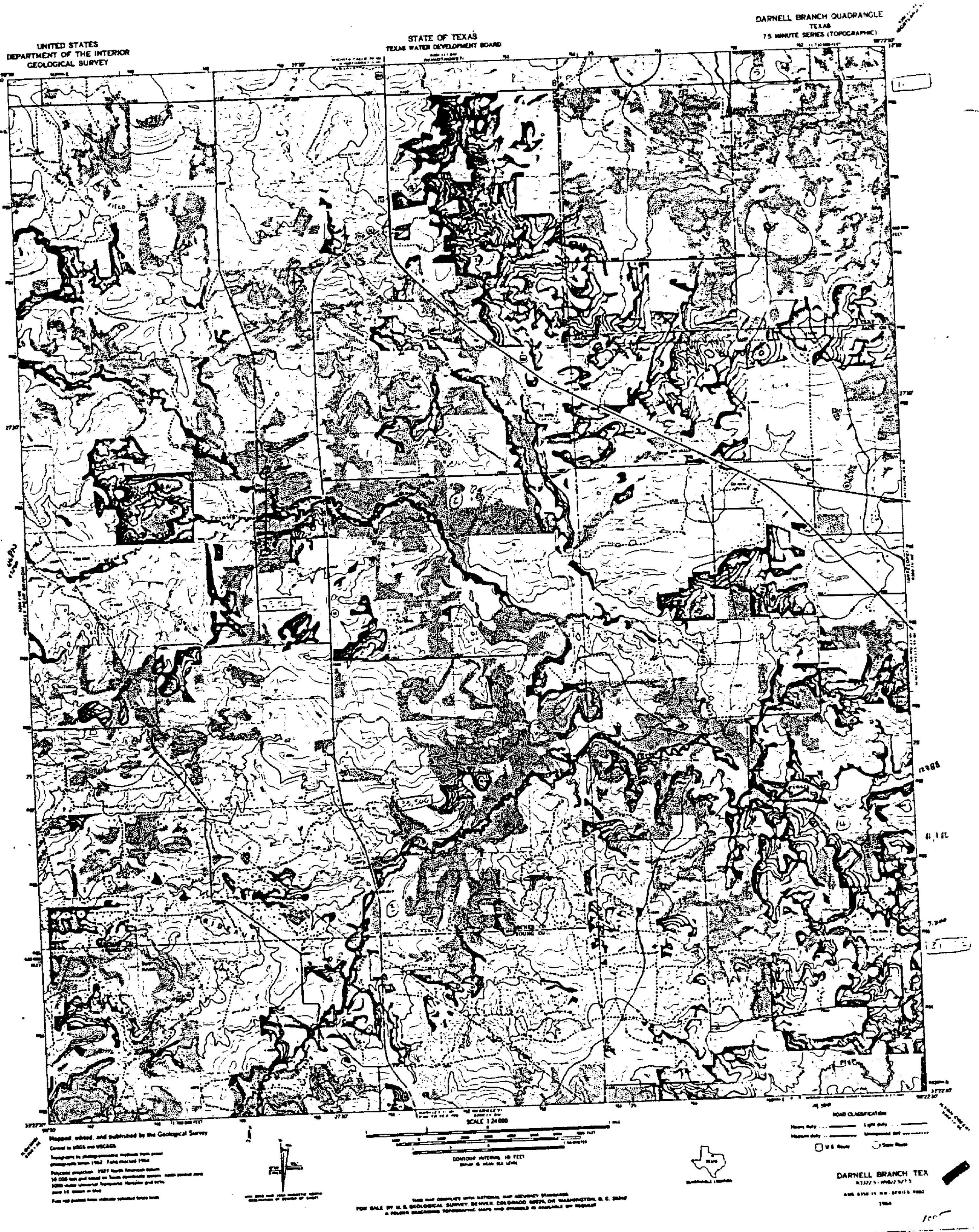
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

BOBCAT BLUFF, TEX

1964



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD
PRICKLY PEAR BRANCH QUADRANGLE
TEXAS
JONES
BURNS
Mapped, edited, and published by the Geological Survey
SCALE 1:24 000
ROAD CLASSIFICATION
PRICKLY PEAR BRANCH, TEX.
1964
13
M


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD
DARNELL BRANCH QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
27'30"
Mapped, edited, and published by the Geological Survey
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
ROAD CLASSIFICATION
U.S. Route
State Route
DARNELL BRANCH, TEX
1964

I-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD

ANTELOPE QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1964

SCALE 1:24000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

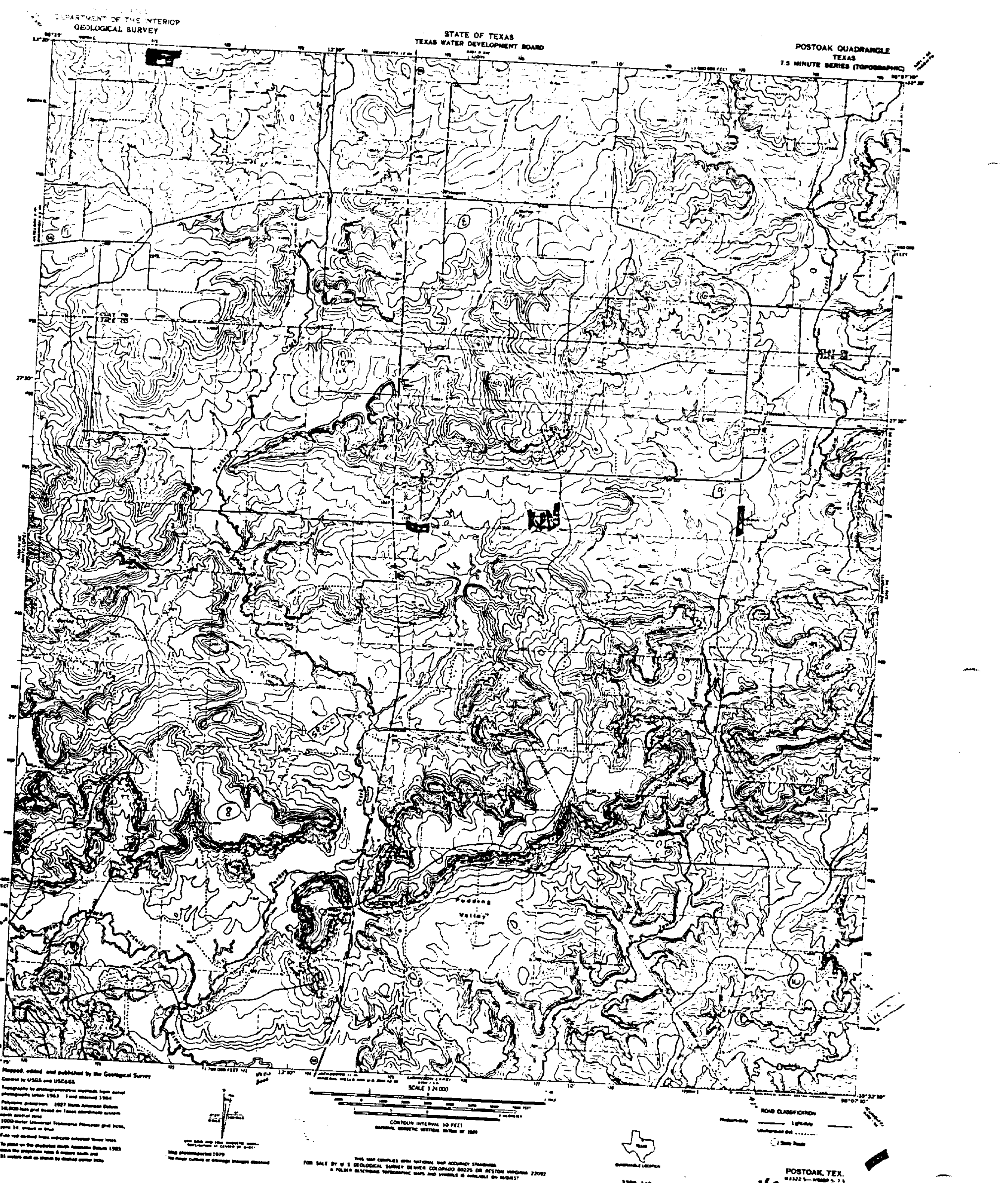
ROAD CLASSIFICATION

3380-134

ANTELOPE, TEX.

1964

15

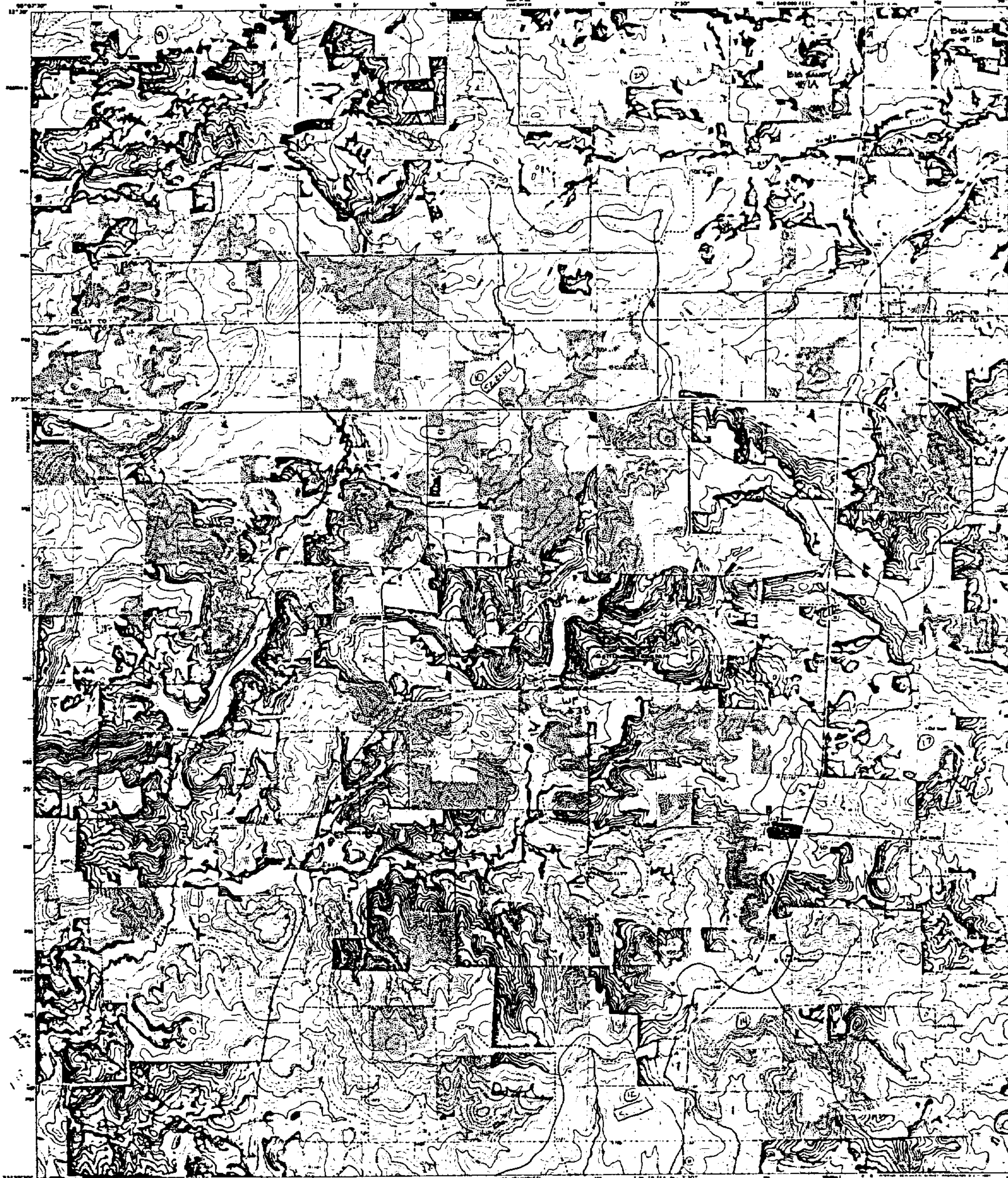


DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD
POSTOAK QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
Pudding
Valley
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
FOR SALE BY U S GEOLOGICAL SURVEY DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
ROAD CLASSIFICATION
POSTOAK, TEX.
3398-143
16

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD

NEWPORT QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Texas coordinate system, north central zone
1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue

Fine red dashed lines indicate selected fence lines

Areas covered by dotted light blue pattern are subject to controlled inundation

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

Medium duty — Light duty
Unimproved dirt
State Route

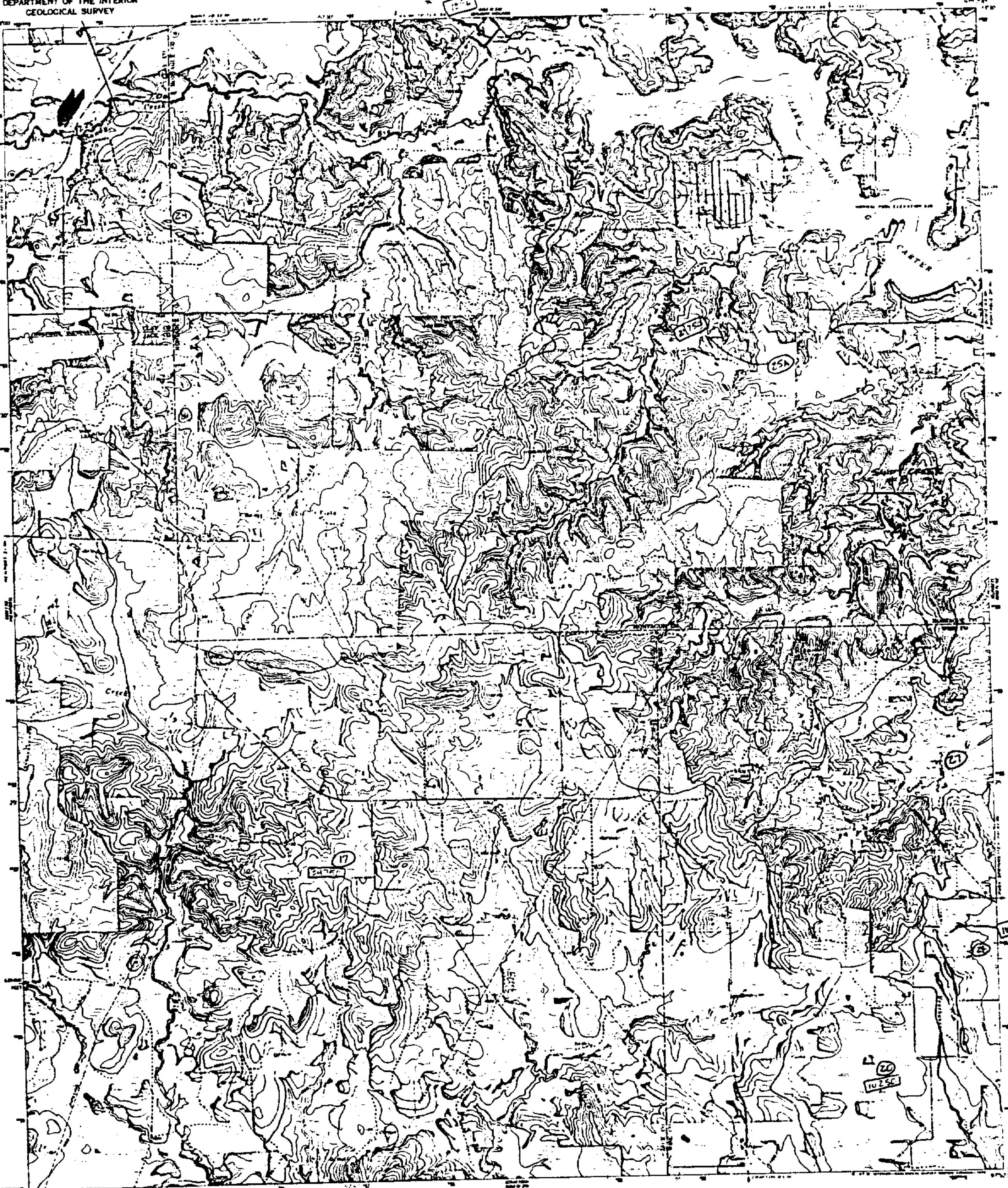
NEWPORT, TEX.

1964

17

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SELMA QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

SCALE 1:24000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

3387-233

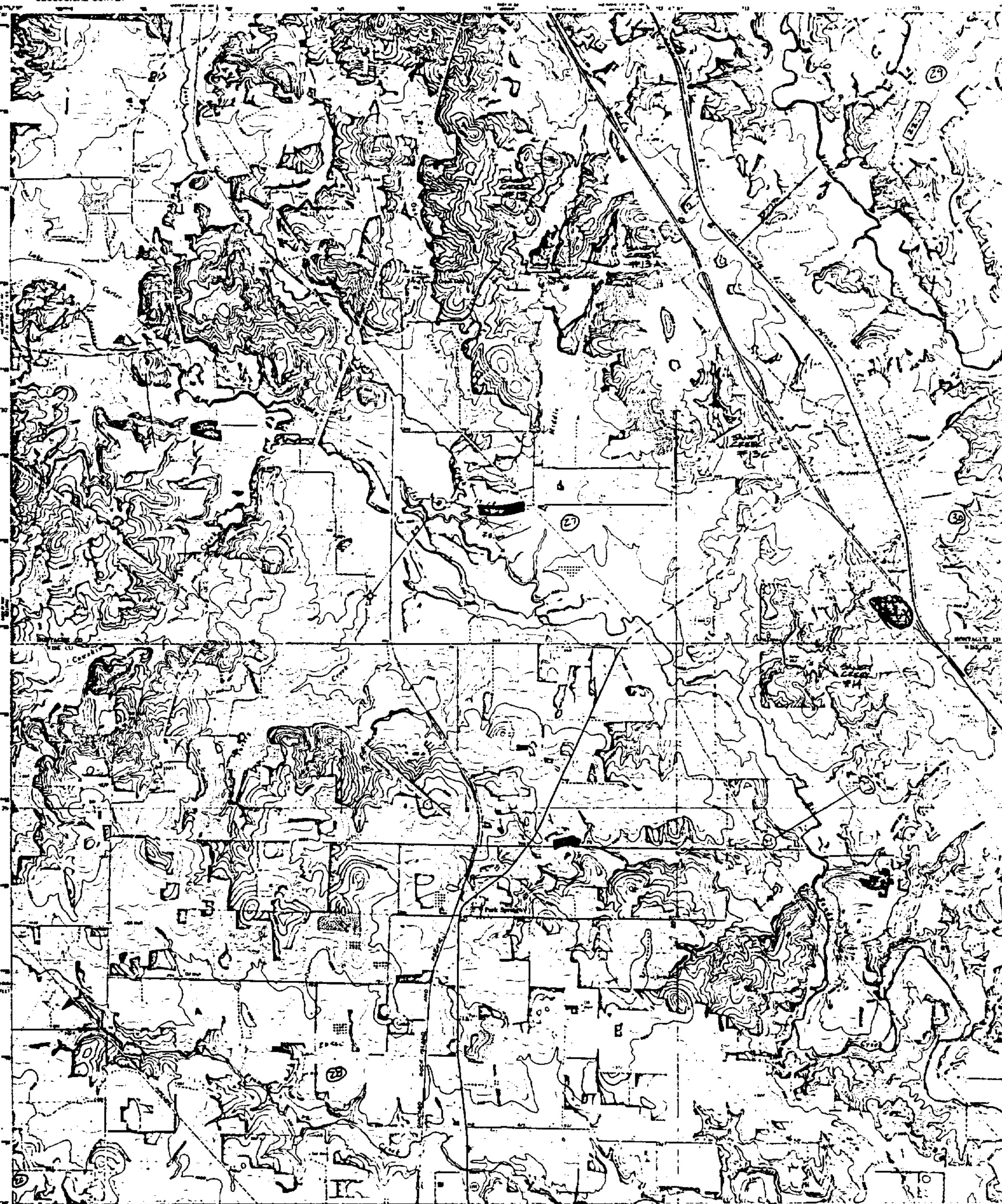
SELMA, TEX.

1961

3457

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNSET QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION
Heavy duty
Light duty
Medium duty
Unimproved dirt
U.S. Route
State Route

3397-734

SUNSET, TEX.
1961


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SMYRNA QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
SANDY CREEK #22B
SANDY CREEK #23A
SANDY CREEK #24
SANDY CREEK #24B
SANDY CREEK #24D
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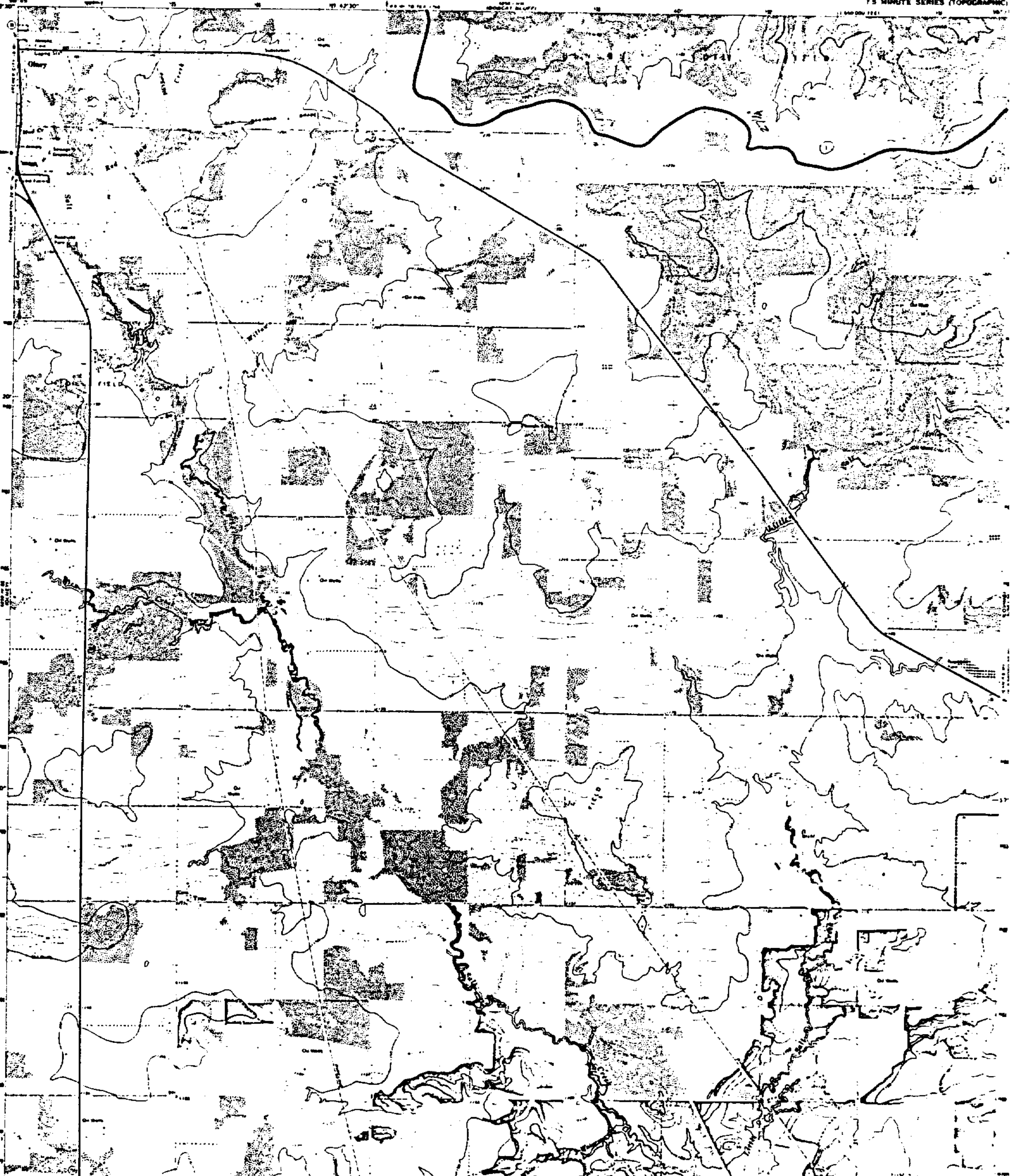
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
3387-243
ROAD CLASSIFICATION
Interstate Route
U.S. Route
State Route
SMYRNA, TEX.
1961
20

20

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD

TRUE QUADRANGLE
TEXAS-YOUNG CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

SCALE 1:24000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

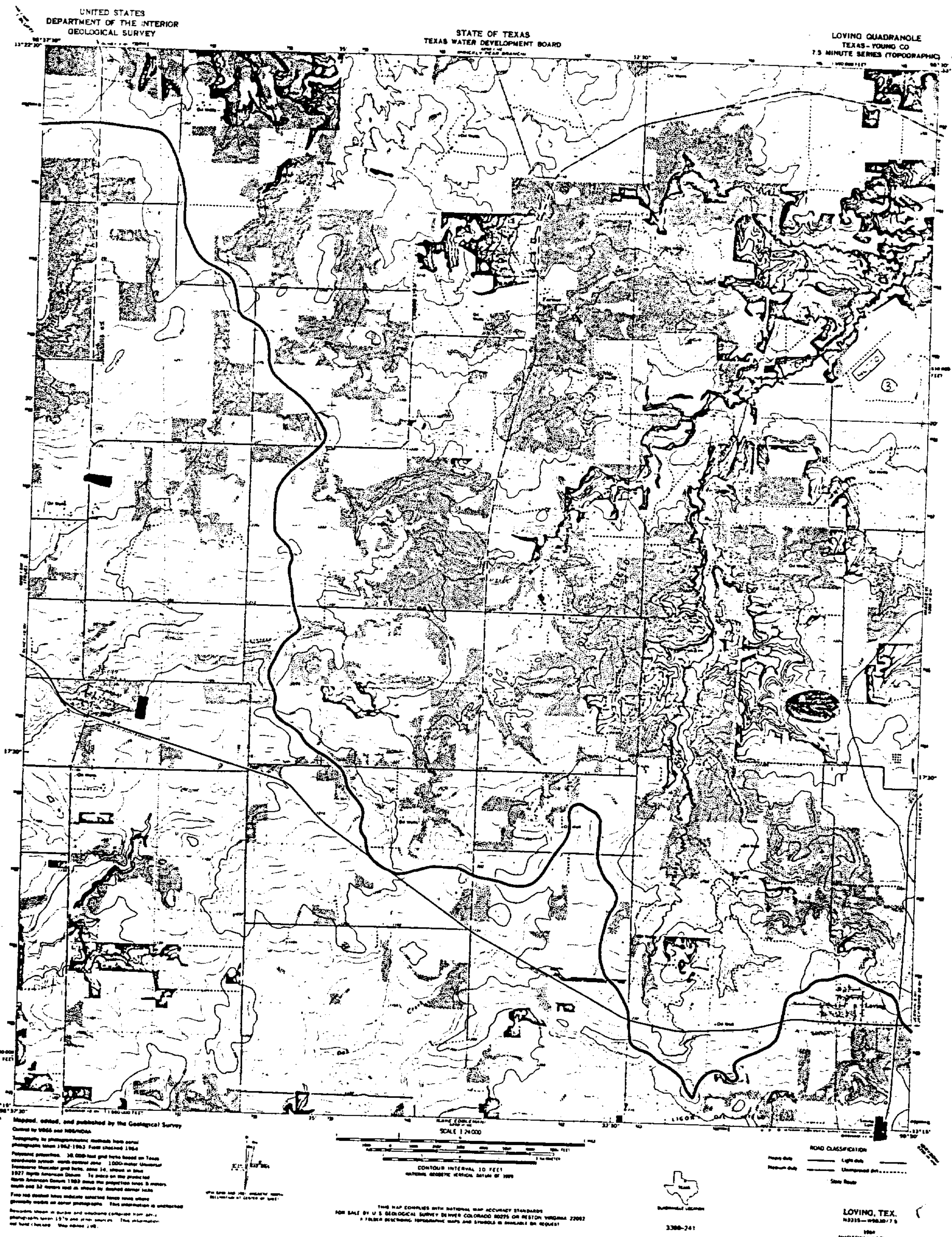
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

3398-242

TRUE, TEX

23



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD
LOVING QUADRANGLE
TEXAS-YOUNG CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
Mapped, edited, and published by the Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
ROAD CLASSIFICATION
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
3380-241
LOVING, TEX.

24

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD

MARKLEY QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

SCALE 1:24 000

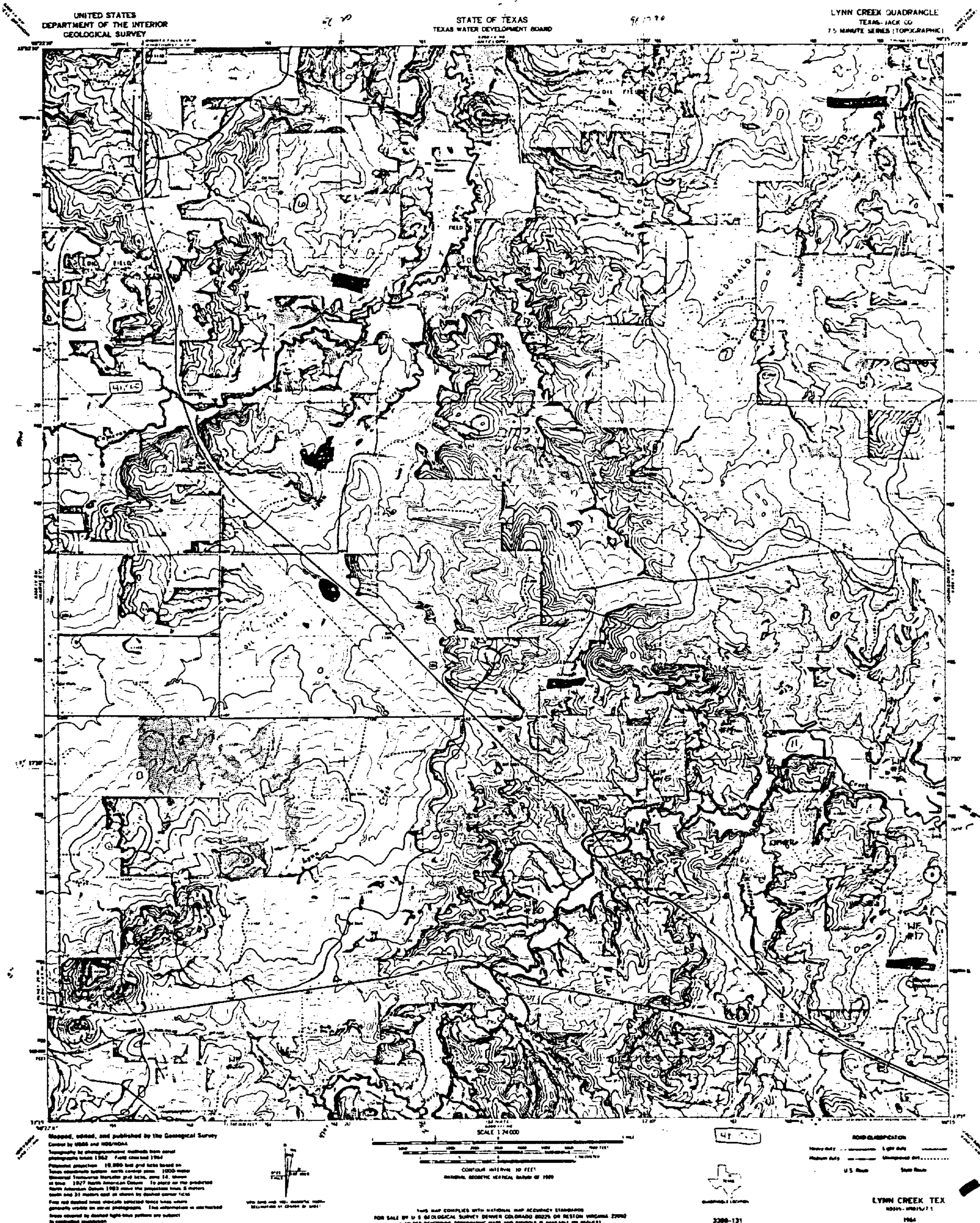
CONTOUR INTERVAL 10 FEET

ROAD CLASSIFICATION

State Route

MARKLEY, TEX

1984



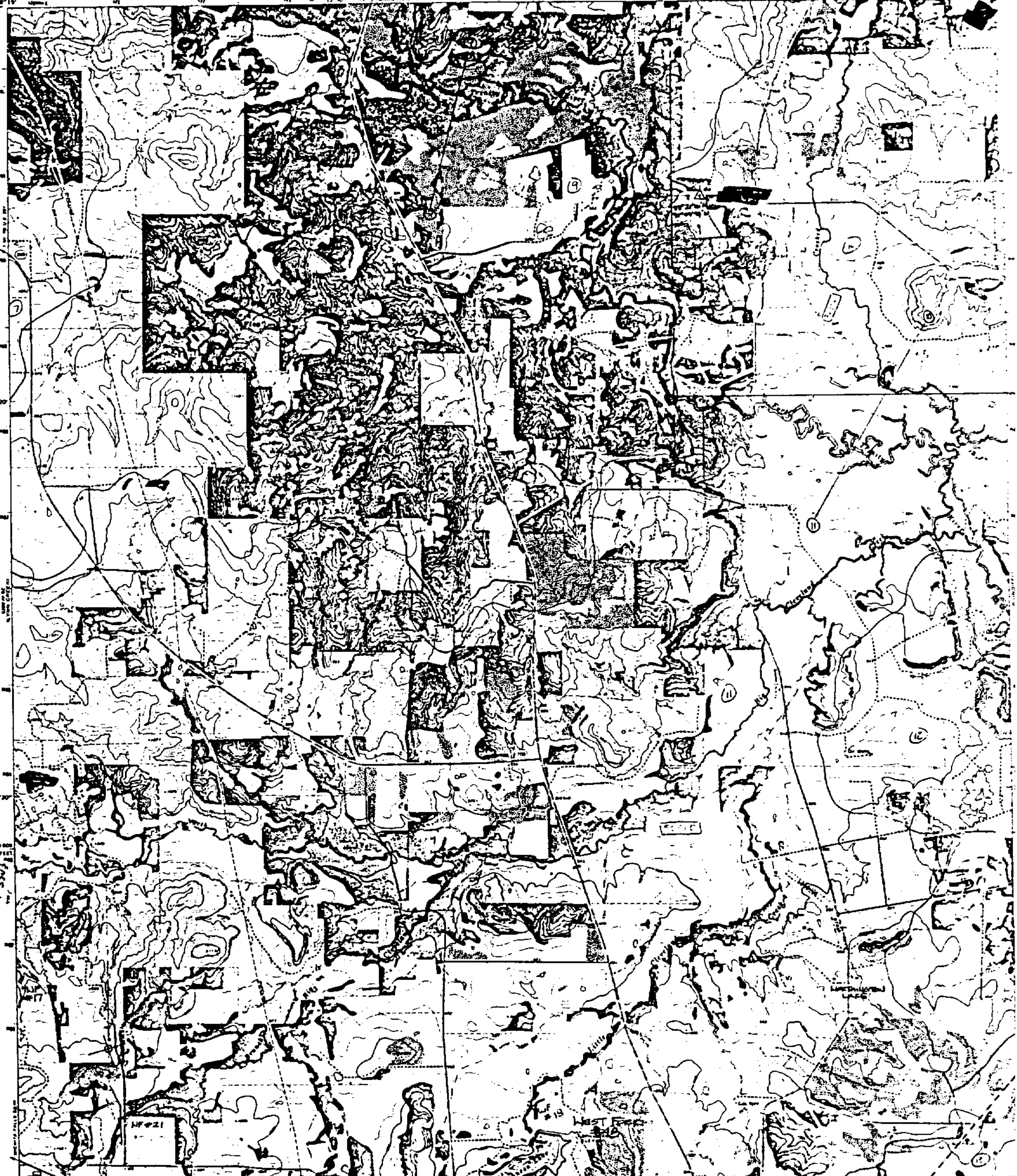
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD
LYNN CREEK QUADRANGLE
TEXAS–JACK CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
OIL FIELD
FIELD
MC DONALD
Mapped, edited, and published by the Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
U.S. Route
State Route
3380-131
LYNN CREEK, TEX.
1964

26

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD

JOHNSON LAKE QUADRANGLE
TEXAS–JACK CO
7.5 MINUTE SERIES (TOPOGRAPHIC)



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Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1964

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

JOHNSON LAKE, TEX

1964

77

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD

CUNDIFF QUADRANGLE
TEXAS–JACK CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1962 and 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Texas coordinate system, north central zone
1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue

SCALE 1:24000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

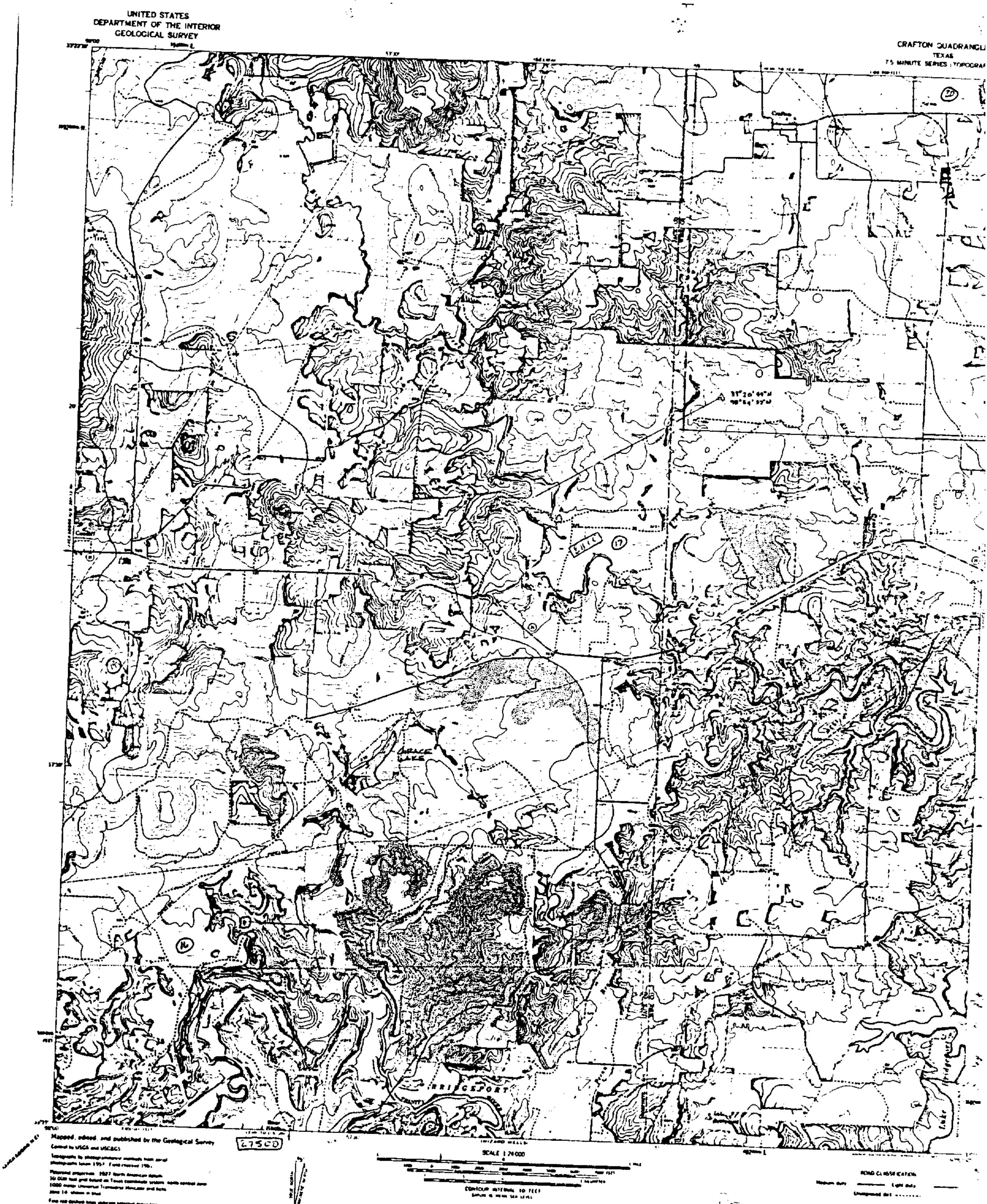
TEXAS
QUADRANGLE LOCATION

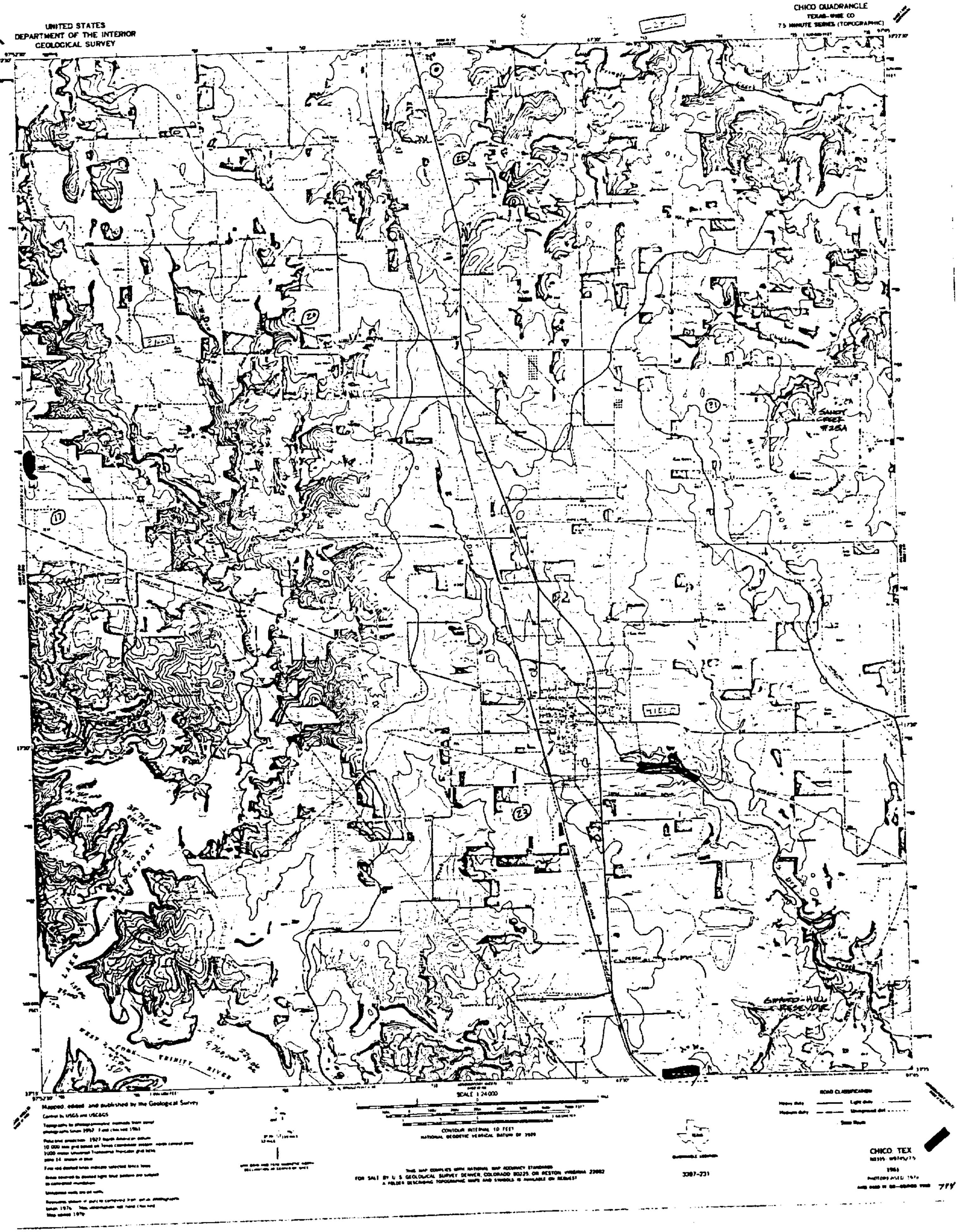
ROAD CLASSIFICATION
Medium-duty
Light-duty
Unimproved dirt
State Route

[redacted]

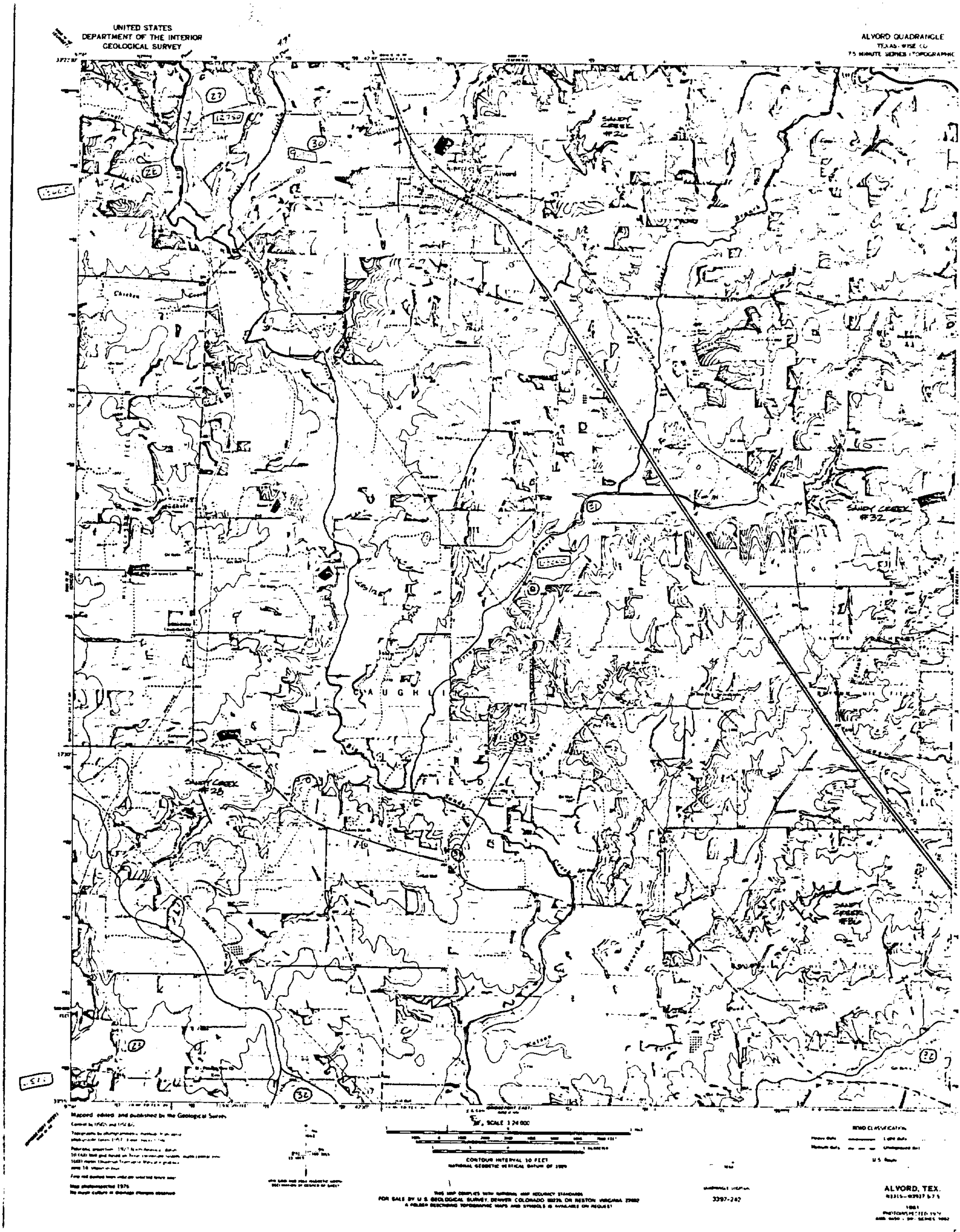
CUNDIFF, TEX.

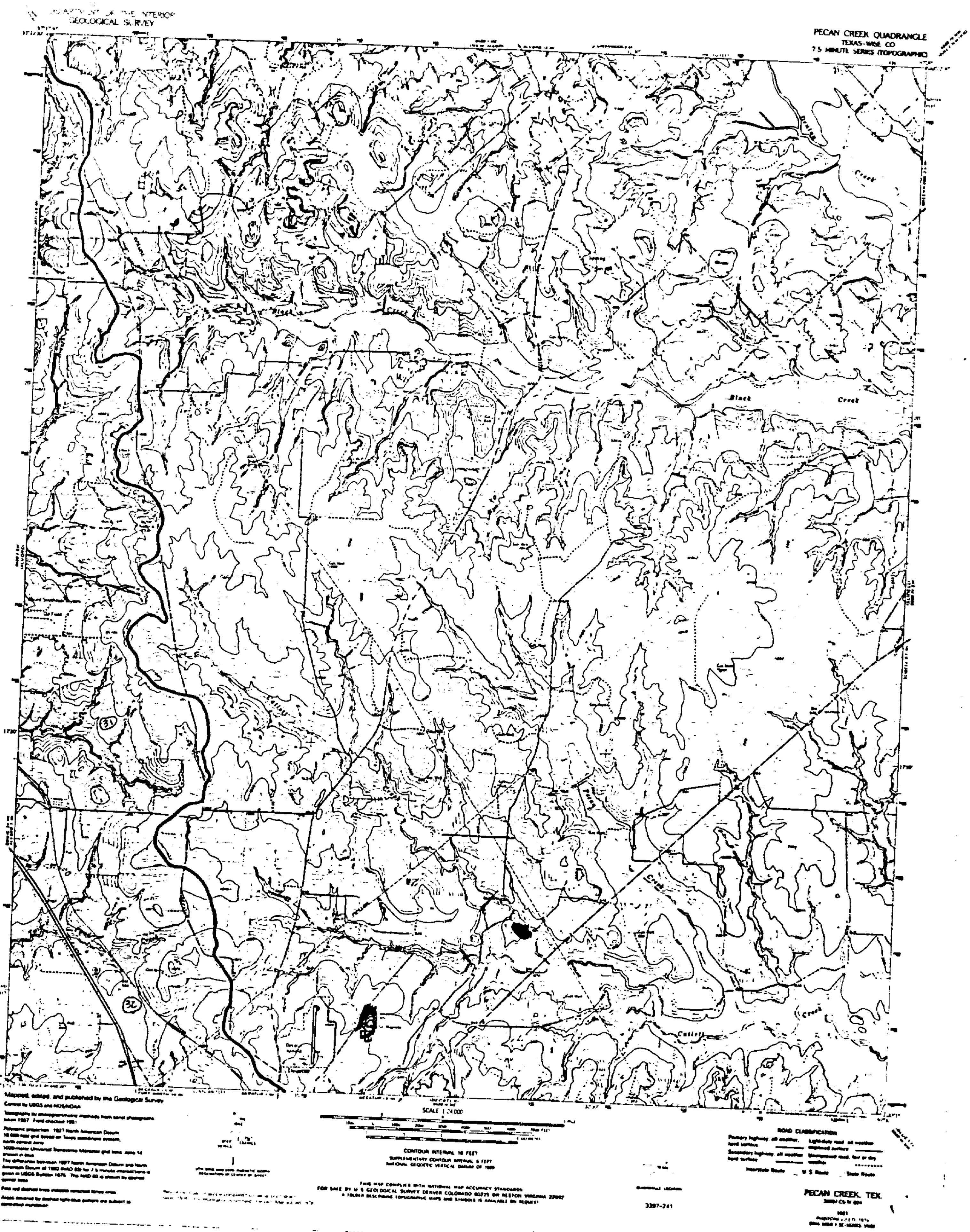
28


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CRAFTON QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
GRACE LAKE
BRIDGEPORT
Mapped, edited, and published by the Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
ROAD CLASSIFICATION
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D.C.
CRAFTON, TEX.
1961


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CHICO QUADRANGLE
TEXAS-WISE CO
7.5 MINUTE SERIES (TOPOGRAPHIC)
MILES
JACKSON
WEST FORK
TRINITY
RIVER
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
ROAD CLASSIFICATION
Light duty
3387-231
CHICO, TEX
1961

30


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
ALVORD QUADRANGLE
TEXAS-WISE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
Alvord
SANDY CREEK #26
SANDY CREEK #32
SANDY CREEK #28
SANDY CREEK #8
Mapped, edited, and published by the Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
Map photoinspected 1976
ALVORD, TEX.
1961
PHOTOINSPECTED 1976


DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
PECAN CREEK QUADRANGLE
TEXAS-WISE CO
7.5 MINUTE SERIES (TOPOGRAPHIC)
Black
Creek
Black
Creek
Creek
Creek
Catlett
Creek
Catlett
31
32
1730
Mapped, edited, and published by the Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
SUPPLEMENTARY CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
Primary highway, all weather, hard surface
Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface
Unimproved road, fair or dry weather
Interstate Route
U S Route
State Route
PECAN CREEK, TEX.
3397-241
2578

32

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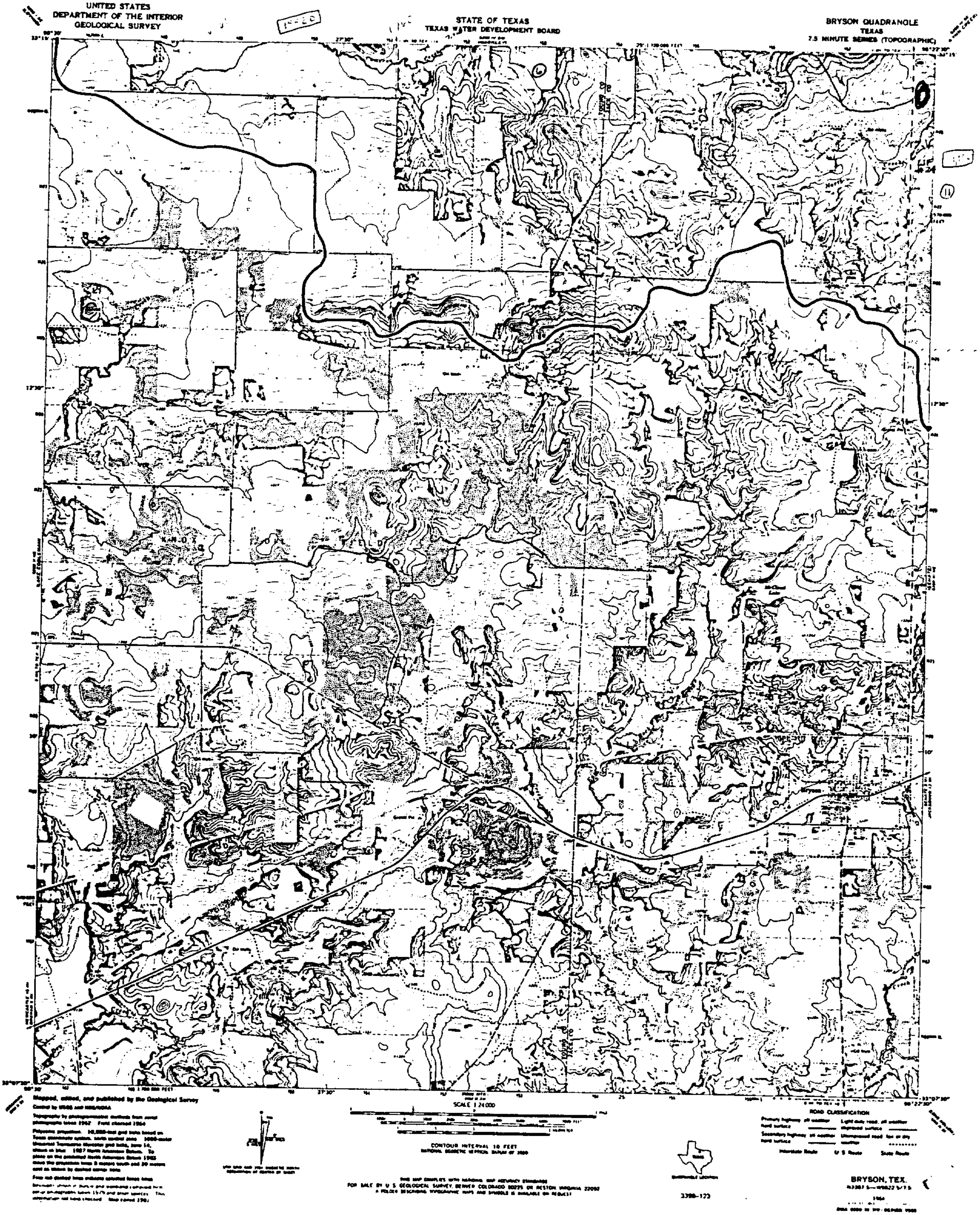
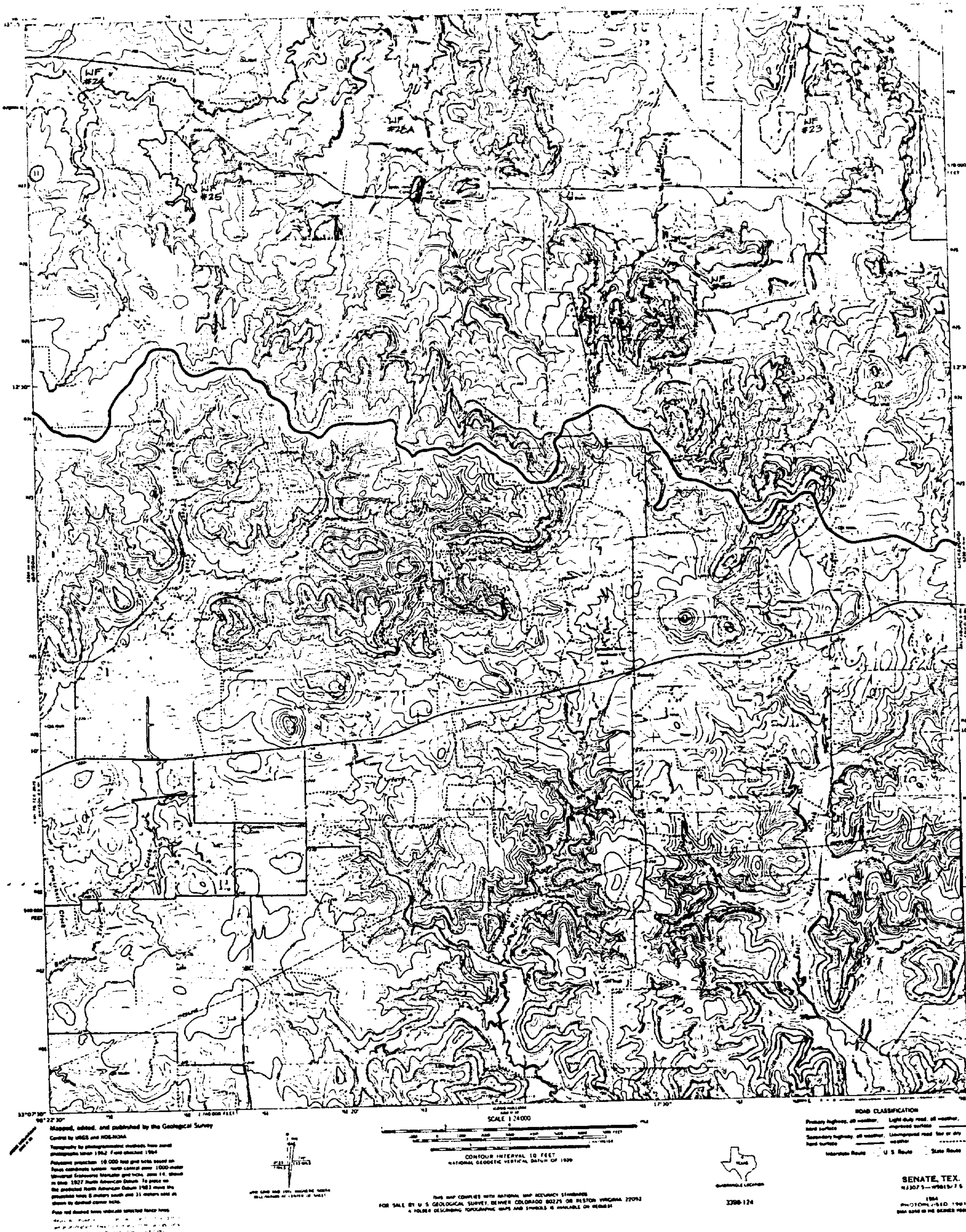

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
STATE OF TEXAS
TEXAS WATER DEVELOPMENT BOARD
BRYSON QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
Mapped, edited, and published by the Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
ROAD CLASSIFICATION
Interstate Route
U S Route
State Route
BRYSON, TEX.
3398-123
36


WF #24
WF #24A
WF #23
#25
WF
12'30"
10'
33°07'30"
98°22'30"
98°20'
17'30"
98°15'
Mapped, edited, and published by the Geological Survey
Topography by photogrammetric methods from aerial photographs taken 1962. Field checked 1964
1927 North American Datum
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY, DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
TEXAS
QUADRANGLE LOCATION
3398-124
ROAD CLASSIFICATION
Interstate Route
U S Route
State Route
SENATE, TEX.
1964

37

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

JACKSBORO QUADRANGLE
TEXAS-JACK CO
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092

ROAD CLASSIFICATION

Heavy duty | Light duty
Medium duty | Unimproved dirt
U.S. Route | State Route

QUADRANGLE LOCATION

3300-113

JACKSBORO, TEX.

1960

38

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

JACKSBORO NE QUADRANGLE
TEXAS-JACK CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1958. Field checked 1961

Polyconic projection. 10,000-foot grid ticks based on Texas coordinate system, north central zone. 1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue. 1927 North American Datum. To place on the predicted North American Datum 1983 move the projection lines 8 meters south and 30 meters east as shown by dashed corner ticks

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

Area of Lake Bridgeport covered by dashed light-blue pattern is subject to controlled inundation to 850 feet

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

Heavy duty		Light duty	
Medium duty		Unimproved dirt	
U.S. Route		State Route	

QUADRANGLE LOCATION

3398-114

JACKSBORO NE, TEX.

1961

37

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WIZARD WELLS QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by photogrammetric methods. Aerial photographs taken 1957. Field check 1960

Polyconic projection. 1927 North American datum
10,000 foot grid based on Texas coordinate system north central zone
1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

Areas covered by dashed light blue pattern are subject to controlled inundation to 850 feet

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

Primary highway, all weather, hard surface	Light-duty road, all weather, improved surface
Secondary highway, all weather, hard surface	Unimproved road, fair or dry weather

Interstate Route U S Route State Route

QUADRANGLE LOCATION

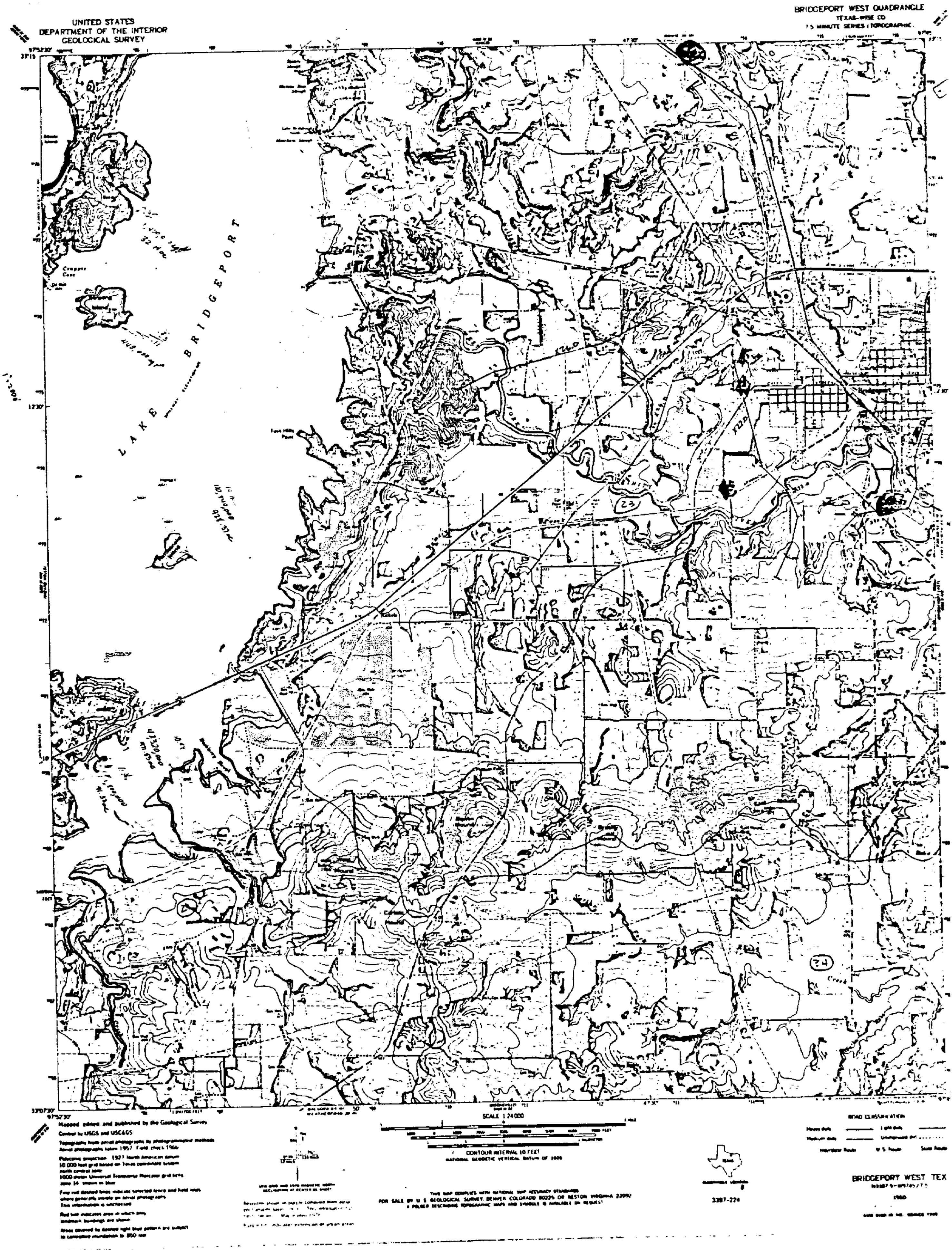
3307-223

40

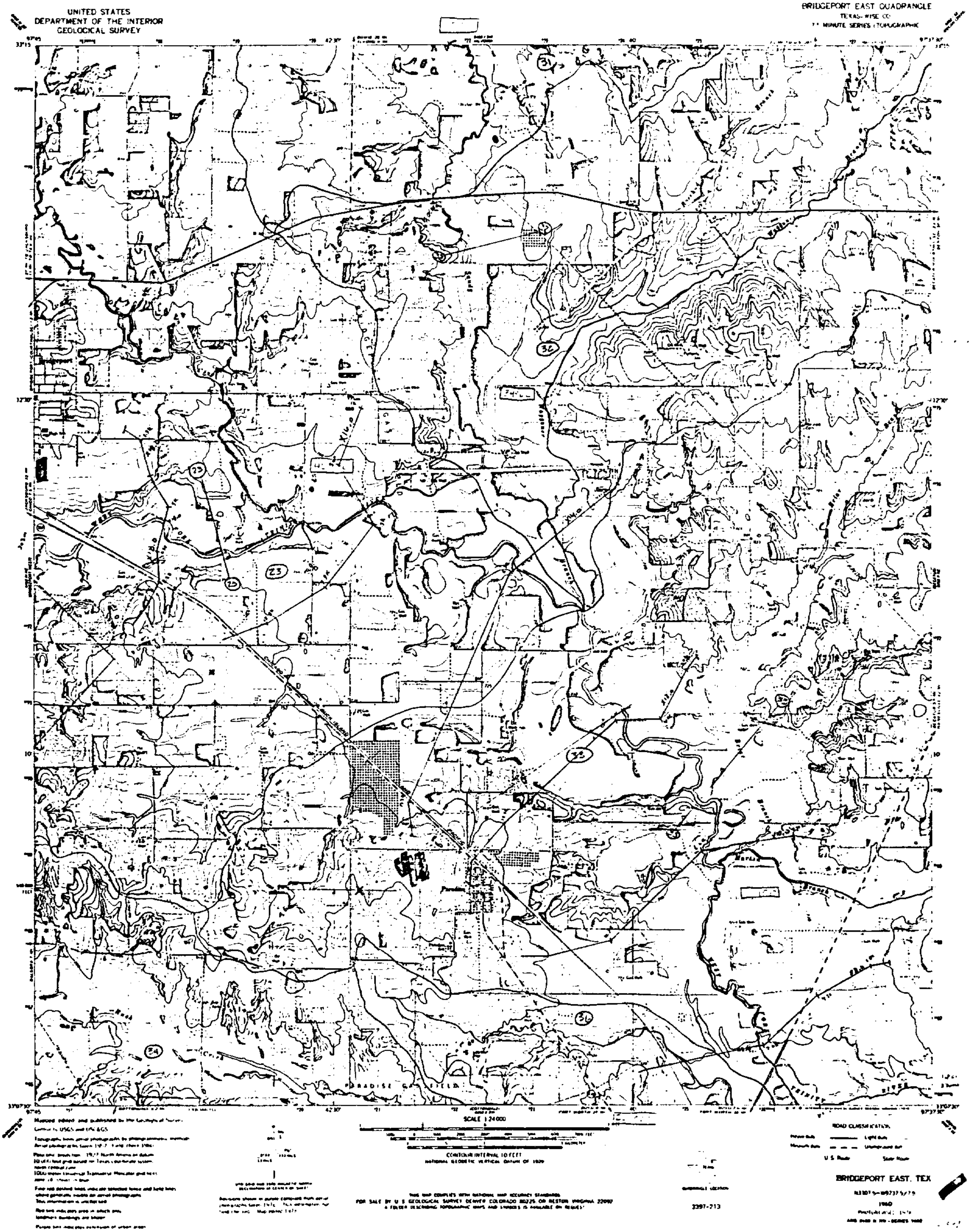
WIZARD WELLS, TEX.
N3307.5—W9752.5/7.5

1960

AMS 6448 III NE—SERIES V882

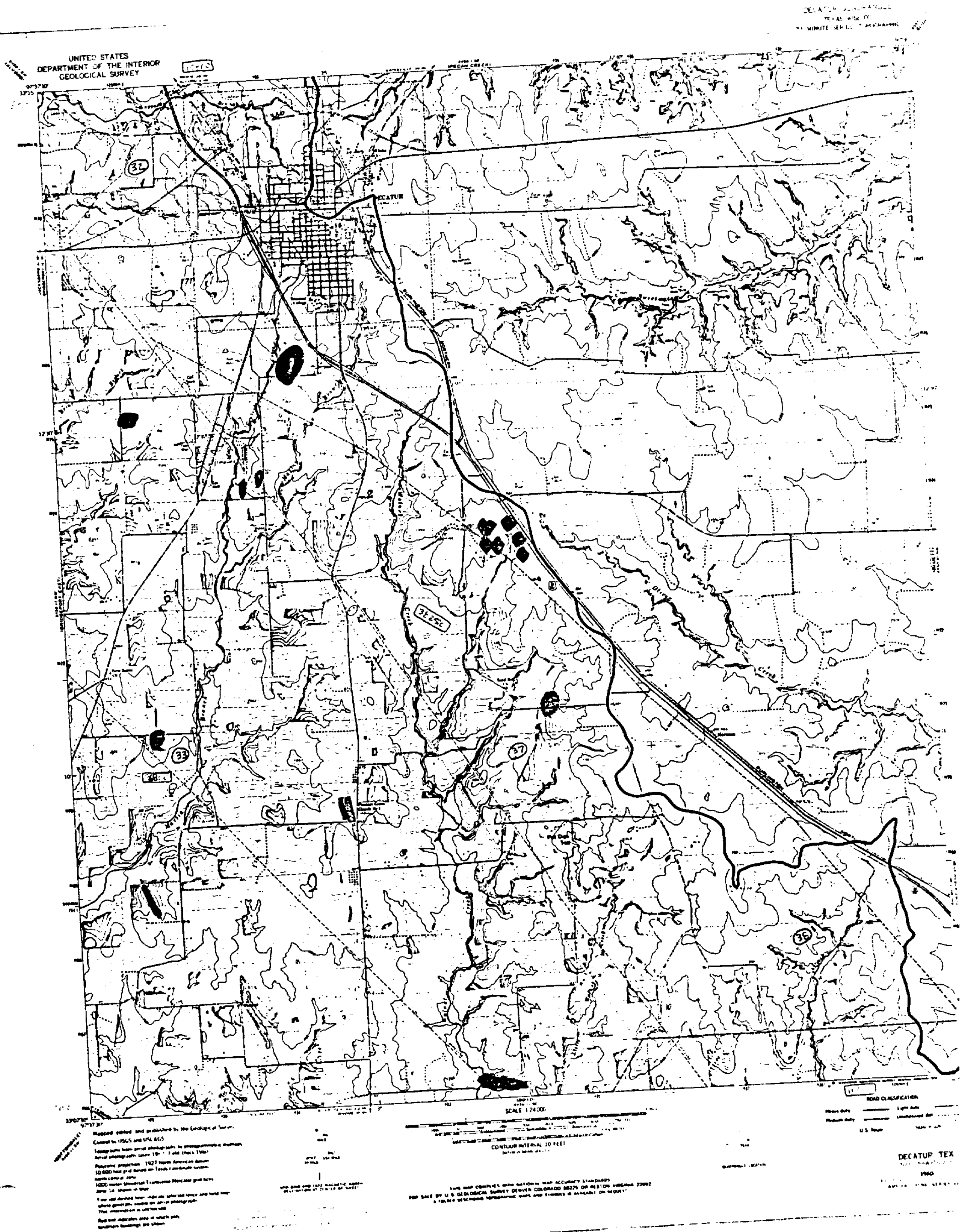

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
BRIDGEPORT WEST QUADRANGLE
TEXAS-WISE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
LAKE BRIDGEPORT
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography from aerial photographs by photogrammetric methods
Aerial photographs taken 1957. Field check 1960
Polyconic projection. 1927 North American datum
10,000-foot grid based on Texas coordinate system, north central zone
1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue
Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked
Red tint indicates area in which only landmark buildings are shown
Areas covered by dashed light-blue pattern are subject to controlled inundation to 850 feet
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
3387-224
BRIDGEPORT WEST, TEX.
1960

4



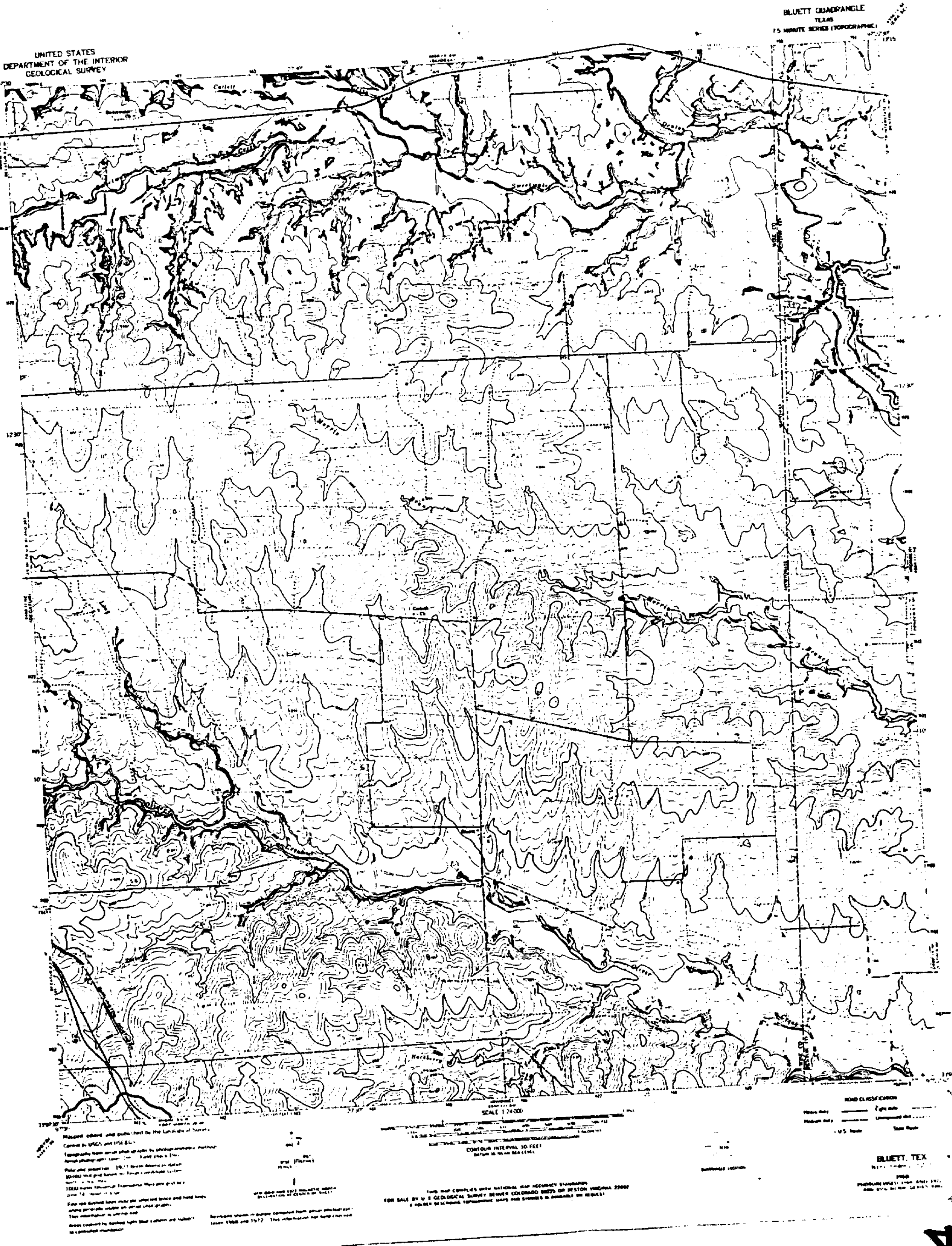
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
BRIDGEPORT EAST QUADRANGLE
TEXAS–WISE CO.
MINUTE SERIES (TOPOGRAPHIC)
PARADISE GAS FIELD
TRINITY RIVER
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
U.S. Route
State Route
QUADRANGLE LOCATION
3397-213
BRIDGEPORT EAST, TEX.
1960

42



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
DECATUR
32
33
37
36
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
ROAD CLASSIFICATION
U.S. Route
DECATUR, TEX.
1960

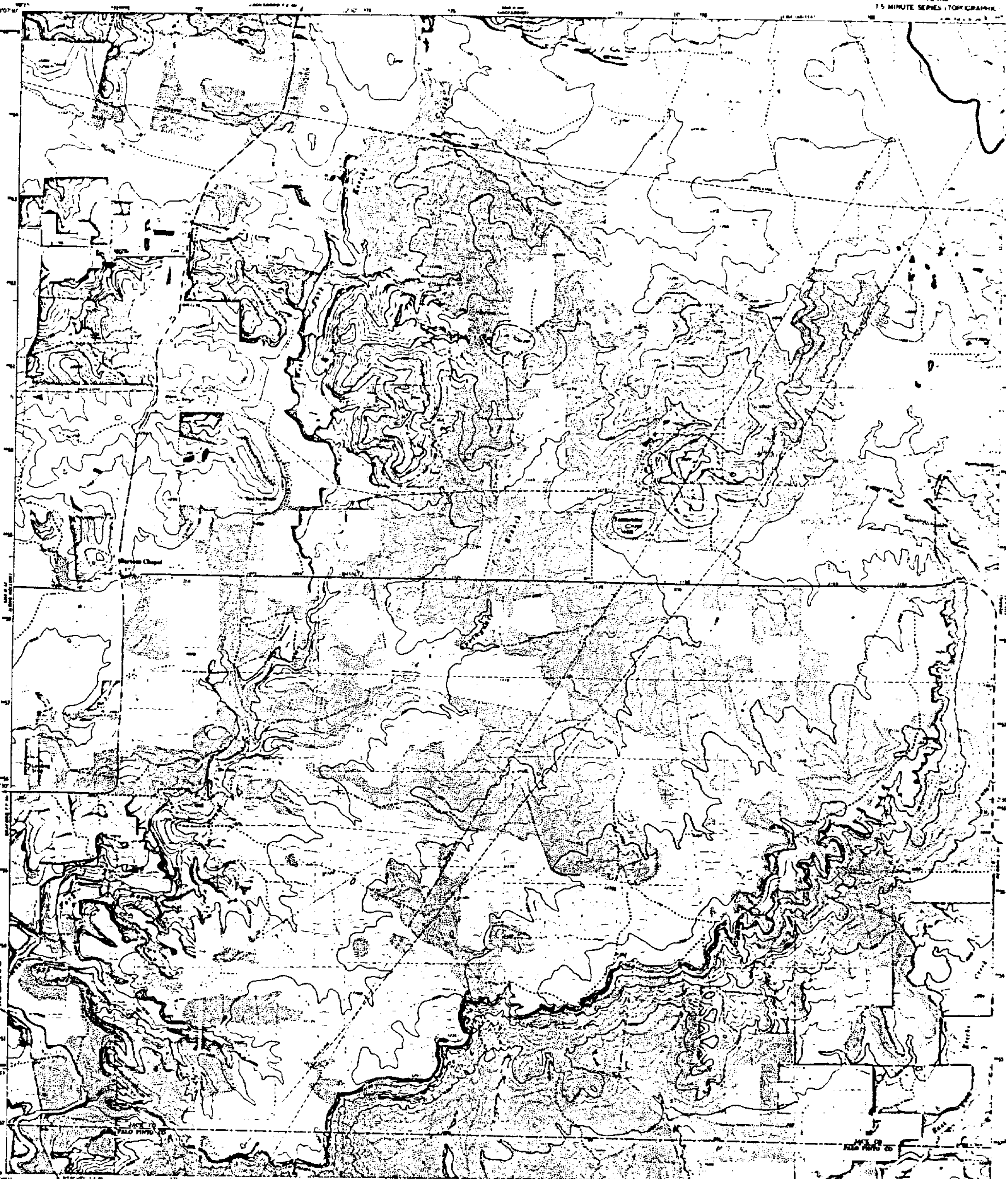
4


BLUETT QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Carlett
Meroberry
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
ROAD CLASSIFICATION
Heavy-duty
Medium-duty
Light-duty
U.S. Route
State Route
BLUETT, TEX.

4

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BARTONS CHAPEL QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION

State Route

BARTONS CHAPEL, TEX

1961

3298 112

49

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PERRIN QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THE MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

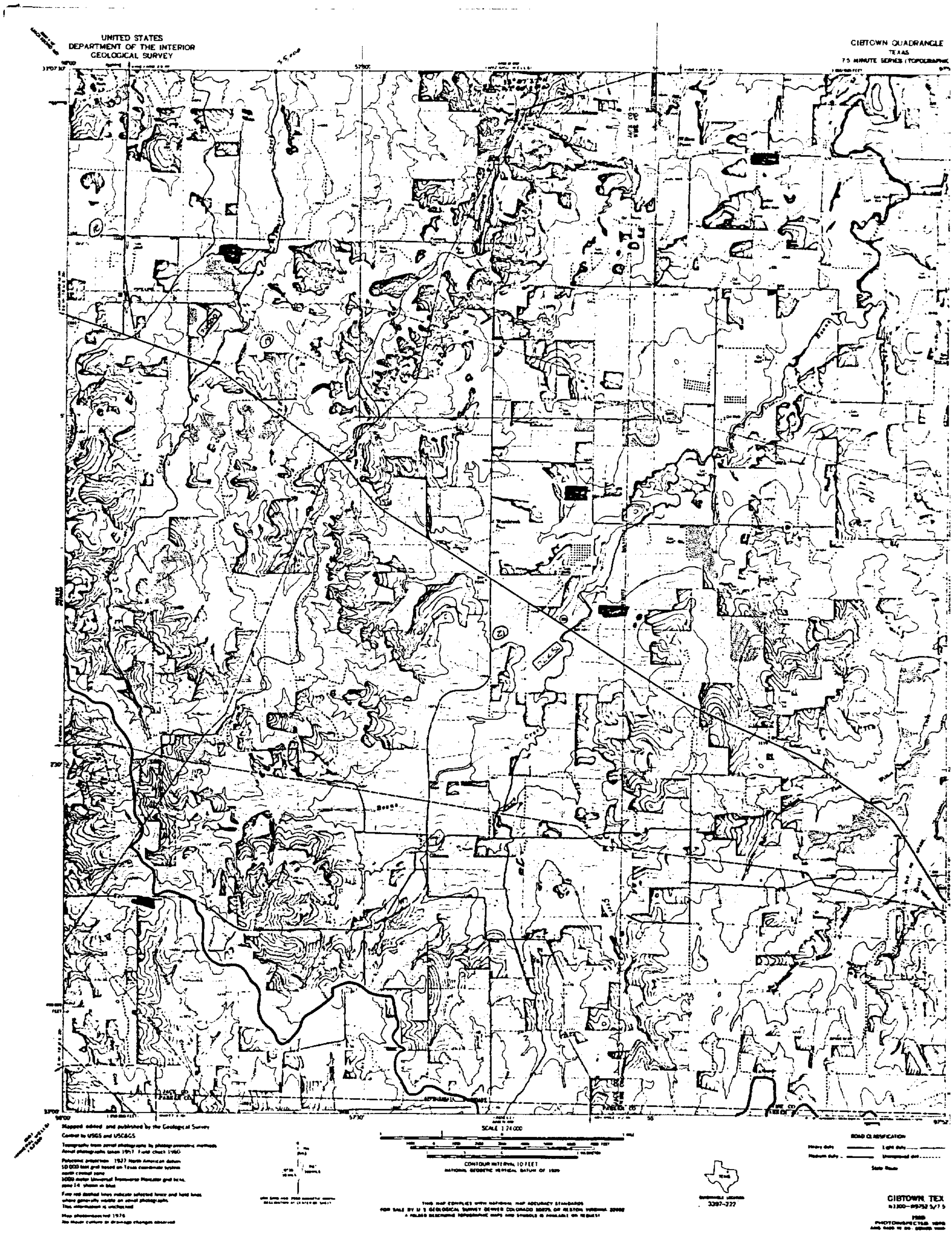
U.S. Route

State Route

3398-111

PERRIN, TEX

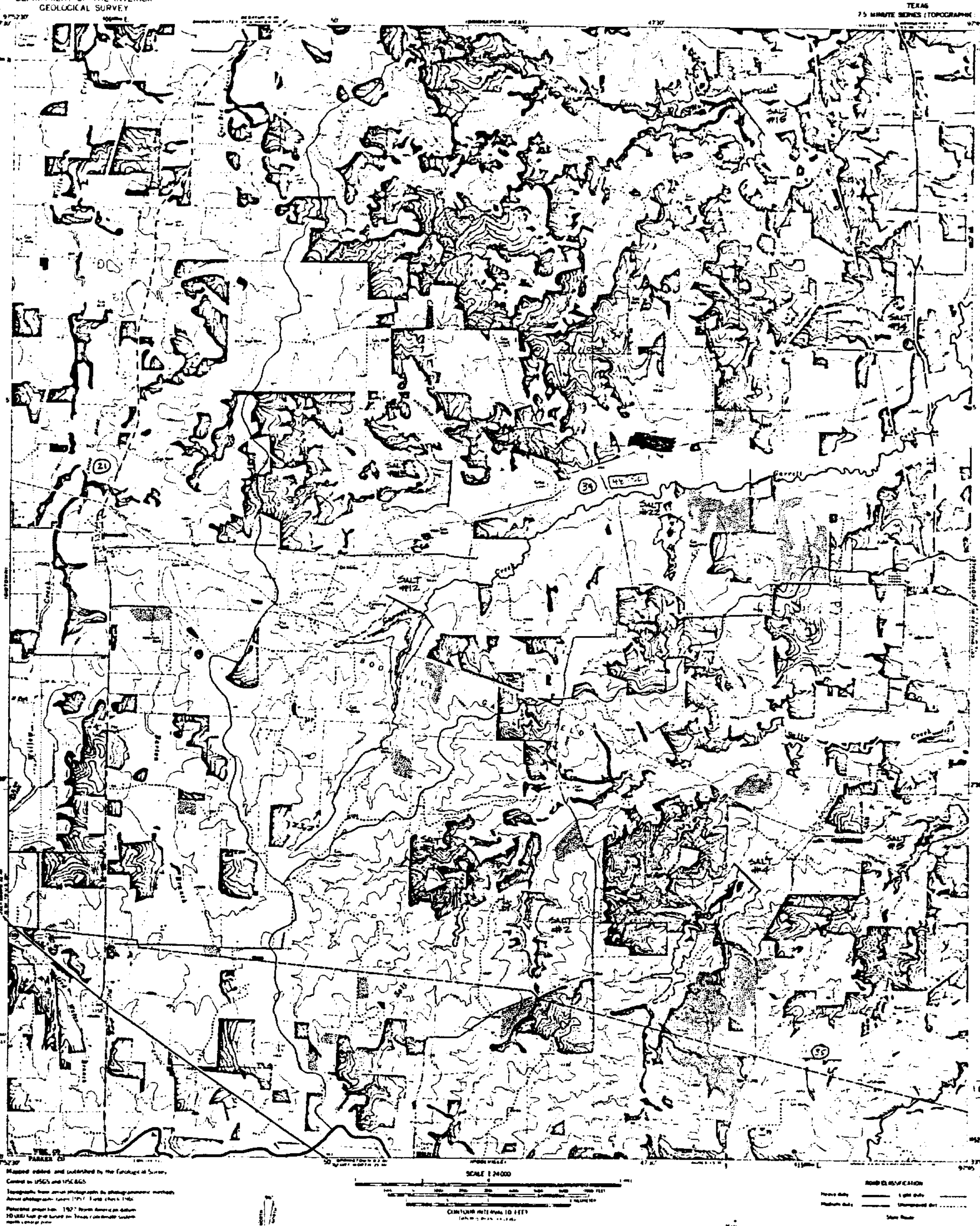
PHOTOINSPECTED 1979


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CIBTOWN QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
JACK CO
PARKER CO
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography from aerial photographs by photogrammetric methods
Aerial photographs taken 1957. Field check 1960
Polyconic projection. 1927 North American datum
10,000-foot grid based on Texas coordinate system, north central zone
1000-meter Universal Transverse Mercator grid ticks, zone 14, shown in blue
Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked
Map photoinspected 1976
No major culture or drainage changes observed
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
TEXAS
3397-222
ROAD CLASSIFICATION
State Route
CIBTOWN, TEX.
N3300—W9752.5/7.5
PHOTOINSPECTED 1976

5

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BOONSVILLE QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

SCALE 1:24000

CONTOUR INTERVAL 10 FEET

ROAD CLASSIFICATION

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D. C.

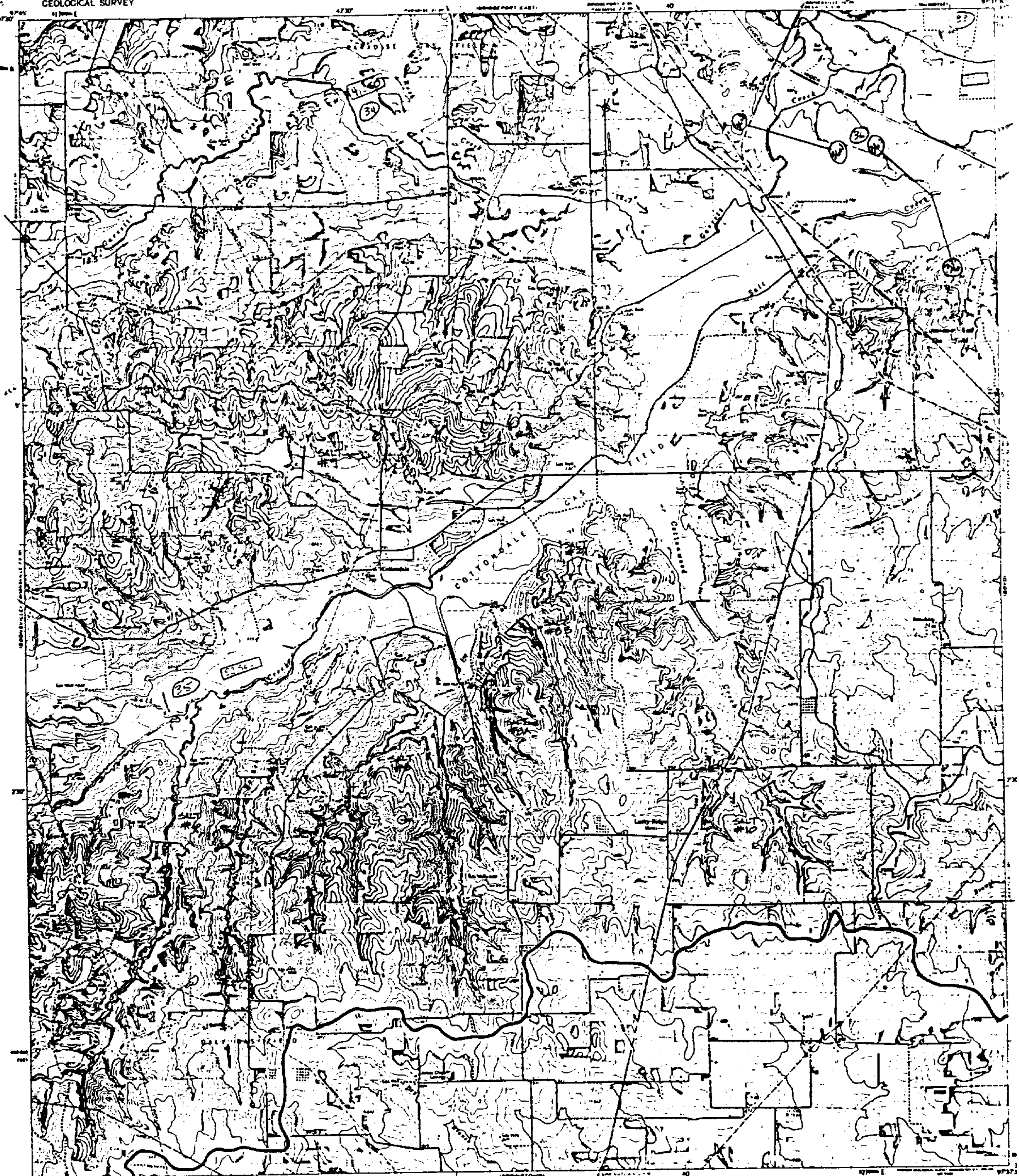
BOONSVILLE, TEX

1960

52

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COTTONDALE QUADRANGLE
TEXAS–WISE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D.C.

ROAD CLASSIFICATION

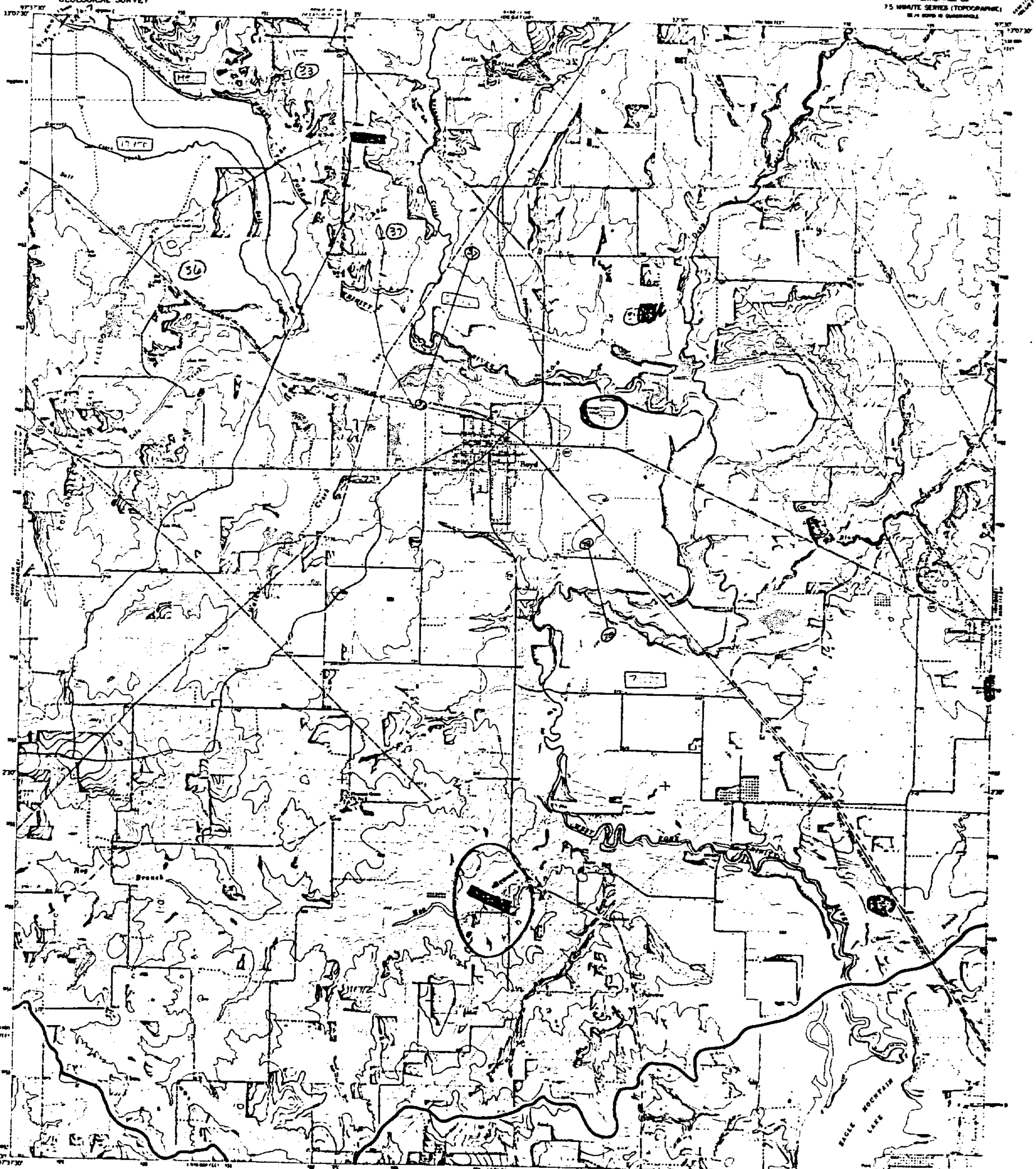
COTTONDALE, TEX.

1960

53

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BOYD QUADRANGLE
TEXAS-WISE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS

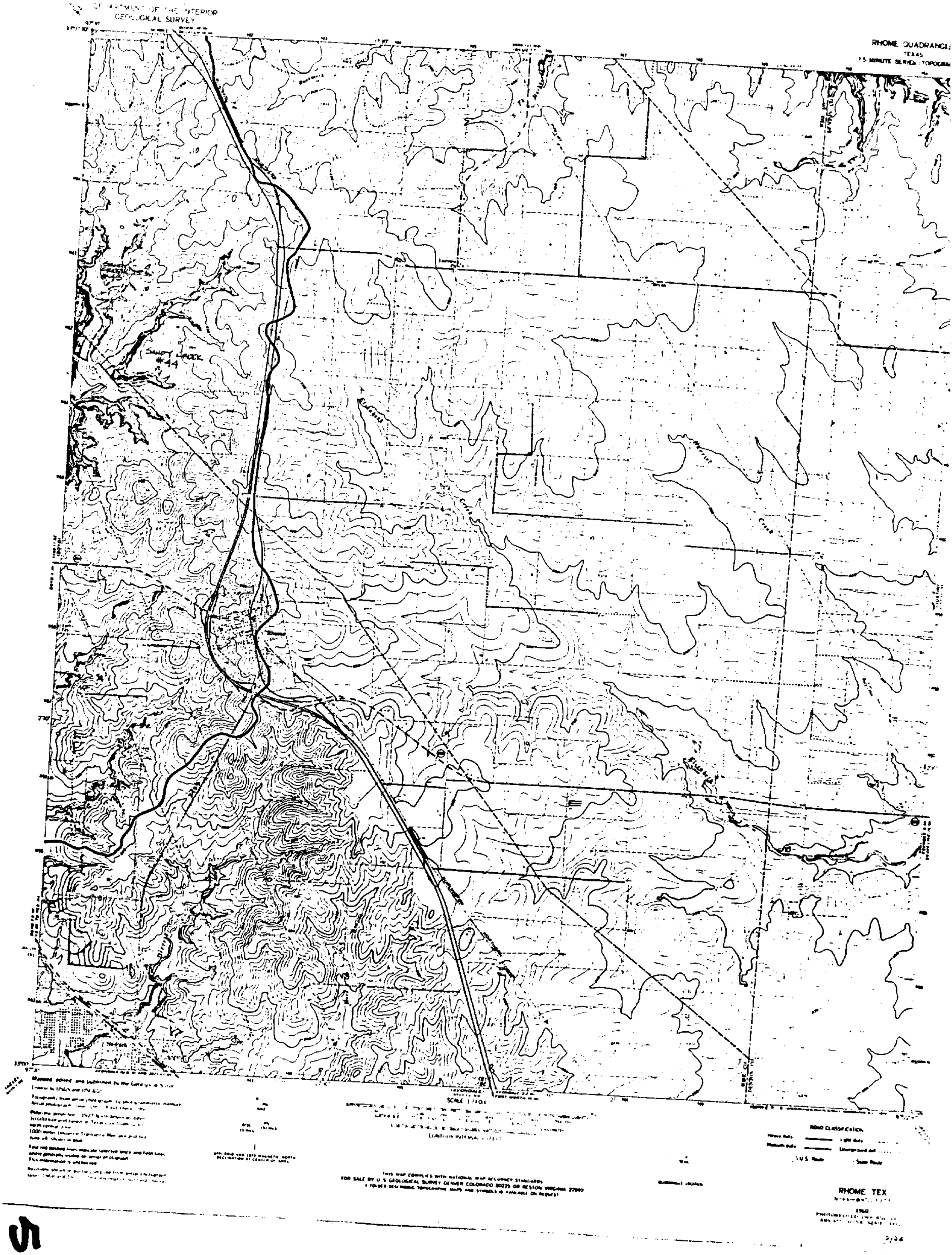
SCALE 1:24 000

CONTOUR INTERVAL 10 FEET

ROAD CLASSIFICATION

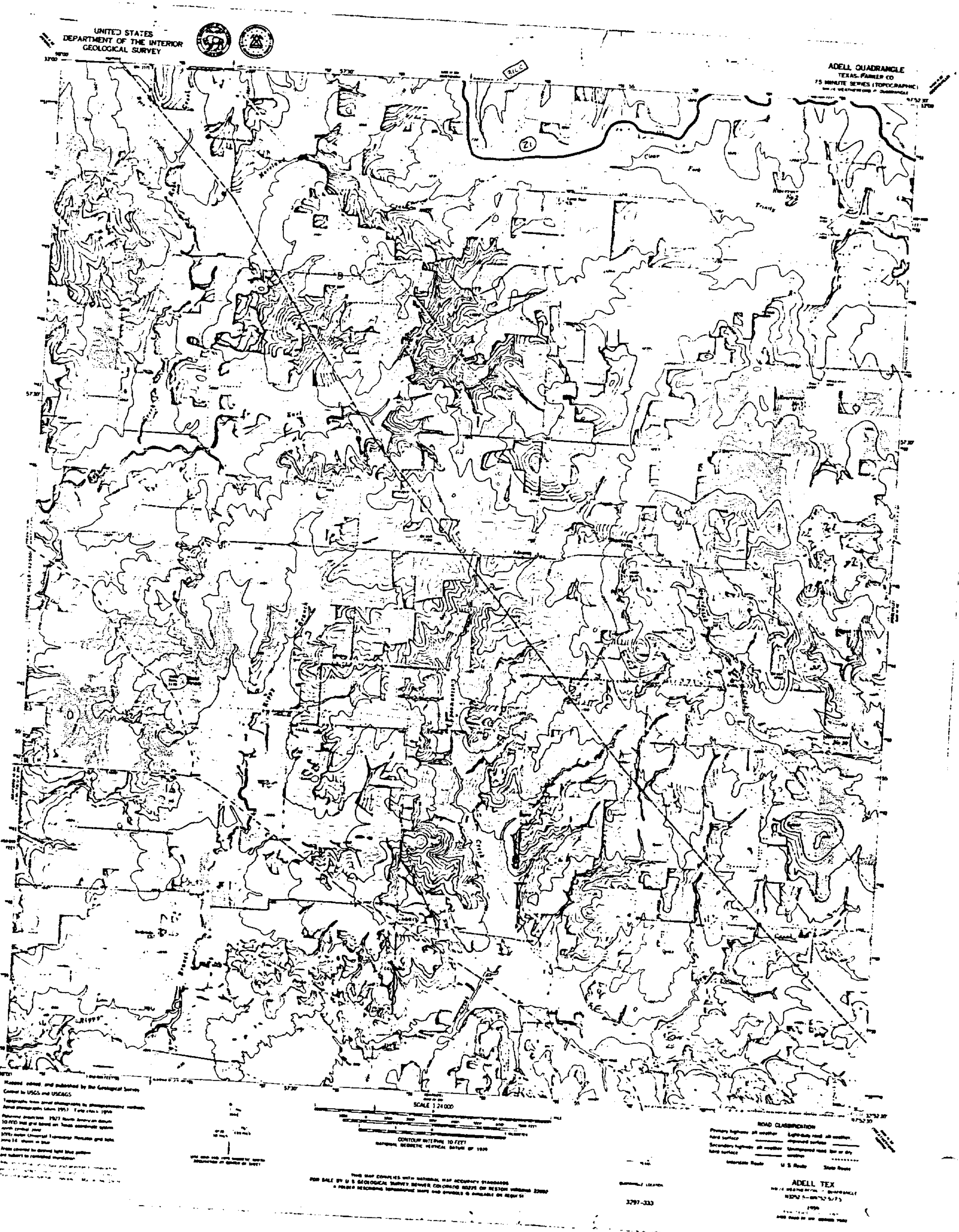
BOYD, TEX

3387-211



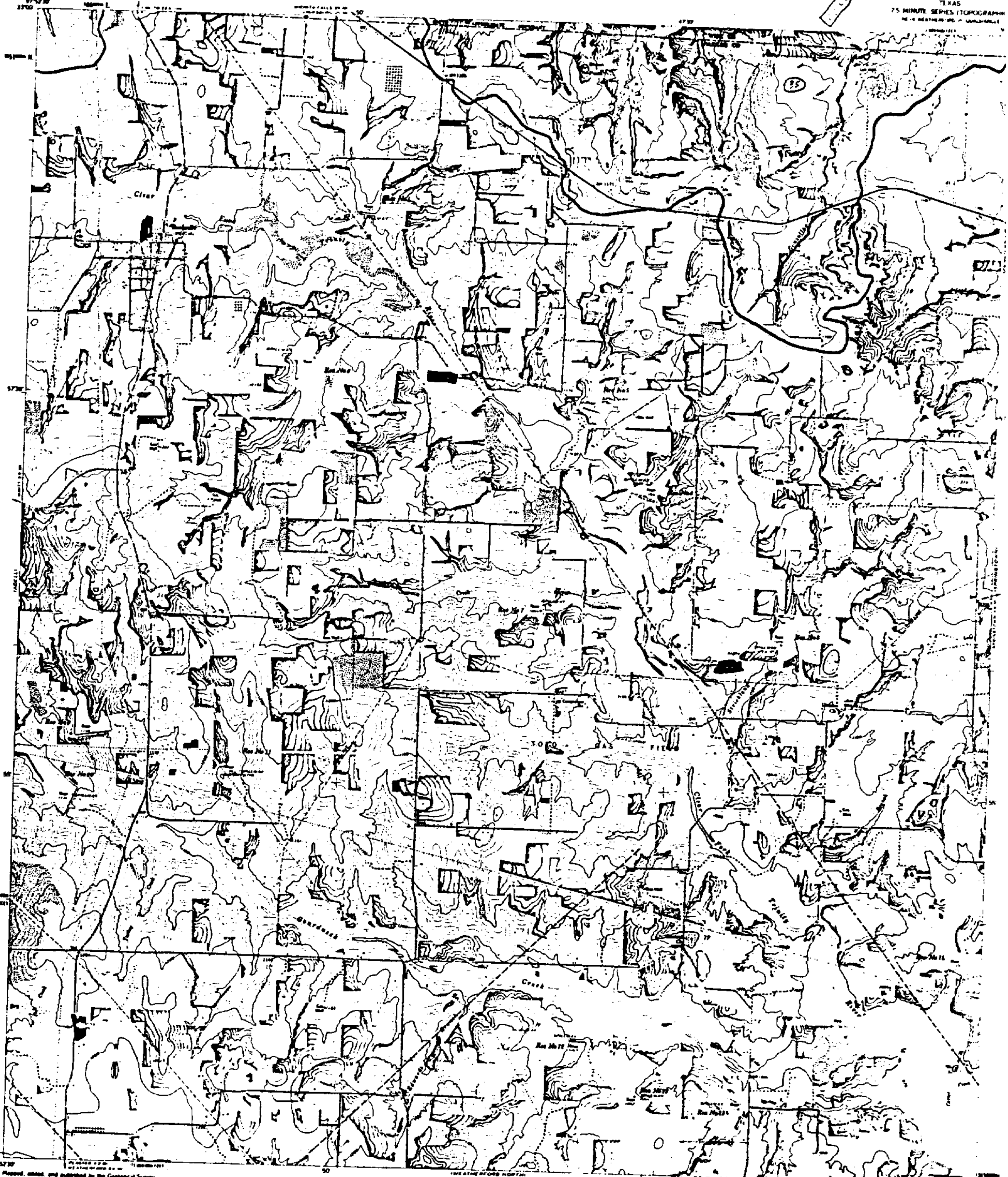
GEOLOGICAL SURVEY
RHOME QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
Sandy Creek
#44
ROAD CLASSIFICATION
U.S. Route
State Route
RHOME, TEX.
1960

55


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
ADELL QUADRANGLE
TEXAS-PARKER CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
Clear Fork Trinity
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
Interstate Route
U S Route
State Route
3797-333
ADELL, TEX.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

POOLVILLE QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

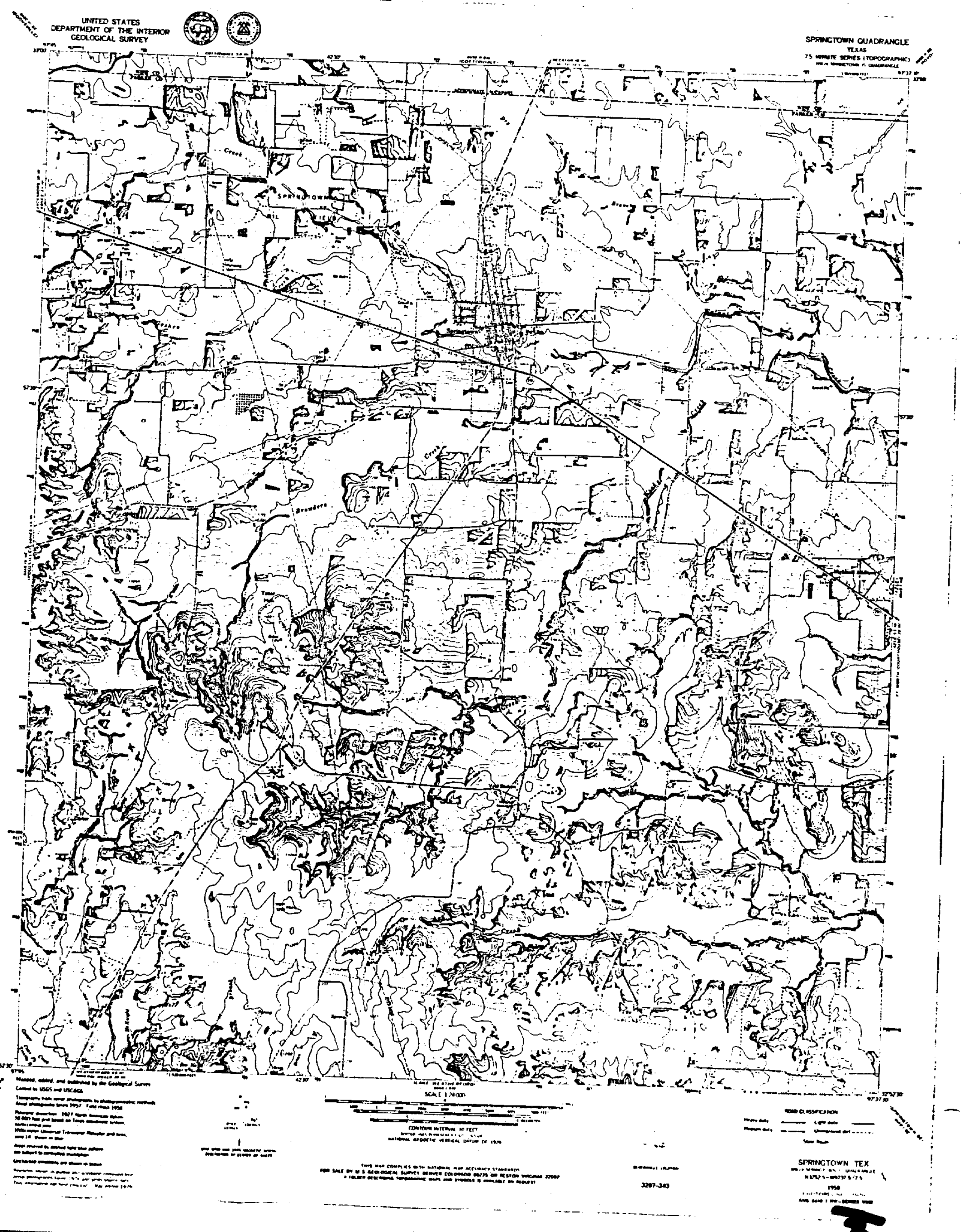
Control by USGS and USC&GS

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D.C.

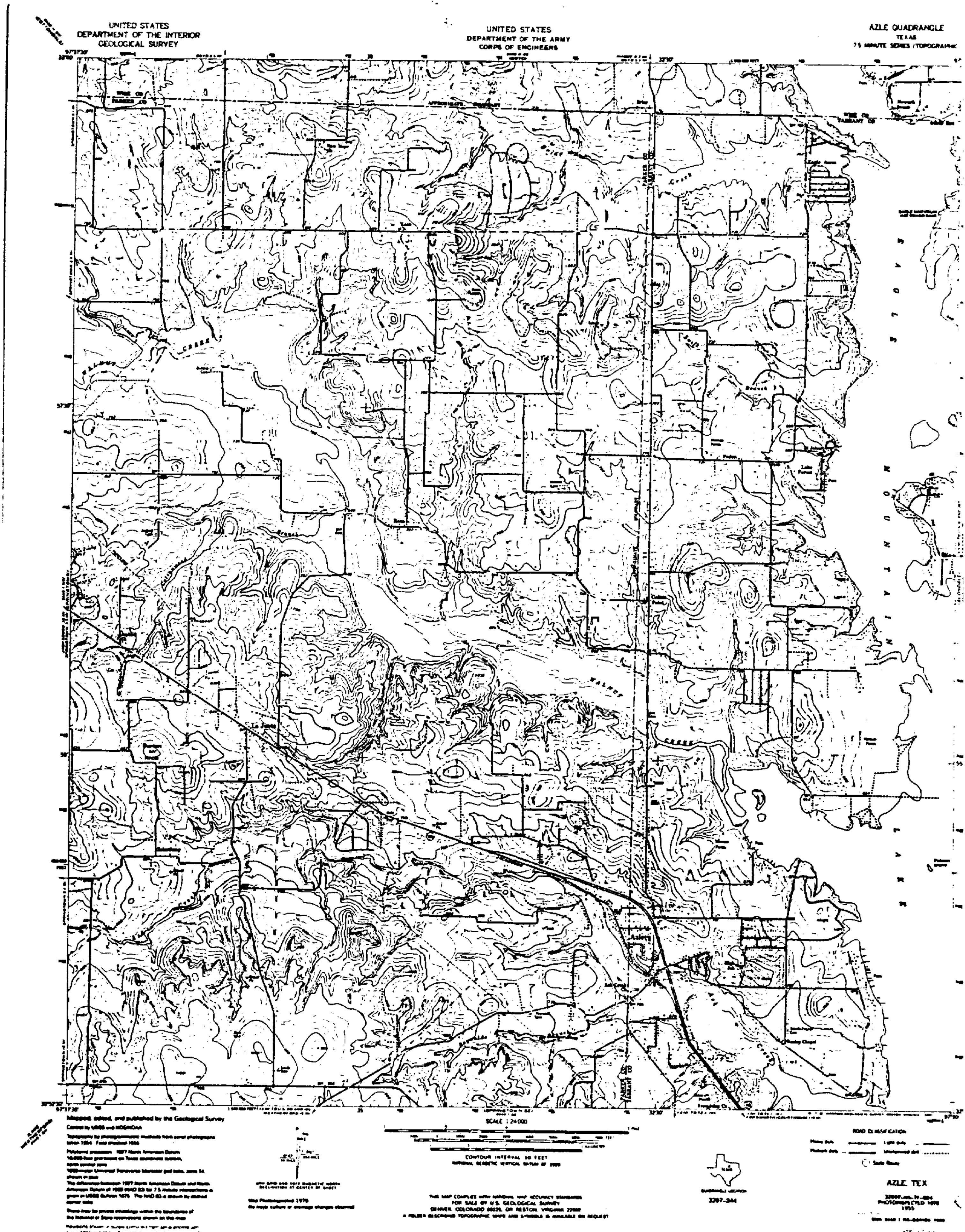
ROAD CLASSIFICATION

POOLVILLE, TEX

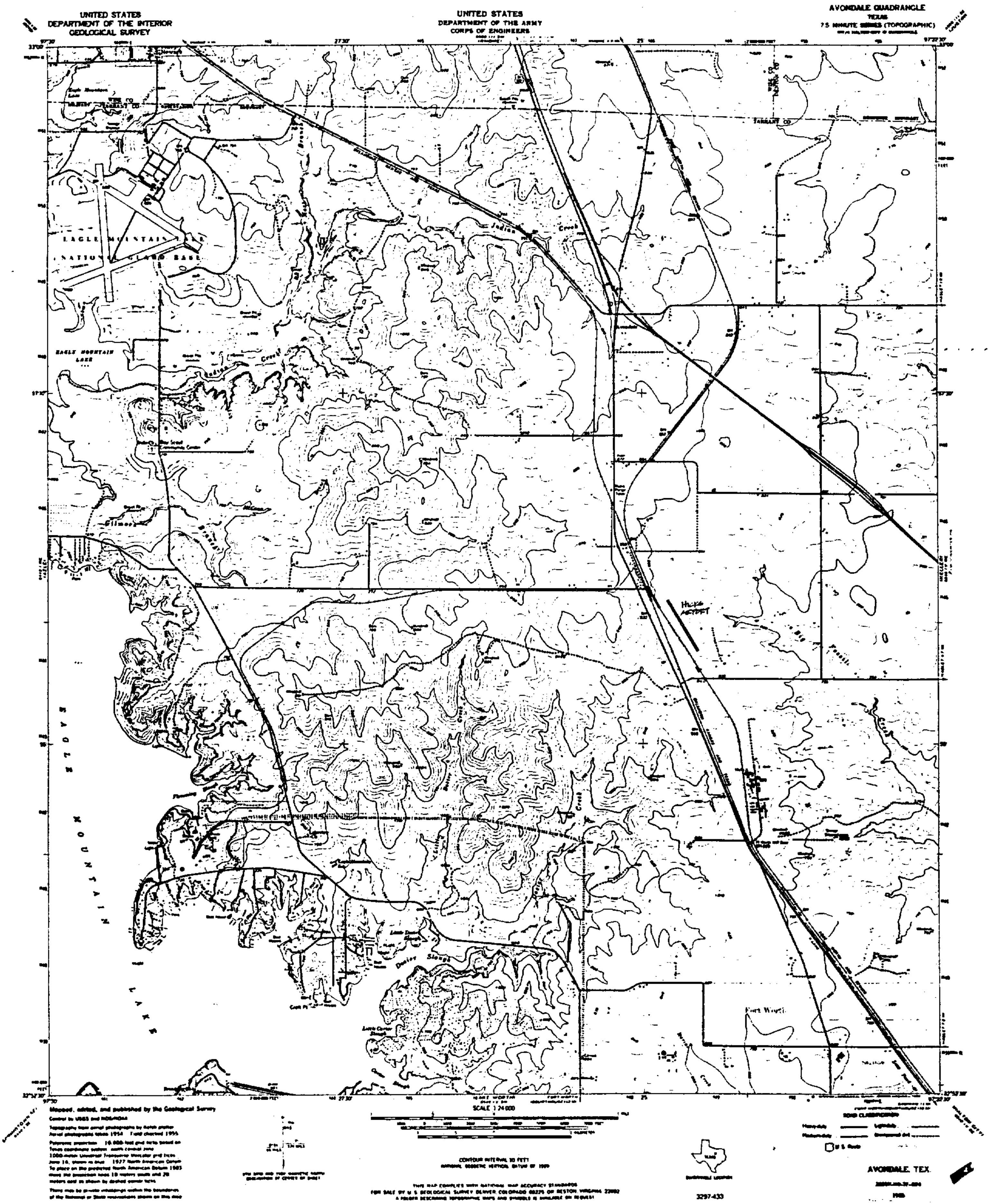
63



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SPRINGTOWN QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
SPRINGTOWN
Creek
Browders
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ROAD CLASSIFICATION
SPRINGTOWN, TEX.
1958
3287-343


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
UNITED STATES
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
AZLE QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
WALNUT CREEK
Azle
Mapped, edited, and published by the Geological Survey
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
Map Photoinspected 1976
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
State Route
3297-344
AZLE, TEX.
PHOTOINSPECTED 1976
1955

65



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
UNITED STATES
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
AVONDALE QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
EAGLE MOUNTAIN LAKE
NATIONAL GUARD BASE
EAGLE MOUNTAIN LAKE
Indian Creek
TARRANT CO
Gilmore
HICKS AIRFIELD
EAGLE MOUNTAIN LAKE
Fort Worth
Mapped, edited, and published by the Geological Survey
Aerial photographs taken 1954   Field checked 1955
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U S GEOLOGICAL SURVEY DENVER COLORADO 80225 OR RESTON VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
U S Route
3297-433
AVONDALE, TEX.

APPENDIX 2

CORRESPONDENCE FROM INTERESTED PARTIES

APPENDIX 2

A. PETITION - BIG SANDY WATER AUTHORITY CONCERNED CITIZENS GROUP

Big Sandy Water Authority

Concerned Citizens Group
Route1 Box 101
Bridgeport, TX 76426

Mr. Bob Shawn, P. E.
Shawn * Kraus Associates, Inc.
1502 Houston Street
Grand Prairie, TX 75050

February 19, 1992

RE: Common Vision Study by North Central Texas Council of Governments conducted by Mr. John Promise and Mr. Chris Brooks
NCTCOG Dept. of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Mr. Bob Shawn;

Enclosed in this box you will find copies of letters which were sent to Mr. Brooks, numbering more than five hundred, from people who are strongly against any type of detention dam structure ever being built on the Big Sandy Creek between the towns of Bridgeport and Decatur or on the Trinity River at Boyd in Wise County, Texas. Many people to whom we gave letters have already sent them to Mr. Chris Brooks of NCTCOG.

Lack of communication between NCTCOG (Chris Brooks), Fort Worth District Corp. of Engineers (Col. John Mills) and the citizens of Wise County needs to be addressed. Projects are being planned for our county <u>without any public notices or hearings</u> before such activities begin. We want your office to know that a lot of misinformation has been put out about how much of the flooding in Tarrant County is a result of water coming down Big Sandy Creek. Big Sandy Creek usually stays within the banks until the gates of Lake Bridgeport Dam are opened and then the lake water coming down the Trinity River hold back Big Sandy Creek, causing it to overflow the banks and flood valuable farmland.

The Big Sandy Water Authority firmly supports strong supervision of Tarrant County Water Control and Improvement District #1 in their water release practices from Lake Bridgeport. The water is released <u>too fast</u> and <u>much too late</u> from the lake. It takes very little common sense to understand that when the area above Lake Bridgeport receives any substantial rainfall, the runoff will affect Lake Bridgeport's water level. Instead of waiting two or three days and crying "Act of God" before even thinking about letting water out of Lake Bridgeport, TCWCID#1 should anticipate releasing water before the need arises. <u>Please recommend from the Wise County Study that a permit hearing be held to address problems created in Wise County by TCWCID #1 water releases.</u>

We sincerely hope that you and your office will take our interests and concerns into consideration and listen to what ALL of Wise County citizens have to say on this very important issue.

Thank you for your help,
The Big Sandy Water Authority

Mr. & Mrs. Grady Cowling — Gary & L. L. Dickerson — L. M. Rawle
Mr. & Mrs. Robert L. Green — Mr. & Mrs. Gary Green — Mr. & Mrs. Curtis Gates
Mr. & Mrs. Harold Upton — Mr. & Mrs. Paul Howard — Mr. & Mrs. Billy Caldwell
Mr. & Mrs. Glen Rhine — J. M. Green — Alma Taylor
Lorene E. Sinters — Roy Lewis DVM — Todd Buckner
Mr. & Mrs. Coley Holmes — Kenneth Buckner — Jamie Caldwell
C. P. Smith, Jr. — Earl M. [illegible] — Curtis & Mary Ann Anderson
Edward L. Green — Travis & Verona Cobb

APPENDIX 2

B. TYPICAL LETTER TO NCTCOG

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

Mr. Brooks;

In regard to the proposed solution for flood reduction, I strongly oppose the building of a detention dam in Wise County along the Big Sandy. Water coming down the Big Sandy is not the problem; and offer the following suggestions for alternative flood control:

1. Dredge Eagle Mountain Lake, Lake Worth and Lake Bridgeport
2. Replan locations for additional Soil Conservation Service type detention dams above FM1810 and northwest of Lake Bridgeport, with construction as soon as possible. We realize that these dams will not control flooding, but will add silt control above Lake Bridgeport and Eagle Mountain Lake, thereby aiding in water supply for the Metroplex.
3. Jack County Dam-In view of Jack County's lack of water supply problems, put a larger dam and lake there, helping that area as well as Wise and Tarrant Counties.
4. Resend and replan the 1968-1972 changes to the Lake Bridgeport Dam. Prior to the above changes, Lake Bridgeport had an available 14-16 feet of flood control storage and a spillway with limited capacity of about 20,000 acre feet per day. After the changes, only a usedable 3 feet of flood storage with over 60,000 acre feet of availabe spillway release. Records show that Lake Bridgeport did have flood control responsibilities prior to the above changes. Downsize the present use capacity and restore flood capacity.
5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. ______________________________

Name: ______________________________

Organization: ______________________________

Address: ______________________________

Phone Number ______________________ Fax Number ______________

Do you want to be added the mailing list for the quarterly *Reflections* ?

[✓] yes [ ] no

APPENDIX 2

C. TYPICAL LETTERS TO NCTCOG WITH ADDITIONAL COMMENTS

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

Mr. Brooks;

In regard to the proposed solution for flood reduction, I strongly oppose the building of a detention dam in Wise County along the Big Sandy. Water coming down the Big Sandy is not the problem; and offer the following suggestions for alternative flood control:

1. Dredge Eagle Mountain Lake, Lake Worth and Lake Bridgeport
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3. Jack County Dam-In view of Jack County's lack of water supply problems, put a larger dam and lake there, helping that area as well as Wise and Tarrant Counties.
4. Resend and replan the 1968-1972 changes to the Lake Bridgeport Dam. Prior to the above changes, Lake Bridgeport had an available 14-16 feet of flood control storage and a spillway with limited capacity of about 20,000 acre feet per day. After the changes, only a usedable 3 feet of flood storage with over 60,000 acre feet of availabe spillway release. Records show that Lake Bridgeport did have flood control responsibilities prior to the above changes. Downsize the present use capacity and restore flood capacity.
5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. Consider a combination 3, 4 & 6 above
I moved out here to get a better place for my boys and family. I'm not ~~goning~~ going to give up my land without a big fight. I love it [illegible]

Name: Linda Gatur
Organization:
Address: Rt 5 Box 335 C Decatur, Texas
Phone Number 627-7543 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[✓] yes [ ] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

Mr. Brooks;

In regard to the proposed solution for flood reduction, I strongly oppose the building of a detention dam in Wise County along the Big Sandy. Water coming down the Big Sandy is not the problem; and offer the following suggestions for alternative flood control:

1. Dredge Eagle Mountain Lake, Lake Worth and Lake Bridgeport

2. Replan locations for additional Soil Conservation Service type detention dams above FM1810 and northwest of Lake Bridgeport, with construction as soon as possible. We realize that these dams will not control flooding, but will add silt control above Lake Bridgeport and Eagle Mountain Lake, thereby aiding in water supply for the Metroplex.

3. Jack County Dam-In view of Jack County's lack of water supply problems, put a larger dam and lake there, helping that area as well as Wise and Tarrant Counties.

4. Resend and replan the 1968-1972 changes to the Lake Bridgeport Dam. Prior to the above changes, Lake Bridgeport had an available 14-16 feet of flood control storage and a spillway with limited capacity of about 20,000 acre feet per day. After the changes, only a usedable 3 feet of flood storage with over 60,000 acre feet of availabe spillway release. Records show that Lake Bridgeport did have flood control responsibilities prior to the above changes. Downsize the present use capacity and restore flood capacity.

5. Channelization--Channel the Trinity River and Big Sandy.

6. ~~Smaller Boyd flood control lake.~~

7. NO LAKE BOYD AREA.

Name: LARRY W. MORROW

Organization:

Address: RT. 1 BOX 267N-2 BRIDGEPORT TEX. 76426

Phone Number 817-683-4214 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[ ] yes [ ] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

Mr. Brooks;

In regard to the proposed solution for flood reduction, I strongly oppose the building of a detention dam in Wise County along the Big Sandy. Water coming down the Big Sandy is not the problem; and offer the following suggestions for alternative flood control:

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2. Replan locations for additional Soil Conservation Service type detention dams above FM1810 and northwest of Lake Bridgeport, with construction as soon as possible. We realize that these dams will not control flooding, but will add silt control above Lake Bridgeport and Eagle Mountain Lake, thereby aiding in water supply for the Metroplex.

3. Jack County Dam--In view of Jack County's lack of water supply problems, put a larger dam and lake there, helping that area as well as Wise and Tarrant Counties.

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5. Channelization--Channel the Trinity River and Big Sandy.

6. ~~Smaller Boyd flood control lake.~~

7. No Lake at Boyd -!!!! This will not help!!

Name: Judy Morrow

Organization:

Address: Rt 1 Box 267 N-2 Bridgeport, Tex 76426

Phone Number 817 683 4214 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ? [x] yes [ ] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

Mr. Brooks;

In regard to the proposed solution for flood reduction, I strongly oppose the building of a detention dam in Wise County along the Big Sandy. Water coming down the Big Sandy is not the problem; and offer the following suggestions for alternative flood control:

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5. Channelization--Channel the Trinity River and Big Sandy.

6. ~~Smaller Boyd Flood Control Lake~~.

7. NO LAKE AT BOYD - PERIOD!! - ONLY A MAJOR LAKE ABOVE LAKE BRIDGEPORT WILL SOLVE THE FLOODING PROBLEM BETWEEN BRIDGEPORT AND FT. WORTH!

Name: GERALD WAYNE GROVES Gerald Wayne Groves

Organization: ________

Address: 802 STEVENS BRIDGEPORT, TX 76426

Phone Number 817-683-4785 Fax Number ________

Do you want to be added the mailing list for the quarterly *Reflections* ? [] yes [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.

6. ~~Smaller Boyd flood control lake.~~

7. No lake / I am vehemently against
in Boyd area / this felecious idea.

Name: Cody Morrow

Organization:

Address: Rt 1 Box 261 N-2

Phone Number 683-4214 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[ ] yes [X] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.

6. Smaller Boyd flood control lake.

7. Consider #3, #4, & #6 to serve the general public before taking my home. I'll fight this lake on Big Sandy all the way. I want my home to remain where it is.

Name: LaVonna Gates

Organization:

Address: Rt. 5 Box 335 D

Phone Number 627-7543/(817) 239-9501 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[X] yes [ ] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.

6. Smaller Boyd flood control lake.

7. Consider Items 3, 4 and 6 above and remember The Trinity is responsible for most of the flooding and No Families would have to be displaced to restore flood control at Bridgeport Lake.

Name: Curtis S. Gates

Organization:

Address: RT 5, Box 335C Decatur TX 76234

Phone Number 817-627-7543 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[X] yes [ ] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

COPY

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.

6. Smaller Boyd flood control lake.

7. ______________________________

Name: Margaret Tilley

Organization: Rt 1 [illegible] Citizens Concerned for Rights of Flood Victims of Big Sandy Watershed

Address: Paradise, Texas 76073

Phone Number ______________ Fax Number ______________

Do you want to be added the mailing list for the quarterly *Reflections* ?   [] yes   [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. If Dams must be constructed, construct Retention Dams + Dedicate X Amount of Acre feet To Wise County Residence annually.

Name: Willard J. Howell

Organization: Private

Address: P.O. Box 55 Decatur, TX. 76234

Phone Number (817) 627-6648 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[] yes [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. I feel we need our good bottom land for farming.

Name: Ruth E. McCollum

Organization:

Address: Rt. 1 Box 234 Chico, Texas 76431

Phone Number (817) 644-2699 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ? [] yes [X] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

Copy.

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5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. WE DON'T NEED A SILT PRODUCING LAKE ON BIG SANDY. A WASTE OF GOOD PRODUCTIVE FARMLAND THAT ONE DAY WILL BE NEEDED TO FEED AMERICA.

Name: Jimmie R. Wilkins

Organization: ____

Address: Route 1 Box 325 Chico

Phone Number 817-644-2369 Fax Number ____

Do you want to be added the mailing list for the quarterly *Reflections* ?

[] yes [X] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.

6. Smaller Boyd flood control lake.

7. PLACE LAKES IN JACK COUNTY TO ALLOW FOR DEEP WATER STORAGE & LOW AREA EVAPORATION SURFACES DO NOT BUILD SURGE PONDS OVER THE MOST PRODUCTIVE LAND IN WISE COUNTY. SUCH SHALLOW LAKES ARE WORTHLESS.

Name: Jesse C. Wilkins

Organization: FARMER WISE COUNTY

Address: RT. 1, BOX 325 CHICO TX, 76431

Phone Number 817-644-2369 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ? [✓] yes [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. We don't need another lake in Wise County Nation in this area

Name: Nebe Tucker

Organization:

Address: Box 363 Chico Tex. 76431

Phone Number 817-644-2423 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ? [] yes [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.

6. Smaller Boyd flood control lake.

7. Please no more Lakes in this area. We need [illegible] land we have for producing of [illegible]

Name: Mrs J. O. Brooks

Organization:

Address: Rt 1 Box 306 Chico, Texas 76431

Phone Number 644-2938 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ? [] yes [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. Don't flood valuable farm land.

Name: Monte Graham

Organization: Farmer & Rancher

Address: Rt 1 Box 233 Chico TX 76431

Phone Number 817 644 5134 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ? [✓] yes [] no

Lone Star Cemetery Assn

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

Copy

Mr. Brooks;

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6. Smaller Boyd flood control lake.

7. ______________________________

re the cemetery.

Name: Jenny D. Head

Organization: ______________________________

Address: Waxahachie

Phone Number 214-938-0939 Fax Number 214-938-7700

Do you want to be added the mailing list for the quarterly *Reflections* ?

[] yes [✓] no

Copy

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

petition

Mr. Brooks;

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5. Channelization--Channel the Trinity River and Big Sandy.

6. Smaller Boyd flood control lake.

7. Dont Need No Lake

Name: Jimmy Wright

Organization: Farmer

Address: Rt 1 Box 143H Bridgeport Tex

Phone Number 683-4954 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[] yes [] no

Copy

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

Petition

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Name: Jimmy Wright

Organization: Farmer

Address: Rt 1 Box 143H Bridgeport Tex

Phone Number 683-4954 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[] yes [] no

Lone Star Cemetery Assn.

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.

6. Smaller Boyd flood control lake.

7. Resend the extreme unacceptable 35" rainfall in 24 hrs. requirement of the Texas Water Commission for Dams in Texas. (This is over 3 times that of a 100 yr. Flood)

Name: Jerry & Carolyn Head

Organization: Lone Star Cemetery Heir

Address: 1014 Ferris Ave #106 Waxahachie, Texas 75165

Phone Number 214-938-7700 Fax Number 214-938-7701

Do you want to be added the mailing list for the quarterly *Reflections* ? [✓] yes [ ] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

Mr. Brooks;

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Stop spending tax money
Comparing of existing facilities

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4. Resend and replan the 1968-1972 changes to the Lake Bridgeport Dam. Prior to the above changes, Lake Bridgeport had an available 14-16 feet of flood control storage and a spillway with limited capacity of about 20,000 acre feet per day. After the changes, only a usedable 3 feet of flood storage with over 60,000 acre feet of availabe spillway release. Records show that Lake Bridgeport did have flood control responsibilities prior to the above changes. Downsize the present use capacity and restore flood capacity.
5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. Check possibility of lakes being dredged for the silt

Name: Erma J. Coy

Organization: ______

Address: Route 1 Box 43 Chico Texas 76431

Phone Number 817-644-2374 Fax Number ______

Do you want to be added the mailing list for the quarterly *Reflections* ? [] yes [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

Mr. Brooks;

In regard to the proposed solution for flood reduction, I strongly oppose the building of a detention dam in Wise County along the Big Sandy. Water coming down the Big Sandy is not the problem; and offer the following suggestions for alternative flood control:

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7. Check posibility of lakes being dredged for the silt

Stop spending tax money comprimising "existing" facilities

Name: E M Coy

Organization:

Address: Route 2 Box 43 Chico Tex 76431

Phone Number 817-644-2374 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ? [] yes [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

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5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. Comment: Use the "Lazy" convicts at the local prison - to clean out rivers, creeks, bottoms

Name: Clyde Kenyon

Organization:

Address: PO BOX 292

Phone Number 683-2511 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[] yes [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. Use the prisoners to help clear out all the brush & etc. Also - go north where the watershed starts be Bowie

Name: Wayne Billington

Organization: ___

Address: P.O. Box 1025 Bridgeport Tx 76426

Phone Number 683-4110 Fax Number ___

Do you want to be added the mailing list for the quarterly *Reflections* ?

[ ] yes [ ] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

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5. Channelization--Channel the Trinity River and Big Sandy.
6. Smaller Boyd flood control lake.
7. Go back to source of problems

Name: Sharon Clampett

Organization:

Address: Route 2 Box 384 Chico

Phone Number 644-5148 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[] yes [] no

Chris Brooks Lone Star Cemetery Assoc
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

Copy

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5. Channelization--Channel the Trinity River and Big Sandy.

6. Smaller Boyd flood control lake.

#4 * This Solve the Problem of Flooding Allong the Trinity River if The Flood Control Storage of Bridgeport Lake is Used

Name: Harry Dickinson

Organization: Lone Star Cemetery

Address: Rt 2 Box 122 Chico Tx

Phone Number 817-644-2445 Fax Number

Do you want to be added the mailing list for the quarterly *Reflections* ?

[X] yes [ ] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

December 30, 1992

Copy

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6. Smaller Boyd flood control lake.
7. ______________________________

____

I Can not understand why the metroplex cities would give building permits to builders to build on the rivers that has flooded in the past and then expect we to give up our land to save these same houses that should never have been built.

Name: June Caldwell

Organization: ______________________________

Address: Rt. 2, Box 125, Chico, Tx. 76431

Phone Number 817-644-2681 Fax Number ______________

Do you want to be added the mailing list for the quarterly *Reflections* ?

[] yes [] no

Chris Brooks
North Central Texas Council of Government
Department of Environmental Resources
P.O. Box 5888
Arlington, TX 76005-5888

Copy

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5. Channelization--Channel the Trinity River and Big Sandy.
6. Much ~~Smaller~~ Boyd flood control lake.
7. __________

Name: Phyllis A. Medlen

Organization: Private Citizen

Address: 1701 Thompson St., Bridgeport, Tx. 76426

Phone Number (817) 683-4510 Fax Number ________

Do you want to be added the mailing list for the quarterly *Reflections* ?

[] yes [] no

APPENDIX 3

SELECTED ENVIRONMENTAL CORRESPONDENCE

APPENDIX 3

A. CONTACT NAMES

Railroad Commission of Texas	
Bob Van Voorhis	(512) 463-7288
Gina	(512) 463-6882
Gerald	(512) 463-7288 x6851
	(512) 463-7288 x7254
Laura Lee Moffett	(512) 463-7313
Petroleum Information	
Craig Goodling	(800) 525-3308
Dave Dedrickson	(800) 525-3308 x184
Mike McLean	(800) 525-3308
Bureau of Economic Geology	
Ed Garner	(512) 471-1534 x 141
Agency Information Consultants	
Mary Ann Koehler	(512) 478-8991
Kim Jackson	
Texas Water Commission/Texas Department of Health	
Bill Dahlin/Boyd Cole	(214) 298-6171 Duncanville
Joe Smith	(512) 908-6067 Austin
Bill Shafford	(512) 908-6595 Austin
Latrice Hertzler	(512) 908-6707 Austin
Steve Reynolds	(512) 908-6787 Austin
North Central Texas Council of Governments	
John Promise	(817) 640-3300
Sam Brush	(817) 640-3300
Saadii Mai	(817) 640-3300
NORTEX Regional Planning Commission	
Clair Holt	(817) 322-5281 Wichita Falls
	(817) 786-2955 Texoma
United States Department of Agriculture	
• US Forest Service	
Dennis Robertson	(409) 639-8570 Lufkin
Ben Harbour	(817) 627-5475 Decatur
• Soil Conservation Service	
Gary Bates	(817) 627-2721
Gary Conner	(817) 894-3401
Mark Walker	(817) 538-4681
Howard Barton	(817) 574-4612
John Paclick	(817) 549-0422

Tony Dean	(817) 567-5641	
Ronald Herring	(817) 594-4731	
Texas Historical Commission		
Dan Prikryl/Chris Jurgens	(512) 463-8434	
Texas Water Development Board		
Hayden Whitsett	(512) 463-8518	archeologist
Texas Archeological Research Laboratory		
Carolyn Spock	(512) 471-6006	archeologist
Environmental Protection Agency		
Mava Davis	(214) 655-6484	reports
Jerva Durham	(214) 655-6484	FOIA
Stan Hitt	(214) 655-6735	superfund
Henry Onsgard		
Verne McFarland		
U.S. Geological Survey -- E.S.I.C.		
Jim Harmon	(800) 872-6277	wetland maps
David Keys	(703) 648-5956	
U.S. Fish and Wildlife Service		
Robert M. Short	(817) 885-7830	
Jeffrey A. Reid	(817) 885-7830	
Don Wilhelm	(817) 885-7830	
Texas Parks and Wildlife Department		
Bob Spain	(800) 792-1112	Director
Bob Farquahr	(512) 732-0761	
Roy Frye	(512) 389-4579	
	(512) 389-4505	
Craig McMahan	(512) 389-4977	

APPENDIX 3

B. CORRESPONDENCE FROM THE US DEPARTMENT OF THE INTERIOR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Stadium Centre Building
711 Stadium Drive East, Suite 252
Arlington, Texas 76011

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
2-12-93-I-073

January 6, 1993

Mr. David Voegeli
Shawn, Kraus Associates, Inc.
1502 Houston Street
Grand Prairie, Texas 75050

Dear Mr. Voegeli:

This responds to your letter of December 17, 1992, requesting information on federally listed threatened and endangered species in Archer, Clay, Jack, Parker, Wise, Montague, and Young Counties, Texas.

This information is provided to assist your firm in assessing potential impacts to federally listed threatened and endangered species associated with a proposed flood control project above Eagle Mountain Lake in the above mentioned counties.

Threatened and endangered species

The following species are known to occur in the counties as listed below:

Archer County	whooping crane (*Grus americana*)
Clay County	bald eagle (*Haliaeetus leucocephalus*) whooping crane (*Grus americana*) interior least tern (*Sterna antillarum*)
Montague County	bald eagle (*Haliaeetus leucocephalus*) interior least tern (*Sterna antillarum*)

Bald eagles nest, roost, and perch in tall trees near water and feed primarily on fish and waterfowl. Winter habitat includes reservoirs, lakes, rivers, and marshes. The bald eagle is a winter resident of Clay County near Lake Arrowhead and along the Red River. In Montague County the bald eagle is known to winter on Nacona Lake, Lake Marion, and along the Red River. Most wintering bald eagles migrate north February through March.

The interior least tern nests on bare to sparsely vegetated river sandbars from May through August along the Red River in Clay and Montague Counties. Nesting areas are ephemeral, changing as sandbars form, move, and become vegetated. Prior to fall migration, least terns gather in staging areas in late July and August at water bodies with concentrations of small fish.

Whooping cranes may be encountered in any county in north central Texas during migration. A recent confirmed sighting occurred north of Olney in Archer County. Autumn migration normally begins in mid-September, with most birds arriving on the wintering grounds at Aransas National Wildlife Refuge between late October and mid-November. Spring migration occurs during March and April. Whooping cranes prefer isolated areas away from human activity for feeding and roosting, with vegetated wetlands and wetlands adjacent to cropland being utilized along the migration route. Foods consumed usually include frogs, fish, plant tubers, crayfish, insects, and waste grains in harvested fields.

Other federally listed threatened and endangered species whose migratory corridor includes Texas or parts of Texas are the American peregrine falcon (*Falco peregrinus anatum*), aplomado falcon (*Falco femoralis septentrionalis*), and the arctic peregrine falcon (*Falco peregrinus tundrius*). No federally listed species are documented to inhabit Jack, Parker, Wise, and Young Counties; however, any of the above mentioned species may migrate through or occupy suitable habitat anywhere in north central Texas.

For information concerning State listed threatened and endangered species, you should contact the Texas Parks and Wildlife Department (Texas Natural Heritage Program, ATTN: Dorinda Sullivan), IH 35 South, Suite 100, Austin, Texas 78704.

Wetlands

National Wetland Inventory maps may be obtained by calling the U.S. Geological Survey-E.S.I.C., at 1-800-872-6277. For additional information concerning wetland delineation, you should contact the Fort Worth District Corps of Engineers, Permits Section, SWFOD-O P.O. Box 17300, Fort Worth, Texas 76102-0300 and the Tulsa District Corps of Engineers, Permits Section, P.O. Box 61, Tulsa, Oklahoma, 74121-0061. It is necessary to contact both offices since all or portions of some counties are in the Brazos and Trinity River drainages which are administered by the Fort Worth District and some are in the Red River drainage which is administered by the Tulsa District.

If you need any additional information or have questions, please contact Wildlife Biologist Jeffrey A. Reid of my staff at (817) 885-7830.

Sincerely,

Robert M. Short

Robert M. Short
Field Supervisor

APPENDIX 3

C. CORRESPONDENCE FROM THE US DEPARTMENT OF AGRICULTURE

United States Department of Agriculture
Forest Service
National Forests and Grasslands in Texas
701 N. 1st Street
Lufkin, TX 75901
409 639-8501

Reply to: 1920/5400

Date: January 21, 1993

David Voegeli
%Shawn Engineering Environmental Corporation
1502 Houston Street
Grand Prairie, Texas 75050

Dear David:

Per your request I am sending a map showing the Lyndon B. Johnson National Grassland ownership in Wise and Montague Counties. These are the only National Grasslands within the study area you described, although other National Grasslands exist in Fannin County, Northeast of your study area.

If you should need additional detail about these lands you can contact our district office in Decatar, Texas. The telephone for that office is; (817) 627-5475 and the address is on the enclosed map.

Sincerely,

L. Dennis Robertson

L. DENNIS ROBERTSON
Staff Officer
Land Management Planning

Enclosure

cc: Ben Harbour, District Ranger
Caddo-LBJ

Caring for the Land and Serving People

FS-6200-28b(4/88)

FINAL ENVIRONMENTAL IMPACT STATEMENT

National Forests in Texas and the Caddo & LBJ National Grasslands
Land and Resource Management Plan

Angelina, Fannin, Houston, Jasper, Montagué, Montgomery, Nacogdoches, Newton, San Augustine, Sabine, San Jacinto, Shelby, Trinity, Walker and Wise counties, Texas

Date: MARCH 1987

Lead Agency:	U.S. Department of Agriculture-- Forest Service
Responsible Official:	John Alcock, Regional Forester Southern Region 1720 Peachtree Road, NW Atlanta, Georgia 30367
For Further Information Contact:	Gordon S. Steele, Forest Planner National Forests in Texas 701 N. First Street Lufkin, Texas 75901 Telephone: 409/639-8501

Abstract

Thirteen alternatives for managing the 634,912-acre National Forests and 38,109-acre Caddo-LBJ National Grasslands in Texas are presented. Alternative K is the preferred alternative and was used to develop the Forest Plan.

This Plan will guide the management on the four National Forests in Texas, including the Caddo and Lyndon B. Johnson National Grasslands in north central Texas. The Plan will be revised every 10-15 years.

The thirteen alternatives considered are:

ALTERNATIVE #1 - Timber will be managed to produce a long-term sustained yield capacity of wood products at the highest level possible consistent with minimum management requirements of other resources.

ALTERNATIVE #2 - Maintain the current planned program with emphasis on improving maintenance of facilities.

ALTERNATIVE #3 - 1980 RPA

ALTERNATIVE #4 - Emphasize all recreation on the Sam Houston National Forest and National Grasslands where recreation demands are high and decrease emphasis for developed recreation on the other three National Forests where demand may be low.

ALTERNATIVE #5 - The No Action Alternative (current management)

ALTERNATIVE #6 - Optimize habitats for demand species of wildlife and fish while keeping other resources at appropriate levels.

ALTERNATIVE #7 - Manage as close as possible to the natural state.

ALTERNATIVE #8 - Minimum new road construction, reduce ORV use, do not cut trees until they reach 70 years for yellowpine, 80 years for longleaf and 120 years for hardwoods; limit harvest cut to less than 35 acres and establish trail corridors.

ALTERNATIVE #9 - Maximize PNV

ALTERNATIVE P - The preferred alternative in the DEIS

ALTERNATIVE J - A modified uneven-aged, single tree selection alternative as identified by several environmental groups

ALTERNATIVE K - Preferred alternative in the FEIS.

ALTERNATIVE L - An uneven-aged, single tree alternative, using herbicides

LAND & RESOURCE MANAGEMENT PLAN

National Forests in Texas
Caddo & LBJ National Grasslands

March 1987

PREFACE

The preparation of this National Forest Land and Resource Management Plan is required by the Forest and Rangeland Renewable Resources Planning Act (RPA), as amended by the National Forest Management Act (NFMA). An assessment of its environmental impacts is required by the National Environmental Policy Act (NEPA) and the implementing regulations of NFMA (36 Code of Federal Regulations (CFR) 219).

The accompanying Environmental Impact Statement (EIS) contains analysis that supports the Forest Plan. Therefore, the Forest Plan and the EIS are combined documents; neither is complete in itself. The EIS describes the alternatives considered in arriving at the Forest Plan and assesses the potential environmental effects of implementing the Plan or any of the alternatives.

This National Forest Land and Resource Management Plan (Forest Plan) was developed to direct management of the National Forests and National Grasslands in East Texas. It is based on Alternative K described in the accompanying Environmental Impact Statement. The goal of this plan is to provide a management program that reflects a mix of management activities allowing use and protection of Forest resources, fulfills legislative requirements, and addresses local issues.

Approval of this Plan is in the form of a Record of Decision. The approved Plan shall not become effective until at least 30 days after publication of the Notice of Availability of the Final Environmental Impact Statement in the Federal Register. The Regional Forester's decision will be subject to administrative appeals procedures pursuant to the provisions of 36 CFR Part 211.18.

If a particular provision of this proposed action, or the application thereof to any person or circumstances, is held invalid, the remainder of the proposed action and the application of such provision to other persons or circumstances shall not be affected thereby.

The approved Forest Plan will replace all previous resource management plans prepared for the National Forests and Grasslands in Texas. The Plan presents the management strategy for the next 10 to 15 years. As soon as practical after approval of the Plan, the Forest Supervisor shall ensure that, subject to valid existing rights, all outstanding and future permits, contracts, cooperative agreements, and other instruments for occupancy and use of affected lands are consistent with the Plan. Subsequent administrative activities affecting such lands, including budget proposals, shall be based on the Plan.

The Forest Supervisor may change proposed implementation schedules to reflect differences between proposed annual budgets and appropriated funds. Such scheduled changes shall be considered an amendment to the Forest Plan, but shall not be considered a significant amendment, or require the preparation of an environmental impact statement, unless the changes significantly alter the long-term relationship between levels of multiple-use goods and services projected under planned budget proposals as compared to those projected under actual appropriations. (36 CFR 219.10(c)).

Comments regarding this plan should be sent to the:

Gordon S. Steele
Forest Planner
National Forests in Texas
Homer Garrison Federal Building
701 N. First Street
Lufkin, Texas 75901
Telephone: 409/639-8501

Copies of this document will be distributed free-of-charge during the public involvement period while supply lasts. Requests for copies after the public involvement period is concluded or depletion of supply may require a copying fee.

APPENDIX 3

D. CORRESPONDENCE FROM THE TEXAS HISTORICAL COMMISSION

THE STATE OF TEXAS

CURTIS TUNNELL
EXECUTIVE DIRECTOR

TEXAS HISTORICAL COMMISSION

P.O. BOX 12276
AUSTIN, TEXAS 78711
(512)463-6100

DEPARTMENT OF ANTIQUITIES PROTECTION

January 4, 1993

Mr. David Voegeli
Environmental Geologist
Shawn Kraus Associates, Inc.
1502 Houston Street
Grand Prairie, TX 75050

Re:Cultural Resources Information Request, Wise and Surrounding Counties, Texas (PRIVATE, F2)

Dear Mr. Voegeli:

This office has received your inquiry for review of the project referenced above. We request your inquiry be directed to the appropriate federal or state agency. The federal agency will make the preliminary assessment in accordance with 36CFR800.4(a)(1)(i). They will then request our views. In the case of state agencies, the agency should consult with us directly.

section 106 mechanics of 800.

We are enclosing several items that you may wish to review prior to submitting the undertaking to the federal agency. These include the federal regulations, a list of historical and archaeological sites currently listed on or determined eligible for the National Register of Historic Places, State Archeological Landmarks, and National Historic Landmarks in the county(ies) of the proposed project, and references and institutions which may have information pertaining to the project area.

If we may be of any further assistance, please contact Dan Prikryl of our staff at (512) 463-6096.

(512) 463-8434 Chris Jurgens TWDB

Sincerely,

James E. Bruseth, Ph.D.
Deputy State Historic Preservation Officer

Tim Perttula

Timothy K. Perttula, Ph.D.
Assistant Director for Antiquities Review

→ handles site assessments

Engineering Section
sewer line project
waste water treatment.

JB/TKP/DP

The State Agency for Historic Preservation

ARCHER

Listed National Register Site(s)
- Archer County Courthouse
- Archer County Jail

Site(s) Determined Eligible to the National Register
- No Sites

State Archeological Landmarks
- Archer County Courthouse
- Archer County Jail

CLAY

Listed National Register Site(s)
Clay County Courthouse & Jail

Site(s) Determined Eligible to the National Register
No Sites

State Archeological Landmarks
Clay County Courthouse & Jail

JACK

Listed National Register Site(s)
Fort Richardson - 41JA2
Knox, J.W., House

Site(s) Determined Eligible to the National Register
No Sites

State Archeological Landmarks
Fort Richardson State Historic Park - Fort Richardson - 41JA2
(Includes 5 structures: officer's quarters, hospital, bakery, guardhouse, and powder magazine and grounds)

MONTAGUE

Listed National Register Site(s)
Spanish Fort - 41MU12

Site(s) Determined Eligible to the National Register
No Sites

State Archeological Landmarks
No Sites

YOUNG

Listed National Register Site(s)
No Sites

Site(s) Determined Eligible to the National Register
No Sites

State Archeological Landmarks
No Sites

WISE

Listed National Register Site(s)
No Sites

Site(s) Determined Eligible to the National Register
No Sites

State Archeological Landmarks
Wise County Courthouse

APPENDIX 3

E. CORRESPONDENCE FROM THE TEXAS PARKS AND WILDLIFE DEPARTMENT

TEXAS
PARKS AND WILDLIFE DEPARTMENT
4200 Smith School Road • Austin, Texas 78744 • 512-389-4800

ANDREW SANSOM
Executive Director

February 10, 1993

Mr. David Voegeli
Shawn-Kraus Associates, Inc.
1502 Houston Street
Grand Prairie, Texas 75050

Re: Flood Plan Protection Plan--West Fork of the Trinity River above Eagle Mountain Lake

Dear Mr. Voegeli:

Information concerning the above referenced project transmitted by your letter of December 10, 1992, has been reviewed by Department staff. The following comments are provided.

If either reservoirs or channelization are identified as alternatives for the proposed project, significant adverse impacts to fish, wildlife and plant resources are expected. Other non-structural alternatives such as development controls and floodplain buyouts should also be considered and discussed in your environmental impact statement or assessment.

Reservoir construction will likely require permits from both federal and state agencies. These agencies will ask for comments from this Department concerning expected impacts and required mitigation as part of the application permit review process. We would appreciate receiving a copy of your draft report for review in anticipation of this action.

If structural alternatives are being considered, the expertise of competent biologists will simplify the planning and evaluation process.

We are including supplemental information concerning the overall project. State Parks are located on Lake Bridgeport (Wise County), Ft. Richardson (Jacksboro) and at Eagle Mountain Lake (NW Tarrant County). Impacts to these areas should be addressed by the Flood Protection Plan.

Potentially occurring sensitive species or natural communities are included as Attachment 1.

Portions of the West Fork of the Trinity River have been identified as significant stream segments. This information is provided as Attachment 2.

Major types of information that should be included in your environmental report are provided as Attachment 3.

I appreciate your coordination on this project.

Sincerely,

Roy G. Frye
for

Robert W. (Bob) Spain, Chief
Habitat Assessment Branch
Resource Protection Division

RWS:RGF:dab

Attachments

ATTACHMENT 1

Texas Natural Heritage Program Information

A search of the Texas Natural Heritage Program Information System produced the enclosed printouts, a list of presently computerized records for each of the five counties, incomplete lists of rare vertebrates, and lists of state endangered and threatened species possibly occurring. Due to the lack of a detailed description of the project area, we are addressing all possibly occurring special species. Providing a summary of work to be performed and a good physical description of the project area will result in a more specific and accurate review.

Federal Category 2 and State Threatened--

Dipodomys elator (Texas Kangaroo Rat) G2 S2 - known only from 9 counties in north-central Texas and in small area of southwest Oklahoma; mostly in association with scattered mesquite shrubs and sparse, short grasses; mesquite not required; areas underlain by firm clay soils supporting shortgrass and scattered mesquite brushland; along fencerows adjacent to cultivated fields and roads; when inactive, in underground burrows; burrows into soil with openings usually at base of mesquite or shrub; dirt is pushed into openings giving a closed appearance even though burrow is occupied; young born in underground nest chamber; feeds on grass seeds and annual and perennial forbs, some insects; metabolizes water from foods, but will drink water when available; nocturnal; active throughout year

Federal Category 2--

Dalea reverchonii (Comanche Peak prairie-clover) G2 S2 - endemic; known only from Parker and Wise counties and presumed extirpated in Hood County; shallow clay soils over Goodland Limestone in grasslands or openings in post oak woodlands; flowering in May

Natural Communities--

Little Bluestem-Indiangrass Series G2 S2 - broadly defined upland tallgrass grassland that once occurred throughout the Blackland, Fayette, and Grand prairies, but is now restricted to small, isolated relicts

Texas Oak Series G3 S3 - mainly deciduous woodland or forest occurring primarily on mesic slopes over calcareous soils of the eastern and southern Edward's Plateau and Lampasas Cut Plain

Ashe Juniper-Oak Series G4 S4 - evergreen shrubland or woodland primarily inhabiting shallow-soiled, sloping sites over limestone in the Edwards Plateau; may also be supported by disturbed areas over deeper soils on flat uplands; this community type forms landscape mosaics with plateau live oak woodland and grasslands on uplands and deciduous oak woodlands on adjacent mesic slopes

Bird Rookeries--(1991-1992 data not yet available)

Colony # 534-064, Sand Valley Ranch - nesting colony of the Great Blue Heron; active 1990

Colony # 534-054, Ball Ranch - nesting colony of the Great Blue Heron; active 1975

The Heritage Program information included here is based on the best data currently available to the state regarding threatened, endangered, or otherwise sensitive species. However, these data do not provide a definite statement as to the presence or absence of special species or natural communities within your project area, nor can these data substitute for an on-site evaluation by qualified biologists. This information is intended to assist you in avoiding harm to species that occur on your site. Please contact the Texas Parks and Wildlife Department's Heritage Program before publishing or otherwise disseminating any specific locality information.

Segment
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0801
, 0802
, 0806,
, 0803
-
0824
0810
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-
-
0839
0804
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0804
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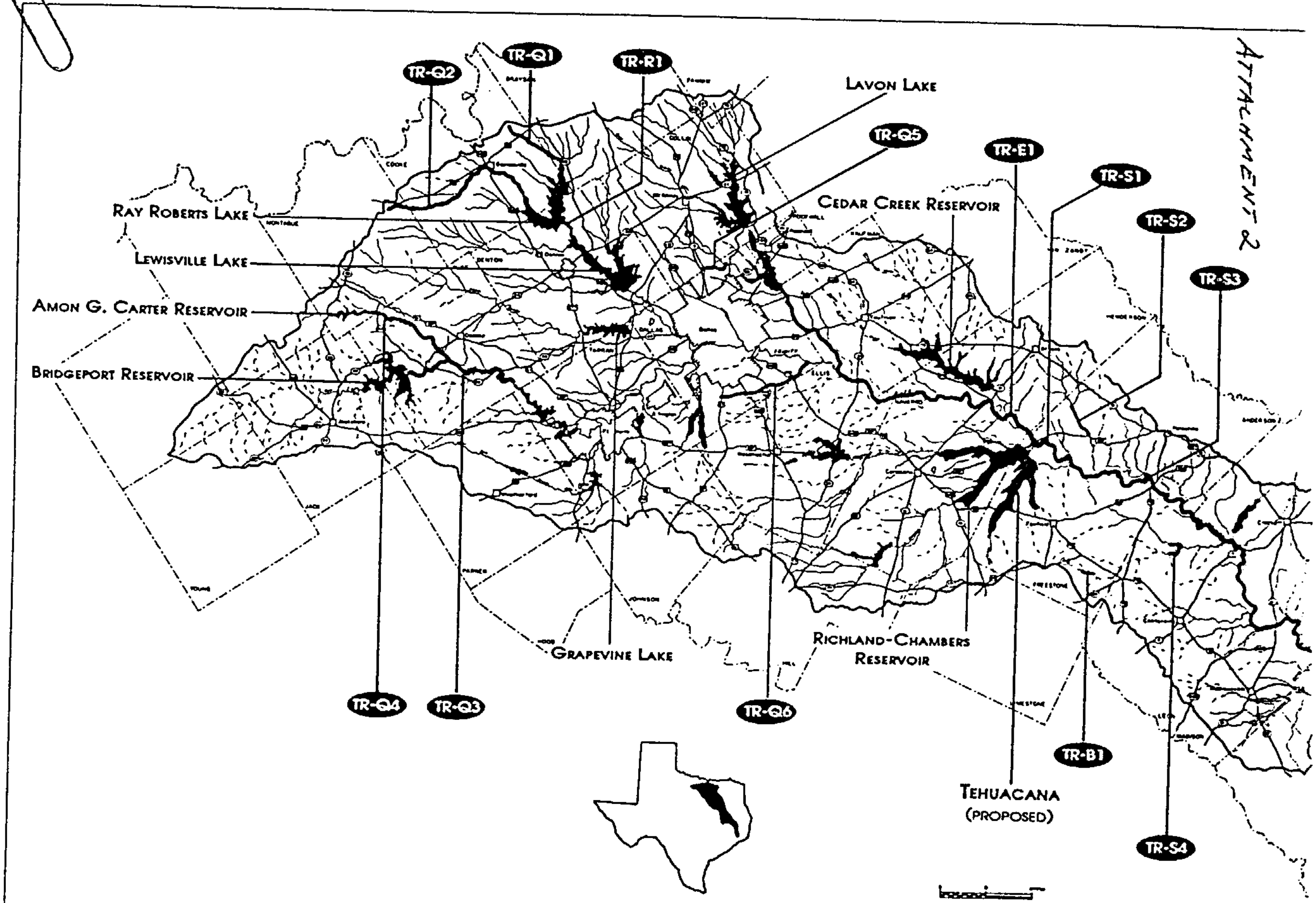
ntinued)

ATTACHMENT 2



SIGNIFICANT STREAM SEGMENT SUMMARY

TRINITY RIVER BASIN:

Segment * Designation	Waterway	Segment Description	Justification	TWC Segment Identification
TR-B1	Confluence of Buffalo and Linn Creeks	Northwest of Buffalo, Freestone County	Priority bottomland hardwood habitat.	--
TR-B2	Trinity River	Moss Bluff, Liberty County, downstream to Trinity Bay	Extensive freshwater wetland habitat.	0801
TR-B3	Trinity	Lake Livingston to Gulf	Prime spawning area for striped bass restoration.	0801, 0802
TR-E1	Trinity	Ray Hubbard Reservoir to Lake Livingston	Paddlefish stocking area (G4 S1).	0819, 0805, 0804, 0803
TR-Q1	Timber Creek	From Callisburg to Ray Roberts (17 miles)	Unique, pristine.	--
TR-Q2	Elm Fork	Headwaters to Ray Roberts (30 miles)	Unique, pristine.	0824
TR-Q3	West Fork of Trinity River	Lake Bridgeport tailrace to Eagle Mountain	Unique, pristine.	0810
TR-Q4	Big Sandy Creek	Amon G. Carter Reservoir tailrace to West Fork of the Trinity River	Unique, pristine.	--
TR-Q5	Spring Creek	Dallas County (2 miles), near Garland	Unique, pristine.	--
TR-Q6	Tenmile Creek	Dallas County	Unique, pristine diverse fishery.	--
TR-R1	Elm Fork, Trinity River	Lake Ray Roberts Dam to Lake Lewisville	Recreation.	0839
TR-S1	Trinity River	Richland Creek Wildlife Management Area	Unique State holdings.	0804
TR-S2	Catfish Creek	Engeling Wildlife Management Area (National Natural Landmark)	Unique State holdings.	--
TR-S3	Trinity River	Big Lake Bottom Wildlife Mangement Area	Unique State holdings.	0804
TR-S4	Keechi Creek at confluence with Buffalo Creek	Keechi Creek Wildlife Management Area	Unique State holdings.	--

(continued)

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: DIPODOMYS ELATOR
COMMON NAME: TEXAS KANGAROO RAT
OTHER NAME:
FEDERAL STATUS: C2
GLOBAL RANK: G2
IDENTIFIED: Y
TRACK: Y
COUNTY: Montague

STATE STATUS: T
STATE RANK: S2
SENSITIVITY: N

USGS TOPO MAPS:
BOWIE

TOPO QUAD:
3309757

MARGIN #:
1

ELEMENT OCCURRENCE NUMBER: 016
PRECISION: M
OCCURRENCE RANK:
SURVEY COMMENTS:

DATE LAST OBSERVED:
DATE FIRST OBSERVED:
DATE SURVEYED:

MANAGED AREAS:

CONTAINED:

DIRECTIONS:
0.5 MILE SOUTH OF BOWIE, MONTAGUE COUNTY, TEXAS.

DESCRIPTION:
CLAY SOILS WITH SPARSE GRASS AND SMALL MESQUITE. BURROWS ARE USUALLY AT BASE OF MESQUITE.

QUALITATIVE/QUANTITATIVE DATA:
A LARGE K-RAT WITH LONG TAIL WITH CONSPICUOUS WHITE BANNER TIP. RESTRICTED TO SMALL AREA OF OKLAHOMA AND TEXAS. NOT COMMON.

MANAGEMENT COMMENTS:
BRUSH CONTROL MAY THREATEN.

PROTECTION COMMENTS:

OTHER COMMENTS:
SPECIMEN RECORD, COLLECTOR AND DATE NOT KNOWN.

SOURCE OF INFORMATION:
BEST, TROY. DEPARTMENT OF BIOLOGY, UNIVERSITY OF NEW MEXICO ALBUQUERQUE, NEW MEXICO. PH-505/277-5971.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: DALEA REVERCHONII
COMMON NAME: COMANCHE PEAK PRAIRIE-CLOVER
OTHER NAME:
FEDERAL STATUS: C2
GLOBAL RANK: G2
IDENTIFIED: Y   TRACK: Y
COUNTY: Wise

STATE STATUS:
STATE RANK: S2
SENSITIVITY:

USGS TOPO MAPS:
RHOME

TOPO QUAD: 3309714
MARGIN #: 1

ELEMENT OCCURRENCE NUMBER: 018
PRECISION: S
OCCURRENCE RANK: D

DATE LAST OBSERVED: 1987-06-23
DATE FIRST OBSERVED: 1984
DATE SURVEYED: 1987-06-23

SURVEY COMMENTS: REMNANT POPULATION ALONG HWY ROW

MANAGED AREAS:

CONTAINED:

DIRECTIONS:
CA 0.8 MILES WEST OF US 81 (287) & TX 114 ON SOUTH SIDE OF TX 114. JUST EAST OF DRIVEWAY ON SOUTH SIDE AT WOOLEY PETROLEUM MILES YOUNG #1 SIGN.

DESCRIPTION:
GENTLY SLOPING GRAVELLY ROADSIDE ROW WITH LIMESTONE FRAGMENTS AND SHELLS ALSO ALONG 50 FT OF ROADSIDE UNDER POWERLINE ROW

QUALITATIVE/QUANTITATIVE DATA:
CA 20 CLUMPS WITHIN ROW; NO PLANTS IN FENCED GRAZED PASTURE. ASSOCIATES INCLUDE GALLARDIA PULCHELLA, THELESPERMA FILIFOLIA, SALVIA TEXANA, ARISTIDA SP., PHYLLANTHUS, ASCLEPIAS VIRIDIS, AND GUTIERREZIA DRACUNCULOIDES.

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
MAHLER #9808 COLLECTED ON 6-11-84 IS AT SMU. ATYPICAL HABITAT PERHAPS A REMNANT OF A FORMER MORE EXTENSIVE POP.

SOURCE OF INFORMATION:
ORZELL, STEVE. 1987. FIELD SURVEY OF NORTH-CENTRAL TEXAS, 18 JUNE TO 2 JULY 1987.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: DALEA REVERCHONII
COMMON NAME: COMANCHE PEAK PRAIRIE-CLOVER
OTHER NAME:
FEDERAL STATUS: C2
GLOBAL RANK: G2
IDENTIFIED: Y TRACK: Y
COUNTY: Wise

STATE STATUS:
STATE RANK: S2
SENSITIVITY:

USGS TOPO MAPS:
BOYD

TOPO QUAD:
3309715

MARGIN #:
2

ELEMENT OCCURRENCE NUMBER: 017
PRECISION: S
OCCURRENCE RANK: B

DATE LAST OBSERVED: 1987-06-23
DATE FIRST OBSERVED: 1984
DATE SURVEYED: 1987-06-23

SURVEY COMMENTS: VULNERABLE TO ROADSIDE MAINTENANCE

MANAGED AREAS:

CONTAINED:

DIRECTIONS:
CA 0.65 MILES SOUTH OF DEEP CREEK CEM. ON UNMARKED GRAVEL ROAD, 3.15 MILES NORTH OF TX 114, 0.3 MILES NORTH OF PIPELINE CROSSING AT GRAVEL ROAD

.SCRIPTION:
SCATTERED OVER 150 FT OF BROAD ROCKY GLADE ROADSIDE ROW THAT HAS NOT BEEN SCRAPED, ON EAST SIDE OF ROADSIDE.

QUALITATIVE/QUANTITATIVE DATA:
APPROXIMATELY 100 CLUMPS. ASSOCIATES INCLUDE PSORALEA REVERCHONII, HEDEOMA DRUMMONDII, DALEA TENUIS, HELIOTROPIUM TENELLUM, THELESPERMA FILIFOLIA, PARYONCHIA SCOPARIA, AND OTHER DRY ADAPTED CALCIPHILIC PLANTS

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
MAHLER #9807 COLLECTED ON 6-11-84 AND IT IS DEPOSITED AT SMU.

SOURCE OF INFORMATION:
ORZELL, STEVE. 1987. FIELD SURVEY OF NORTH-CENTRAL TEXAS, 18 JUNE TO 2 JULY 1987.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: DALEA REVERCHONII
COMMON NAME: COMANCHE PEAK PRAIRIE-CLOVER
OTHER NAME:
FEDERAL STATUS: C2 — STATE STATUS:
GLOBAL RANK: G2 — STATE RANK: S2
IDENTIFIED: Y — TRACK: Y — SENSITIVITY:
COUNTY: Wise

USGS TOPO MAPS: BOYD
TOPO QUAD: 3309715
MARGIN #: 1

ELEMENT OCCURRENCE NUMBER: 016
DATE LAST OBSERVED: 1987-06-23
PRECISION: S
DATE FIRST OBSERVED: 1984
OCCURRENCE RANK: BC
DATE SURVEYED: 1987-06-23
SURVEY COMMENTS: PROBABLY A VIABLE POPULATION

MANAGED AREAS:
CONTAINED:

DIRECTIONS:
CA 0.15 MILES SOUTH OF DEEP CREEK ON UNMARKED GRAVEL ROAD, 3.55 MILES NORTH OF TX 114, AND 0.7 MILES NORTH OF PIPELINE CROSSING AT GRAVEL ROAD

.SCRIPTION:
BOTH ROADSIDE (WEST SIDE) AND PASTURE ON TOP OF KNOLL, RELATIVELY FLAT

QUALITATIVE/QUANTITATIVE DATA:
SEVERAL HUNDRED CLUMPS IN FLOWER AND FRUIT.

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
MAHLER #9807 COLLECTED ON 6-11-84 IN FLOWER, IS DEPOSITED AT SMU.

SOURCE OF INFORMATION:
ORZELL, STEVE. 1987. FIELD SURVEY OF NORTH-CENTRAL TEXAS, 18 JUNE TO 2 JULY 1987.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: DALEA REVERCHONII
COMMON NAME: COMANCHE PEAK PRAIRIE-CLOVER
OTHER NAME:
FEDERAL STATUS: C2 STATE STATUS:
GLOBAL RANK: G2 STATE RANK: S2
IDENTIFIED: Y TRACK: Y SENSITIVITY:
COUNTY: Parker

USGS TOPO MAPS: POOLVILLE
TOPO QUAD: 3209787
MARGIN #: 1

ELEMENT OCCURRENCE NUMBER: 004 DATE LAST OBSERVED: 1987-06-22
PRECISION: S DATE FIRST OBSERVED: 1984
OCCURRENCE RANK: B DATE SURVEYED: 1987-06-22
SURVEY COMMENTS: RELATIVELY LARGE POPULATION

MANAGED AREAS: CONTAINED:

DIRECTIONS:
2.1 MILES SOUTH OF POOLVILLE FROM FR 920 (NOT 290) AND FM 3107 JUNCTION, ON FR 920.

DESCRIPTION:
SLIGHTLY SLOPING LIMESTONE GLADE ON THE GOODLAND LIMESTONE (CRETACEOUS AGE), ON ROW OF FR 920

QUALITATIVE/QUANTITATIVE DATA:
CA 100 PLANTS MOSTLY IN FRUIT ON 6-22-87. ASSOCIATES INCLUDE ARENARIA STRICTA, HELIOTROPIUM TENELLUM, HEDEOMA DRUMMONDII, EVOLVULUS PILOSUS, HEDYOTIS NIGRICANS, SALVIA TEXANA AND OTHER DRY ADAPTED CALCIPHILIC PLANTS.

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
ORZELL # 5508 TO BE DEPOSITED AT UNIVERSITY OF TEXAS, AUSTIN MAHLER #9806 COLLECTED ON 6-11-84 IS DEPOSITED AT SMU.

SOURCE OF INFORMATION:
ORZELL, STEVE. 1987. FIELD SURVEY OF NORTH-CENTRAL TEXAS, 18 JUNE TO 2 JULY 1987.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: DALEA REVERCHONII
COMMON NAME: COMANCHE PEAK PRAIRIE-CLOVER
OTHER NAME:
FEDERAL STATUS: C2 | STATE STATUS:
GLOBAL RANK: G2 | STATE RANK: S2
IDENTIFIED: Y | TRACK: Y | SENSITIVITY:
COUNTY: Parker

USGS TOPO MAPS: POOLVILLE | TOPO QUAD: 3209787 | MARGIN #: 2

ELEMENT OCCURRENCE NUMBER: 013 | DATE LAST OBSERVED: 1987-06-25
PRECISION: S | DATE FIRST OBSERVED: 1987
OCCURRENCE RANK: BC | DATE SURVEYED: 1987-06-25
SURVEY COMMENTS: MANY PLANTS IN RELATIVELY UNDISTURBED HABITAT

MANAGED AREAS: | CONTAINED:

DIRECTIONS:
SOUTHEAST OF INDIAN KNOB ON TOPO-MAP, 4.9 MILES WNW [WSW] OF SPRINGTOWN, OFF UNMARKED GRAVEL ROAD.

DESCRIPTION:
PLANTS IN NARROW NATURAL ECOTONE BETWEEN SCRAPED GLADE AND AND EDGE OF WOODS

QUALITATIVE/QUANTITATIVE DATA:
APPROXIMATELY 100 CLUMPS IN FLOWER AND FRUIT.

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
ORZELL #5572 TO BE DEPOSITED AT UNIVERSITY OF TEXAS, AUSTIN

SOURCE OF INFORMATION:
ORZELL, STEVE. 1987. FIELD SURVEY OF NORTH-CENTRAL TEXAS, 18 JUNE TO 2 JULY 1987.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: SCHIZACHYRIUM SCOPARIUM-SORGHASTRUM NUTANS SERIES
COMMON NAME: LITTLE BLUESTEM-INDIANGRASS SERIES
OTHER NAME:
FEDERAL STATUS: STATE STATUS:
GLOBAL RANK: G2 STATE RANK: S2
IDENTIFIED: Y TRACK: Y SENSITIVITY:
COUNTY: Wise

USGS TOPO MAPS: PECAN CREEK
TOPO QUAD: 3309735
MARGIN #: 4

ELEMENT OCCURRENCE NUMBER: 069
PRECISION: S
OCCURRENCE RANK: C
DATE LAST OBSERVED: 1989-08-01
DATE FIRST OBSERVED: 1989
DATE SURVEYED: 1989-08-01
SURVEY COMMENTS: OVERGRAZED IN PARTS, SOME LITTLE BLUESTEM DOMINATED AREAS

MANAGED AREAS:	CONTAINED:
LBJ NATIONAL GRASSLAND	Y
CROSS TIMBERS RESEARCH NATURAL AREA	Y

DIRECTIONS:
CA. 7.5 AIR MILES NORTH OF DECATUR, BOUNDED BY FS RD'S 900, 900A, AND 904; LBJ NATIONAL GRASSLAND, COMPARTMENT 31

DESCRIPTION:
DOMINANT GRASSES INCLUDE LITTLE BLUESTEM, INDIANGRASS, TEXAS GRAMA, SOME DISTURBED GRAZED AREAS DOMINATED BY KING RANCH BLUESTEM (BOTHRIOCHLOA ISCHAEMUM)

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:
SITE NEEDS TO BE FENCED TO ELIMINATE GRAZING; PRESCRIBED BURNING PROGRAM NEEDS INITIATION

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
ORZELL, STEVE. 1989. FIELD SURVEY OF THE NATIONAL GRASSLANDS OF TEXAS, 1-4 AUGUST 1989.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: SCHIZACHYRIUM SCOPARIUM-SORGHASTRUM NUTANS SERIES
COMMON NAME: LITTLE BLUESTEM-INDIANGRASS SERIES
OTHER NAME:
FEDERAL STATUS:
GLOBAL RANK: G2
IDENTIFIED: Y
TRACK: Y
COUNTY: Wise

STATE STATUS:
STATE RANK: S2
SENSITIVITY:

USGS TOPO MAPS:
SUNSET
SMYRNA

TOPO QUAD:
3309747
3309746

MARGIN #:
2

ELEMENT OCCURRENCE NUMBER: 068
PRECISION: S
OCCURRENCE RANK: C

DATE LAST OBSERVED: 1989-08-01
DATE FIRST OBSERVED: 1989
DATE SURVEYED: 1989-08-01

SURVEY COMMENTS: UPPER STEEPER SLOPES BETTER QUALITY GRASSLANDS, LOWER SLOPES ARE WEEDIER

MANAGED AREAS:
LBJ NATIONAL GRASSLAND

CONTAINED:
Y

DIRECTIONS:
CA. 4 AIR MILES NORTHEAST OF ALVORD, CA. 3.8 AIR MILES EAST-SOUTHEAST OF PARK SPRINGS, EAST OF BIG SANDY CREEK; LBJ NATIONAL GRASSLAND, COMPARTMENT 2

DESCRIPTION:
UPPER STEEP SLOPES DOMINATED BY LITTLE BLUESTEM, HAIRY GRAMA, TALL GRAMA, SIDE-OATS GRAMA, AND LONGSPIKE SILVER BLUESTEM

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
ORZELL, STEVE. 1989. FIELD SURVEY OF THE NATIONAL GRASSLANDS OF TEXAS, 1-4 AUGUST 1989.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: QUERCUS TEXANA (BUCKLEYANA) SERIES
COMMON NAME: TEXAS OAK SERIES
OTHER NAME:
FEDERAL STATUS:
GLOBAL RANK: G3
IDENTIFIED: Y
TRACK: Y
COUNTY: Wise

STATE STATUS:
STATE RANK: S3
SENSITIVITY:

USGS TOPO MAPS:
PECAN CREEK

TOPO QUAD:
3309735

MARGIN #:
1

ELEMENT OCCURRENCE NUMBER: 016
PRECISION: S
OCCURRENCE RANK: B

DATE LAST OBSERVED: 1989-08-01
DATE FIRST OBSERVED: 1987
DATE SURVEYED: 1989-08-01

SURVEY COMMENTS: RELATIVELY INTACT, GRAZED IN PAST, RECOVERABLE

MANAGED AREAS:
LBJ NATIONAL GRASSLAND

CONTAINED:
Y

DIRECTIONS:
ON EAST SIDE OF FS RD 900, CA. 0.3 MILE NORTH OF INTERSECTION WITH FS RD 904, CA. 6.5 AIR MILES EAST-NORTHEAST OF ALVORD, LBJ NATIONAL GRASSLAND, COMPARTMENT 31

DESCRIPTION:
STEEP-SIDED, FLAT-TOPPED MESA OF GOODLAND LIMESTONE WITH PLATEAU LIVE OAK AND TEXAS OAK WOODLANDS ON SLOPE AND GRASSLAND ON MESA TOP WITH LIMESTONE BEDROCK EXPOSED

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:
PRESCRIBE BURN GRASSLAND ON MESA TOP

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
ORZELL, STEVE. 1989. FIELD SURVEY OF THE NATIONAL GRASSLANDS OF TEXAS, 1-4 AUGUST 1989.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: QUERCUS TEXANA (BUCKLEYANA) SERIES
COMMON NAME: TEXAS OAK SERIES
OTHER NAME:
FEDERAL STATUS:
GLOBAL RANK: G3
IDENTIFIED: Y
TRACK: Y
COUNTY: Wise
STATE STATUS:
STATE RANK: S3
SENSITIVITY:

USGS TOPO MAPS:
PECAN CREEK
TOPO QUAD: 3309735
MARGIN #: 2

ELEMENT OCCURRENCE NUMBER: 017
PRECISION: S
OCCURRENCE RANK: B
DATE LAST OBSERVED: 1989-08-01
DATE FIRST OBSERVED: 1989
DATE SURVEYED: 1989-08-01
SURVEY COMMENTS: WOODLANDS ARE RELATIVELY UNDISTURBED AND INTACT

MANAGED AREAS:	CONTAINED:
LBJ NATIONAL GRASSLAND	Y
CROSS TIMBERS RESEARCH NATURAL AREA	Y

DIRECTIONS:
CA. 7.5 AIR MILES NORTH OF DECATUR, BOUNDED BY FS RD'S 900, 900A, AND 904; LBJ NATIONAL GRASSLAND, COMPARTMENT 31

DESCRIPTION:
UPPER LIMESTONE SLOPES DOMINATED BY PLATEAU LIVE OAK, TEXAS OAK, AND CEDAR ELM

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
ORZELL, STEVE. 1989. FIELD SURVEY OF THE NATIONAL GRASSLANDS OF TEXAS, 1-4 AUGUST 1989.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: QUERCUS STELLATA-QUERCUS MARILANDICA SERIES
COMMON NAME: POST OAK-BLACKJACK OAK SERIES
OTHER NAME:
FEDERAL STATUS:
GLOBAL RANK: G4
IDENTIFIED: Y
COUNTY: Wise

TRACK: Y

STATE STATUS:
STATE RANK: S4
SENSITIVITY:

USGS TOPO MAPS:
PECAN CREEK

TOPO QUAD:
3309735

MARGIN #:
5

ELEMENT OCCURRENCE NUMBER: 016
PRECISION: S
OCCURRENCE RANK: B
SURVEY COMMENTS:

DATE LAST OBSERVED: 1989-08-01
DATE FIRST OBSERVED: 1989
DATE SURVEYED: 1989-08-01

MANAGED AREAS:

	CONTAINED:
LBJ NATIONAL GRASSLAND	Y
CROSS TIMBERS RESEARCH NATURAL AREA	Y

DIRECTIONS:
CA. 7.5 AIR MILES NORTH OF DECATUR, BOUNDED BY FS RD'S 900, 900A, AND 904; LBJ NATIONAL GRASSLAND, COMPARTMENT 31

DESCRIPTION:
POST OAK AND BLACKJACK OAK OVERSTORY OFTEN OVER GREENBRIAR AND CORALBERRY

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
ORZELL, STEVE. 1989. FIELD SURVEY OF THE NATIONAL GRASSLANDS OF TEXAS, 1-4 AUGUST 1989.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: QUERCUS STELLATA-QUERCUS MARILANDICA SERIES
COMMON NAME: POST OAK-BLACKJACK OAK SERIES
OTHER NAME:
FEDERAL STATUS:
GLOBAL RANK: G4
IDENTIFIED: Y
COUNTY: Wise
TRACK: Y
STATE STATUS:
STATE RANK: S4
SENSITIVITY:

USGS TOPO MAPS:
SUNSET
SMYRNA

TOPO QUAD:
3309747
3309746

MARGIN #:
1

ELEMENT OCCURRENCE NUMBER: 014
PRECISION: S
OCCURRENCE RANK: B
DATE LAST OBSERVED: 1989-08-01
DATE FIRST OBSERVED: 1989
DATE SURVEYED: 1989-08-01
SURVEY COMMENTS: AREA GRAZED IN PAST, RECOVERING EXAMPLE

MANAGED AREAS:
LBJ NATIONAL GRASSLAND

CONTAINED:
Y

DIRECTIONS:
CA. 4 AIR MILES NORTHEAST OF ALVORD, CA. 3.8 AIR MILES EAST-SOUTHEAST OF PARK SPRINGS, EAST OF BIG SANDY CREEK, LBJ NATIONAL GRASSLAND, COMPARTMENT 2

DESCRIPTION:
PROMINENT STEEP SIDED, BOULDER-STREWN SANDSTONE RIDGETOP DOMINATED BY POST OAK, FRAGRANT SUMAC, AND DOWNY GOLDENROD; POST OAK HAVE AN OPEN SPREADING CANOPY

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:
USE PRESCRIBED BURNING AND ELIMINATE GRAZING FROM SITE

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
ORZELL, STEVE. 1989. FIELD SURVEY OF THE NATIONAL GRASSLANDS OF TEXAS, 1-4 AUGUST 1989.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: QUERCUS STELLATA-QUERCUS MARILANDICA SERIES
COMMON NAME: POST OAK-BLACKJACK OAK SERIES
OTHER NAME:
FEDERAL STATUS:
GLOBAL RANK: G4
IDENTIFIED: Y
TRACK: Y
COUNTY: Wise
STATE STATUS:
STATE RANK: S4
SENSITIVITY:

USGS TOPO MAPS:
SUNSET
TOPO QUAD: 3309747
MARGIN #: 3

ELEMENT OCCURRENCE NUMBER: 015
PRECISION: S
OCCURRENCE RANK: D
DATE LAST OBSERVED: 1989-08-01
DATE FIRST OBSERVED: 1989
DATE SURVEYED: 1989-08-01
SURVEY COMMENTS: AREA GRAZED IN RECENT PAST, OIL WELL INTRUSIONS

MANAGED AREAS:
LBJ NATIONAL GRASSLAND
CONTAINED: Y

DIRECTIONS:
CA. 2 MILES EAST OF TX 114 ON BUCKER ROAD, SOUTH OF BUCKER ROAD, ALONG TRIBUTARY TO PRINGLE CREEK; CA. 3 AIR MILES SOUTHEAST OF PARK SPRINGS, LBJ NATIONAL GRASSLAND, COMPARTMENT 3

DESCRIPTION:
OPEN POST OAK WOODLAND WITH SMALL NATURAL PRAIRIE-LIKE OPENINGS

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:
AREA NEEDS PRESCRIBED BURNING TO RESTORE DIVERSITY

PROTECTION COMMENTS:

OTHER COMMENTS:

SOURCE OF INFORMATION:
ORZELL, STEVE. 1989. FIELD SURVEY OF THE NATIONAL GRASSLANDS OF TEXAS, 1-4 AUGUST 1989.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: JUNIPERUS ASHEI-QUERCUS SPP. SERIES
COMMON NAME: ASHE JUNIPER-OAK SERIES
OTHER NAME:
FEDERAL STATUS: STATE STATUS:
GLOBAL RANK: G4 STATE RANK: S4
IDENTIFIED: Y TRACK: Y SENSITIVITY:
COUNTY: Wise

USGS TOPO MAPS: SMYRNA
TOPO QUAD: 3309746
MARGIN #: 3

ELEMENT OCCURRENCE NUMBER: 011
PRECISION: S
OCCURRENCE RANK: C
DATE LAST OBSERVED: 1989-08-01
DATE FIRST OBSERVED: 1989
DATE SURVEYED: 1989-08-01
SURVEY COMMENTS: AREA DISTURBED BY OIL WELLS AND GRAZING

MANAGED AREAS: LBJ NATIONAL GRASSLAND
CONTAINED: Y

DIRECTIONS:
CA. 1 MILE SOUTH OF THE LBJ NATIONAL GRASSLAND FIELD HEADQUARTERS, JUST NORTH AND WEST OF BALL KNOB CEMETERY, LBJ NATIONAL GRASSLAND, COMPARTMENT 32

DESCRIPTION:
HIGH STEEP HILL DOMINATED BY PLATEAU LIVE OAK, TEXAS OAK, AND ASHE JUNIPER; SKUNKBUSH AND CEDAR SEDGE DOMINATE SHRUB AND HERB LAYER, RESPECTIVELY

QUALITATIVE/QUANTITATIVE DATA:

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
ALTHOUGH DISTURBED, THIS REPRESENTS ONE OF THE ONLY EXAMPLES OF THIS TYPE IN THE NATIONAL GRASSLANDS

SOURCE OF INFORMATION:
ORZELL, STEVE. 1989. FIELD SURVEY OF THE NATIONAL GRASSLANDS OF TEXAS, 1-4 AUGUST 1989.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: ROOKERY
COMMON NAME:
OTHER NAME: COLONY # 534-064, SAND VALLEY RANCH
FEDERAL STATUS: STATE STATUS:
GLOBAL RANK: STATE RANK:
IDENTIFIED: Y TRACK: Y SENSITIVITY:
COUNTY: Jack

USGS TOPO MAPS: TOPO QUAD: MARGIN #:
JOHNSON LAKE 3309832 1

ELEMENT OCCURRENCE NUMBER: 439 DATE LAST OBSERVED: 1990
PRECISION: S DATE FIRST OBSERVED: 1987
OCCURRENCE RANK: DATE SURVEYED:
SURVEY COMMENTS:

MANAGED AREAS: CONTAINED:

DIRECTIONS:
PONDS AND TRIBUTARY OF BIG CLEVELAND CREEK, NORTHEAST OF INTERSECTION OF HIGHWAYS 148 AND 2190, NORTH OF JACKSBORO

DESCRIPTION:

QUALITATIVE/QUANTITATIVE DATA:
NESTING COLONY OF THE GREAT BLUE HERON

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
COLONY NUMBER 534-064

SOURCE OF INFORMATION:
TEXAS COLONIAL WATERBIRD SOCIETY AND TPWD. 1990. SPECIAL ADMINISTRATIVE REPORT, TCW ANNUAL CENSUS SUMMARY.

TEXAS NATURAL HERITAGE PROGRAM
TEXAS PARKS AND WILDLIFE DEPARTMENT
06 JAN 1993

NAME: ROOKERY
COMMON NAME:
OTHER NAME: COLONY # 534-054, BALL RANCH
FEDERAL STATUS:
GLOBAL RANK:
IDENTIFIED: Y
TRACK: Y
COUNTY: Jack
STATE STATUS:
STATE RANK:
SENSITIVITY:

USGS TOPO MAPS:
ANTELOPE

TOPO QUAD:
3309843

MARGIN #:
1

ELEMENT OCCURRENCE NUMBER: 350
PRECISION: S
OCCURRENCE RANK: B
SURVEY COMMENTS:

DATE LAST OBSERVED: 1975
DATE FIRST OBSERVED: 1975
DATE SURVEYED:

MANAGED AREAS:

CONTAINED:

DIRECTIONS:
WEST FORK TRINITY RIVER; EAST-SOUTHEAST OF MOUNT LEBO; SOUTHEAST OF OAKLAND

DESCRIPTION:
RIVER BOTTON WITH COTTONWOOD AND PECAN TREES ALONG RIVER; 12-15 METERS

QUALITATIVE/QUANTITATIVE DATA:
NESTING COLONY OF THE GREAT BLUE HERON

MANAGEMENT COMMENTS:

PROTECTION COMMENTS:

OTHER COMMENTS:
COLONY NUMBER 534-054

SOURCE OF INFORMATION:
MULLINS, L.M. ET.AL. 1982. ET.SEQ. ATLAS & CENSUS OF TEXAS WATERBIRD COLONIES, 1973-1980. TX COLONIAL WATERBIRD SOCIETY. (AND SPECIAL ADMINISTRATIVE REPORT FOR 1989, 1988, 1987, AND 1986.)

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
06 JAN 1993
COMPUTERIZED ELEMENT OCCURRENCES OF SPECIAL CONCERN
SELECTED COUNTIES

MONTAGUE, CLAY, ARCHER, PARKER, WISE

Scientific/Common Name Eo#	Quadrangle	Countyname	Global Rank	State Rank	Federal Status	State Status
CELTIS LAEVIGATA-ULMUS SPP. SERIES - SUGARBERRY-ELM SERIES						
023	MINERAL WELLS EAST	Parker	G4	S4		
CYPERUS GRAYIOIDES - MOHLENBROCK'S UMBRELLA SEDGE						
030	MINERAL WELLS EAST	Parker	G3G4	S3	C2	
DALEA REVERCHONII - COMANCHE PEAK PRAIRIE-CLOVER						
001	SPRINGTOWN	Parker	G2	S2	C2	
002	SPRINGTOWN	Parker	G2	S2	C2	
004	POOLVILLE	Parker	G2	S2	C2	
005	WEATHERFORD NORTH	Parker	G2	S2	C2	
006	WEATHERFORD NORTH	Parker	G2	S2	C2	
007	WEATHERFORD NORTH	Parker	G2	S2	C2	
008	WEATHERFORD NORTH	Parker	G2	S2	C2	
009	WEATHERFORD NORTH	Parker	G2	S2	C2	
010	WEATHERFORD NORTH	Parker	G2	S2	C2	
011	WEATHERFORD NORTH	Parker	G2	S2	C2	
012	SPRINGTOWN	Parker	G2	S2	C2	
013	POOLVILLE	Parker	G2	S2	C2	
014	SPRINGTOWN	Parker	G2	S2	C2	
015	SPRINGTOWN	Parker	G2	S2	C2	
016	BOYD	Wise	G2	S2	C2	
017	BOYD	Wise	G2	S2	C2	
018	RHOME	Wise	G2	S2	C2	
019	SPRINGTOWN	Parker	G2	S2	C2	
DIPODOMYS ELATOR - TEXAS KANGAROO RAT						
035	DEER CREEK	Clay	G2	S2	C2	T
016	BOWIE	Montague	G2	S2	C2	T
017	STONEBURG	Montague	G2	S2	C2	T
001	LAKE DIVERSION	Archer	G2	S2	C2	T
037	ARCHER CITY WEST	Archer	G2	S2	C2	T
GRUS AMERICANA - WHOOPING CRANE						
001	CHARLIE	Clay	G1	S1	LE	E
JUNIPERUS ASHEI-QUERCUS SPP. SERIES - ASHE JUNIPER-OAK SERIES						
011	SMYRNA	Wise	G4	S4		
012	MINERAL WELLS EAST	Parker	G4	S4		
QUERCUS HAVARDII SERIES - HAVARD SHIN OAK-TALLGRASS SERIES						
001		Clay	G3	S3		
QUERCUS STELLATA-QUERCUS MARILANDICA SERIES - POST OAK-BLACKJACK OAK SERIES						
004	MINERAL WELLS EAST	Parker	G4	S4		
014	SUNSET SMYRNA	Wise	G4	S4		
015	SUNSET	Wise	G4	S4		

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
06 JAN 1993
COMPUTERIZED ELEMENT OCCURRENCES OF SPECIAL CONCERN
SELECTED COUNTIES

Scientific/Common Name Eo#	Quadrangle	Countyname	Global Rank	State Rank	Federal Status	State Status
016	PECAN CREEK	Wise	G4	S4		
017	MINERAL WELLS EAST	Parker	G4	S4		
QUERCUS TEXANA (BUCKLEYANA) SERIES - TEXAS OAK SERIES						
001	SLIDELL	Wise	G3	S3		
016	PECAN CREEK	Wise	G3	S3		
017	PECAN CREEK	Wise	G3	S3		
ROOKERY -						
351	DEER CREEK	Clay				
353	DEER CREEK	Clay				
352	SCOTLAND	Archer				
354	LAKE DIVERSION	Baylor Archer				
459	MINERAL WELLS EAST	Parker				
SCHIZACHYRIUM SCOPARIUM-SORGHASTRUM NUTANS SERIES - LITTLE BLUESTEM-INDIANGRASS SERIES						
039	MUENSTER WEST	Cooke Montague	G2	S2		
006	SLIDELL	Wise	G2	S2		
-33	ANNETA	Parker	G2	S2		
,68	SUNSET SMYRNA	Wise	G2	S2		
069	PECAN CREEK	Wise	G2	S2		
070	MINERAL WELLS EAST	Parker	G2	S2		

48 Records Processed

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
INCOMPLETE LIST OF RARE VERTEBRATES BY SELECTED COUNTIES
06 JAN 1993

MONTAGUE

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
*** BIRDS					
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3T2	S1	LE	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	G3T2	S1	LT	T
GRUS AMERICANA	WHOOPING CRANE	G1	S1	LE	E
PELECANUS OCCIDENTALIS	BROWN PELICAN	G5	S1	LE	E
PLEGADIS CHIHI	WHITE-FACED IBIS	G5	S2	C2	T
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	G4T2	S1	LE	E
*** MAMMALS					
DIPODOMYS ELATOR	TEXAS KANGAROO RAT	G2	S2	C2	T
*** REPTILES					
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD	G5	S4	C2	T

8 Records Processed

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
INCOMPLETE LIST OF RARE VERTEBRATES BY SELECTED COUNTIES
06 JAN 1993

ARCHER

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
*** BIRDS					
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3T2	S1	LE	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	G3T2	S1	LT	T
GRUS AMERICANA	WHOOPING CRANE	G1	S1	LE	E
PELECANUS OCCIDENTALIS	BROWN PELICAN	G5	S1	LE	E
PLEGADIS CHIHI	WHITE-FACED IBIS	G5	S2	C2	T
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	G4T2	S1	LE	E
*** MAMMALS					
DIPODOMYS ELATOR	TEXAS KANGAROO RAT	G2	S2	C2	T
*** REPTILES					
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD	G5	S4	C2	T

8 Records Processed

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
INCOMPLETE LIST OF RARE VERTEBRATES BY SELECTED COUNTIES
06 JAN 1993

WISE

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
*** BIRDS					
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3T2	S1	LE	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	G3T2	S1	LT	T
GRUS AMERICANA	WHOOPING CRANE	G1	S1	LE	E
PELECANUS OCCIDENTALIS	BROWN PELICAN	G5	S1	LE	E
PLEGADIS CHIHI	WHITE-FACED IBIS	G5	S2	C2	T
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	G4T2	S1	LE	E
*** REPTILES					
CROTALUS HORRIDUS	TIMBER RATTLESNAKE	G5	S5		T
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD	G5	S4	C2	T
THAMNOPHIS SIRTALIS ANNECTENS	TEXAS GARTER SNAKE	G5T3	S3	C2	

9 Records Processed

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
INCOMPLETE LIST OF RARE VERTEBRATES BY SELECTED COUNTIES
06 JAN 1993

PARKER

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
*** BIRDS					
DENDROICA CHRYSOPARIA	GOLDEN-CHEEKED WARBLER	G2	S2	LE	E
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3T2	S1	LE	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	G3T2	S1	LT	T
GRUS AMERICANA	WHOOPING CRANE	G1	S1	LE	E
PELECANUS OCCIDENTALIS	BROWN PELICAN	G5	S1	LE	E
PLEGADIS CHIHI	WHITE-FACED IBIS	G5	S2	C2	T
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	G4T2	S1	LE	E
*** MAMMALS					
CANIS RUFUS	RED WOLF	GXC	SX	LE	E
*** REPTILES					
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD	G5	S4	C2	T
THAMNOPHIS SIRTALIS ANNECTENS	TEXAS GARTER SNAKE	G5T3	S3	C2	

10 Records Processed

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
INCOMPLETE LIST OF RARE VERTEBRATES BY SELECTED COUNTIES
06 JAN 1993

CLAY

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
*** BIRDS					
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3T2	S1	LE	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	G3T2	S1	LT	T
GRUS AMERICANA	WHOOPING CRANE	G1	S1	LE	E
PELECANUS OCCIDENTALIS	BROWN PELICAN	G5	S1	LE	E
PLEGADIS CHIHI	WHITE-FACED IBIS	G5	S2	C2	T
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	G4T2	S1	LE	E
*** FISHES					
SCAPHIRHYNCHUS PLATORYNCHUS	SHOVELNOSE STURGEON	G4	S2		E
*** MAMMALS					
DIPODOMYS ELATOR	TEXAS KANGAROO RAT	G2	S2	C2	T
*** REPTILES					
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD	G5	S4	C2	T

9 Records Processed

COUNTY: Archer

ENDANGERED SPECIES

*EAGLE, BALD (*Haliaeetus leucocephalus*)
*TERN, LEAST, INTERIOR (*Sterna antillarum athalassos*)

THREATENED SPECIES

***RAT, KANGAROO, TEXAS (*Dipodomys elator*)
**IBIS, WHITE-FACED (*Plegadis chihi*)
**FALCON, PEREGRINE, ARCTIC (*Falco peregrinus tundrius*)
*KITE, SWALLOW-TAILED, AMERICAN (*Elanoides forficatus*)
***LIZARD, HORNED, TEXAS (*Phrynosoma cornutum*)
**SNAKE, WATER, BRAZOS (*Nerodia harteri harteri*)

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

COUNTY: Clay

ENDANGERED SPECIES

***CRANE, WHOOPING (*Grus americana*)
*EAGLE, BALD (*Haliaeetus leucocephalus*)
*TERN, LEAST, INTERIOR (*Sterna antillarum athalassos*)

THREATENED SPECIES

***RAT, KANGAROO, TEXAS (*Dipodomys elator*)
**IBIS, WHITE-FACED (*Plegadis chihi*)
*KITE, SWALLOW-TAILED, AMERICAN (*Elanoides forficatus*)
*STORK, WOOD (*Mycteria americana*)
*FALCON, PEREGRINE, ARCTIC (*Falco peregrinus tundrius*)
***LIZARD, HORNED, TEXAS (*Phrynosoma cornutum*)
*RATTLESNAKE, TIMBER (*Crotalus horridus*)

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

COUNTY: Montague

ENDANGERED SPECIES

**CRANE, WHOOPING (*Grus americana*)
**EAGLE, BALD (*Haliaeetus leucocephalus*)
*VIREO, BLACK-CAPPED (*Vireo atricapillus*)
*TERN, LEAST, INTERIOR (*Sterna antillarum athalassos*)
*PADDLEFISH (*Polyodon spathula*)

THREATENED SPECIES

***RAT, KANGAROO, TEXAS (*Dipodomys elator*)
**KITE, SWALLOW-TAILED, AMERICAN (*Elanoides forficatus*)
**STORK, WOOD (*Mycteria americana*)
**IBIS, WHITE-FACED (*Plegadis chihi*)
**FALCON, PEREGRINE, ARCTIC (*Falco peregrinus tundrius*)
***LIZARD, HORNED, TEXAS (*Phrynosoma cornutum*)
***RATTLESNAKE, TIMBER (*Crotalus horridus*)
*BLUE SUCKER (*Cycleptus elongatus*)

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

COUNTY: Parker

ENDANGERED SPECIES

***VIREO, BLACK-CAPPED (*Vireo atricapillus*)
**CRANE, WHOOPING (*Grus americana*)
**EAGLE, BALD (*Haliaeetus leucocephalus*)
*TERN, LEAST, INTERIOR (*Sterna antillarum athalassos*)

THREATENED SPECIES

**IBIS, WHITE-FACED (*Plegadis chihi*)
**FALCON, PEREGRINE, ARCTIC (*Falco peregrinus tundrius*)
**STORK, WOOD (*Mycteria americana*)
**KITE, SWALLOW-TAILED, AMERICAN (*Elanoides forficatus*)
*WARBLER, GOLDEN-CHEEKED (*Dendroica chrysoparia*)
***LIZARD, HORNED, TEXAS (*Phrynosoma cornutum*)
**SNAKE, WATER, BRAZOS (*Nerodia harteri harteri*)
*RATTLESNAKE, TIMBER (*Crotalus horridus*)

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

COUNTY: **Wise**

ENDANGERED SPECIES

**EAGLE, BALD (*Haliaeetus leucocephalus*)
**CRANE, WHOOPING (*Grus americana*)
*CURLEW, ESKIMO (*Numenius borealis*)
*TERN, LEAST, INTERIOR (*Sterna antillarum athalassos*)
*VIREO, BLACK-CAPPED (*Vireo atricapillus*)

THREATENED SPECIES

***IBIS, WHITE-FACED (*Plegadis chihi*)
***KITE, SWALLOW-TAILED, AMERICAN (*Elanoides forficatus*)
***FALCON, PEREGRINE, ARCTIC (*Falco peregrinus tundrius*)
***PLOVER, PIPING (*Charadrius melodus*)
**STORK, WOOD (*Mycteria americana*)
***LIZARD, HORNED, TEXAS (*Phrynosoma cornutum*)
***RATTLESNAKE, TIMBER (*Crotalus horridus*)

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

CODE KEY

FEDERAL STATUS (USESA)

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

STATE STATUS

E - Listed as Endangered in the State of Texas
T - Listed as Threatened in the State of Texas

GLOBAL RANK (GRANK)

G1 - Critically imperiled globally, extremely rare, 5 or fewer occurrences. [Critically endangered throughout range.]
G2 - Imperiled globally, very rare, 6 to 20 occurrences. [Endangered throughout range.]
G3 - Very rare and local throughout range or found locally in restricted range, 21 to 100 occurrences. [Threatened throughout range.]
G4 - Apparently secure globally.
G5 - Demonstrably secure globally.
GH - Of historical occurrence through its range.
G#NA - Accidental in North America.

G#NE - An exotic species established in North America.
G#T# - "G"= species rank; "T"= rank of variety or subspecies taxa.
GU - Possibly in peril range-wide, but status uncertain.
G#G# - Ranked within a range as status uncertain.
GX - Believed to be extinct throughout range.
Q - Qualifier denoting questionable taxonomic assignment.
? - Not ranked to date; or, Qualifier denoting uncertain rank.
C - Captive population exists.

STATE RANK (SRANK)
S1 - Critically imperiled in state, extremely rare, very vulnerable to extirpation, 5 or fewer occurrences.
S2 - Imperiled in state, very rare, vulnerable to extirpation, 6 to 20 occurrences.
S3 - Rare or uncommon in state, 21 to 100 occurrences.
S4 - Apparently secure in state.
S5 - Demonstrably secure in state.
SA - Accidental in state.
SE - An exotic species established in state.
SH - Of historical occurrence in state. May be rediscovered.
SN - Regularly occurring, usually migratory and typically non-breeding status.
SR - Reported, but without persuasive documentation.
SRF - Reported in error, but error persists in literature.
SU - Possibly in peril in state, but status uncertain.
SX - Apparently extirpated from State.
? - Not ranked to date; or, Qualifier denoting uncertain rank.
C - Captive population exists.

PRECISION
S - Second: Accuracy within 3-second radius of latitude/longitude.
M - Minute: Accuracy within 1-minute radius of lat/long, approx. 2 km or 1.5 mi radius.
G - Occurrence mapped general to quad or place name precision only, precision within about 8 km or 5 mi radius.
U - Unmappable record.

OCCURRENCE RANK
A - Excellent
B - Good
C - Marginal
D - Poor
E - Extant/Present
H - Historical/No Field Information
O - Obscure
X - Destroyed/Extirpated

AI - Excellent, Introduced
BI - Good, Introduced
CI - Marginal, Introduced
DI - Poor, Introduced
EI - Extant, Introduced
HI - Historical, Introduced
OI - Obscure, Introduced
XI - Destroyed, Introduced

MANAGED AREA - CONTAINED (code following managed area name)
Y - Element occurrence contained within the managed area boundaries.
N - Element occurrence is not entirely contained within the managed area boundaries.
? - Whether the element occurrence is wholly contained or not within the managed area boundaries is disputed.
blank - No information available.

ATTACHMENT 3

Texas Parks and Wildlife Department
Suggested Guidelines for Preparation of
Environmental Assessment Documents

Following is an outline of categories of information needed to evaluate a proposed project or action. Every effort should be made to supply quantified data. If subjective data is all that can be supplied, documentation verifying the credentials of the data collector should be provided.

Categories considered essential for adequate biological review by this agency are noted by an asterisk (*). Depending on the complexity and scope of the proposed project or action, or requirements by other agencies, all the items listed below may be required.

Whenever practical, environmental documents should be supported by aerial photography, topographic maps, schematics, charts, tables, etc. with minimum narrative sufficient to describe, quantify, and qualify the data.

A. Project Description

* * ● Identify who is proposing the project.
* * ● Identify who is conducting the assessments and provide credentials of this person(s).
* * ● Describe the purpose of the project.
* * ● Define the scope of work.
* * ● Identify the project area and study area (total acres, miles of r-o-w, etc.)
* * ● Identify the time table projected for the entire project.
* * ● Describe any required coordination and review for the project.
* * ● List or describe any required public input.
* ● Provide historical information significant to the project.

B. Description of the Affected Environment

1. Natural Resources

* ● Describe the geology within the study area.
* * ● Describe the soils present and their characteristics.
* * ● Describe the landform (topography) and the natural processes impacting the present landform.
* ● Describe the climatic factors affecting the study area.
* * ● Describe the supply and quality of surface water resources in the study area.
* * ● Describe the supply and quality of groundwater resources including aquifer recharge zones occurring within the study area.
* * ● Describe natural hazards affecting the study area, i.e. tidal influences, flood activity, etc.).
* ● Describe the quality of the air in the study area.

* • Describe the vegetation communities (cover types) specifically impacted by the project to include: dominant plant species; estimated height of trees, woody shrubs, or brush; and estimated canopy coverage of woody vegetation. Total acreage of each cover type disturbed by the project should also be listed.
* • Describe the fauna that would be associated with the dominant vegetation cover types identified above.
* • Identify "sensitive" ecosystems which occur in the study area such as: springs, streams, rivers, floodplains, vegetation corridors, bottomland hardwoods, wetlands, bays, estuaries, native grasslands, etc.
* • Describe the occurrence of threatened/endangered species (or their habitats) and unique or rare natural communities which occur in the study area.
    a. On site inspection of the study area for permanent or seasonal occurrence
    b. On site inspection of the study area for occurrence of habitat
    c. Interviews with recognized experts on all species with a potential of occurrence
    d. Literature review of data applicable to a potential occurring species concerning species distribution, habitat needs, and biological requirements

2. Cultural Resources

* • Identify public use and open space areas in the vicinity of the proposed project such as parks, natural areas, wildlife preserves and management areas.
- Identify previous, present, and proposed land uses within the study area.
- Identify significant archeological features within the study area.
- Identify significant historical features in the study area with special consideration of "National Register of Historic Places" properties.
- Identify rights-of-way, easements, public utilities, and transportation features within the study area.
- Identify noise pollution sources and current noise levels within the study area.
- Identify existing and proposed public health and hazardous waste facilities which exist in the study area such as land fills, hazardous waste sites, wastewater treatment facilities, septic tanks, etc.
- Identify socioeconomic factors, if applicable.

*C. Project Alternatives

List and describe project alternatives (including "no action") and associated impacts (direct and indirect) to described resources. If the project is potentially large in scope, cumulative effects with other similar projects may be required.

***D. Mitigation**

A major responsibility of TPWD is to conserve and protect the state's fish, wildlife, and plant resources. Certain categories of these biotic resources warrant special consideration. They include habitats that are locally and regionally scarce; habitat supporting or capable of supporting unique species or communities; preservation of the biological integrity and diversity of stream and river communities, bays, and estuaries; wetlands; bottomland hardwoods; and, native grasslands. All projects which could adversely affect these resources should be fully evaluated, and where possible, assessment of less damaging alternatives should be undertaken. If it is determined that a project or action will potentially affect fish, wildlife or plant resources, a mitigation mechanism should be initiated to account for the resources lost. Mitigation options should occur sequentially as follows:

1. **AVOIDANCE:** Avoiding adverse impacts through changes in project location, design, operation, or maintenance procedures, or through selection of other less damaging alternatives to the project or action.
2. MINIMIZATION: Minimizing impacts and by project modification or rectification to restore or improve impacted habitat to pre-project condition; or through reducing the impacts over time by preservation and maintenance operations during the life of the project or action.
3. COMPENSATION: Compensating for unavoidable impacts by providing replacement or substitute resources (including appropriate management) for losses caused by project construction, operation, or maintenance.

Mitigation should be an integral part of any action or project which adversely affects fish, wildlife, and habitats upon which they depend. Failure to adequately avoid or minimize adverse impacts or to adequately compensate for unavoidable losses of natural resources is a serious deficiency in any project plan and shall constitute grounds for this Departments opposition to a project or action. Where potentially impacted resources are considered irreplaceable or adequate mitigation is otherwise not practicable, opposition to project development can be expected. In assessing project impacts, reasonably foreseeable secondary and cumulative impacts shall be included.

***E. Coordination**

Provide copies of pertinent coordination correspondence.

***F. Document Preparers and Their Qualifications**

***G. Bibliography**

(references: 40 CRF Parts 1500-1508 and various EPA handouts concerning Environmental Assessment Documentation)

APPENDIX 3

F. RESOURCE CONSERVATION RECOVERY ACT LISTING

PAGE: 1
PROGRAM: NIRPFI06

* * * THIS REPORT IS INTENDED FOR F.O.I.A. USAGE * * *
* * NOTIFIERS REPORT * *

DATABASE: Region VI Merge

DATE: 02/12/93
TIME: 10.16.15

User Selection: STATE OF TEXAS LISTED BY COUNTY
REPORT DESCRIPTION:
This report provides a one line description of each facility where the source of information is: Source -N- Selected

Universe: COUNTY CODES ENTERED

REPORT CODES:

LQG: 1 = Large Quantity Generator
SQG: 2 = Small Quantity Generator
CEG: 3 = Very Small Quantity Generator
NRG: Generator (CE) Regulatory Status Description:
1 = Conditionally exempt SQG
2 = Definitionally excluded wastes
3 = Delisted wastes
4 = One-time generator
5 = Periodic generator
6 = No longer generating hazardous waste, still in business
7 = No longer generating hazardous waste, out of business
8 = Never generated hazardous waste
9 = ID number to transport hazardous waste
10 = Regulated under another ID number

TRS: Code indicating that the handler is engaged in the transportation of hazardous waste.
C = Handler transports waste for hire.
S = Handler transports waste for self.
X = Handler transports waste, but COMMERCIAL status is unknown.
N = Not a transporter, verified.

TSD: Code indicating that the handler is engaged in the treatment, storage, or disposal of hazardous waste.
S = Flag indicating that the facility has been verified as having storage/treatment units on site.
I = Flag indicating that the facility has been verified as having incinerators on site.
D = Flag indicating that the facility has been verified as a site with a land disposal process.
NRT: TSD (CE) Regulatory Status Description:
1 = Only hazardous waste received is from exempt SQG
2 = Definitionally excluded wastes
3 = Delisted wastes
4 = Uses only exempt handling methods
5 = Closure/Post-Closure
6 = Less than 90-day storage
7 = Regulated under another ID number

UIC: Underground Injection Control Indicator (X = Indication of activity)

OSF: O = Code indicating that the handler is engaged in marketing off-spec. used oil fuel other than generator marketing to burner.
M = Code indicating that the handler is a generator engaged in marketing to burners of off-spec. used oil fuel.
B = Code indicating that the handler is engaged in the burning of off-spec. used oil fuel.

SOF: Specification Used Oil Marketing Indicator.
B = Boiler and/or Industrial furnace (BIF).
X = Indication of activity other than BIF.

B/B: Burner/Blender Indicator
B = Boiler and/or Industrial Furnace (BIF) only
S = BIF only, Smelter Deferral
E = BIF only, Small Quantity Exemption claimed
N = Not a burner/blender, verified
X = Other burner/blender activity.

PER: Permitted (Y/N)

SRC: Source of information - N = Notification; A = Part A; R = Annual/Biennial Report; E = EPA Inspection; S = State Inspection.

COM: COMMERCIAL FACILITY, Off-Site Waste Receipt
A = Accepts waste from (any) off-site source
R = Accepts waste from only a restricted group of off-site generators

TYP: Type of Owner/Operator - F = Federal; S = State; P = Private; I = Indian; C = County; M = Municipal; D = Dist.; O = Other.

DATE: Receipt Date

PAGE: 2
PROGRAM:
NIRPFI06

* * * THIS REPORT IS INTENDED FOR F.O.I.A. USAGE * * *
* * NOTIFIERS REPORT * *
DATABASE: Region VI Merge
Source -%- Selected

STATE OF TEXAS LISTED BY COUNTY

DATE: 02/12/93
TIME: 10.16.15

ID NUMBER	FACILITY NAME	FACILITY ADDRESS	FACILITY CITY	ST	ZIP	L S C N T (LQG SQG CER NRG TRS)	T N U O S B P S C T (TSD NRT UIC OSF SDF B/F P/B SER CRC TOM P)	DATE
COUNTY: ARCHER								
TXD0245092620	AGRICULTURAL APPLICATIO	MAIN STREET	MEGARGEL	TX	76370	3 8	N N P	800818
TXD000760957	ARCO PIPELINE CO CARSON	FM 1954 4.5M SE	HOLLIDAY	TX	76366	3	N N P	800818
TXD987996495	CUSTOM METAL	2450 BURKBURNETT RD	WICHITA FALLS	TX	76304	2	N N P	900823
TXD990026075	HERB EASLEY MOTORS INC	2303 JACKSBORO HWY	WICHITA FALLS	TX	76302	2	N N P	910918
TXD986032710	HODGES TIRE	2901 JACKSBORO HWY	WICHITA FALLS	TX	76302	2	N N P	910411
TXT490010311	MOBIL PIPLN HOLLIDAY ST	RURAL	HOLLIDAY	TX	76366	1	N N P	800813
TXD980178622	PAYLESS CASHWAYS INC	4401 SEYMOUR HWY	WICHITA FALLS	TX	76309	3 1	N N P	920921
TXD000744532	SUN EXPLORATION & PRODU	FM 368 2M S	HOLLIDAY	TX	79000	3 7	N N P	800818
TXD000743542	SUN EXPLORATION AND PRO	4MI SE HOLIDAY OFF FM 368	ARCHER COUNTY	TX	79000	3 7	N N P	800818
TXD000743591	SUN EXPLORATION AND PRO	4 MI SE HOLIDAY ON FM 366	ARCHER COUNTY	TX	79060	3 7	N N P	800818
TXD000745443	SUN EXPLORATION AND PRO	4 MI SE HOLIDAY OFF FM 368	ARCHER COUNTY	TX	79000	3 7	N N P	800818
TXD000745455	SUN EXPLORATION AND PRO	4 MI SE HOLIDAY OFF FM 368	ARCHER COUNTY	TX	79000	3 7	N N P	800818
TXD000745453	SUN EXPLORATION AND PRO	4 MI SE HOLIDAY OFF FM 368	ARCHER COUNTY	TX	79000	3 7	N N P	800818
TXD000745471	SUN EXPLORATION AND PRO	4 MI SE HOLLIDAY OFF FM 368	ARCHER COUNTY	TX	79000	3 7	N N P	800818
TXD981144859	TEXAS DEPT OF HWYS & PU	507 N CENTER	ARCHER CITY	TX	76351	2	N N P	850930
TXD980583983	TOTAL PIPELINE CORP FAR	H AND TC RR A-1275 ARCHER CO	FARGO	TX	76384	3 8	N N	810324
TXD980583868	TOTAL PIPELINE CORP WIL	H & TC RR A-1278 ARCHER CO	ARCHER COUNTY	TX	76090	3 7	N N	810324
COUNTY: CLAY								
TXD983072252	AMBASSADOR STORAGE COMP	7M SW	HENRIETTA	TX	76365	3	N N P	920519
TXT000642884	HOUSEHOLDER TANK	RURAL	HENRIETTA	TX	76365	3	N N P	800813
TXD988069183	LONE STAR AMBASSADOR DE	GRAVEL RD OFF FM 2847 5M S	HENRIETTA	TX	76365	3 1	N N P	920505
TXD988072245	LONE STAR GAS LAPAN DEH	HWY 148 5M S	HENRIETTA	TX	76365	3 1	N N P	920519
TXD988069217	LONE STAR NYC DEHY PLT	HWY 287 8M S	HENRIETTA	TX	76365	3 1	N N P	920603
TXT490010345	MOBIL PIPLN COSTLY TANK	RURAL	HENRIETTA	TX	76365	1	N N P	800813
TXT490010337	MOBIL PIPLN STINE TANK	RURAL	HENRIETTA	TX	76365	1	N N P	800813
TXD988072195	NEW YORK STORAGE COMPR	HWY 287 10M SE	HENRIETTA	TX	76365	3	N N P	920519
TXD981144843	TEXAS DEPT OF HWYS & PU	PETROLIA HIGHWAY SH 148	HENRIETTA	TX	76365	2	N N P	850930
COUNTY: JACK								
TXD988048568	ASSOCIATED ENGINEERING	HWY 380 W	BRYSON	TX	76427	2	N N P	910718
TXD980599443	AMERICAN TEL & TEL CO	L-.5M E-SE L435159	PERRIN	TX	76075	3 8	N N P	810415
TXD000836866	ARCO PIPELINE CO JACKSB	FM 3324 4M SE	JACKSBORO	TX	76056	3	N N P	800818
TXD000836817	ARCO PIPELINE CO MATHIS	CTY RD 0.5M E H-380	JACKSBORO	TX	76056	3	N N P	800818
TXD988075061	EASTON CHAPEL COMP STA	HWY 199 4M W HWY 199 ON FM 3	JACKSBORO	TX	76458	3 1	N N P	920729
TXD000171931	BJ TITAN, INC JACKSBORO	FT WORTH HWY 2M S INT 59 & 1	JACKSBORO	TX	76056	2	N N	800818
TXD981410584	CLASSIC CLEANERS	226 N BELKNAP ST	JACKSBORO	TX	76056	2	N N P	861006
TXD988072203	CUNDIFF COMPRESSOR STN	17M NE OF JACK GRACE RANCH	JACKSBORO	TX	76056	3	N N P	920519
TXD000844054	CEES TANK TRUCKS INC	HWY 281 1M S	JACKSBORO	TX	76056	X	X N N P	870824
TXD982306052	HALLIBURTON SVCS	634 DEPOT ST	JACKSBORO	TX	76056	1	N N P	870630
TXD988072724	JACKSBORO COMPRESSOR ST	12M SE	JACKSBORO	TX	76056	3	N N P	920519
TXD988071654	LONE STAR GAS WIZARD WE	DIRT RD .5M S OF FM 1156	JACKSBORO	TX	00000	3 1	N N P	920608
TXT490013632	M-I DRILLING FLUIDS	535 DEPOT ST	JACKSBORO	TX	76056	3 8	N N P	801119
TXD986043147	STATE DEPT HWYS & PUB T	615 N 6TH ST	JACKSBORO	TX	76056	3	N N P	910717
TXD987988944	TUFCO BRYSON FACILITY	CEMENT MOUNTAIN RD 5M N	BRYSON	TX	76427	2	N N P	900501
TXD987989910	TUFCO HORSHAM STEED FAC	HWY 281 9M S	JACKSBORO	TX	76056	2	N N P	900501

* * * THIS REPORT IS INTENDED FOR F.O.I.A. USAGE * * *
* * NOTIFIERS REPORT * *
DATABASE: Region VI Merge
STATE OF TEXAS LISTED BY COUNTY
Source =N= Selected

DATE: 02/12/93
TIME: 10.16.15

ID NUMBER	FACILITY NAME	FACILITY ADDRESS	FACILITY CITY	ST	ZIP	L Q G	S Q G	C E G	N R G	T R S	T S D	N R T	U I C	O S F	S O F	B / B	P E R	S R C	C O H	T Y P	DATE
============	COUNTY: MONTAGUE	===============																			
TXD987997954	AMOCO PIPELINE CO	HWY 287 .5M S	BOWIE	TX	76230	1											N	N		P	900813
TXD000760959	ARCO PIPELINE CO BOWIE	DECATUR ST .6M N INT 1125	BOWIE	TX	76230			3									N	N		P	800818
TXD000783506	ASHLEY OIL CO	CLAY & COWAN ST	BOWIE	TX	76230			3	6								N	N		P	800818
TXD007326958	BELL MFG CO	900 N WISE ST	BOWIE	TX	76230	1											N	N		P	860211
TXD000833754	CHEVRON USA FITER FIELD	3 MI SE	NOCONA	TX	76255			3	8								N	N			800818
TXD981555931	GOODYEAR AUTO SERVICE C	209 EAST WISE ST	BOWIE	TX	76230		2									X	N	N		P	861010
TXD987989652	KOCH RECOVERY SVC	705 DECATUR ST	BOWIE	TX	76230		2										N	N		P	900416
TXD988033155	LARRY SLACK FORD MERCUR	711 W WISE	BOWIE	TX	76230		2										N	N		P	910411
TXD988059175	LONE STAR GAS BOWIE DEH	HWY 175S 5M OUT OF NOCONA	NOCONA	TX	76255			3	1								N	N		P	920603
TXT490010333	MOBIL PIPLN RINGGOLD ST	RURAL	RINGGOLD	TX	76261	1											N	N		P	800613
TXD007327430	NOCONA LEATHER GOODS#	203 W WALNUT	NOCONA	TX	76255		2										N	N		P	800714
TXD988076721	PAYLESS CASHWAYS INC	927 N ROBISON RD	TEXARKANA	TX	75501			3	1								N	N		P	920921
TXD981143100	TEXAS DEPT OF HWYS & PU	US 81 NORTH 1 MILE	BOWIE	TX	76230		2										N	N		P	850828
TXD981144819	TEXAS DEPT OF HWYS & PU	HWY 175 10 FT S OF C LIMITS	NOCONA	TX	76255		2										N	N		P	850930
============	COUNTY: PARKER	===============																			
TXD980869085	A H CHANEY INC	RANGER HIGHWAY	WEATHERFORD	TX	76086					X							N	N		P	831213
TXD988051512	BAND H GARAGE	203 W FOURTH ST	WEATHERFORD	TX	76086		2			X							N	N		P	910914
TXD988072256	BOONESVILLE COMPRESSOR	HWY 51 1.5M NE	SPRINGTOWN	TX	76082			3									N	N		P	920519
TXD981146910	BOURLANDS DRYCLEANING I	1221 S MAIN	WEATHERFORD	TX	76086	1											N	N		P	851205
TXD981914575	BOURLANDS DRYCLEANING,	1514 SANTA FE	WEATHERFORD	TX	76086		2										N	N		P	870515
TXD988033627	BUTLER VENTAMATIC	106 HOOD ST	MINERAL WELLS	TX	76067			3									N	N		P	910417
TXD068347614	CHEMICAL DYNAMICS	610 W 3RD	WEATHERFORD	TX	76086	1											N	N		P	801118
TXD980810162	CHEMICAL DYNAMICS	1020 E COLUMBIA	WEATHERFORD	TX	76086	1											N	N		P	830615
TXD052726660	CHEMLINE IND INC	2022 FORT WORTH HWY	WEATHERFORD	TX	76086		2										N	N			850505
TXD988074330	CLARKS PRECISION MACHIN	636 PROFIT ST	AZLE	TX	76020		2										N	N		P	920714
TXD981597818	DALE NICHOLS MARBLE	2500 OLD BANKHEAD HWY	ALEDO	TX	76008		2										N	N		P	861211
TXD981612930	DON ALLEN OLDS PONT GMC	1305 FORT WORTH HWY	WEATHERFORD	TX	76086	1											N	N		P	861024
TXD988028817	EXXON CO USA #67284	US 80 & WINFIELD PUB 4	WEATHERFORD	TX	76086			3									N	N		P	910401
TXD987993342	EZ RENTAL SALES & SVC	110 FORT WORTH HWY	WEATHERFORD	TX	76086		2										N	N		P	900625
TXD982264655	FLA TEX INC	1810 BANKS DR	WEATHERFORD	TX	76086	1											N	N		P	871105
TXD060155546	GOODYEAR AUTO SERVICE C	302 PALO PINTO ST	WEATHERFORD	TX	76086		2									X	N	N		P	861110
TXD060745236	GULF PIPELINE CO WEATHE	RT 6 BOX 87 FM 1543	WEATHERFORD	TX	76086	1											N	N		P	810521
TXD987990215	H&S VALVE SVC	1901 MINERAL WELLS	WEATHERFORD	TX	76086	1											N	N		P	900428
TXD981906193	HOOKS LINCOLN MERCURY S	3015 FT WORTH HWY	WEATHERFORD	TX	76086	1											N	N		P	870311
TXD064207509	JAMAK FABRICATION INC	1401 NORTH BOWIE DR.	WEATHERFORD	TX	76086	1											N	N		P	860304
TXD052722999	JERRY'S CHEVROLET INC	HWY 80 AND I-20	WEATHERFORD	TX	76086		2										N	N			850124
TXD987987252	JERRYS OLD PONT GMC INC	1300 FT WORTH HWY	WEATHERFORD	TX	76086	1											N	N		P	900205
TXD988069159	LONE STAR SPRINGTOWN ME	HWY 51 1.75 M N	SPRINGTOWN	TX	76082			3	1								N	N		P	920505
TXD058501008	M&N PLASTICS, INC	HWY 199 W 1M W INT 199 & 51	SPRINGTOWN	TX	76082		2										N	N		P	800709
TXD987996980	MOUGHON OIL CO INC	406 N ALAMO ST	WEATHERFORD	TX	76086			3									N	N		P	900808
TXD987990000	NIPULT AUTOMOTIVE	1624 FT WORTH HWY	WEATHERFORD	TX	76086	1											N	N		P	900510
TXD982558256	NATIONAL DIAMOND LAB	1306 FEASTER HWY	WEATHERFORD	TX	76086		2										N	N		P	880919
TXD988061689	NATIONAL SHOT PEENING I	1020B E COLUMBIA ST	WEATHERFORD	TX	76086		2			X							N	N		P	921106
TXD060175321	PHILLIPS COMPONENTS	AIRPORT RD	MINERAL WELLS	TX	76067												N	N		P	800818
TXD987999836	ROYAL AUTO CNTR	9275 MAIN	WEATHERFORD	TX	76086		2										N	N		P	900826
TXD981149313	SOUTHWEST FORD INC	1015 FT WORTH	WEATHERFORD	TX	76086			3	7								N	N		P	851205

PAGE: 4 * * * THIS REPORT IS INTENDED FOR F.O.I.A. USAGE * * *
PROGRAM: * * NOTIFIERS REPORT * *
NIRPFIDS DATABASE: Region VI Merge DATE: 02/12/93
TIME: 10.16.15
STATE OF TEXAS LISTED BY COUNTY Source -N- Selected

ID NUMBER	FACILITY NAME	FACILITY ADDRESS	FACILITY CITY	ST	ZIP	LQG	SQG	CEG	NRG	TRS	TSD	NRT	UIC	OSF	SOF	B/B	PER	SRC	COM	TYP	DATE
TXD982291619	SOUTHWEST FORD INC	3001 FT WORTH HWY	WEATHERFORD	TX	76086		2										N	N		P	871022
TXD984627561	SOUTHWESTERN BELL TELEP	117 WEST COLUMBIA	WEATHERFORD	TX	76086			3	8								N	N			811019
TXD986072146	SPRINGTOWN COMPRESSOR S	1.5M NE ON HWY 51	SPRINGTOWN	TX	76082			3									N	N		P	920519
TXD987995321	STAR ENTERPRISE	I-20 & SH 171	WEATHERFORD	TX	76086		2										N	N		P	900718
TXD983043155	STATE DEPT OF HWYS & PU	1427 E BANKHEAD HWY	WEATHERFORD	TX	76086			3									N	N		P	910717
TXD988026695	THURMOND CO	1435 FT WORTH HWY	WEATHERFORD	TX	76086		2										N	N		P	910313
TXD988025912	TAI TIN TOP SAND & GRAV	5211 NEW TINTOP RD	WEATHERFORD	TX	76086		2										N	N		P	910214
TXD988026337	TXI-BOONSVILLE STONE	SH199 15 M N	SPRINGTOWN	TX	76082		2										N	N		P	910325
TXD000763171	WAYNE CARTER OIL CO BUL	133 N WATER	WEATHERFORD	TX	76086			3	8								N	N		O	800818
TXD000836373	WEATHERFORD CITY OF	702 FORT WORTH STREET	WEATHERFORD	TX	76086			3	8								N	N			800818
TXD000836357	WEATHERFORD CITY OF WAS	602 HICKORY LANE	WEATHERFORD	TX	76086			3	8								N	N			800818
TXD105007554	WEATHERFORD DEMOCRAT	512 PALO PINTO ST	WEATHERFORD	TX	76086		2										N	N		P	870521
TXD000836361	WEATHERFORD LANDFILL	OLD BROCK ROAD	WEATHERFORD	TX	76086			3	8								N	N			800818
TXD000812791	WEATHERFORD US INC	501 E OAK	WEATHERFORD	TX	76086		2										N	N		P	800703
TXD982561119	WEST SIDE TOYOTA	3131 FT WORTH HWY	WEATHERFORD	TX	76086	1											N	N		P	881207
============	COUNTY: WISE	===============																			
TXD980599468	AMERICAN TEL & TEL CO L	1M E L435140	DECATUR	TX	76234			3	8								N	N		P	810415
TXD987986690	BRAZOS GAS COMPRESSING	300 YDS N OF H-114 & FM 920J	BRIDGEPORT	TX	76026		2										N	N		P	900124
TXD076560372	CHISHOLM TRAIL TESTING	302 S MILLER ST	DECATUR	TX	76234		2										N	N		P	810302
TXD981914531	COMET CLEANERS	1203 & FM 51 S	DECATUR	TX	76234			3									N	N		P	870515
TXD000641130	COOKS OIL COMPANY INC	FARM ROAD 730 NORTH	BOYD	TX	76023					X					X	X	N	N		P	800820
TXD982244473	D/I TEX TRUCK SALES, IN	HWY 114 & 287	RHOME	TX	76078	1											N	N		P	871005
TXD988064523	FIRST RECOVERY	HWY 390 N SITE 3	BRIDGEPORT	TX	78208		2			X				M		B	N	N			920303
TXD982235565	STEFORD HILL PLT #74	HWY 101 5M N	BRIDGEPORT	TX	76026	1											N	N		P	871127
TXD144427622	IMPERIAL FABRICATING CO	HWY 380 4M E	DECATUR	TX	76234		2										N	N		P	891013
TXD054641555	JAMES WOOD MOTORS INC	US HIGHWAY 287	DECATUR	TX	76234		2										N	N		P	860107
TXD981150402	KARL KLEMENT FORD-MERCU	HWY 81 287 BYPASS	DECATUR	TX	76234		2										N	N		P	860107
TXD107057561	KARL KLEMENT MOTORS CRD	500 N LOOP 287	DECATUR	TX	76234		2										N	N		P	900110
TXD982203707	KENNETH COPELAND MINIST	MORRIS DIDO RD 1M W OF FM 71	NEWARK	TX	76071	1											N	N		P	870917
TXD981569351	KIEBIE BROS. TRUCKING	1300 WEST MAIN STREET	DECATUR	TX	76234					X							N	N		P	860828
TXD981609637	LATIMORE MATERIALS COMP	HWY 101 2MI N OF CITY	BRIDGEPORT	TX	76026	1											N	N		P	860930
TXD000726034	LIQUID ENERGY INC - BRI	US HIGHWAY 380	BRIDGEPORT	TX	76026			3	8								N	N		P	800818
TXD988074753	LONE STAR GAS DECATUR D	115 N MAIN	DECATUR	TX	76234			3	1								N	N		P	920721
TXD988042225	LONE STAR RUNAWAY BAY D	HWY 380 7M SW	BRIDGEPORT	TX	76012			3	1								N	N		P	920603
TXD931147135	MILLER CHEVROLET INC	US HWY 81 287 N	DECATUR	TX	76234		2										N	N		P	851113
TXD980744973	MILLPARK DRILLING FLUID	102 OLD LAKE ROAD	BRIDGEPORT	TX	76026			3	7								N	N		P	820701
TXD987990991	MITCHELL ENERGY CORP YA	INTERSECTION OF 1658 & 380	BRIDGEPORT	TX	76026		2										N	N		P	900510
TXD981586834	NATURAL GAS P/L CO AM	LOC 3MI E OF CITY ON FM1810	CHICO	TX	76030		2										N	N		P	860731
TXD042736195	NATURAL GAS PIPELINE CO	LOC 4MI SW OF CITY ON TX380	BRIDGEPORT	TX	76026		2										N	N		P	800818
TXD000837676	NITROCHEM ENERGY CORP.	FARM RT 1658 LAKE RD	BRIDGEPORT	TX	76036			3	8								N	N		P	800818
TXD981053365	OXY USA INC CHICO GAS P	FM 1810 5 W CHICO	CHICO	TX	76030		2										N	N		P	910430
TXD050103746	POCO GRAPHITE INC	1000 MILES ROAD	DECATUR	TX	76234			3	8								N	N			820121
TXD981612237	RAINBOW CLEANERS	HWY 114-P&W SHOPPING CTR.	BRIDGEPORT	TX	76026		2										N	N		P	861006
[illegible]	SMITH & SONS SALES	HWY 714 & AIRFIELD RD	RHOME	TX	00000		2										N	N		P	910912
TXD988081957	SPECIALTY ENVIRONMENTAL	FM 730 N 4M	BOYD	TX	76023					X				O	X	X	N	N		P	921216
TXD987099952	STAR HOLDING CO INC	US RTE 81 & 287-143 [illegible]	RHOME	TX	76078		2									X	N	N		P	901003
TXD988143071	STATE DEPT OF HWYS & PU	HWY 81-287 N BUSINESS LIMITS	DECATUR	TX	76234			3									N	N		P	910717
[illegible]	STANN EXPLOSIVES INC	ROUTE 6 BOX 361	CHICO	TX	76030					X							N	N		P	800818
TXD000749665	SUN EXPLORATION AND POR	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814

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NIRPFIG6 DATABASE: Region VI Merge

STATE OF TEXAS LISTED BY COUNTY Source -Y- Selected

ID NUMBER	FACILITY NAME	FACILITY ADDRESS	FACILITY CITY	ST	ZIP	L Q G	S Q G	C E G	N R G	T R S	T S D	N R T	U I C	D S F	S O F	B / B	P E R	S R C	C O M	T Y P	DATE
TXD000741256	SUN EXPLORATION AND POR	1303 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXT490010659	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000737991	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000738444	SUN EXPLORATION AND PRO	1903 S TRINITY	DECATUR	TX	76234			3	6								N	N		P	800814
TXD000738526	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000740557	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000740423	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000740456	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000740430	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000740522	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000740530	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000749143	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000749646	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	6								N	N		P	800814
TXD000749671	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	3								N	N		P	800814
TXD000749705	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000750034	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000750117	SUN EXPLORATION AND PRO	1803 S TRINTY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000753707	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000753573	SUN EXPLORATION AND PRO	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000749150	SUN GAS CO ANDERSON JUD	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738435	SUN GAS CO ARK VALLEY F	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738443	SUN GAS CO AXNER IRIS P	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738450	SUN GAS CO BELL HEIRS P	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738468	SUN GAS CO BERRY J G G	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738476	SUN GAS CO BLEVINS PROP	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738492	SUN GAS CO BRATTON H A	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738500	SUN GAS CO BROWNE F 1-1	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738518	SUN GAS CO BROWNE F 2-1	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738534	SUN GAS CO BUCHANAN J U	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738542	SUN GAS CO BURNS G D PR	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738559	SUN GAS CO BURNS R L A	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738567	SUN GAS CO CARMAN GEO A	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738583	SUN GAS CO CARMAN UNIT	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738575	SUN GAS CO CARMAN UNIT	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738591	SUN GAS CO CASTEEL C W	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738609	SUN GAS CO CHADWELL-NEL	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738617	SUN GAS CO CHERRYHOMES	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738625	SUN GAS CO CHILES-COOKS	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738633	SUN GAS CO CLAGG BEULAH	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750174	SUN GAS CO COLE J W COM	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750182	SUN GAS CO COLE J W PRO	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750166	SUN GAS CO COLE R L PRO	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750158	SUN GAS CO COLE TERESA	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750141	SUN GAS CO COOK C H B P	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750133	SUN GAS CO COOK C W C P	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750125	SUN GAS CO COOK ERNEST	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750109	SUN GAS CO CRAIG JAMES	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750091	SUN GAS CO DECATUR WHSE	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750083	SUN GAS CO DENNY PROP S	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750075	SUN GAS CO DIAMOND UNIT	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740290	SUN GAS CO DICKENS IREN	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814

ID NUMBER	FACILITY NAME	FACILITY ADDRESS	FACILITY CITY	ST	ZIP	LQG	SQG	CEG	NRG	TRS	TSD	NRT	UIC	OSF	SOF	B/B	PER	SRC	COM	TYP	DATE
TXD[illegible]75	SUN GAS CO DIAMOND UNIT	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740297	SUN GAS CO DICKENS IKEN	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814

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TXD000740454	SUN GAS CO JUPITER COMP	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740340	SUN GAS CO DURHA E UNIT	1803 S TRINITY	DECATUR	TX	76234			3	8								N	N		P	800814
TXD000740308	SUN GAS CO DURHAM A-1 U	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740316	SUN GAS CO DURHAM A-3 U	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740324	SUN GAS CO DURHAM B UNI	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740332	SUN GAS CO DURHAM C UNI	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740365	SUN GAS CO ERWIN PETE U	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740373	SUN GAS CO EVANS J B UT	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740381	SUN GAS CO EWING UNIT P	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740399	SUN GAS CO FLEET OSBORN	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740407	SUN GAS CO FOWLER G W A	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740415	SUN GAS CO FOXALL T H U	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740431	SUN GAS CO GRIMM E F PR	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740449	SUN GAS CO HIGHTOWER PR	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000741553	SUN GAS CO JUPITER GASO	402 W WALNUT	DECATUR	TX	76234	1											N	N		P	800814
TXD000740472	SUN GAS CO KELLY HENRY	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740495	SUN GAS CO KERN LUCY UN	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740506	SUN GAS CO KETTLEHUT-SH	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740514	SUN GAS CO KINSEY ODIS	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740548	SUN GAS CO LIVENGOOD A	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740555	SUN GAS CO LOWREY R W P	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000740563	SUN GAS CO MCBRIDE M S	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753624	SUN GAS CO MCCASLAND UN	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753632	SUN GAS CO MCKEE VIOLA	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753657	SUN GAS CO MELTON TED C	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753640	SUN GAS CO MELTON TED 1	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753665	SUN GAS CO MELTON TED 2	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753681	SUN GAS CO MOLTHAN H C	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753699	SUN GAS CO MORGAN A J U	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000749739	SUN GAS CO N PAMP GAS S	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000749721	SUN GAS CO ODOM HEIRS F	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000749713	SUN GAS CO ODOM PEARL P	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000749697	SUN GAS CO PAYNE O T A	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000749689	SUN GAS CO PERRIN GEORGE	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000749663	SUN GAS CO PHILLIPS R H	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750067	SUN GAS CO REED R W PRO	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750059	SUN GAS CO REED ROY UT	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750042	SUN GAS CO REMER JOHNNY	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750026	SUN GAS CO REMMELE J B	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750018	SUN GAS CO ROBERTS M D	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000750000	SUN GAS CO RYAN UNIT PR	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000749994	SUN GAS CO SEE SMITH UT	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753277	SUN GAS CO SHELTON R E	1803 TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753251	SUN GAS CO SHEFFET D R P	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000753269	SUN GAS CO SMEDLEY UNIT	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738653	SUN GAS CO TEXAS DIAL B	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738641	SUN GAS CO TEXAS DIAL D	1903 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738666	SUN GAS CO THOMAS W P F	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738674	SUN GAS CO TURNER MARY	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738682	SUN GAS CO WALKER D UNI	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738690	SUN GAS CO WANGENSTEEN	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814

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TXD000738716	SUN GAS CO WATSON A UNI	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738724	SUN GAS CO WATSON MARVI	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738708	SUN GAS CO WATSON PROP	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000739732	SUN GAS CO WEBB BILLY P	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000737937	SUN GAS CO WILLIAMS ED	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000737945	SUN GAS CO WILLIAMS SUE	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000737955	SUN GAS CO WOMACK COMP	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000737373	SUN GAS CO WOMACK J L A	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000737999	SUN GAS CO WOMACK UNIT	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000738635	SUN GAS CO YAEGER MAX S	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000741645	SUN GAS CO YAEGER MAX V	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000741652	SUN GAS CO YOUNG RANCH	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD000741660	SUN GAS CO YOUNG RANCH	1803 S TRINITY	DECATUR	TX	76234	1											N	N		P	800814
TXD980796370	TRANSPIRATION SERVICES	FM 2048 3.5M S	BOYD	TX	76023					X							N	N		P	820304
TXD078152535	TUCKER & TUCKER TRUCKIN	HWY 101 1/4 MILE N	BRIDGEPORT	TX	76026											X	N	N		P	861120
TXD988025920	TXI METROPLEX STONE	HWY 101 4M N	BRIDGEPORT	TX	76026		2										N	N		P	910214
TXD981607385	TXI PARADISE SAND & GRA	HWY 114 .5M NW	PARADISE	TX	76073		2										N	N		P	860923
TXD988080451	TXI-BRIDGEPORT STONE	SH 101 4.5M N	BRIDGEPORT	TX	75247		2										N	N		P	921104
TXT490014974	WAGGONER WASTE OIL INC	8 1/2 MI S ON FM HWY 730	DECATUR	TX	76234					X							N	N		P	810812
TXD982291429	WAL-MART STORES INC	1200 FM 51 S	DECATUR	TX	76234		2										N	N		P	871016
TXD000783472	WAYNE CARTER OIL CO.	HWY 114 BYPASS	BRIDGEPORT	TX	76026			3	8								N	N		O	800818
TXD981591142	WICHITA CONST CO.	HWY 1656 .5M W OF 380	BRIDGEPORT	TX	76026		2										N	N		P	860902

============ COUNTY: YOUNG ===============

ID NUMBER	FACILITY NAME	FACILITY ADDRESS	FACILITY CITY	ST	ZIP	L Q G	S O G	C E G	N R G	T R S	T S D	N R T	U I C	O S F	S O F	B / B	P E R	S R C	C O M	T Y P	DATE
TXD986021242	AIR TRACTOR INC	OLNEY MUNICIPAL AIRPORT	OLNEY	TX	76374		2										N	N		P	901115
TXD009730425	AMF TUBOSCOPE INC	708 LOVING RD	GRAHAM	TX	76046	1											N	N		P	801119
TXD000836700	ARCO PIPE LINE CLEARFOR	FM 701 1M S INT 701 & 1974	ELIASVILLE	TX	76038			3									N	N		P	800818
TXD000760983	ARCO PIPELINE CO BROCK	HWY 769 3.5M S	OLNEY	TX	76374			3									N	N		P	800818
TXD000836692	ARCO PIPELINE CO CLARK	CTY RD 5M E OF MEGARGEL TX	OLNEY	TX	76374			3									N	N		P	800818
TXD063364454	ARCO PIPELINE CO GRAHAM	OLD BUNGER RD 1.5M S	GRAHAM	TX	76046			3									N	N		P	800818
TXT490010915	ARCO PIPELINE CO MOSE S	1 MI SOUTH OF TOWN	GRAHAM	TX	76046			3	6								N	N		P	800818
TXD000836668	ARCO PIPELINE CO PREDO	PAVED RD 5M NW	MARKLEY	TX	76062			3									N	N		P	800818
TXD986506455	ATLAS OILFIELD SVCS WES	166 NORTH ELM	GRAHAM	TX	76046		2										N	N		P	800818
TXD981914526	BILL BURRIS MOTORS, INC	1105 W MAIN	OLNEY	TX	76374		2										N	N		P	870515
TXD046039553	BRADFORD CHEV OLDS	223 ELM ST	GRAHAM	TX	76046		2										N	N		P	860902
TXD076564705	CONSTRUCTION EQUIPMENT	NEW CASTLE HWY	OLNEY	TX	76374			3	8								N	N			800721
TXD000833252	DOWELL SCHLUMBERGER INC	201 PLUM	GRAHAM	TX	76046	1											N	N		P	800814
TXD056541543	DOWELL SCHLUMBERGER INC	LOUIS STREET	GRAHAM	TX	76046	1											N	N		P	800818
TXD982235611	DOYLES AUTO SVC	501 PECAN	GRAHAM	TX	76046		2										N	N		P	871127
TXD073183610	ELECTRIC HOSE & RUBBER	NEWCASTLE HWY	OLNEY	TX	76374			3	7								N	N			800818
TXD149982751	GOODYEAR AUTO SERVICE C	609 4TH ST	GRAHAM	TX	76046		2									X	N	N		P	861110
TXD980506725	GRAHAM CITY OF	UNKNOWN	GRAHAM	TX	76046			3	8								N	N			800818
TXD986072211	GRAHAM COMPRESSOR STN	FM RD 2179 2.5M NE	GRAHAM	TX	76046			3									N	N		P	920519
TXD091862035	GRAHAM MAGNETICS INC	1715 4TH ST	GRAHAM	TX	76450	1											N	N		P	800818
TXD047581636	HEXCEL CORP	334 N PENNSYLVANIA AVE	GRAHAM	TX	76046	1											N	N		P	800818
TXD000813716	HUB MACHINE & TOOL CO	SUPPLY STREET	GRAHAM	TX	76046			3	8								N	N		P	800624
TXD985365108	JOHNSON TANK TRKS	HWY 16 S	GRAHAM	TX	76450		2			X							N	N		P	920323
TXD988022497	MEDIA RECOVERY INC	604 LOVING HYW	GRAHAM	TX	76046		2										N	N		P	901213
TXD982292492	MIKES GARAGE	603 LOVING HWY	GRAHAM	TX	76046		2										N	N		P	871211
TXT490012960	NL PETROLEUM SVC INC	159 N ELM	GRAHAM	TX	76046			3	8								N	N			801204

TXT49. 2... NL PETROLEUM SVC INC ... LOVING HWY GRAHAM TX 76046 2 N N P 901213
158 N ELM GRAHAM TX 76046 3 8 N N P 871211
N N 801204

PAGE: 3
PROGRAM:
NIRPF106

* * * THIS REPORT IS INTENDED FOR F.O.I.A. USAGE * * *
* * NOTIFIERS REPORT * *

STATE OF TEXAS LISTED BY COUNTY

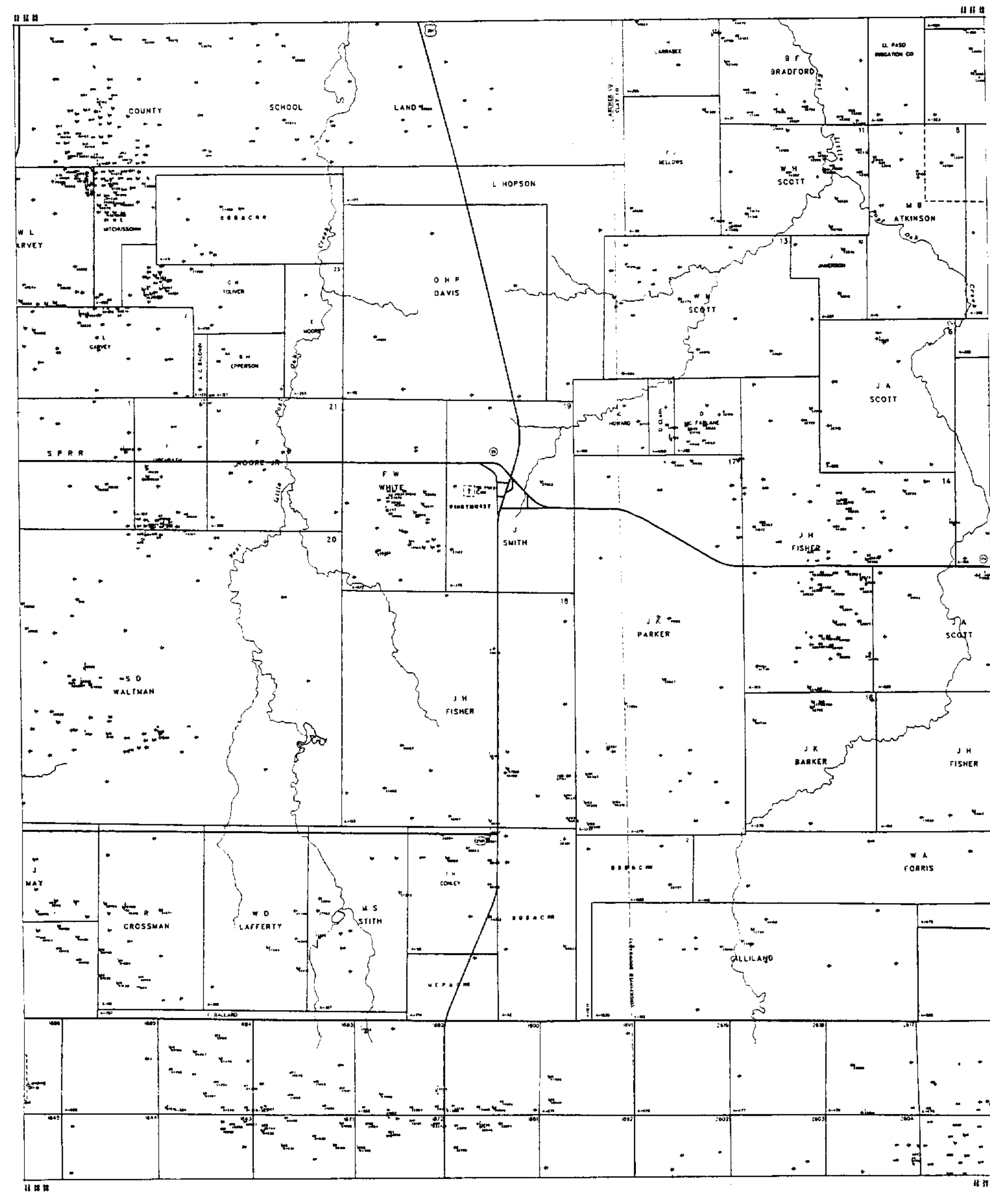
DATABASE: Region VI Merge
Source =S= Selected

DATE: 02/12/93
TIME: 10.16.15

ID NUMBER	FACILITY NAME	FACILITY ADDRESS	FACILITY CITY	ST	ZIP	L O G	S O G	C E G	N R G	T R S	T S D	N R T	U I C	O S F	S D F	B / B	P E R	S R C	C O M	T Y P	DATE
TXD981611122	NORMANS TAILORS & CLEAN	1031 E FOURTH ST	GRAHAM	TX	76046		2										N	N		P	861006
TXD026599661	ORR MOTOR CO	1030 4TH ST	GRAHAM	TX	76046	1											N	N		P	860911
TXD098785181	OTIS ENGINEERING CORPOR	95 OHIO STREET	GRAHAM	TX	76046			3	7								N	N		P	800818
TXD053693534	PEMBERTON CABINET SHOP	319 S AVE C	OLNEY	TX	76374			3	8								N	N		P	800714
TXD986092650	PSI EXTRUSIONS	841 79 S	OLNEY	TX	76374		2										N	N		P	930201
TXD982299493	RAY BLACK FORD	1546 4TH ST	GRAHAM	TX	76046		2										N	N		P	870824
TXD037699661	SCHLUMBERGER WELL SVCS	903 LOVING HWY	GRAHAM	TX	76046		2										N	N		P	880826
TXT490010527	SUN GAS CO-PARK CANYON	RT 1 FLINT CREEK RD	GRAHAM	TX	76046	1											N	N		P	800814
TXT490010501	SUN GAS CO-GRAHAM GAS P	RT 1 FLINT CREEK RD	GRAHAM	TX	76046	1											N	N		P	800814
TXT490010519	SUN GAS CO-THROCKMORTON	ST 1 FLINT CREEK RD	GRAHAM	TX	76046	1											N	N		P	800814
TXD000618124	SUN GAS-OLNEY GAS PLNT	ROUTE 1 FLINT CREEK ROAD	GRAHAM	TX	76046	1											N	N		P	800814
TXD000744581	SUN OIL CO BERTHA BASIN	25 MI W KERMIT NO ON BOULDER	LOVING COUNTY	TX	79000		2										N	N		P	800818
TXD000744912	SUN OIL CO JOHNSON-TXL	14 MI N MENTONE-10 MI E FM 6	LOVING COUNTY	TX	79000		2										N	N		P	800818
TXD000756163	SUN OIL CO T-X-M-37	13 MI N MENTONE 10 MI E FM 6	LOVING COUNTY	TX	79000		2										N	N		P	800818
TXD981145782	TEXAS DEPT OF HWYS	922 LOVING RD	GRAHAM	TX	76046		2										N	N		P	851008
TXD990880165	TRUCK-AUTO-PAINT-BODY-C	JACKSBORO HIGHWAY NEAR HALMA	GRAHAM	TX	46046		2										N	N		P	841024
TXD000751065	TUELECTRIC GRAHAM SES	OFF HWY 380 2M NW OF GRAHAM	GRAHAM	TX	76046			3	8								N	N		P	800818
TXD982292575	WAGGONER OIL FIELD SUPP	401 N PENNSYLVANIA ST	GRAHAM	TX	76046		2										N	N		P	871211

APPENDIX 4

RAILROAD COMMISSION OF TEXAS OIL AND GAS WELL MAPS



DEC 23, 1992
SCALE: 1" = 2000'

PREPARED BY
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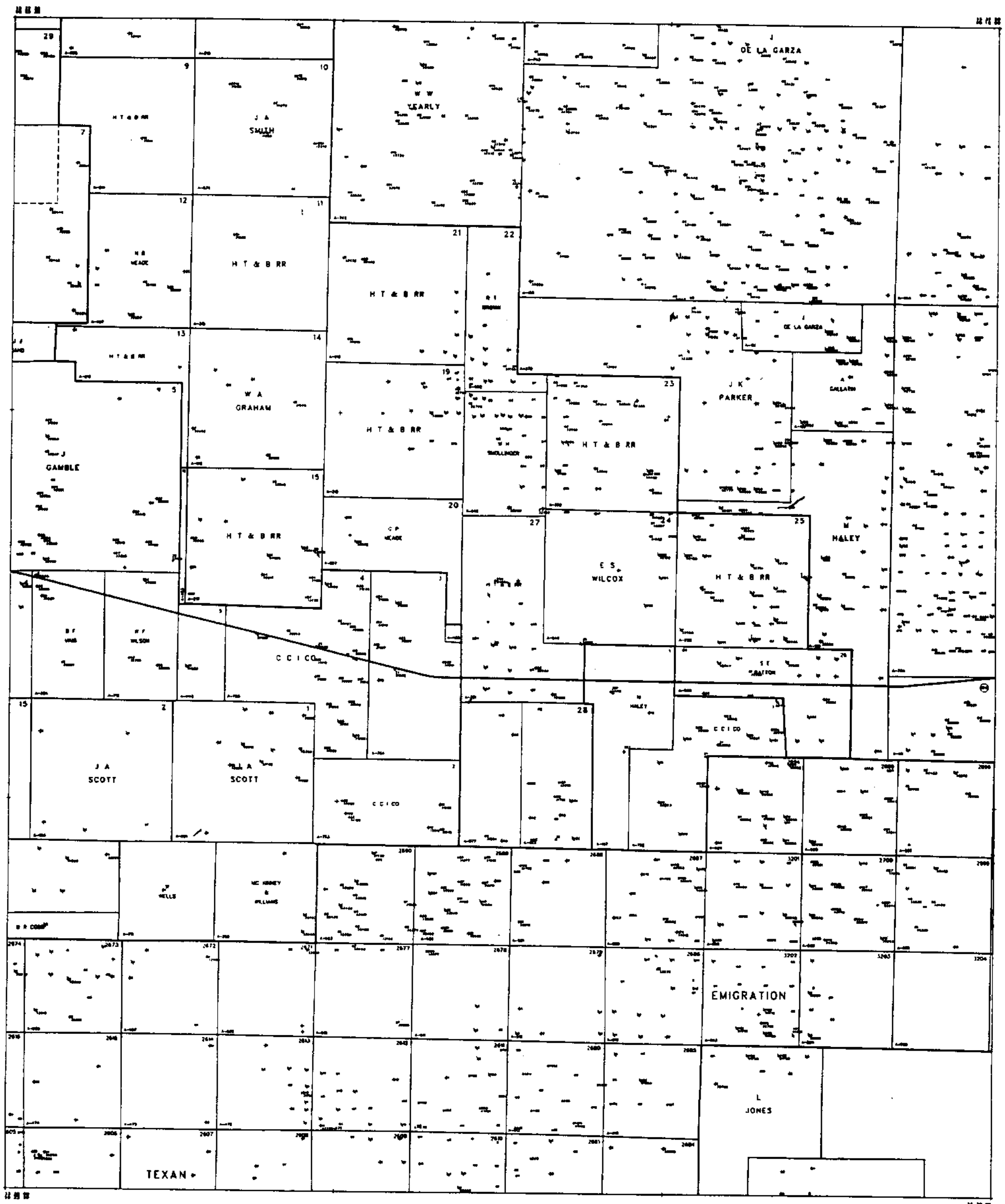
OIL AND GAS DIVISION
MAP INFORMATION MANAGEMENT SYSTEM
P.O. BOX 12967
AUSTIN, TEXAS 78711-2967

WINDTHORST
7.5 MINUTE QUADRANGLE



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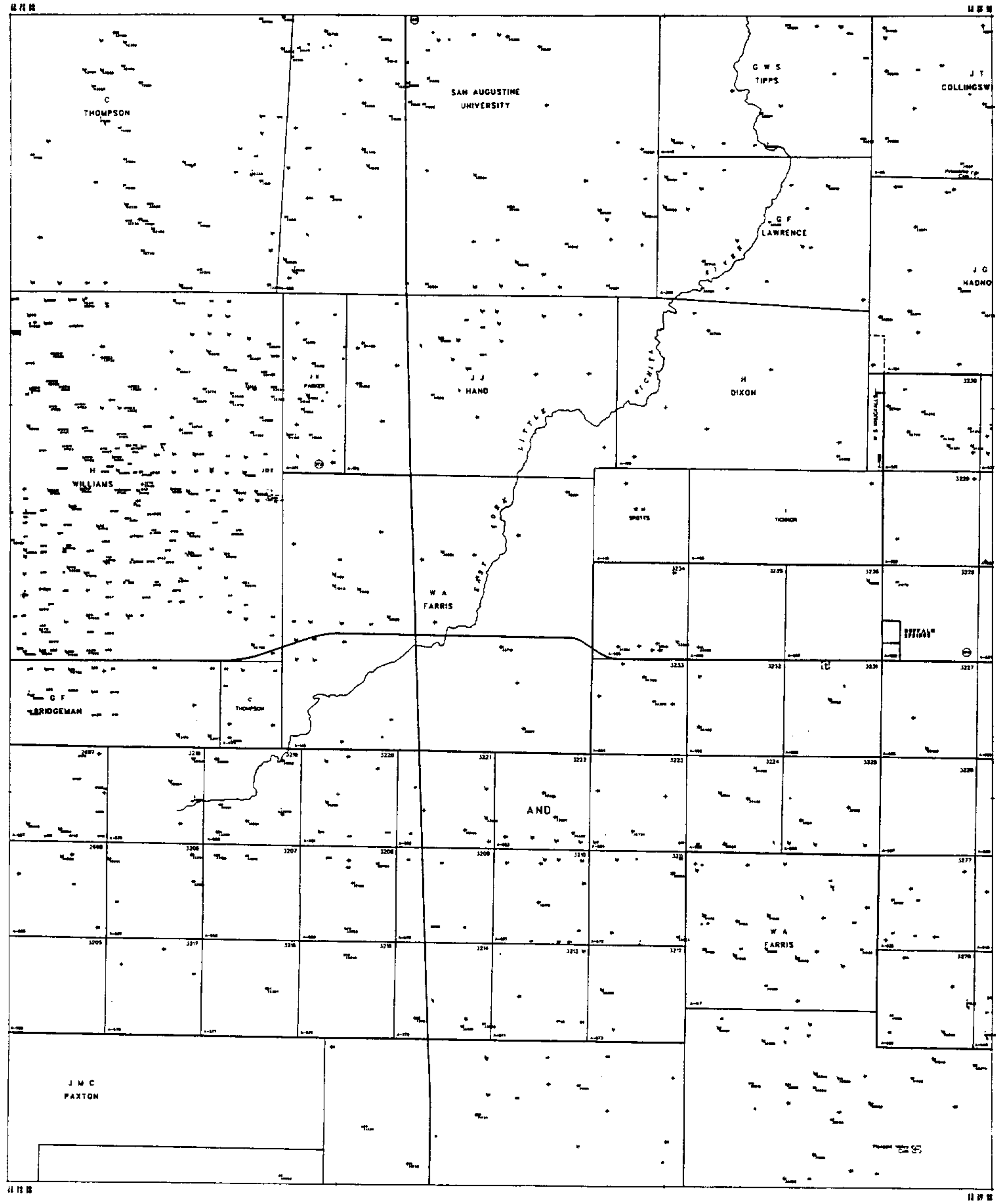
AUSTIN, TEXAS 78711-2967

SCOTLAND SE
7.5 MINUTE QUADRANGLE
3398421

N

4



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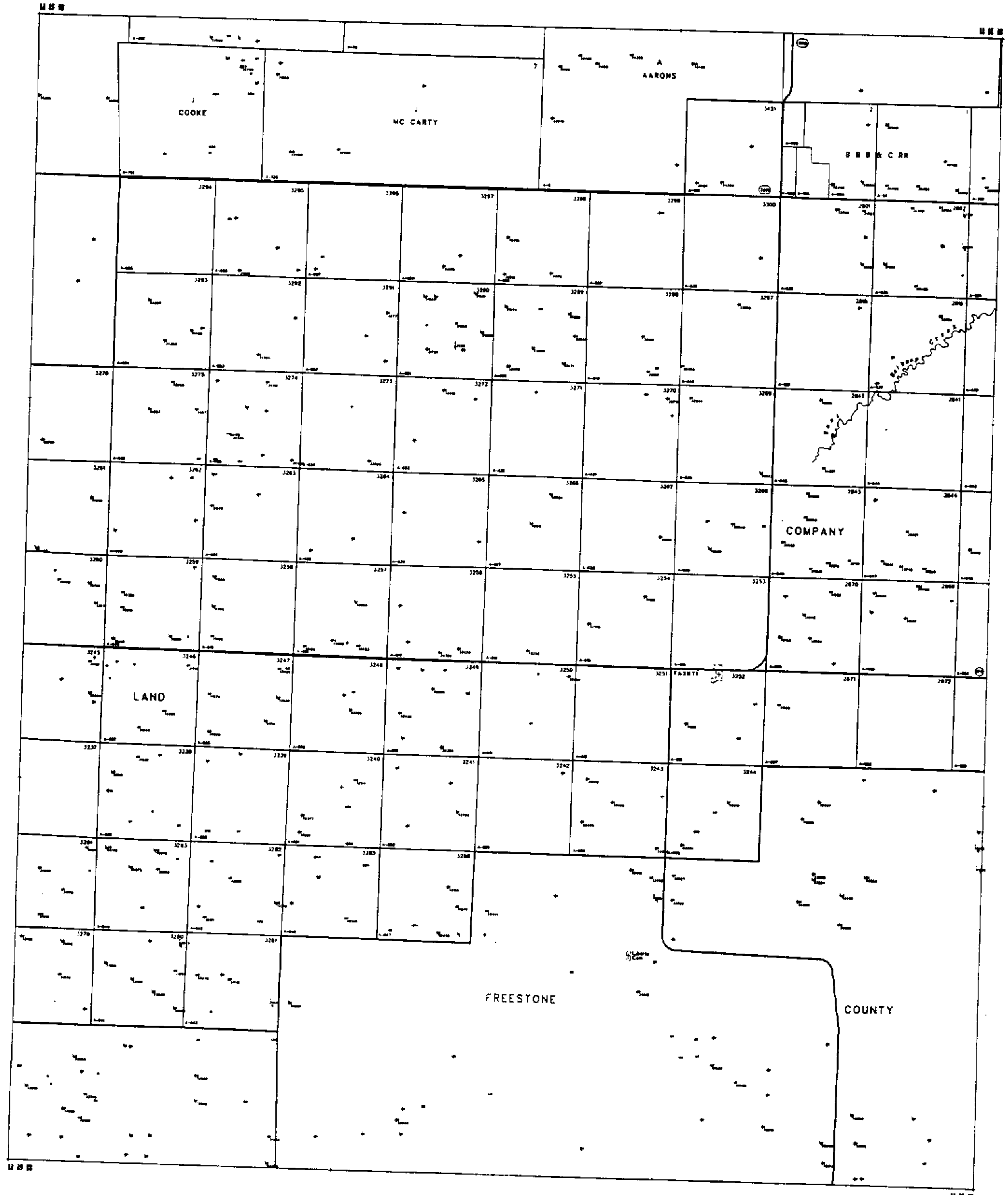
JOY
7.5 MINUTE QUADRANGLE
3398412

-N-

5



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AUSTIN, TEXAS 78711-2967

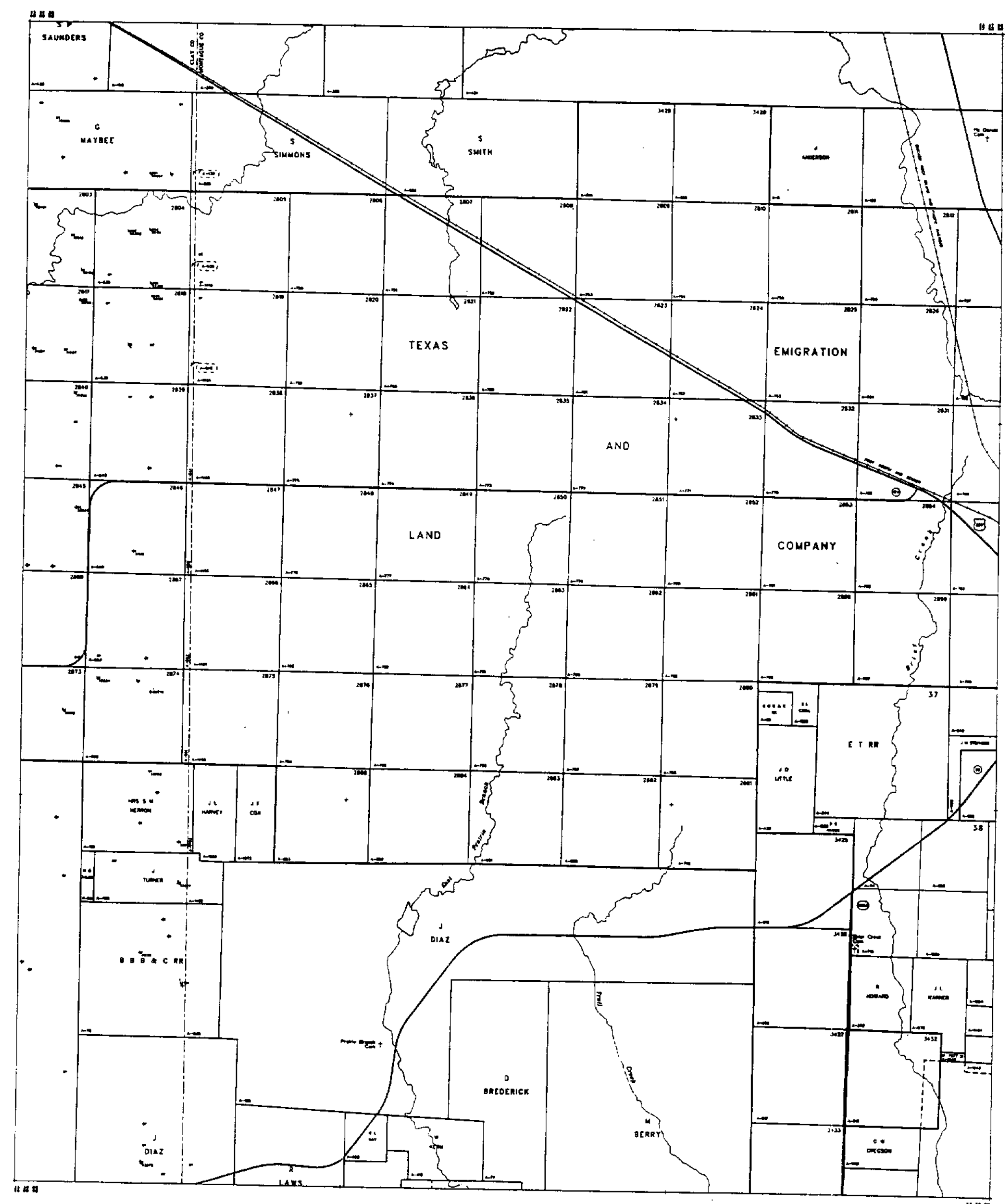
DEC 23, 1982

SCALE: 1" = 2000'

VASHTI

7.5 MINUTE QUADRANGLE

-N-



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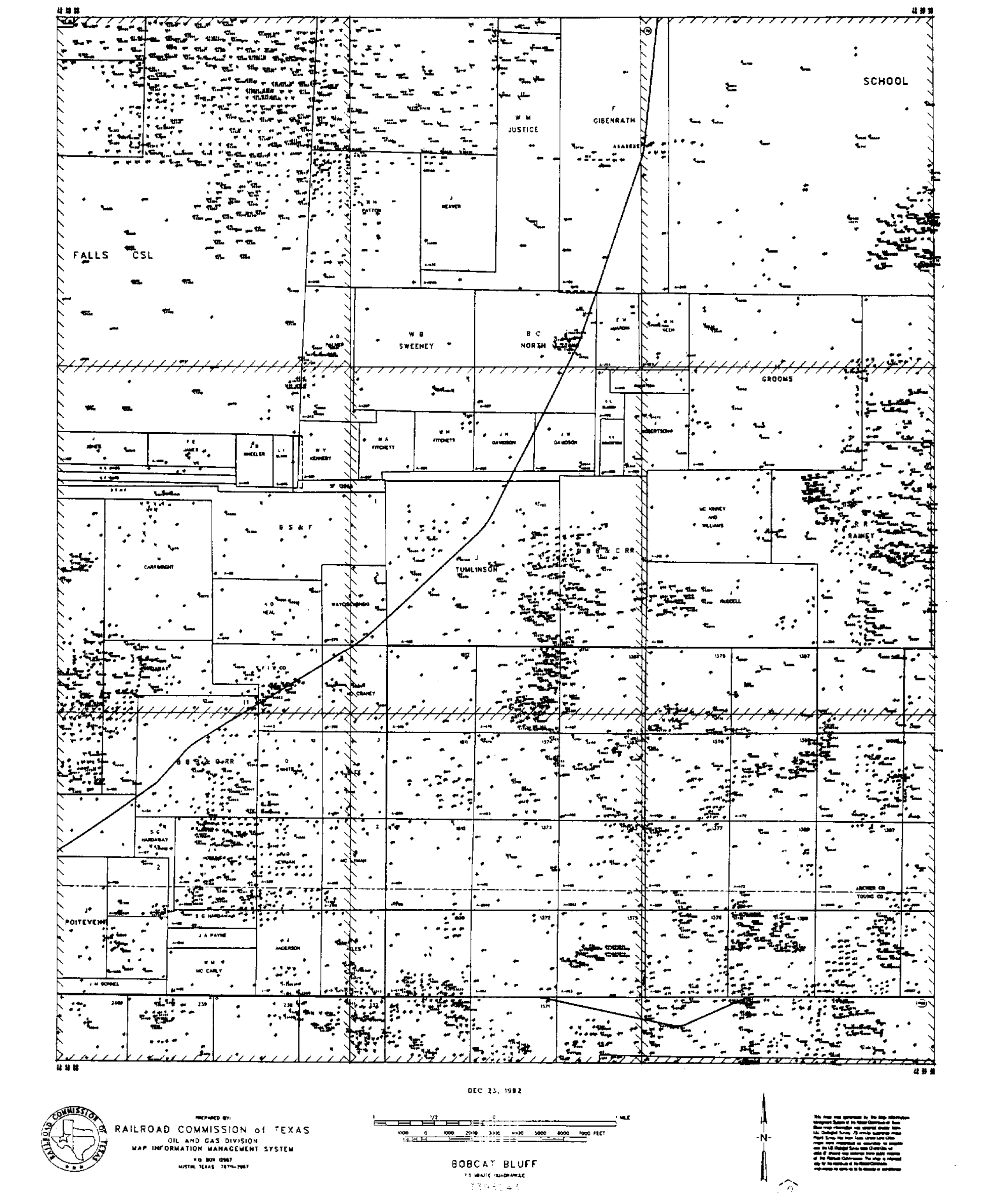
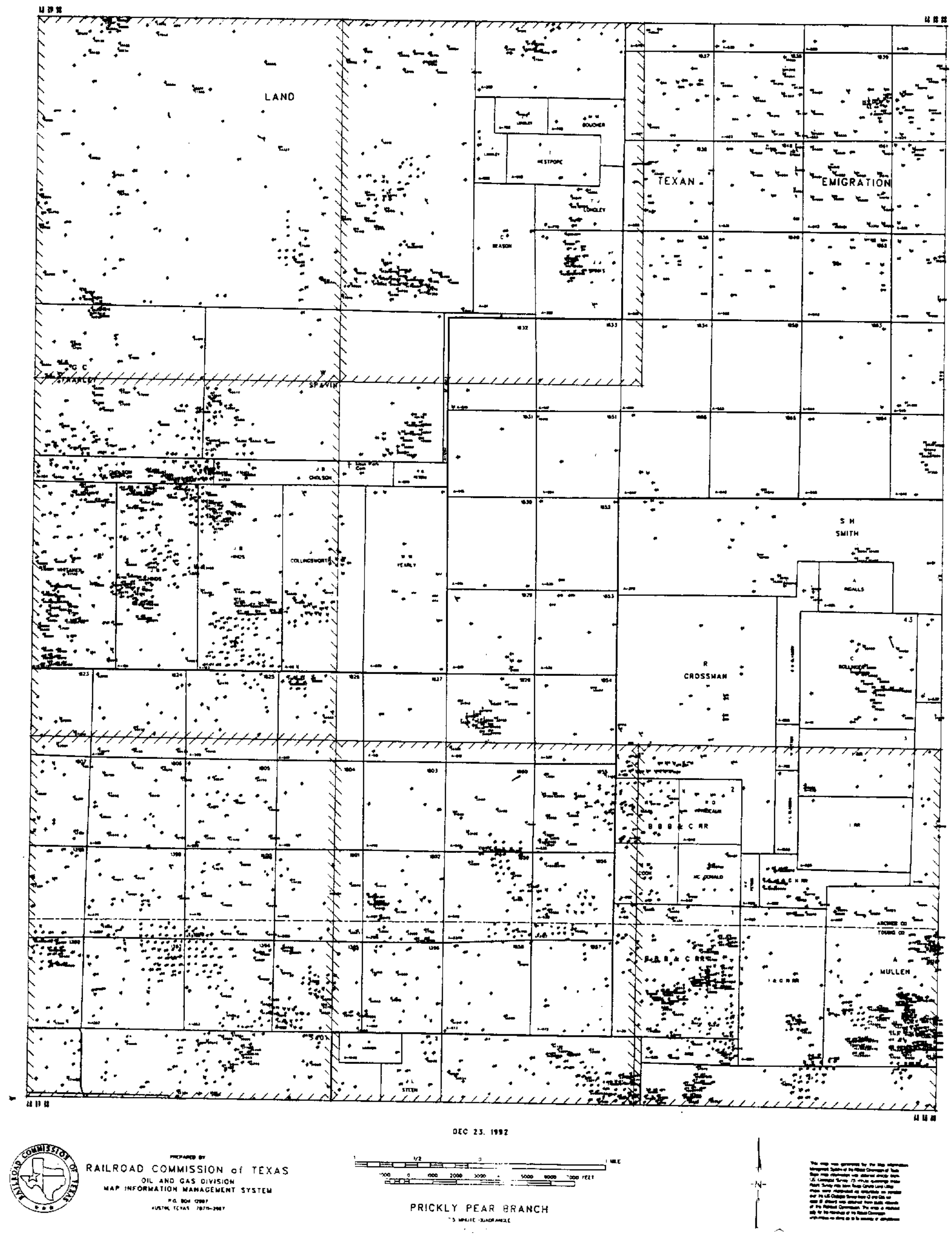
OIL AND GAS DIVISION
MAP INFORMATION MANAGEMENT SYSTEM

BRUSHY MOUND
7.5 MINUTE QUADRANGLE
3397322

(7)


SCHOOL
W M
JUSTICE
F
GIBENRATH
FALLS CSL
W B
SWEENEY
B C
NORTH
GROOMS
B S & F
TUMLINSON
B B B & C RR
RAMEY
POITEVENT
DEC 23, 1982
PREPARED BY:
RAILROAD COMMISSION of TEXAS
OIL AND GAS DIVISION
MAP INFORMATION MANAGEMENT SYSTEM
BOBCAT BLUFF
-N-


LAND
TEXAN
EMIGRATION
S H SMITH
R CROSSMAN
SPAVIN
COLLINSWORTH
MULLEN
B B B & C RR
ARCHER CO
YOUNG CO
DEC 23, 1992
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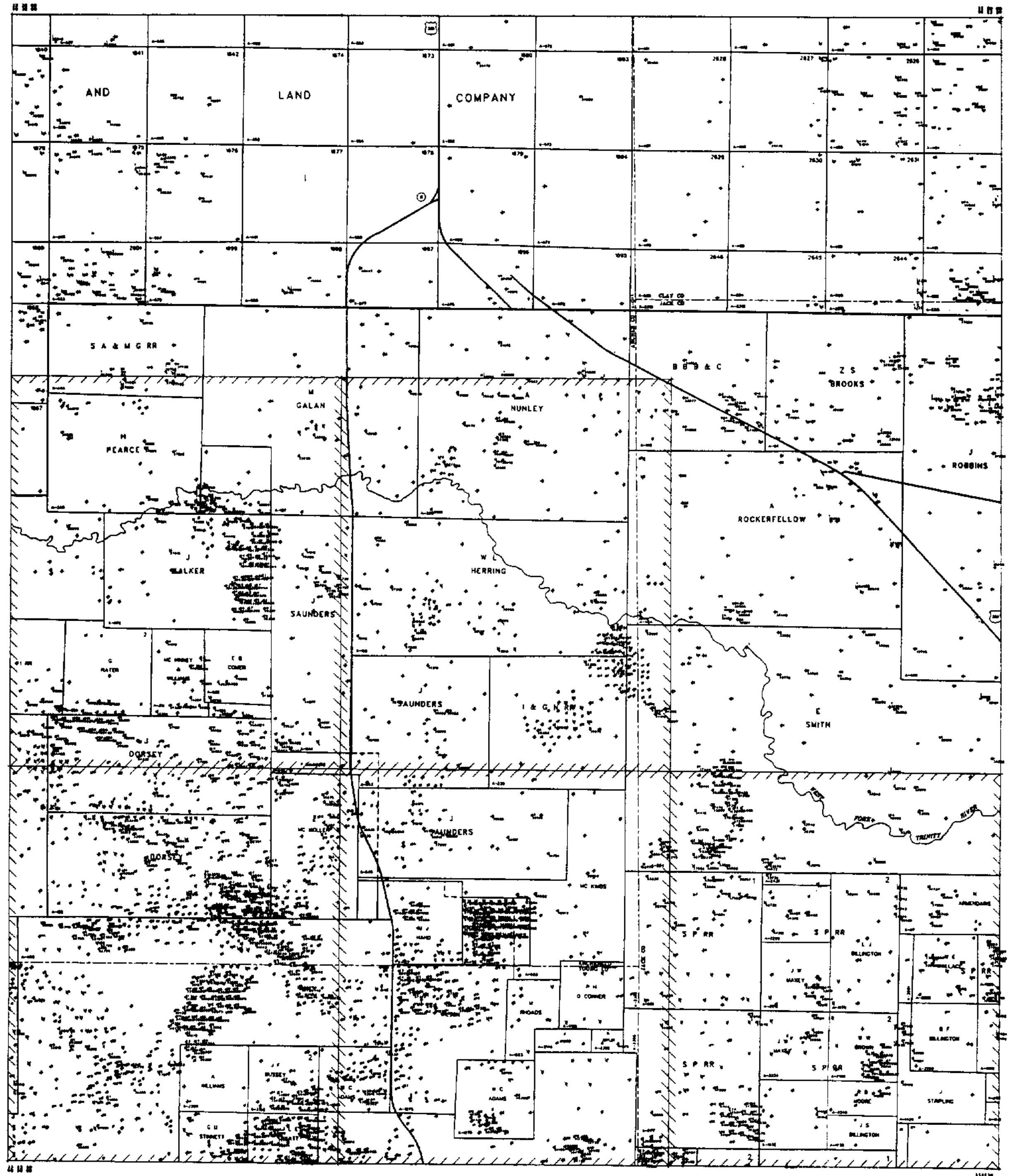
OIL AND GAS DIVISION
MAP INFORMATION MANAGEMENT SYSTEM
P.O. BOX 12967
AUSTIN, TEXAS 78711-2967
PRICKLY PEAR BRANCH
N



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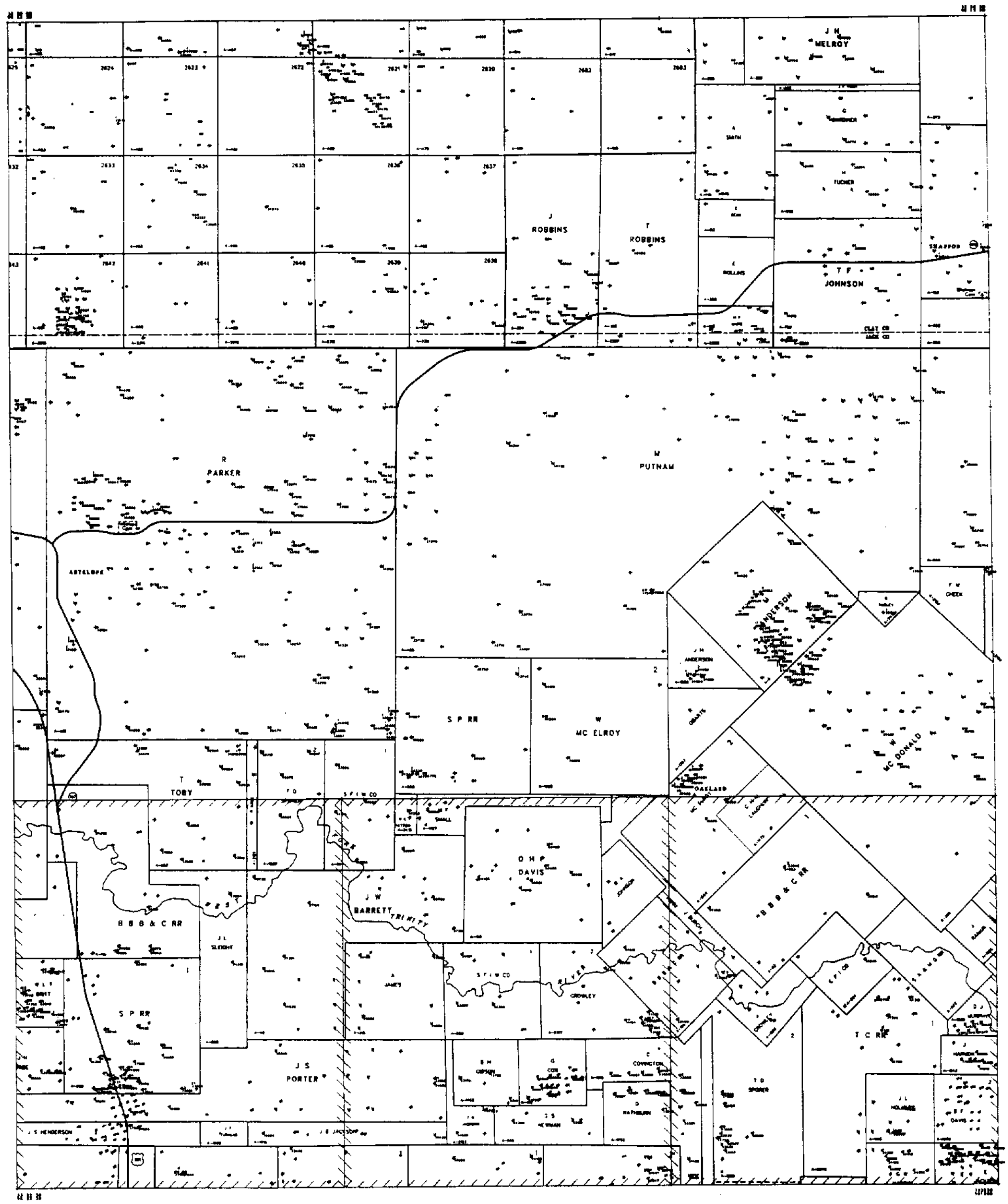
1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

DARNELL BRANCH
7.5 MINUTE QUADRANGLE
3398133

N

14



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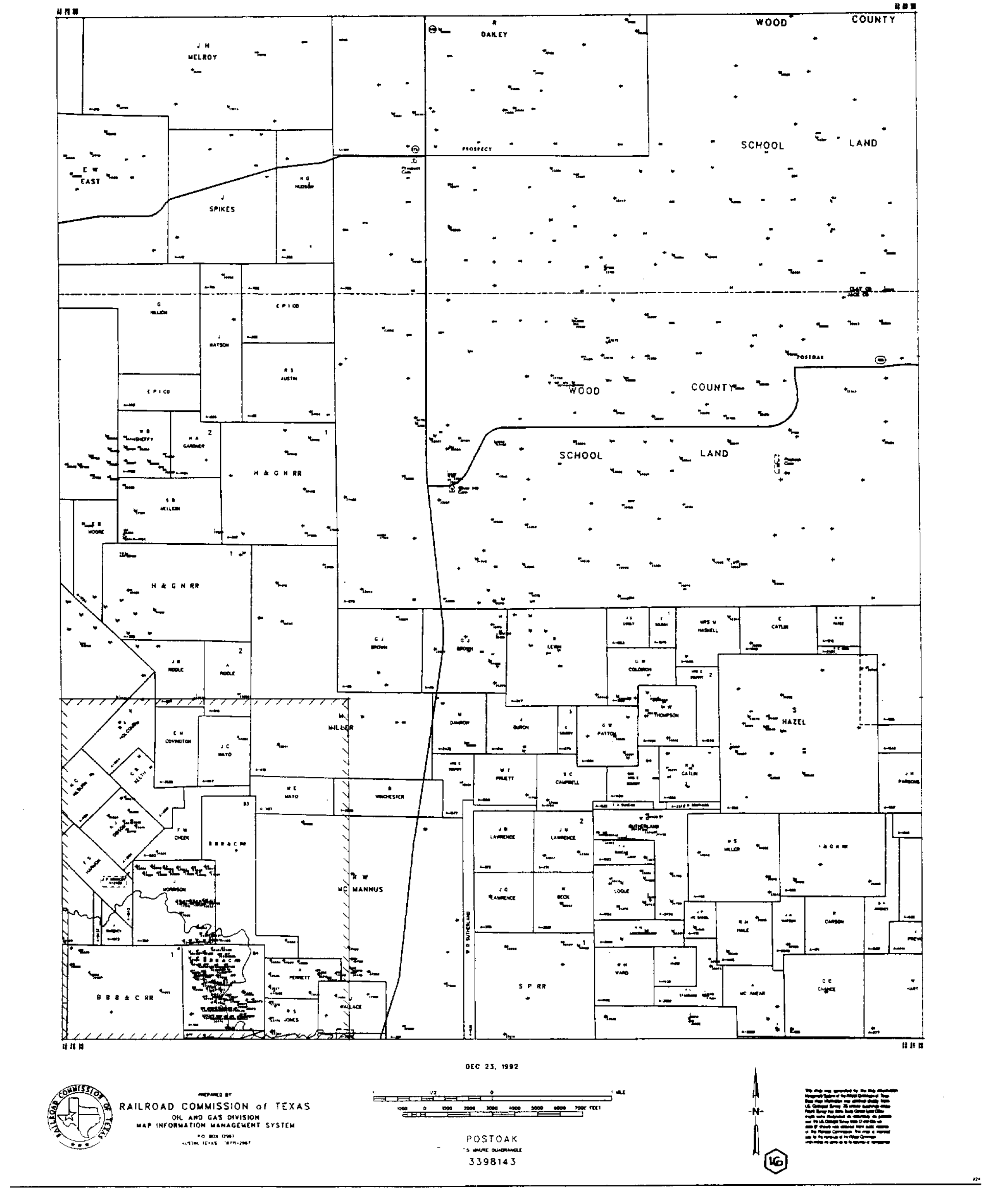
MAP INFORMATION MANAGEMENT SYSTEM

ANTELOPE
7.5 MINUTE QUADRANGLE
3398134

15


WOOD
COUNTY
SCHOOL
LAND
J H
MELROY
R
DARLEY
PROSPECT
E W
EAST
J
SPIKES
H G
HUDSON
E P I CO
G
MILLION
J
WATSON
R S
AUSTIN
H & G N RR
WOOD
COUNTY
SCHOOL
LAND
H & G N RR
J B
RIDDLE
A
RIDDLE
G J
BROWN
HAZEL
MILLER
MC MANNUS
R W
J C
MAYO
E M
COVINGTON
WINCHESTER
J W
LAWRENCE
J D
LAWRENCE
H S
MILLER
C C
CHANCE
S P RR
B B B & C RR
W D SUTHERLAND
CARSON
CATLIN
PATTON
THOMPSON
CAMPBELL
PRUETT
DAMRON
BURCH
LOGUE
BECK
WARD
WALLACE
MORRISON
CHEEK
MC ANEAR
HALE
PARSONS
DEC 23, 1992
PREPARED BY
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MAP INFORMATION MANAGEMENT SYSTEM
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AUSTIN, TEXAS 78711-2967
POSTOAK
7.5 MINUTE QUADRANGLE
3398143
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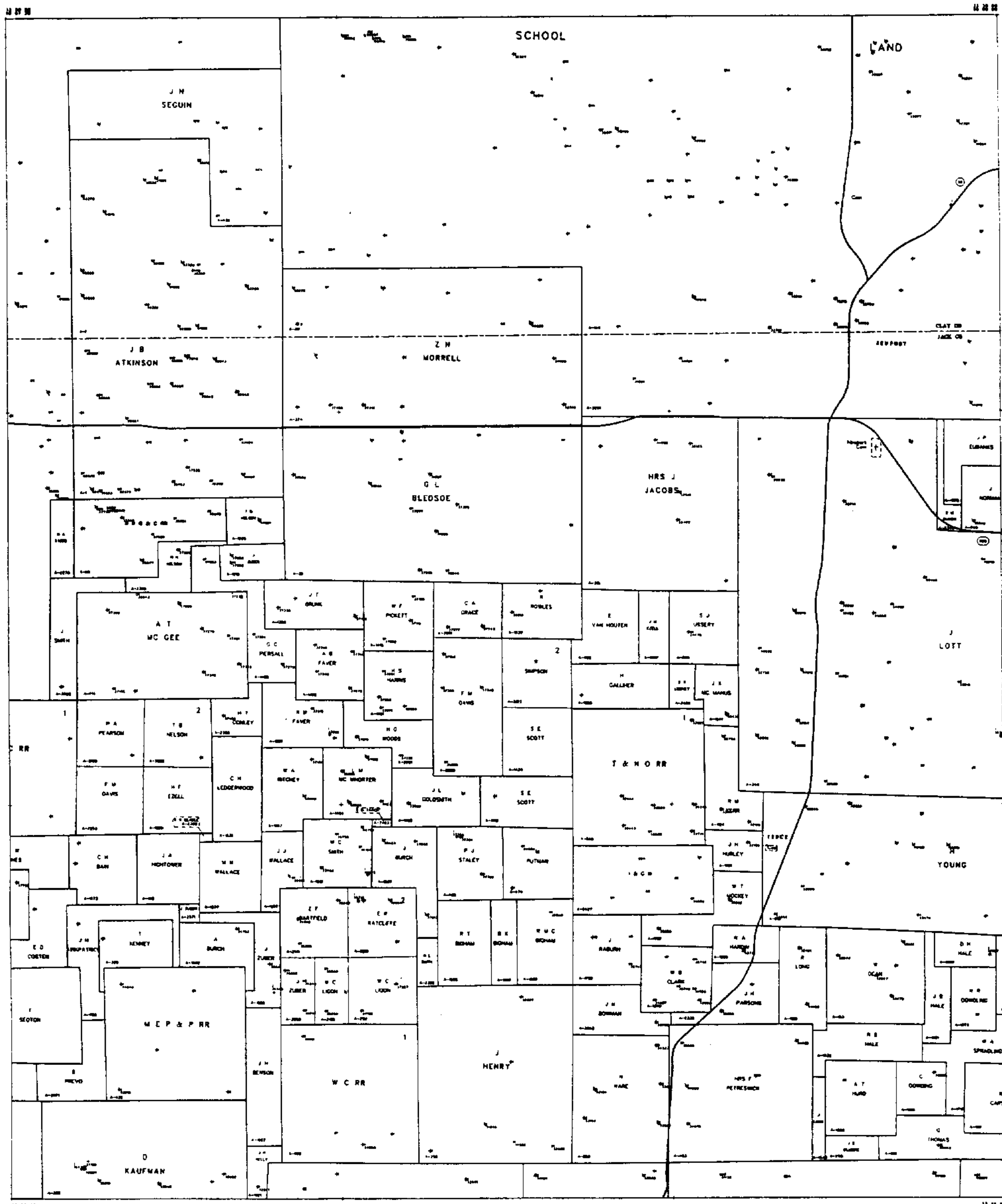
1 MILE
7000 FEET



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NEWPORT
7.5 MINUTE QUADRANGLE
3398144

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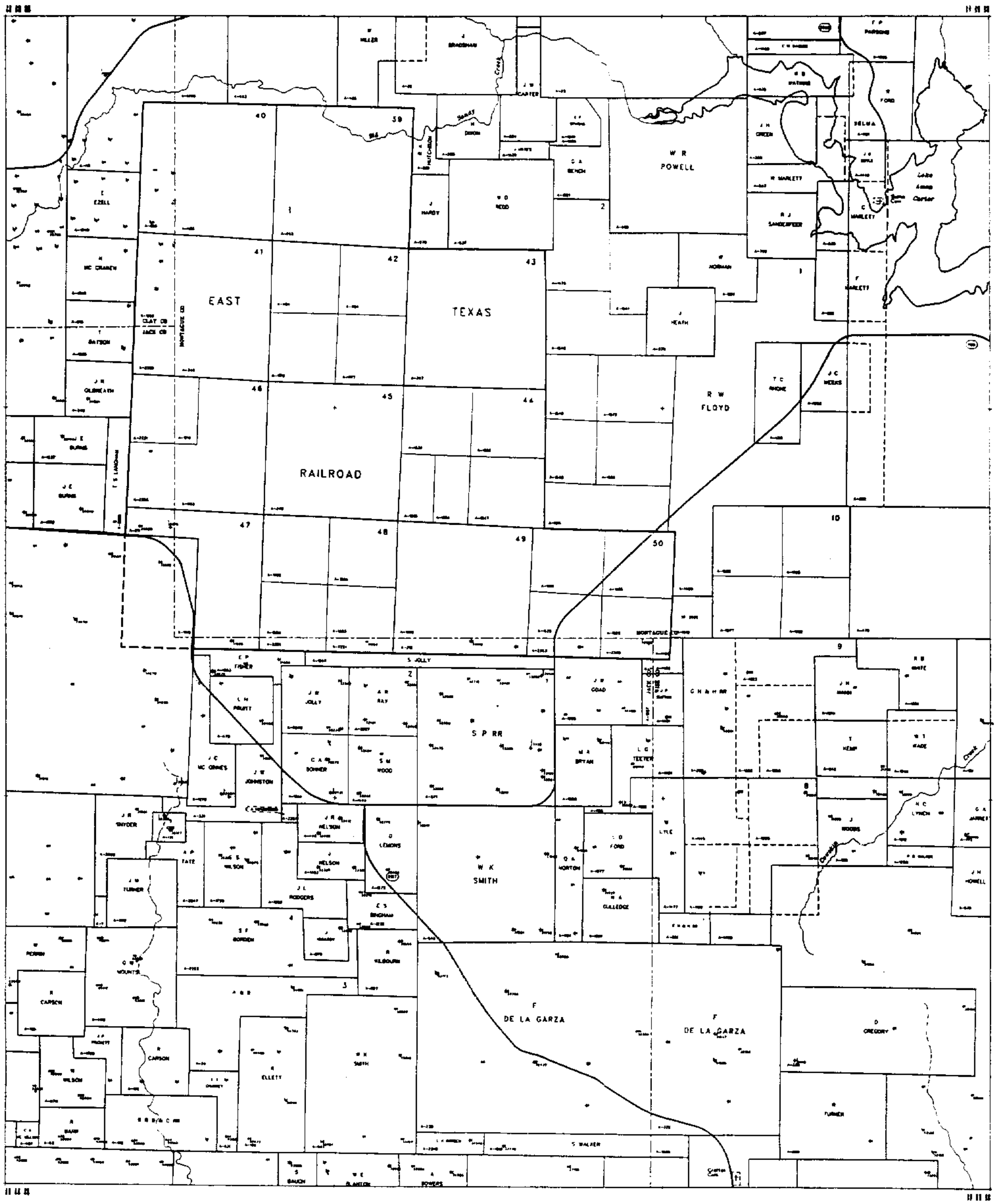

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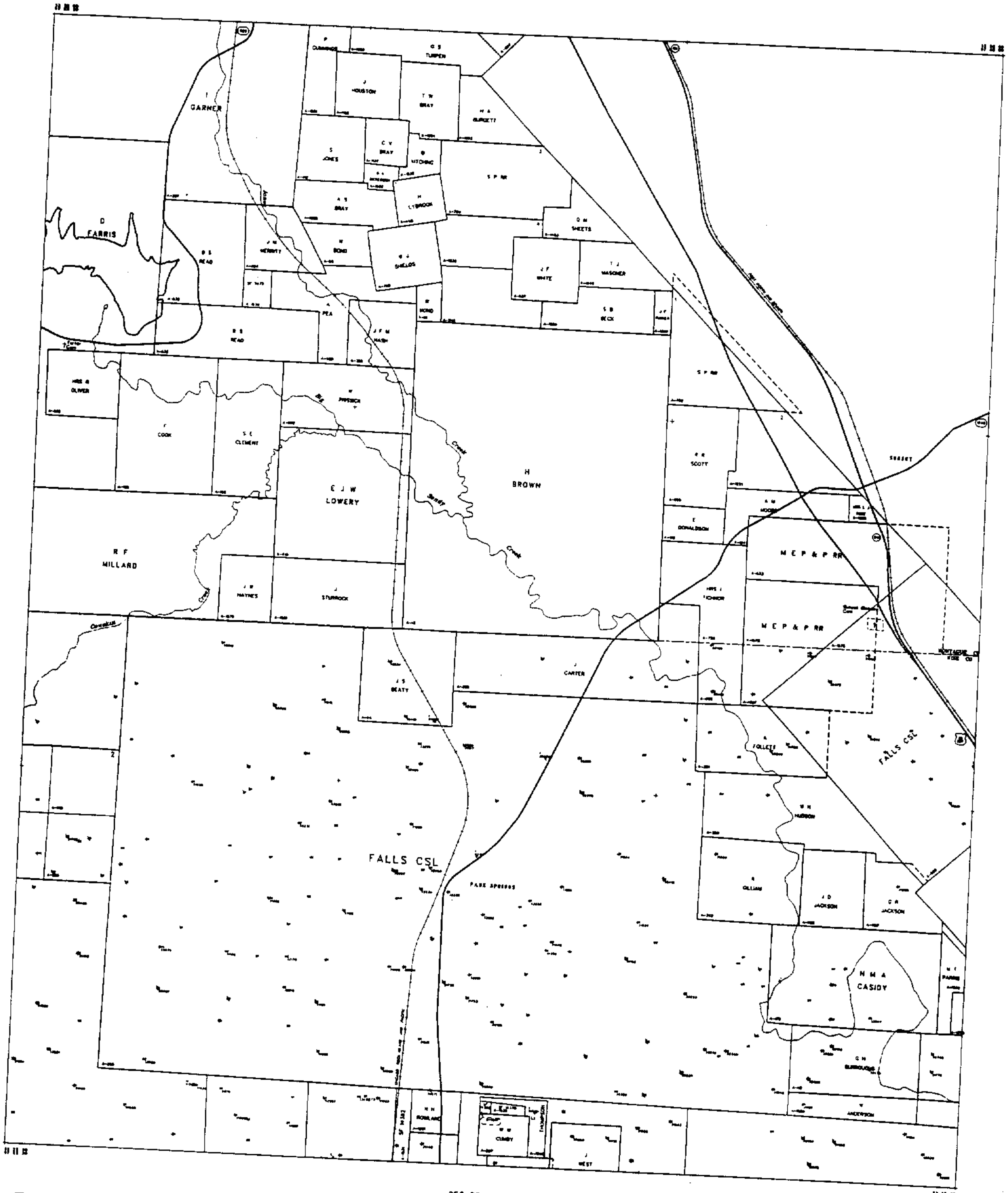
SELMA
7.5 MINUTE QUADRANGLE
3397233

18



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AUSTIN, TEXAS 78711-2967

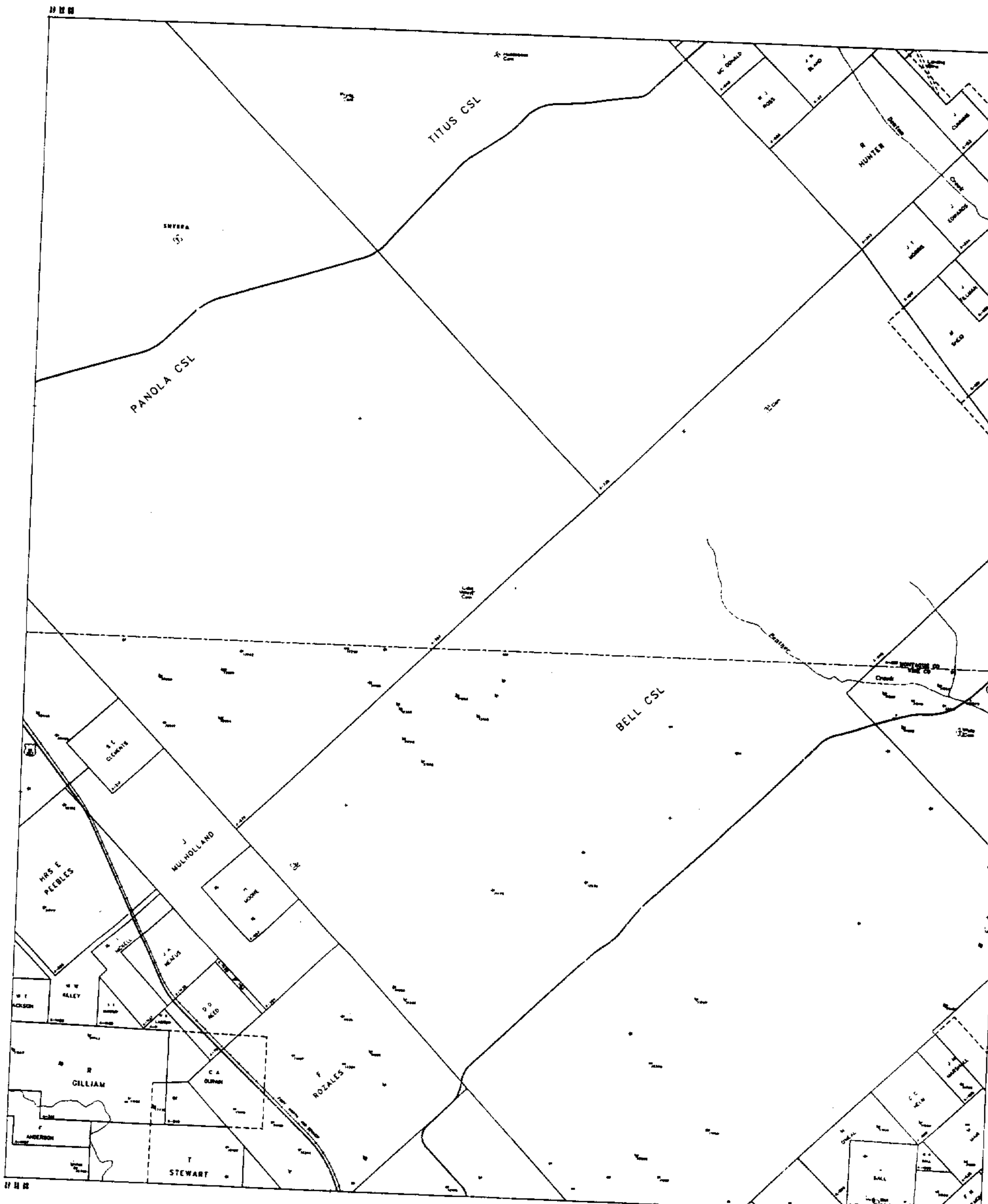
DEC 23, 1992

SUNSET

7.5 MINUTE QUADRANGLE

3397234

-N-



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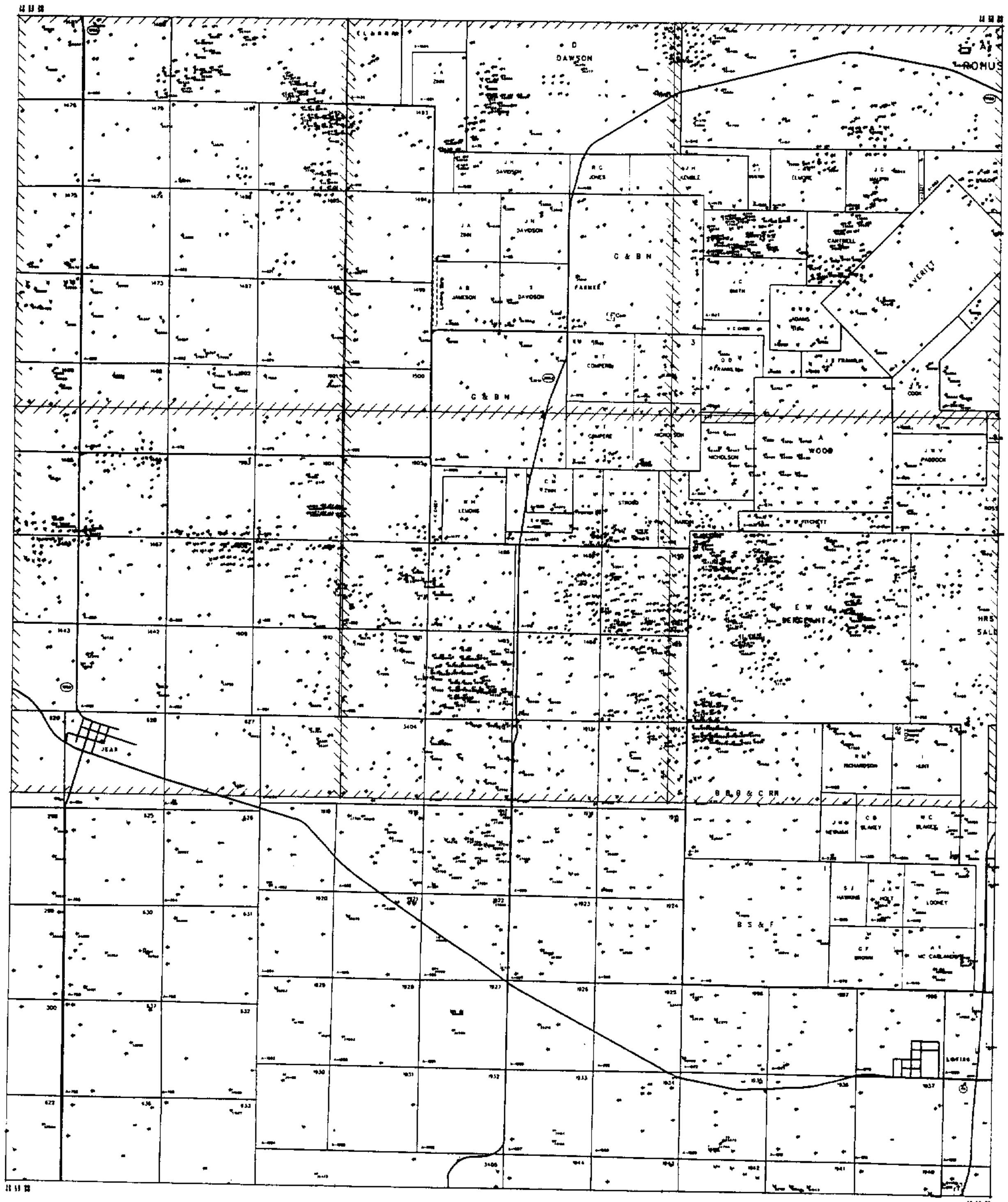
SMYRNA
7.5 MINUTE QUADRANGLE



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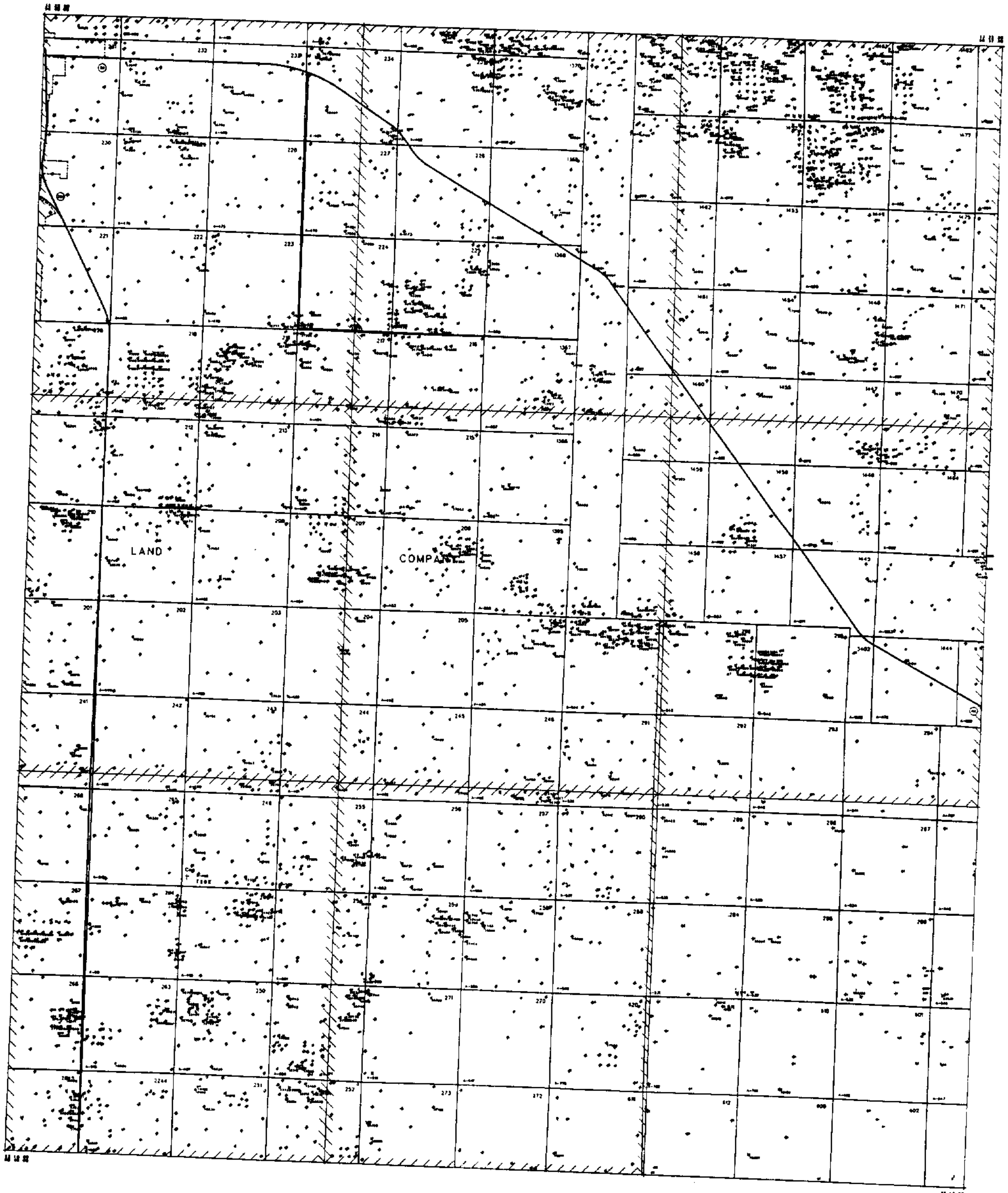
LOVING
7.5 MINUTE QUADRANGLE
3398241

24



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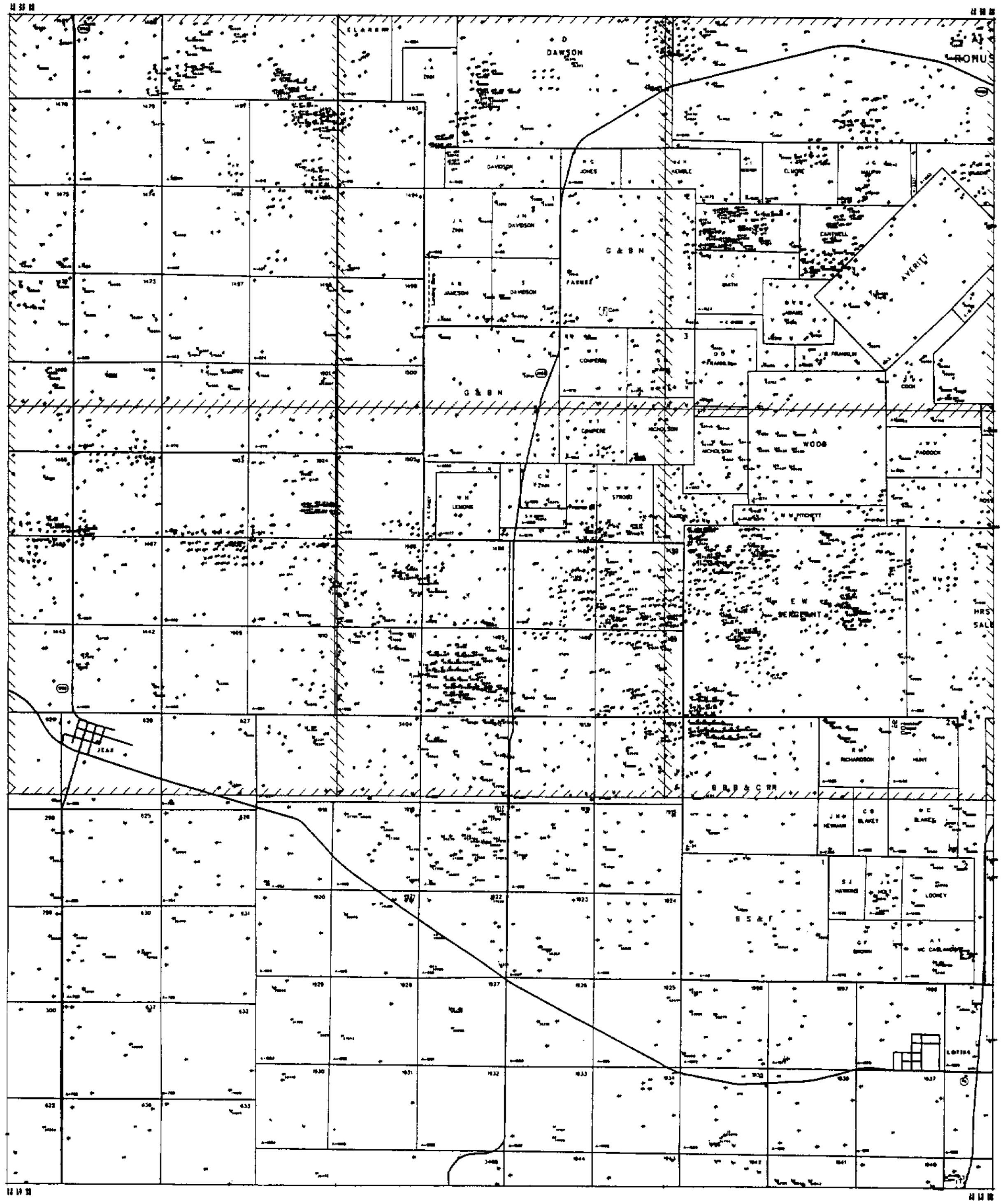
TRUE

-N-



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LOVING
7.5 MINUTE QUADRANGLE
3398241

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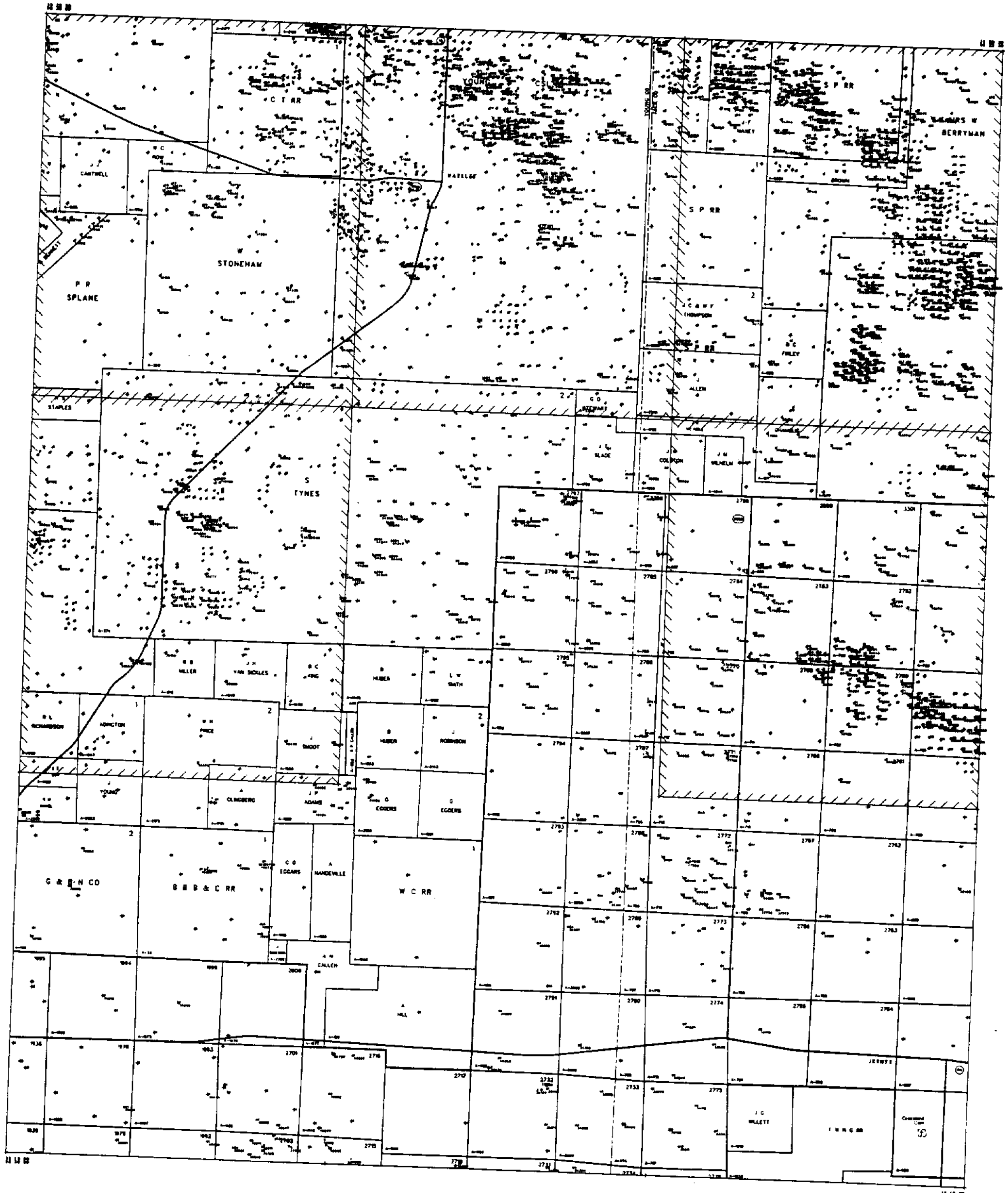

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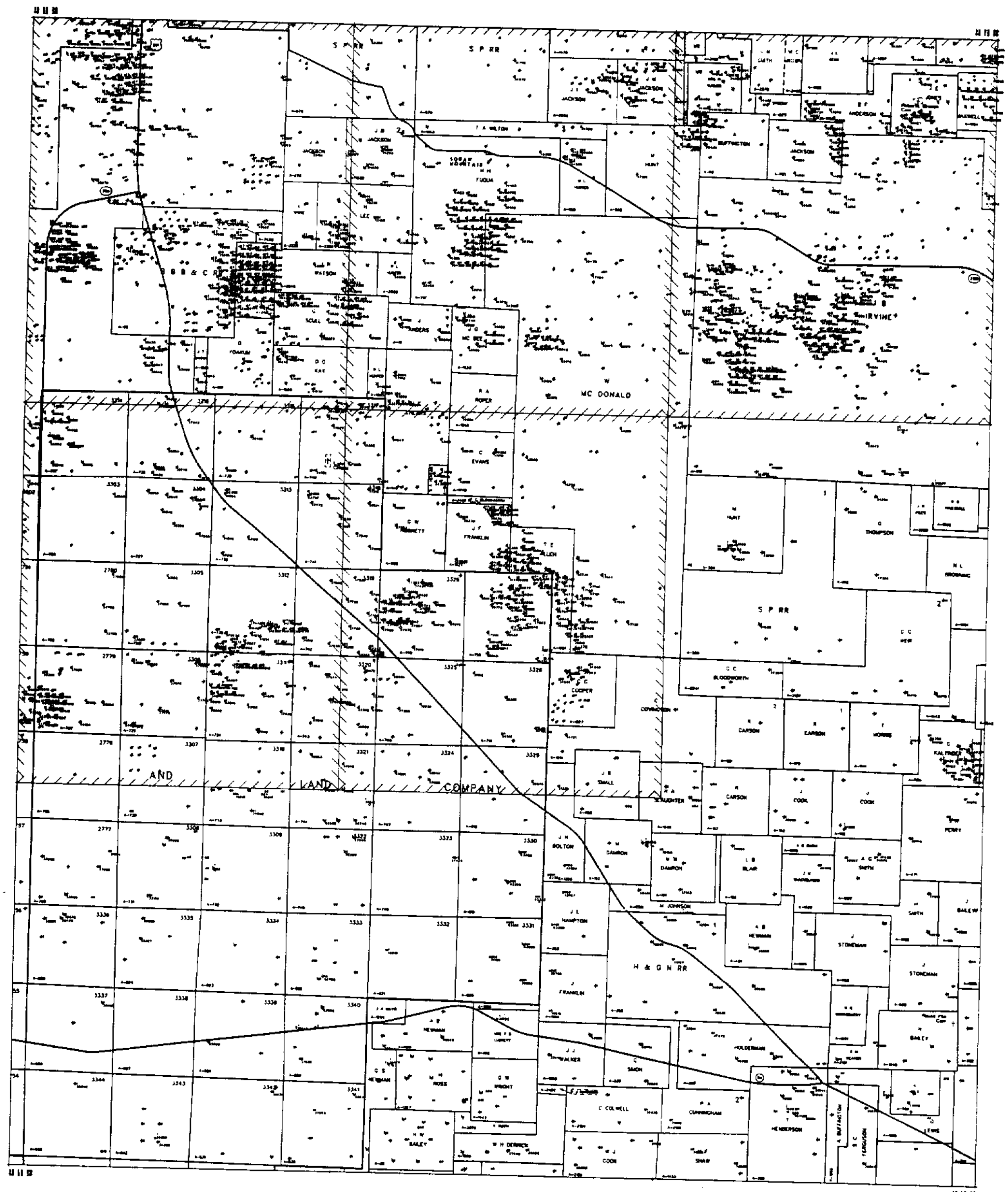
MARKLEY
7.5 MINUTE QUADRANGLE
3398132



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LYNN CREEK
7.5 MINUTE QUADRANGLE
3398131

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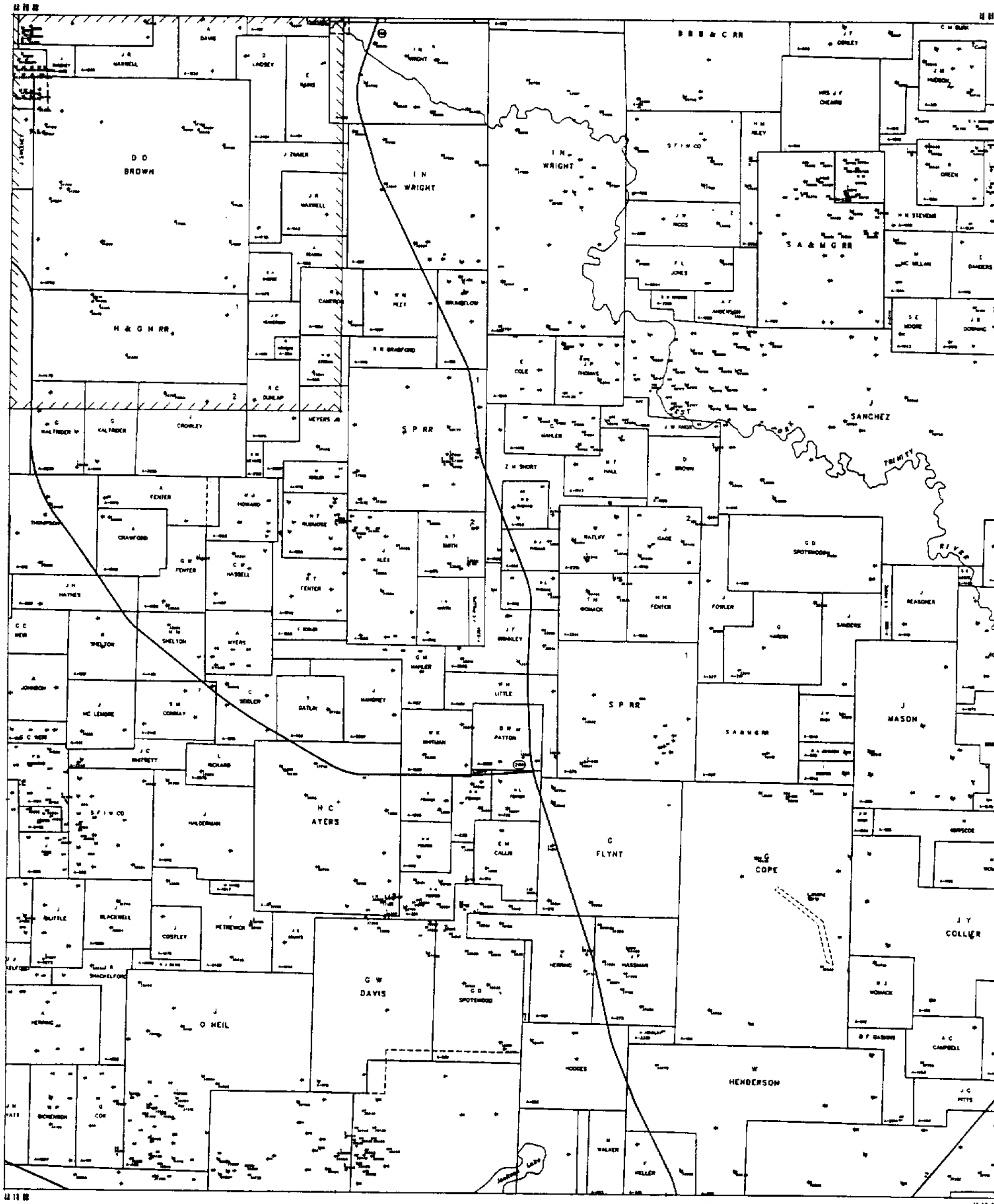

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SCALE: 1" = 2000'

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JOHNSON LAKE
7.5 MINUTE QUADRANGLE
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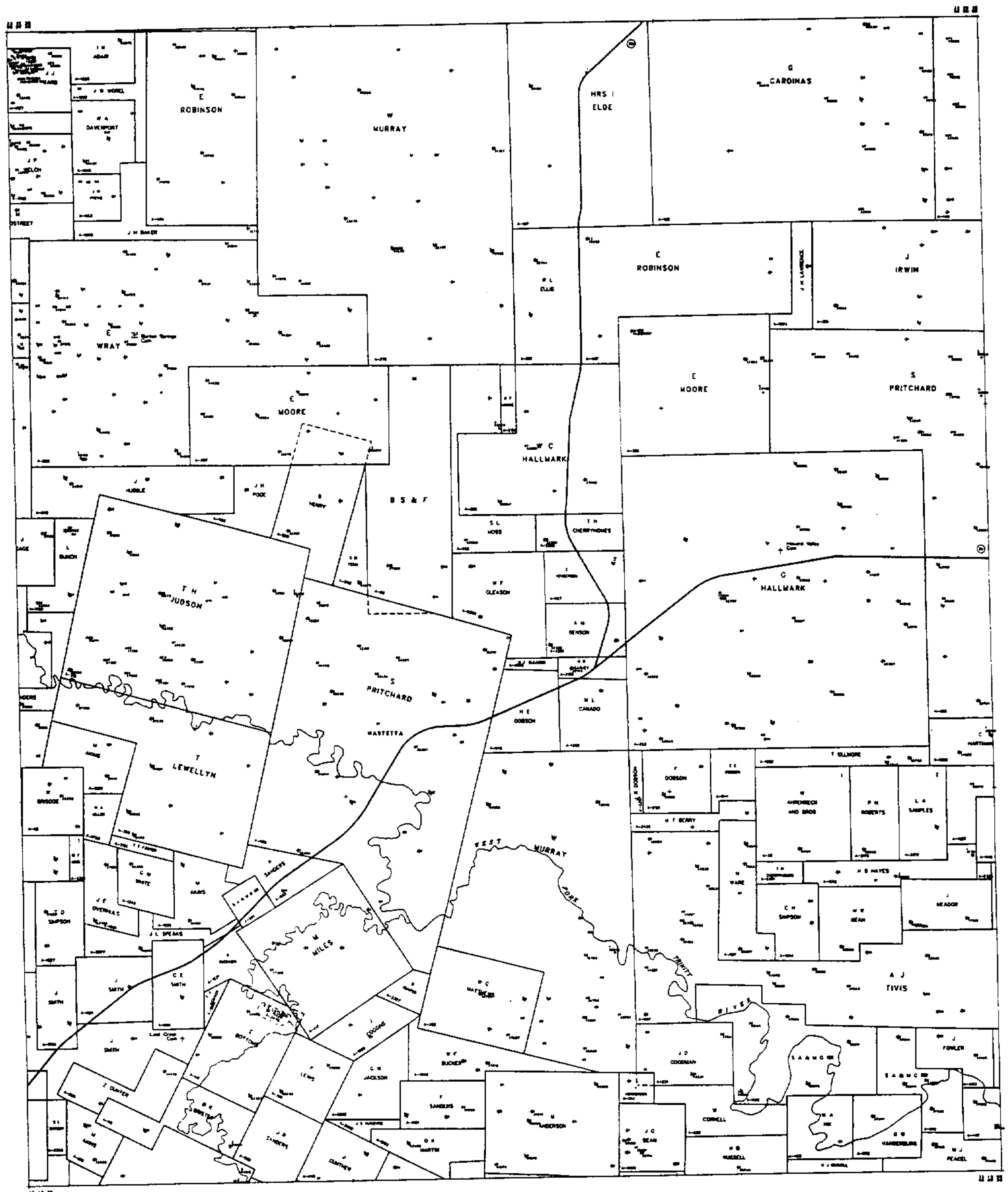

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MAP INFORMATION MANAGEMENT SYSTEM
P.O. BOX 12967
AUSTIN, TEXAS 78711-2967

DEC 23, 1992
SCALE: 1" = 2000'

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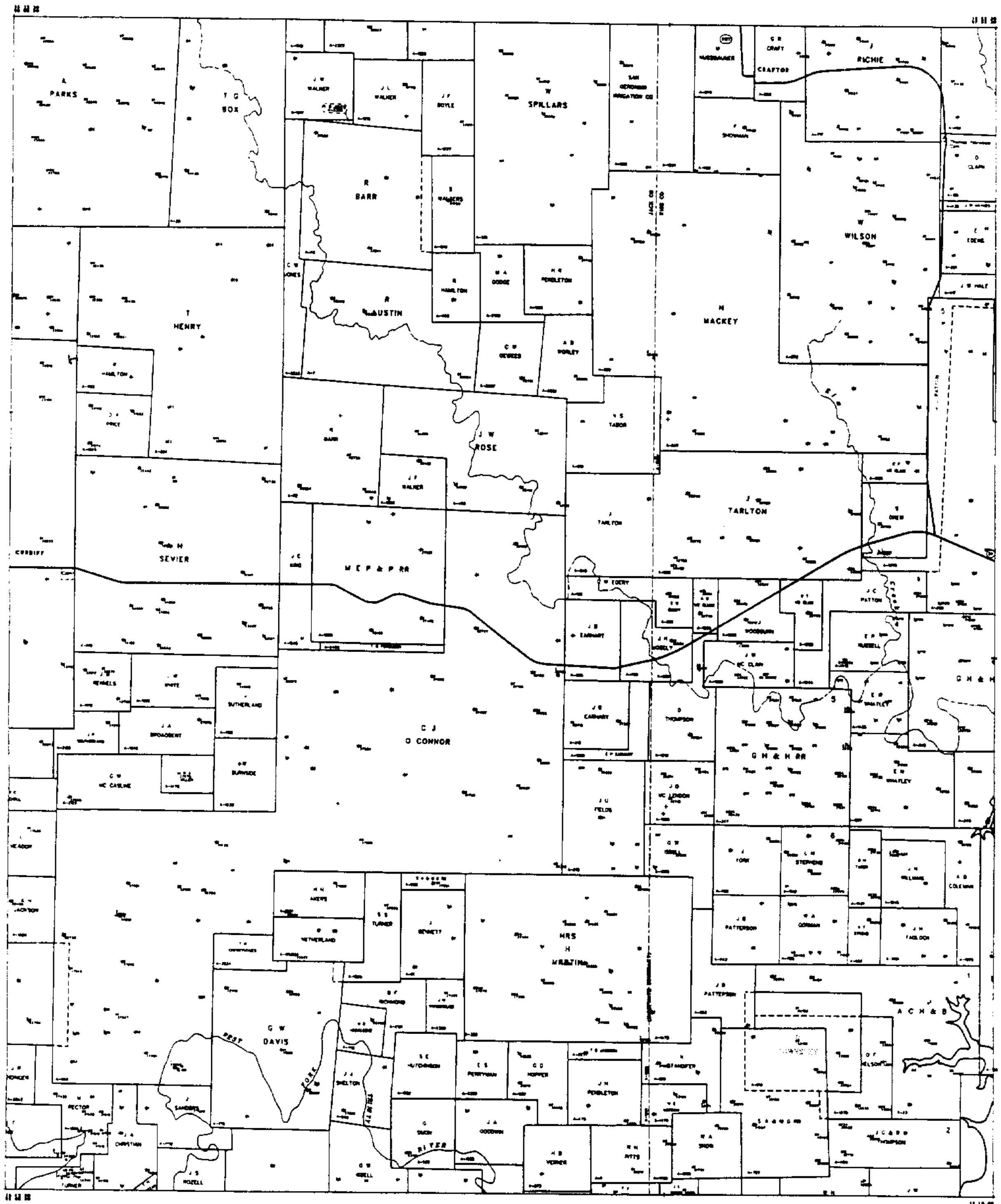
CUNDIFF
7.5 MINUTE QUADRANGLE
3398141

-N-



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MAP INFORMATION MANAGEMENT SYSTEM
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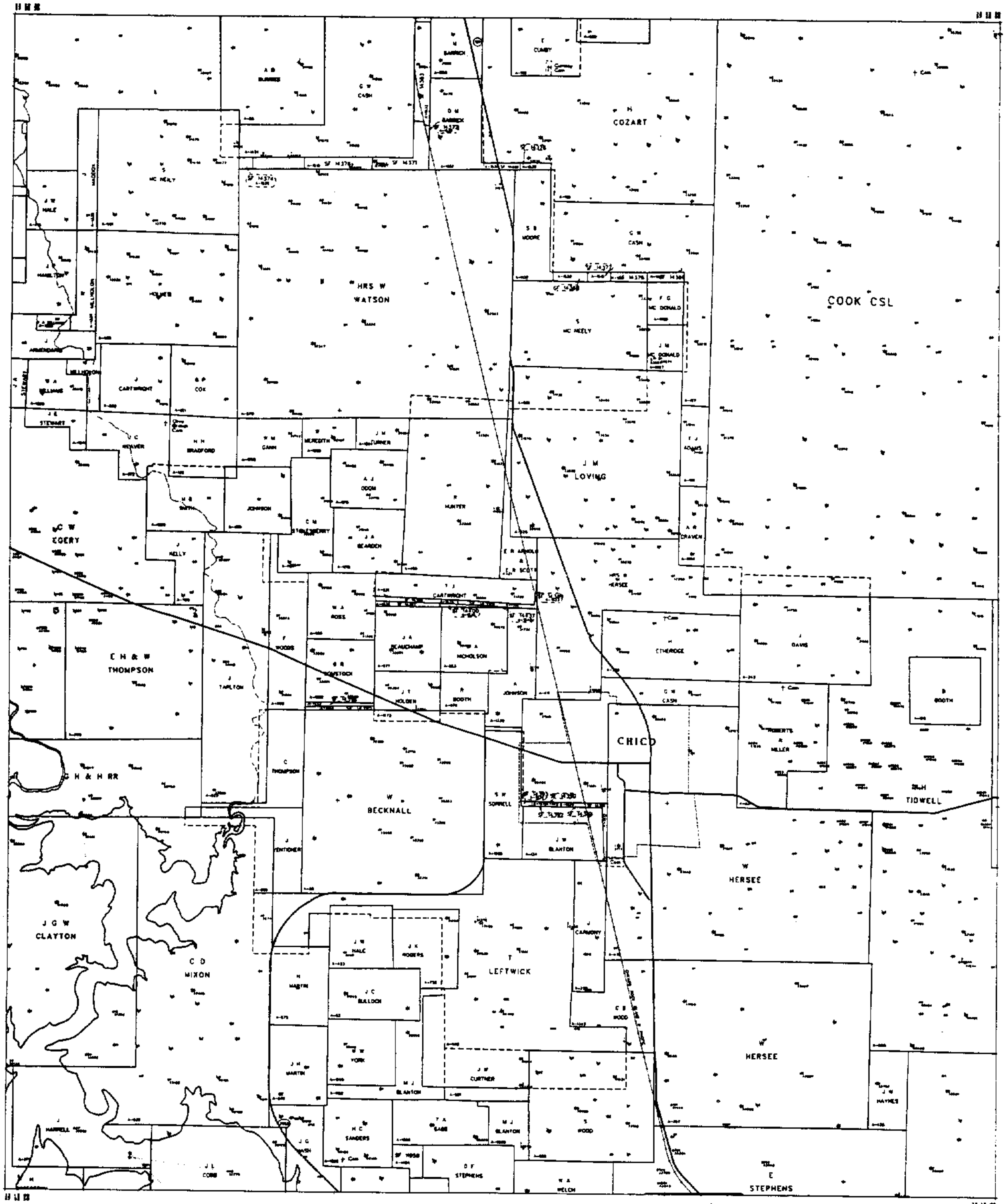
CRAFTON
7.5 MINUTE QUADRANGLE
3397232



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OIL AND GAS DIVISION
MAP INFORMATION MANAGEMENT SYSTEM
P.O. BOX 12967
AUSTIN, TEXAS 78711-2967

1 MILE
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CHICO
7.5 MINUTE QUADRANGLE
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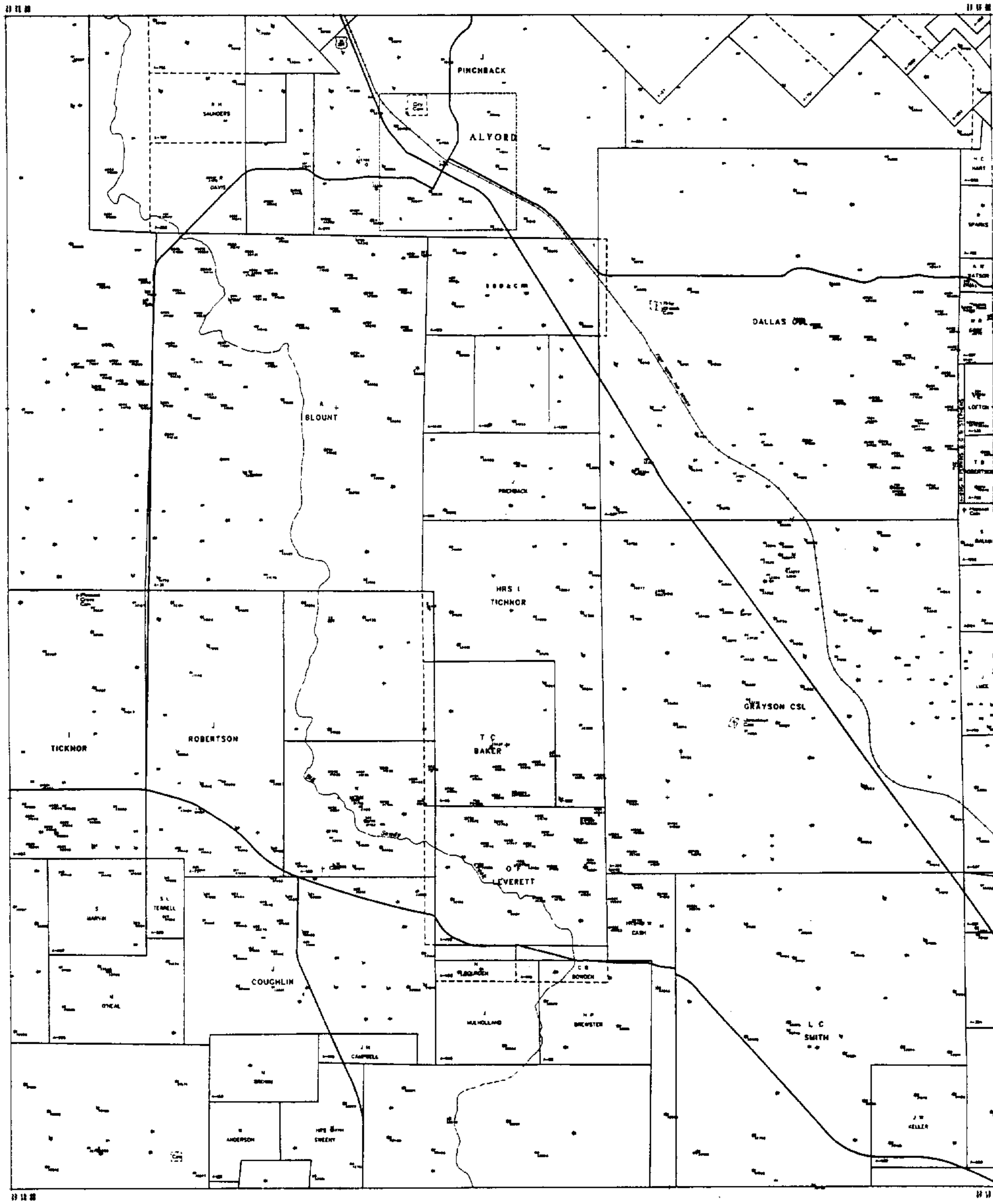

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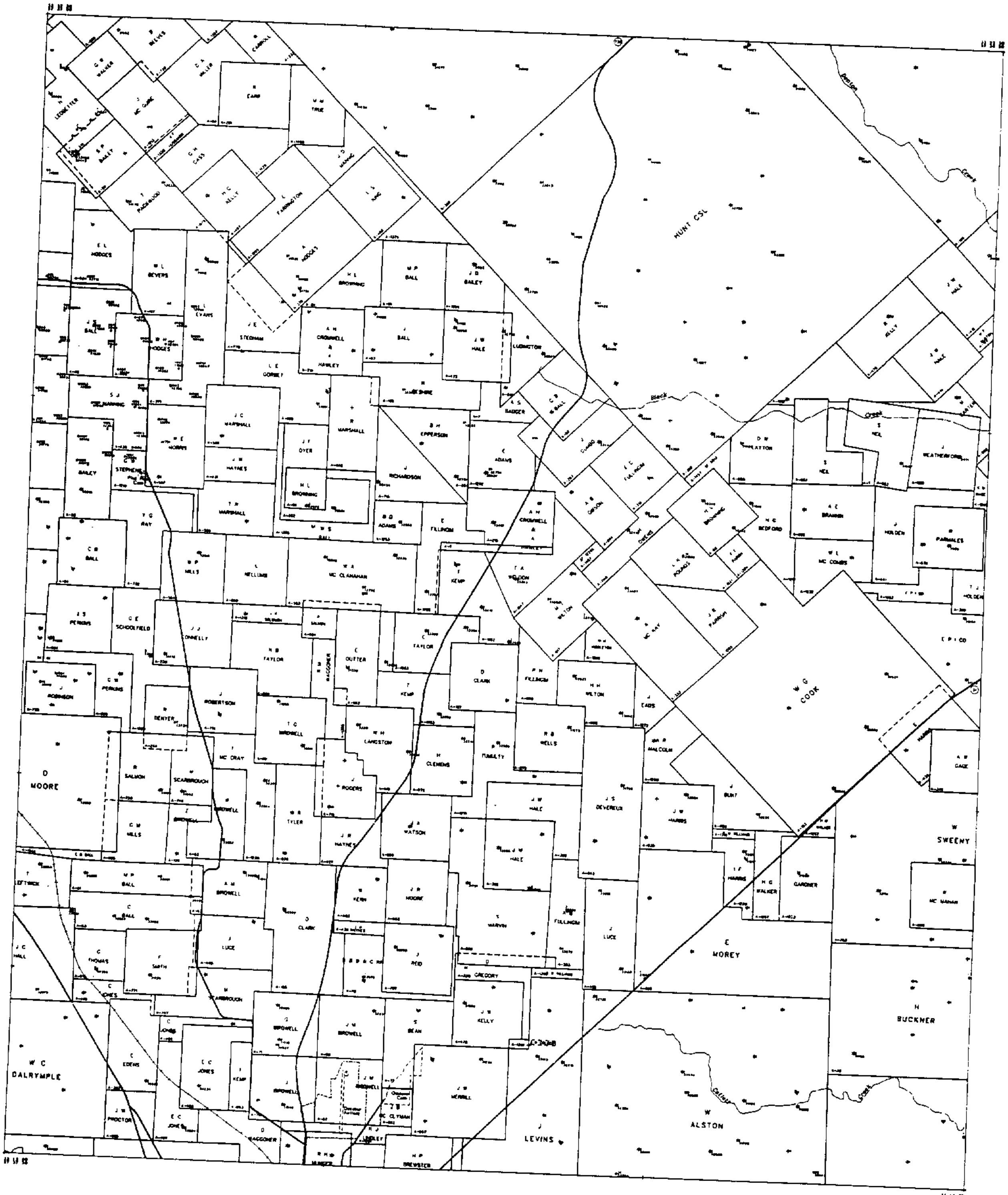
ALVORD
7.5 MINUTE QUADRANGLE
3397242

31



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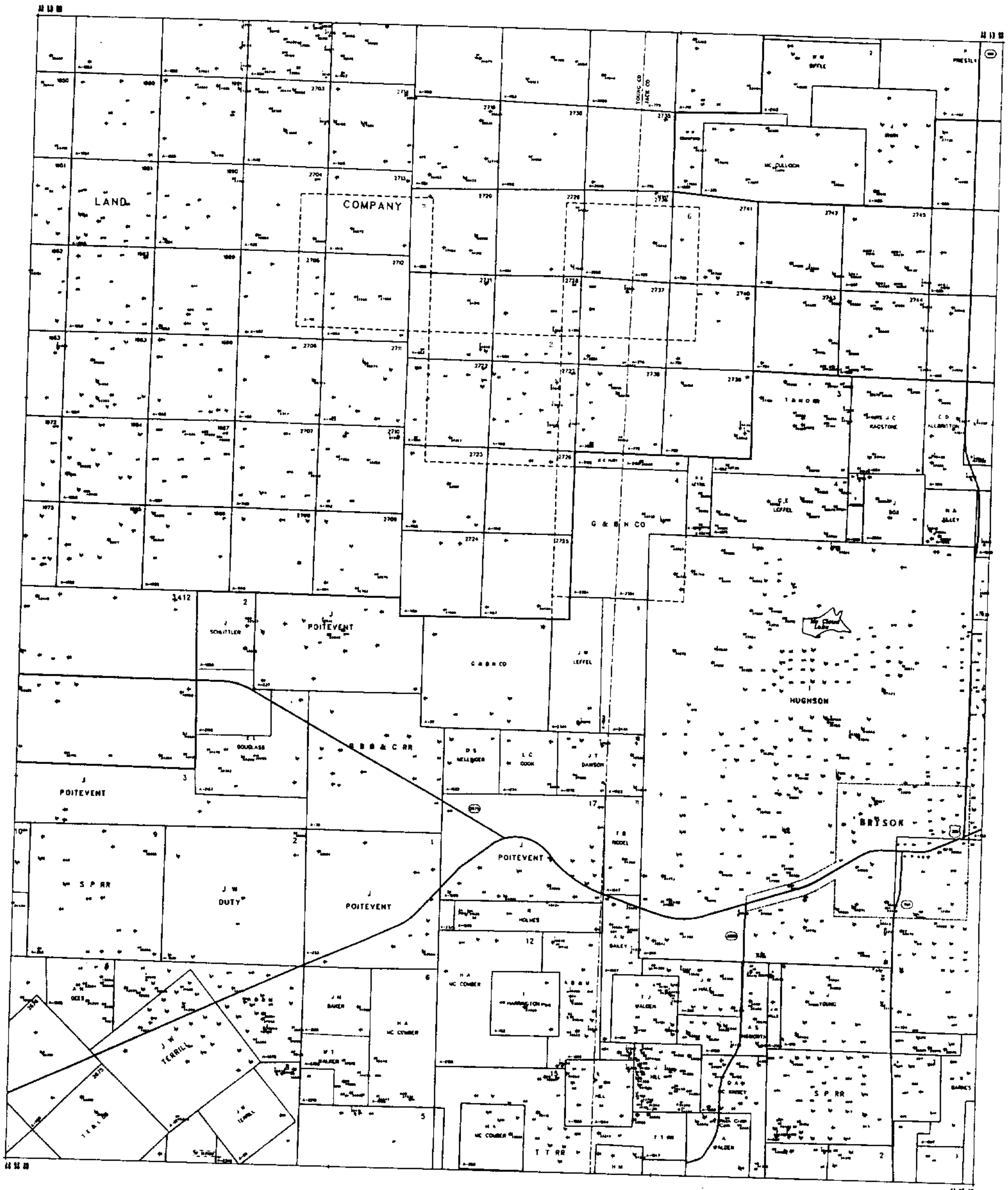
DEC 23, 1992
SCALE: 1" = 2000'

PECAN CREEK
7.5 MINUTE QUADRANGLE
3397241

N



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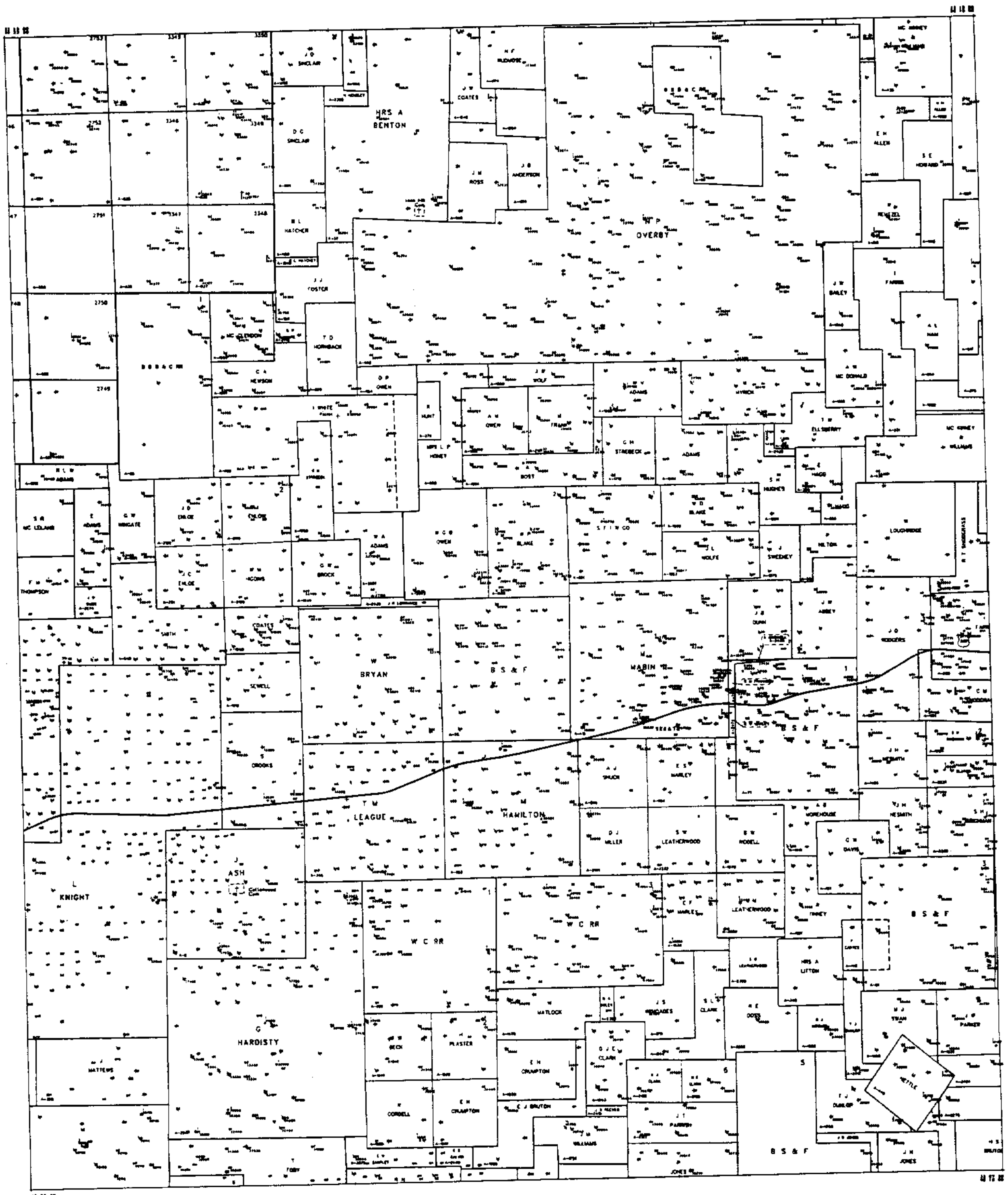
BRYSON
7.5 MINUTE QUADRANGLE
3398123



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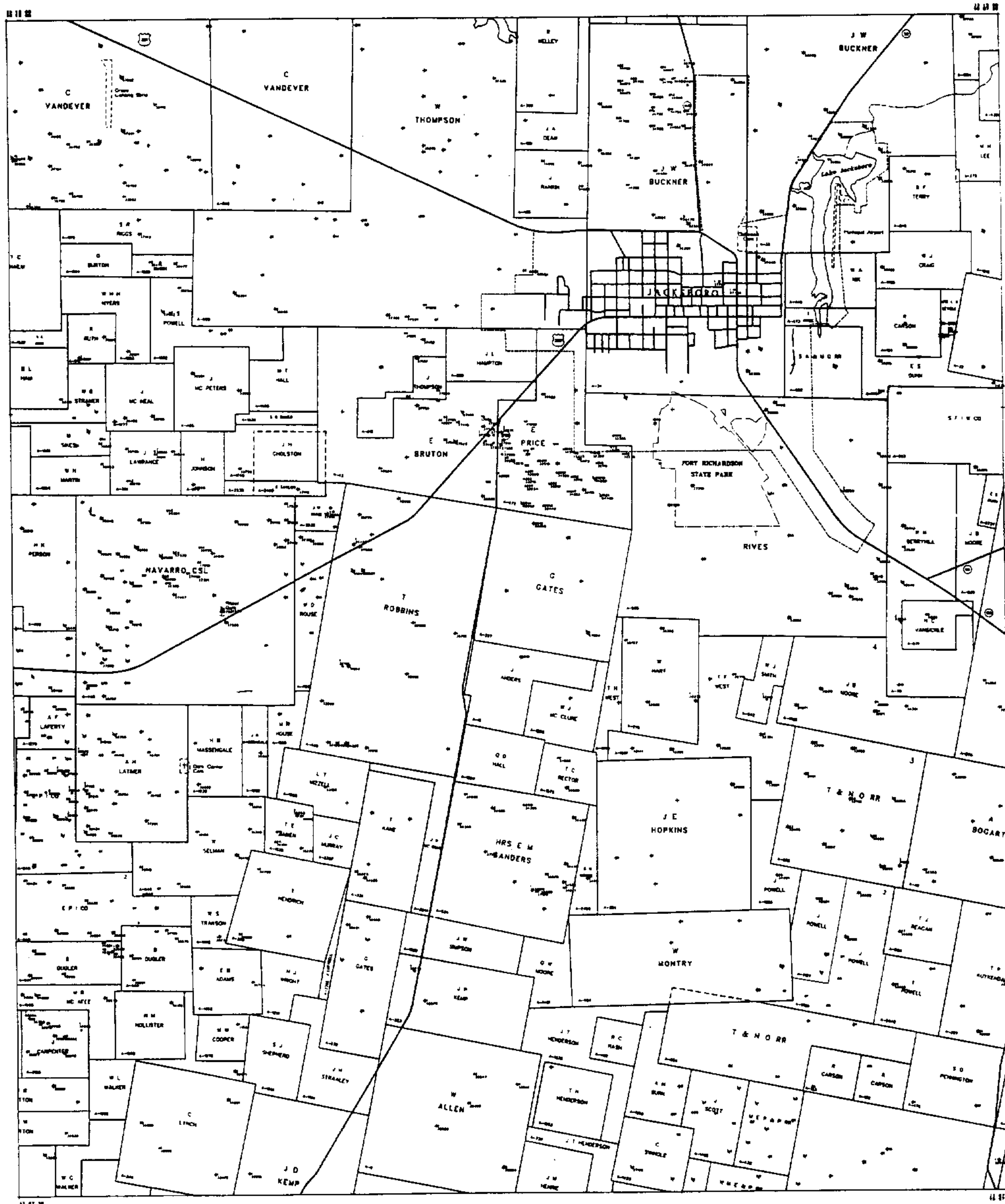
MILE

FEET

SENATE
7.5 MINUTE QUADRANGLE
3398124

N

37



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SCALE: 1" = 2000'

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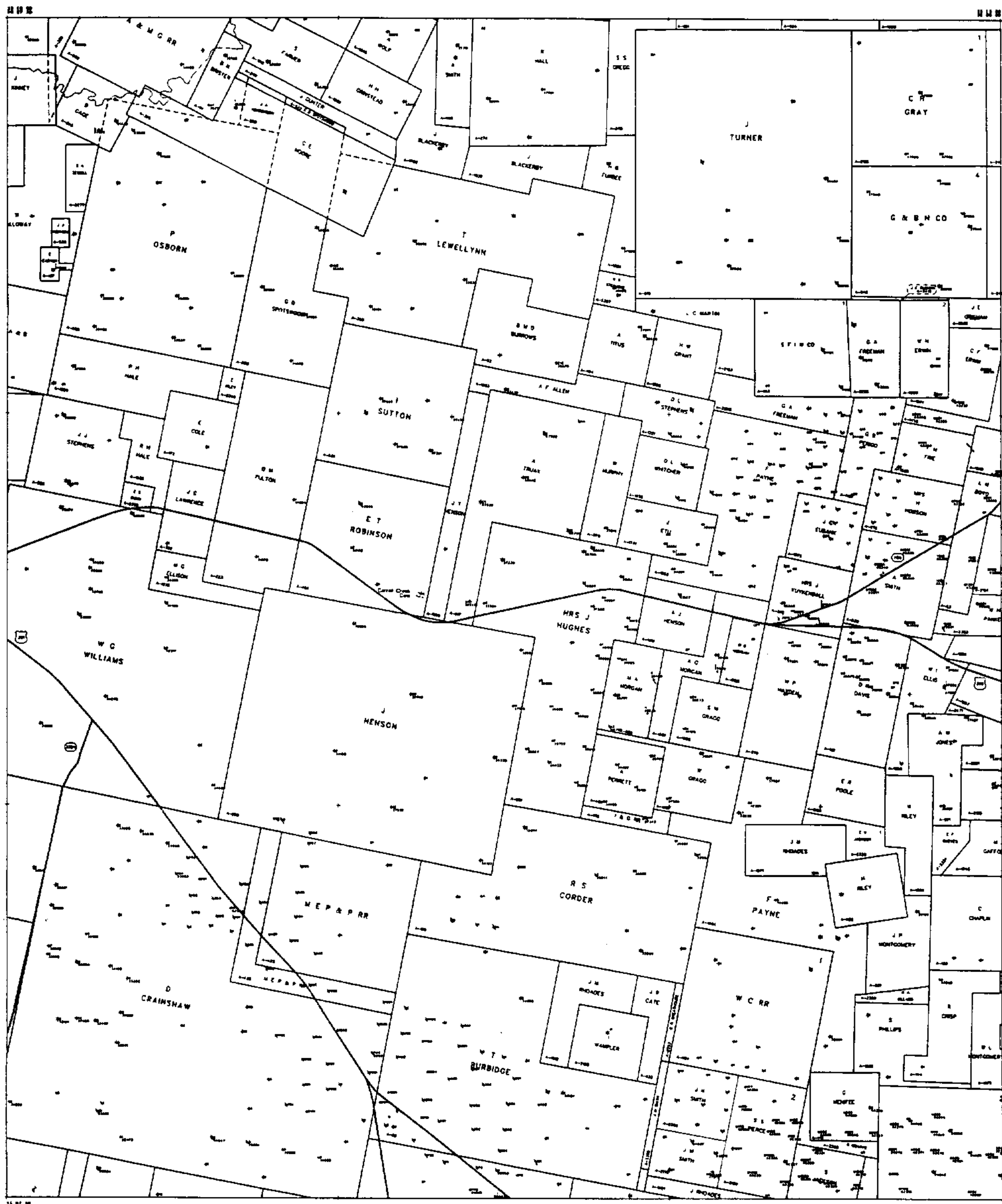
JACKSBORO
7.5 MINUTE QUADRANGLE
3398113



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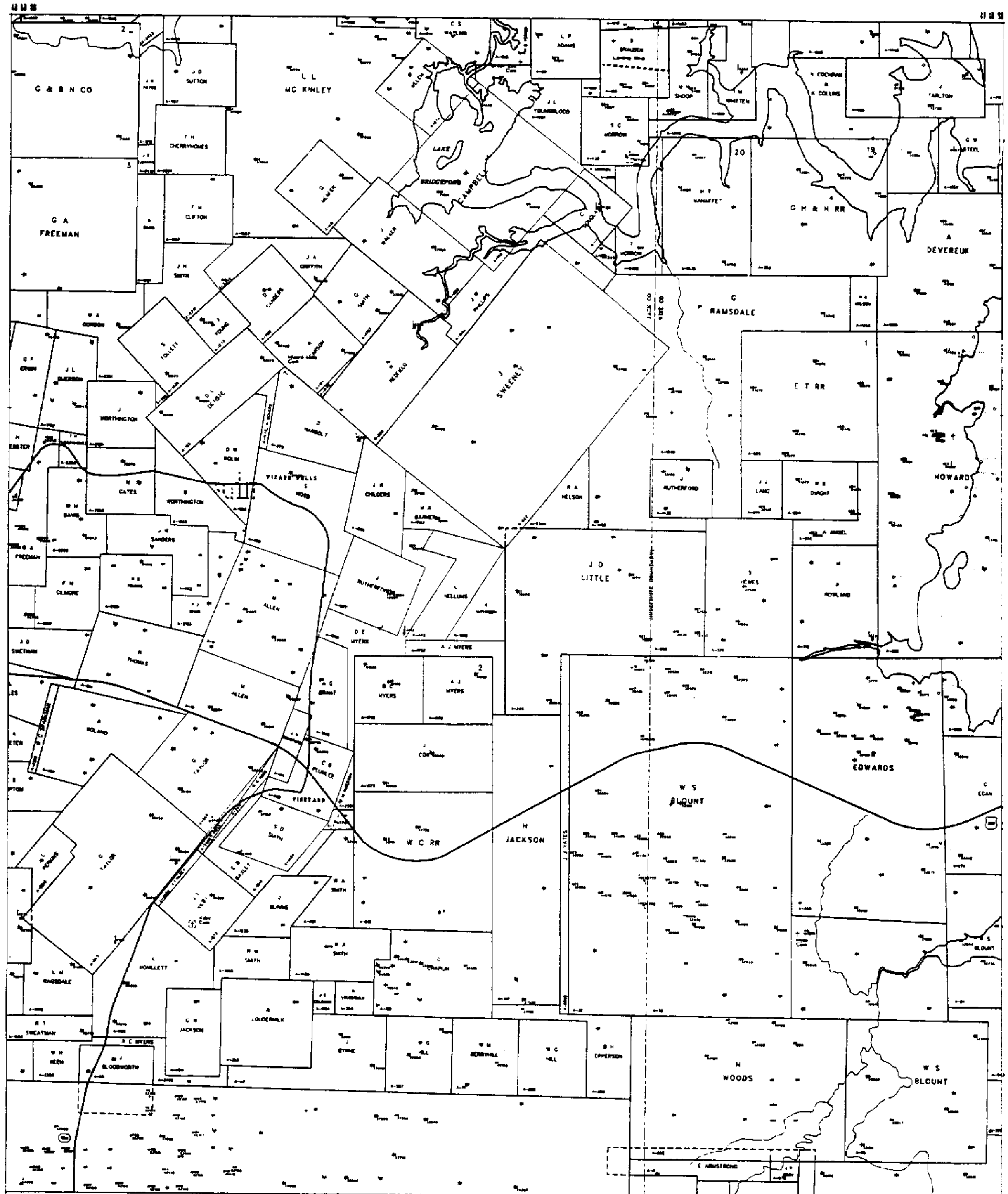
JACKSBORO NE
7.5 MINUTE QUADRANGLE
3398114



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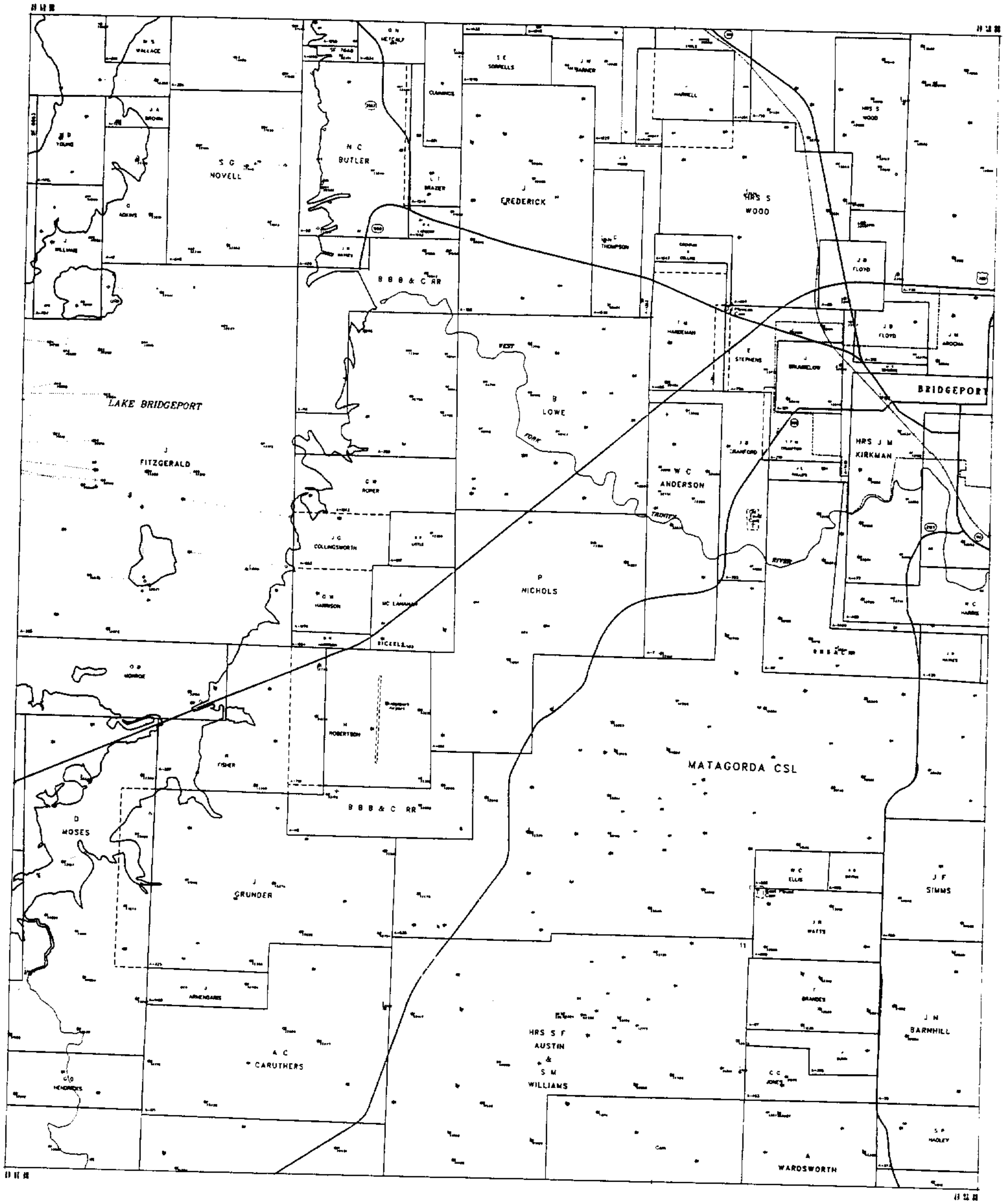
WIZARD WELLS
~~JACKSBORO NE~~
7.5 MINUTE QUADRANGLE
3397223

N

40



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1 1/2 0 1 MILE

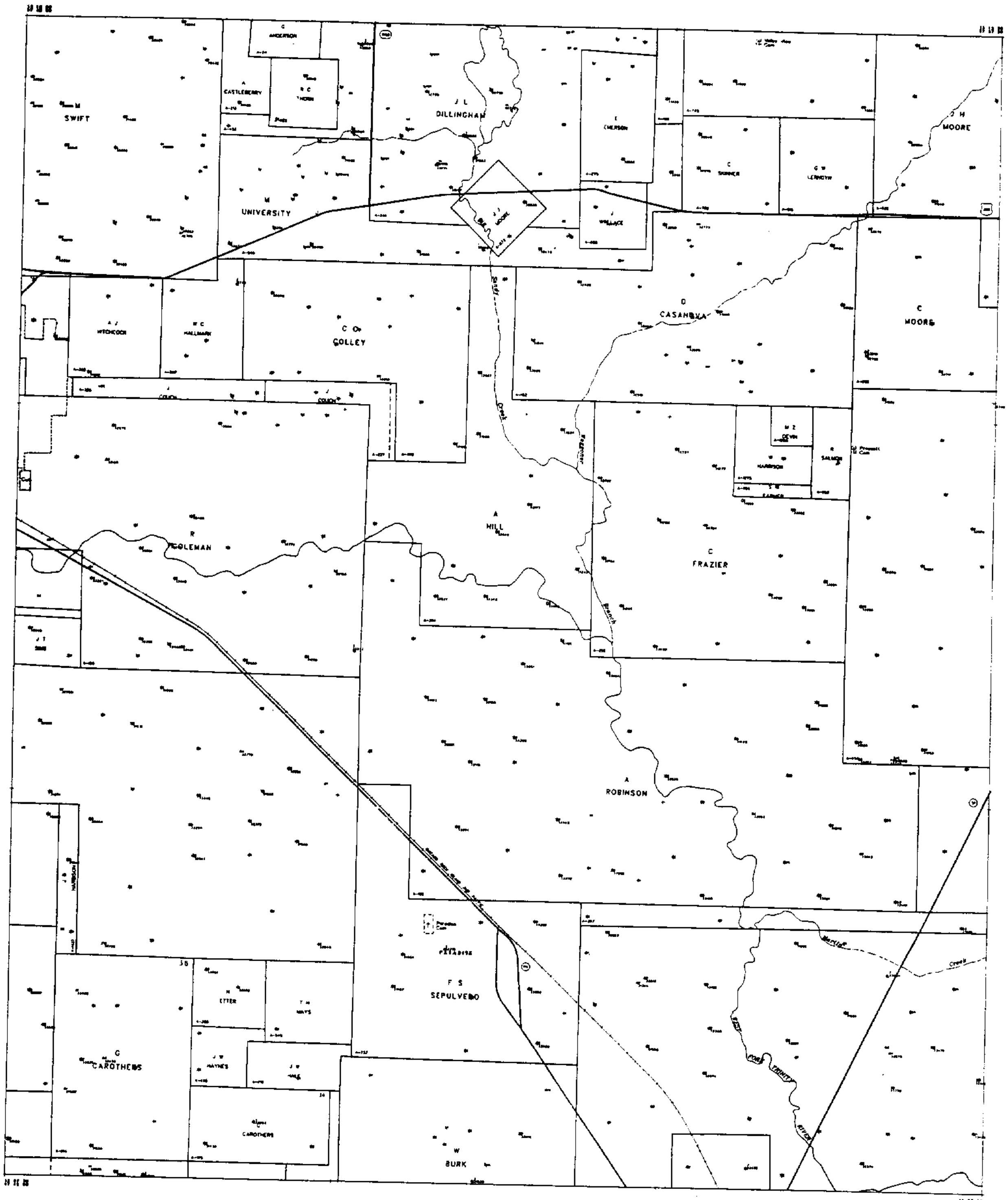
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

BRIDGEPORT WEST

7.5 MINUTE QUADRANGLE

3397224

N



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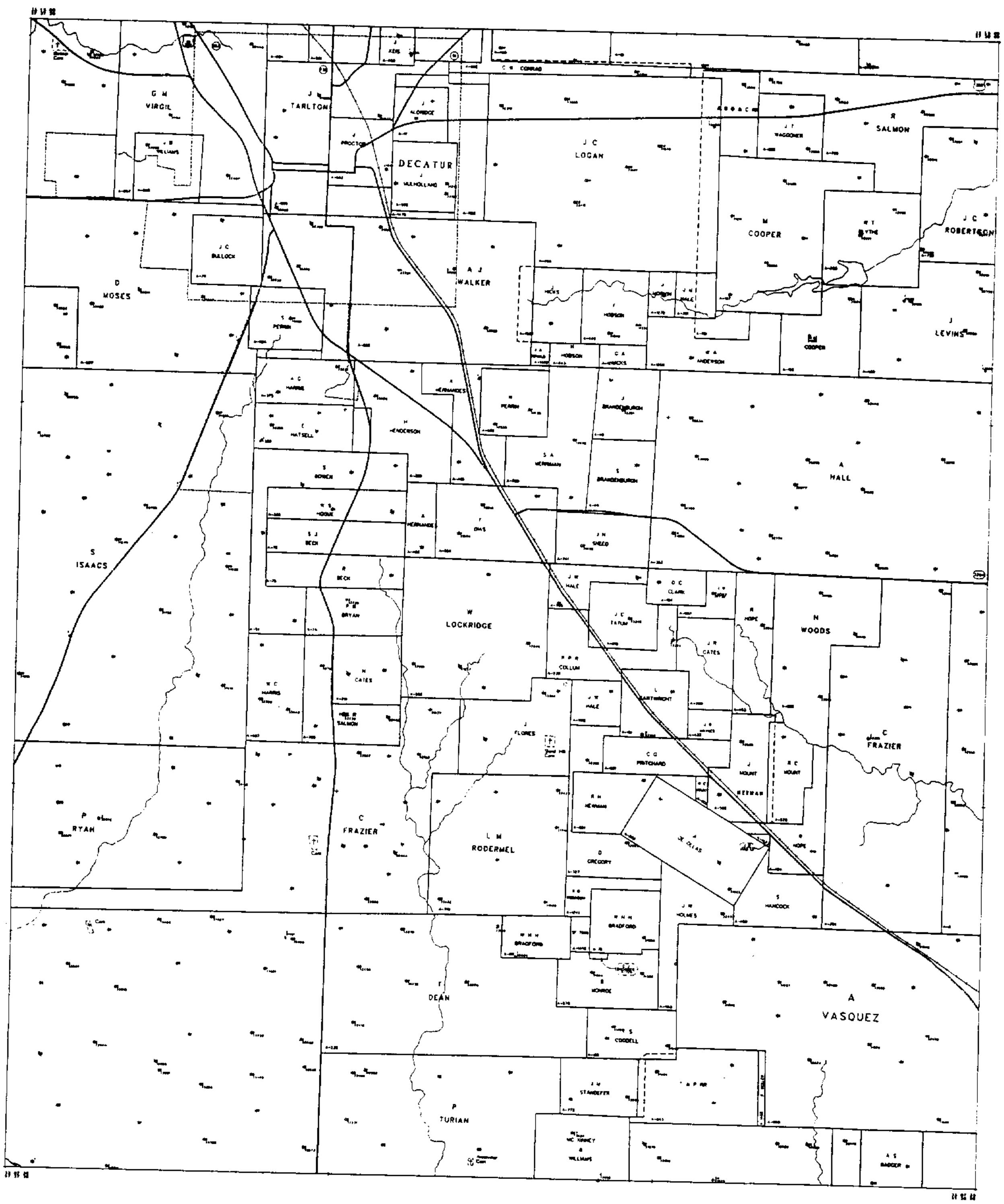
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

BRIDGEPORT EAST

7.5 MINUTE QUADRANGLE

3397213

N



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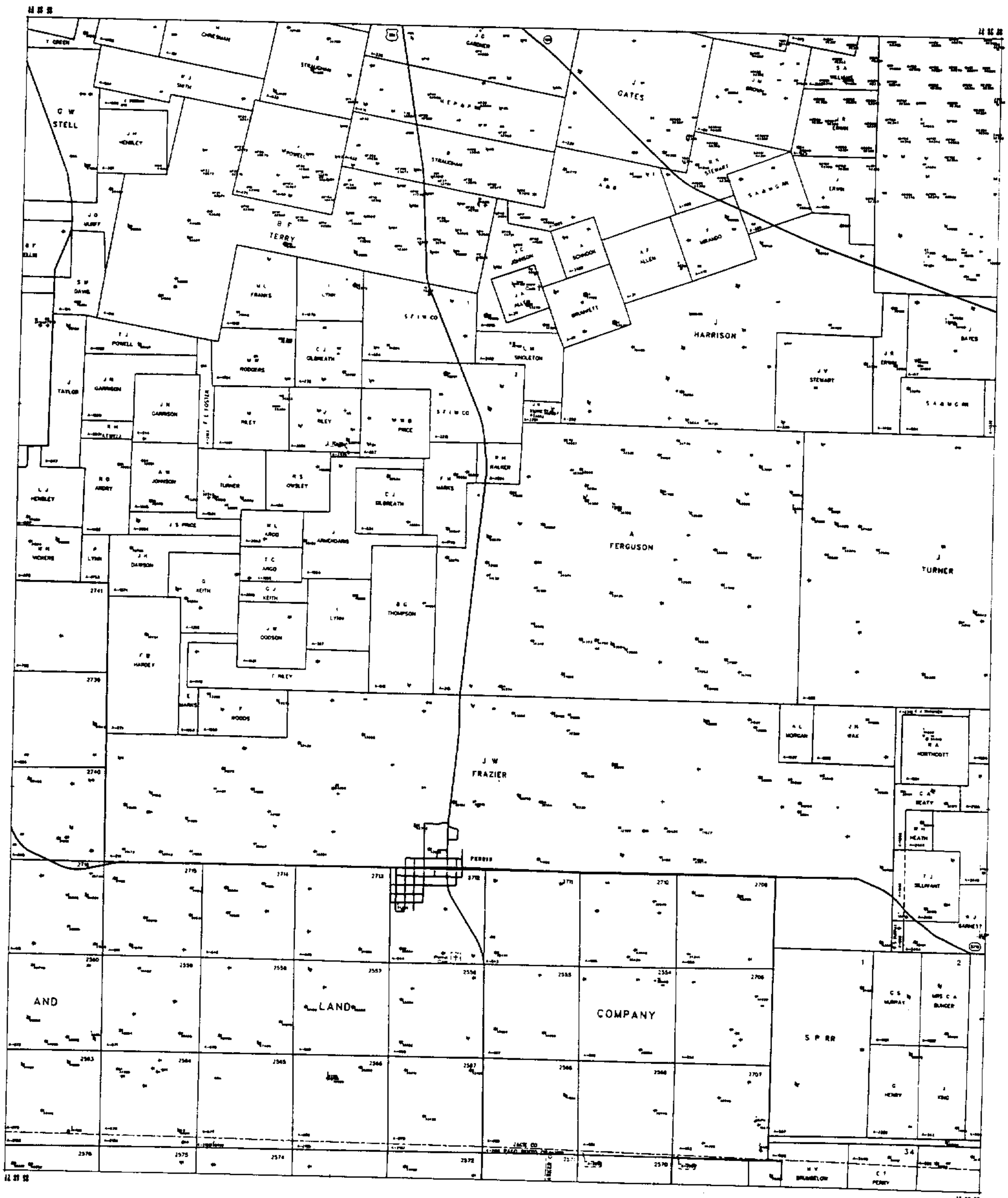
1 1/2 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

DECATUR
7.5 MINUTE QUADRANGLE
3397214

N

43



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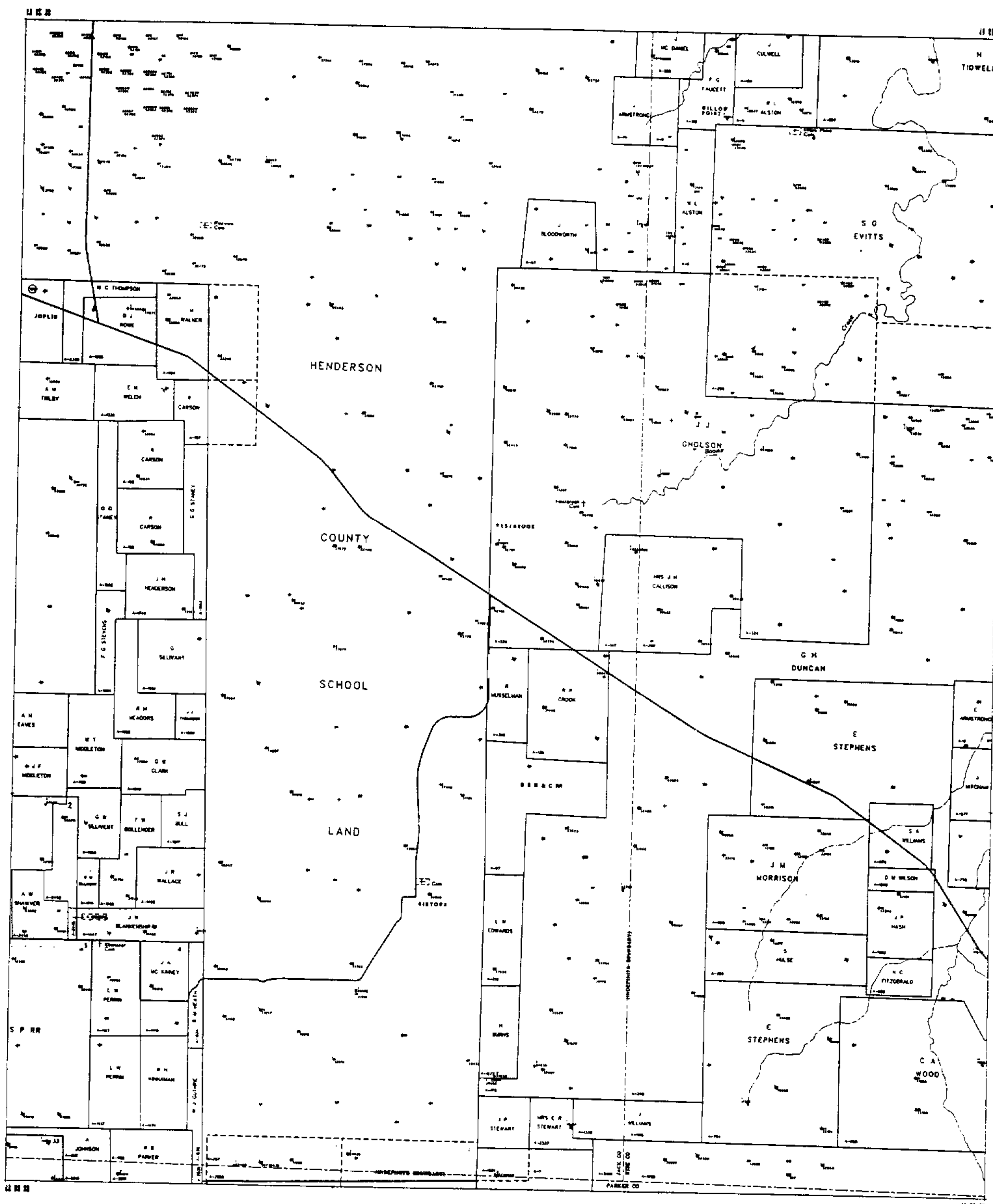
PERRIN
7.5 MINUTE QUADRANGLE
3398111

N

50



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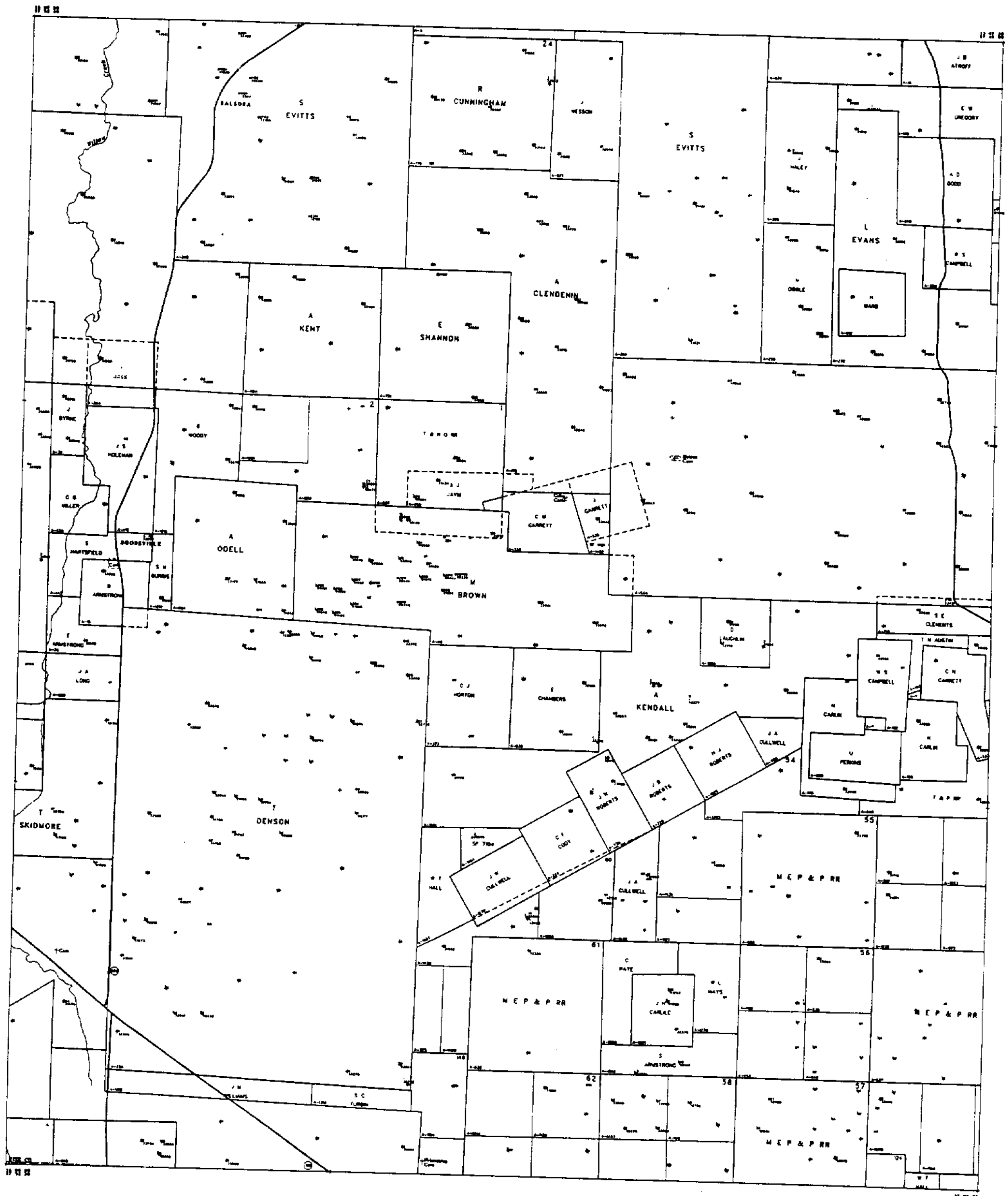
GIBTOWN
7.5 MINUTE QUADRANGLE
3397222

N



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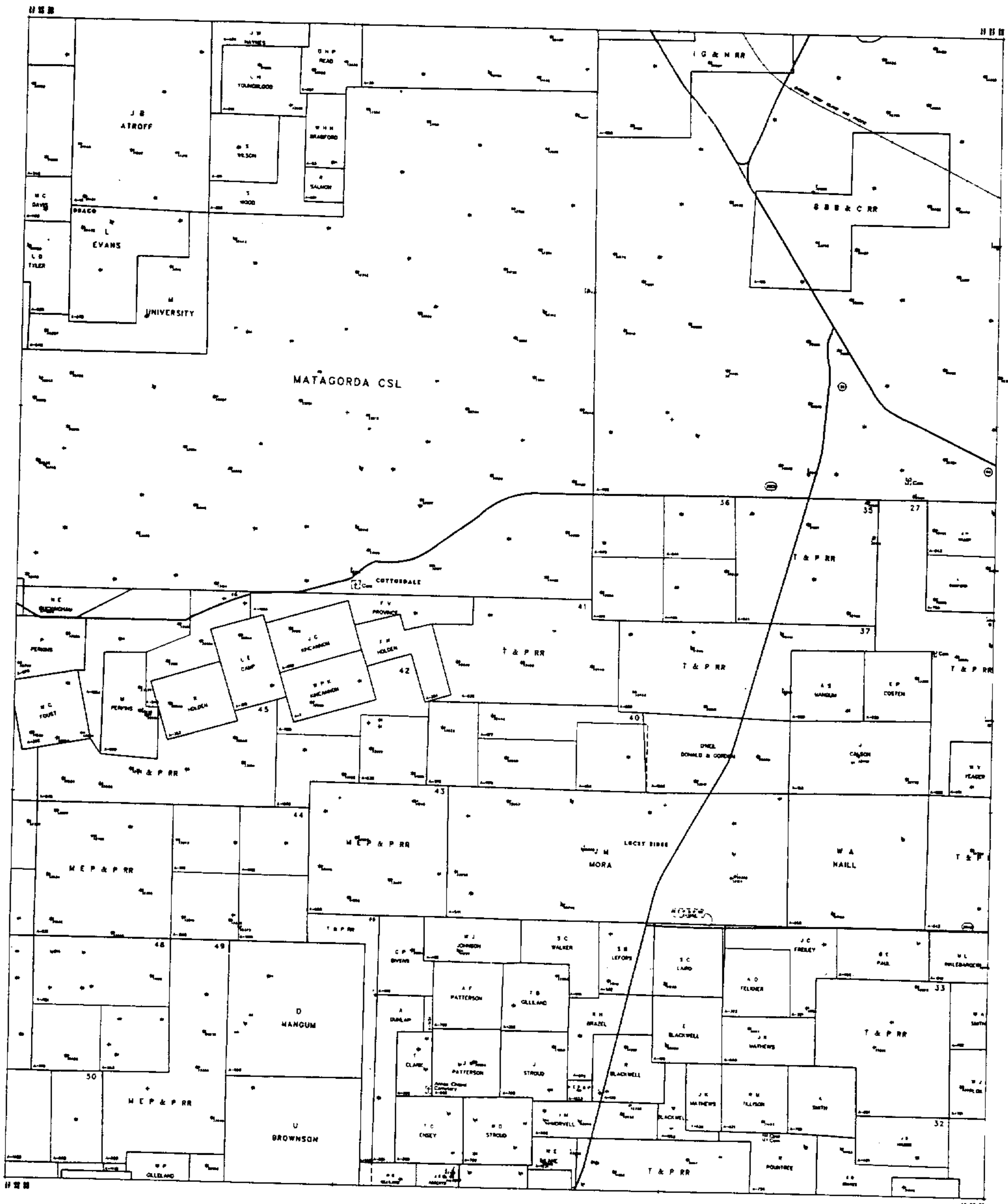
BOONSVILLE
7.5 MINUTE QUADRANGLE
3397221



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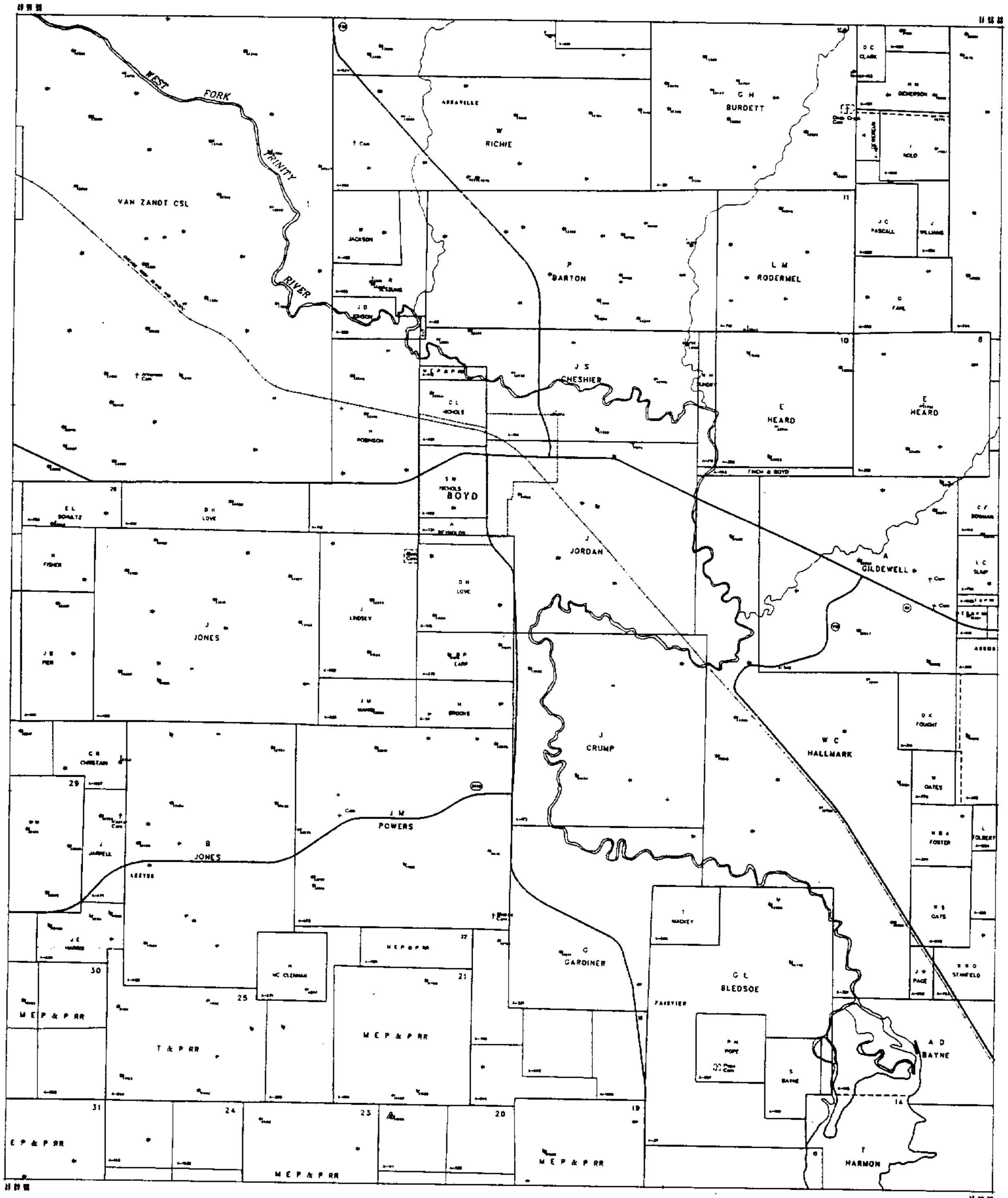
1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

COTTONDALE
7.5 MINUTE QUADRANGLE
3397212

N



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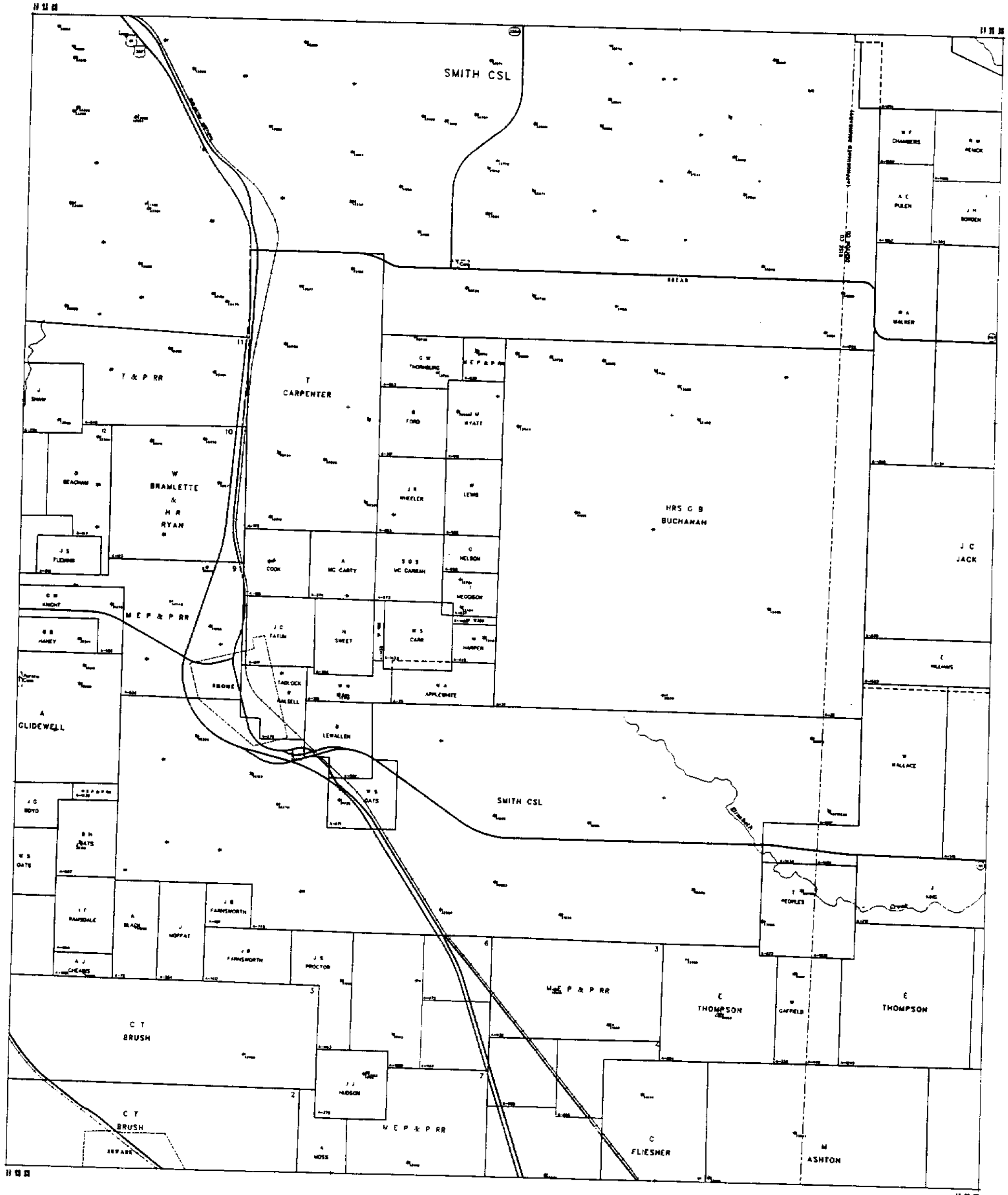
BOYD
7.5 MINUTE QUADRANGLE
3397211

-N-

54



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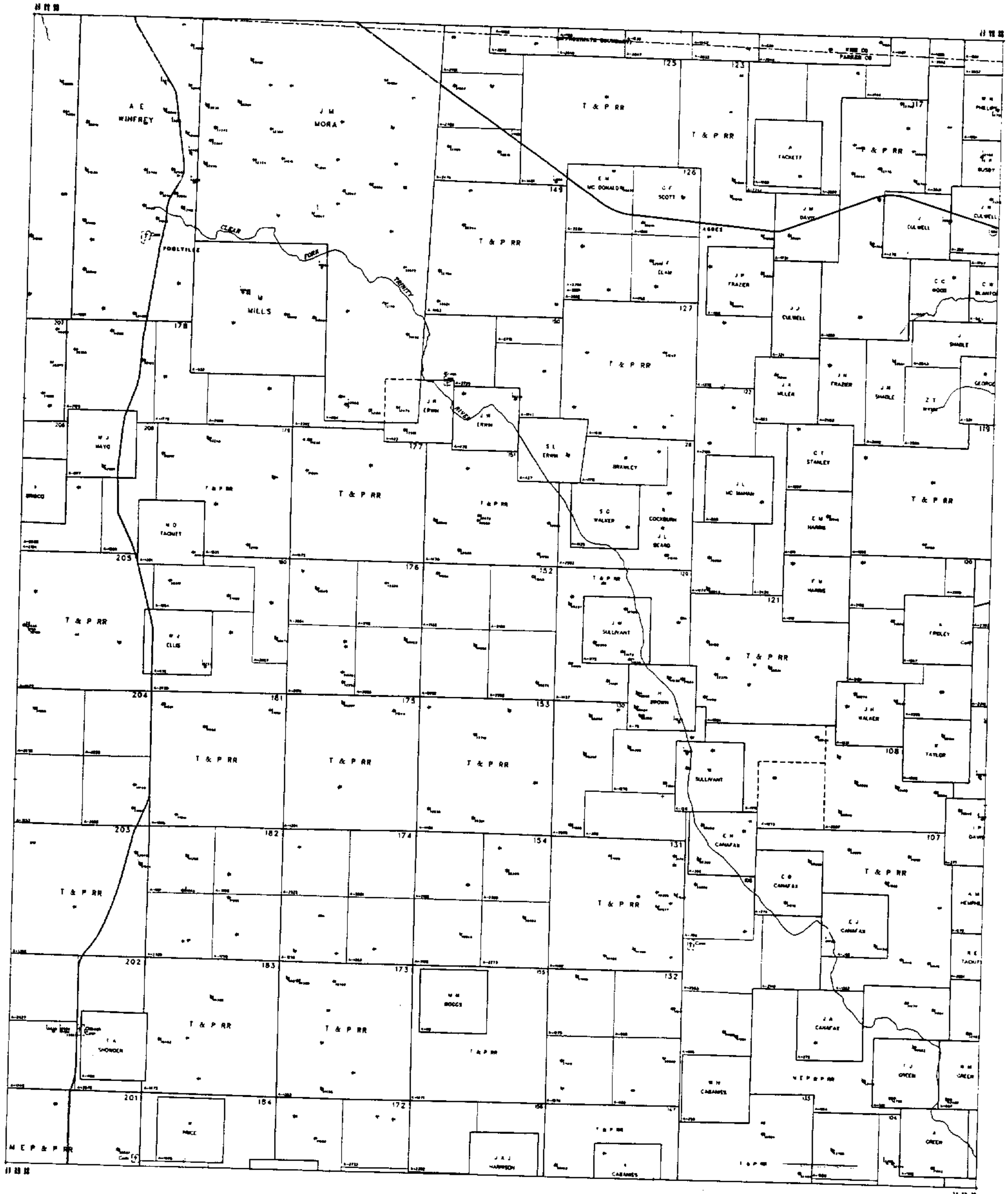
1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

N

RHOME
7.5 MINUTE QUADRANGLE
3397122

55



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1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

POOLVILLE
7.5 MINUTE QUADRANGLE
3297334

N

63

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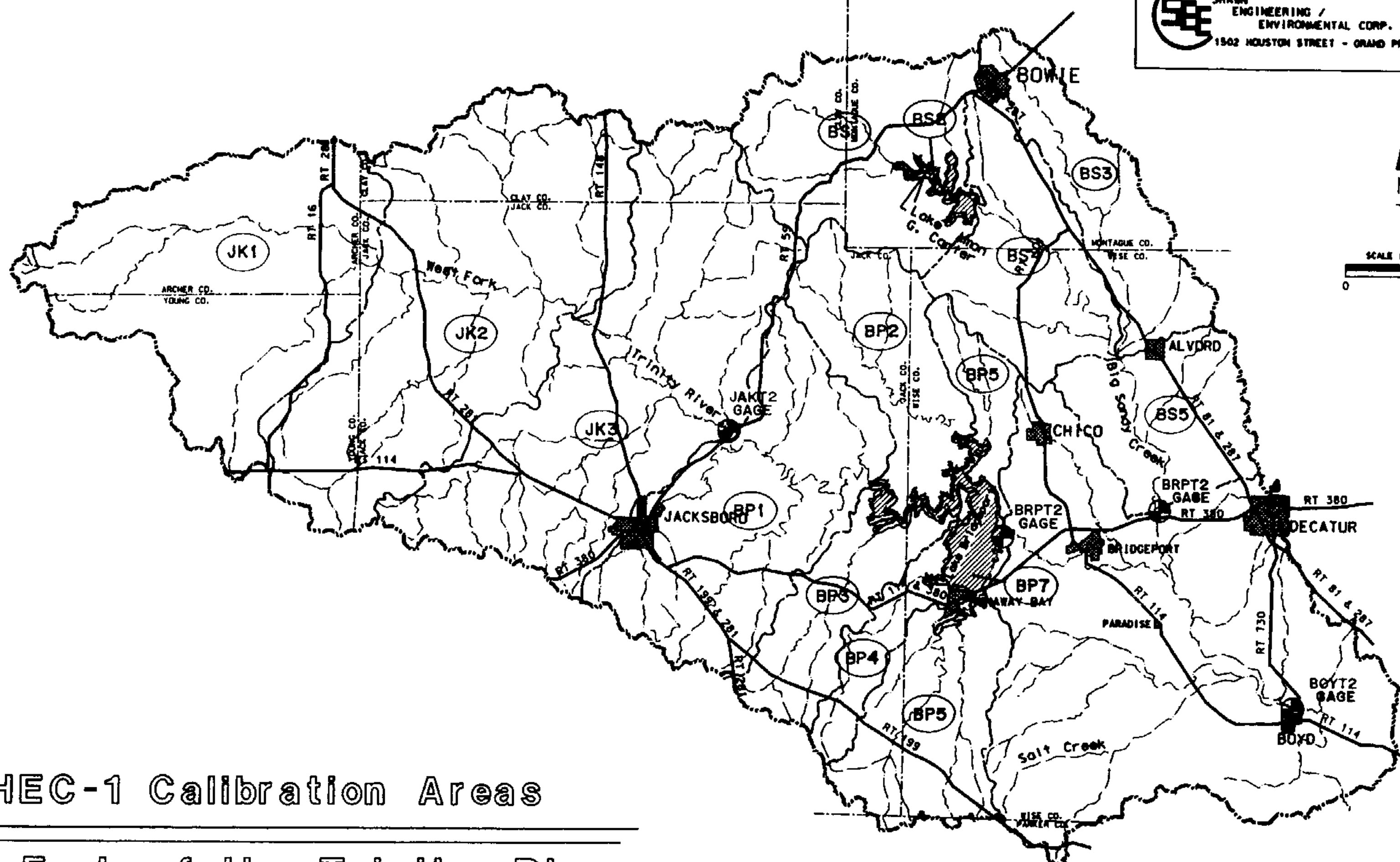
1502 HOUSTON STREET - GRAND PRAIRIE - TEXAS - 75050
METRO (214) 263-7270



HEC-1 Calibration Areas

West Fork of the Trinity River Above Eagle Mountain Lake

LEGEND

JK1 - SUBAREA NO.

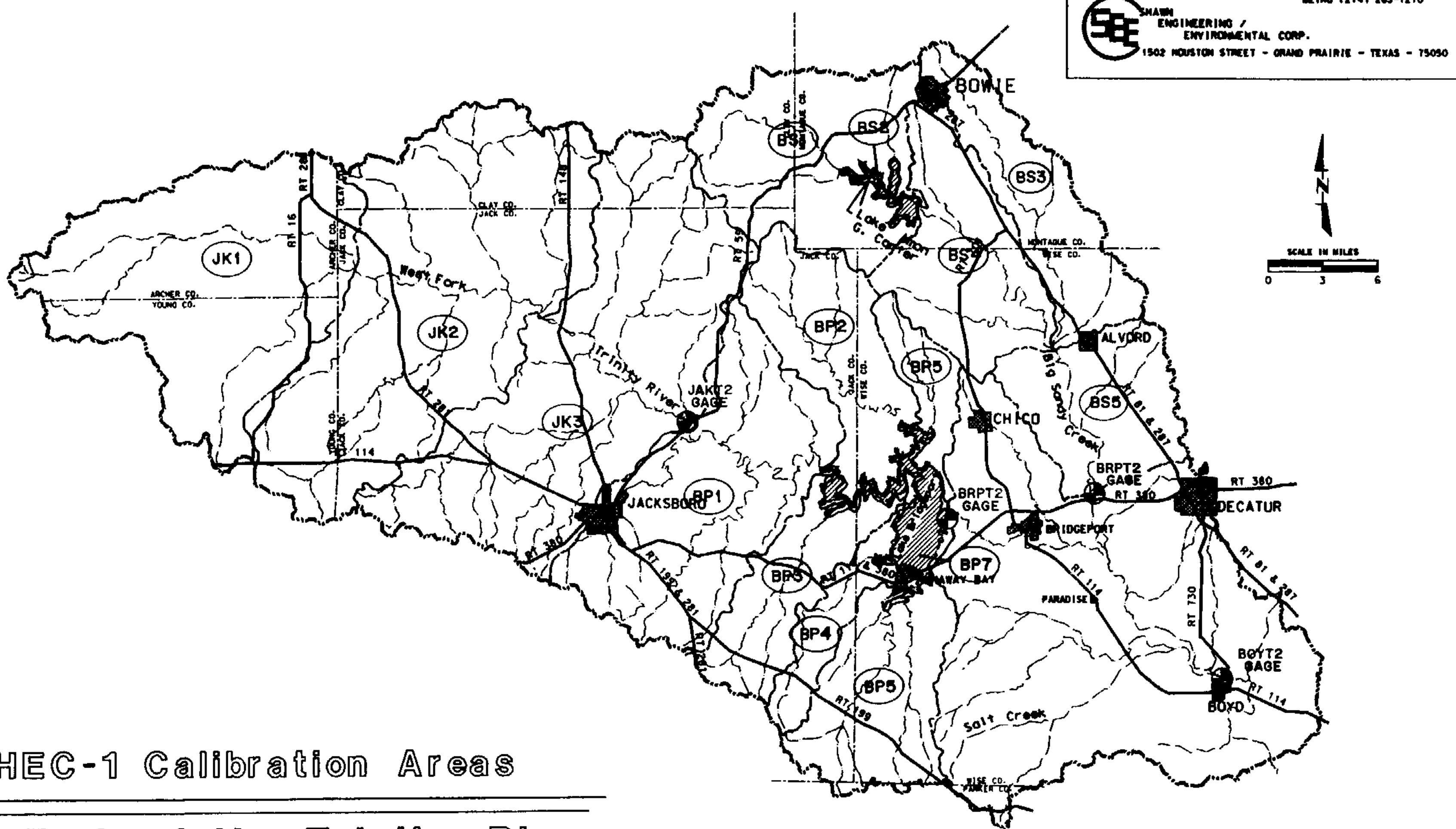
- SUBAREA DRAINAGE DIVIDE

- GAGE LOCATION

PLATE 5.1

APPENDIX 5

HEC-1 CALIBRATION DATA



HEC-1 Calibration Areas

West Fork of the Trinity River Above Eagle Mountain Lake

LEGEND

JK1 - SUBAREA NO.

- SUBAREA DRAINAGE DIVIDE

- GAGE LOCATION

PLATE 5.1

TABLE 5-1

HEC-1 MODEL PARAMETERS -- DRAINAGE AREA

Area No.	Drainage Area	
JK1	191.2	square miles
JK2	249.0	
JK3	231.1	
BP1	150.7	
BP2	73.6	
BP3	54.0	
BP4	28.7	
BP5	76.4	
BP6	24.4	
BP7	13.0	
BS1	105.9	
BS2	4.0	
BS3	70.6	
BS4	82.9	
BS5	71.0	

TABLE 5-2

HEC-1 CALIBRATED PARAMETERS
STORM BEGINNING 25 APR 90

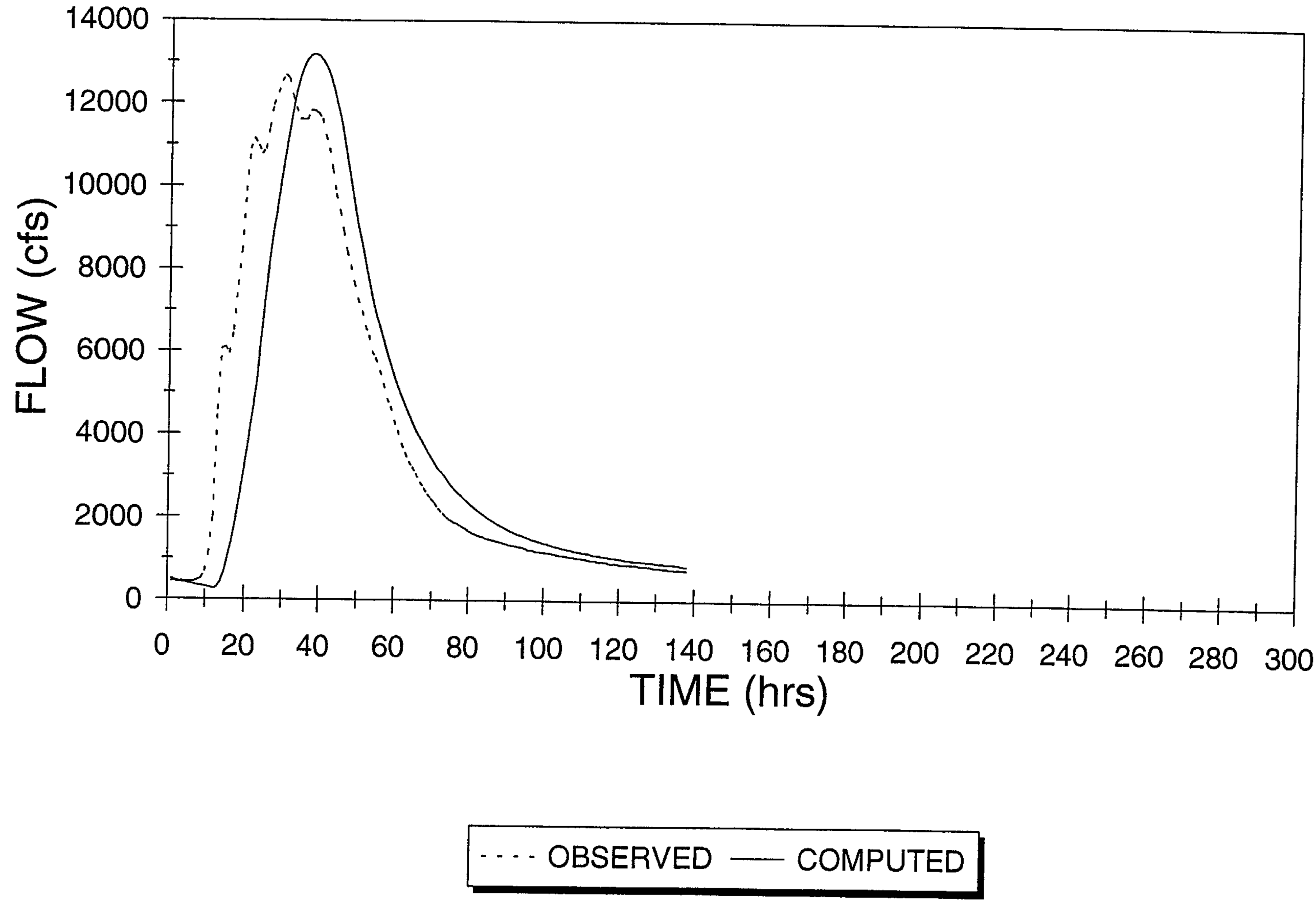
Area No.	STRTL	CNSTL	TP	CP	K	X
JK1	2.2	0.07	7.9	0.35	16	0.2
JK2	2.2	0.07	7.9	0.35	16	0.2
JK3	2.2	0.07	12.9	0.35	18	0.2
BP1	0.5	0.09	11.0	0.35	--	--
BP2	0.5	0.09	8.0	0.35	--	--
BP3	0.5	0.09	5.9	0.35	--	--
BP4	0.5	0.09	5.4	0.35	--	--
BP5	0.5	0.09	5.8	0.35	--	--
BP6	0.5	0.09	3.1	0.35	--	--
BP7	--	--	--	--	--	--
BS1	0.6	0.06	5.4	0.5	--	--
BS2	--	--	--	--	8	0.4
BS3	0.6	0.06	8.7	0.4	--	--
BS4	0.6	0.06	8.2	0.4	5	0.4
BS5	0.6	0.07	6.6	0.4	--	--

TABLE 5-3

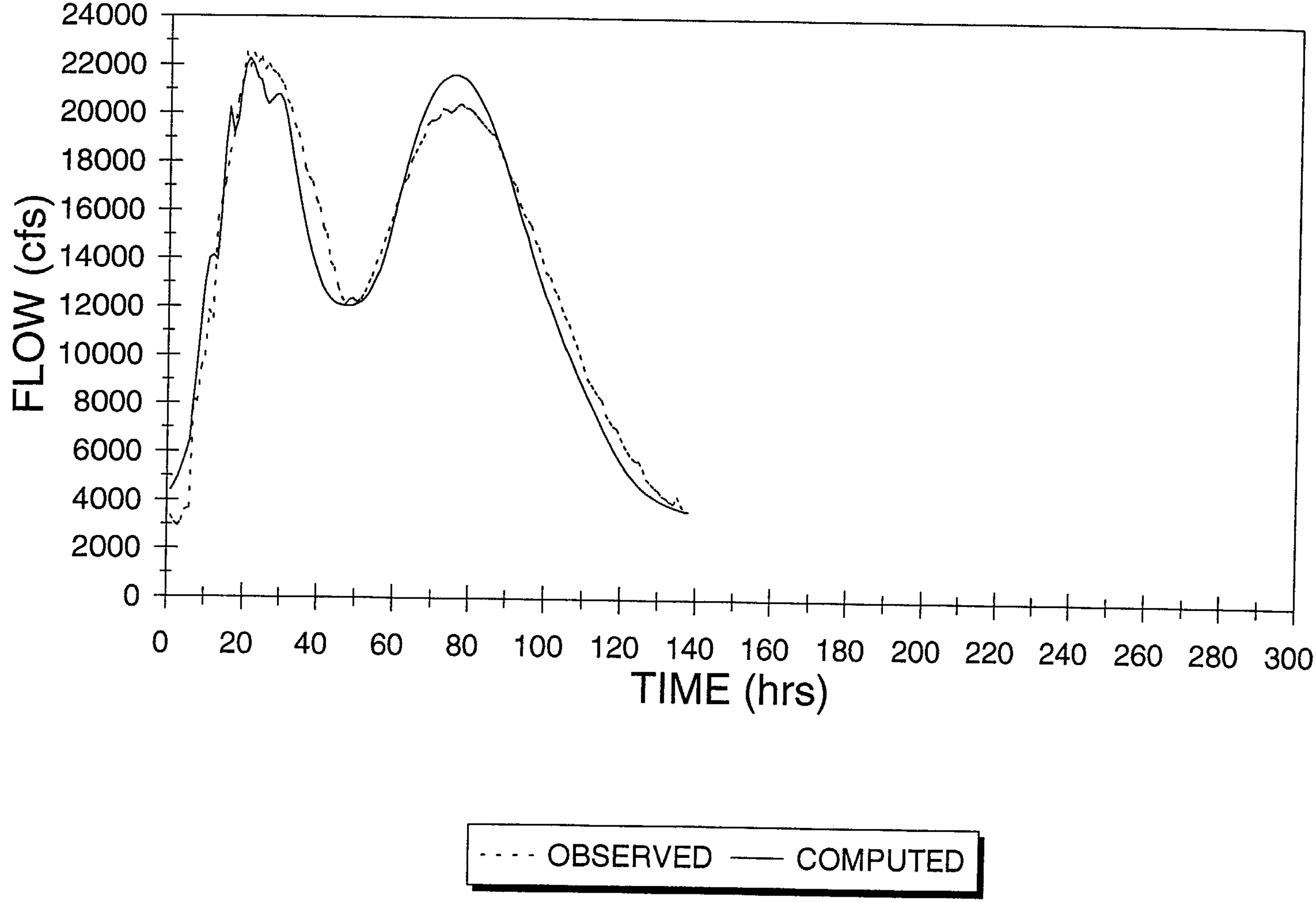
HEC-1 CALIBRATED PARAMETERS
STORM BEGINNING 01 MAY 90

Area No.	STRTL	CNSTL	TP	CP	K	X
JK1	0.5	0.055	7.9	0.2	16	0.2
JK2	0.5	0.055	7.9	0.2	16	0.2
JK3	0.5	0.055	12.9	0.2	22	0.2
BP1	0.2	0.04	12.0	0.35	--	--
BP2	0.2	0.04	8.9	0.35	--	--
BP3	0.2	0.04	6.6	0.35	--	--
BP4	0.2	0.04	6.0	0.35	--	--
BP5	0.2	0.04	7.6	0.35	--	--
BP6	0.2	0.04	4.6	0.35	--	--
BP7	--	--	--	--	--	--
BS1	0.4	0.05	5.4	0.5	--	--
BS2	--	--	--	--	8	0.4
BS3	0.4	0.05	8.7	0.4	--	--
BS4	0.4	0.05	8.2	0.4	5	0.4
BS5	0.4	0.05	6.6	0.7	--	--

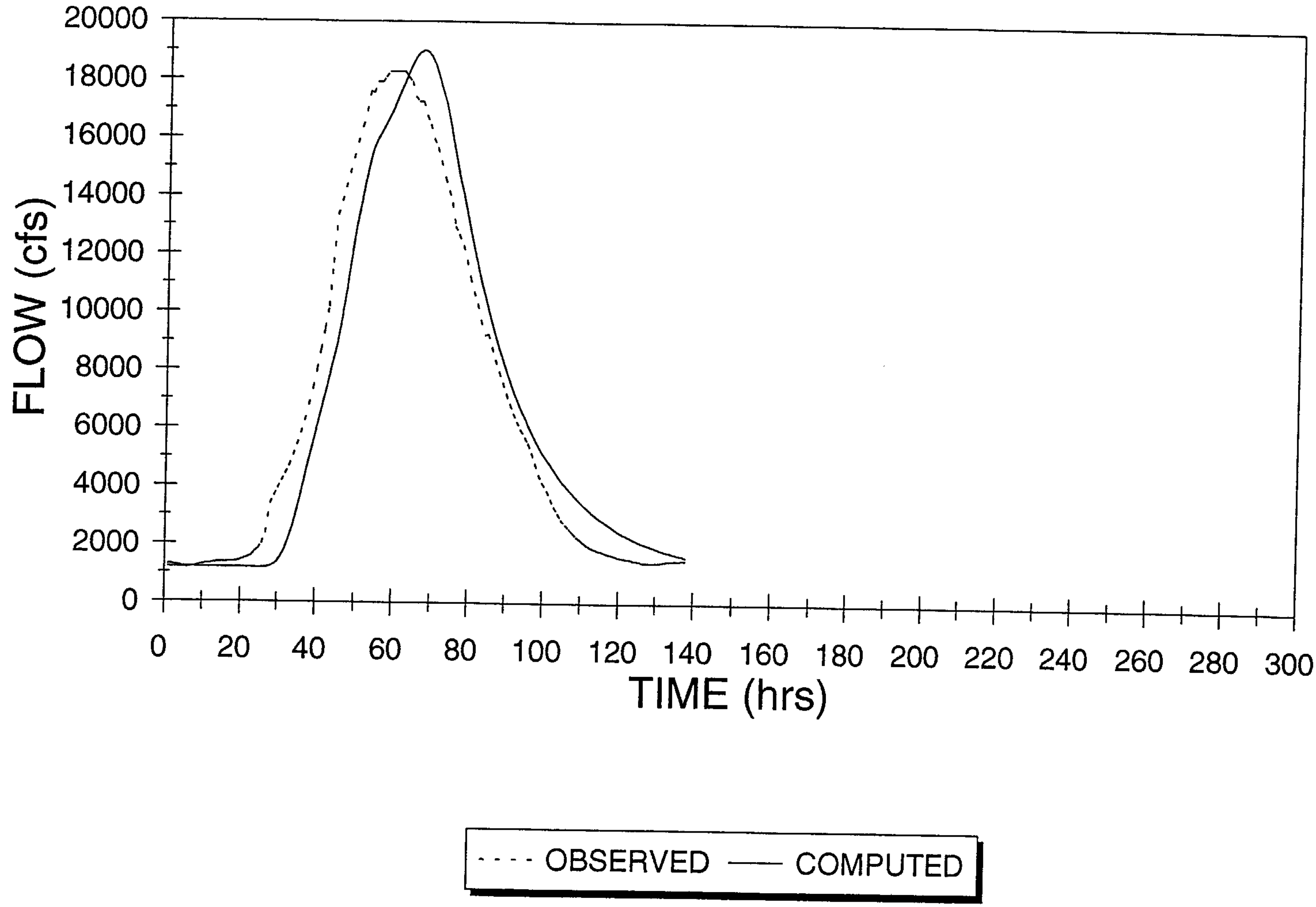
CALIBRATION - BIG SANDY GAGE
APRIL 1990 FLOOD

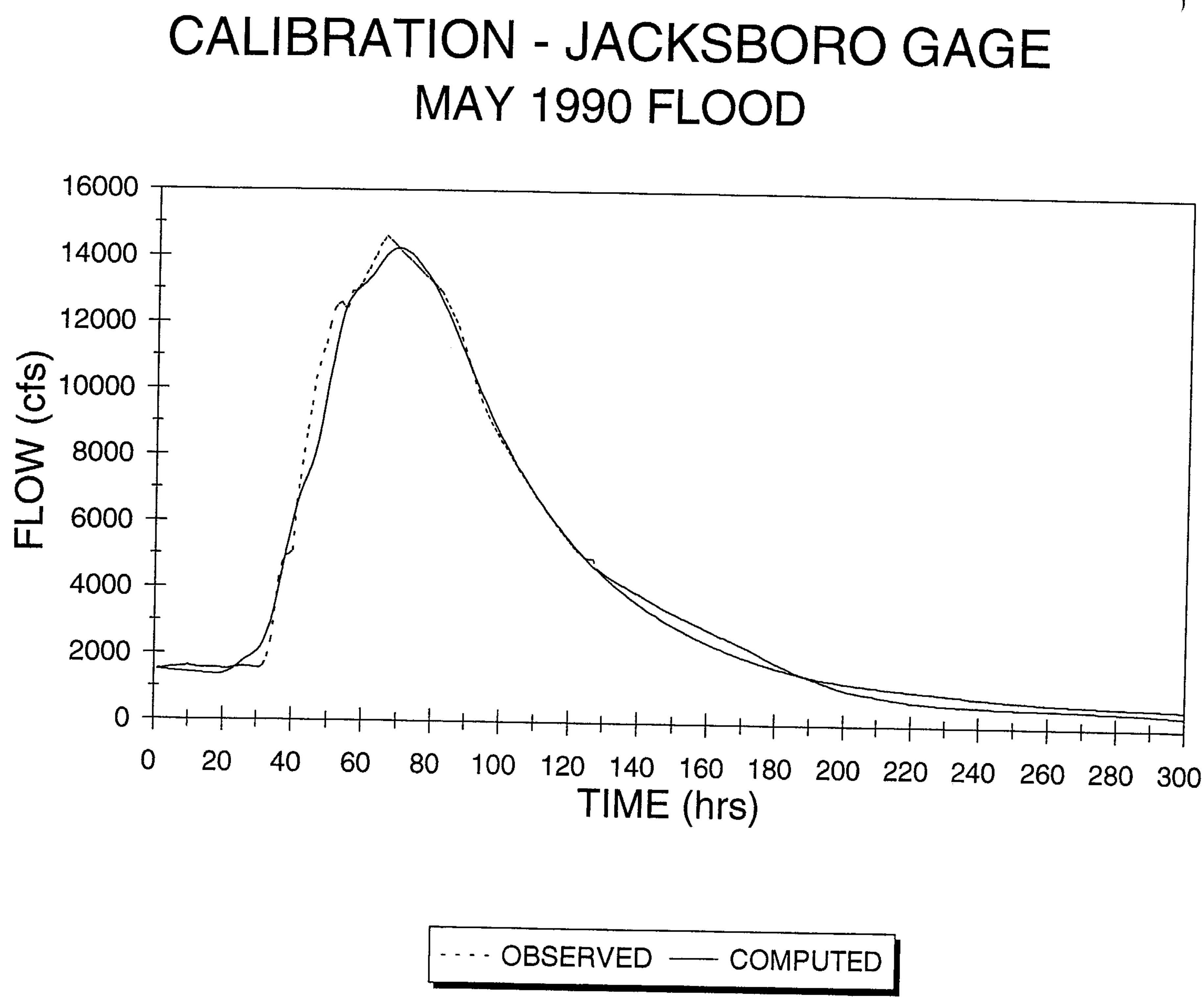


CALIBRATION - LAKE BRIDGEPORT INFLOW
APRIL 1990 FLOOD

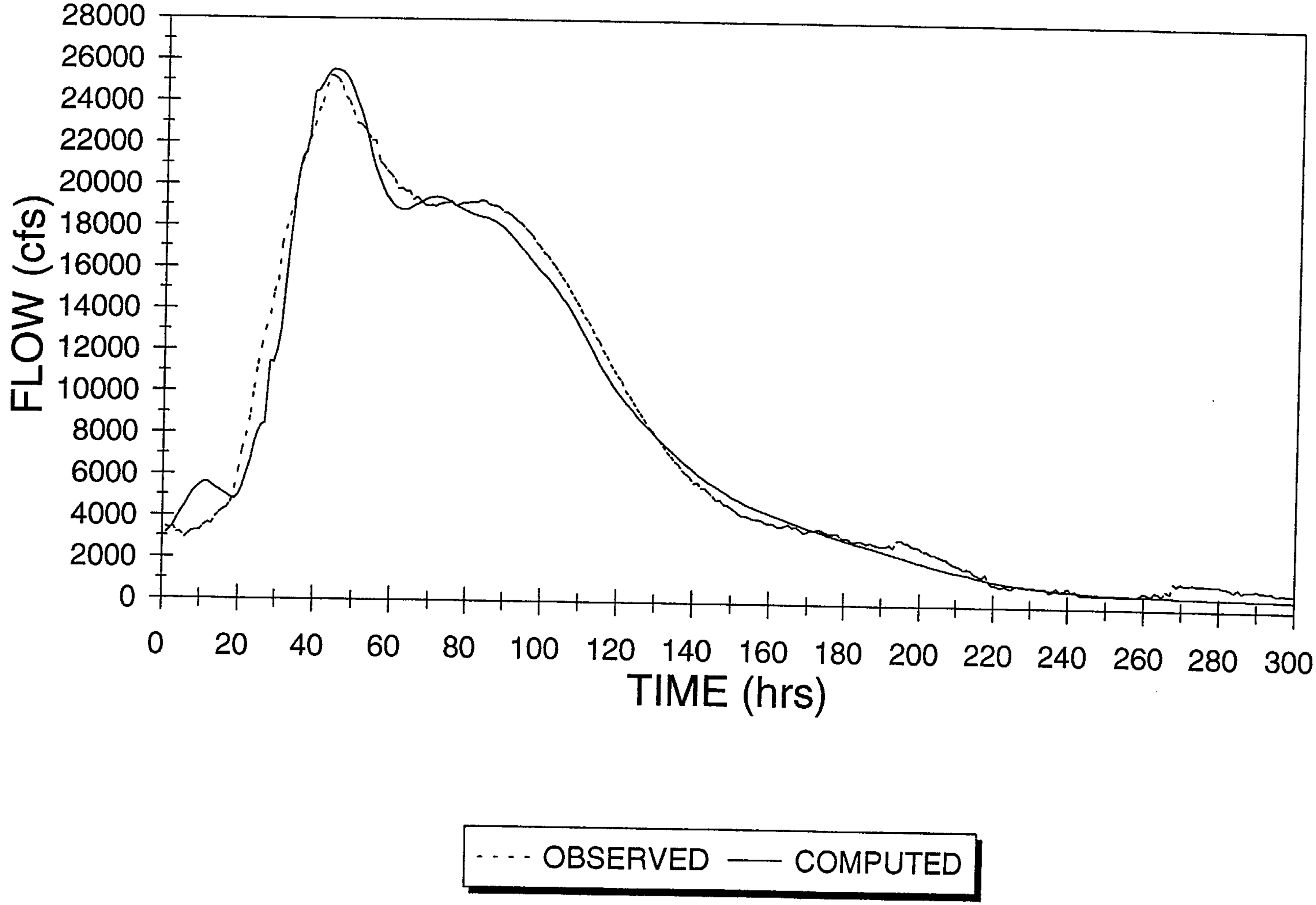


CALIBRATION - JACKSBORO GAGE
APRIL 1990 FLOOD

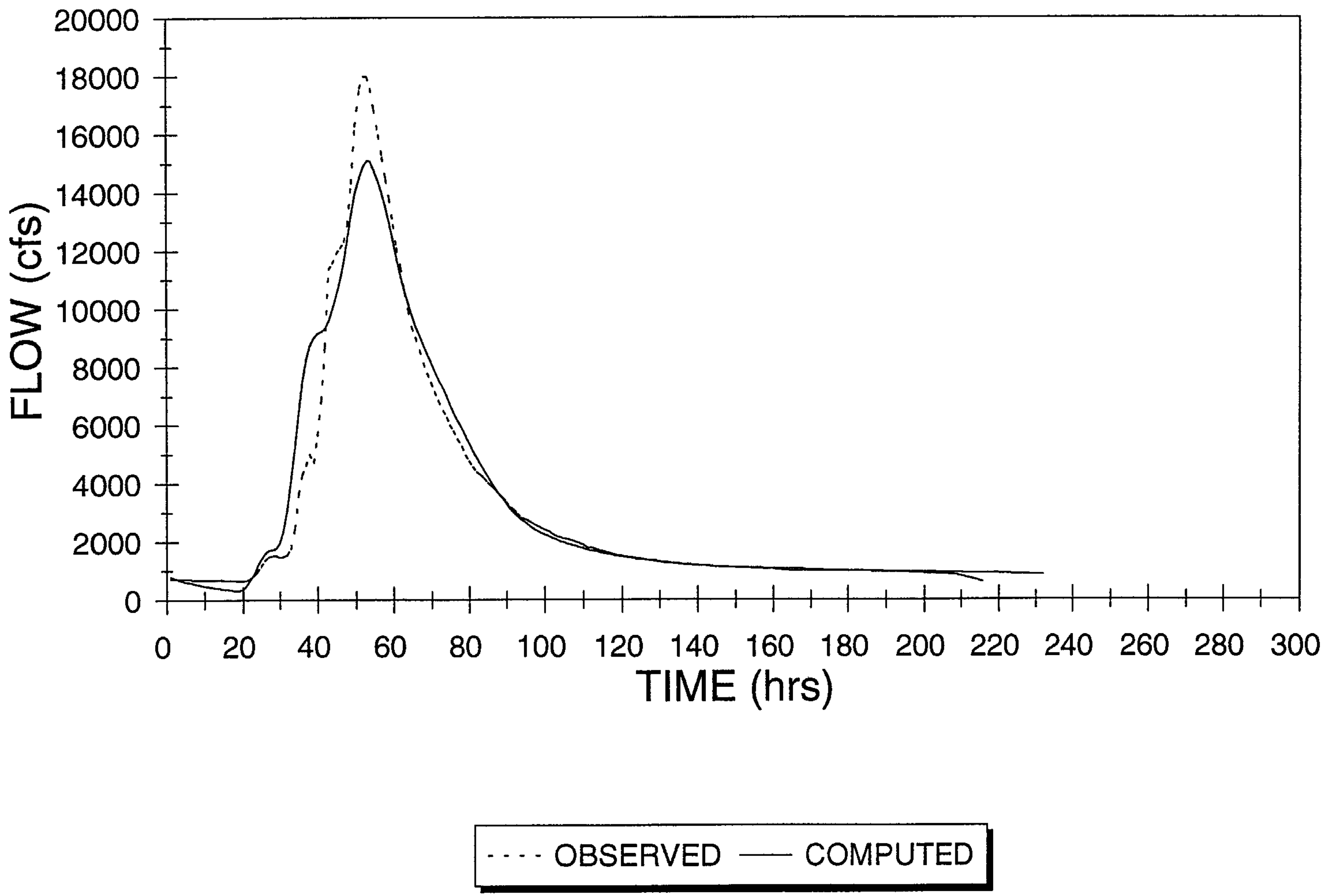



CALIBRATION - JACKSBORO GAGE
MAY 1990 FLOOD
FLOW (cfs)
16000
14000
12000
10000
8000
6000
4000
2000
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
TIME (hrs)
OBSERVED
COMPUTED

CALIBRATION - LAKE BRIDGEPORT INFLOW
MAY 1990 FLOOD



CALIBRATION - BIG SANDY GAGE
MAY 1990 FLOOD



Note: Due to discrepancies of Lake Bridgeport releases as compared with the measured flow at the Boyd Gage (BOYT2), SEE Corp. did not feel that adequate calibration was feasible. When Big Sandy flows were dominate around the peak flows, SEE Corp. was able to approximately match both peak flows and timing of the peak flows. Where Lake Bridgeport release were dominate, proper calibration was not achieved. SEE Corp. therefore felt that any parameters would be biased and would not be suitable for publication.