

**CHANNEL-BED DEGRADATION IN MAJOR OKLAHOMA  
STREAMS**

**VOLUME III of V: NORTH CANADIAN RIVER**

**Final Report  
ODOT Item Number 2191**

**by**

**A. K. Tyagi, Ph.D., P.E.  
Director**

**and**

**Pratima Poudyal  
Research Associate**

**Oklahoma Infrastructure Consortium  
School of Civil and Environmental Engineering  
Oklahoma State University  
Stillwater, OK 74078**

**December 2007**

The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the views of the Oklahoma Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification or regulation. While trade names may be used in this report, it is not intended as an endorsement of any machine, contractor, process or product.



## TECHNICAL REPORT DOCUMENTATION PAGE

- |  |                                |   |
|--|--------------------------------|---|
| 1. Report No.<br>FHWA/07(06), vol. III of V  | 2. Government<br>Accession No. | 3. Recipient's Catalog No.                            |
| 4. Title and Subtitle<br>Channel-Bed Degradation in Major Oklahoma Streams<br>North Canadian River   |                                | 5. Report Date<br>December 2007                       |
|  |                                | 6. Performing Organization Code                       |
| 7. Authors<br>Avdhesh K. Tyagi and Pratima Poudyal   |                                | 8. Performing Organization Report No.                 |
| 9. Performing Organization Name and Address<br>Avdhesh K. Tyagi<br>School of Civil and Environmental Engineering<br>Oklahoma State University<br>Stillwater, OK 74078                    |                                | 10. Work Unit No.                                     |
|  |                                | 11. Contract or Grant No.<br>Item 2191                |
| 12. Sponsoring Agency Name and Address<br>Oklahoma Department of Transportation<br>Planning & Research Division<br>200 N.E. 21 <sup>st</sup> Street, Room 3A7<br>Oklahoma City, OK 73105 |                                | 13. Type of Report and Period Covered<br>Final Report |
|  |                                | 14. Sponsoring Agency Code<br>HTFS-16                 |

### Supplementary Notes

#### 15. Abstract

The purpose of this research is to analyze the flowline data and relate it to the degradation of the river bed at bridge locations in the river. This information may then be used to replace or rehabilitate those bridges that experienced severe degradation.

This report evaluates channel degradation in 463.85-mile reach of North Canadian River in Oklahoma. In this study, the 463.85 mile river length is divided into three Reaches: Reach 1- river station (RS) 1 (Bridge Key 16523) to Canton Dam, Reach 2- Canton Dam to Overholser Dam, and Reach 3- Overholser Dam to river station (RS) 40 (Bridge Key b15585). The flowlines of North Canadian River in Oklahoma were observed over a long period. RS 2 in reach 1 shows the maximum degradation of 4.63 feet from 1965 to 2000. In reach 2, RS 9 shows the maximum degradation of 5.83 feet in 58 years. Similarly, in reach 3, RS 33 shows the maximum degradation of 17.67 feet in 38 years. The maximum aggradation of 9.75 in 20 years is observed at RS 21.

The North Canadian River in Oklahoma has experienced degradation over 10 feet at three river stations which have been serving more than 10 years. River station (RS 23) at S.H. 270, RS 33 at I-40, and RS 39 at S.H. 84 have experienced degradation of 15.6 feet in 11 years, 17.67 feet in 38 years, and 15.0 feet in 47 years, respectively. These bridges are defined as critical and recommended for rehabilitation or replacement in the replacement cycle. A detailed hydraulic and geotechnical analysis should be performed before reconstruction.

It is recommended that degradation of tributaries is evaluated to determine the structures where flowline is severely degrading in North Canadian River basin.

#### 17. Key Words

Degradation, North Canadian River, Dam, and flowlines

#### 18. Distribution Statement

No restriction. This publication is available from the office of Planning & Research Division, Oklahoma DOT.

#### 19. Security

Classification. (of this report)  
Unclassified

#### 20. Security Classification. (of this

page)  
Unclassified

#### 21. No. of

Pages  
142

#### 22. Price



## CONTENTS

|  | Page |
|--|------|
| I. Introduction .....  | 1    |
| II. Study area .....   | 3    |
| III. Hydrology .....   | 6    |
| IV. Analysis of cross-sectional geometry .....                   | 28   |
| V. Analysis of flowline profile .....                            | 55   |
| VI. Discussion of results .....                                  | 85   |
| VII. Conclusions and recommendation .....                        | 88   |
| VIII. References .....   | 90   |
| APPENDIX A – Tables of cross-sectional geometries .....          | 92   |
| APPENDEX B – Flow path of North Canadian River in Oklahoma ..... | 141  |

## FIGURES

|   | Page |
|---|------|
| 1. Location of Study points in North Canadian River, and USGS gage stations                     | 5    |
| 2. Annual peak streamflow in North Canadian River at Woodward (USGS 07237500), OK .....         | 11   |
| 3. Annual peak streamflow in North Canadian River at Seiling (USGS 07238000), OK .....          | 12   |
| 4. Annual peak streamflow in North Canadian River at Canton (USGS 07239000), OK .....           | 13   |
| 5. Annual peak streamflow in North Canadian River at Watonga (USGS 07239300), OK .....          | 14   |
| 6. Annual peak streamflow in North Canadian River at Calumet (USGS 07239450), OK .....          | 15   |
| 7. Annual peak streamflow in North Canadian River at El Reno (USGS 07239500), OK .....          | 16   |
| 8. Annual peak streamflow in North Canadian River at Yukon (USGS 07239700), OK .....            | 17   |
| 9. Annual peak streamflow in North Canadian River at River near OKC (USGS 07241000), OK .....   | 18   |
| 10. Annual peak streamflow in North Canadian River at OKC (USGS 07241520), OK .....             | 19   |
| 11. Annual peak streamflow in North Canadian River at Harrah (USGS 07241550), OK .....          | 20   |
| 12. Annual peak streamflow in North Canadian River at Shawnee (USGS 07241800), OK .....         | 21   |
| 13. Annual peak streamflow in North Canadian River at Wetunka (USGS 07242000), OK .....         | 22   |
| 14. Schematic diagram of sinuosity of natural channel.....                                      | 27   |
| 15. Cross-section at bridge (Bridge No.16642 and RS 2) on SH 34, North Canadian River, OK ..... | 31   |

|   |    |
|---|----|
| 16. Cross-section at bridge (Bridge No. 17602 and RS 3) on SH 50,<br>North Canadian River, OK .....   | 32 |
| 17. Cross-section at bridge (Bridge No. 16193 and RS 5) on US 60,<br>North Canadian River, OK .....   | 33 |
| 18. Cross-section at bridge (Bridge No. 13679 and RS 6) on SH 51,<br>North Canadian River, OK .....   | 34 |
| 19. Cross-section at bridge (Bridge No. 20864 and RS 8) on US 270,<br>North Canadian River, OK .....  | 35 |
| 20. Cross-section at bridge (Bridge No. 05523 and RS 9) on US 270,<br>North Canadian River, OK .....  | 36 |
| 21. Cross-section at bridge (Bridge No. 18134 and RS 10) on US 270,<br>North Canadian River, OK ..... | 37 |
| 22. Cross-section at bridge (Bridge No. 18608 and RS 12) on US 81,<br>North Canadian River, OK .....  | 38 |
| 23. Cross-section at bridge (Bridge No. 12832 and RS 13) on SH 4,<br>North Canadian River, OK .....   | 39 |
| 24. Cross-section at bridge (Bridge No. 12820 and RS 14) on SH 4,<br>North Canadian River, OK .....   | 40 |
| 25. Cross-section at bridge (Bridge No. 18352 and RS 15) on SH 4,<br>North Canadian River, OK .....   | 41 |
| 26. Cross-section at bridge (Bridge No. 14208 and RS 16) on US 66,<br>North Canadian River, OK .....  | 42 |
| 27. Cross-section at bridge (Bridge No. 16189 and RS 17) on I-40,<br>North Canadian River, OK .....   | 43 |
| 28. Cross-section at bridge (Bridge No. 16190 and RS 18) on I-40,<br>North Canadian River, OK .....   | 44 |
| 29. Cross-section at bridge (Bridge No. 21357 and RS 20) on US 62,<br>North Canadian River, OK .....  | 45 |
| 30. Cross-section at bridge (Bridge No. 21129 and RS 21) on US 62,<br>North Canadian River, OK .....  | 46 |
| 31. Cross-section at bridge (Bridge No. 05040 and RS 22) on SH 102,<br>North Canadian River, OK ..... | 47 |

|   |       |
|---|-------|
| 32. Cross-section at bridge (Bridge No. 15870 and RS 33) on I-40,<br>North Canadian River, OK .....                         | 48    |
| 33. Cross-section at bridge (Bridge No. 15871 and RS 34) on I-40,<br>North Canadian River, OK .....                         | 49    |
| 34. Cross-section at bridge (Bridge No. 18361 and RS 35) on SH 48,<br>North Canadian River, OK .....                        | 49    |
| 35. Cross-section at bridge (Bridge No. 10570 and RS 36) on SH 27,<br>North Canadian River, OK .....                        | 51    |
| 36. Cross-section at bridge (Bridge No. 21128 and RS 37) on US 75,<br>North Canadian River, OK .....                        | 52    |
| 37. Cross-section at bridge (Bridge No. 14200 and RS 39) on SH 84,<br>North Canadian River, OK .....                        | 53    |
| 38. Cross-section at bridge (Bridge No. 15585 and RS 40) on US 69,<br>North Canadian River, OK .....                        | 54    |
| 39. Trend line of stream-bed elevation changes .....  | 56    |
| 40. The best fit line of stream-bed elevation changes .....   | 57    |
| 41. Longitudinal Profile of North Canadian River Bed, Oklahoma .....  | 64    |
| 42-60. Longitudinal River-bed profiles for 25 miles interval from<br>SH 34 to US 69 of North Canadian River, Oklahoma ..... | 65-84 |

## TABLES

|  | Page |
|--|------|
| 1. Description of USGS gage stations .....                                       | 7    |
| 2. Sinuosity and slope of North Canadian River for study reach 1, 2, and 3 ..... | 25   |
| 3. Summary of channel –bed elevation change, North Canadian River .....          | 58   |
| 4. Flow line interpolated data for 5 years interval, North Canadian River .....  | 61   |
| 5. Summary of channel bed degradation, North Canadian River.....                 | 86   |
| 6. Summary of bridges with degradation in five river basins .....                | 87   |

## I. INTRODUCTION

Natural alluvial rivers generally do not exist in equilibrium. The fluvial process in an alluvial river is a dynamic process, a function of flow and sediment regimes interacting with the physiographic features and vegetative cover of the landscape (Ward and Stanford 2006). Streams are not inherently unstable but they are often out of equilibrium due to imposed conditions. Man made activities and natural events are the major factors which disturb the stability of a river, causing high sediment load, high slope, relatively coarse grain size, high lateral mobility rate, and multi-thread, braided stream. If the streambed is eroded, resulting in a low bed elevation it is called “degradation” and if bed elevation is elevated due to an accumulation of sediment it is called “aggradation”.

A river channel is considered stable if the streambed does not change its dimension, pattern and profile over a relatively long river reach and long period of time. If the hydraulic, hydrologic, and sedimentological characteristics of the alluvial rivers are altered naturally or by human interference, the river will adjust dynamically and geometrically as the fluvial system seeks to establish a state of equilibrium. The river equilibrium concept was explained by Macklin (1948) as the “graded” river in which channel size, cross-sectional shape, and slope are adjusted to the quantities of sediment and water transported so that the river bed neither degrades nor aggrades.

Human activities such as construction of reservoir are major factors in changing in river equilibrium. When the sediment transport is interrupted by a dam, the flow may become sediment-starved and prone to erode the channel



bed and banks, producing channel incision, and coarsening of bed material (Kondolf 2004).

The purpose of this research is to analyze the flowline data and relate it to the degradation of the river bed at different bridge locations in the river. This information may then be used to replace or rehabilitate those bridges that experienced severe degradation.

## II. STUDY AREA

The 800-mile long North Canadian River basin is located in the west central portion of Oklahoma, where it is known as Corrupta Creek. From there it flows eastwardly through the Oklahoma Panhandle, where it is known as the Beaver River. The Coldwater Creek empties into the Beaver River and it flows southwestward into the Texas Panhandle for six miles, turning northeast and back into the Oklahoma Panhandle before continuing on to the east. It enters northwest Oklahoma and turns southeast and takes the name North Canadian River. Just south of the town of Fort Supply, Oklahoma, the river is joined by Wolf Creek. From there, it flows eastward through Oklahoma City and Shawnee on its way to Lake Eufaula in McIntosh County where it joins the waters of the Canadian River (Wikipedia). North Canadian River is a major U.S. waterway. It has total drainage basin of nearly 15,212 sq mi., out of which approximately 61% is in Oklahoma, 33% in Texas, and 6% in New Mexico (Pigg & Coleman 1992).

In Oklahoma North Canadian River flows through thirteen counties: Woodward, Major, Dewey, Blaine, Canadian, Oklahoma, Pottawatomie, Seminole, Okfuskee, Hughes, McIntosh, Pittsburg, and Haskell. The focus of this study area is the middle 463.85 mile reach of the North Canadian River between State Highway 34 crossing in the Woodward County, Oklahoma and US-69 crossing at McIntosh County, Oklahoma (Fig. 1). The North Canadian River starts as a narrow river which gains in size after entering Oklahoma, and becomes a waterway that, in places, is more than a mile wide. Throughout the study reach, North Canadian River has been impounded in two reservoirs:

Canton Lake, Lake Overholser, and merges into the Canadian River at the Eufaula Lake reservoir.

Canton Lake Dam is on the North Canadian River at mile 394.3, about 2 miles north of the town of Canton and 75 miles northeast of Oklahoma City. The dam was constructed by the corps of engineers and the construction began in 1940 and was completed in 1948. The lake has conservative pool elevation of 1615.0 feet and flood control capacity of 377,100 acre-feet. The shore of the lake is in Blaine County (Kurka 2006).

Lake Overholser in central Oklahoma is located on the east side of Yukon in Canadian county. The lake has a shore length of 7 miles and surface area of 1,500 acres.

Eufaula dam is located on the Canadian river, approximately 12 miles east of Eufaula in McIntosh County, Oklahoma (Austin & Thomas, 2006). At Eufaula Lake North Canadian River merges with the Canadian River. The lake has a drainage area of 47,522 square miles and surface area of 159.375 square miles. The shore length of the lake is over 600 miles. The lake is owned and operated by the U.S. Army Corps of Engineers (Wikipedia).

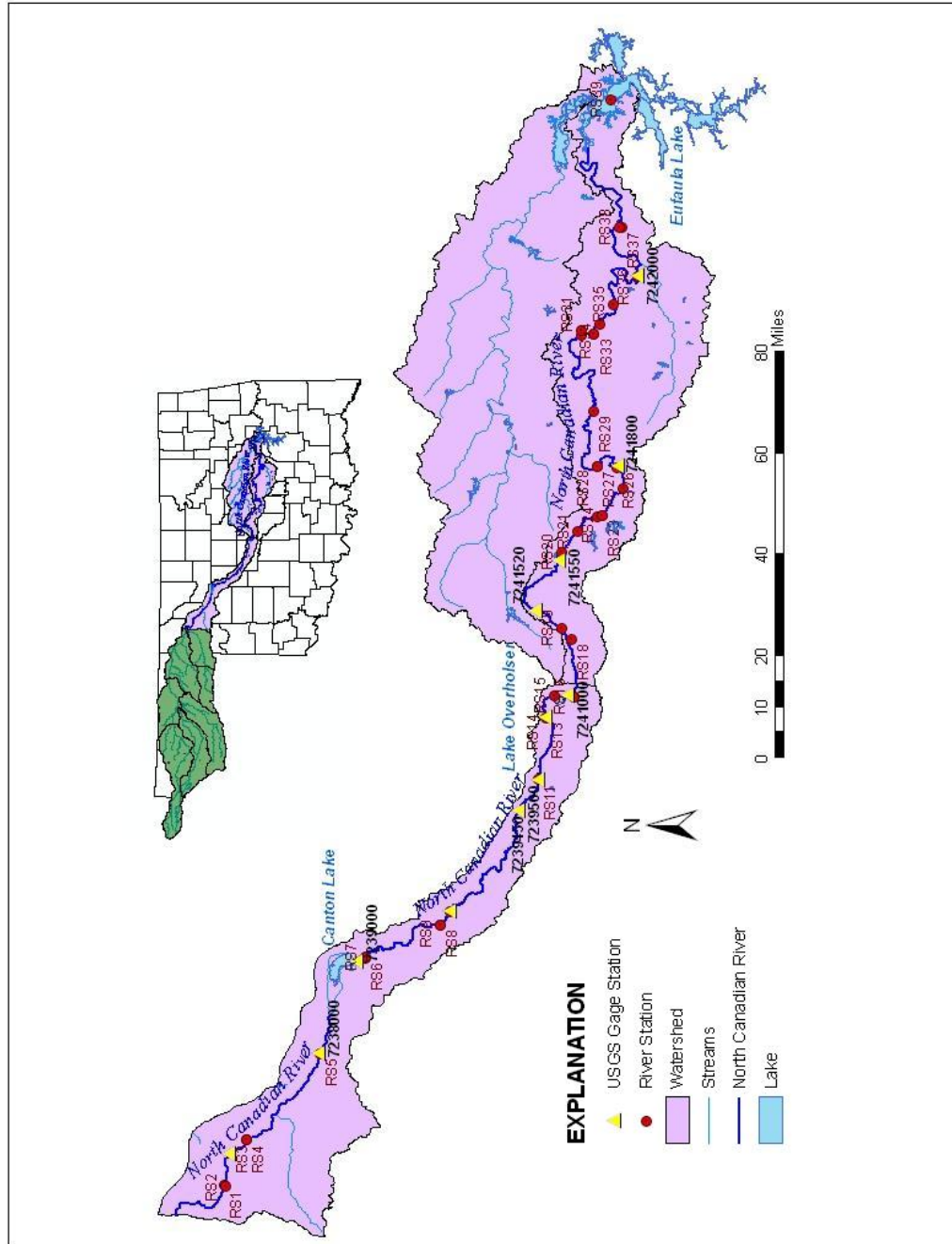


Figure 1. Location of Study points in North Canadian River, and USGS gage stations

### III. HYDROLOGY

The physical characteristics of the stream such as channel bed degradation, stream widening, deposition of channel bars, shifting flowline, and stream bank erosion depends on the hydrology of the stream. According to Doyle (2003), “channels formed in fine alluvial material that is easily eroded and transported out of the system with little downstream aggradation will respond to disturbance by lateral adjustments”. As the stream profile degrades, the stream tries to widen to accommodate higher flows, and stream bank erosions increase along with increases in sediment loads. Flow measurement of the stream is one of the fundamental tasks in accessing surface hydrology. USGS stream flow gage stations have been studied in the study reach. Currently there are twelve USGS gaging stations in North Canadian River (Fig.1).

**Table 1. Description of USGS gage stations**

| Data Locations and Descriptions   | Data Available   |
|---|------------------|
| <p>USGS 07237500 North Canadian River at Woodward, OK<br/> Woodward County, Oklahoma<br/> Hydrologic Unit Code 11100301<br/> Latitude 36°26'12", Longitude 99°16'41" NAD27<br/> Drainage area 11,589 square miles<br/> Contributing drainage area 6,777 square miles<br/> Gage datum 1,829.95 feet above sea level NGVD29</p>                         | <p>1938-2006</p> |
| <p><i>USGS 07238000 North Canadian River near Seiling, OK</i><br/> Major County, Oklahoma<br/> Hydrologic Unit Code 11100301<br/> Latitude 36°11'00", Longitude 98°55'15" NAD27<br/> Drainage area 12,261 square miles<br/> Contributing drainage area 7,414 square miles<br/> Gage datum 1,675.53 feet above sea level NGVD29</p>                    | <p>1924-2006</p> |
| <p>USGS 07239000 North Canadian River at Canton, OK<br/> Blaine County, Oklahoma<br/> Hydrologic Unit Code 11100301<br/> Latitude 36°04'37", Longitude 98°35'47" NAD27<br/> Drainage area 12,484 square miles<br/> Contributing drainage area 7,601 square miles<br/> Gage datum 1,562.50 feet above sea level NGVD29</p>                             | <p>1938-2003</p> |
| <p><i>USGS 07239300 North Canadian River blw Weavers Ck nr<br/> Watonga, OK</i><br/> Blaine County, Oklahoma<br/> Hydrologic Unit Code 11100301<br/> Latitude 35°48'43", Longitude 98°25'14" NAD27<br/> Drainage area 12,736 square miles<br/> Contributing drainage area 7,837 square miles<br/> Gage datum 1,453.60 feet above sea level NGVD29</p> | <p>1984-2006</p> |

**Table 1. Continued**

| Data Locations and Descriptions   | Data Available   |
|---|------------------|
| <p>USGS 07239500 North Canadian River near El Reno, OK<br/>                     Canadian County, Oklahoma<br/>                     Hydrologic Unit Code 11100301<br/>                     Latitude 35°33'47", Longitude 97°57'26" NAD27<br/>                     Drainage area 13,042 square miles<br/>                     Contributing drainage area 8,143 square miles<br/>                     Gage datum 1,295.00 feet above sea level NGVD29</p>  | <p>1903-2006</p> |
| <p><i>USGS 07239700 North Canadian River near Yukon, OK</i><br/>                     Canadian County, Oklahoma<br/>                     Hydrologic Unit Code 11100301<br/>                     Latitude 35°32'22", Longitude 97°44'32" NAD27<br/>                     Drainage area 13,183 square miles<br/>                     Gage datum 1,247.66 feet above sea level NGVD29</p>  | <p>2000-2006</p> |
| <p>USGS 07241000 North Canadian River below Lake Overholser near<br/>                     OKC, OK<br/>                     Oklahoma County, Oklahoma<br/>                     Hydrologic Unit Code 11100301<br/>                     Latitude 35°28'43", Longitude 97°39'47" NAD27<br/>                     Drainage area 13,222 square miles<br/>                     Contributing drainage area 8,323 square miles<br/>                     Gage datum 1,194.66 feet above sea level NGVD29</p> | <p>1921-2006</p> |
| <p><i>SGS 07241520 North Canadian River at Britton Rd at OKC, OK</i><br/>                     Oklahoma County, Oklahoma<br/>                     Hydrologic Unit Code 11100302<br/>                     Latitude 35°33'56", Longitude 97°22'01" NAD27<br/>                     Drainage area 13,413 square miles<br/>                     Contributing drainage area 8,514 square miles<br/>                     Gage datum 1,109.40 feet above sea level NGVD29</p>                              | <p>1989-2006</p> |

**Table 1. Continued**

| Data Locations and Descriptions  | Data Available   |
|--|------------------|
| <p><i>USGS 07241550 North Canadian River near Harrah, OK</i><br/>                     Oklahoma County, Oklahoma<br/>                     Hydrologic Unit Code 11100302<br/>                     Latitude 35°30'01", Longitude 97°11'37" NAD27<br/>                     Drainage area 13,501 square miles<br/>                     Contributing drainage area 8,602 square miles<br/>                     Gage datum 1,055.69 feet above sea level NGVD29</p> | <p>1969-2006</p> |
| <p><i>USGS 07241800 North Canadian River at Shawnee, OK</i><br/>                     Pottawatomie County, Oklahoma<br/>                     Hydrologic Unit Code 11100302<br/>                     Latitude 35°19'59", Longitude 96°52'09" NAD27<br/>                     Drainage area 13,730.00 square miles<br/>                     Contributing drainage area 8,831.00 square miles</p>   | <p>2001-2006</p> |
| <p><i>USGS 07242000 North Canadian River near Wetumka, OK</i><br/>                     Hughes County, Oklahoma<br/>                     Hydrologic Unit Code 11100302<br/>                     Latitude 35°15'56", Longitude 96°12'21" NAD27<br/>                     Drainage area 14,290 square miles<br/>                     Contributing drainage area 9,391 square miles<br/>                     Gage datum 678.28 feet above sea level NGVD29</p>    | <p>1924-2006</p> |



Annual peak discharge is the annual instantaneous maximum discharge. Human land use practices such as agricultural and forest clearing also impact the fluvial geomorphic systems. In addition to this, channel changes are variable in time, depending somewhat on the timing of floods and droughts. Annual peak discharge plots were downloaded from USGS gaging stations to evaluate the historical flood occurrences. In 1946, record-breaking flood occurred in the streams of the Texas Panhandle and Oklahoma. Precipitation ranged from 1 to more than 8 inches during the period of October 4-10. As a result of which, high water levels were reached in the headwater of the North Canadian River (Jordan 1946). Due to the excessive rainfall in this region, peak streamflow were recorded as 42000cfs at Woodward OK (Fig. 2), 28000 cfs at Seiling OK (Fig. 3), 25000 cfs at Canton OK (Fig. 4), 15000cfs at El Reno OK (Fig. 7), and 15000cfs at Wetunka OK (Fig. 13) in 1946. Peak streamflow records of 14000cfs at El Reno (Fig. 7), 8000cfs at Oklahoma City (Fig. 10), and 25000 at Harrah OK (Fig. 11) mimics the flood of 1997 and peak streamflows of 9000cfs at Oklahoma City OK (Fig. 10), and 17000 cfs at Harrah OK (Fig. 11) were due to the flood in 1995.

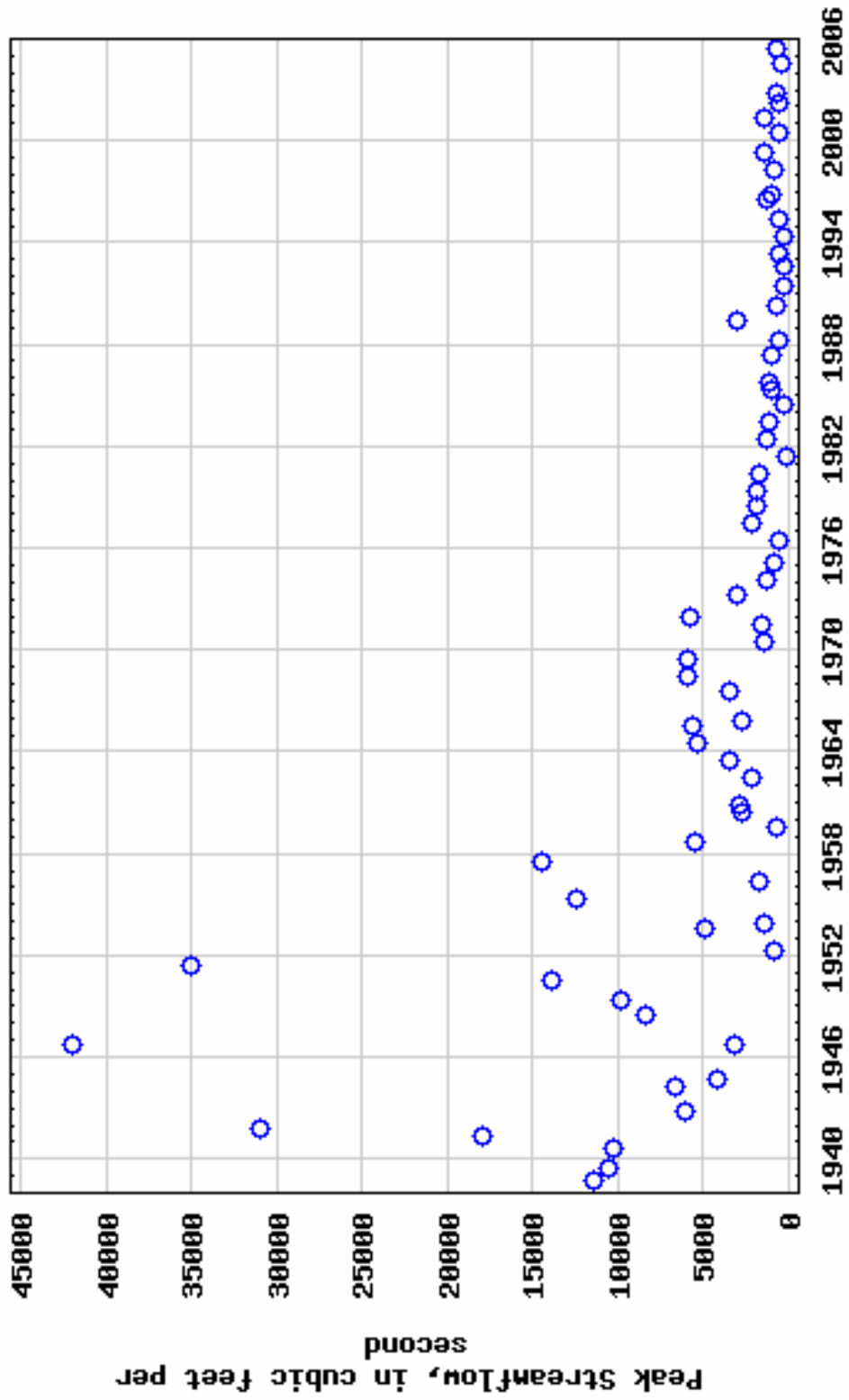


Figure 2 . Annual peak streamflow in North Canadian River at Woodward (USGS 07237500), OK

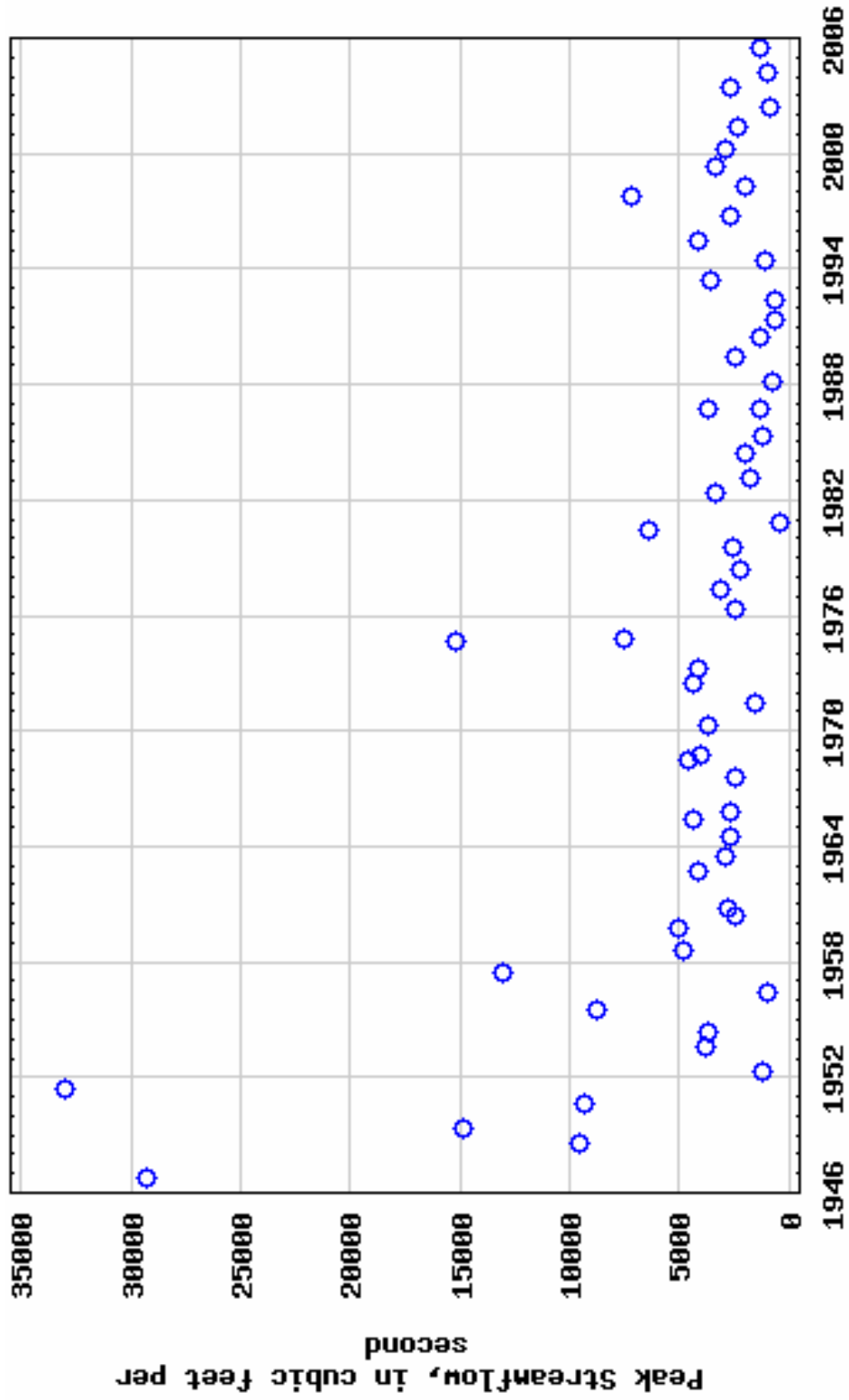


Figure 3. Annual peak streamflow in North Canadian River at Seiling (USGS 07238000), OK

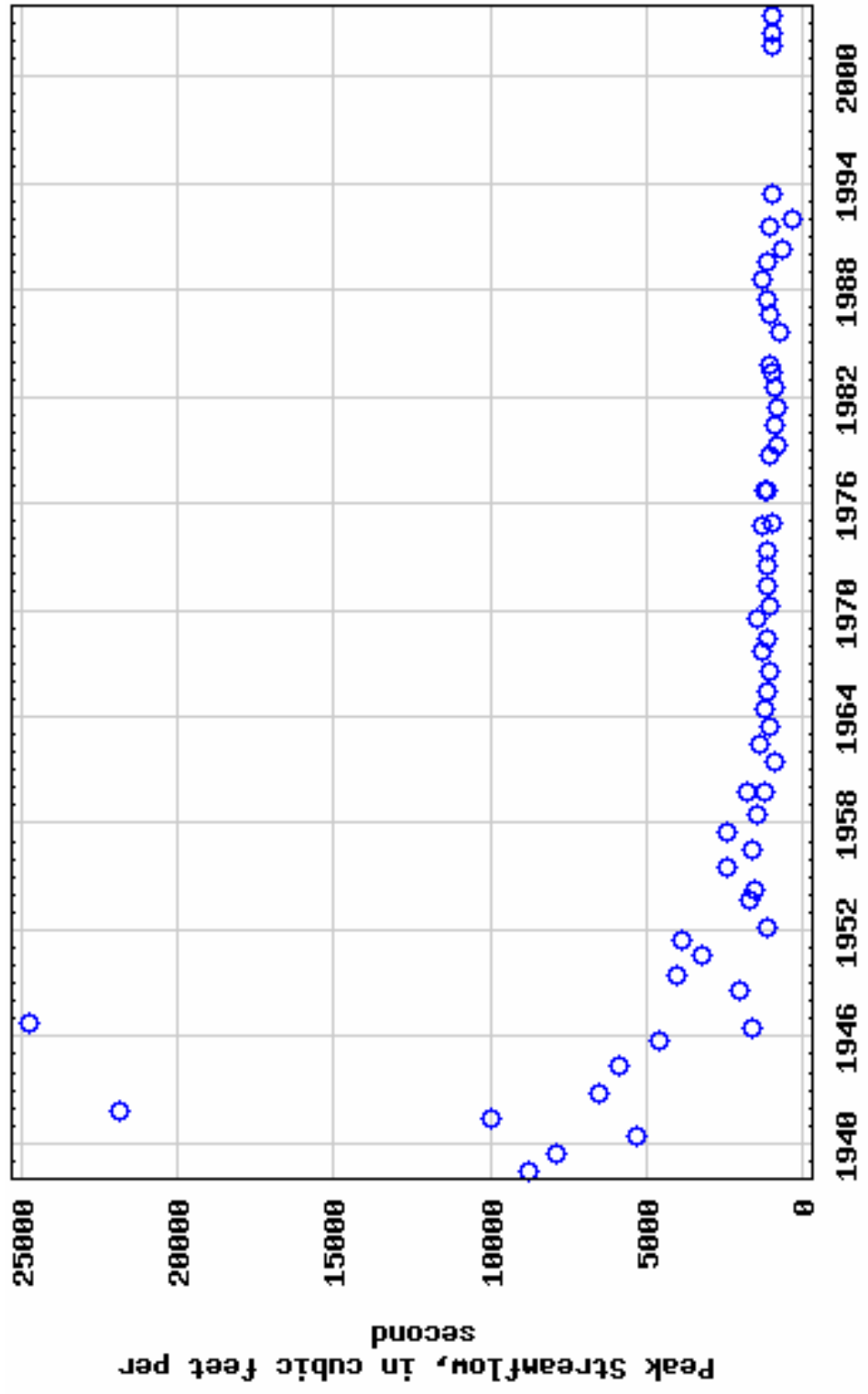


Figure 4. Annual peak streamflow in North Canadian River at Canton (USGS 07239000), OK

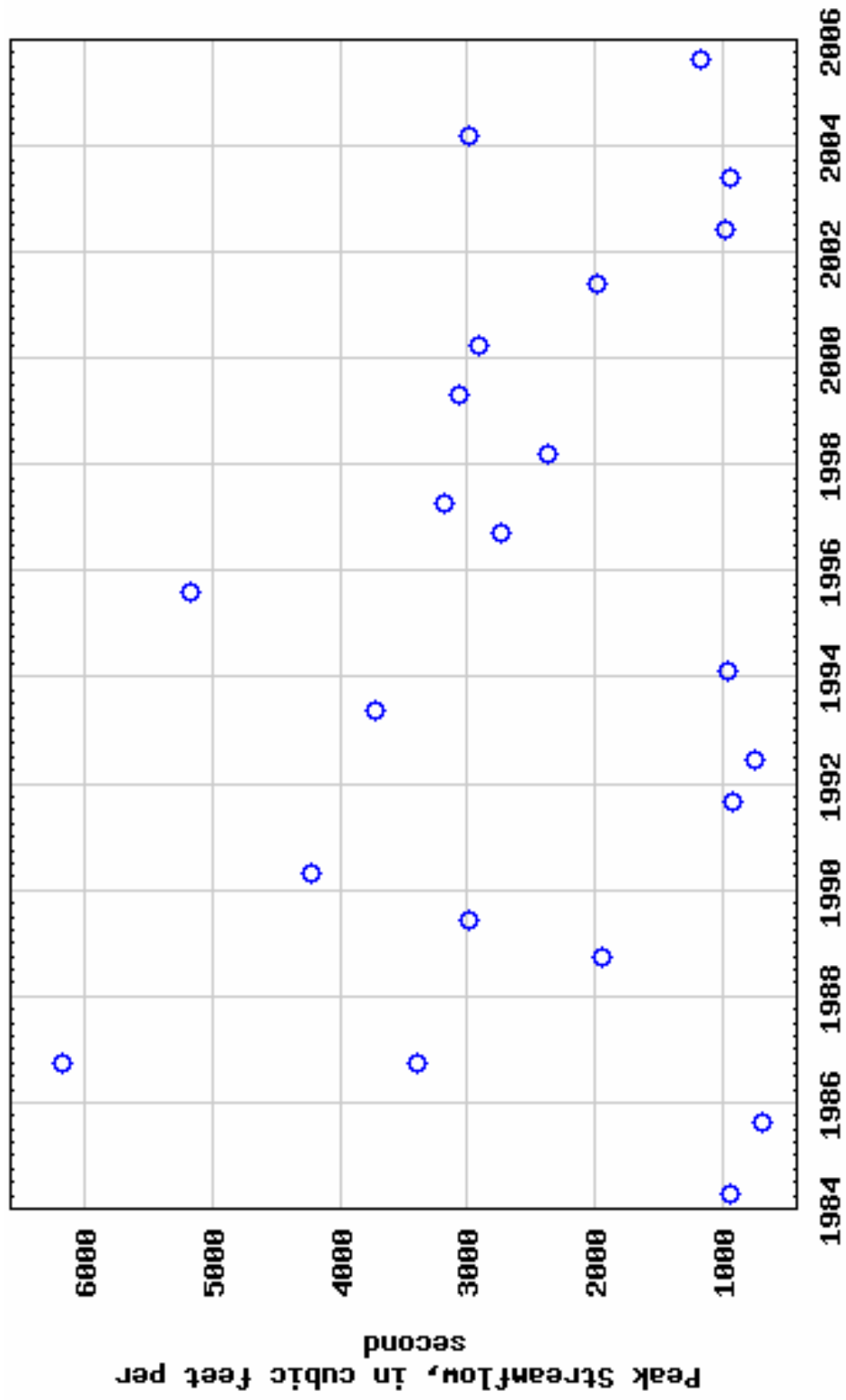


Figure 5. Annual peak streamflow in North Canadian River at Watonga (USGS 07239300), OK

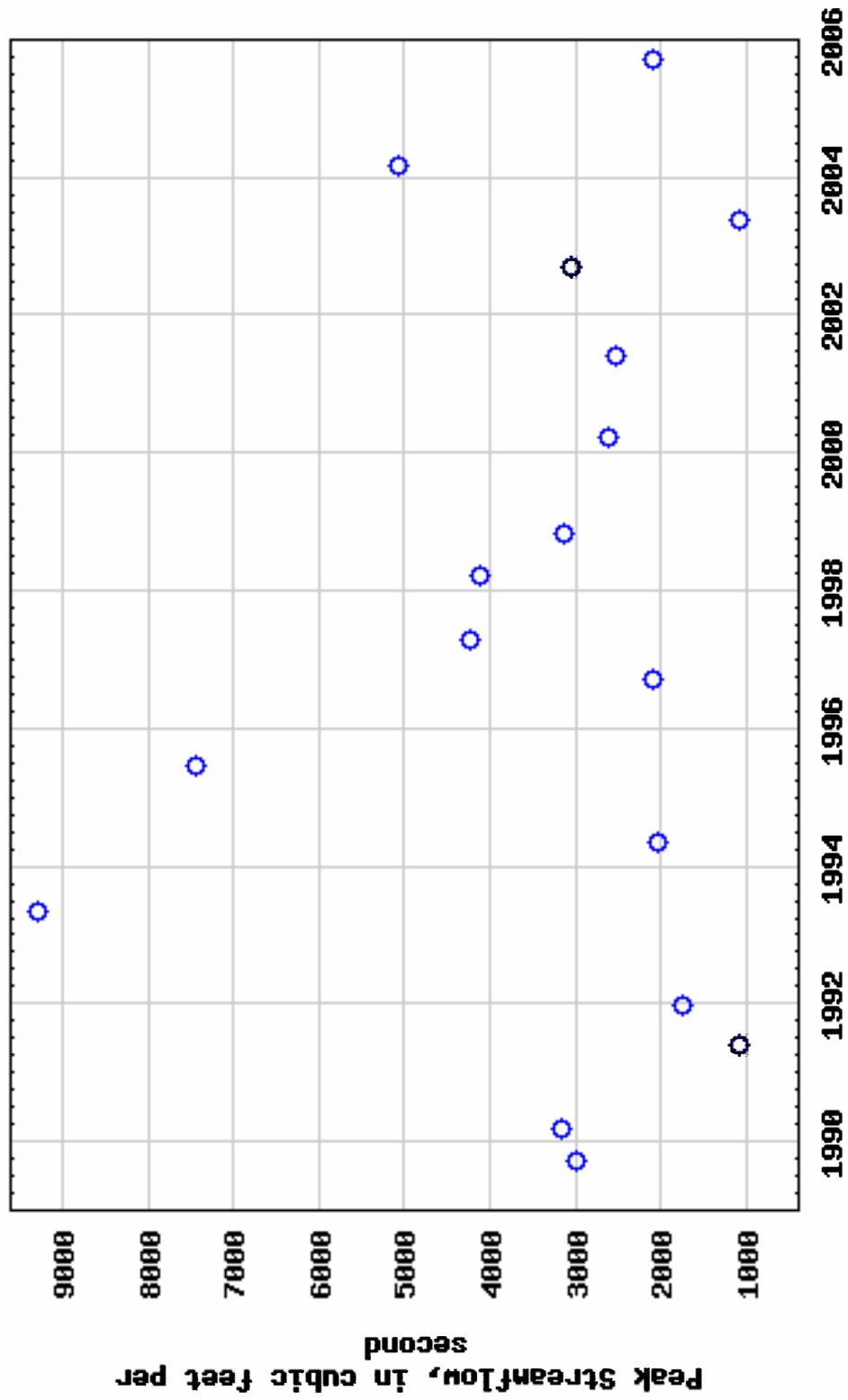


Figure 6. Annual peak streamflow in North Canadian River near Calumet (USGS 07239450),

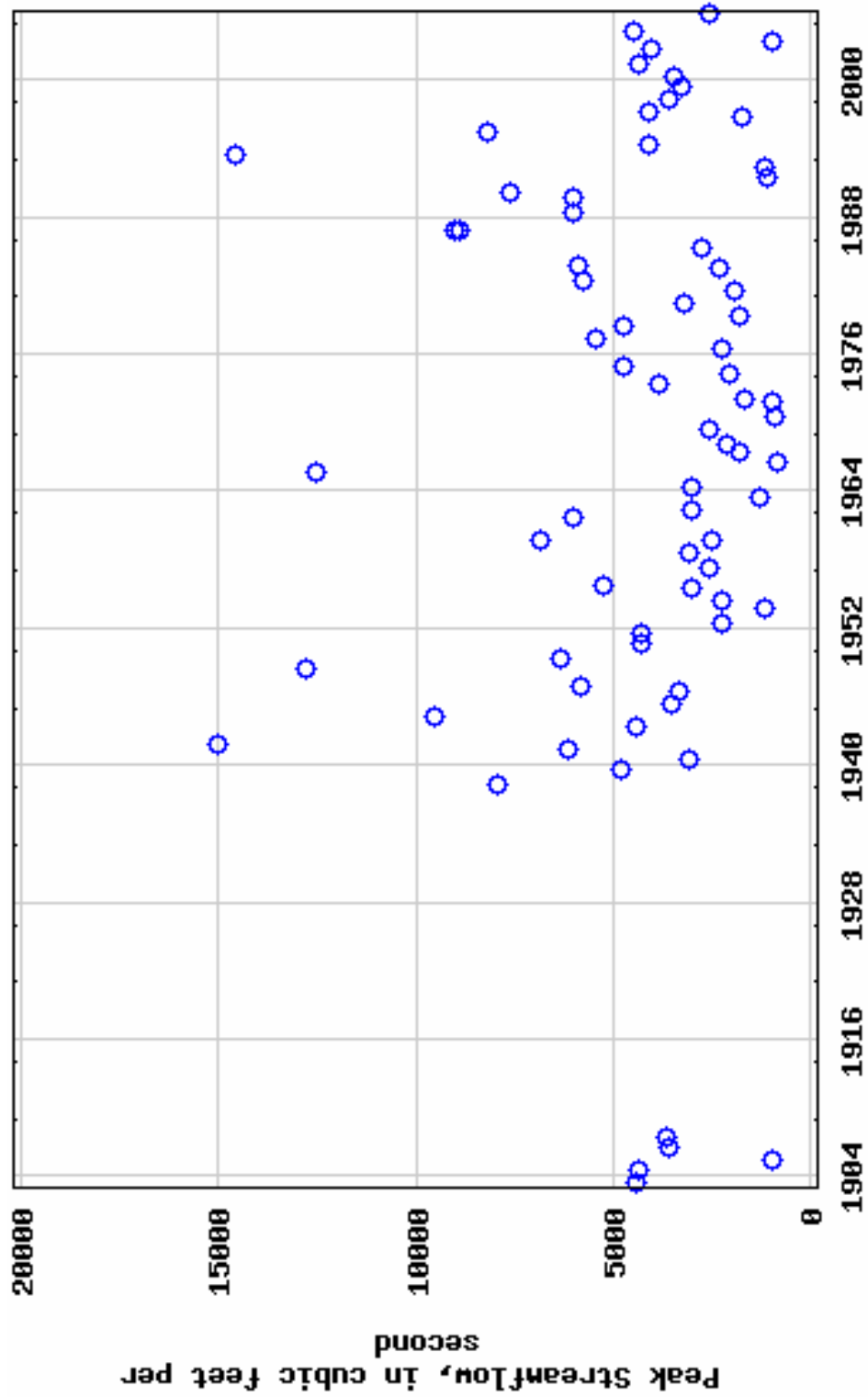


Figure 7. Annual peak streamflow in North Canadian River near El Reno (USGS 07239500), OK

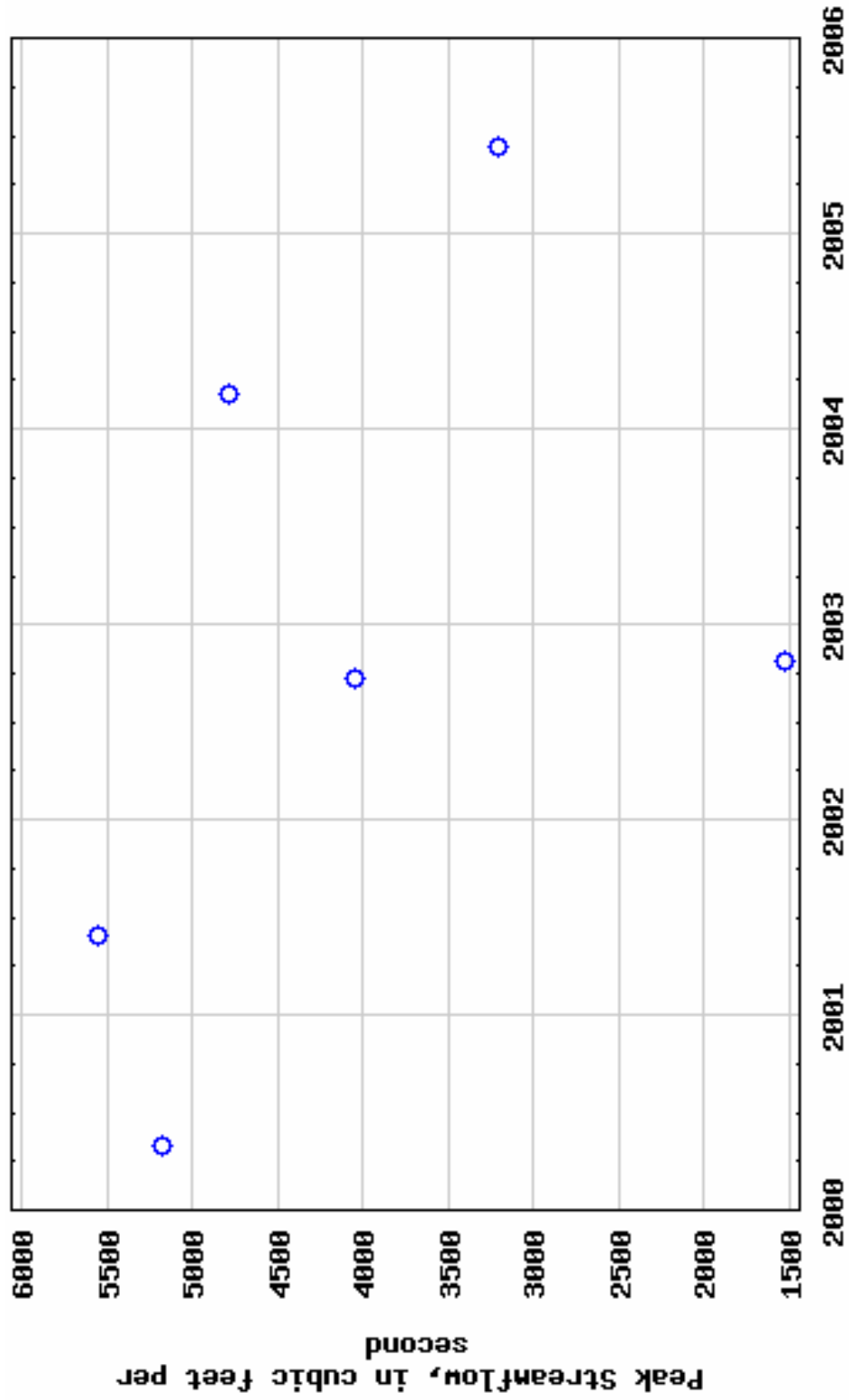


Figure 8. Annual peak streamflow in North Canadian River near Yukon (USGS 07239700), OK



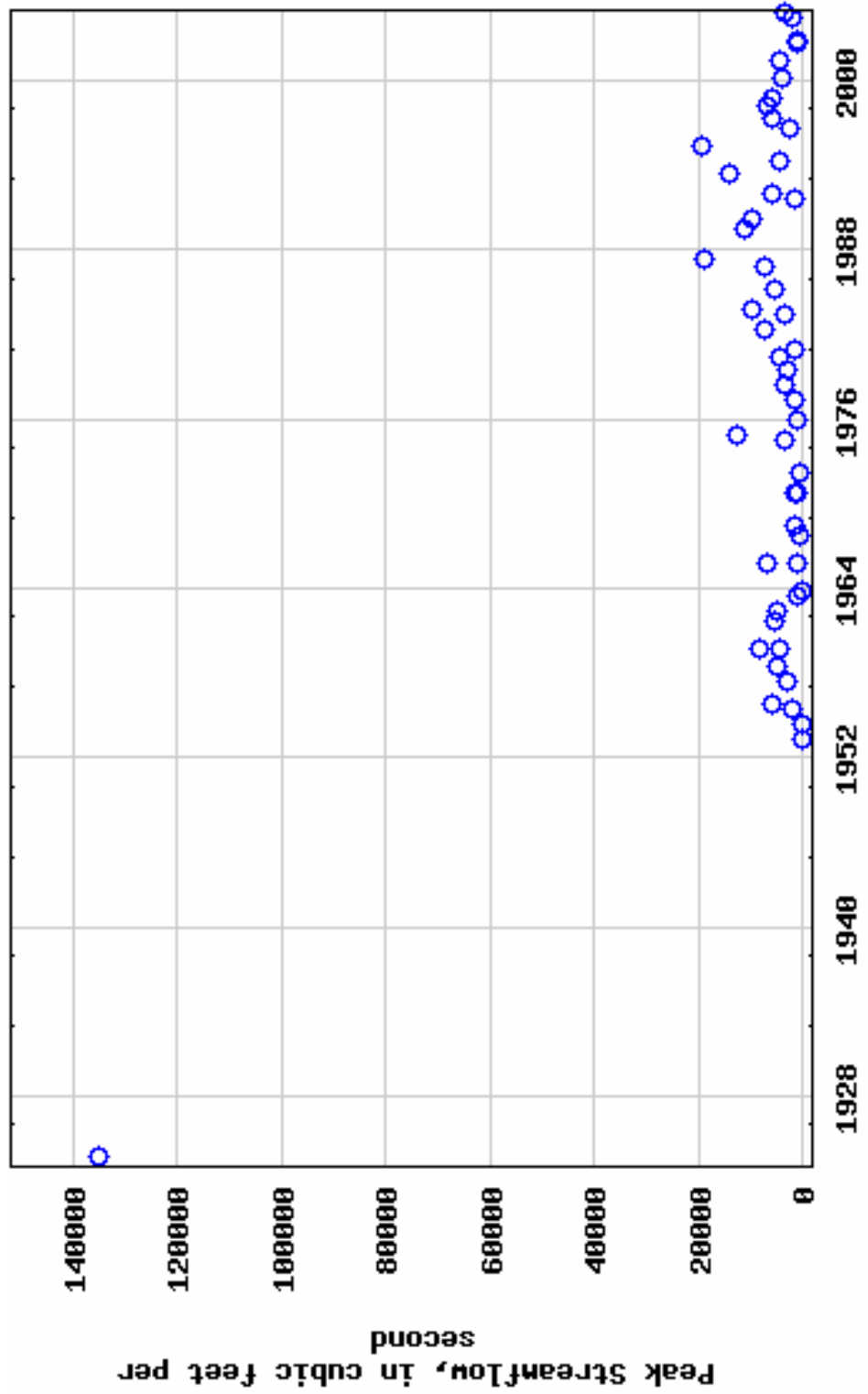


Figure 9. Annual peak streamflow in North Canadian River near OKC (USGS 07241000), OK

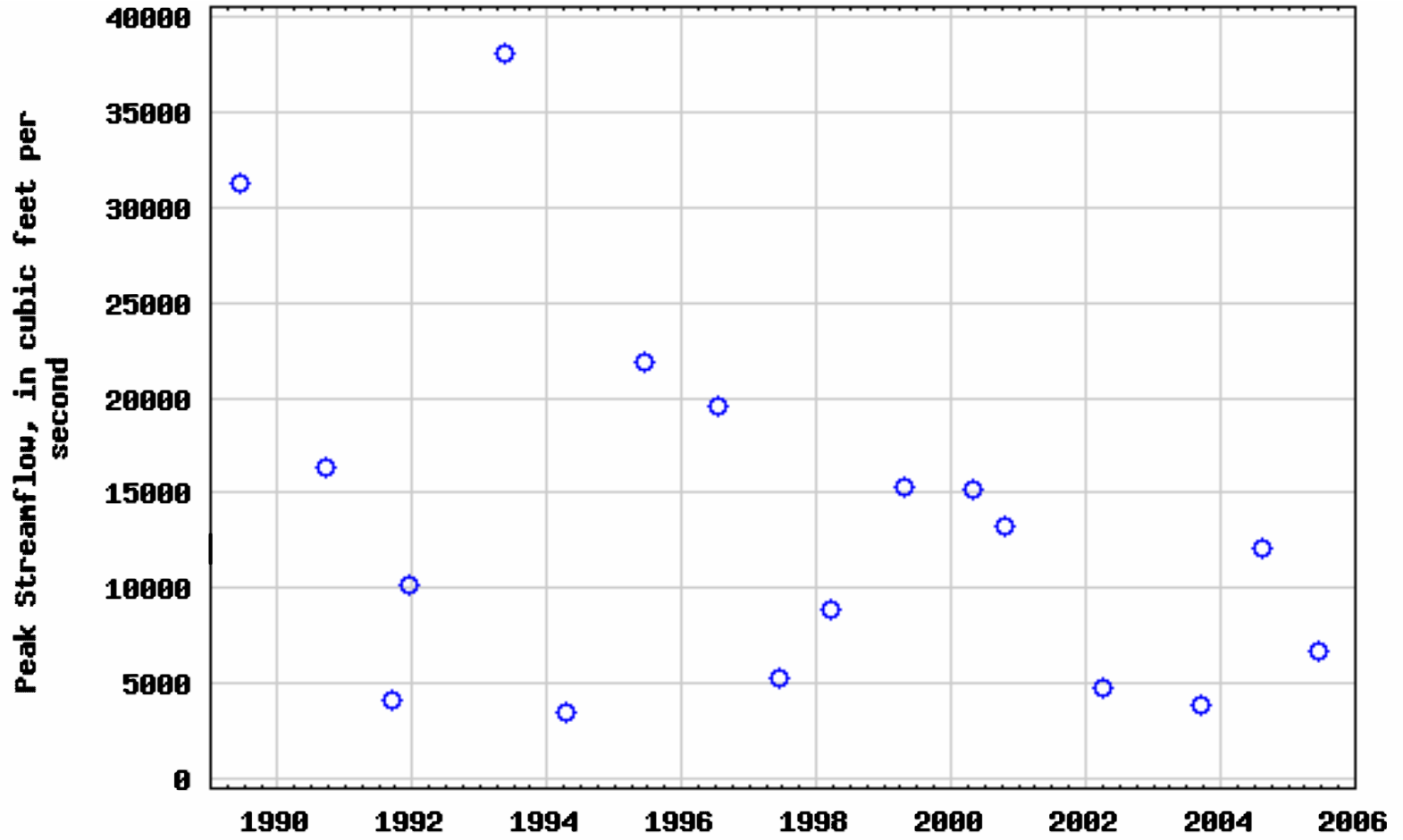


Figure 10. Annual peak streamflow in North Canadian River at OKC (USGS 07241520), OK

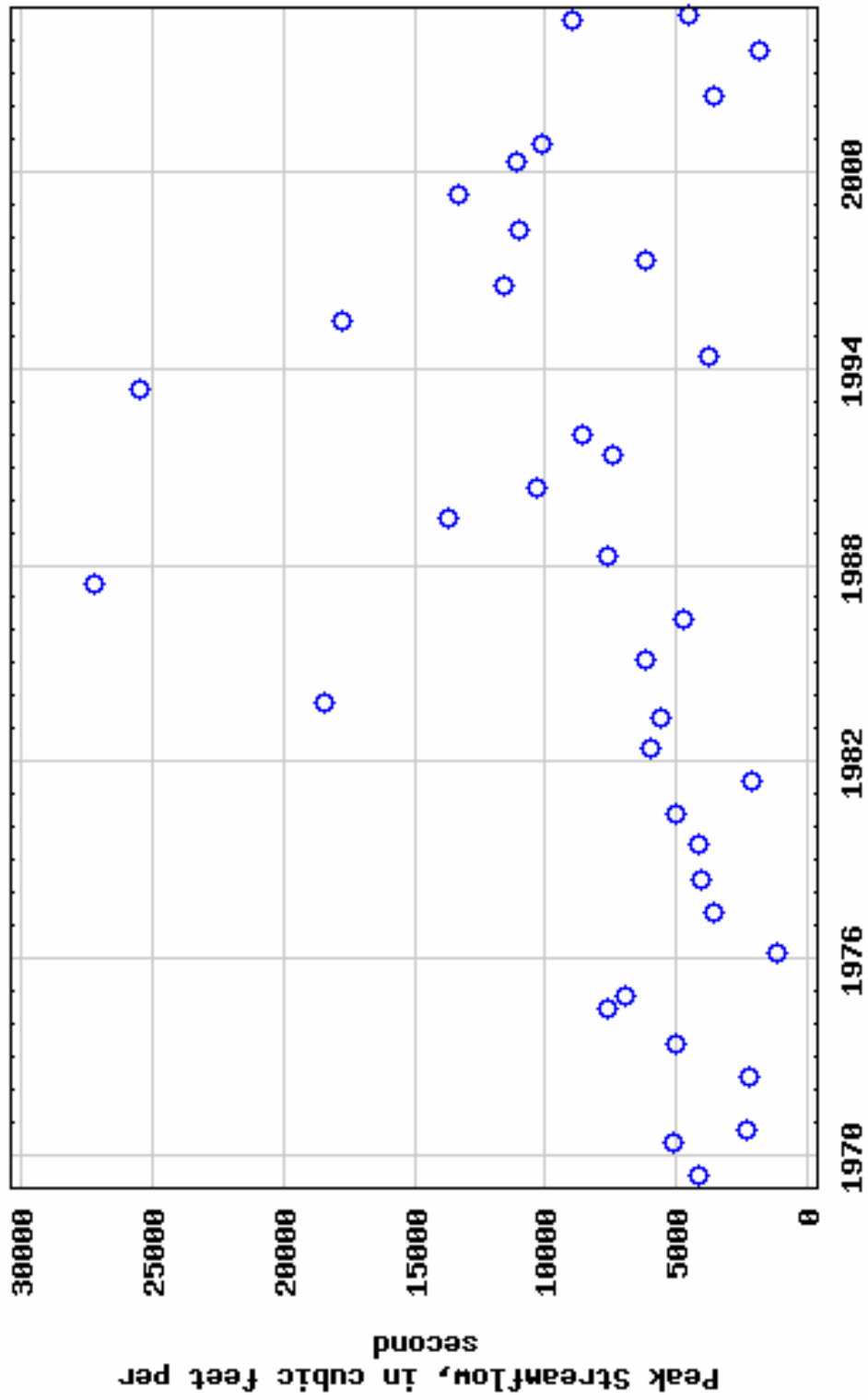


Figure 11. Annual peak streamflow in North Canadian River near Harrah (USGS 07241550),

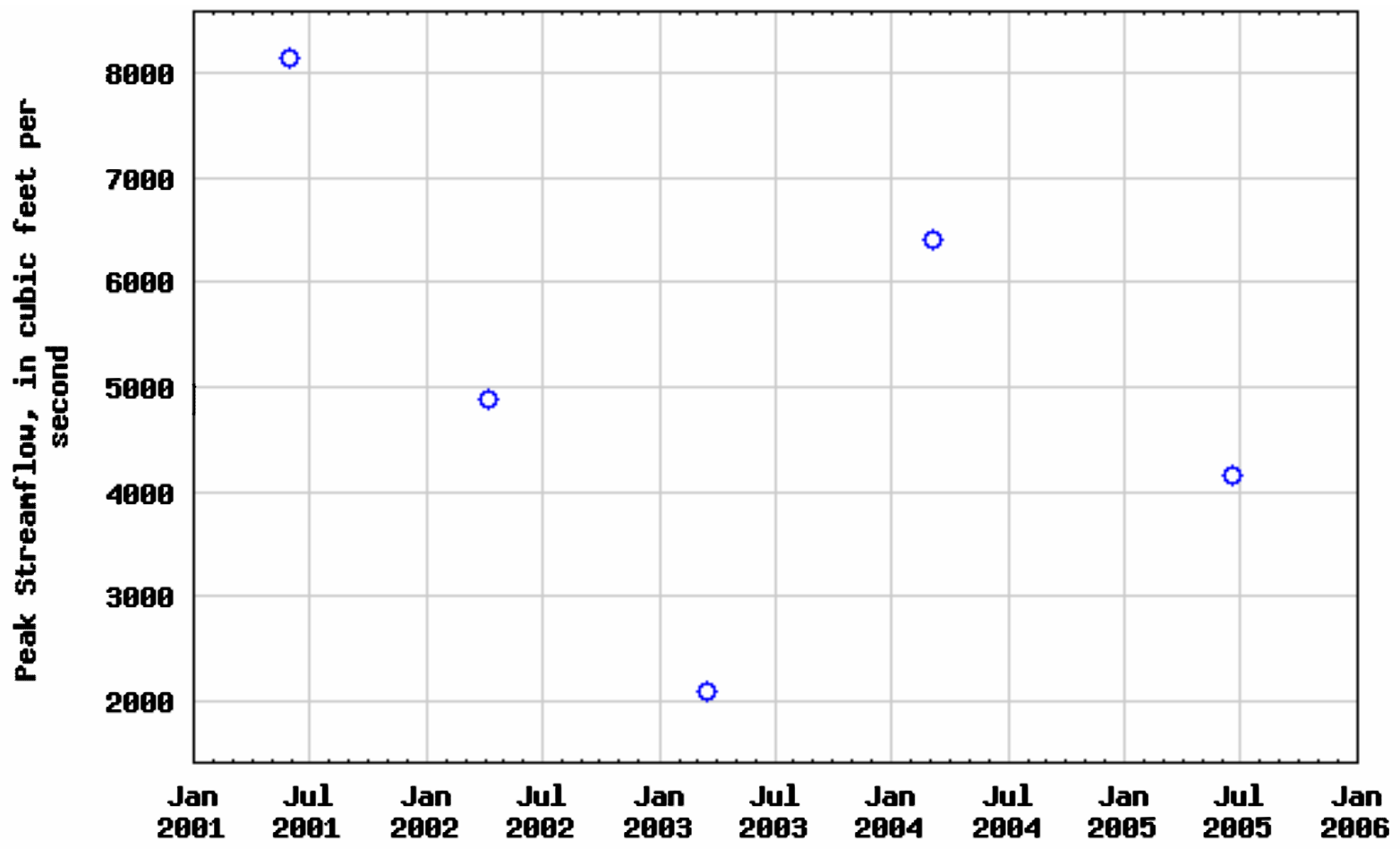


Figure 12. Annual peak streamflow in North Canadian River at Shawnee (USGS 07241800), OK

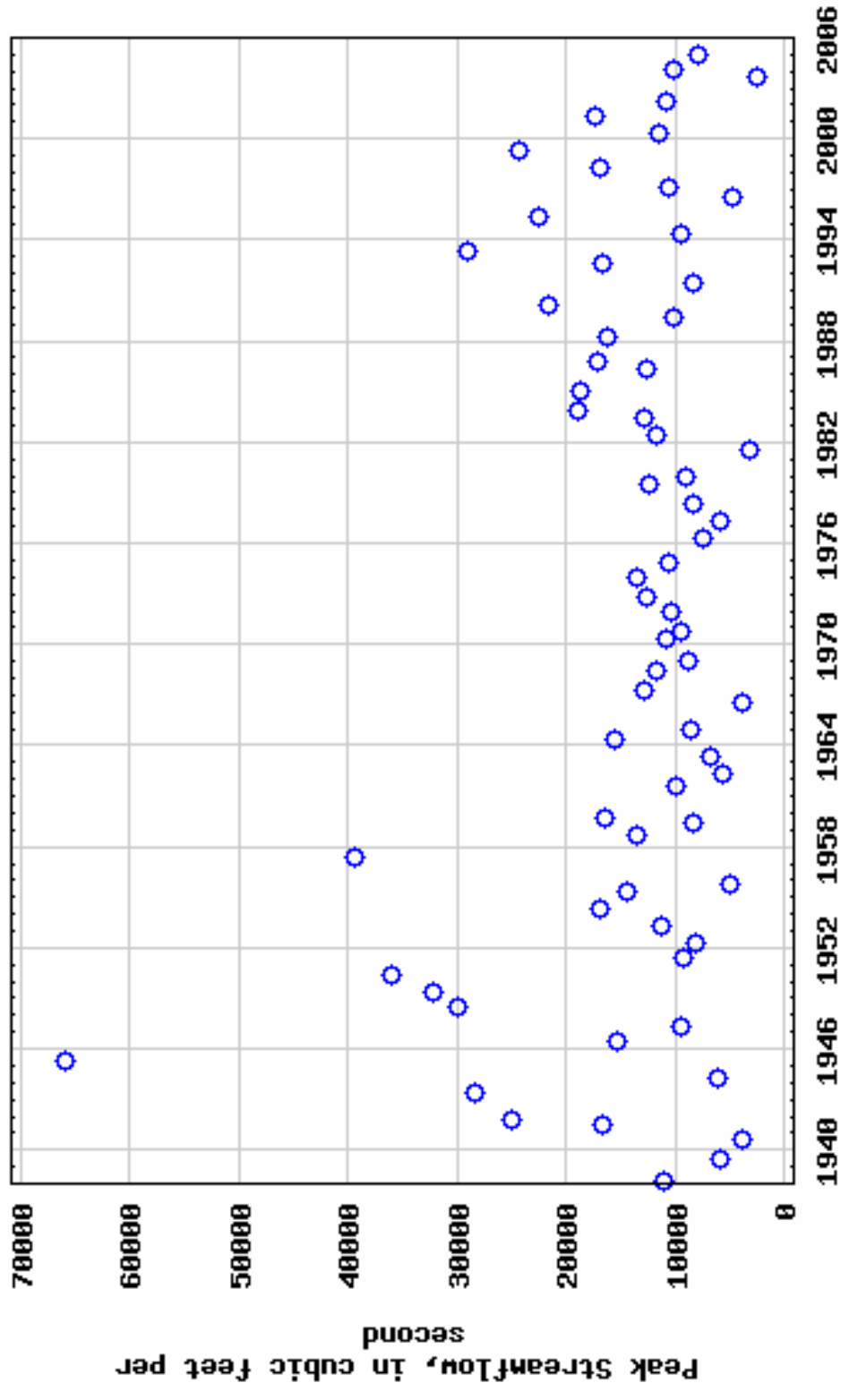


Figure 13. Annual peak streamflow in North Canadian River at Wetunka (USGS 07242000), OK

Gilvler (1999) studied a number of areas in which fluvial geomorphology is directly relevant and beneficial to river engineering. These are when:

- 1) River channel functions as a three dimensional form with longitudinal, transverse, and vertical dimensions (x,y,z-directions) involving changes in morphology and amount of water and sediment.
- 2) The river system functions in response to water and sediment coming from the upstream watersheds.
- 3) The planform of a river normally varies through time, but the dynamics of natural channel adjustment varies between and along rivers.
- 4) The geomorphic stability of a river system is disturbed by activities such as river training, removing riparian vegetation, land use, and climatic change etc.

In this study, the 463.85 mile river is divided into 3 Reaches: Reach 1- RS1 to Canton Lake Dam, Reach 2- Canton Lake Dam to Lake Overholser dam, and Lake Overholser dam to RS 40 (Bridge No. 15585). The objective of this study was to evaluate the downstream effects of each dam in river degradation. Data collection at each site included channel gradient, cross-sectional geometry, and bed material composition. Channel gradient from one river station to another was calculated arithmetically and taken mean for each study Reach. River meandering between two successive river stations was determined by calculating sinuosity as shown in Figure 14 using Geographic Information System (GIS), to examine the downstream effects of dams in meandering channels. Sinuosity is

defined as a ratio of total length between two river stations along the flowline to shortest length of the channel.

The meandering tendency of the North Canadian River in Oklahoma increases as its flows. As the sinuosity is increasing along the length, the slope of the river is simultaneously decreasing. Reach-1 is less meandered where the slope is high. Reach-3 is highly meandered where the slope is less (Table 2).

Longitudinal and vertical changes of the river channel bed are also studied and will be discussed separately in another chapter.

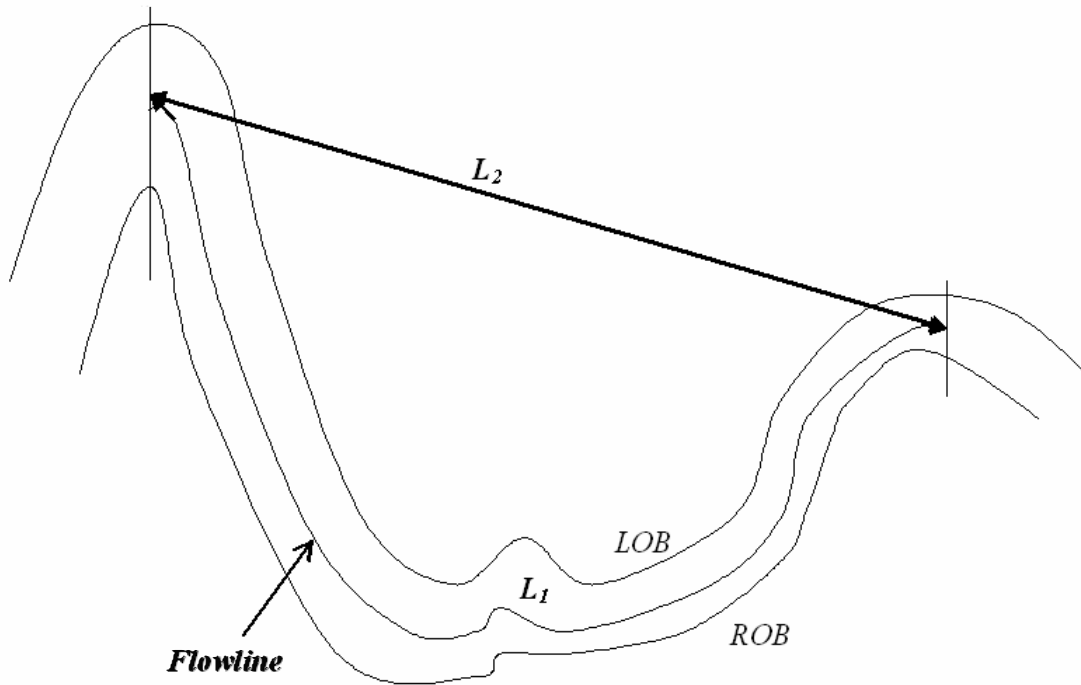
**Table 2. Sinuosity and slope study of North Canadian River**

| Study of reach |  |             |                 | Study of River Stations |        |           |
|----------------|--|-------------|-----------------|-------------------------|--------|-----------|
| Reach          | Location                               | Reach slope | Reach Sinuosity | River Stations          | Slope  | Sinuosity |
| 1              | RS 1 (b16523) to Canton Lake Dam       | 3.83        | 1.53            | RS 1 to RS 2            | 0.00   | 0.00      |
|                |  |             |                 | RS 2 to RS 3            | 3.94   | 1.35      |
|                |  |             |                 | RS 3 to RS 4            | 0.00   | 1.12      |
|                |  |             |                 | RS 4 to RS 5            | 4.13   | 1.51      |
| 2              | Canton Lake Dam to Lake Overholser Dam | 3.08        | 1.80            | RS 5 to RS 6            | 3.42   | 1.64      |
|                |  |             |                 | RS 6 to RS 7            | 0.00   | 0.00      |
|                |  |             |                 | RS 7 to RS 8            | 3.13   | 1.77      |
|                |  |             |                 | RS 8 to RS 9            | 0.00   | 1.33      |
|                |  |             |                 | RS 9 to RS 10           | 3.60   | 1.14      |
|                |  |             |                 | RS 10 to RS 11          | 2.87   | 1.00      |
|                |  |             |                 | RS 11 to RS 12          | -35.17 | 1.80      |
|                |  |             |                 | RS 12 to RS 13          | 2.66   | 1.37      |
|                |  |             |                 | RS 13 to RS 14          | 0.00   | 0.00      |
|                |  |             |                 | RS 14 to RS 15          | 0.00   | 0.00      |
| 3              | Lake Overholser Dam to RS 40 (b15585)  | 2.53        | 2.24            | RS 15 to RS 16          | 2.06   | 1.65      |
|                |  |             |                 | RS 16 to RS 17          | 6.85   | 1.64      |
|                |  |             |                 | RS 17 to RS 18          | 0.00   | 1.00      |
|                |  |             |                 | RS 18 to RS 19          | 3.19   | 1.21      |
|                |  |             |                 | RS 19 to RS 20          | 1.90   | 1.04      |
|                |  |             |                 | RS 20 to RS 21          | 2.31   | 2.58      |



**Table 2. Continued**

| Study of reach |                                       |             |                 | Study of River Stations |       |           |
|----------------|---------------------------------------|-------------|-----------------|-------------------------|-------|-----------|
| Reach          | Location                              | Reach slope | Reach Sinuosity | River Stations          | Slope | Sinuosity |
| 3              | Lake Overholser Dam to RS 40 (b15585) | 2.53        | 2.4             | RS 20 to RS 21          | 2.31  | 2.58      |
|                |                                       |             |                 | RS 21 to RS 22          | 1.67  | 1.39      |
|                |                                       |             |                 | RS 22 to RS23           | 3.03  | 2.41      |
|                |                                       |             |                 | RS 23 to RS 24          | -2.97 | 2.22      |
|                |                                       |             |                 | RS 24 to RS 25          | 0.00  | 0.79      |
|                |                                       |             |                 | RS 25 to RS 26          | 4.27  | 1.39      |
|                |                                       |             |                 | RS 26 to RS 27          | 2.73  | 1.69      |
|                |                                       |             |                 | RS 27 to RS 28          | 0.87  | 2.90      |
|                |                                       |             |                 | RS 28 to RS 29          | 4.30  | 10.82     |
|                |                                       |             |                 | RS 29 to RS 30          | 3.22  | 2.15      |
|                |                                       |             |                 | RS 30 to RS 31          | 2.41  | 2.29      |
|                |                                       |             |                 | RS 31 to RS 32          | 0.00  | 0.00      |
|                |                                       |             |                 | RS 32 to RS 33          | 11.87 | 1.57      |
|                |                                       |             |                 | RS 33 to RS 34          | 0.00  | 0.00      |
|                |                                       |             |                 | RS 34 to RS 35          | 12.11 | 1.35      |
|                |                                       |             |                 | RS 35 to RS 36          | -0.77 | 1.87      |
|                |                                       |             |                 | RS 36 to RS 37          | 2.98  | 3.16      |
| RS 37 to RS 38 | 4.81                                  | 1.71        |                 |                         |       |           |
| RS 38 to RS 39 | 0.00                                  | 0.00        |                 |                         |       |           |
| RS 39 to RS 40 | 2.33                                  | 1.78        |                 |                         |       |           |



$$\text{Sinuosity} = \frac{\text{Flowline Length}(L_1)}{\text{Shortest Length}(L_2)}$$

Figure 14. Schematic diagram of sinuosity of natural channels

#### **IV. ANALYSIS OF CROSS-SECTIONAL GEOMETRY**

Field data measured for a long period of time by Oklahoma Department of Transportation were examined in this study. Throughout the study reach, 40 River Stations (RS) were selected: RS 1 to Canton Lake Dam in Reach 1, Canton Lake Dam to Lake Overholser dam in Reach 2, Lake Overholser dam to RS 40 in Reach 3. Twenty-four out of forty River Stations have data on cross-section geometry. These river stations are measured in bridge crossings.

Among the 5 river stations in Reach 1, aggradations are observed in RS 1 and RS 3. RS 1 has the aggradation of 1.1 feet from year 1965 to 1991 whereas RS 3 is the most stable river station in Reach 1 having only the slight aggradation of 0.31 feet from years 1969 to 1991. Bed materials at RS 1 and RS 3 (Fig. 16) are characterized as Sand to Red Bed. RS 2 (Fig. 15) at the crossing of SH 34 shows the maximum degradation of 4.63 feet from year 1965 to 2000. The degradation is primarily on the left side of the river section. RS 4 at the crossing of SH 50 and RS 5 (Fig. 17) at the crossing of US 60 shows the degradation of 2.78 feet and 3.40 feet in 22 and 34 years respectively.

Reach-2 has eleven river stations from RS 6 to RS 15. Among these river stations, five are observed with aggradations. Downstream of Canton Lake Dam, two conjugative river stations, RS 6 (Fig. 18), and RS 7, shows the aggradation of 0.68 feet, and 0.50 feet in 48, 46 years respectively. The aggradations at these river stations shows notable results since both of the river stations are only 3.69 miles downstream of the Canton Lake Dam. Similarly, RS 12 (Fig. 22) at the crossing of US-81, RS 13 (Fig. 23) at the crossing of SH-4, and RS 16 (Fig. 26) at the crossing of US-66 show the

aggradation of 1.75 feet, 0.5 feet, and 8.4 feet in 32, 53, and 47 years respectively. RS 9 (Fig. 20) at the crossing of US-270 shows the maximum degradation of 5.83 feet in Reach-2. The degradation is occurred in the 58 year time period from 1937 to 1995. Similarly, RS 11 at the crossing of US-81 shows the maximum degradation rate of 1.01 feet/year.

Reach-3 has twenty-four river stations from RS 17 to RS 40. Degradation is observed in RS 17 (Fig. 27) and RS 18 (Fig. 28) at the crossing of I-40. These two conjugative river stations are at the downstream of the Lake Overholser dam at the distance of 2.40 miles. From 1964 to 2005, RS 17 is subjected to a degradation of 5 feet and RS 18 for 3.33 feet respectively. Bed materials for both of the river stations are characterized as Sand to Red Bed. Beyond RS 18, four conjugative river stations are subjected to the aggradations. Among them, RS 21 (Fig. 30) at the crossing of US-62, has the maximum aggradation of 9.75 feet in 20 years from 1985. RS 20 (Fig. 29) at the crossing of US-62 shows the aggradation of 4.75 feet in 19 years and the flowline at this river station has shifted from right to the middle. Bed materials for these four river stations are characterized as Sand and Sand Stone. RS 23 at the crossing of SH-270 is observed with maximum degradation rate in whole study reach. This river station has experienced 15.6 feet degradation in 11 years from 1983 to 1994. Bed material at this river stations is characterized as Sand and Soft Sandy Clay. Similarly, RS 24 to RS 27, RS 29, RS 31, and RS 32 are subjected to the constant degradation which ranges from 0.09 feet to 4.43 feet. RS 33 (Fig. 32) at the crossing of I-40 has experienced maximum degradation of 17.67 feet throughout the study reach from 1962 to 2000. Bed material at this river station is Sand to Medium Hard Shale. At this river station degradation occurs

primarily on the right side and Pier Nos. 15 and 16 are in danger. In contrast to this, calculated value at RS 34 (Fig. 33) at the same distance of RS 33 has experienced the aggradation of 0.42 feet in 40 years. Similarly, RS 36 (Fig. 35) at the crossing of SH-27 has the aggradation of 4.08 feet in 55 years. Other river stations RS 35 (Fig. 34), and RS 37 (Fig. 36) to RS 40 (Fig. 38) are facing degradation of the bed. Among them, RS 39 (Fig. 36) at the crossing of SH-84 has experienced maximum degradation of 15 feet from year 1958 to 2005 and degradation is primarily on the left side which has created potential threat to Pier Nos. 1 and 2. At RS 35, the flowline has shifted from right to the middle. RS 40 (Fig. 38) is within the Eufaula Lake dam which has experienced a degradation of 3.50 feet from 1958 to 2003. Bed material at this river station is Rock.

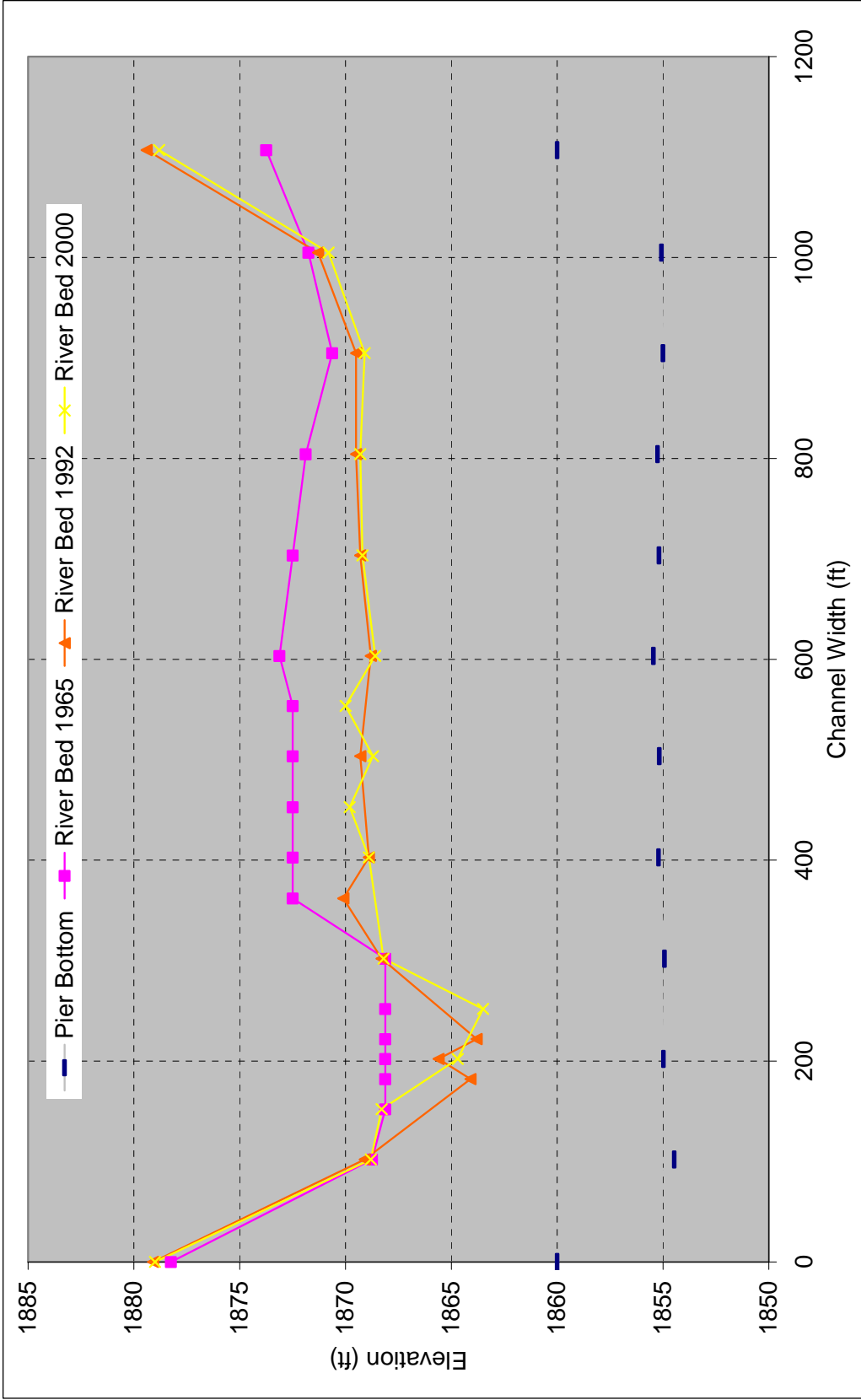


Figure 15. Cross-section at bridge (Key No. 16642 and RS 2) on SH 34, North Canadian River, OK

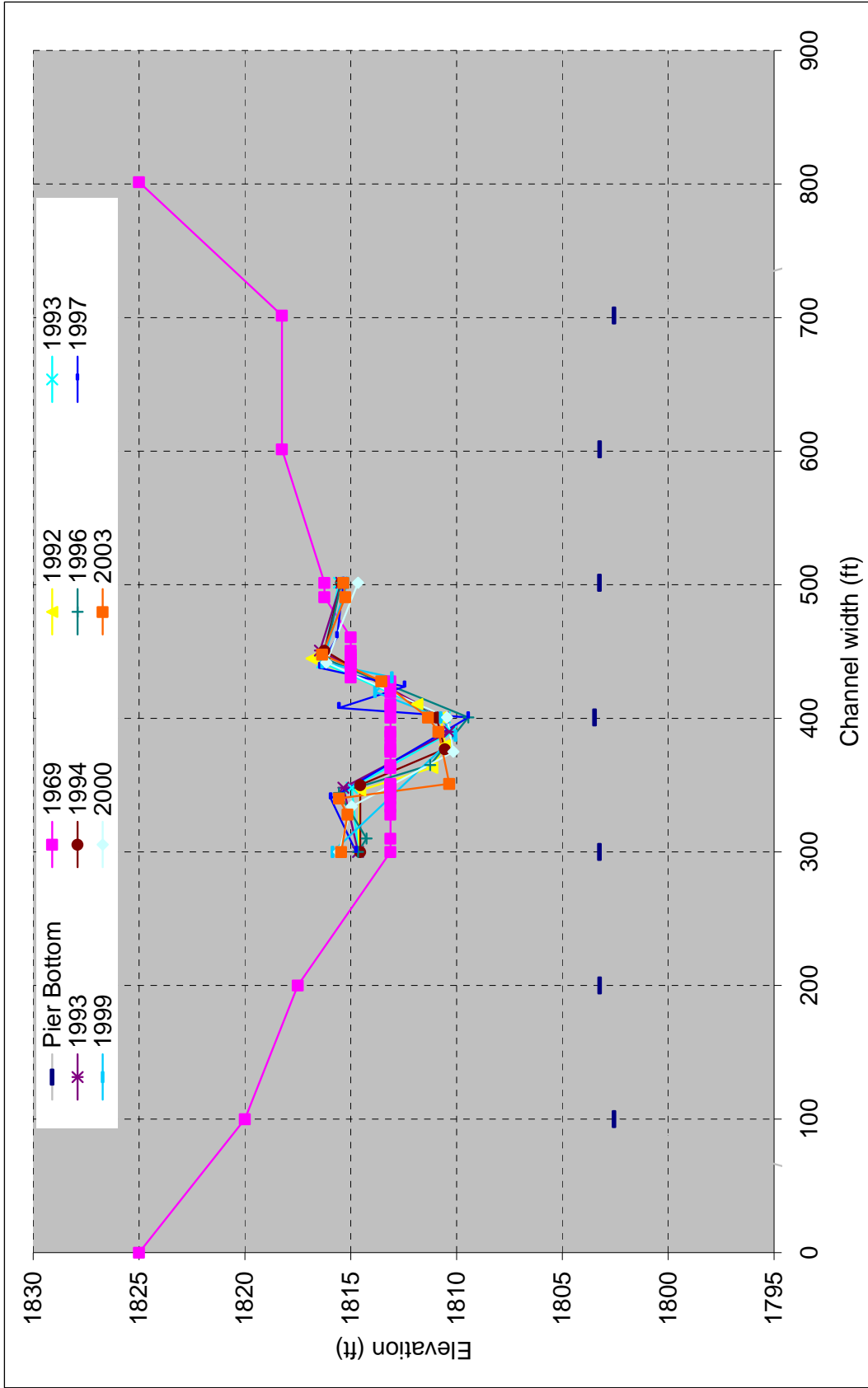


Figure 16. Cross-section at bridge (Key No. 17602 and RS 4) on SH 50, North Canadian River, OK

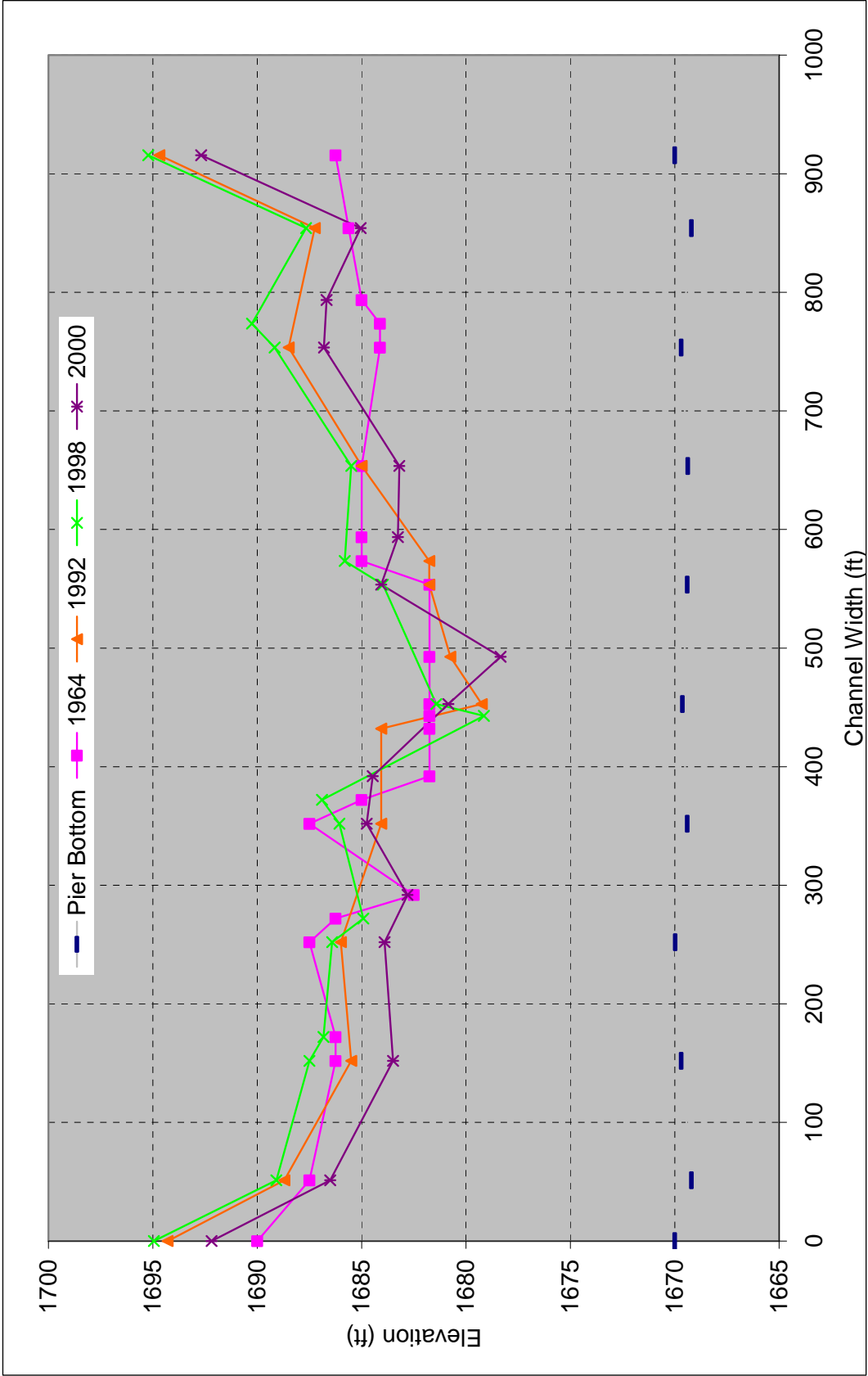


Figure 17. Cross-section at bridge (Key No. 16193 and RS 5) on US 60, North Canadian River, OK



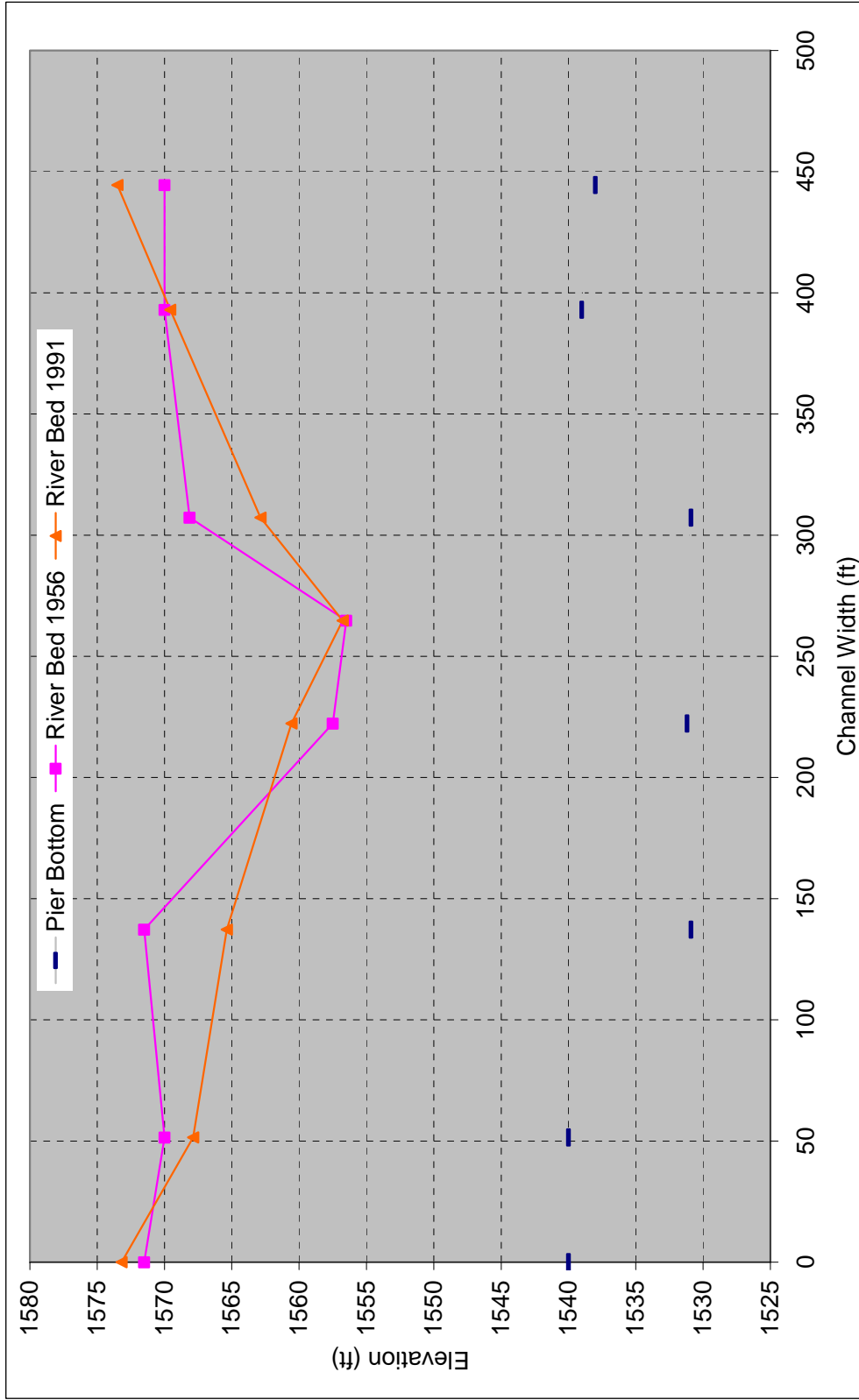


Figure 18. Cross-section at bridge (Key No. 13679 and RS 6) on SH 51, North Canadian River, OK

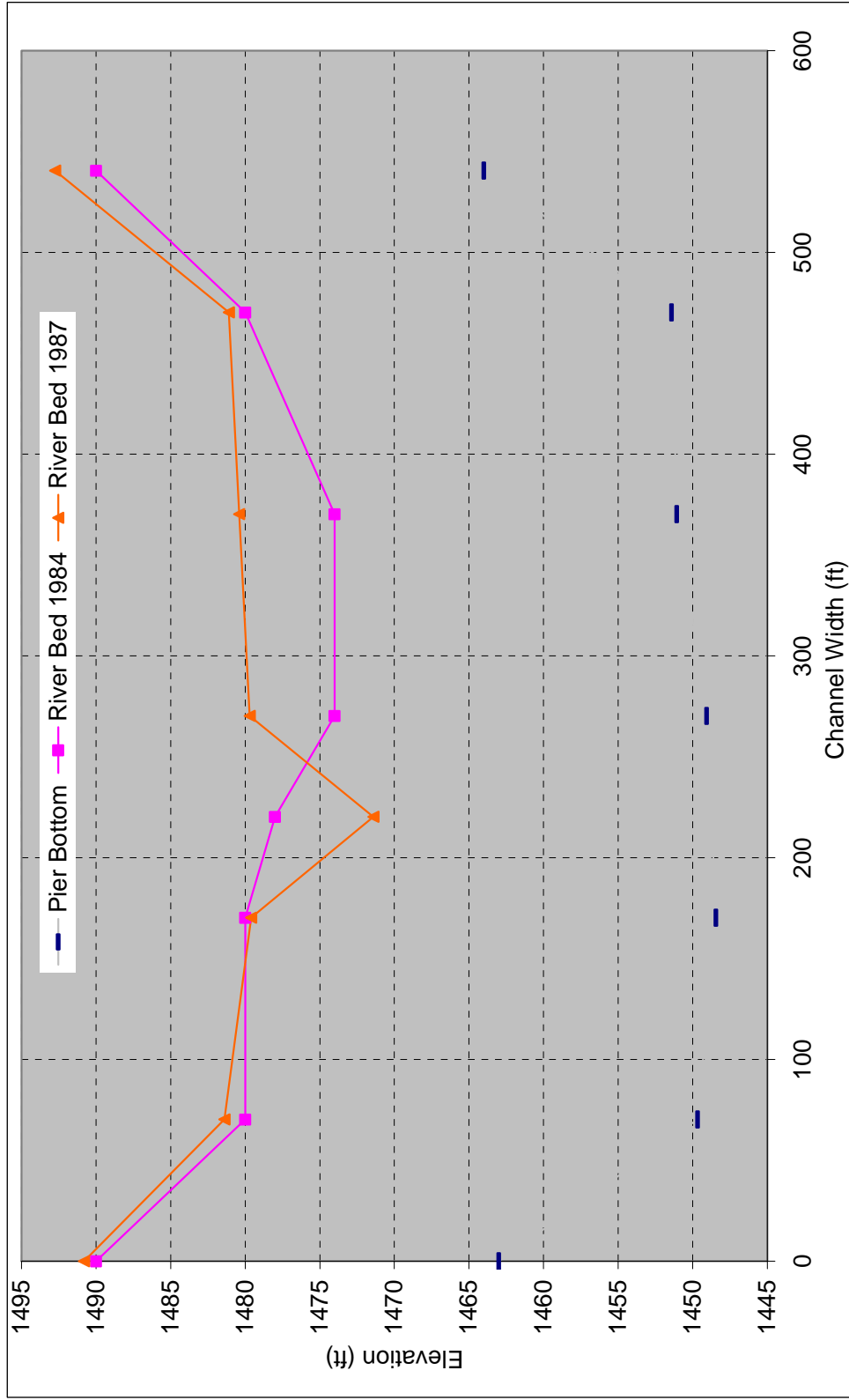


Figure 19. Cross-section at bridge (Key No. 20864 and RS 8) on US 270, North Canadian River, OK

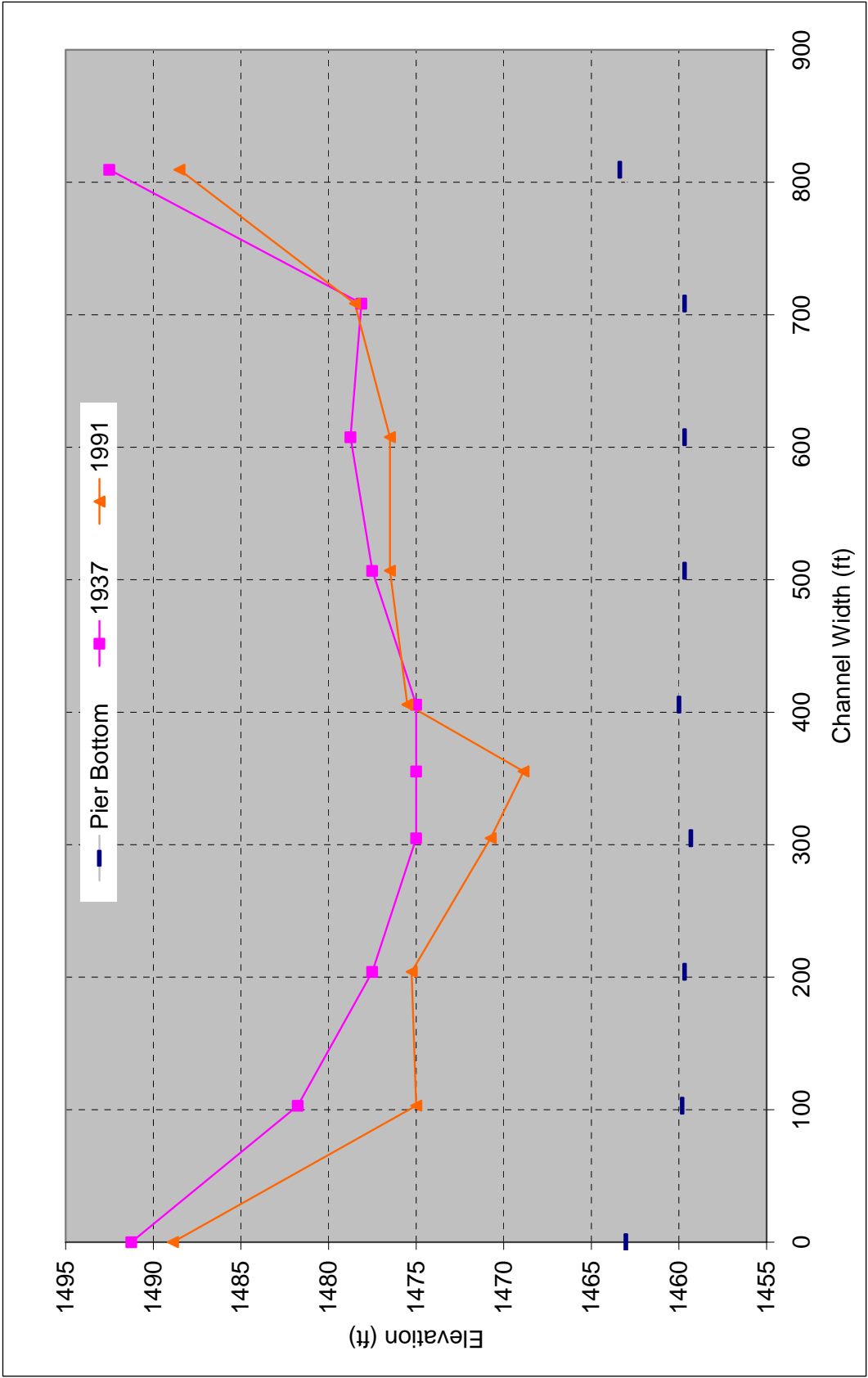


Figure 20. Cross-section at bridge (Key No. 05523 and RS 9) on US 270, North Canadian River, OK

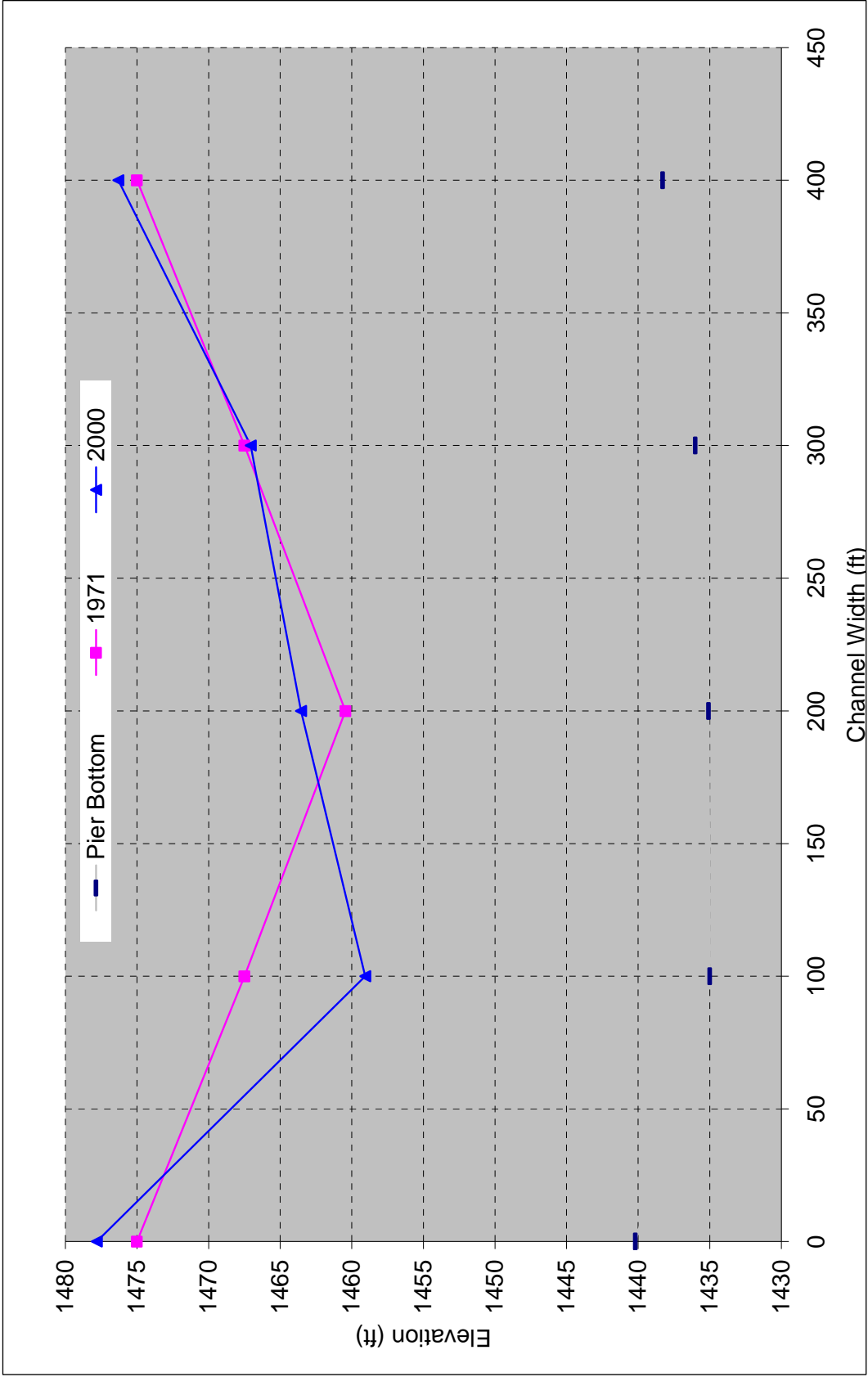


Figure 21. Cross-section at bridge (Key No. 18134 and RS 10) on US 270, North Canadian River, OK

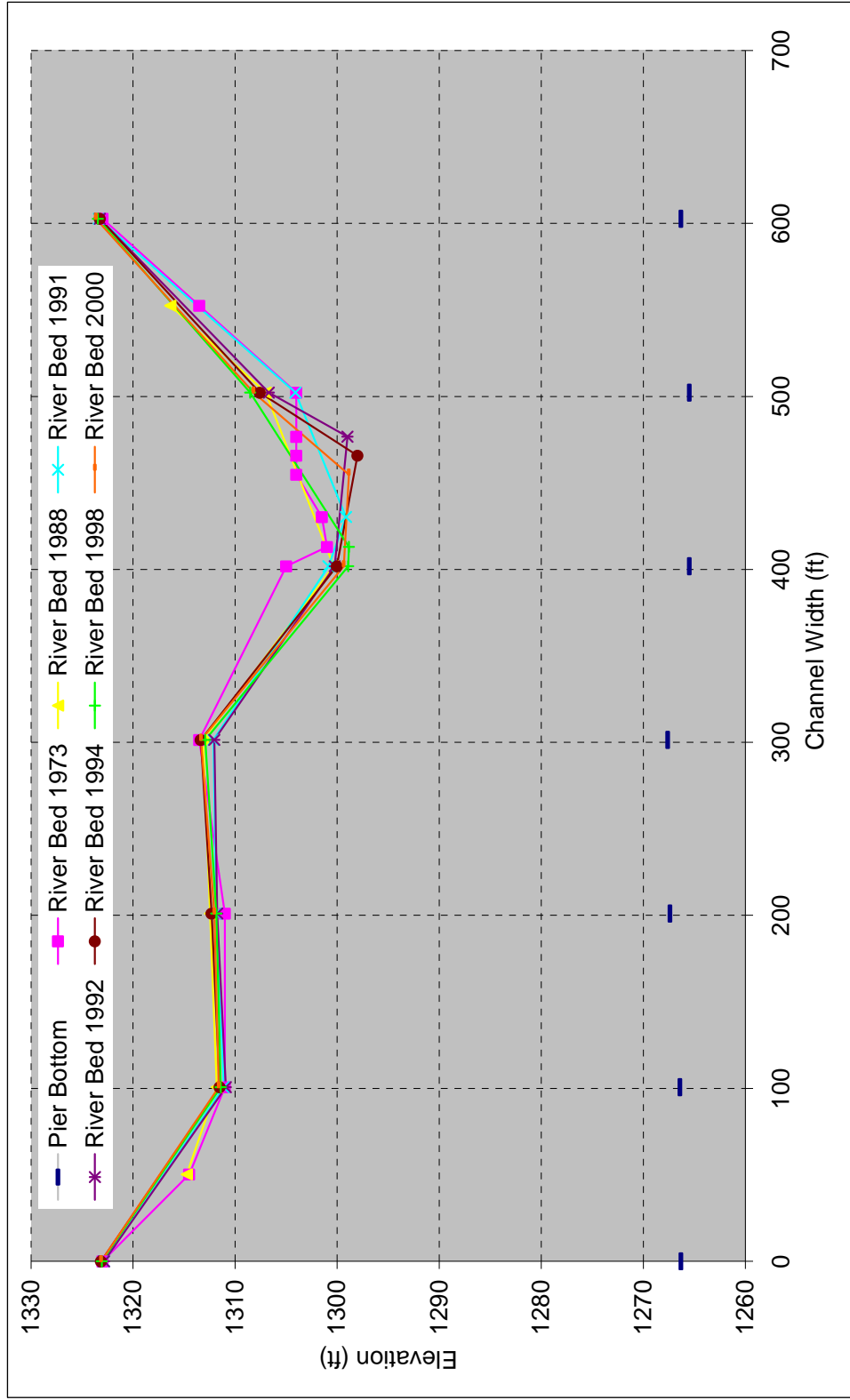


Figure 22. Cross-section at bridge (Key No. 18608 and RS 12) on US 81, North Canadian River, OK

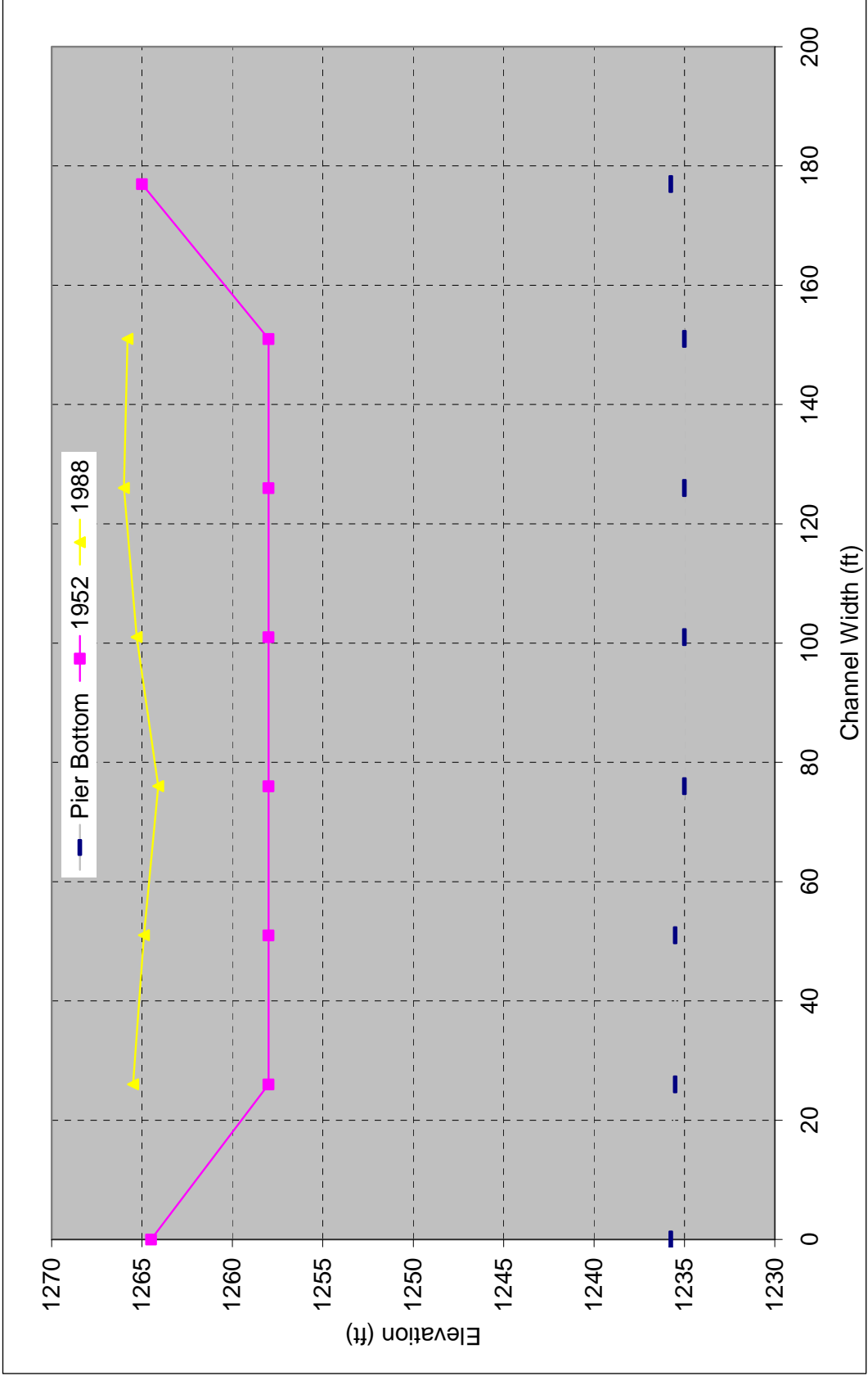


Figure 23. Cross-section at bridge (Key No. 12832 and RS 13) on SH 4, North Canadian River, OK

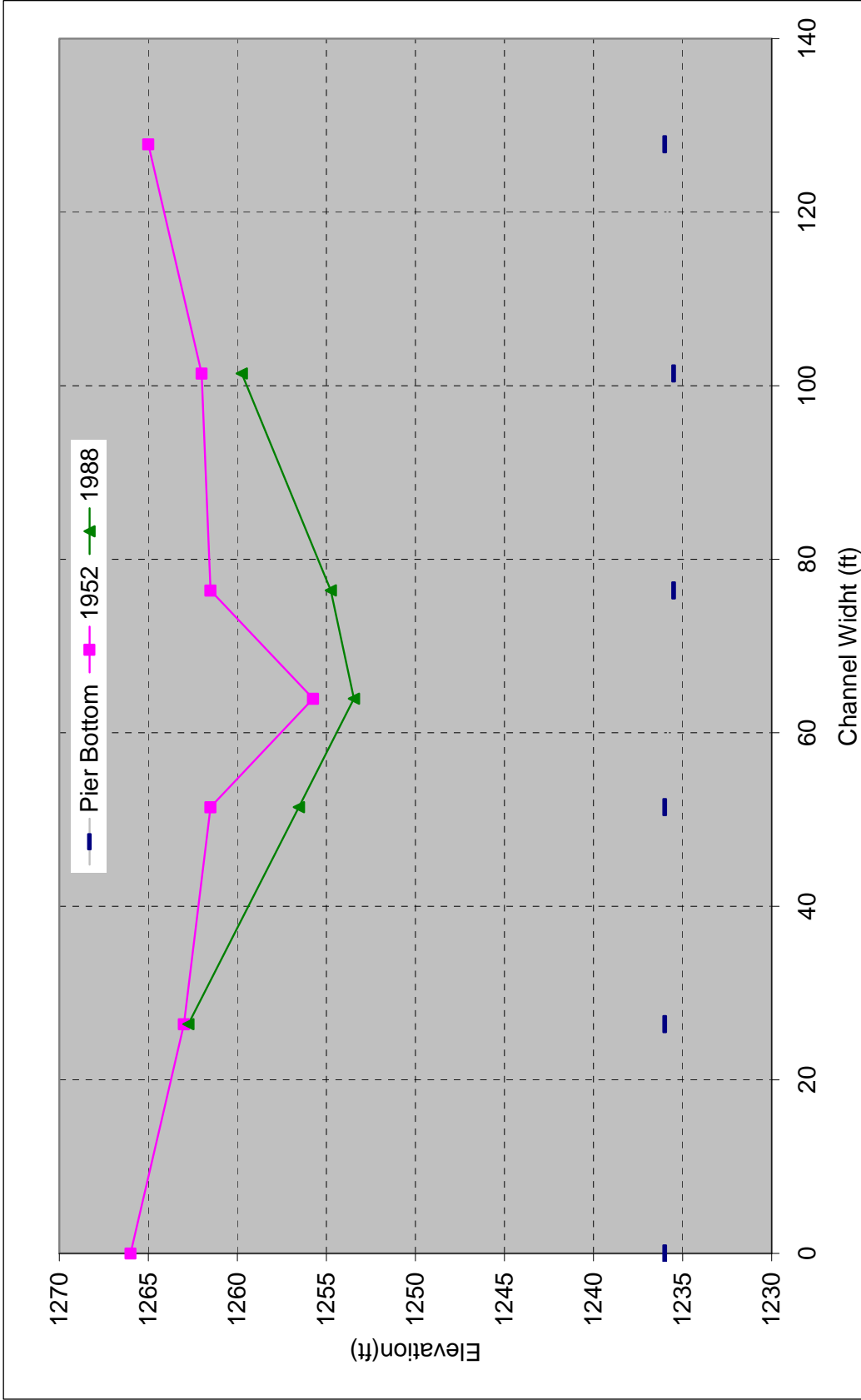


Figure 24. Cross-section at bridge (Key No. 12820 and RS 14) on SH 4, North Canadian River, OK

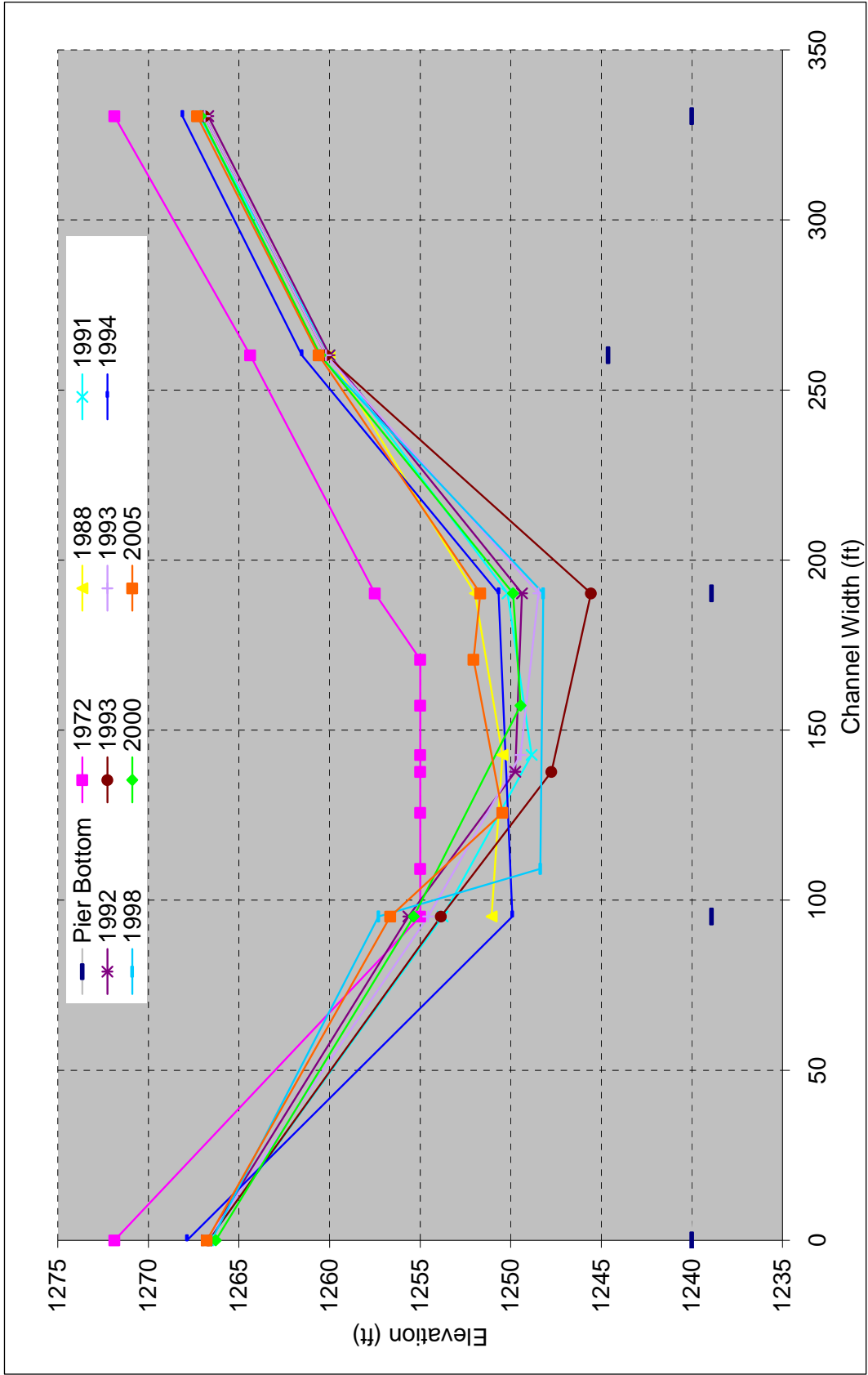


Figure 25. Cross-section at bridge (Key No. 18352 and RS 15) on SH 4, North Canadian River, OK



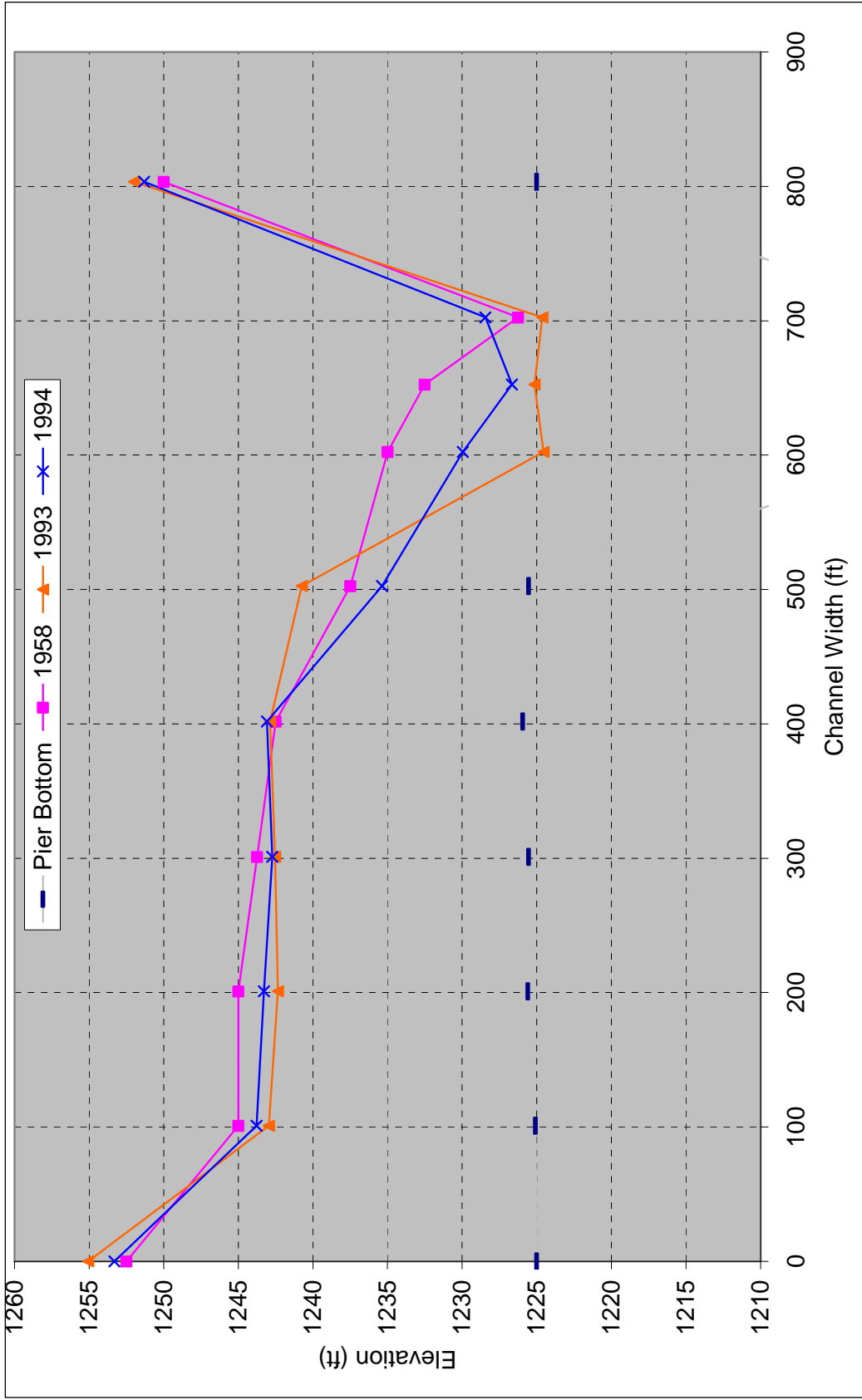


Figure 26. Cross-section at bridge (Key No. 14208 and RS 16) on US 66, North Canadian River, OK

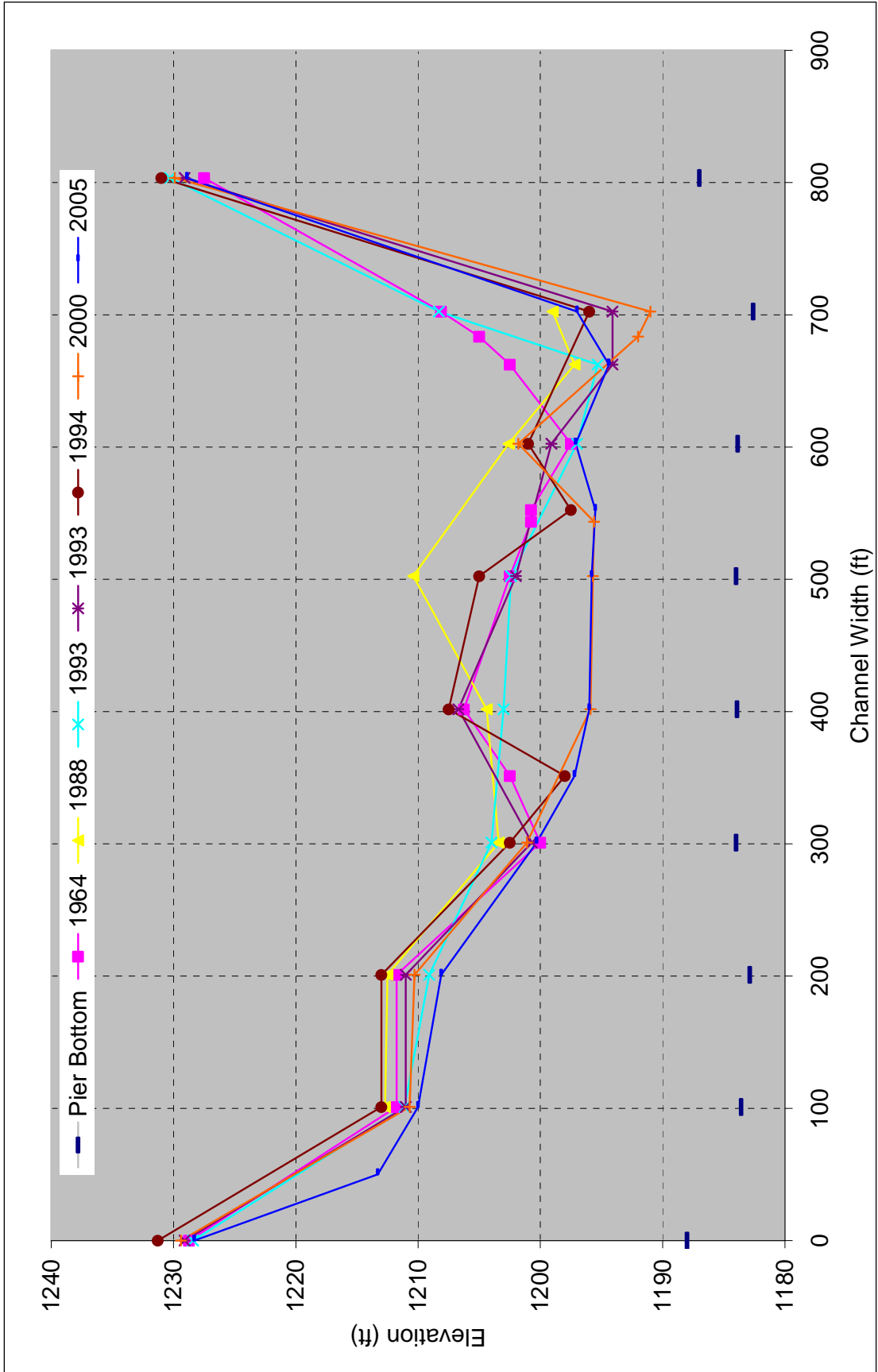


Figure 27. Cross-section at bridge (Key No. 16189 and RS 17) on I-40, North Canadian River, OK

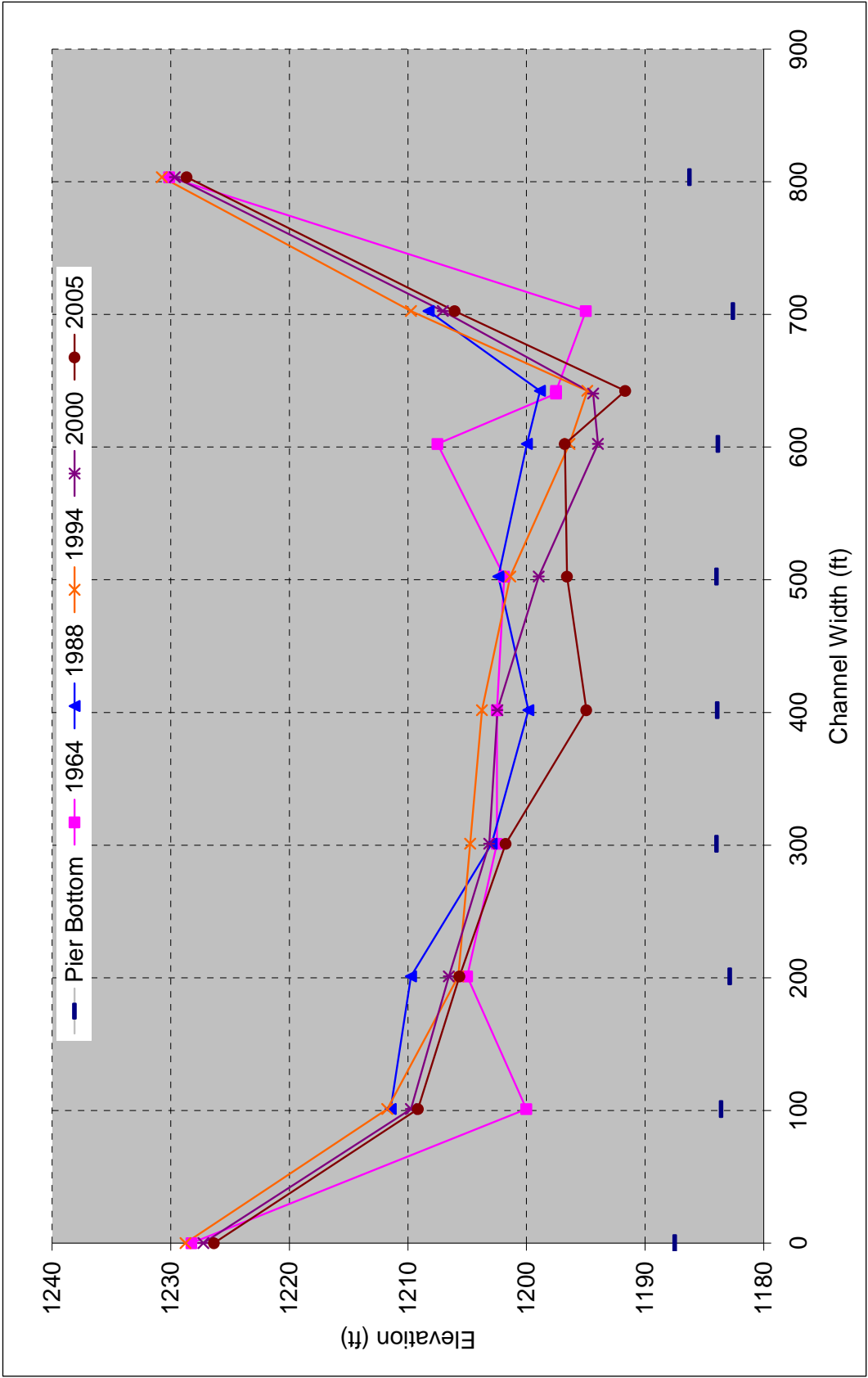


Figure 28. Cross-section at bridge (Key No. 16190 and RS 18) on I-40, North Canadian River, OK

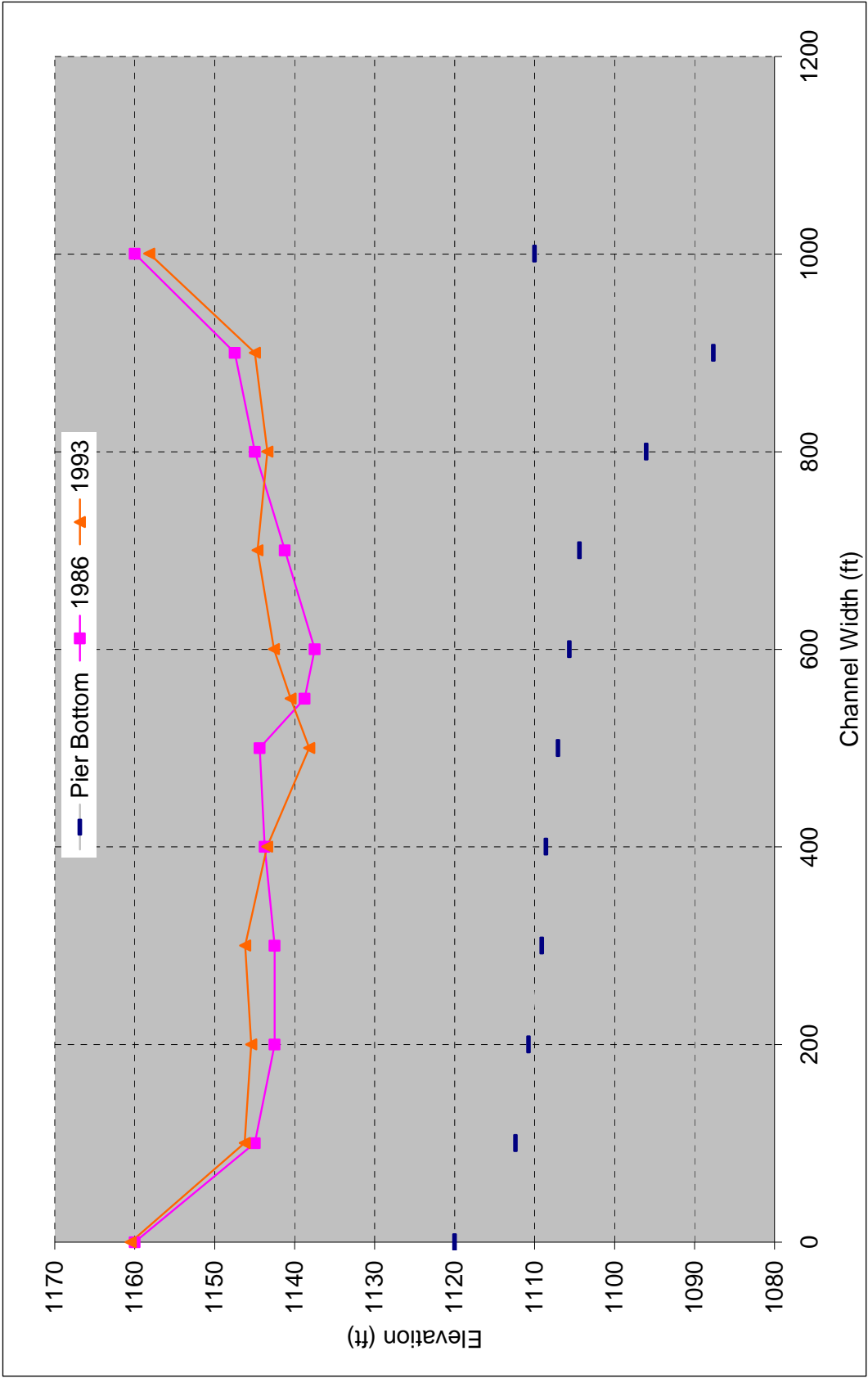


Figure 29. Cross-section at bridge (Key No. 21357 and RS 20) on US 69, North Canadian River, OK

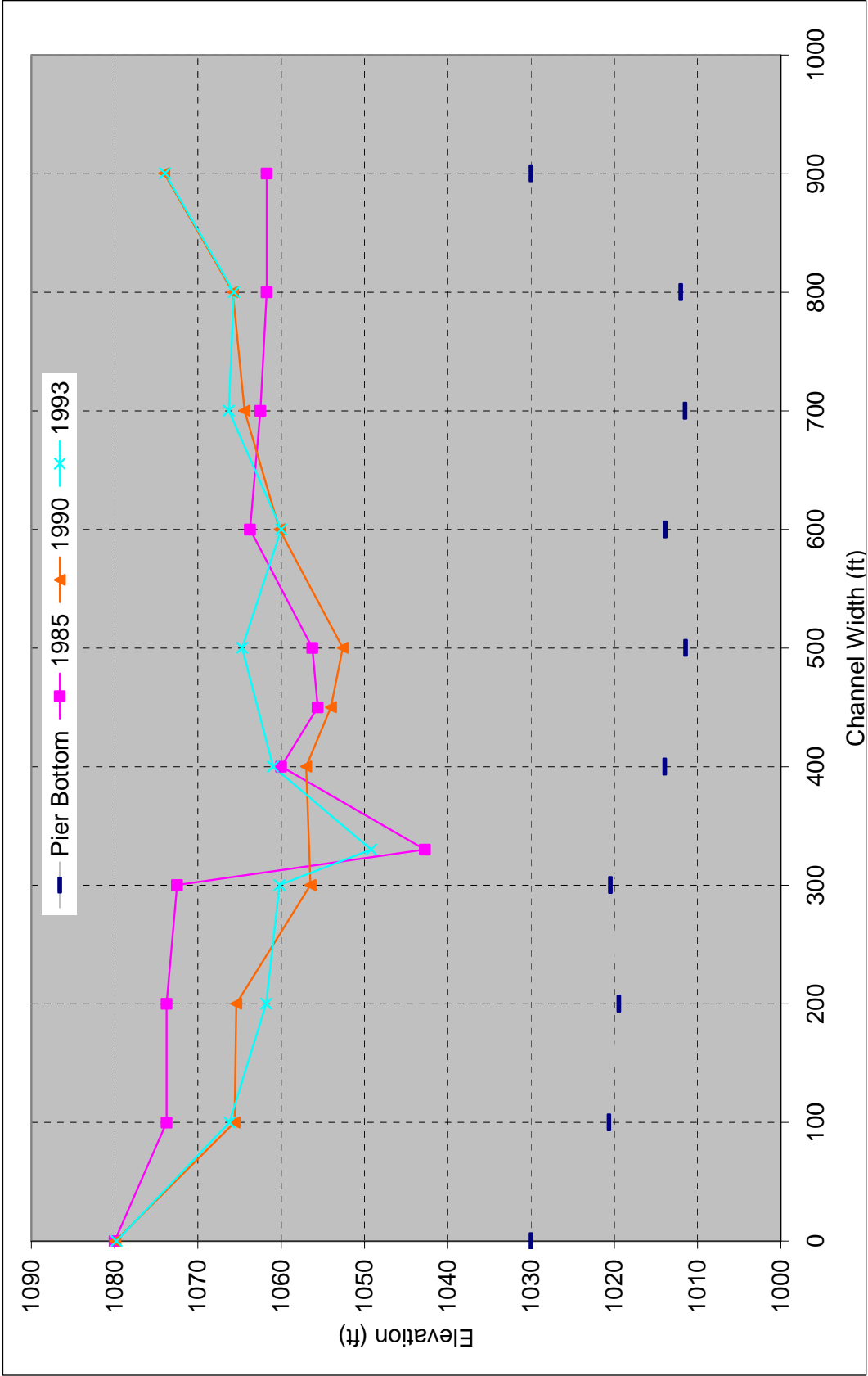


Figure 30. Cross-section at bridge (Key No. 21129 and RS 21) on US 62, North Canadian River, OK

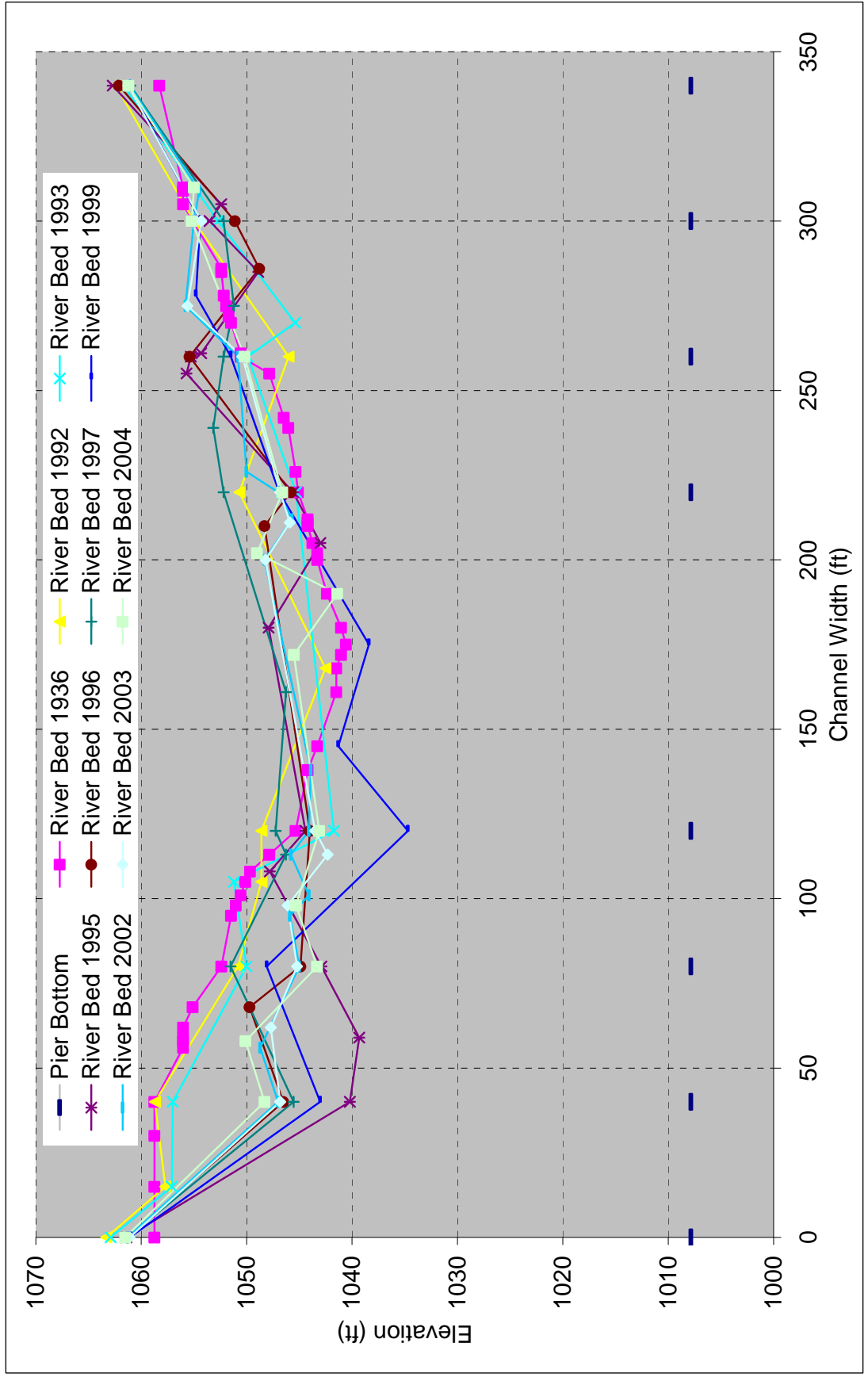


Figure 31. Cross-section at bridge (Key No. 05040 and RS 22) on SH 102, North Canadian River, OK

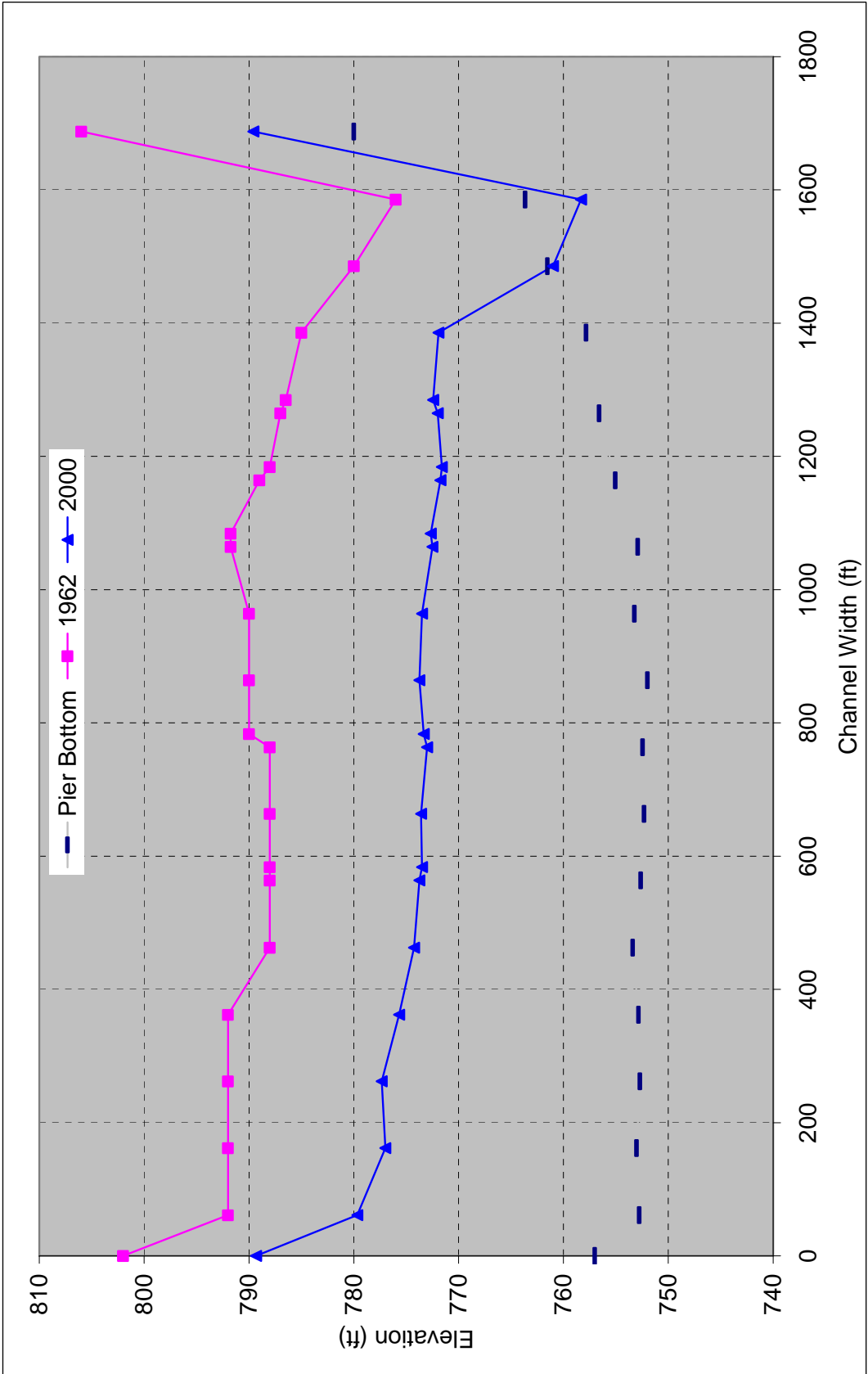


Figure 32. Cross-section at bridge (Key No. 15870 and RS 33) on I-20, North Canadian River, OK

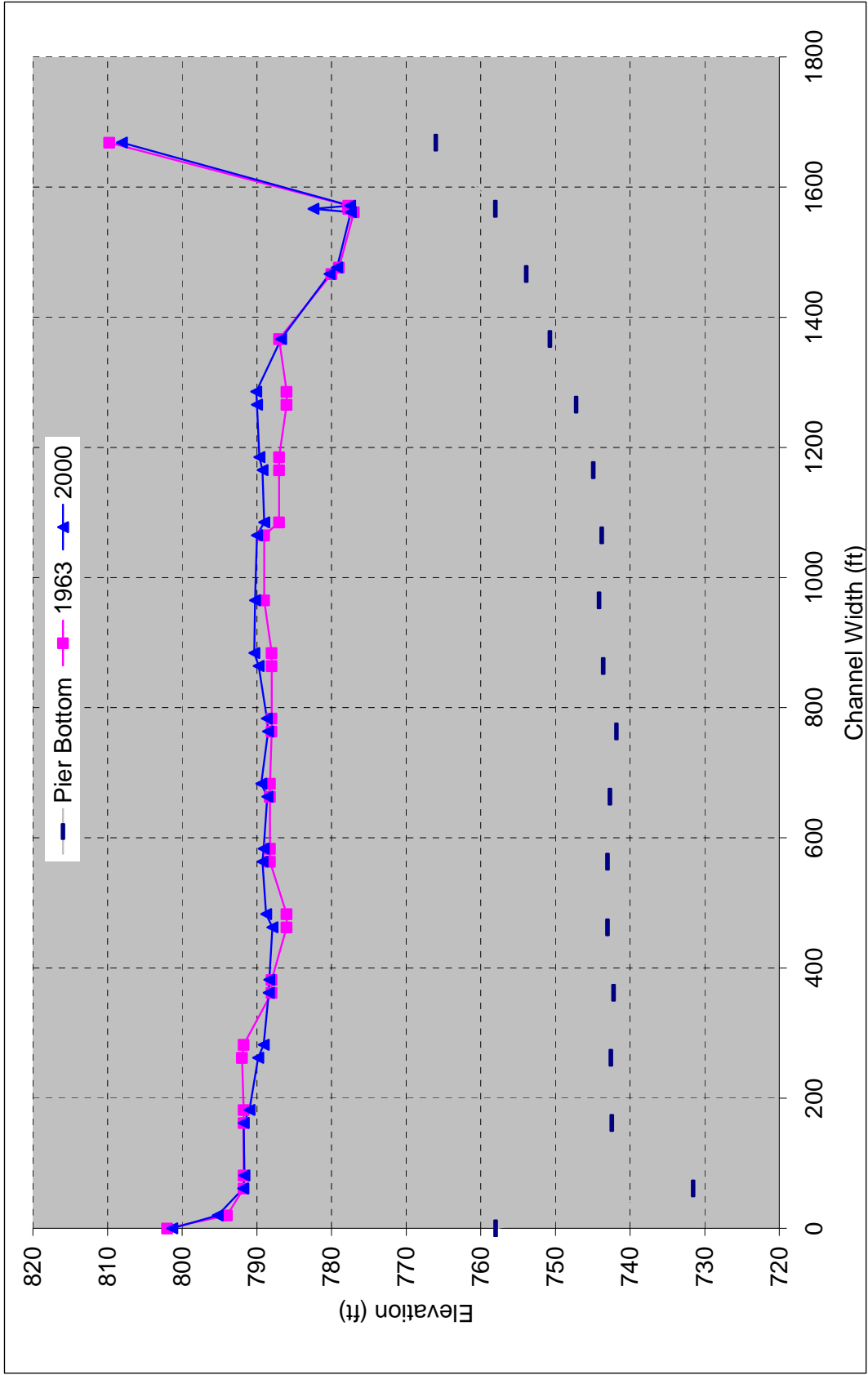


Figure 33. Cross-section at bridge (Key No. 15871 and RS 34) on I-40, North Canadian River, OK



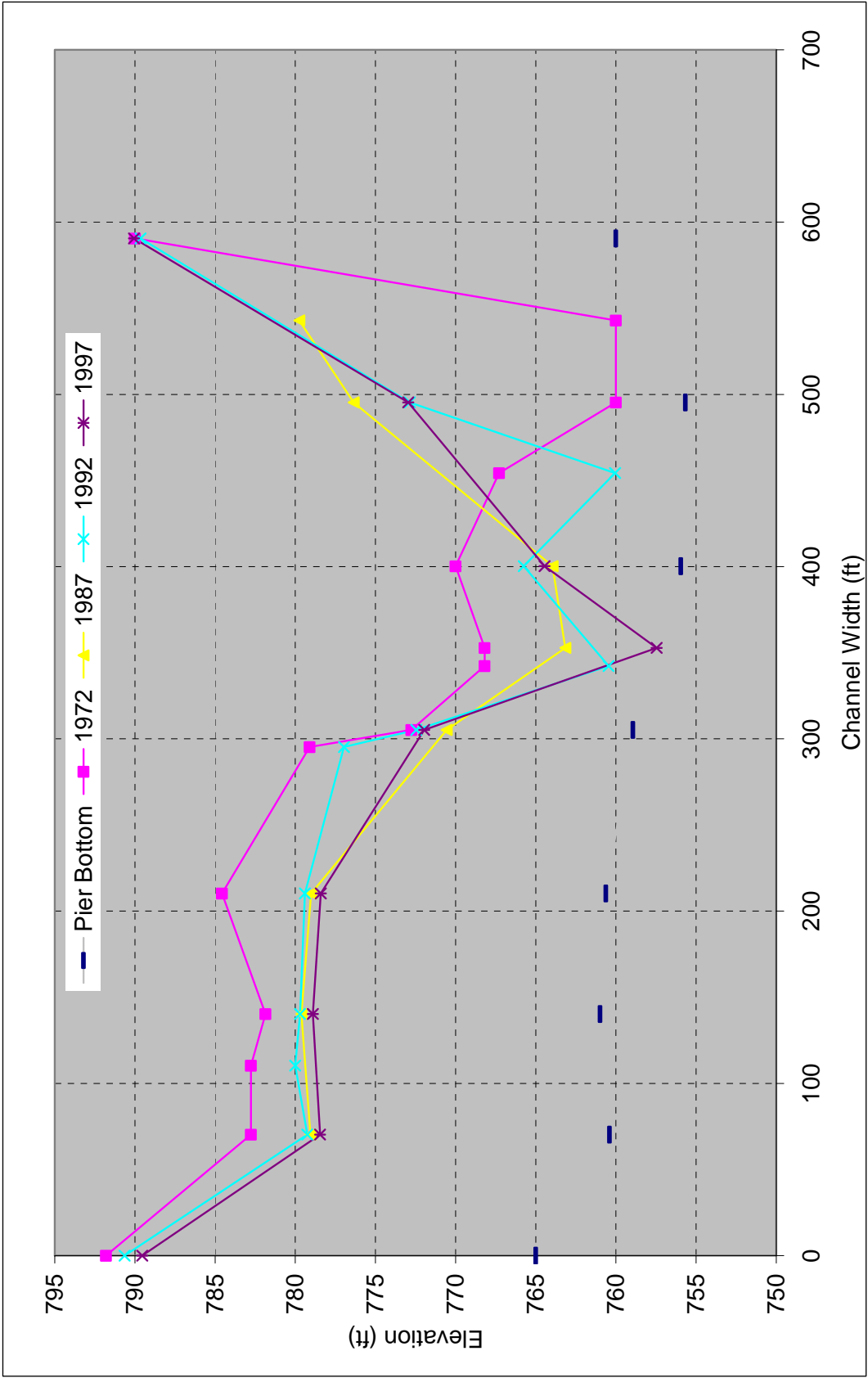


Figure 34. Cross-section at bridge (Key No. 18361 and RS 35) on S.H.48, North Canadian River, OK

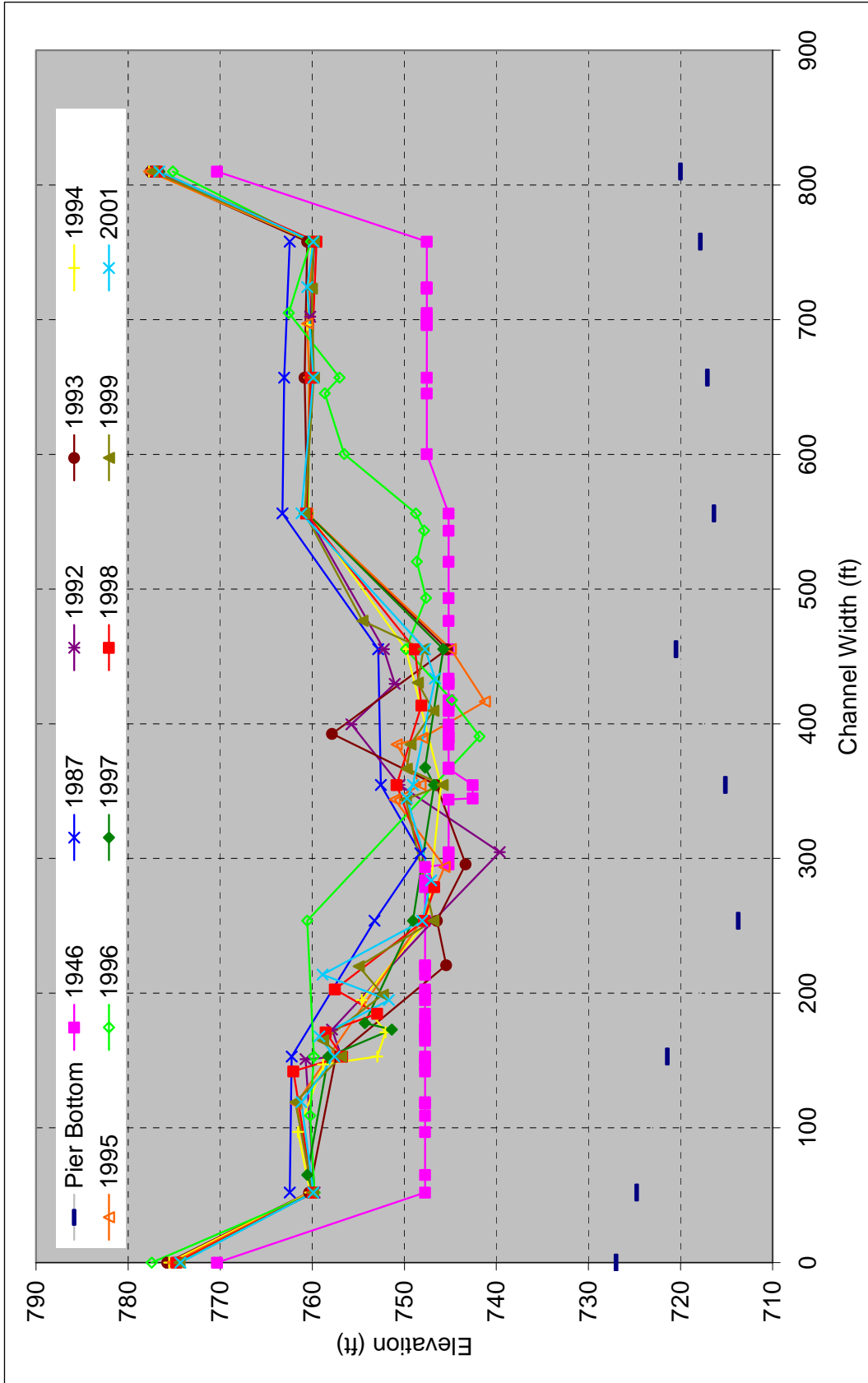


Figure 35. Cross-section at bridge (Key No. 10570 and RS 36) on S.H.27, North Canadian River, OK

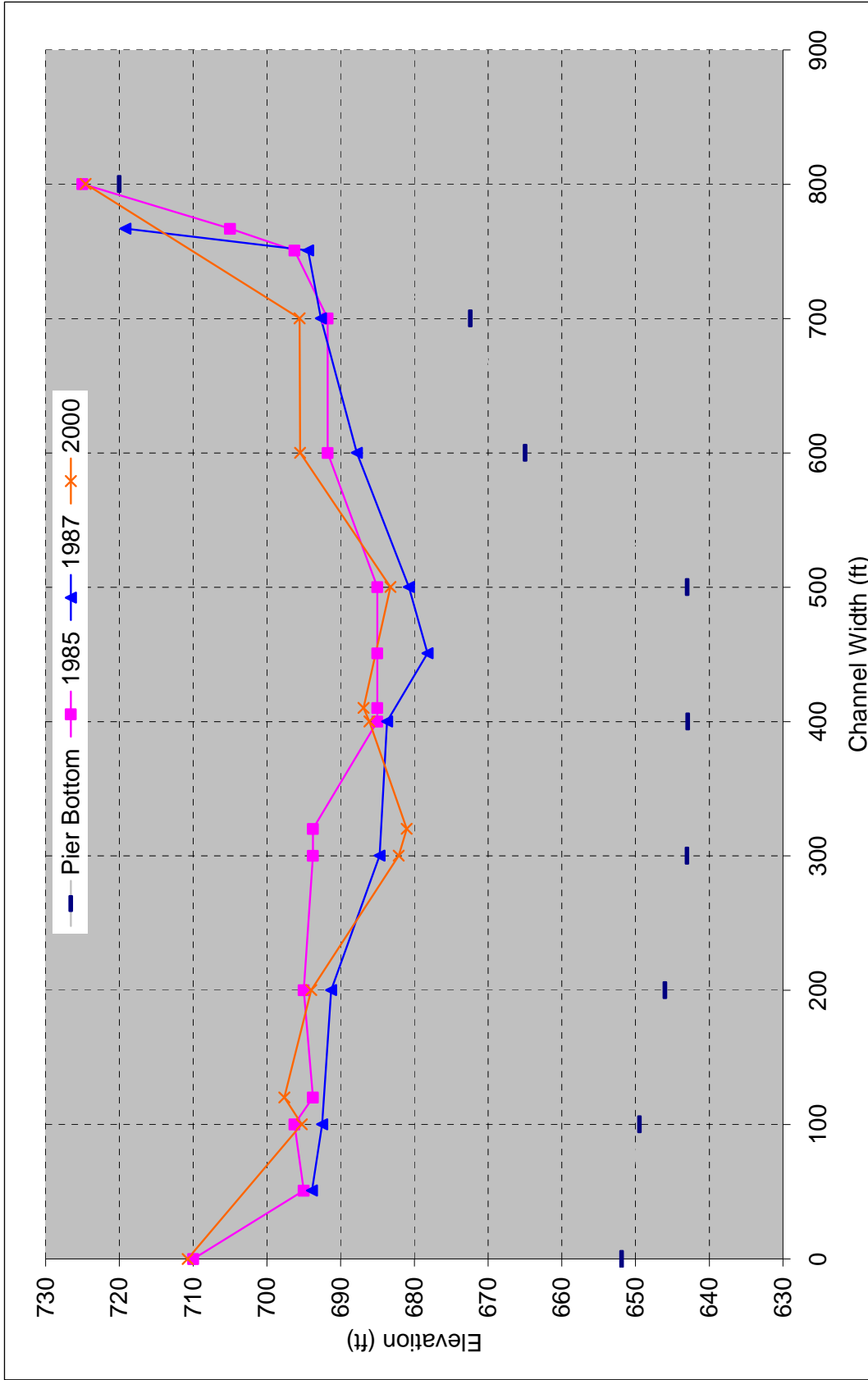


Figure 36. Cross-section at bridge (Key No. 21128 and RS 37) on U.S.75, North Canadian River, OK

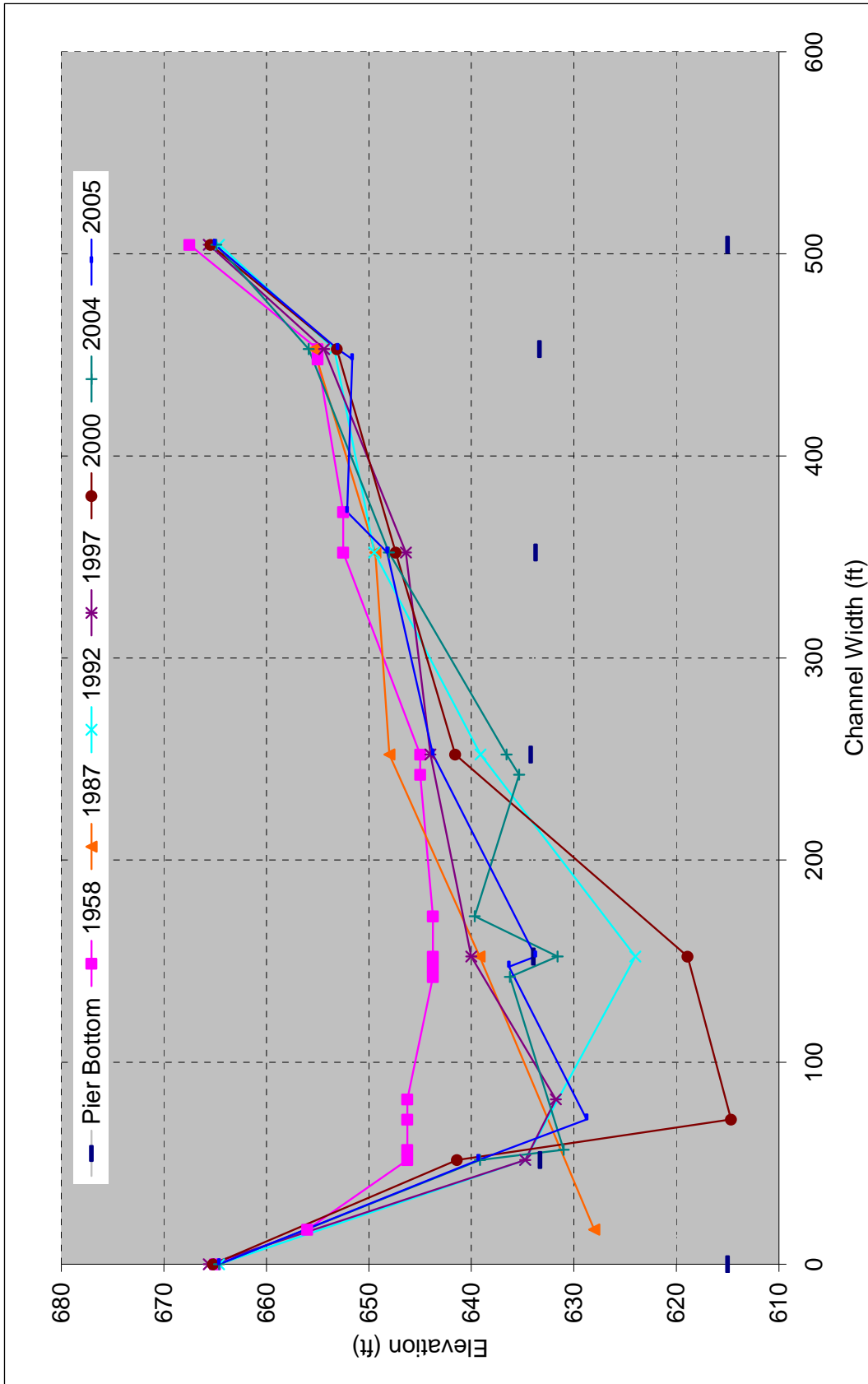


Figure 37. Cross-section at bridge (Key No. 14200 and RS 39) on S.H. 84, North Canadian River, OK

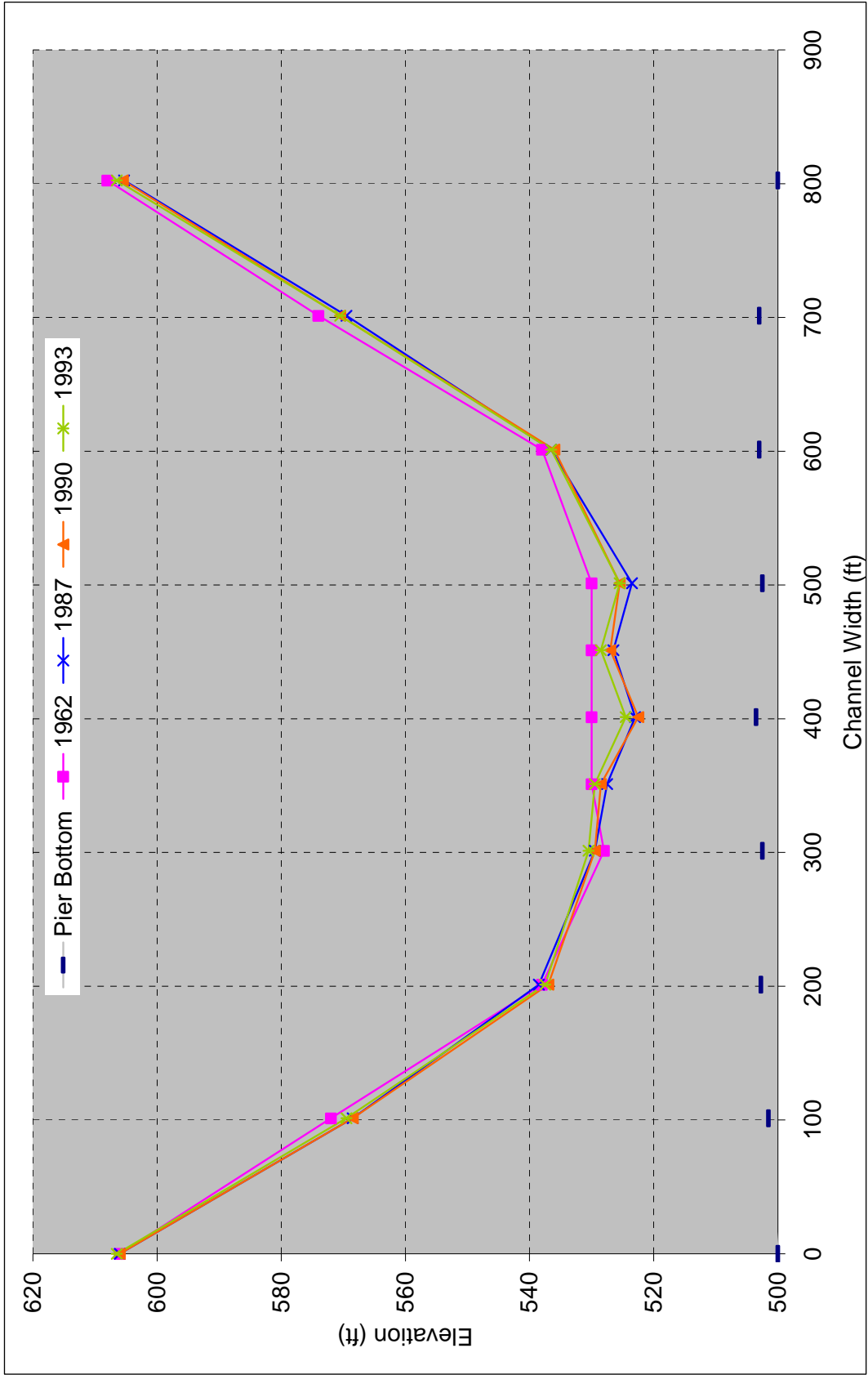


Figure 38. Cross-section at bridge (Key No. 15585 and RS 40) on U.S. 69, North Canadian River, OK

## V. ANALYSIS OF FLOWLINE PROFILE

The rate of channel-bed elevation changes was estimated as the net difference in channel-bed elevation between the starting and ending dates divided by total duration of time between the two dates (Table 3). The trend line of bed-elevation changes (Fig.39) was plotted for study Reach 1, 2, and 3. Reach 1 and 2 are at upstream of Eufaula Lake dam and Reach 3 is at downstream of Eufaula Lake dam respectively. The best fit line for the stream bed elevation change rate (Fig. 40) is also plotted.

Flowlines at each river station were interpolated for 5 year intervals (Table 4) and longitudinal profiles of flowlines were then plotted in Microsoft Excel (Fig. 41). Twenty five miles of river reach is plotted separately in each sheet for the evaluation of channel-bed elevation changes (Fig. 42-61).

In the study reach, at RS 6 and RS 7, 3.69 miles downstream the Canton Lake Dam aggradation is observed. Aggradation at the short downstream point of the dam is an uncharacteristic phenomenon. But according to the study conducted by Grant and Schmidt (2003), if the ratio of sediment supply below the dam to the sediment supply above the dam is largely greater than 1, then channel aggradation occurs downstream of the dam. RS 17 at the crossing of I-40, which is 1.69 miles downstream of the Lake Overholser Dam, shows the degradation of 5 feet in 41 years.

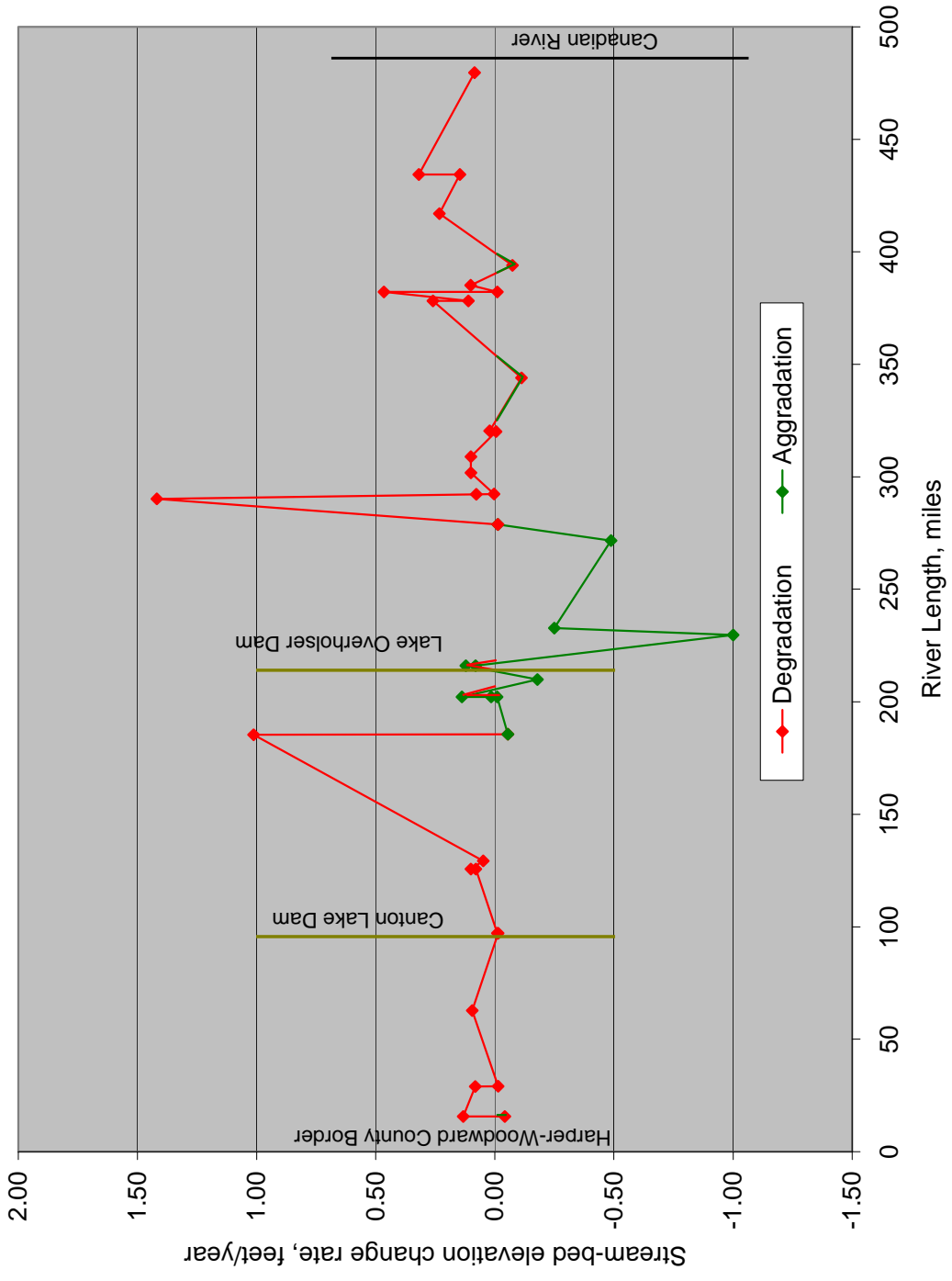
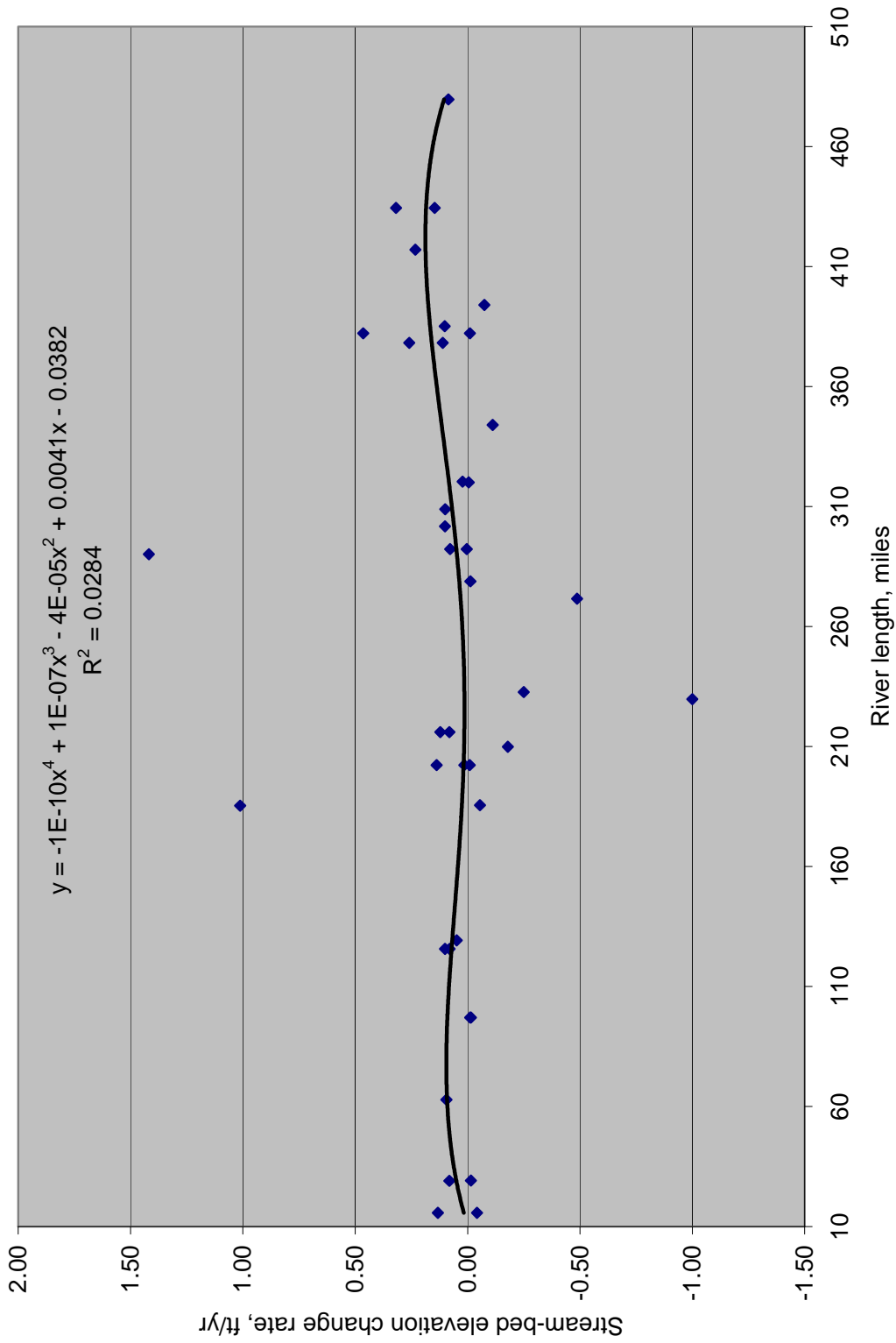


Figure 39. Trend line of stream-bed elevation changes



**Figure. 40. The best fit line of stream-bed elevation change rate (ft/yr) versus river length in miles**



**Table 3. Summary- channel –bed elevation change, North Canadian River**

| <b>BRI_key</b> | <b>River Station</b> | <b>Miles</b> | <b>Highway</b> | <b>Bridge Installed</b> | <b>Stratum</b>              | <b>Max. Scour** (ft)</b> | <b>Duration (yr)</b> | <b>Scour Rate** (ft/yr)</b> |
|----------------|----------------------|--------------|----------------|-------------------------|-----------------------------|--------------------------|----------------------|-----------------------------|
| *b16523        | RS1                  | 15.72        | S.H.34         | 1965                    | Sand to Medium Hard Red Bed | -1.10                    | 26                   | -0.042                      |
| b16642         | RS2                  | 15.72        | S.H.34         | 1965                    | Sand to Medium Hard Red Bed | 4.63                     | 35                   | 0.1321                      |
| *b17509        | RS3                  | 29.05        | S.H. 50        | 1969                    | Sand to Soft Red Bed        | -0.31                    | 22                   | -0.0142                     |
| b17602         | RS4                  | 29.15        | S.H. 50        | 1969                    | Sand to Soft Red Bed        | 2.78                     | 34                   | 0.0816                      |
| b16193         | RS5                  | 62.82        | U.S. 60        | 1964                    | Sand to Medium Hard Shale   | 3.40                     | 36                   | 0.0944                      |
| b13679         | RS6                  | 97.12        | S.H. 51        | 1956                    | Sand to Red Bed             | -0.68                    | 48                   | -0.0142                     |
| *b13655        | RS7                  | 97.12        | S.H. 51        | 1956                    | Sand to Red Bed             | -0.50                    | 46                   | -0.0109                     |
| b20864         | RS8                  | 125.64       | U.S. 270       | 1984                    | Sand to Red Bed             | 1.60                     | 20                   | 0.0800                      |
| b05523         | RS9                  | 125.67       | U.S. 270       | 1937                    | Sand to Red Bed             | 5.83                     | 58                   | 0.1005                      |
| b18134         | RS10                 | 129.29       | U.S. 270       | 1971                    | Sand to Medium Hard Sale    | 1.40                     | 29                   | 0.0483                      |
| *b26237        | RS11                 | 185.37       | U.S. 81        | 2000                    | Sand to Medium Hard Red Bed | 5.06                     | 5                    | 1.0125                      |
| b18608         | RS12                 | 185.57       | U.S. 81        | 1973                    | Sand to Medium Hard Red Bed | -1.75                    | 32                   | -0.0547                     |
| b12832         | RS13                 | 202.22       | S.H. 4         | 1952                    | Medium Packed Sand to Shale | -0.50                    | 53                   | -0.0094                     |
| b12820         | RS14                 | 202.22       | S.H. 4         | 1952                    | Sand to Rock Sand           | 0.80                     | 53                   | 0.0151                      |
| b18352         | RS15                 | 202.22       | S.H.4          | 1972                    | Sand to Red Bed             | 4.55                     | 33                   | 0.1379                      |

**Table 3. (Continued)**

| <b>BRI_key</b> | <b>River Station</b> | <b>Miles</b> | <b>Highway</b>     | <b>Bridge Installed</b> | <b>Stratum</b>              | <b>Max. Scour** (ft)</b> | <b>Duration (yr)</b> | <b>Scour Rate** (ft/yr)</b> |
|----------------|----------------------|--------------|--------------------|-------------------------|-----------------------------|--------------------------|----------------------|-----------------------------|
| b14208         | RS16                 | 209.88       | U.S. 66            | 1958                    | Sand to Red Bed             | -8.40                    | 47                   | -0.1787                     |
| b16189         | RS17                 | 216.03       | I-40               | 1964                    | Sand to Red Bed             | 5.00                     | 41                   | 0.1220                      |
| b16190         | RS18                 | 216.04       | I-40               | 1964                    | Sand to Red Bed             | 3.33                     | 41                   | 0.0812                      |
| *b27867        | RS19                 | 229.72       | I-40 WB TO I-35 NB | 2003                    | Sand to Sand Stone          | -2.00                    | 2                    | -1.0000                     |
| b21357         | RS20                 | 232.75       | U.S. 62            | 1986                    | Sand to Sand Stone          | -4.75                    | 19                   | -0.2500                     |
| b21129         | RS21                 | 271.65       | U.S. 62            | 1985                    | Sand to Sand Stone          | -9.75                    | 20                   | -0.4875                     |
| b05040         | RS22                 | 278.83       | S.H. 102           | 1936                    | Sand                        | -0.83                    | 68                   | -0.0122                     |
| *b20576        | RS23                 | 290.19       | S.H. 270           | 1983                    | Sand to Soft Sandy Clay     | 15.60                    | 11                   | 1.4182                      |
| *b15380        | RS24                 | 292.30       | I-40               | 1961                    | Sand to Red Bed             | 2.03                     | 26                   | 0.0781                      |
| *b15381        | RS25                 | 292.31       | I-40               | 1961                    | Sand to Hard Sand Stone     | 0.09                     | 26                   | 0.0035                      |
| *b15388        | RS26                 | 301.79       | U.S. 270           | 1961                    | Sand to Red Bed             | 4.43                     | 44                   | 0.1007                      |
| *b19276        | RS27                 | 308.91       | S.H.-3E            | 1976                    | Fine Sand to Hard Shale     | 2.70                     | 27                   | 0.1000                      |
| *b15865        | RS28                 | 320.10       | N/A                | 1962                    | Clay to Shale               | -0.17                    | 33                   | -0.0052                     |
| *b15864        | RS29                 | 320.42       | N/A                | 1962                    | Sand to Hard Red Bed        | 0.73                     | 33                   | 0.0221                      |
| *b22683        | RS30                 | 343.98       | S.H. 99            | 1990                    | Silty Sand to Shaley Clay   | -1.45                    | 13                   | -0.1115                     |
| *b22686        | RS31                 | 378.25       | S.H. 56            | 1990                    | Weathered Sandstone to Rock | 3.90                     | 15                   | 0.2600                      |
| *b22666        | RS32                 | 378.25       | S.H. 57            | 1990                    | Weathered Shale to Rock     | 1.66                     | 15                   | 0.1107                      |
| b15870         | RS33                 | 382.16       | I-40               | 1962                    | Sand to Medium Hard Shale   | 17.67                    | 38                   | 0.4650                      |

**Table 3. (Continued)**

| <b>BRI_key</b> | <b>River Station</b> | <b>Miles</b> | <b>Highway</b> | <b>Bridge Installed</b> | <b>Stratum</b>                          | <b>Max. Scour** (ft)</b> | <b>Duration (yr)</b> | <b>Scour Rate** (ft/yr)</b> |
|----------------|----------------------|--------------|----------------|-------------------------|---|--------------------------|----------------------|-----------------------------|
| b15871         | RS34                 | 382.16       | I-40           | 1963                    | Sand to Gray Shale                      | -0.42                    | 40                   | -0.0105                     |
| b18361         | RS35                 | 385.13       | S.H.48         | 1972                    | Sand to Hard Sand Stone                 | 2.54                     | 25                   | 0.1018                      |
| b10570         | RS36                 | 394.03       | S.H. 27        | 1946                    | Sand to Shale to Rock                   | -4.08                    | 55                   | -0.0742                     |
| b21128         | RS37                 | 417.02       | U.S. 75        | 1985                    | Sand to Coarse Sandy Clay to Gray Shale | 3.95                     | 17                   | 0.2324                      |
| *b14189        | RS38                 | 434.44       | S.H. 84        | 1958                    | Sand to Shale                           | 5.00                     | 34                   | 0.1471                      |
| b14200         | RS39                 | 434.44       | S.H. 84        | 1958                    | Sand to Sand Stone                      | 15.00                    | 47                   | 0.3191                      |
| b15585         | RS40                 | 479.66       | U.S. 69        | 1962                    | Rock                                    | 3.50                     | 41                   | 0.0854                      |

\* Bridges without cross section data

\*\*Note: (-) Aggradation  
: (+) Degradation

**Table 4. Flowline interpolated data for 5 years interval, North Canadian River**

| Location    |                  |        | Years   |         |         |         |         |         |           |         |         |  |  |  |  |
|-------------|------------------|--------|---------|---------|---------|---------|---------|---------|-----------|---------|---------|--|--|--|--|
| BRL_K<br>EY | River<br>Station | Miles  | 1965    | 1970    | 1975    | 1980    | 1985    | 1990    | 1995      | 2000    | 2005    |  |  |  |  |
| 16523       | RS1              | 15.72  | 1869.33 | 1869.63 | 1869.48 | 1869.43 | 1869.85 | 1870.43 | 1870.43   | 1870.43 | 1870.43 |  |  |  |  |
| 16642       | RS2              | 15.72  | 1868.13 | 1865.40 | 1865.00 | 1864.40 | 1864.70 | 1864.10 | 1863.87   | 1863.50 | 1862.52 |  |  |  |  |
| 17509       | RS3              | 29.05  |         | 1814.61 | 1813.33 | 1813.29 | 1815.26 | 1815.31 | 1815.31   | 1815.31 | 1815.31 |  |  |  |  |
| 17602       | RS4              | 29.15  |         | 1810.85 | 1811.25 | 1810.38 | 1811.25 | 1809.90 | 1810.00   | 1810.15 | 1810.48 |  |  |  |  |
| 16193       | RS5              | 62.82  | 1680.06 | 1678.76 | 1679.26 | 1678.16 | 1677.31 | 1676.56 | 1677.30   | 1678.35 | 1676.36 |  |  |  |  |
| 13679       | RS6              | 97.12  | 1557.18 | 1556.18 | 1554.68 | 1555.51 | 1555.48 | 1556.23 | 1557.88   | 1555.46 | 1559.02 |  |  |  |  |
| 13655       | RS7              | 97.12  | 1561.40 | 1561.51 | 1561.56 | 1561.61 | 1561.79 | 1561.71 | 1562.00   | 1561.59 | 1561.19 |  |  |  |  |
| 20864       | RS8              | 125.64 | 1476.40 | 1476.30 | 1475.50 | 1475.37 | 1473.13 | 1471.90 | 1477.40   | 1474.62 | 1471.84 |  |  |  |  |
| 5523        | RS9              | 125.67 | 1468.50 | 1468.40 | 1467.60 | 1467.47 | 1465.93 | 1468.19 | 1469.17   | 1469.54 | 1469.91 |  |  |  |  |
| 18134       | RS10             | 129.29 |         |         | 1460.45 | 1461.53 | 1460.25 | 1460.05 | 1461.25   | 1459.05 | 1456.85 |  |  |  |  |
| 26237       | RS11             | 185.37 |         |         |         |         |         |         |           | 1300.83 | 1295.77 |  |  |  |  |
| 18608       | RS12             | 185.57 |         |         | 1302.55 | 1301.97 | 1300.75 | 1300.05 | 1298.23   | 1298.85 | 1302.75 |  |  |  |  |
| 12832       | RS13             | 202.22 | 1263.00 | 1258.50 | 1260.16 | 1261.82 | 1258.00 | 1257.80 | 1258.05   | 1258.27 | 1258.50 |  |  |  |  |
| 12820       | RS14             | 202.22 | 1258.15 | 1259.15 | 1255.15 | 1256.82 | 1255.25 | 1254.05 | 1254.75   | 1255.01 | 1254.95 |  |  |  |  |
| 18352       | RS15             | 202.22 |         |         | 1253.88 | 1251.88 | 1250.38 | 1249.38 | 1249.49   | 1249.45 | 1250.45 |  |  |  |  |
| 14208       | RS16             | 209.88 | 1237.75 | 1232.95 | 1232.91 | 1232.87 | 1240.75 | 1230.79 | 1227.3955 | 1231.02 | 1234.65 |  |  |  |  |

**Table 4. (Continued)**

| Location    |                  |        | Years   |         |         |         |         |         |         |         |         |  |  |  |
|-------------|------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--|--|--|
| BRL_K<br>EY | River<br>Station | Miles  | 1965    | 1970    | 1975    | 1980    | 1985    | 1990    | 1995    | 2000    | 2005    |  |  |  |
| 16189       | RS17             | 206.03 | 1199.22 | 1207.80 | 1200.50 | 1200.58 | 1198.70 | 1196.70 | 1195.17 | 1191.00 | 1192.50 |  |  |  |
| 16190       | RS18             | 216.04 | 1197.10 | 1207.58 | 1199.68 | 1199.51 | 1198.33 | 1196.08 | 1194.73 | 1193.98 | 1191.68 |  |  |  |
| 27867       | RS 19            | 229.72 |         |         |         |         |         |         |         |         | 1148.00 |  |  |  |
| 21357       | RS20             | 23275  |         |         |         |         |         | 1140.45 | 1143.26 | 1142.75 | 1142.25 |  |  |  |
| 21129       | RS21             | 271.65 |         |         |         |         | 1042.75 | 1052.60 | 1050.06 | 1051.28 | 1052.50 |  |  |  |
| 05040       | RS22             | 278.83 | 1050.93 | 1052.71 | 1048.64 | 1046.81 | 1045.75 | 1043.44 | 1042.91 | 1037.78 | 1040.51 |  |  |  |
| 20576       | RS 23            | 290.19 |         |         |         |         | 1001.25 | 992.68  | 991.35  | 999.05  | 1006.05 |  |  |  |
| 15380       | RS 24            | 292.30 | 1015.59 | 1015.15 | 1015.07 | 1014.61 | 1014.15 | 1013.70 | 1013.24 | 1012.78 | 1012.32 |  |  |  |
| 15381       | RS 25            | 292.31 | 1014.31 | 1014.59 | 1014.51 | 1014.26 | 1014.01 | 1013.76 | 1013.51 | 1013.26 | 1013.01 |  |  |  |
| 15388       | RS 26            | 301.79 | 974.47  | 974.47  | 973.97  | 972.97  | 975.67  | 973.53  | 972.97  | 972.97  | 972.57  |  |  |  |
| 19276       | RS 27            | 308.91 |         |         |         | 955.60  | 955.00  | 954.29  | 953.83  | 953.50  | 953.17  |  |  |  |
| 15865       | RS 28            | 320.10 | 929.62  | 928.62  | 928.07  | 929.27  | 927.27  | 925.97  | 931.17  | 937.30  | 943.42  |  |  |  |
| 15864       | RS 29            | 320.42 | 929.77  | 928.47  | 929.27  | 929.47  | 926.57  | 926.07  | 930.77  | 936.40  | 942.02  |  |  |  |
| 22683       | RS 30            | 343.98 |         |         |         |         |         | 865.00  | 867.25  | 866.75  | 866.25  |  |  |  |
| 22686       | RS 31            | 378.25 |         |         |         |         |         | 787.50  | 786.00  | 784.50  | 783.60  |  |  |  |
| 22666       | RS 32            | 378.25 |         |         |         |         |         | 802.50  | 801.28  | 801.00  | 800.84  |  |  |  |

**Table 4. (Continued)**

| Location    |                  |        | Years  |        |        |        |        |        |        |        |        |  |  |  |
|-------------|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--|--|--|
| BRL_K<br>EY | River<br>Station | Miles  | 1965   | 1970   | 1975   | 1980   | 1985   | 1990   | 1995   | 2000   | 2005   |  |  |  |
| 15871       | RS 34            | 382.16 | 777.30 | 777.67 | 776.50 | 777.50 | 777.50 | 775.30 |        |        |        |  |  |  |
| 18361       | RS 35            | 385.13 |        |        | 764.27 | 762.34 | 762.31 | 762.66 | 777.50 | 777.45 | 777.40 |  |  |  |
| 10570       | RS 36            | 394.03 | 748.74 | 746.38 | 743.74 | 745.99 | 747.54 | 746.84 | 761.46 | 751.46 | 741.46 |  |  |  |
| 21128       | RS 37            | 417.02 |        |        |        |        | 685.00 | 680.00 | 741.24 | 746.25 | 748.30 |  |  |  |
| 14189       | RS 38            | 434.44 | 656.40 | 656.52 | 656.60 | 656.55 | 656.50 | 659.00 | 684.17 | 681.94 | 679.70 |  |  |  |
| 14200       | RS 39            | 434.44 | 638.85 | 624.75 | 630.75 | 633.25 | 620.25 | 619.55 | 641.00 | 618.50 | 596.00 |  |  |  |
| 15585       | RS 40            | 479.66 | 527.93 | 527.83 | 527.72 | 527.61 | 527.50 | 522.50 | 620.75 | 614.67 | 628.75 |  |  |  |

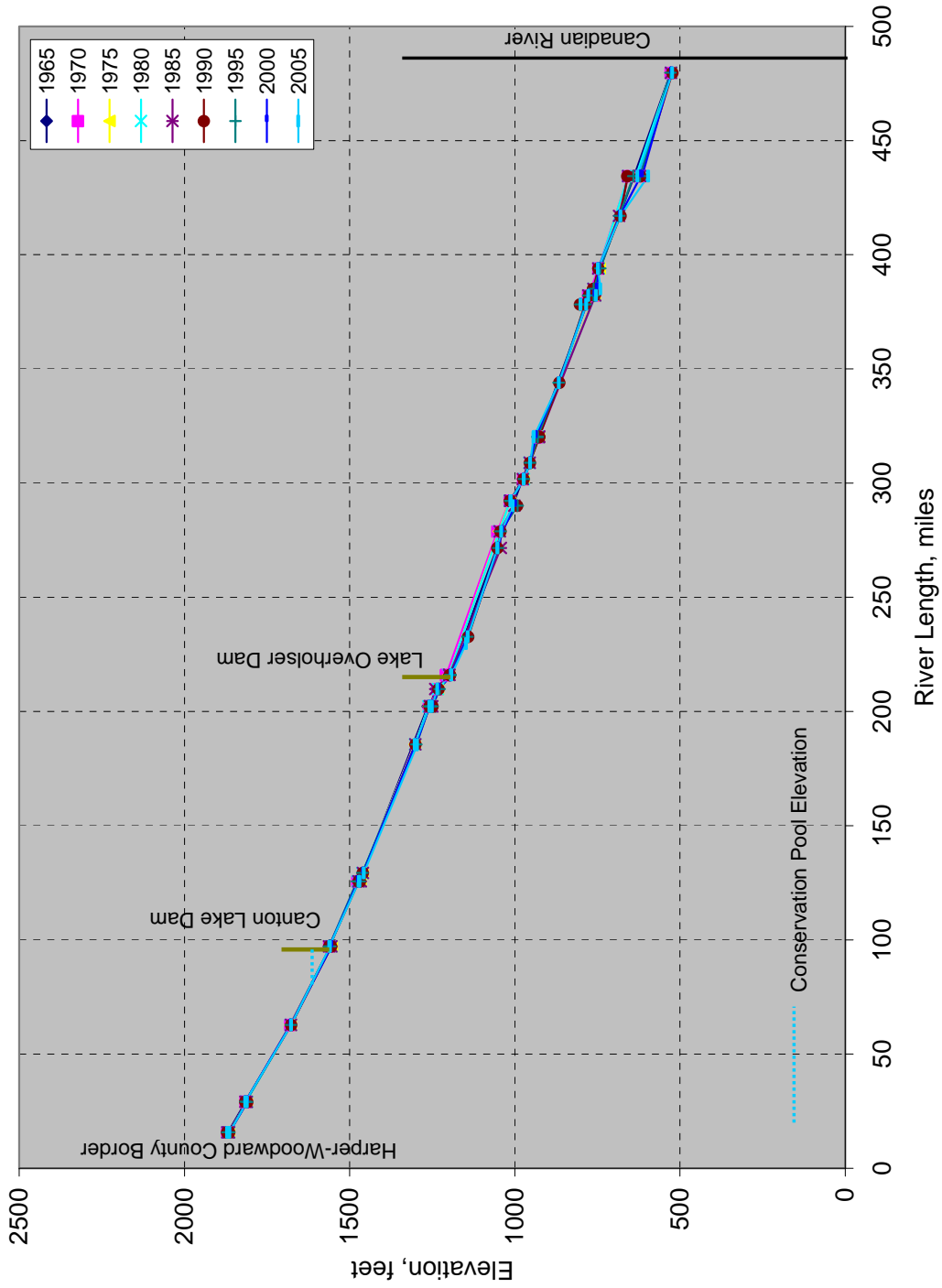


Figure 41. Longitudinal Profile of North Canadian River Bed, Oklahoma

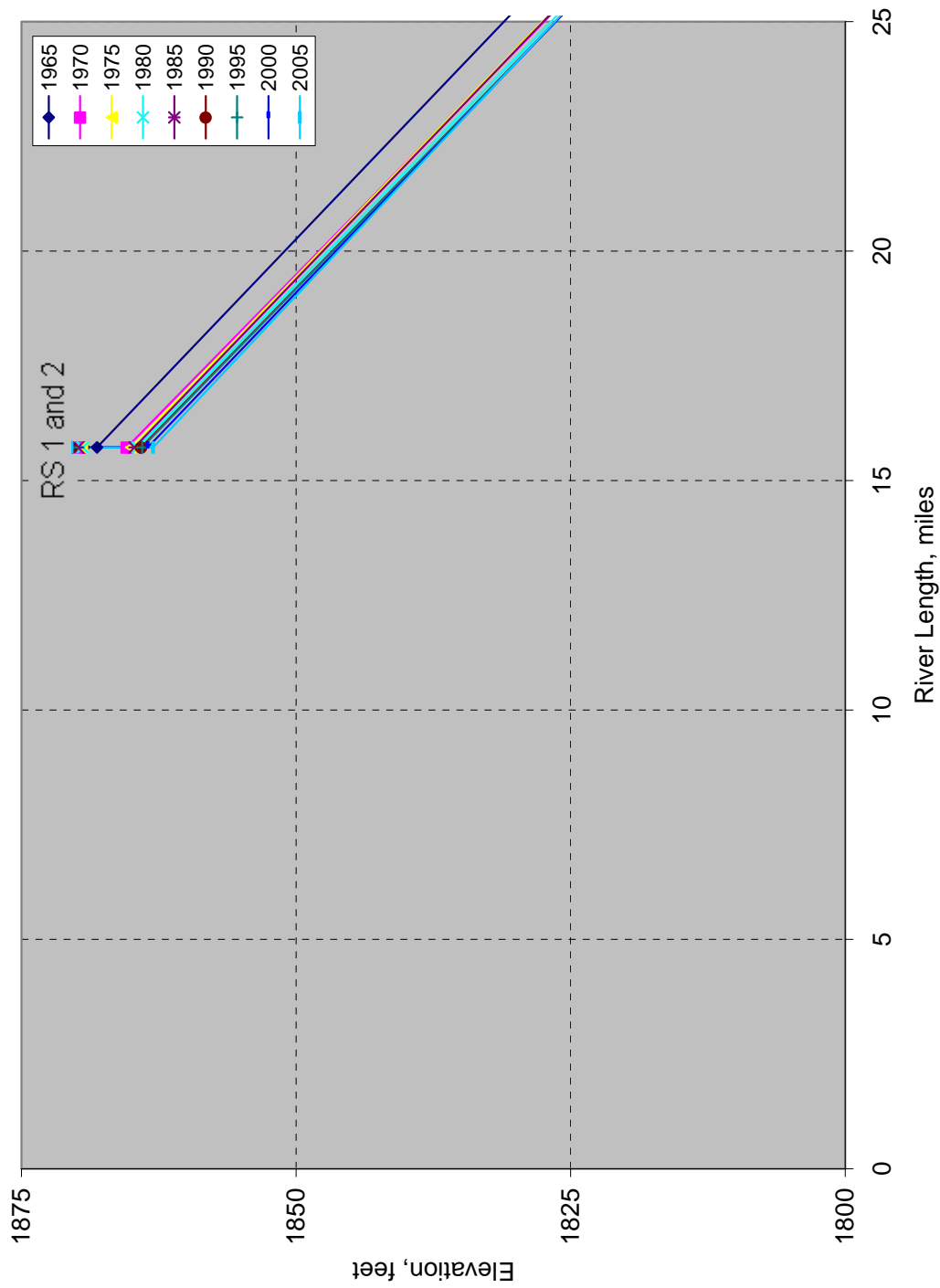
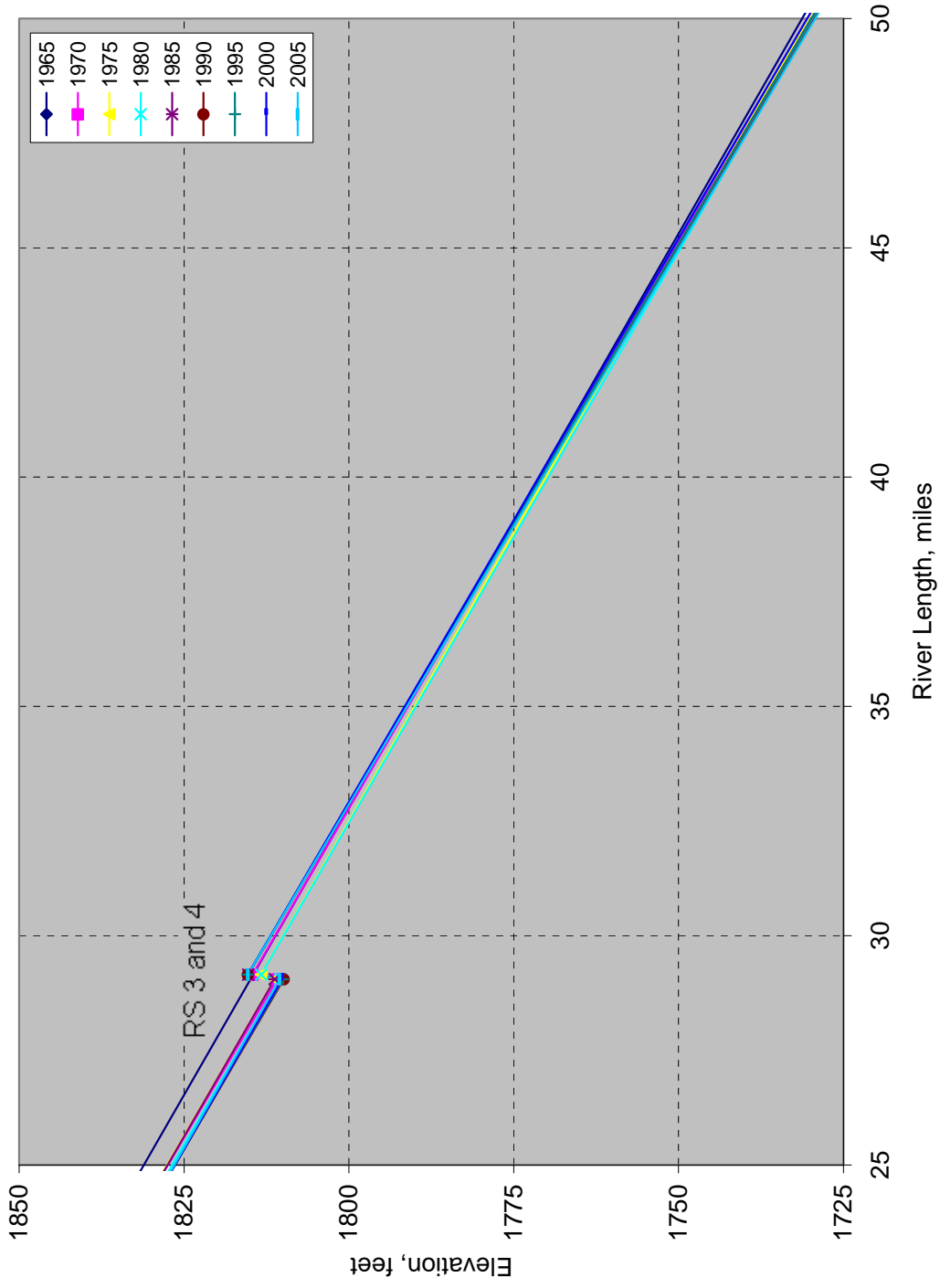


Figure 42. Longitudinal Profile of North Canadian River Bed, Oklahoma





**Figure 43. Longitudinal Profile of North Canadian River Bed, Oklahoma**

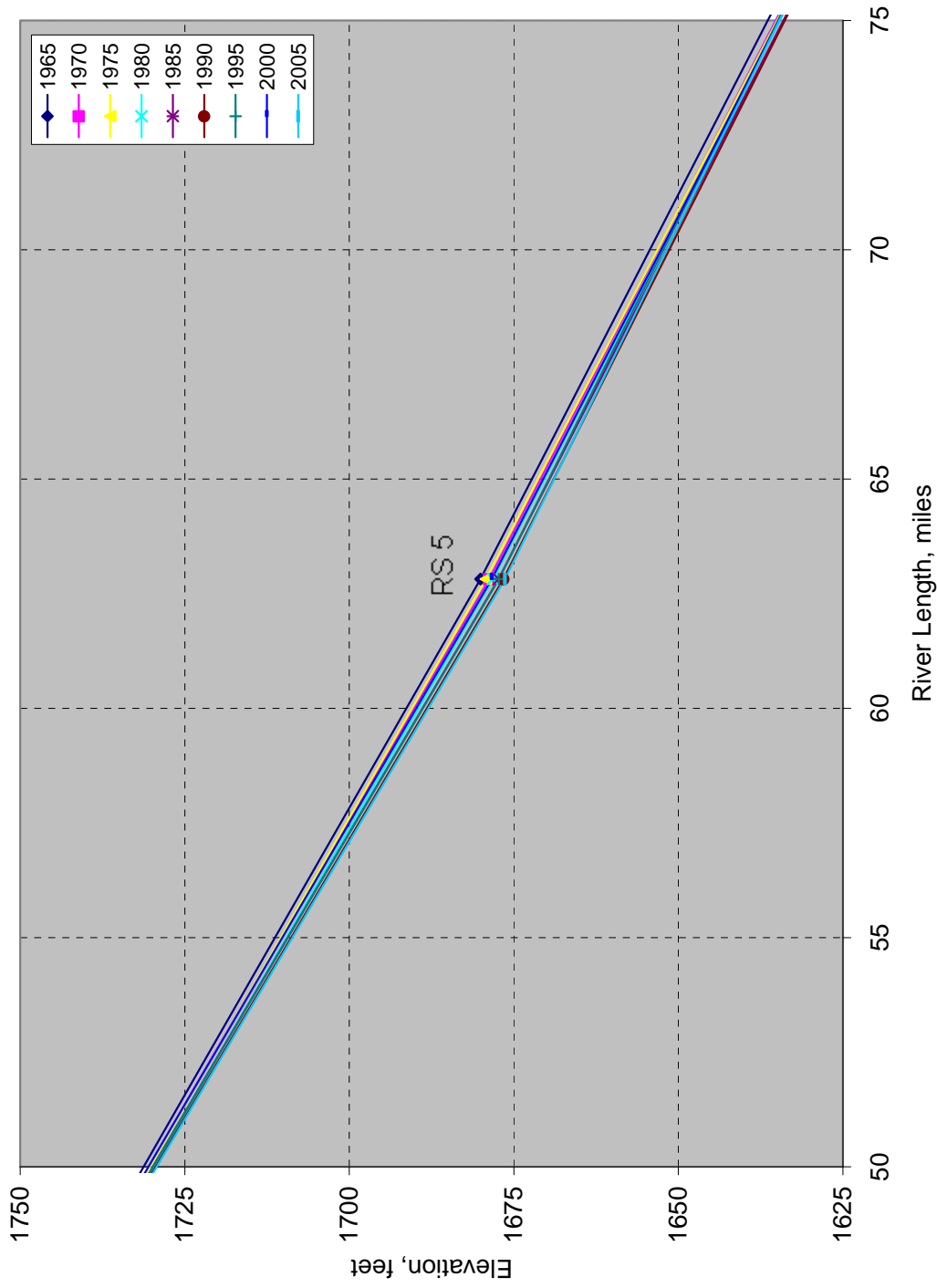


Figure 44. Longitudinal Profile of North Canadian River Bed, Oklahoma

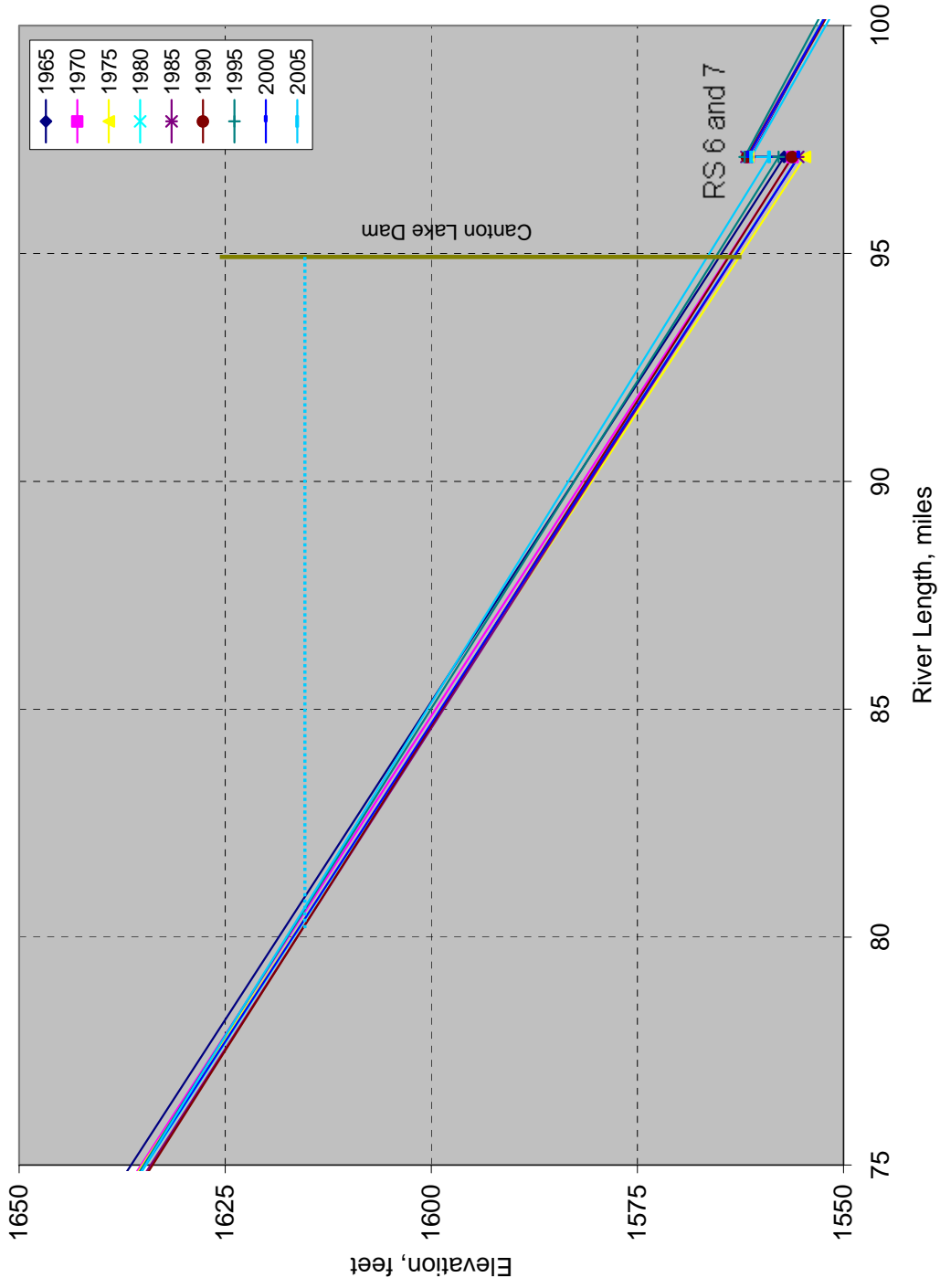
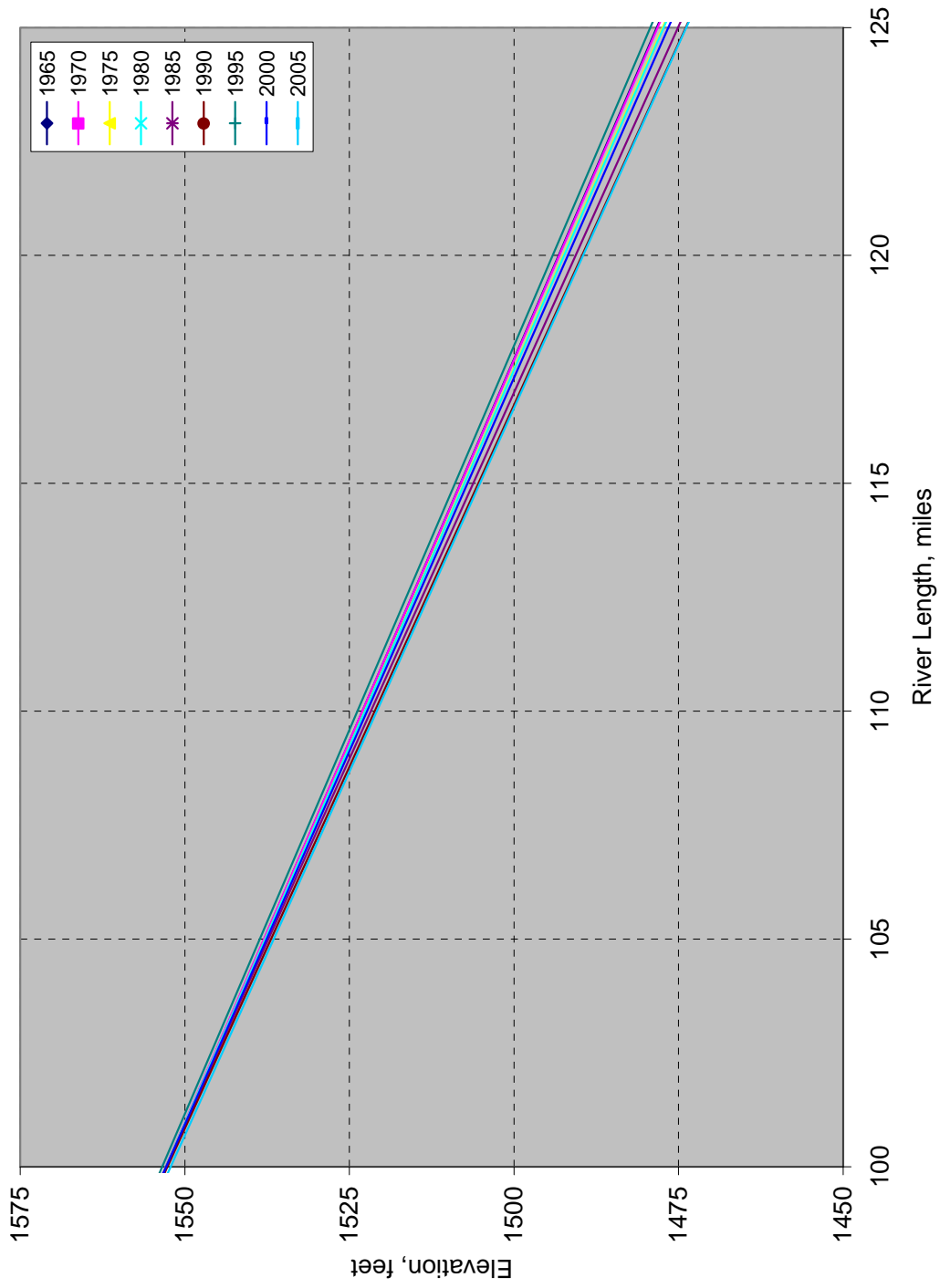


Figure 45. Longitudinal Profile of North Canadian River Bed, Oklahoma



**Figure 46. Longitudinal Profile of North Canadian River Bed, Oklahoma**

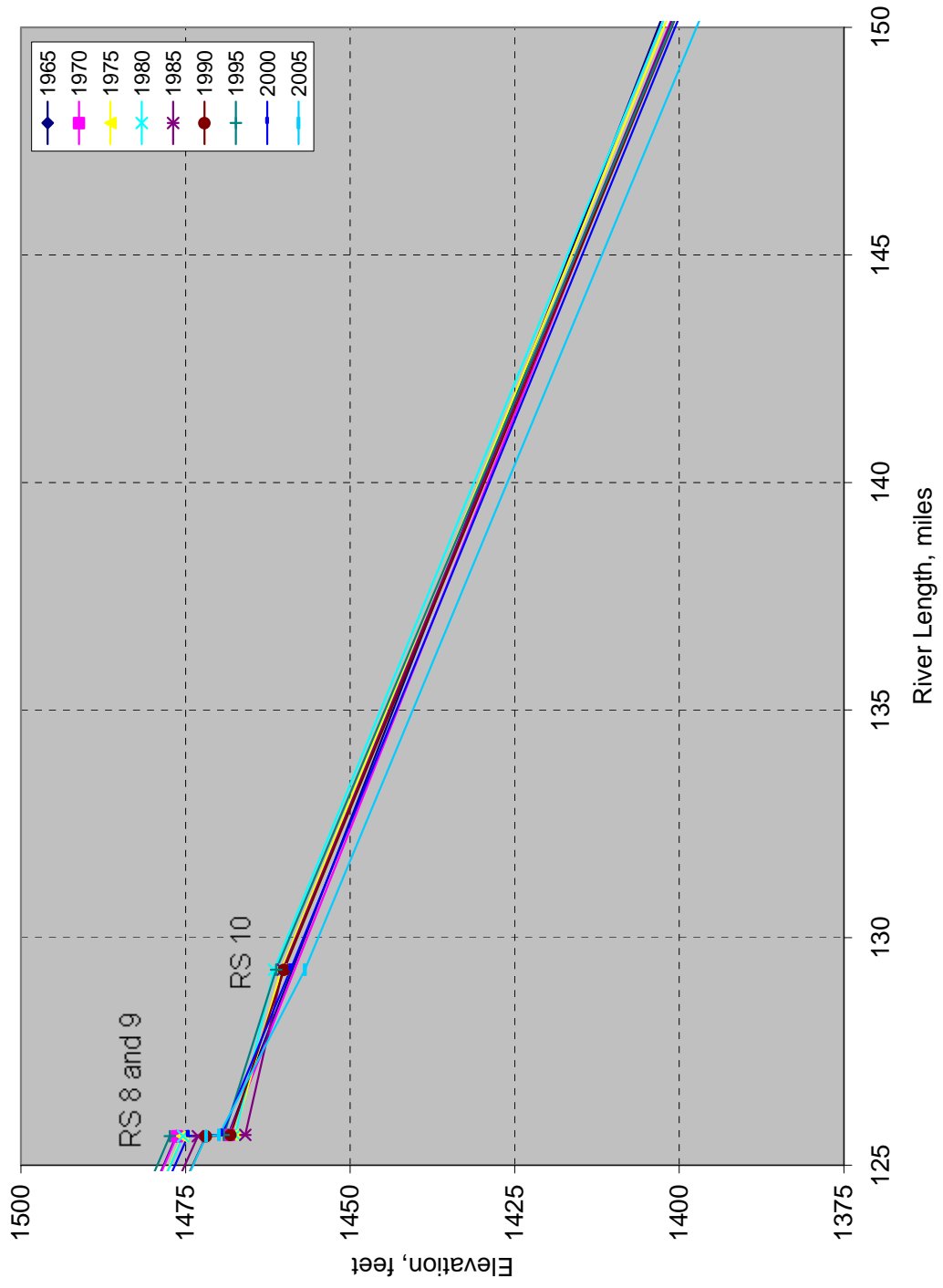
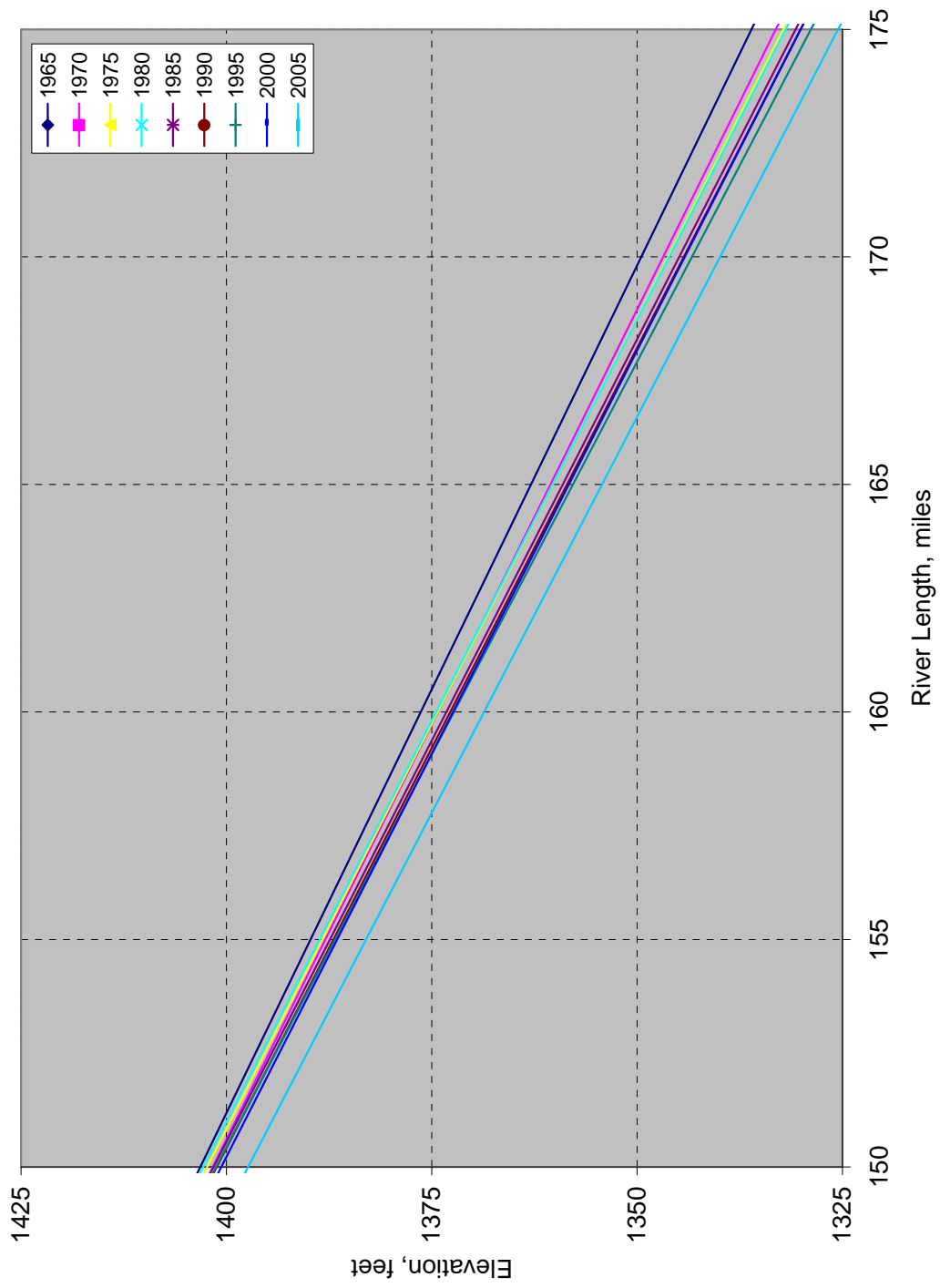
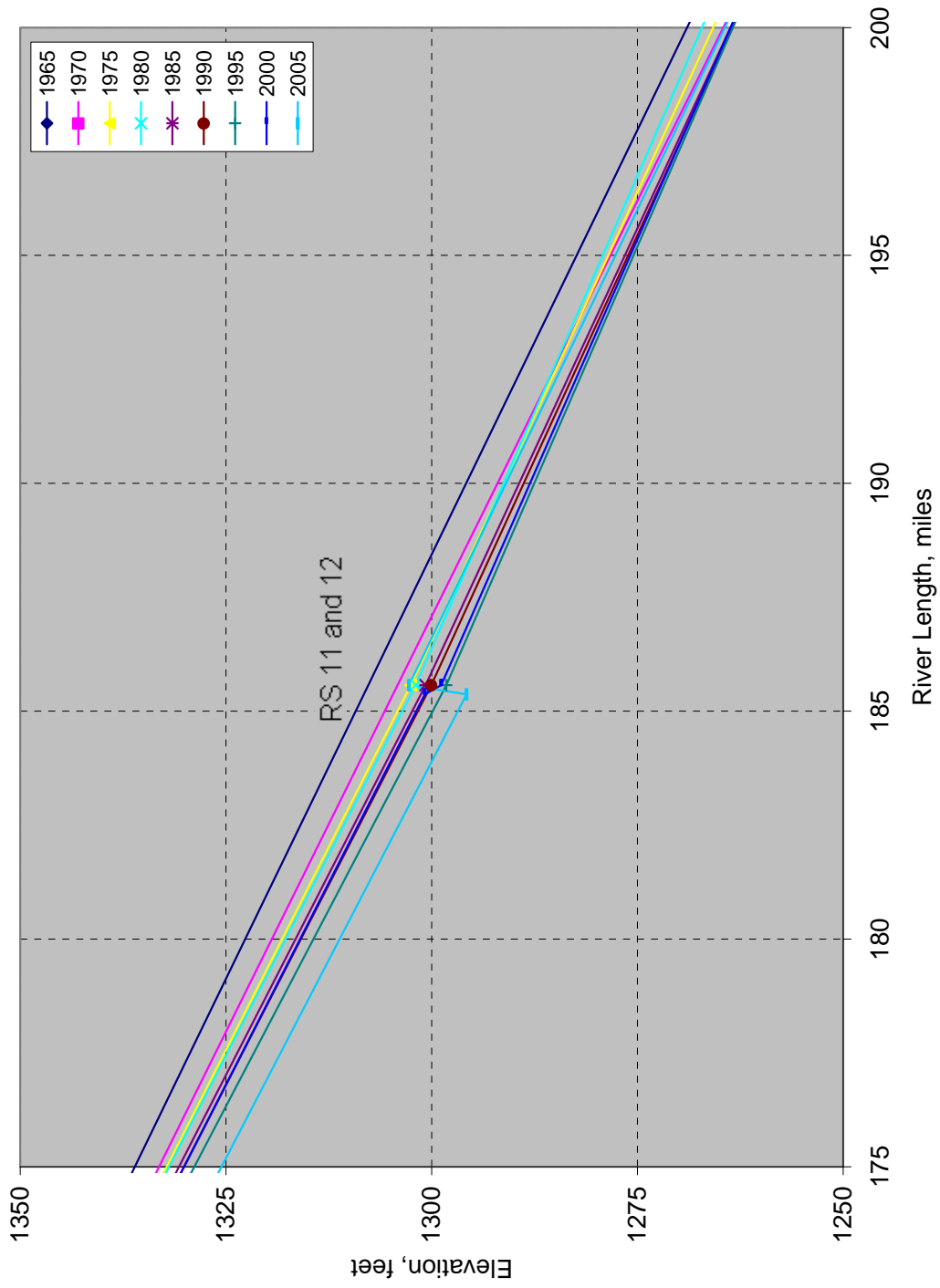


Figure 47. Longitudinal Profile of North Canadian River Bed, Oklahoma



**Figure 48. Longitudinal Profile of North Canadian River Bed, Oklahoma**



**Figure 49. Longitudinal Profile of North Canadian River Bed, Oklahoma**

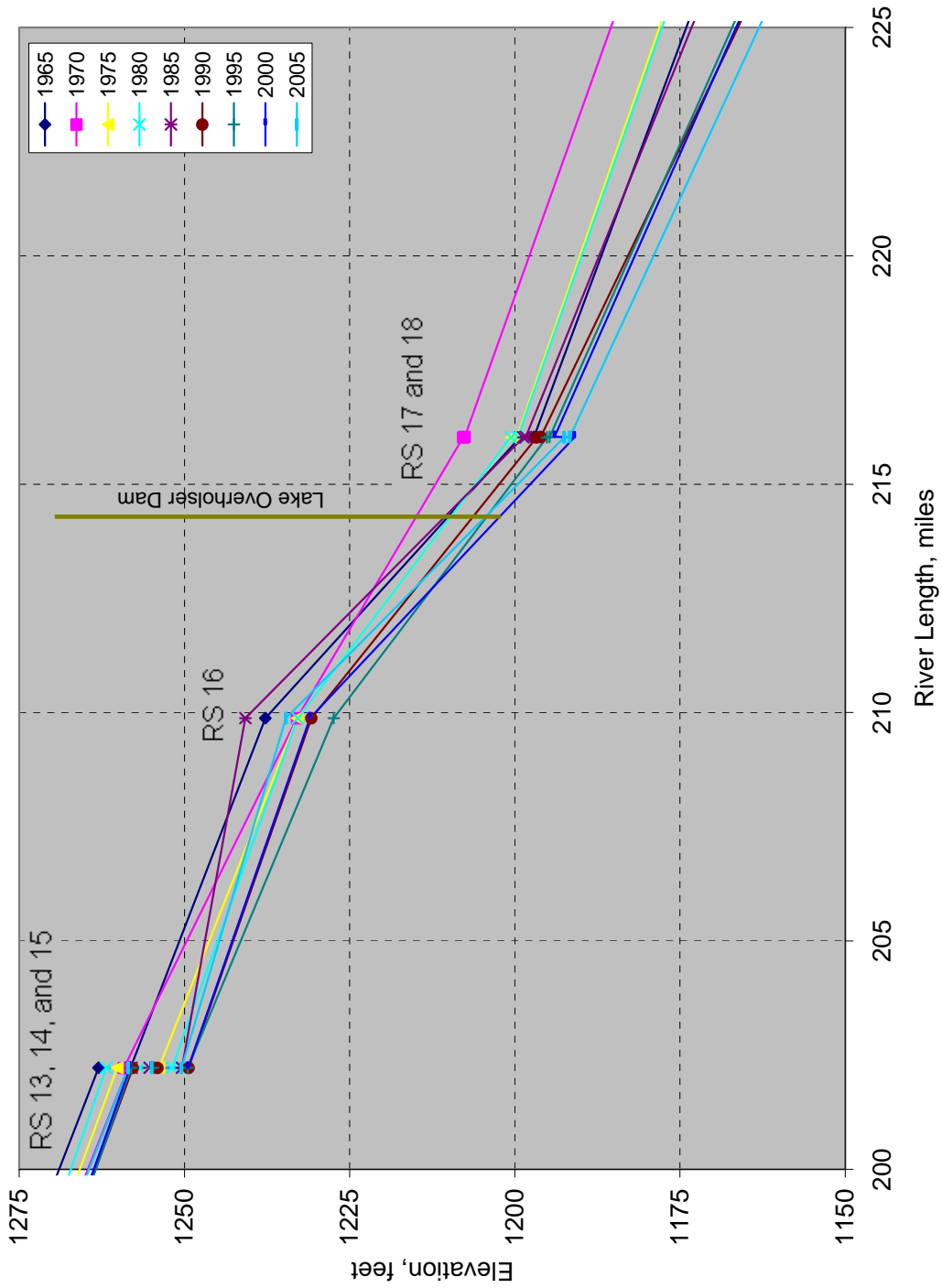


Figure 50. Longitudinal Profile of North Canadian River Bed, Oklahoma



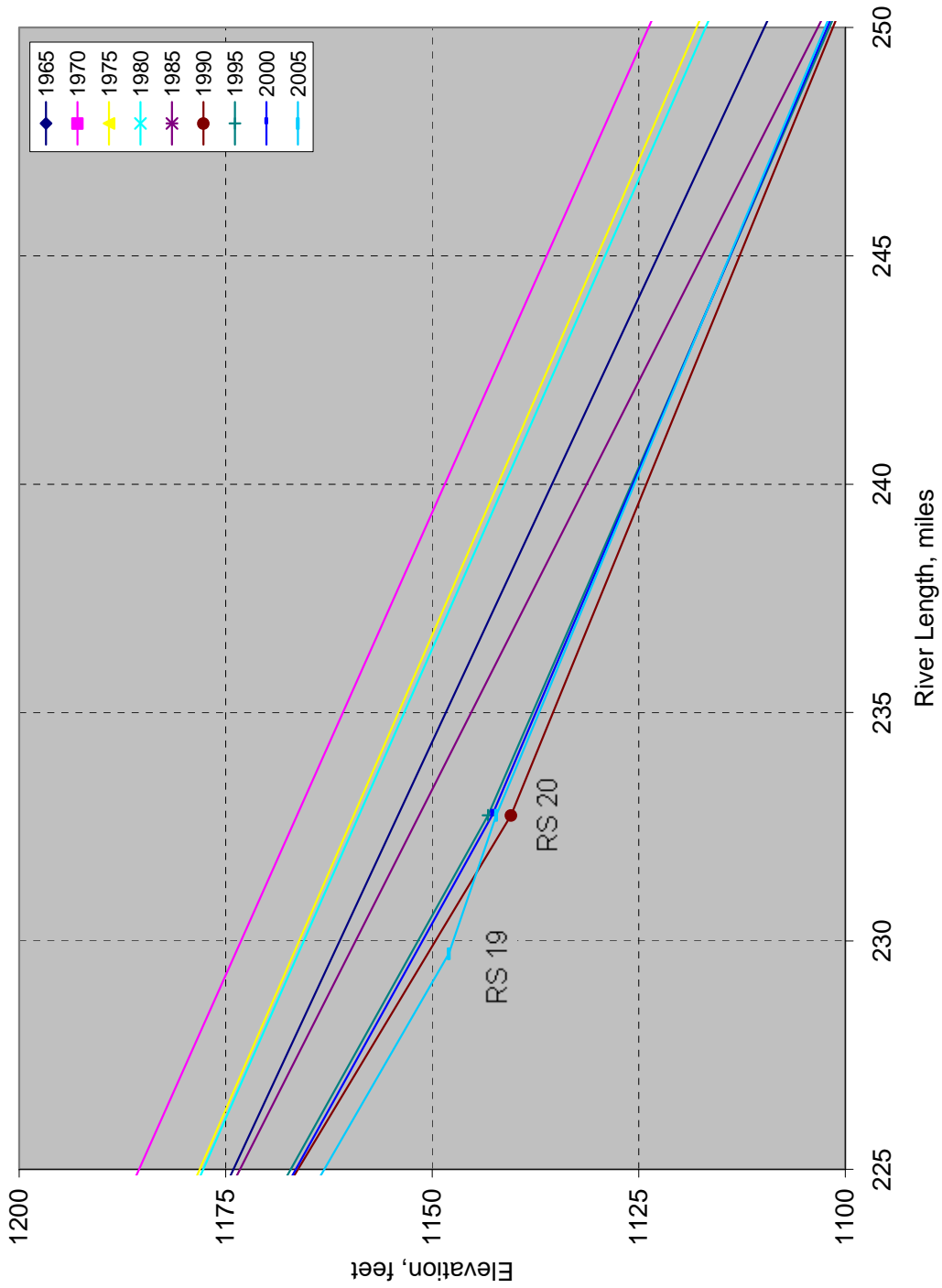


Figure 51. Longitudinal Profile of North Canadian River Bed, Oklahoma

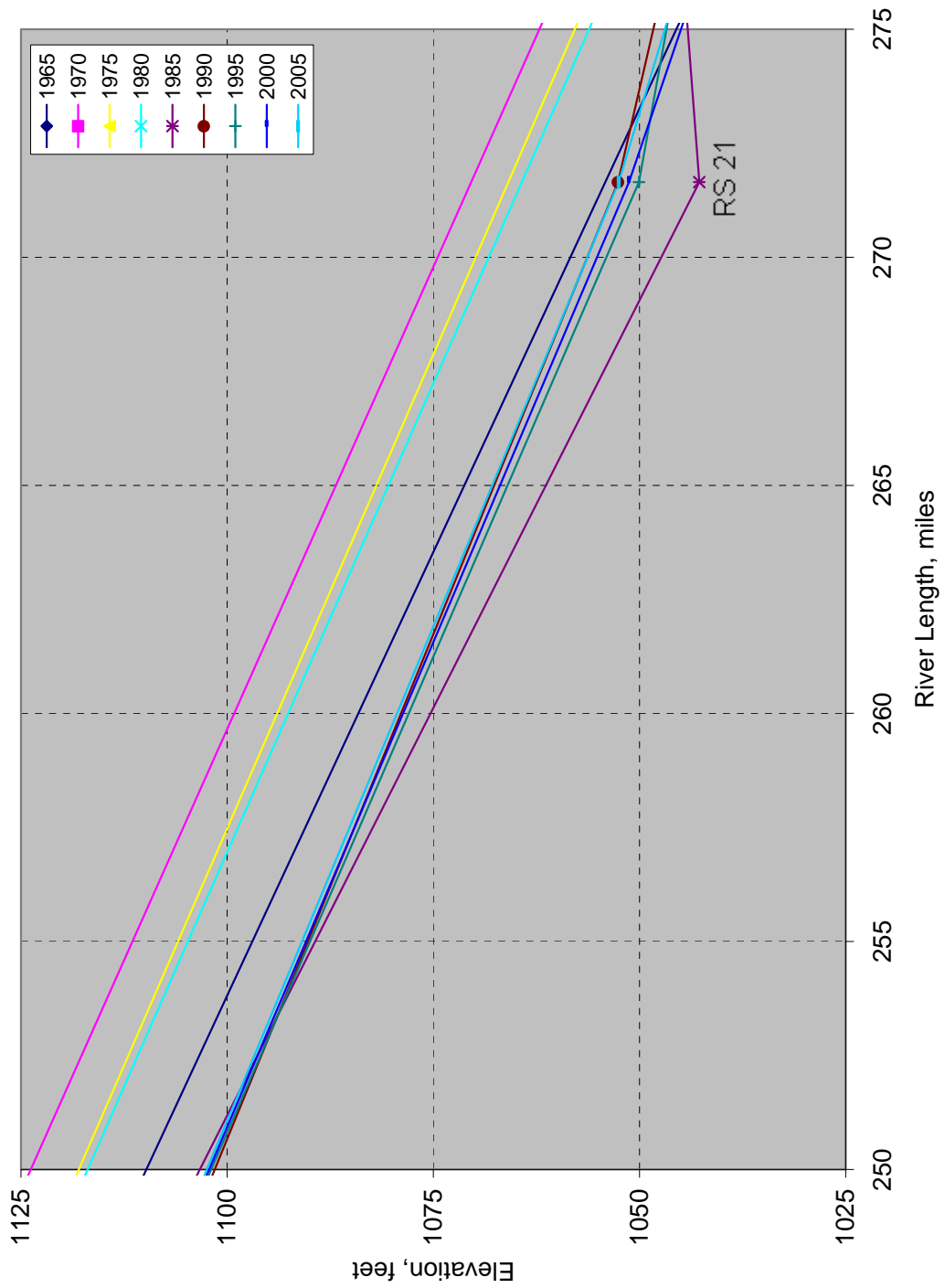


Figure 52. Longitudinal Profile of North Canadian River Bed, Oklahoma

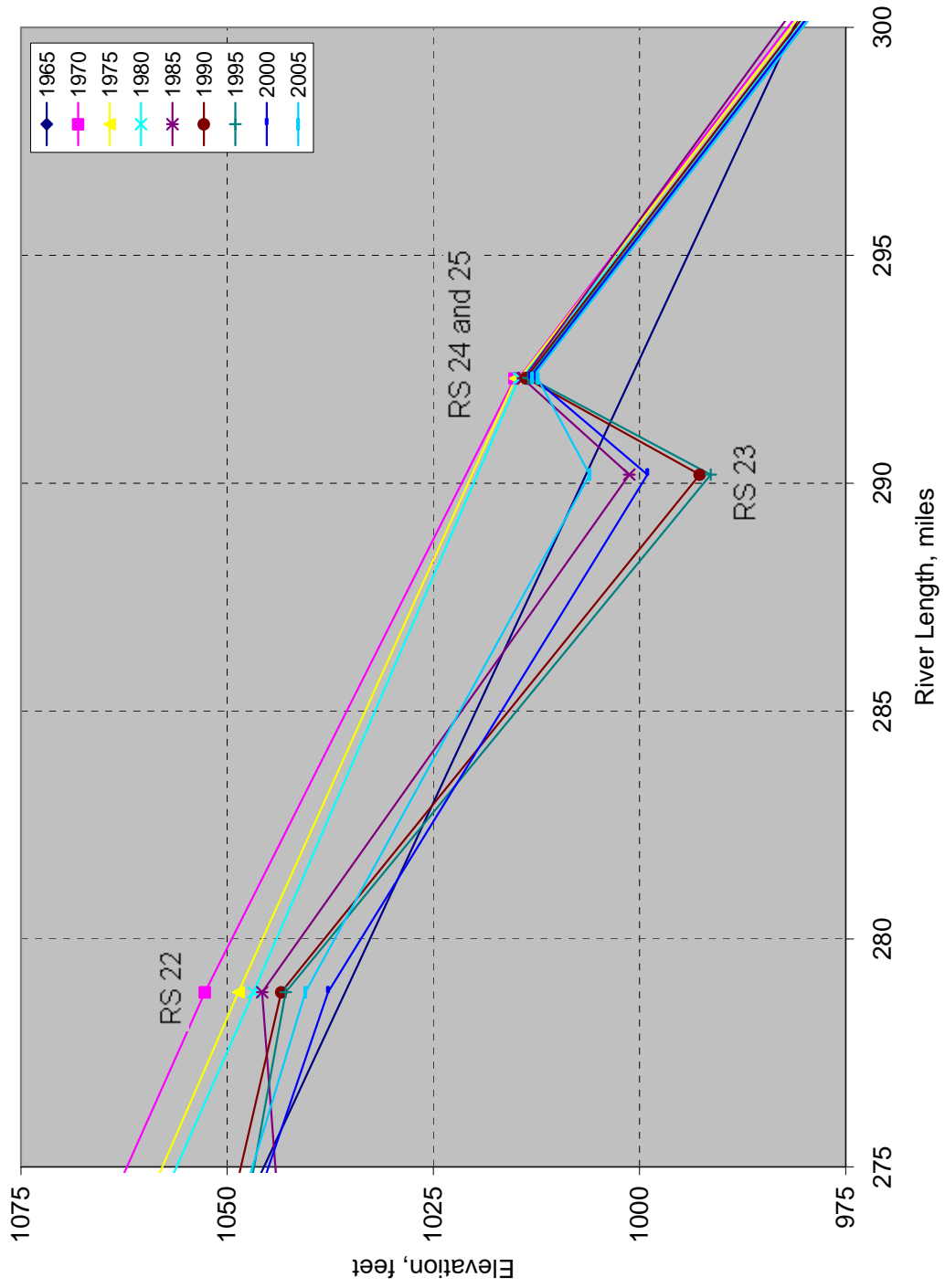


Figure 53. Longitudinal Profile of North Canadian River Bed, Oklahoma

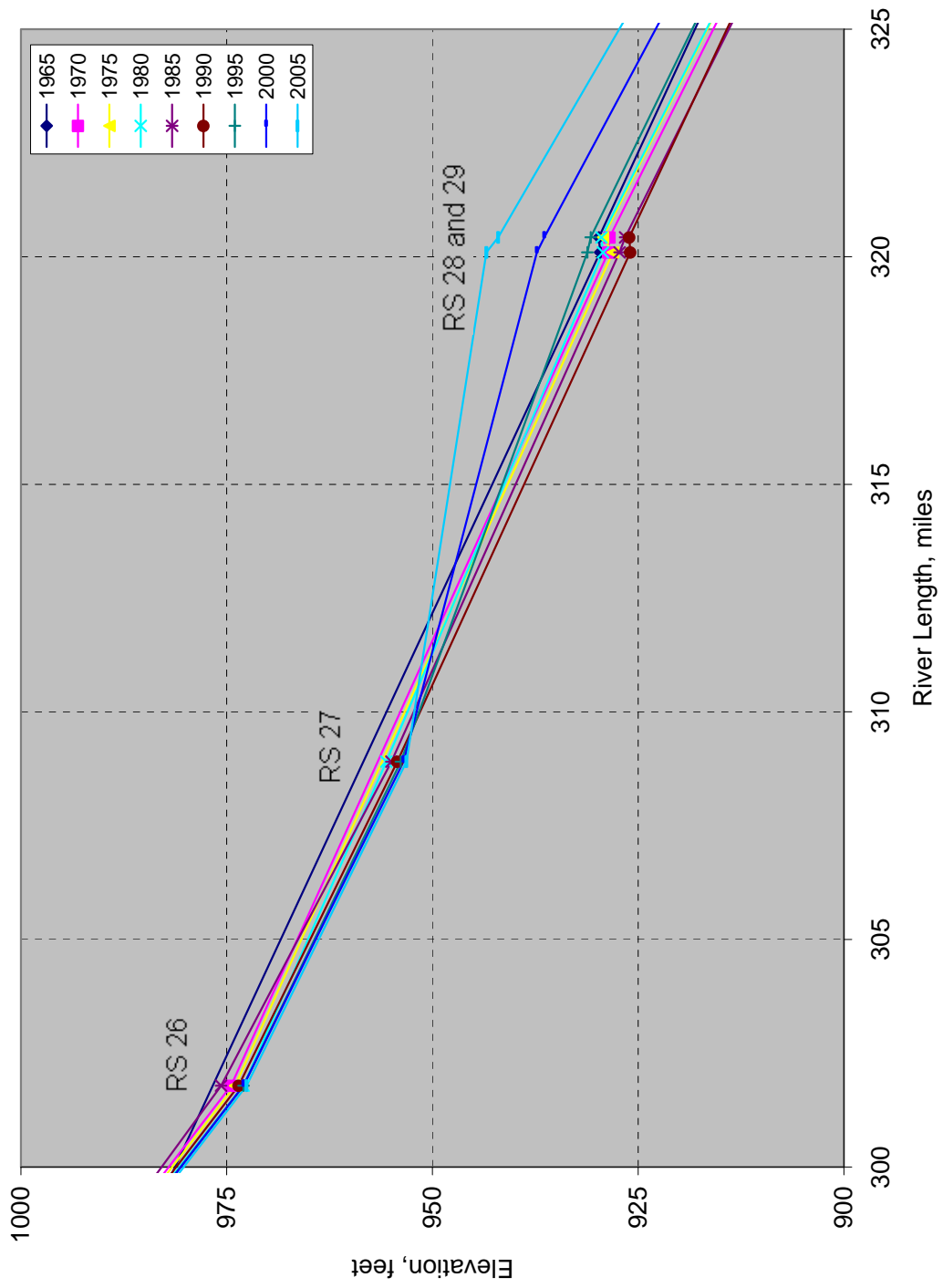
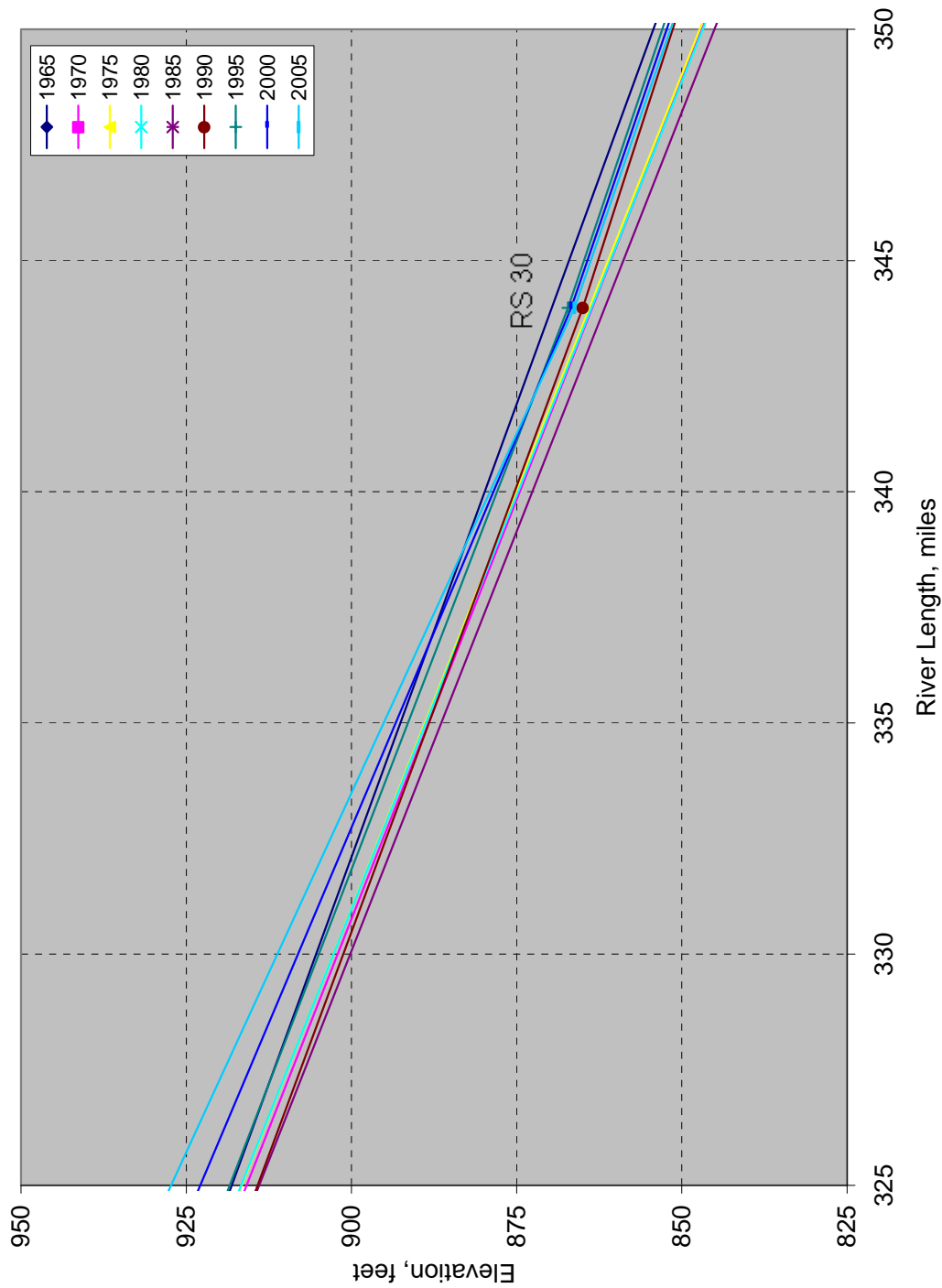


Figure 54. Longitudinal Profile of North Canadian River Bed, Oklahoma



**Figure 55. Longitudinal Profile of North Canadian River Bed, Oklahoma**

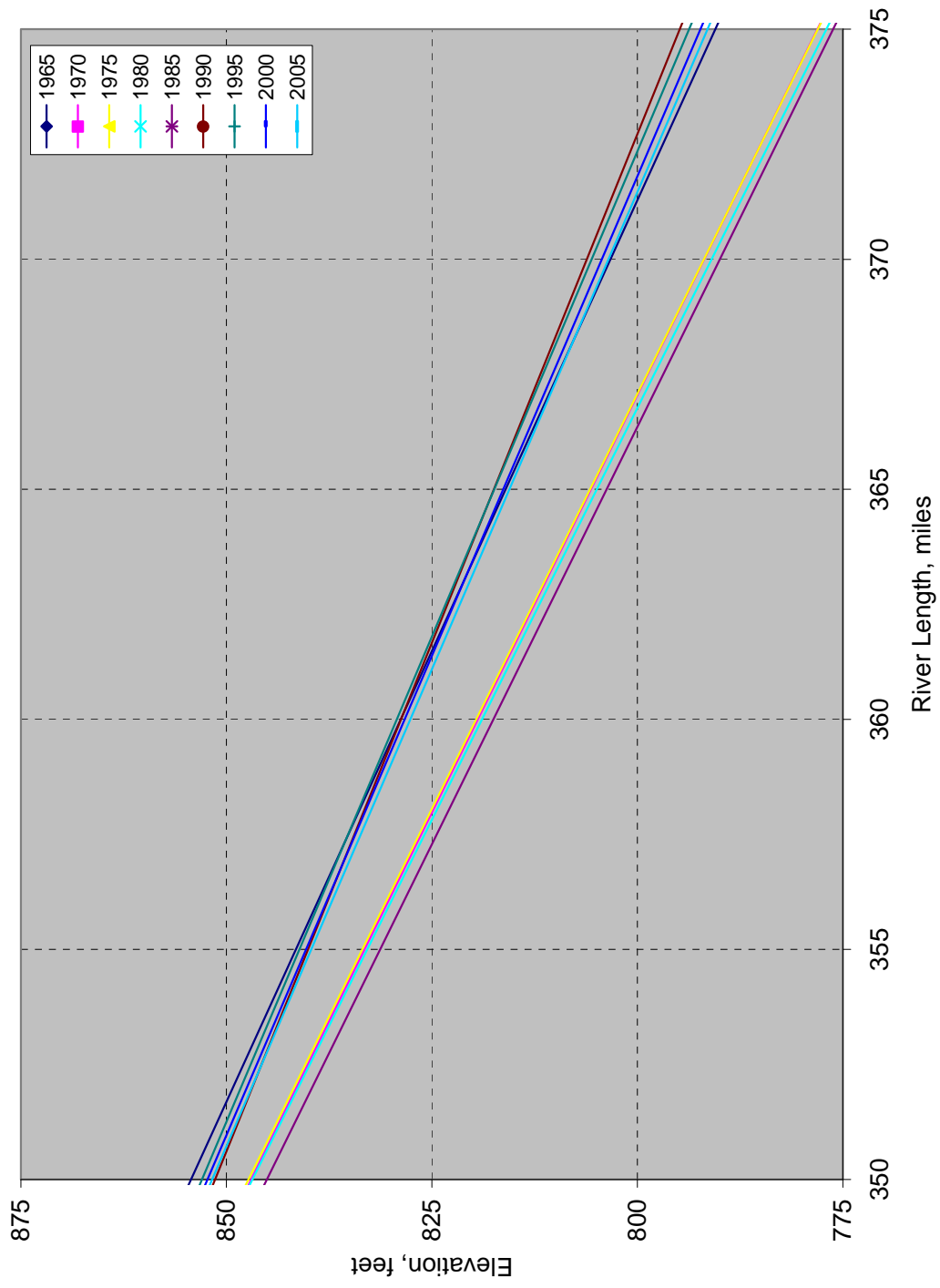


Figure 56. Longitudinal Profile of North Canadian River Bed, Oklahoma

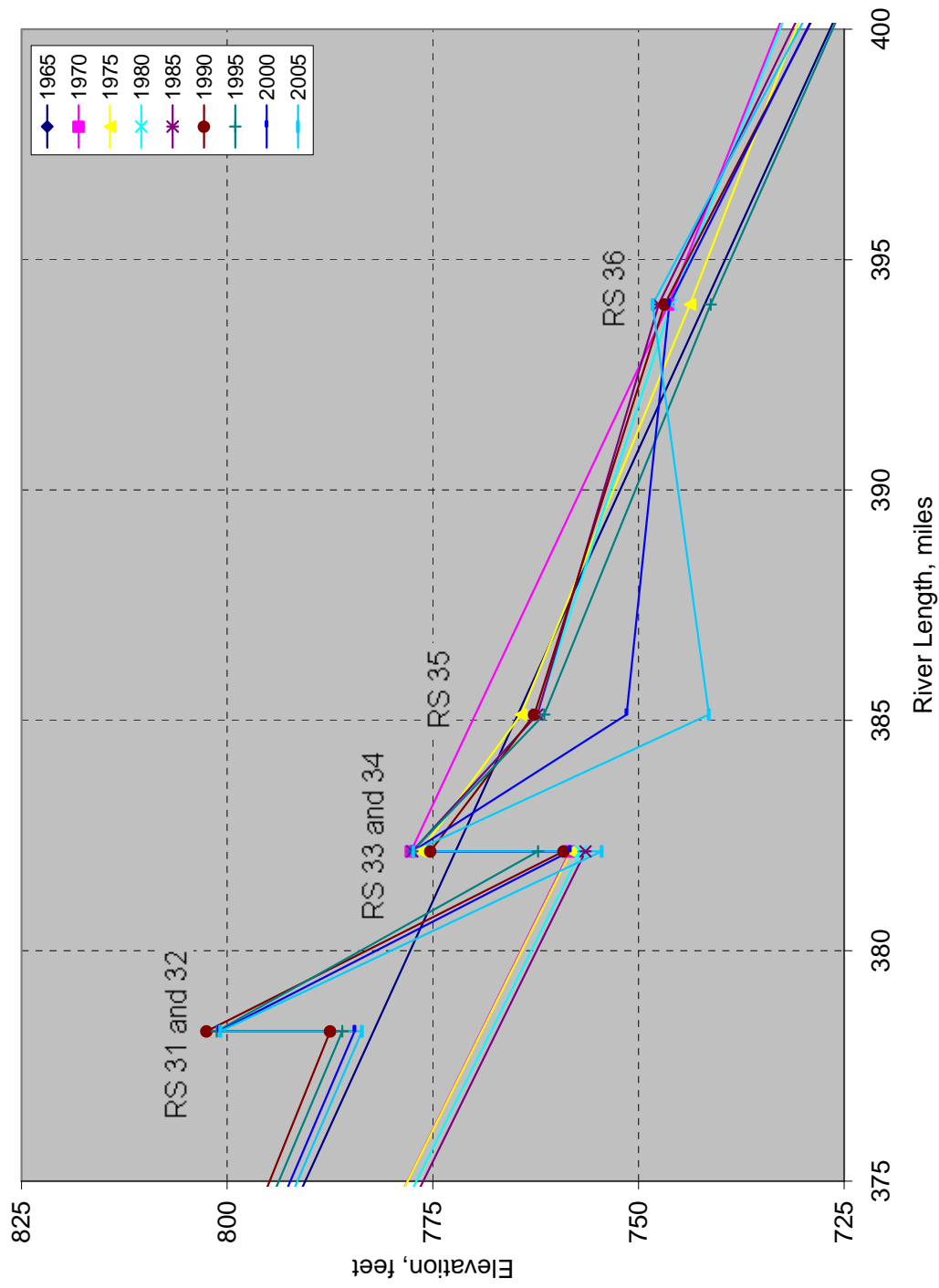


Figure 57. Longitudinal Profile of North Canadian River Bed, Oklahoma

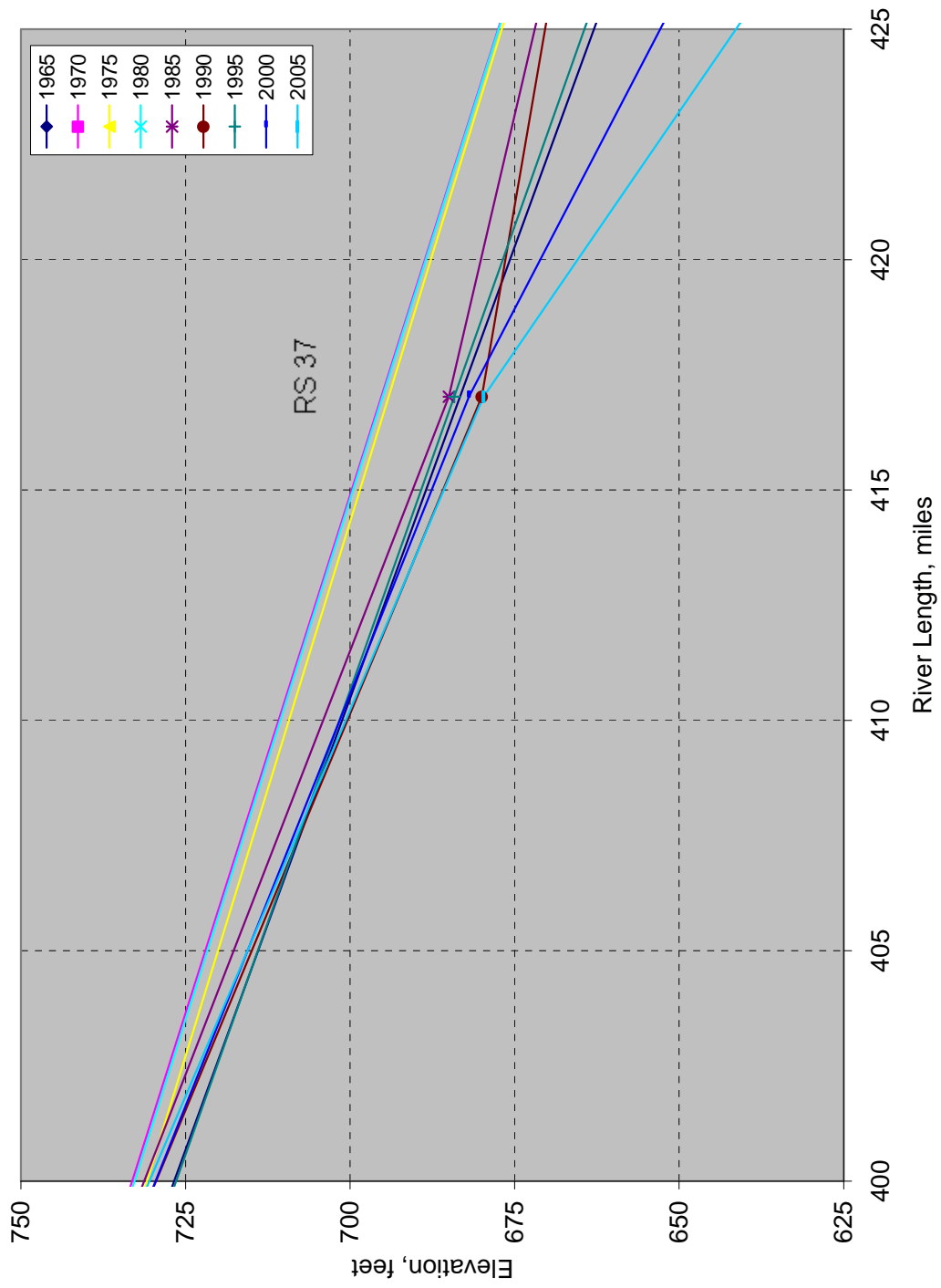


Figure 58. Longitudinal Profile of North Canadian River Bed, Oklahoma



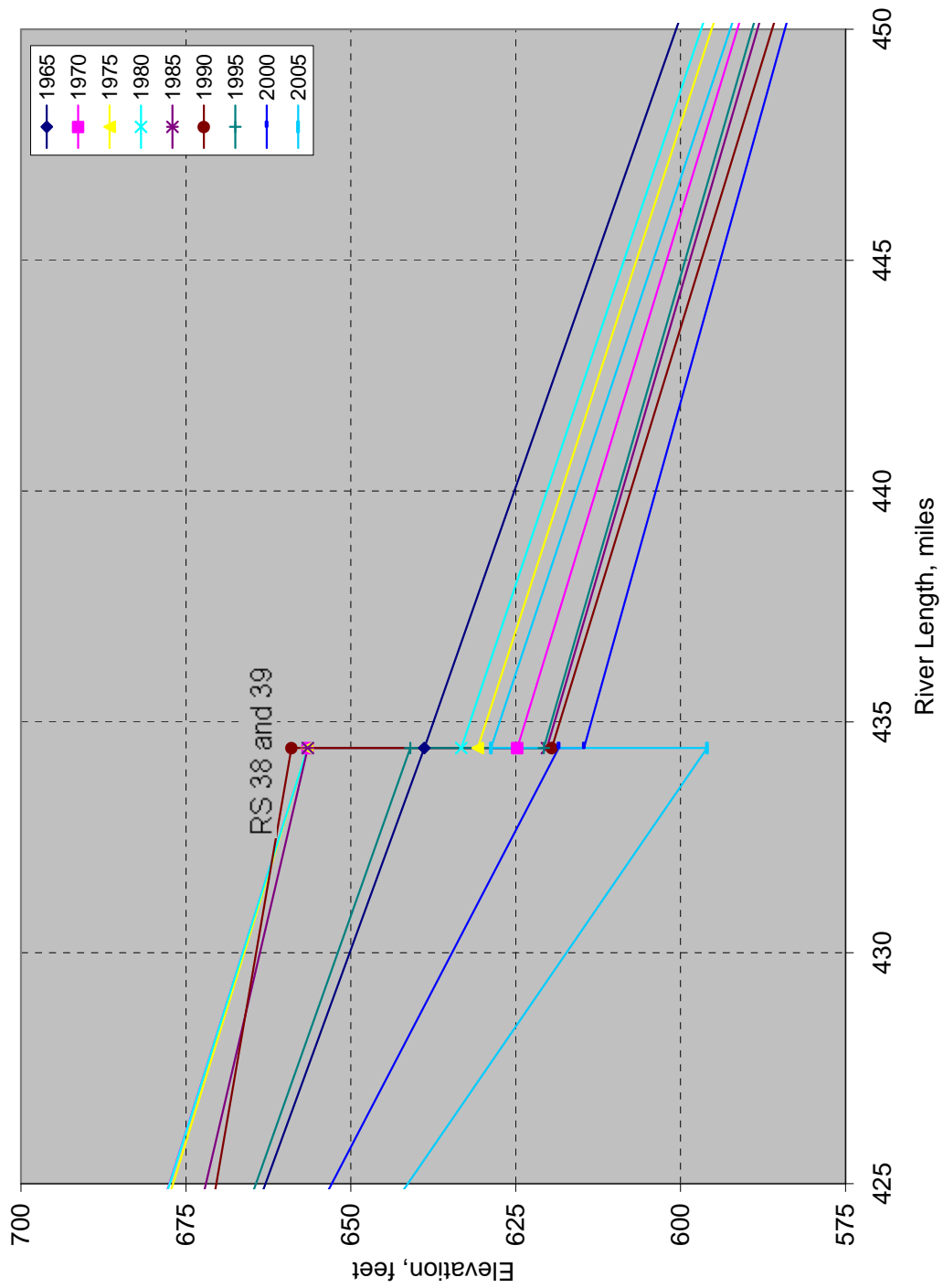
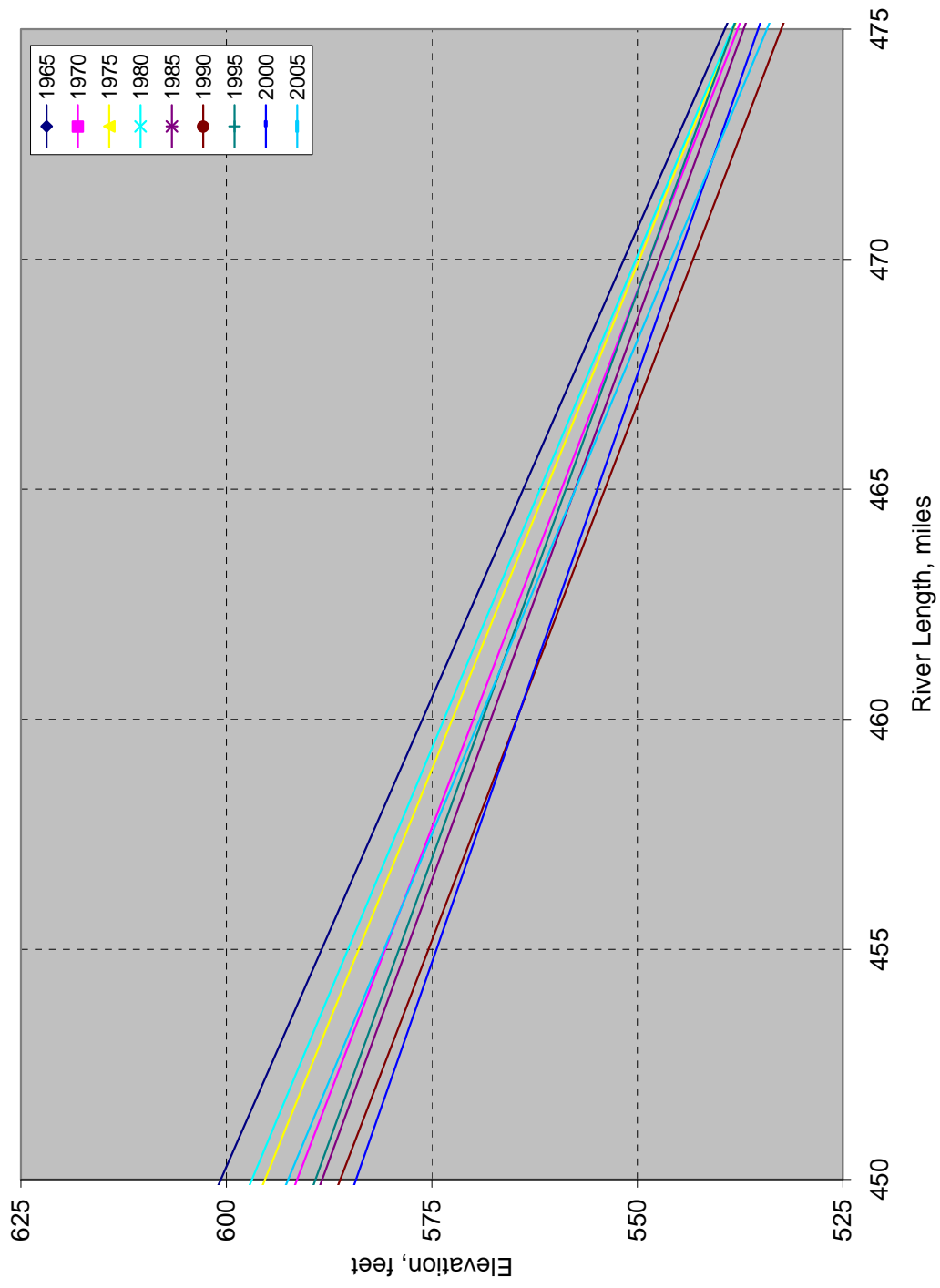


Figure 59. Longitudinal Profile of North Canadian River Bed, Oklahoma



**Figure 60. Longitudinal Profile of North Canadian River Bed, Oklahoma**

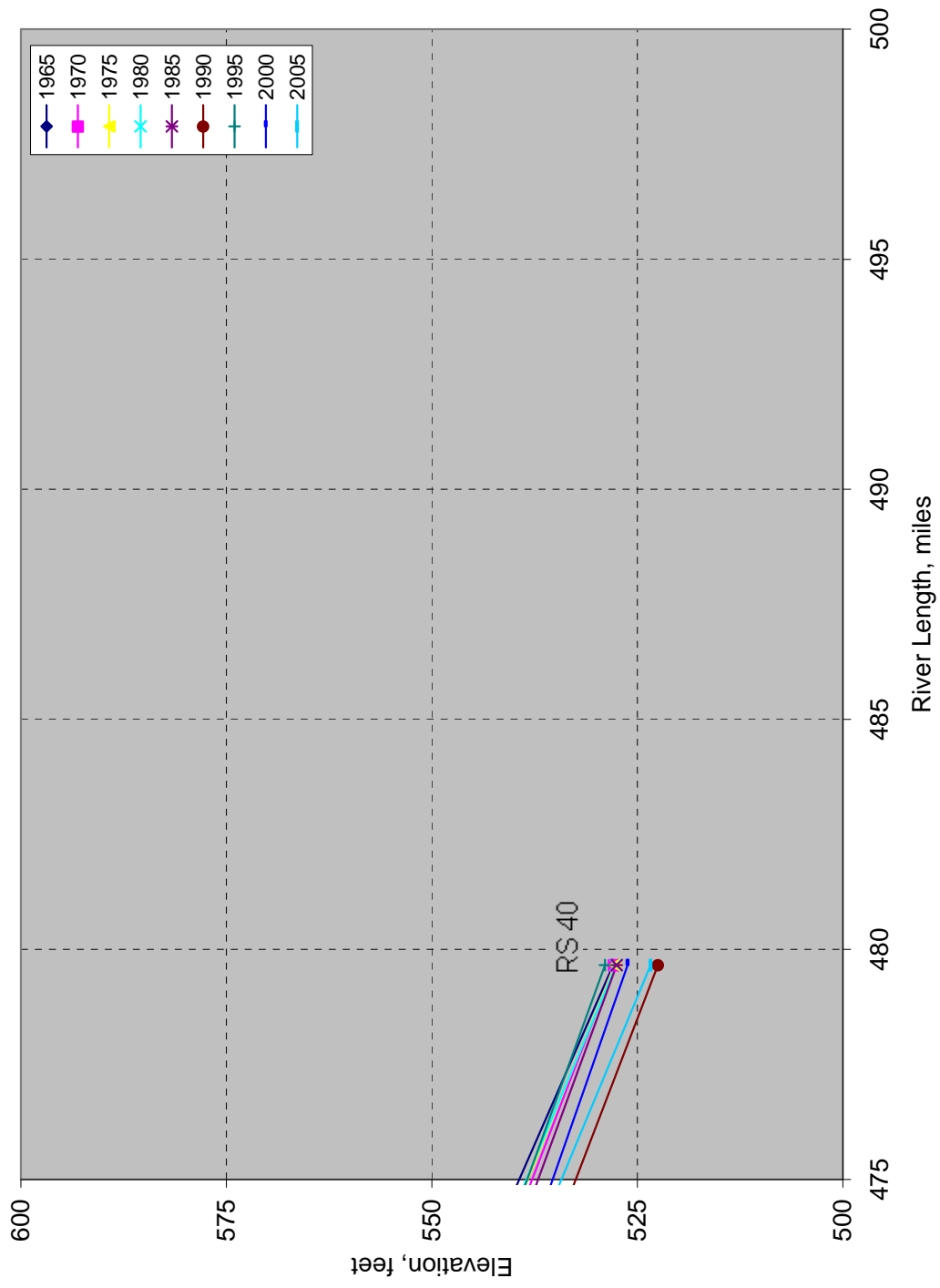


Figure 61. Longitudinal Profile of North Canadian River Bed, Oklahoma

## VI. DISCUSSION OF RESULTS

Table 5 presents the summary of bridges which has experienced degradation. Along the 463.85-mile reach of North Canadian River, twenty-five bridges have experienced degradation. Fourteen bridges have experienced degradation in the range of 0-5 feet, two have experienced in the range of 5-10 feet, and three have experienced degradation more than 10 feet. Sixth and seventh columns of Table 5 present the service year of the bridges through 2007 and corresponding degradation in river bed. Nineteen bridges in the study reach of North Canadian have been serving for more than 30 years.

Table 6 presents the number of bridges in the five major river basins of Oklahoma which have experienced degradation more than 5 and 10 feet with 10 year and all service year criteria. In this study, bridges with degradation of 10 feet or more and that have been serving from more than 10 years are determined as critical. River station (RS 23) at S.H. 270, RS 33 at I-40, and RS 39 at S.H. 84 have experienced degradation of 15.6 feet in 11 years, 17.67 feet in 38 years, and 15.0 feet in 47 years, respectively. Therefore, RS 23 (Bridge Key b20576), RS 33 (Bridge Key b15870), and RS 39 (Bridge Key b14200) are determined as critical. It is recommended for rehabilitation or replacement. A detailed hydraulic and geotechnical analysis should be performed before reconstruction.

**Table 5. Summary of river bed degradation, North Canadian River**

| <b>Bri_key</b> | <b>River Station</b> | <b>Highway</b> | <b>Miles</b> | <b>Brigde Installed</b> | <b>Years of Construction through 2007</b> | <b>Max. Scour (ft)</b> | <b>Duration (yr)</b> | <b>Scour Rate (ft/yr)</b> |
|----------------|----------------------|----------------|--------------|-------------------------|---|------------------------|----------------------|---------------------------|
| b16642         | RS2                  | S.H.34         | 15.72        | 1965                    | 42  | 4.63                   | 35                   | 0.1321                    |
| b17602         | RS3                  | S.H. 50        | 29.05        | 1969                    | 38  | 2.78                   | 34                   | 0.0816                    |
| b16193         | RS5                  | U.S. 60        | 62.82        | 1964                    | 43  | 3.40                   | 36                   | 0.0944                    |
| b20864         | RS8                  | U.S. 270       | 125.64       | 1984                    | 23  | 1.60                   | 20                   | 0.0800                    |
| b05523         | RS9                  | U.S. 270       | 125.67       | 1937                    | 70  | 5.83                   | 58                   | 0.1005                    |
| b18134         | RS10                 | U.S. 270       | 129.29       | 1971                    | 36  | 1.40                   | 29                   | 0.0483                    |
| b26237         | RS11                 | U.S. 81        | 185.37       | 2000                    | 7   | 5.06                   | 5                    | 1.0125                    |
| b12820         | RS14                 | S.H. 4         | 202.22       | 1952                    | 55  | 0.80                   | 53                   | 0.0151                    |
| b18352         | RS15                 | S.H.4          | 202.22       | 1972                    | 35  | 4.55                   | 33                   | 0.1379                    |
| b16189         | RS17                 | I-40           | 216.03       | 1964                    | 43  | 5.00                   | 41                   | 0.1220                    |
| b16190         | RS18                 | I-40           | 216.04       | 1964                    | 43  | 3.33                   | 41                   | 0.0812                    |
| b20576         | RS23                 | S.H. 270       | 290.19       | 1983                    | 24  | 15.60                  | 11                   | 1.4182                    |
| b15380         | RS24                 | I-40           | 292.30       | 1961                    | 46  | 2.03                   | 26                   | 0.0781                    |
| b15381         | RS25                 | I-40           | 292.31       | 1961                    | 46  | 0.09                   | 26                   | 0.0035                    |
| b15388         | RS26                 | U.S. 270       | 301.79       | 1961                    | 46  | 4.43                   | 44                   | 0.1007                    |
| b19276         | RS27                 | S.H.-3E        | 308.91       | 1976                    | 31  | 2.70                   | 27                   | 0.1000                    |
| b15864         | RS29                 | N/A            | 320.42       | 1962                    | 45  | 0.73                   | 33                   | 0.0221                    |
| b22686         | RS31                 | S.H. 56        | 378.25       | 1990                    | 17  | 3.90                   | 15                   | 0.2600                    |
| b22666         | RS32                 | S.H. 57        | 378.25       | 1990                    | 17  | 1.66                   | 15                   | 0.1107                    |
| b15870         | RS33                 | I-40           | 382.16       | 1962                    | 45  | 17.67                  | 38                   | 0.4650                    |
| b18361         | RS35                 | S.H.48         | 385.13       | 1972                    | 35  | 2.54                   | 25                   | 0.1018                    |
| b21128         | RS37                 | U.S. 75        | 417.02       | 1985                    | 22  | 3.95                   | 17                   | 0.2324                    |
| b14189         | RS38                 | S.H. 84        | 434.44       | 1958                    | 49  | 5.00                   | 34                   | 0.1471                    |
| b14200         | RS39                 | S.H. 84        | 434.44       | 1958                    | 49  | 15.00                  | 47                   | 0.3191                    |
| b15585         | RS40                 | U.S. 69        | 479.66       | 1962                    | 45  | 3.50                   | 41                   | 0.0854                    |

**Table 6. Summary of bridges with degradation in five river basins**

| River Basin     | Degradation in $\geq 10$ years |                  | Degradation with all service year criteria |                  |
|-----------------|--------------------------------|------------------|--|------------------|
|                 | $\geq 5.0$ feet                | $\geq 10.0$ feet | $\geq 5.0$ feet                            | $\geq 10.0$ feet |
| Arkansas        | 5                              | 1                | 5  | 1                |
| Cimarron        | 6                              | 2                | 6  | 2                |
| North Canadian* | 8                              | 3                | 9  | 3                |
| Canadian        | 7                              | 3                | 9  | 5                |
| Washita         | 12                             | 1                | 12   | 1                |
| Total           | 38                             | 10               | 41   | 12               |

\* This report includes the river basin as indicated. Refer to other volumes **I** through **V** for different river basins.

## VII. CONCLUSIONS AND RECOMMENDATION

Following conclusions can be drawn based on this research:

- 1) Degradation predominates in Reach 1 from river station (RS)1 to Canton Lake Dam, except some river stations have slight aggradation. Maximum degradation at river station 2 and aggradation at river station 1 both on S.H. 34 in Reach 1 are 4.63 and 1.1 feet, respectively.
- 2) In Reach 2 from Canton Lake Dam to Lake Overholser Dam, degradation is predominant. Maximum degradation of 5.83 feet is observed in river station 9 on U.S. 270.
- 3) Bed profile data in Reach 3 from Lake Overholser Dam to river station (RS) 40, shows both aggradation and degradation. The river station 17 downstream of Lake Overholser dam shows the degradation of 5.0 feet in 41 years. In this reach maximum aggradation of 9.75 feet is observed at river station 21 at U.S. 62 and maximum degradation of 17.67 feet is observed at river station 33 at I-40.
- 4) The North Canadian River in Oklahoma has experienced degradation over 10 feet at three river stations which have been serving more than 10 years. River station (RS 23) at S.H. 270, RS 33 at I-40, and RS 39 at S.H. 84 have experienced degradation of 15.6 feet in 11 years, 17.67 feet in 38 years, and 15.0 feet in 47 years, respectively. These bridges are defined as critical and recommended for rehabilitation or replacement in the replacement cycle. A detailed hydraulic and geotechnical analysis should be performed before reconstruction.

It is recommended that degradation of tributaries is evaluated to determine the structures where flowline is severely degrading in North Canadian River basin.



## VIII. REFERENCES

- Austin, B. and Thomas D. (2006). "Volumetric survey report of Eufaula lake dam June 2004 survey." Texas Water Development Board.
- Doyel, W. M. and Harbor, M. J. (2003). "Modeling the effects of form and profile adjustments on the channel equilibrium timescales." *Earth Surface Processes and Landforms*, 1271-1287.
- Gilvear, D. J. (1999). "Fluvial geomorphology and river engineering: future roles utilizing a fluvial hydrosystems framework." *Geomorphology* 31: 229–245.
- Grant, G. E., Schmidt C. J., and Lewis, L. S., (2003). "A Geological Framework for Interpreting Downstream Effects of Dams on Rivers." American Geophysical Union.
- Jorden, C. R., (1946). "River stages and flood for October 1946." <<http://docs.lib.noaa.gov/rescue/mwr/074/mwr-074-10-0176.pdf>>, retrieved on August 9, 2007.
- Kondolf, M. G. (2004) "Hungry Water: Effects of Dams and Gravel Mining on River Channels". *Environmental Management*, 533-551.
- Kurka, M. P., (2006). "Canton lake dam safety assurance evaluations supplement Canton." U.S. army corps of engineers.
- Pigg, J., Coleman, S. M., and Duncan, J. (1992). "An Ecological Investigation of the Ichthyofauna of the North Canadian River in Oklahoma: 1976-1989." State Oklahoma.

Macklin, J. H. (1948). "Concept of the graded river." *Geological Society of America Bulletin* 59, 463-512.

McCord, W. M, (2005), "Canadian river."  
<<http://southwestpaddler.com/docs/canadianok2.html>>, retrieved on  
August 9, 2007.

Ward, J. V. and Standford J. A. (2006). "Ecological connectivity in alluvial river ecosystems and its disruption by flow regulation." *Regulated Rivers: Research and Management*, 11 (1), 105-119.

**APPENDIX A**

**TABLES OF CROSS-SECTIONAL GEOMETRIES,  
NORTH CANADIAN RIVER, OK**

**Table 7. Structure, and Flowline Details  
 Bridge No 16523 (RS 1) on North Canadian River**

| <b>Bridge No</b> | <b>Location</b>    | <b>Latitude</b> | <b>Longitude</b> | <b>Highway</b> | <b>Design Year</b> | <b>Length</b> |
|------------------|--------------------|-----------------|------------------|----------------|--------------------|---------------|
| b16523           | 1.1 MI N JCT SH 15 | 36-27-06        | 99-23-18         | S.H. 34        | 1965               | 105.90        |

| <b>Year</b>     | <b>1965</b> | <b>1969</b> | <b>1970</b> | <b>1977</b> | <b>1982</b> | <b>1989</b> | <b>1991</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1869.33     | 1869.43     | 1869.63     | 1869.43     | 1869.43     | 1870.43     | 1870.43     |

**Table 8. Structure, Cross-section, and Flowline Details  
Bridge No 16642 (RS 2) on North Canadian River**

| Bridge No | Location         | Latitude | Longitude | Highway | Design Year | Length   |
|-----------|------------------|----------|-----------|---------|-------------|----------|
| b16642    | 8 MI N JCT SH 15 | 36-26-48 | 99-23-18  | S.H.34  | 1965        | 1,105.00 |

| Pier_No | Distance | Pier_BTM | Pier_Top | R-bed 65 | S-Rding92 | R-bed92 | S-Rding00 | R-bed00 |
|---------|----------|----------|----------|----------|-----------|---------|-----------|---------|
| S-A     | 0.00     | 1860.00  | 1882.00  | 1878.25  | 10.00     | 1879.10 | 10.10     | 1879.00 |
| 1       | 102.00   | 1854.47  | 1882.47  | 1868.75  | 20.00     | 1869.10 | 20.30     | 1868.80 |
|         | 152.00   |          |          | 1868.13  |           |         | 20.80     | 1868.30 |
|         | 182.00   |          |          | 1868.13  | 25.00     | 1864.10 |           |         |
| 2       | 202.00   | 1854.98  | 1882.98  | 1868.13  | 23.50     | 1865.60 | 24.40     | 1864.70 |
|         | 222.00   |          |          | 1868.13  | 25.30     | 1863.80 |           |         |
|         | 252.00   |          |          | 1868.13  |           |         | 25.60     | 1863.50 |
| 3       | 302.00   | 1854.93  | 1882.93  | 1868.13  | 20.80     | 1868.30 | 20.90     | 1868.20 |
|         | 362.00   |          |          | 1872.50  | 19.00     | 1870.10 |           |         |
| 4       | 402.75   | 1855.21  | 1883.21  | 1872.50  | 20.20     | 1868.90 | 20.20     | 1868.90 |
|         | 452.75   |          |          | 1872.50  |           |         | 19.30     | 1869.80 |
| 5       | 503.50   | 1855.17  | 1883.17  | 1872.50  | 19.80     | 1869.30 | 20.40     | 1868.70 |
|         | 553.50   |          |          | 1872.50  |           |         | 19.10     | 1870.00 |
| 6       | 603.50   | 1855.45  | 1883.46  | 1873.13  | 20.30     | 1868.80 | 20.50     | 1868.60 |
| 7       | 703.50   | 1855.19  | 1883.19  | 1872.50  | 19.80     | 1869.30 | 19.90     | 1869.20 |
| 8       | 804.25   | 1855.26  | 1883.26  | 1871.88  | 19.60     | 1869.50 | 19.80     | 1869.30 |
| 9       | 905.00   | 1855.00  | 1883.00  | 1870.63  | 19.60     | 1869.50 | 20.00     | 1869.10 |
| 10      | 1005.00  | 1855.07  | 1883.07  | 1871.75  | 17.80     | 1871.30 | 18.30     | 1870.80 |
| N-A     | 1107.00  | 1860.00  | 1882.00  | 1873.75  | 9.70      | 1879.40 | 10.30     | 1878.80 |

| Year     | 1965   | 1967   | 1969   | 1970   | 1971   | 1973   | 1974    | 1979    |
|----------|--------|--------|--------|--------|--------|--------|---------|---------|
| Flowline | 1866.1 | 1866.1 | 1866.1 | 1865.4 | 1865.1 | 1865.2 | 1865.10 | 1864.60 |

| Year     | 1982 | 1985    | 1987   | 1989   | 1990   | 1992   |
|----------|------|---------|--------|--------|--------|--------|
| Flowline | 1864 | 1864.70 | 1864.1 | 1864.1 | 1864.1 | 1864.1 |

**Table 9. Structure, and Flowline Details  
 Bridge No 17509 (RS 3) on North Canadian River**

| <b>Bridge No</b> | <b>Location</b>        | <b>Latitude</b> | <b>Longitude</b> | <b>Highway</b> | <b>Design Year</b> | <b>Length</b> |
|------------------|------------------------|-----------------|------------------|----------------|--------------------|---------------|
| b17509           | 5.3 MI N JCT<br>US 183 | 36-23-18        | 99-13-42         | S.H. 50        | 1969               | 160.10        |

| <b>Year</b>     | <b>1970</b> | <b>1977</b> | <b>1982</b> | <b>1989</b> | <b>1991</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1814.61     | 1812.81     | 1815.21     | 1815.31     | 1815.31     |

**Table 10. Structure, Cross-section, and Flowline Details  
Bridge No 17602 (RS 4) on North Canadian River**

| Bridge No | Location            | Latitude | Longitude | Highway | Design Year | Length |
|-----------|---------------------|----------|-----------|---------|-------------|--------|
| b17602    | 5.4 MI N JCT US 183 | 36-23-18 | 99-13-42  | S.H. 50 | 1969        | 801.50 |

| PIER_NO | DISTANCE | PIER_BTM | PIER_TOP | R_BED 69 | S_RDING 92 | R_BED 92 | S_RDING 93 | R_BED 93 |
|---------|----------|----------|----------|----------|------------|----------|------------|----------|
| S-A     | 0.00     | 1780.00  | 1827.09  | 1825.00  |            |          |            |          |
| 1       | 100.00   | 1802.56  | 1827.56  | 1820.00  |            |          |            |          |
| 2       | 200.00   | 1803.24  | 1828.84  | 1817.50  |            |          |            |          |
| 3       | 300.00   | 1803.25  | 1828.25  | 1813.13  | 21.60      | 1814.65  | 21.60      | 1814.65  |
|         | 310.00   |          |          | 1813.13  |            |          |            |          |
|         | 328.00   |          |          | 1813.13  |            |          |            |          |
|         | 334.00   |          |          | 1813.13  |            |          |            |          |
|         | 340.00   |          |          | 1813.13  |            |          |            |          |
|         | 344.00   |          |          | 1813.13  |            |          |            |          |
|         | 346.00   |          |          | 1813.13  | 21.70      | 1814.55  |            |          |
|         | 348.00   |          |          | 1813.13  |            |          | 21.30      | 1814.95  |
|         | 350.00   |          |          | 1813.13  |            |          |            |          |
|         | 351.00   |          |          | 1813.13  |            |          |            |          |
|         | 363.00   |          |          | 1813.13  | 25.10      | 1811.15  |            |          |
|         | 365.00   |          |          | 1813.13  |            |          |            |          |
|         | 375.00   |          |          | 1813.13  |            |          |            |          |
|         | 377.00   |          |          | 1813.13  |            |          |            |          |
|         | 380.00   |          |          | 1813.13  | 25.70      | 1810.55  |            |          |
|         | 387.00   |          |          | 1813.13  |            |          |            |          |
|         | 390.00   |          |          | 1813.13  |            |          | 26.00      | 1810.25  |
| 4       | 400.75   | 1803.48  | 1828.42  | 1813.13  | 25.50      | 1810.75  | 25.70      | 1810.55  |

**Table 10. (Continued)**

| <b>PIER_NO</b> | <b>DISTANCE</b> | <b>PIER_BTM</b> | <b>PIER_TOP</b> | <b>R_BED 69</b> | <b>S_RDING 92</b> | <b>R_BED 92</b> | <b>S_RDING 93</b> | <b>R_BED 93</b> |
|----------------|-----------------|-----------------|-----------------|-----------------|-------------------|-----------------|-------------------|-----------------|
|                | 407.75          |                 |                 | 1813.13         |                   |                 |                   |                 |
|                | 410.75          |                 |                 | 1813.13         | 24.40             | 1811.85         |                   |                 |
|                | 419.75          |                 |                 | 1813.13         |                   |                 |                   |                 |
|                | 423.75          |                 |                 | 1813.13         |                   |                 |                   |                 |
|                | 427.75          |                 |                 | 1813.13         |                   |                 |                   |                 |
|                | 430.75          |                 |                 | 1815.00         |                   |                 |                   |                 |
|                | 437.75          |                 |                 | 1815.00         |                   |                 |                   |                 |
|                | 441.75          |                 |                 | 1815.00         |                   |                 | 19.90             | 1816.35         |
|                | 444.75          |                 |                 | 1815.00         | 19.40             | 1816.85         |                   |                 |
|                | 447.75          |                 |                 | 1815.00         |                   |                 |                   |                 |
|                | 450.75          |                 |                 | 1815.00         |                   |                 |                   |                 |
|                | 460.75          |                 |                 | 1815.00         |                   |                 |                   |                 |
|                | 490.75          |                 |                 | 1816.25         |                   |                 |                   |                 |
| 5              | 501.50          | 1803.25         | 1828.25         | 1816.25         |                   |                 | 20.70             | 1815.55         |
| 6              | 601.50          | 1803.24         | 1828.24         | 1818.25         |                   |                 |                   |                 |
| 7              | 701.50          | 1802.56         | 1827.55         | 1818.25         |                   |                 |                   |                 |
| N-A            | 801.50          | 1780.00         | 1827.09         | 1825.00         |                   |                 |                   |                 |



**Table 10. (Continued)**

| <b>S_RDING 93</b> | <b>R_BED 93</b> | <b>S_RDING 94</b> | <b>R_BED 94</b> | <b>S_RDING 96</b> | <b>R_BED 96</b> | <b>S_RDING 97</b> | <b>R_BED 97</b> |
|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|
|                   |                 |                   |                 |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 |                   |                 |
| 21.60             | 1814.65         | 21.70             | 1814.55         | 21.60             | 1814.65         | 21.50             | 1814.75         |
|                   |                 |                   |                 | 22.00             | 1814.25         |                   |                 |
|                   |                 |                   |                 |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 | 20.30             | 1815.95         |
|                   |                 |                   |                 | 20.70             | 1815.55         |                   |                 |
| 20.90             | 1815.35         |                   |                 |                   |                 |                   |                 |
|                   |                 | 21.70             | 1814.55         |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 |                   |                 |
|                   |                 |                   |                 | 25.00             | 1811.25         |                   |                 |
|                   |                 | 25.70             | 1810.55         |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 |                   |                 |
| 25.90             | 1810.35         |                   |                 |                   |                 |                   |                 |
| 25.60             | 1810.65         | 25.30             | 1810.95         | 26.80             | 1809.45         | 26.80             | 1809.45         |

**Table 10. (Continued)**

| <b>S_RDING 93</b> | <b>R_BED 93</b> | <b>S_RDING 94</b> | <b>R_BED 94</b> | <b>S_RDING 96</b> | <b>R_BED 96</b> | <b>S_RDING 97</b> | <b>R_BED 97</b> |
|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|
|                   |                 |                   |                 |                   |                 | 20.70             | 1815.55         |
|                   |                 |                   |                 |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 | 23.80             | 1812.45         |
|                   |                 |                   |                 |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 | 19.80             | 1816.45         |
|                   |                 |                   |                 | 20.00             | 1816.25         |                   |                 |
| 19.80             | 1816.45         | 20.00             | 1816.25         |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 | 20.60             | 1815.65         |
| 20.80             | 1815.45         | 20.80             | 1815.45         | 20.80             | 1815.45         | 20.90             | 1815.35         |
|                   |                 |                   |                 |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 |                   |                 |

Table 10. (Continued)

| S_RDING 99 | R_BED 99 | S_RDING 00 | R_BED 00 | S_RDING 03 | R_BED 03 |
|------------|----------|------------|----------|------------|----------|
|            |          |            |          |            |          |
|            |          |            |          |            |          |
| 20.40      | 1815.85  | 20.70      | 1815.55  | 20.80      | 1815.45  |
|            |          |            |          | 21.10      | 1815.15  |
|            |          | 21.3       | 1814.95  |            |          |
|            |          |            |          | 20.70      | 1815.55  |
|            |          |            |          |            |          |
|            |          |            |          |            |          |
|            |          |            |          |            |          |
|            |          |            |          | 25.90      | 1810.35  |
|            |          |            |          |            |          |
|            |          | 26.1       | 1810.15  |            |          |
|            |          |            |          |            |          |
| 26.20      | 1810.05  |            |          |            |          |
|            |          |            |          | 25.40      | 1810.85  |
| 25.50      | 1810.75  | 25.80      | 1810.45  | 24.90      | 1811.35  |

**Table 10. (Continued)**

| <b>S_RDING 99</b> | <b>R_BED 99</b> | <b>S_RDING 00</b> | <b>R_BED 00</b> | <b>S_RDING 03</b> | <b>R_BED 03</b> |
|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|
|                   |                 |                   |                 |                   |                 |
| 22.40             | 1813.85         |                   |                 |                   |                 |
|                   |                 |                   |                 | 22.70             | 1813.55         |
| 23.20             | 1813.05         |                   |                 |                   |                 |
| 19.90             | 1816.35         | 20.10             | 1816.15         |                   |                 |
|                   |                 |                   |                 | 19.90             | 1816.35         |
|                   |                 |                   |                 |                   |                 |
|                   |                 |                   |                 | 21.00             | 1815.25         |
| 21.10             | 1815.15         | 21.60             | 1814.65         | 20.90             | 1815.35         |
|                   |                 |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 |
|                   |                 |                   |                 |                   |                 |

**Table 10. (Continued)**

| <b>Year</b>     | <b>1970</b> | <b>1971</b> | <b>1973</b> | <b>1974</b> | <b>1977</b> | <b>1979</b> | <b>1982</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1810.85     | 1811.25     | 1811.25     | 1811.25     | 1811.25     | 1810.35     | 1810.45     |

| <b>Year</b>     | <b>1985</b> | <b>1987</b> | <b>1989</b> | <b>1991</b> | <b>1992</b> | <b>1993</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1811.25     | 1811.25     | 1810.25     | 1809.55     | 1810.55     | 1809.35     |

**Table 11. Structure, Cross-section, and Flowline Details  
Bridge No 16193 (RS 5) on North Canadian River**

| Bridge No | Location             | Latitude | Longitude | Highway | Design Year | Length |
|-----------|----------------------|----------|-----------|---------|-------------|--------|
| b16193    | 1.5 MI. N. Dewey C/L | 36-11-00 | 98-55-12  | U.S. 60 | 1964        | 924.00 |

| Pier-No | Distance | Pier-BTM | Pier-Top | R-bed64 | S-Rding92 | R-bed92 | S-Rding98 | R-bed98 | S-Rding00 | R-bed00 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|-----------|---------|
| S-A     | 0.00     | 1670.00  | 1696.91  | 1690.00 | 9.50      | 1694.29 | 8.83      | 1694.96 | 11.60     | 1692.19 |
| 1       | 51.25    | 1669.20  | 1697.20  | 1687.50 | 16.80     | 1688.70 | 16.42     | 1689.08 | 19.00     | 1686.50 |
| 2       | 152.00   | 1669.69  | 1697.69  | 1686.25 | 20.00     | 1685.50 | 18.00     | 1687.50 | 22.00     | 1683.50 |
|         | 172.00   |          |          | 1686.25 |           |         | 18.67     | 1686.83 |           |         |
| 3       | 252.00   | 1669.98  | 1698.38  | 1687.50 | 19.50     | 1686.00 | 19.08     | 1686.42 | 21.60     | 1683.90 |
|         | 272.00   |          |          | 1686.25 |           |         | 20.58     | 1684.92 |           |         |
|         | 292.00   |          |          | 1682.50 |           |         |           |         | 22.70     | 1682.80 |
| 4       | 352.00   | 1669.40  | 1698.40  | 1687.50 | 21.50     | 1684.06 | 19.50     | 1686.06 | 20.80     | 1684.76 |
|         | 372.00   |          |          | 1685.00 |           |         | 18.67     | 1686.89 |           |         |
|         | 392.00   |          |          | 1681.75 |           |         |           |         | 21.10     | 1684.46 |
|         | 432.00   |          |          | 1681.75 | 21.50     | 1684.06 |           |         |           |         |
|         | 442.75   |          |          | 1681.75 |           |         | 26.42     | 1679.15 |           |         |
| 5       | 452.75   | 1669.63  | 1698.63  | 1681.75 | 27.50     | 1679.25 | 25.33     | 1681.42 | 25.90     | 1680.85 |
|         | 492.75   |          |          | 1681.75 | 26.00     | 1680.75 |           |         | 28.40     | 1678.35 |
| 6       | 553.50   | 1669.40  | 1698.40  | 1681.75 | 23.80     | 1681.76 | 21.58     | 1683.98 | 21.50     | 1684.06 |
|         | 573.50   |          |          | 1685.00 | 23.80     | 1681.76 | 19.75     | 1685.81 |           |         |
|         | 593.50   |          |          | 1685.00 |           |         |           |         | 22.30     | 1683.26 |
| 7       | 653.50   | 1669.38  | 1698.38  | 1685.00 | 20.50     | 1685.00 | 20.00     | 1685.50 | 22.30     | 1683.20 |
| 8       | 753.50   | 1669.69  | 1697.69  | 1684.13 | 17.00     | 1688.50 | 16.33     | 1689.17 | 18.70     | 1686.80 |
|         | 773.50   |          |          | 1684.13 |           |         | 15.25     | 1690.25 |           |         |
|         | 793.50   |          |          | 1685.00 |           |         |           |         | 18.20     | 1686.68 |
| 9       | 854.25   | 1669.20  | 1697.20  | 1685.63 | 17.00     | 1687.25 | 16.58     | 1687.67 | 19.20     | 1685.05 |
| N-A     | 915.50   | 1670.00  | 1696.27  | 1686.25 | 9.70      | 1694.69 | 9.17      | 1695.22 | 11.70     | 1692.69 |

| Year     | 1965    | 1967    | 1969    | 1970    | 1971    | 1973    | 1975    | 1979    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1680.06 | 1679.56 | 1680.76 | 1678.76 | 1678.56 | 1678.46 | 1679.26 | 1677.96 |

| Year     | 1982    | 1984    | 1986    | 1989    | 1990    | 1991    | 1993    | 1994    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1678.56 | 1678.06 | 1676.56 | 1676.56 | 1676.56 | 1678.66 | 1676.56 | 1676.06 |

**Table 12. Structure, Cross-section, and Flowline Details  
Bridge No 13679 (RS 6) on North Canadian River**

| Bridge No | Location           | Latitude | Longitude | Highway | Design Year | Length |
|-----------|--------------------|----------|-----------|---------|-------------|--------|
| b13679    | 3.1 MI E Dewey C/L | 36-03-18 | 98-34-54  | S.H. 51 | 1956        | 444.50 |

| Pier-No | Distance | Pier-BTM | Pier-Top | R-bed56 | S-Rding91 | R-bed91 |
|---------|----------|----------|----------|---------|-----------|---------|
| W-A     | 0.00     | 1540.00  | 1575.00  | 1571.5  | 7.00      | 1573.18 |
| 1       | 51.50    | 1540.00  | 1575.76  | 1570.00 | 12.30     | 1567.88 |
| 2       | 137.25   | 1530.89  | 1575.89  | 1571.50 | 14.80     | 1565.38 |
| 3       | 222.25   | 1531.19  | 1576.13  | 1557.50 | 19.60     | 1560.58 |
|         | 264.75   |          |          | 1556.50 | 23.40     | 1556.78 |
| 4       | 307.25   | 1530.89  | 1575.89  | 1568.13 | 17.30     | 1562.88 |
| 5       | 393.00   | 1539.00  | 1575.76  | 1570.00 | 10.60     | 1569.58 |
| E-A     | 444.50   | 1538.00  | 1576.25  | 1570.00 | 7.00      | 1573.50 |

| Year     | 1959    | 1965    | 1969    | 1970    | 1971    | 1973    | 1974    | 1976    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1557.18 | 1557.18 | 1557.08 | 1556.18 | 1555.78 | 1554.88 | 1554.78 | 1554.58 |

| Year     | 1979    | 1982    | 1984    | 1987    | 1989    | 1991    | 1991    | 1995    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1555.58 | 1555.38 | 1555.58 | 1555.28 | 1555.68 | 1557.58 | 1553.58 | 1557.88 |

| Year     | 1999    | 2002    | 2004    |
|----------|---------|---------|---------|
| Flowline | 1556.43 | 1553.51 | 1557.18 |

**Table 13. Structure, and Flowline Details  
 Bridge No 13655 (RS 7) on North Canadian River**

| <b>Bridge No</b> | <b>Location</b>        | <b>Latitude</b> | <b>Longitude</b> | <b>Highway</b> | <b>Design Year</b> | <b>Length</b> |
|------------------|------------------------|-----------------|------------------|----------------|--------------------|---------------|
| b13655           | 3.5 Mi. E<br>Dewey C/L | 36-03-18        | 98-34-36         | S.H. 51        | 1956               | 150.90        |

| <b>Year</b>     | <b>1965</b> | <b>1976</b> | <b>1984</b> | <b>1991</b> | <b>1995</b> | <b>1999</b> | <b>2002</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1561.40     | 1561.00     | 1561.80     | 1561.70     | 1562.00     | 1561.67     | 1561.59     |

**Table 14. Structure, Cross-section, and Flowline Details  
Bridge No 20864 (RS 8) on North Canadian River**

| Bridge No | Location            | Latitude | Longitude | Highway  | Design Year | Length |
|-----------|---------------------|----------|-----------|----------|-------------|--------|
| b20864    | 10.2 MI E Dewey C/L | 35-50-30 | 98-27-54  | U.S. 270 | 1984        | 540.58 |

| Pier-No | Distance | Pier-BTM | Pier-Top | R-bed84 | S-Rding87 | R-bed87 |
|---------|----------|----------|----------|---------|-----------|---------|
| E-A     | 0.00     | 1463.00  | 1492.00  | 1490.00 | 10.60     | 1490.80 |
| 1       | 70.29    | 1449.67  | 1493.17  | 1480.00 | 20.00     | 1481.40 |
| 2       | 170.29   | 1448.44  | 1493.44  | 1480.00 | 21.80     | 1479.60 |
|         | 220.29   |          |          | 1478.00 | 30.00     | 1471.40 |
| 3       | 270.29   | 1449.06  | 1493.55  | 1474.00 | 21.70     | 1479.70 |
| 4       | 370.29   | 1451.07  | 1493.57  | 1474.00 | 21.00     | 1480.40 |
| 5       | 470.29   | 1451.42  | 1493.42  | 1480.00 | 20.30     | 1481.10 |
| W-A     | 540.58   | 1464.00  | 1492.00  | 1490.00 | 9.00      | 1492.74 |

| Year     | 1984    | 1987    | 1989    | 1991    | 1995    | 2004    |
|----------|---------|---------|---------|---------|---------|---------|
| Flowline | 1474.30 | 1472.90 | 1472.40 | 1471.40 | 1477.40 | 1472.40 |



**Table 15. Structure, Cross-section, and Flowline Details  
Bridge No 05523 (RS 9) on North Canadian River**

| Bridge No | Location               | Latitude | Longitude | Highway  | Design Year | Length |
|-----------|------------------------|----------|-----------|----------|-------------|--------|
| b05523    | 10.5 MI E<br>Dewey C/L | 35-50-30 | 98-27-54  | U.S. 270 | 1937        | 809.50 |

| Pier-No | Distance | Pier-BTM | Pier-Top | R-bed37 | S-Rding91 | R-bed91 |
|---------|----------|----------|----------|---------|-----------|---------|
| E-A     | 0.00     | 1463.03  | 1494.18  | 1491.25 | 6.00      | 1488.88 |
| 1       | 103.08   | 1459.81  | 1494.18  | 1481.75 | 18.00     | 1475.00 |
| 2       | 204.00   | 1459.68  | 1494.18  | 1477.50 | 19.00     | 1475.25 |
| 3       | 304.92   | 1459.31  | 1494.18  | 1475.00 | 23.50     | 1470.75 |
|         | 355.38   |          |          | 1475.00 | 26.00     | 1468.88 |
| 4       | 405.83   | 1459.99  | 1494.18  | 1475.00 | 20.00     | 1475.50 |
| 5       | 506.75   | 1459.68  | 1494.18  | 1477.50 | 19.00     | 1476.50 |
| 6       | 607.67   | 1459.68  | 1494.18  | 1478.75 | 19.00     | 1476.50 |
| 7       | 708.58   | 1459.68  | 1494.18  | 1478.13 | 17.00     | 1478.50 |
| W-A     | 809.50   | 1463.37  | 1494.18  | 1492.50 | 7.00      | 1488.50 |

| Year     | 1954    | 1959    | 1965    | 1970    | 1971    | 1973    | 1974    | 1976    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1468.20 | 1468.50 | 1468.50 | 1468.40 | 1468.40 | 1467.90 | 1467.70 | 1467.50 |

| Year     | 1979    | 1982    | 1984    | 1987    | 1989    | 1991    | 1995    |
|----------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1467.60 | 1467.20 | 1466.40 | 1465.00 | 1467.50 | 1467.50 | 1469.17 |

**Table 16. Structure, Cross-section, and Flowline Details  
Bridge No 26237 (RS 10)on North Canadian River**

| Bridge No | Location            | Latitude | Longitude | Highway  | Design Year | Length |
|-----------|---------------------|----------|-----------|----------|-------------|--------|
| B18134    | 2.2 MI S.<br>SH. 33 | 35-48-48 | 98-25-12  | U.S. 270 | 1971        | 400.00 |

| PIER_NO | DISTANCE | PIER_BTM | PIER_TOP | R_BED 71 | S_RDING 00 | R_BED 00 | WSE 00  |
|---------|----------|----------|----------|----------|------------|----------|---------|
| S-A     | 0.00     | 1440.19  | 1477.48  | 1475.00  | 9.70       | 1477.80  | 1479.50 |
| 1       | 100.00   | 1435.00  | 1477.50  | 1467.50  | 27.20      | 1459.05  | 1460.75 |
| 2       | 200.00   | 1435.08  | 1477.58  | 1460.45  | 22.70      | 1463.55  | 1465.25 |
| 3       | 300.00   | 1436.00  | 1477.50  | 1467.50  | 19.20      | 1467.05  | 1468.75 |
| N-A     | 400.00   | 1438.29  | 1477.48  | 1475.00  | 11.20      | 1476.30  | 1478.00 |

| Year     | 1971    | 1973    | 1974    | 1976    | 1979    | 1984    |
|----------|---------|---------|---------|---------|---------|---------|
| Flowline | 1460.45 | 1460.45 | 1460.45 | 1460.25 | 1461.95 | 1459.85 |

| Year     | 1987    | 1989    | 1990    | 1992    | 1995    |
|----------|---------|---------|---------|---------|---------|
| Flowline | 1461.05 | 1460.25 | 1460.05 | 1460.25 | 1461.25 |

**Table 17. Structure, and Flowline Details  
Bridge No 26237 (RS 11)on North Canadian River**

| Bridge No | Location               | Latitude | Longitude | Highway | Design Year | Length |
|-----------|------------------------|----------|-----------|---------|-------------|--------|
| b26237    | 2.2 N. JCT.<br>S.H. 66 | Missing  | Missing   | U.S. 81 | 2000        | 602.50 |

| Year     | 2005    |
|----------|---------|
| Flowline | 1295.77 |

**Table 18. Structure, Cross-section, and Flowline Details  
Bridge No 18608 (RS 12) on North Canadian River**

| Bridge No | Location                 | Latitude | Longitude | Highway | Design Year | Length |
|-----------|--------------------------|----------|-----------|---------|-------------|--------|
| b18608    | 2.2 MI. N. JCT.<br>SH 66 | 35-33-30 | 97-57-30  | U.S. 81 | 1973        | 602.77 |

| Pier-No | Distance | Pier-BTM | Pier-Top | R-bed73 | S-Rding88 | R-bed88 | S-Rding91 | R-bed91 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|
| S-A     | 0.00     | 1266.30  | 1325.42  | 1323.00 |           |         | 10.90     | 1322.85 |
|         | 50.32    |          |          | 1314.50 | 19.50     | 1314.75 |           |         |
| 1       | 100.63   | 1266.40  | 1325.93  | 1311.00 | 22.70     | 1311.80 | 23.40     | 1311.10 |
| 2       | 201.01   | 1267.40  | 1326.23  | 1311.00 | 22.30     | 1312.45 | 22.90     | 1311.85 |
| 3       | 301.39   | 1267.60  | 1326.33  | 1313.50 | 21.60     | 1313.15 | 22.60     | 1312.15 |
| 4       | 401.76   | 1265.48  | 1326.23  | 1305.00 | 34.40     | 1300.35 | 33.90     | 1300.85 |
|         | 413.00   |          |          | 1301.00 |           |         |           |         |
|         | 430.26   |          |          | 1301.50 |           |         | 35.60     | 1299.15 |
|         | 454.76   |          |          | 1304.00 |           |         |           |         |
|         | 465.76   |          |          | 1304.00 |           |         |           |         |
|         | 476.76   |          |          | 1304.00 |           |         |           |         |
| 5       | 502.14   | 1265.48  | 1325.03  | 1304.00 | 27.50     | 1307.00 | 30.40     | 1304.10 |
|         | 552.46   |          |          | 1313.50 | 17.90     | 1316.35 |           |         |
| N-A     | 602.77   | 1266.30  | 1325.42  | 1323.00 |           |         | 10.40     | 1323.35 |

| S-Rding92 | R-bed92 | S-Rding94 | R-bed94 | S-Rding98 | R-bed98 | S-Rding00 | R-bed00 |
|-----------|---------|-----------|---------|-----------|---------|-----------|---------|
| 10.90     | 1322.85 | 10.62     | 1323.13 | 10.69     | 1323.06 | 10.60     | 1323.15 |
|           |         |           |         |           |         |           |         |
| 23.60     | 1310.90 | 22.99     | 1311.51 | 23.09     | 1311.41 | 22.90     | 1311.60 |
| 23.00     | 1311.75 | 22.44     | 1312.31 | 22.90     | 1311.85 | 22.70     | 1312.05 |
| 22.70     | 1312.05 | 21.39     | 1313.36 | 21.81     | 1312.94 | 21.40     | 1313.35 |
| 34.50     | 1300.25 | 34.71     | 1300.04 | 35.82     | 1298.93 | 35.40     | 1299.35 |
|           |         |           |         | 35.89     | 1298.86 |           |         |
|           |         |           |         |           |         |           |         |
|           |         |           |         |           |         | 35.90     | 1298.85 |
|           |         | 36.48     | 1298.02 |           |         |           |         |
| 35.50     | 1299.00 |           |         |           |         |           |         |
| 27.80     | 1306.70 | 26.90     | 1307.60 | 25.98     | 1308.52 | 26.30     | 1308.20 |
|           |         |           |         |           |         |           |         |
| 10.50     | 1323.25 | 10.49     | 1323.26 | 10.30     | 1323.45 | 10.10     | 1323.65 |

**Table 18. (Continued)**

| <b>Year</b>     | <b>1973</b> | <b>1975</b> | <b>1981</b> | <b>1984</b> | <b>1985</b> | <b>1990</b> | <b>1991</b> | <b>1992</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1302.25     | 1302.55     | 1301.85     | 1301.15     | 1300.75     | 1299.95     | 1300.05     | 1301.25     |

| <b>Year</b>     | <b>1993</b> | <b>2005</b> |
|-----------------|-------------|-------------|
| <b>Flowline</b> | 1298.85     | 1302.75     |

**Table 19. Structure, Cross-section, and Flowline Details  
Bridge No 12832 (RS 13) on North Canadian River**

| <b>Bridge No</b> | <b>Location</b>          | <b>Latitude</b> | <b>Longitude</b> | <b>Highway</b> | <b>Design Year</b> | <b>Length</b> |
|------------------|--------------------------|-----------------|------------------|----------------|--------------------|---------------|
| b12832           | 2.0 MI. N. JCT.<br>SH 66 | 35-32-12        | 97-44-30         | S.H. 4         | 1952               | 177.00        |

| <b>Pier-No</b> | <b>Distance</b> | <b>Pier-BTM</b> | <b>Pier-Top</b> | <b>R-bed52</b> | <b>S-Rding88</b> | <b>R-bed88</b> |
|----------------|-----------------|-----------------|-----------------|----------------|------------------|----------------|
| S-A            | 0.00            | 1235.75         | 1267.33         | 1264.5         |                  |                |
| 1              | 26.00           | 1235.50         | 1267.33         | 1258.00        | 4.50             | 1265.50        |
| 2              | 51.00           | 1235.50         | 1267.33         | 1258.00        | 5.10             | 1264.90        |
| 3              | 76.00           | 1235.00         | 1267.33         | 1258.00        | 5.90             | 1264.10        |
| 4              | 101.00          | 1235.00         | 1267.33         | 1258.00        | 5.70             | 1265.30        |
| 5              | 126.00          | 1235.00         | 1267.33         | 1258.00        | 5.00             | 1266.00        |
| 6              | 151.00          | 1235.00         | 1267.33         | 1258.00        | 5.20             | 1265.80        |
| N-A            | 177.00          | 1235.75         | 1267.33         | 1265.00        |                  |                |

| <b>Year</b>     | <b>1955</b> | <b>1960</b> | <b>1965</b> | <b>1966</b> | <b>1967</b> | <b>1969</b> | <b>1970</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1261.50     | 1263.00     | 1263.00     | 1263.00     | 1259.50     | 1257.60     | 1258.50     |

| <b>Year</b>     | <b>1981</b> | <b>1985</b> | <b>1988</b> | <b>1990</b> | <b>1991</b> | <b>1994</b> | <b>2005</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1265.80     | 1258.00     | 1260.20     | 1257.80     | 1256.40     | 1258.00     | 1258.50     |

**Table 20. Structure, Cross-section, and Flowline Details  
Bridge No 12820 (RS 14) on North Canadian River**

| Bridge No | Location               | Latitude | Longitude | Highway | Design Year | Length |
|-----------|------------------------|----------|-----------|---------|-------------|--------|
| b12820    | 2.3MI. N.<br>JCT. SH66 | 35-32-30 | 97-44-30  | S.H. 4  | 1952        | 127.84 |

| Pier-No | Distance | Pier-BTM | Pier-Top | R-bed52 | S-Rding 88 | R-bed 88 |
|---------|----------|----------|----------|---------|------------|----------|
| S-A     | 0.00     | 1236.00  | 1267.97  | 1266.00 |            |          |
| 1       | 26.42    | 1236.00  | 1267.72  | 1263.00 | 8.00       | 1262.75  |
| 2       | 51.42    | 1236.00  | 1267.47  | 1261.50 | 14.20      | 1256.55  |
|         | 63.92    |          |          | 1255.75 | 17.30      | 1253.45  |
| 3       | 76.42    | 1235.50  | 1267.22  | 1261.50 | 16.00      | 1254.75  |
| 4       | 101.42   | 1235.50  | 1266.97  | 1262.00 | 11.00      | 1259.75  |
| N-A     | 127.84   | 1236.00  | 1266.75  | 1265.00 |            |          |

| Year     | 1955    | 1958    | 1960    | 1965    | 1967    | 1969    | 1970    | 1972    | 1975    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1261.05 | 1261.65 | 1258.25 | 1258.15 | 1258.35 | 1258.95 | 1259.15 | 1257.25 | 1255.15 |

| Year     | 1981    | 1984    | 1985    | 1988    | 1990    | 1991    | 1995    | 2005    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1257.15 | 1255.75 | 1255.25 | 1253.45 | 1254.05 | 1254.25 | 1254.75 | 1254.95 |

**Table 21. Structure, Cross-section, and Flowline Details  
Bridge No 18352 (RS 15)on North Canadian River**

| Bridge No | Location                | Latitude | Longitude | Highway | Design Year | Length |
|-----------|-------------------------|----------|-----------|---------|-------------|--------|
| b18352    | 22 MI. N.<br>JCT. SH 66 | 35-32-18 | 97-44-30  | S.H.4   | 1972        | 330.50 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed72 | S-Rding88 | R-bed88 | S-Rding91 | R-bed91 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|
| S-A     | 0.00     | 1240.00  | 1268.78  | 1271.88 |           |         | 10.70     | 1266.68 |
| 1       | 95.25    | 1238.92  | 1268.92  | 1255.00 | 25.70     | 1251.05 | 23.00     | 1253.75 |
|         | 109.25   |          |          | 1255.00 |           |         |           |         |
|         | 125.75   |          |          | 1255.00 |           |         |           |         |
|         | 137.75   |          |          | 1255.00 |           |         |           |         |
|         | 142.75   |          |          | 1255.00 | 26.30     | 1250.45 | 27.90     | 1248.85 |
|         | 157.25   |          |          | 1255.00 |           |         |           |         |
|         | 170.75   |          |          | 1255.00 |           |         |           |         |
| 2       | 190.25   | 1238.92  | 1268.92  | 1257.50 | 25.40     | 1251.98 | 27.20     | 1250.18 |
| 3       | 260.25   | 1244.63  | 1269.63  | 1264.38 | 18.00     | 1260.00 | 18.00     | 1260.00 |
| N-A     | 330.50   | 1240.00  | 1268.55  | 1271.88 |           |         | 10.80     | 1267.20 |

| S-Rding92 | R-bed92 | S-Rding93 | R-bed93 | S-Rding93 | R-bed93 | S-Rding94 | R-bed94 |
|-----------|---------|-----------|---------|-----------|---------|-----------|---------|
| 10.60     | 1266.78 | 10.70     | 1266.68 | 10.60     | 1266.78 | 9.51      | 1267.86 |
| 21.10     | 1255.65 | 22.90     | 1253.85 | 22.20     | 1254.55 | 26.84     | 1249.91 |
|           |         |           |         |           |         |           |         |
| 27.00     | 1249.75 | 29.00     | 1247.75 |           |         |           |         |
|           |         |           |         | 27.30     | 1249.45 |           |         |
|           |         |           |         |           |         |           |         |
| 28.00     | 1249.38 | 31.80     | 1245.58 | 28.90     | 1248.48 | 26.71     | 1250.67 |
| 18.00     | 1260.00 | 17.80     | 1260.20 | 17.80     | 1260.20 | 16.47     | 1261.53 |
| 11.30     | 1266.70 | 11.10     | 1266.90 | 11.10     | 1266.90 | 9.88      | 1268.12 |

**Table 21. (Continued)**

| <b>S-Rding98</b> | <b>R-bed98</b> | <b>S-Rding00</b> | <b>R-bed00</b> | <b>S-Rding05</b> | <b>R-bed05</b> |
|------------------|----------------|------------------|----------------|------------------|----------------|
| 10.86            | 1266.52        | 11.10            | 1266.28        | 10.60            | 1266.78        |
| 19.46            | 1257.29        | 21.40            | 1255.35        | 20.10            | 1256.65        |
| 28.38            | 1248.37        |                  |                |                  |                |
|                  |                |                  |                | 26.30            | 1250.45        |
|                  |                |                  |                |                  |                |
|                  |                | 27.30            | 1249.45        |                  |                |
|                  |                |                  |                | 24.70            | 1252.05        |
| 29.17            | 1248.21        | 27.50            | 1249.88        | 25.70            | 1251.68        |
| 17.42            | 1260.58        | 17.50            | 1260.50        | 17.40            | 1260.60        |
| 10.89            | 1267.11        | 10.90            | 1267.10        | 10.70            | 1267.30        |

| <b>Year</b>     | <b>1972</b> | <b>1973</b> | <b>1975</b> | <b>1981</b> | <b>1984</b> | <b>1985</b> | <b>1988</b> | <b>1991</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1251.88     | 1252.58     | 1253.88     | 1251.48     | 1250.88     | 1250.38     | 1248.58     | 1249.98     |

| <b>Year</b>     | <b>1993</b> | <b>1994</b> | <b>2005</b> |
|-----------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1245.58     | 1249.88     | 1251.68     |

**Table 22. Structure, Cross-section, and Flowline Details  
Bridge No 14208 (RS 16) on North Canadian River**

| Bridge No | Location              | Latitude | Longitude | Highway | Design Year | Length |
|-----------|-----------------------|----------|-----------|---------|-------------|--------|
| b14208    | 0.3 MI E Canadian C/L | 35-30-54 | 97-40-00  | U.S. 66 | 1958        | 803.50 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed58 | S-Rding93 | R-bed93 | S-Rding94 | R-bed94 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|
| W-A     | 0.00     | 1225.00  | 1254.04  | 1252.50 | 5.90      | 1255.07 | 7.67      | 1253.30 |
| 1       | 101.00   | 1225.09  | 1254.09  | 1245.00 | 18.30     | 1242.95 | 17.48     | 1243.77 |
| 2       | 201.00   | 1225.59  | 1254.59  | 1245.00 | 18.90     | 1242.35 | 17.97     | 1243.28 |
| 3       | 301.00   | 1225.54  | 1250.54  | 1243.75 | 18.70     | 1242.55 | 18.53     | 1242.72 |
| 4       | 401.75   | 1225.94  | 1254.94  | 1242.50 | 19.00     | 1242.88 | 18.79     | 1243.09 |
| 5       | 502.50   | 1225.54  | 1254.54  | 1237.50 | 20.50     | 1240.75 | 25.88     | 1235.37 |
| 6       | 602.50   | 1198.59  | 1254.59  | 1235.00 | 36.70     | 1224.55 | 31.29     | 1229.96 |
|         | 652.50   |          |          | 1232.50 | 36.10     | 1225.15 | 34.58     | 1226.67 |
| 7       | 702.50   | 1198.09  | 1254.09  | 1226.25 | 36.00     | 1224.63 | 32.18     | 1228.45 |
| E-A     | 803.50   | 1225.00  | 1254.04  | 1250.00 | 9.00      | 1251.99 | 9.67      | 1251.32 |

| Year     | 1965    | 1970    | 1982    | 1984    | 1986    | 1988    | 1994    | 2005    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1237.75 | 1232.95 | 1232.85 | 1248.25 | 1233.25 | 1234.95 | 1228.77 | 1234.65 |



**Table 23. Structure, Cross-section, and Flowline Details  
Bridge No 16189 (RS 17) on North Canadian River**

| Bridge No | Location          | Latitude | Longitude | Highway | Design Year | Length |
|-----------|-------------------|----------|-----------|---------|-------------|--------|
| b16189    | 1MI E Canadian Co | 35-27-36 | 97-40-12  | I-40    | 1964        | 804.00 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed64 | S-Rding88 | R-bed88 | S-Rding93 | R-bed93 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|
| W-A     | 0.00     | 1188.00  | 1230.12  | 1228.75 |           |         | 11.60     | 1228.40 |
|         | 50.00    |          |          |         |           |         |           |         |
| 1       | 101.00   | 1183.58  | 1230.58  | 1211.75 | 27.30     | 1212.70 | 28.90     | 1211.10 |
| 2       | 201.00   | 1182.86  | 1230.86  | 1211.75 | 27.50     | 1212.50 | 30.90     | 1209.10 |
| 3       | 301.00   | 1183.98  | 1230.98  | 1200.00 | 36.60     | 1203.40 | 36.00     | 1204.00 |
|         | 351.38   |          |          | 1202.50 |           |         |           |         |
| 4       | 401.75   | 1183.92  | 1230.92  | 1206.25 | 35.60     | 1204.40 | 37.00     | 1203.00 |
| 5       | 502.50   | 1183.98  | 1230.98  | 1202.50 | 29.60     | 1210.40 | 37.60     | 1202.40 |
|         | 543.50   |          |          | 1200.75 |           |         |           |         |
|         | 552.50   |          |          | 1200.75 |           |         |           |         |
| 6       | 602.50   | 1183.86  | 1230.86  | 1197.50 | 37.40     | 1202.60 | 43.00     | 1197.00 |
|         | 662.50   |          |          | 1202.50 | 42.80     | 1197.20 | 44.70     | 1195.30 |
|         | 683.50   |          |          | 1205.00 |           |         |           |         |
| 7       | 702.50   | 1182.58  | 1230.58  | 1208.13 | 41.00     | 1199.00 | 31.70     | 1208.30 |
| E-A     | 803.50   | 1187.00  | 1230.12  | 1227.50 |           |         | 9.70      | 1230.30 |

**Table 23. (Continued)**

| <b>S-Rding93</b> | <b>R-bed93</b> | <b>S-Rding94</b> | <b>R-bed94</b> | <b>S-Rding00</b> | <b>R-bed00</b> | <b>S-Rding05</b> | <b>R-bed05</b> |
|------------------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|
| 10.90            | 1229.10        | 8.70             | 1231.30        | 10.60            | 1229.40        | 11.70            | 1228.30        |
|                  |                |                  |                |                  |                | 26.70            | 1213.30        |
| 29.00            | 1211.00        | 27.00            | 1213.00        | 29.30            | 1210.70        | 30.00            | 1210.00        |
| 29.00            | 1211.00        | 27.00            | 1213.00        | 29.70            | 1210.30        | 31.90            | 1208.10        |
| 39.30            | 1200.70        | 37.50            | 1202.50        | 38.90            | 1201.10        | 39.70            | 1200.30        |
|                  |                | 42.00            | 1198.00        |                  |                | 42.80            | 1197.20        |
| 33.30            | 1206.70        | 32.50            | 1207.50        | 44.10            | 1195.90        | 44.00            | 1196.00        |
| 38.00            | 1202.00        | 35.00            | 1205.00        | 44.30            | 1195.70        | 44.20            | 1195.80        |
|                  |                |                  |                | 44.40            | 1195.60        |                  |                |
|                  |                | 42.50            | 1197.50        |                  |                | 44.50            | 1195.50        |
| 40.90            | 1199.10        | 39.00            | 1201.00        | 38.20            | 1201.80        | 42.90            | 1197.10        |
| 45.90            | 1194.10        |                  |                |                  |                | 45.60            | 1194.40        |
|                  |                |                  |                | 48.00            | 1192.00        |                  |                |
| 45.90            | 1194.10        | 44.00            | 1196.00        | 49.00            | 1191.00        | 43.00            | 1197.00        |
| 10.90            | 1229.10        | 9.00             | 1231.00        | 10.10            | 1229.90        | 11.10            | 1228.90        |

| <b>Year</b>     | <b>1970</b> | <b>1975</b> | <b>1981</b> | <b>1984</b> | <b>1986</b> | <b>1988</b> | <b>1990</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1207.80     | 1200.50     | 1200.60     | 1200.00     | 1197.40     | 1197.20     | 1196.70     |

| <b>Year</b>     | <b>1994</b> | <b>2005</b> |
|-----------------|-------------|-------------|
| <b>Flowline</b> | 1196.00     | 1192.50     |

**Table 24. Structure, Cross-section, and Flowline Details  
Bridge No 16190 (RS 18) on North Canadian River**

| Bridge No | Location                 | Latitude | Longitude | Highway | Design Year | Length |
|-----------|--------------------------|----------|-----------|---------|-------------|--------|
| b16190    | 0.1 MI E<br>Canadian Co. | 35-27-36 | 97-40-12  | I-40    | 1964        | 803.50 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed64 | S-Rding88 | R-bed88 | S-Rding94 | R-bed94 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|
| W-A     | 0.00     | 1187.50  | 1230.12  | 1228.25 |           |         | 10.00     | 1228.75 |
| 1       | 101.00   | 1183.58  | 1230.58  | 1200.00 | 27.30     | 1211.45 | 27.00     | 1211.75 |
| 2       | 201.00   | 1182.86  | 1230.86  | 1205.00 | 29.00     | 1209.75 | 33.00     | 1205.75 |
| 3       | 301.00   | 1183.98  | 1230.98  | 1202.50 | 35.80     | 1202.95 | 34.00     | 1204.75 |
| 4       | 401.75   | 1183.92  | 1230.92  | 1202.50 | 38.90     | 1199.85 | 35.00     | 1203.75 |
| 5       | 502.50   | 1183.98  | 1230.98  | 1201.88 | 37.00     | 1202.38 | 38.00     | 1201.38 |
| 6       | 602.50   | 1183.86  | 1230.86  | 1207.50 | 39.40     | 1199.98 | 43.00     | 1196.38 |
|         | 640.50   |          |          | 1197.50 |           |         |           |         |
|         | 642.50   |          |          | 1197.50 | 40.50     | 1198.88 | 44.50     | 1194.88 |
|         | 650.50   |          |          |         |           |         |           |         |
| 7       | 702.50   | 1182.58  | 1230.58  | 1195.00 | 30.50     | 1208.25 | 29.00     | 1209.75 |
| E-A     | 803.50   | 1186.25  | 1230.12  | 1230.12 |           |         | 8.00      | 1230.75 |

| S-Rding00 | R-bed00 | S-Rding05 | R-bed05 |
|-----------|---------|-----------|---------|
| 11.50     | 1227.25 | 12.40     | 1226.35 |
| 29.00     | 1209.75 | 29.60     | 1209.15 |
| 32.20     | 1206.55 | 33.10     | 1205.65 |
| 35.60     | 1203.15 | 37.00     | 1201.75 |
| 36.30     | 1202.45 | 43.80     | 1194.95 |
| 40.40     | 1198.98 | 42.80     | 1196.58 |
| 45.40     | 1193.98 | 42.60     | 1196.78 |
| 45.00     | 1194.38 |           |         |
|           |         |           |         |
|           |         | 47.70     | 1191.68 |
| 31.70     | 1207.05 | 32.70     | 1206.05 |
| 9.10      | 1229.65 | 10.10     | 1228.65 |

| Year     | 1970    | 1975    | 1981    | 1984    | 1986    | 1988    | 1990    | 1994    | 2005    |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Flowline | 1207.58 | 1199.68 | 1199.48 | 1199.88 | 1196.78 | 1198.88 | 1196.08 | 1194.88 | 1191.68 |

**Table 25. Structure, and Flowline Details  
Bridge No 27867 (RS 19) on North Canadian River**

| Bridge No | Location                      | Latitude | Longitude | Highway               | Design Year | Length |
|-----------|-------------------------------|----------|-----------|-----------------------|-------------|--------|
| b27867    | 0.25 E I-35/I-40<br>Ft. Smith | 35-28-06 | 97-28-00  | I-40 WB TO<br>I-35 NB | 2003        | 660.60 |

|                 |             |
|-----------------|-------------|
| <b>Year</b>     | <b>2005</b> |
| <b>Flowline</b> | 1148.00     |

**Table 26. Structure, Cross-section, and Flowline Details  
Bridge No 21357 (RS 20) on North Canadian River**

| Bridge No | Location          | Latitude | Longitude | Highway | Design Year | Length   |
|-----------|-------------------|----------|-----------|---------|-------------|----------|
| b21357    | 2MI E JCT<br>I-35 | 35-29-36 | 97-25-42  | U.S. 62 | 1986        | 1,000.50 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed86 | S-Rding93 | R-bed93 |
|---------|----------|----------|----------|---------|-----------|---------|
| W-A     | 0.00     | 1120.000 | 1166.47  | 1160.00 | 9.50      | 1160.50 |
| 1       | 100.25   | 1112.390 | 1161.89  | 1145.00 | 25.00     | 1146.25 |
| 2       | 200.25   | 1110.770 | 1162.76  | 1142.50 | 25.80     | 1145.45 |
| 3       | 300.25   | 1109.105 | 1163.60  | 1142.50 | 26.30     | 1146.20 |
| 4       | 400.25   | 1108.590 | 1164.36  | 1143.75 | 30.30     | 1143.45 |
| 5       | 500.25   | 1107.055 | 1164.55  | 1144.38 | 36.80     | 1138.20 |
|         | 550.25   |          |          | 1138.75 | 34.50     | 1140.50 |
| 6       | 600.25   | 1105.640 | 1164.13  | 1137.50 | 32.40     | 1142.60 |
| 7       | 700.25   | 1104.375 | 1163.37  | 1141.25 | 29.10     | 1144.65 |
| 8       | 800.25   | 1096.040 | 1162.54  | 1145.00 | 27.20     | 1143.43 |
| 9       | 900.25   | 1087.655 | 1161.66  | 1147.50 | 25.00     | 1145.00 |
| E-A     | 1000.5   | 1110.000 | 1166.19  | 1160.00 | 11.20     | 1158.18 |

|                 |             |             |             |             |
|-----------------|-------------|-------------|-------------|-------------|
| <b>Year</b>     | <b>1988</b> | <b>1990</b> | <b>1994</b> | <b>2005</b> |
| <b>Flowline</b> | 1140.25     | 1140.45     | 1143.36     | 1142.25     |

**Table 27. Structure, Cross-section, and Flowline Details  
Bridge No 21129 (RS 21) on North Canadian River**

| Bridge No | Location                 | Latitude | Longitude | Highway | Design Year | Length |
|-----------|--------------------------|----------|-----------|---------|-------------|--------|
| b21129    | 17.5 MI E OF<br>JCT I-35 | 35-29-36 | 97-09-42  | U.S. 62 | 1985        | 900.34 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed85 | S-Rding90 | R-bed90 | S-Rding93 | R-bed93 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|
| S-A     | 0.00     | 1030.00  | 1080.00  | 1080.00 | 12.60     | 1079.90 | 12.70     | 1079.80 |
| 1       | 100.17   | 1020.62  | 1082.62  | 1073.75 | 24.40     | 1065.60 | 23.80     | 1066.20 |
| 2       | 200.17   | 1019.45  | 1081.45  | 1073.75 | 24.60     | 1065.40 | 28.20     | 1061.80 |
| 3       | 300.17   | 1020.46  | 1080.46  | 1072.50 | 33.50     | 1056.50 | 29.80     | 1060.20 |
|         | 330.17   |          |          | 1042.75 |           |         | 40.80     | 1049.20 |
| 4       | 400.17   | 1013.92  | 1079.92  | 1060.00 | 33.00     | 1057.00 | 29.00     | 1061.00 |
|         | 450.17   |          |          | 1055.63 | 34.10     | 1054.03 |           |         |
| 5       | 500.17   | 1011.44  | 1079.44  | 1056.25 | 34.90     | 1052.60 | 22.80     | 1064.70 |
| 6       | 600.17   | 1013.87  | 1078.87  | 1063.75 | 27.30     | 1060.20 | 27.50     | 1060.00 |
| 7       | 700.17   | 1011.48  | 1078.48  | 1062.50 | 23.10     | 1064.40 | 21.20     | 1066.30 |
| 8       | 800.17   | 1012.00  | 1078.00  | 1061.75 | 21.70     | 1065.80 | 21.80     | 1065.70 |
| N-A     | 900.34   | 1030.00  | 1077.44  | 1061.75 | 12.20     | 1074.05 | 12.30     | 1073.95 |

| Year     | 1986    | 1988    | 1990    | 1994    | 2005    |
|----------|---------|---------|---------|---------|---------|
| Flowline | 1055.30 | 1053.20 | 1053.40 | 1049.81 | 1052.50 |

**Table 28. Structure, Cross-section, and Flowline Details  
Bridge No 05040 (RS 22)on North Canadian River**

| Bridge No | Location           | Latitude | Longitude | Highway  | Design Year | Length |
|-----------|--------------------|----------|-----------|----------|-------------|--------|
| b05040    | 0.7 MI N OF SH 270 | 35-26-48 | 97-05-24  | S.H. 102 | 1936        | 340.00 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed36 | S-Rding92 | R-bed92 | S-Rding93 | R-bed93 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|
| N-A     | 0.00     | 1007.85  | 1060.47  | 1058.76 | 8.80      | 1063.32 | 9.20      | 1062.92 |
|         | 15.00    |          |          | 1058.76 | 14.40     | 1057.72 | 15.00     | 1057.12 |
|         | 30.00    |          |          | 1058.76 |           |         |           |         |
| 1       | 40.00    | 1007.85  | 1060.47  | 1058.76 | 13.40     | 1058.72 | 15.10     | 1057.02 |
|         | 56.00    |          |          | 1056.03 |           |         |           |         |
|         | 58.00    |          |          | 1056.03 |           |         |           |         |
|         | 59.00    |          |          | 1056.03 |           |         |           |         |
|         | 62.00    |          |          | 1056.03 |           |         |           |         |
|         | 68.00    |          |          | 1055.12 |           |         |           |         |
| 2       | 80.00    | 1007.85  | 1060.47  | 1052.40 | 20.40     | 1050.81 | 21.20     | 1050.01 |
|         | 95.00    |          |          | 1051.49 |           |         |           |         |
|         | 98.00    |          |          | 1051.03 |           |         |           |         |
|         | 101.00   |          |          | 1050.58 |           |         |           |         |
|         | 105.00   |          |          | 1050.12 | 22.60     | 1048.61 | 20.00     | 1051.21 |
|         | 108.00   |          |          | 1049.67 |           |         |           |         |
| 3       | 113.00   |          |          | 1047.85 |           |         |           |         |
|         | 120.00   | 1007.85  | 1060.47  | 1045.35 | 22.60     | 1048.61 | 29.50     | 1041.71 |
|         | 138.00   |          |          | 1044.21 |           |         |           |         |
|         | 145.00   |          |          | 1043.30 |           |         |           |         |
|         | 161.00   |          |          | 1041.49 |           |         |           |         |
|         | 168.00   |          |          | 1041.49 | 28.70     | 1042.51 |           |         |
|         | 172.00   |          |          | 1041.03 |           |         |           |         |
|         | 175.00   |          |          | 1040.58 |           |         |           |         |
|         | 180.00   |          |          | 1041.03 |           |         |           |         |
|         | 190.00   |          |          | 1042.40 |           |         |           |         |
| 4       | 200.00   |          |          | 1043.30 |           |         |           |         |
|         | 202.00   |          |          | 1043.30 |           |         |           |         |
|         | 205.00   |          |          | 1043.76 |           |         |           |         |
|         | 210.00   |          |          | 1044.21 |           |         |           |         |
|         | 211.00   |          |          | 1044.21 |           |         |           |         |
|         | 212.00   |          |          | 1044.21 |           |         |           |         |
|         | 220.00   | 1007.85  | 1060.47  | 1045.12 | 21.40     | 1050.72 | 26.80     | 1045.32 |
| 226.00  |          |          | 1045.35  |         |           |         |           |         |

**Table 28. (Continued)**

|     |        |         |         |         |       |         |       |         |
|-----|--------|---------|---------|---------|-------|---------|-------|---------|
|     | 239.00 |         |         | 1046.03 |       |         |       |         |
|     | 242.00 |         |         | 1046.49 |       |         |       |         |
|     | 255.00 |         |         | 1047.85 |       |         |       |         |
| 5   | 260.00 | 1007.85 | 1060.47 | 1050.58 | 25.20 | 1046.01 | 21.30 | 1049.91 |
|     | 261.00 |         |         | 1050.58 |       |         |       |         |
|     | 270.00 |         |         | 1051.49 |       |         | 25.80 | 1045.41 |
|     | 272.00 |         |         | 1051.71 |       |         |       |         |
|     | 275.00 |         |         | 1051.94 |       |         |       |         |
|     | 278.00 |         |         | 1052.17 |       |         |       |         |
|     | 285.00 |         |         | 1052.40 |       |         |       |         |
|     | 286.00 |         |         | 1052.40 |       |         |       |         |
| 6   | 300.00 | 1007.85 | 1060.47 | 1055.12 | 16.20 | 1055.01 | 18.50 | 1052.71 |
|     | 305.00 |         |         | 1056.03 |       |         |       |         |
|     | 309.00 |         |         | 1056.03 |       |         |       |         |
|     | 310.00 |         |         | 1056.03 |       |         |       |         |
| S-A | 340.00 | 1007.85 | 1060.47 | 1058.30 | 8.80  | 1062.41 | 9.50  | 1061.71 |

| <b>S-Rding95</b> | <b>R-bed95</b> | <b>S-Rding96</b> | <b>R-bed96</b> | <b>S-Rding97</b> | <b>R-bed97</b> | <b>S-Rding99</b> | <b>R-bed99</b> |
|------------------|----------------|------------------|----------------|------------------|----------------|------------------|----------------|
| 10.70            | 1061.42        | 10.80            | 1061.32        | 10.82            | 1061.30        | 11.00            | 1061.12        |
|                  |                |                  |                |                  |                |                  |                |
| 31.90            | 1040.22        | 25.60            | 1046.52        | 26.57            | 1045.55        | 29.10            | 1043.02        |
|                  |                |                  |                |                  |                |                  |                |
| 32.80            | 1039.32        |                  |                |                  |                |                  |                |
|                  |                | 22.40            | 1049.72        |                  |                |                  |                |
| 28.30            | 1042.91        | 26.30            | 1044.91        | 19.68            | 1051.53        | 23.10            | 1048.11        |
|                  |                |                  |                |                  |                |                  |                |
|                  |                |                  |                |                  |                |                  |                |
| 23.40            | 1047.81        |                  |                |                  |                |                  |                |
|                  |                |                  |                | 24.93            | 1046.28        |                  |                |
| 26.80            | 1044.41        | 27.20            | 1044.01        | 23.95            | 1047.26        | 36.50            | 1034.71        |
|                  |                |                  |                |                  |                |                  |                |
|                  |                |                  |                |                  |                | 29.90            | 1041.31        |
|                  |                |                  |                | 24.93            | 1046.28        |                  |                |
|                  |                |                  |                |                  |                |                  |                |
|                  |                |                  |                |                  |                | 32.80            | 1038.41        |
| 23.30            | 1047.91        |                  |                |                  |                |                  |                |

**Table 28. (Continued)**

|       |         |       |         |       |         |       |         |
|-------|---------|-------|---------|-------|---------|-------|---------|
|       |         |       |         |       |         |       |         |
|       |         |       |         |       |         |       |         |
| 28.20 | 1043.01 |       |         |       |         |       |         |
|       |         | 22.90 | 1048.31 |       |         |       |         |
|       |         |       |         |       |         |       |         |
| 25.60 | 1045.61 | 25.40 | 1045.81 | 19.02 | 1052.19 | 24.30 | 1046.91 |
|       |         |       |         | 18.04 | 1053.17 |       |         |
|       |         |       |         |       |         |       |         |
| 15.50 | 1055.71 |       |         |       |         |       |         |
| 15.90 | 1055.31 | 15.80 | 1055.41 | 19.02 | 1052.19 | 19.70 | 1051.51 |
| 16.90 | 1054.31 |       |         |       |         |       |         |
|       |         |       |         |       |         |       |         |
|       |         |       |         | 20.01 | 1051.20 |       |         |
|       |         |       |         |       |         | 16.40 | 1054.81 |
| 22.30 | 1048.91 |       |         |       |         |       |         |
|       |         | 22.40 | 1048.81 |       |         |       |         |
| 17.70 | 1053.51 | 20.10 | 1051.11 | 19.02 | 1052.19 | 16.80 | 1054.41 |
| 18.80 | 1052.41 |       |         |       |         |       |         |
|       |         |       |         |       |         |       |         |
|       |         |       |         |       |         |       |         |
| 8.50  | 1062.71 | 9.10  | 1062.11 | 10.17 | 1061.04 | 10.10 | 1061.11 |

| <b>S-Rding02</b> | <b>R-bed02</b> | <b>S-Rding03</b> | <b>R-bed03</b> | <b>S-Rding04</b> | <b>R-bed04</b> |
|------------------|----------------|------------------|----------------|------------------|----------------|
| 10.80            | 1061.32        | 11.00            | 1061.12        | 10.60            | 1061.52        |
|                  |                |                  |                |                  |                |
| 25.10            | 1047.02        | 25.30            | 1046.82        | 23.80            | 1048.32        |
| 23.40            | 1048.72        |                  |                |                  |                |
|                  |                |                  |                | 22.00            | 1050.12        |
|                  |                | 24.40            | 1047.72        |                  |                |
|                  |                |                  |                |                  |                |
| 26.20            | 1045.01        | 26.00            | 1045.21        | 27.90            | 1043.31        |
| 25.30            | 1045.91        |                  |                |                  |                |
|                  |                | 25.10            | 1046.11        | 25.90            | 1045.31        |
| 27.10            | 1044.11        |                  |                |                  |                |
|                  |                |                  |                |                  |                |
|                  |                |                  |                |                  |                |



**Table 28. (Continued)**

|       |         |       |         |       |         |
|-------|---------|-------|---------|-------|---------|
| 25.40 | 1045.81 | 28.90 | 1042.31 |       |         |
| 27.10 | 1044.11 | 27.70 | 1043.51 | 28.10 | 1043.11 |
| 27.30 | 1043.91 |       |         |       |         |
|       |         |       |         |       |         |
|       |         |       |         |       |         |
|       |         |       |         | 25.70 | 1045.51 |
|       |         |       |         |       |         |
|       |         |       |         |       |         |
|       |         |       |         | 29.80 | 1041.41 |
| 22.90 | 1048.31 | 23.00 | 1048.21 |       |         |
|       |         |       |         | 22.20 | 1049.01 |
|       |         |       |         |       |         |
|       |         |       |         |       |         |
|       |         | 25.30 | 1045.91 |       |         |
| 25.50 | 1045.71 |       |         |       |         |
| 24.20 | 1047.01 | 24.40 | 1046.81 | 24.60 | 1046.61 |
| 21.20 | 1050.01 |       |         |       |         |
|       |         |       |         |       |         |
|       |         |       |         |       |         |
|       |         |       |         |       |         |
| 20.40 | 1050.81 | 20.80 | 1050.41 | 21.00 | 1050.21 |
|       |         |       |         |       |         |
|       |         |       |         |       |         |
|       |         |       |         |       |         |
| 15.40 | 1055.81 | 15.60 | 1055.61 |       |         |
|       |         |       |         |       |         |
|       |         |       |         |       |         |
|       |         |       |         |       |         |
| 16.20 | 1055.01 | 16.90 | 1054.31 | 16.00 | 1055.21 |
|       |         |       |         |       |         |
| 16.70 | 1054.51 |       |         |       |         |
|       |         |       |         | 16.20 | 1055.01 |
| 10.10 | 1061.11 | 10.00 | 1061.21 | 10.00 | 1061.21 |

| <b>Year</b>     | <b>1970</b> | <b>1977</b> | <b>1980</b> | <b>1983</b> | <b>1985</b> | <b>1992</b> | <b>2003</b> | <b>2004</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 1052.71     | 1047.01     | 1046.81     | 1046.61     | 1046.21     | 1042.51     | 1042.31     | 1043.11     |

**Table 29. Structure, and Flowline Details  
Bridge No 20576 (RS 23) on North Canadian River**

| Bridge No | Location      | Latitude | Longitude | Highway  | Design Year | Length |
|-----------|---------------|----------|-----------|----------|-------------|--------|
| b20576    | 0.4 MI E Dale | 35-23-30 | 97-02-24  | S.H. 270 | 1983        | 801.80 |

| Year     | 1985    | 1992   | 1994   |
|----------|---------|--------|--------|
| Flowline | 1001.25 | 989.25 | 990.65 |

**Table 30. Structure, and Flowline Details  
Bridge No 15380 (RS 24) on North Canadian River**

| Bridge No | Location        | Latitude | Longitude | Highway | Design Year | Length |
|-----------|-----------------|----------|-----------|---------|-------------|--------|
| b15380    | 6.1 MI E OK C/L | 35-22-36 | 97-02-18  | I-40    | 1961        | 400.90 |

| Year     | 1969    | 1975    | 1987    |
|----------|---------|---------|---------|
| Flowline | 1015.17 | 1015.07 | 1013.97 |

**Table 31. Structure, and Flowline Details  
Bridge No 15381 (RS 25) on North Canadian River**

| Bridge No | Location        | Latitude | Longitude | Highway | Design Year | Length |
|-----------|-----------------|----------|-----------|---------|-------------|--------|
| b15381    | 6.1 MI E OK C/L | 35-22-36 | 97-02-18  | I-40    | 1961        | 400.90 |

| Year     | 1969    | 1975    | 1987    |
|----------|---------|---------|---------|
| Flowline | 1014.61 | 1014.51 | 1013.91 |

**Table 32. Structure, and Flowline Details  
Bridge No 15388 (RS 26)on North Canadian River**

| Bridge No | Location          | Latitude | Longitude | Highway  | Design Year | Length |
|-----------|-------------------|----------|-----------|----------|-------------|--------|
| b15388    | 3.9 MI S JCT SH 3 | 35-18-54 | 96-56-36  | U.S. 270 | 1961        | 803.10 |

| Year     | 1963   | 1965   | 1967   | 1969   | 1970   | 1971   | 1973   | 1975   | 1977   |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 976.77 | 974.47 | 974.47 | 974.67 | 974.47 | 974.27 | 974.47 | 973.97 | 974.47 |

| Year     | 1980   | 1983   | 1985   | 1987   | 1992   | 1994   | 2003   | 2005   |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 972.97 | 971.97 | 975.67 | 974.37 | 972.97 | 972.97 | 972.97 | 972.57 |

**Table 33. Structure, and Flowline Details  
Bridge No 19276 (RS 27) on North Canadian River**

| Bridge No | Location           | Latitude | Longitude | Highway | Design Year | Length |
|-----------|--------------------|----------|-----------|---------|-------------|--------|
| b19276    | 2.2 MI E JCT SH 18 | 35-20-00 | 96-52-18  | S.H. 3E | 1976        | 852.00 |

| Year     | 1977   | 1980   | 1983   | 1985   | 1992   | 1994   | 2003   |
|----------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 958.00 | 955.60 | 956.00 | 955.00 | 954.00 | 953.90 | 953.30 |

**Table 34. Structure, and Flowline Details  
Bridge No 15865 (RS 28)on North Canadian River**

| Bridge No | Location | Latitude | Longitude | Highway | Design Year | Length |
|-----------|----------|----------|-----------|---------|-------------|--------|
| b15865    | N/S      | N/A      | N/A       | N/A     | 1962        | N/A    |

| Year     | 1969   | 1971   | 1973   | 1975   | 1980   | 1985   | 1987   | 1989   | 1990   |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 927.77 | 929.47 | 929.27 | 928.07 | 929.27 | 927.27 | 927.07 | 926.27 | 925.97 |

| Year     | 1991   | 1995   |
|----------|--------|--------|
| Flowline | 926.27 | 931.17 |

**Table 35. Structure, and Flowline Details  
Bridge No 15864 (RS 29)on North Canadian River**

| Bridge No | Location | Latitude | Longitude | Highway | Design Year | Length |
|-----------|----------|----------|-----------|---------|-------------|--------|
| b15864    | N/A      | N/A      | N/A       | N/A     | 1962        | N/A    |

| Year     | 1969   | 1971   | 1973   | 1975   | 1980   | 1985   | 1987   | 1989   |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 927.47 | 929.47 | 929.27 | 929.27 | 929.47 | 926.57 | 928.27 | 926.27 |

| Year     | 1990   | 1991   | 1995   |
|----------|--------|--------|--------|
| Flowline | 926.07 | 926.27 | 930.77 |

**Table 36. Structure, and Flowline Details  
Bridge No 22683 (RS 30)on North Canadian River**

| Bridge No | Location             | Latitude | Longitude | Highway | Design Year | Length |
|-----------|----------------------|----------|-----------|---------|-------------|--------|
| b22683    | Pott-Seminole<br>C/L | 35-23-54 | 96-40-12  | S.H. 99 | 1990        | 812.00 |

| Year     | 1992   | 2003   |
|----------|--------|--------|
| Flowline | 867.55 | 866.45 |

**Table 37. Structure, and Flowline Details  
Bridge No 22686 (RS 31)on North Canadian River**

| Bridge No | Location                 | Latitude | Longitude | Highway | Design Year | Length   |
|-----------|--------------------------|----------|-----------|---------|-------------|----------|
| b22686    | 2.5 MI E<br>Seminole Co. | 35-25-48 | 96-24-30  | S.H. 56 | 1990        | 1,501.00 |

| Year     | 2003   | 2005   |
|----------|--------|--------|
| Flowline | 783.60 | 783.60 |

**Table 38. Structure, and Flowline Details  
 Bridge No 22666 (RS 32) on North Canadian River**

| <b>Bridge No</b> | <b>Location</b>          | <b>Latitude</b> | <b>Longitude</b> | <b>Highway</b> | <b>Design Year</b> | <b>Length</b> |
|------------------|--------------------------|-----------------|------------------|----------------|--------------------|---------------|
| b22666           | 3.4 MI E<br>Seminole Co. | 35-25-42        | 96-23-24         | S.H. 56        | 1990               | 211.00        |

| <b>Year</b>     | <b>1992</b> | <b>2003</b> | <b>2005</b> |
|-----------------|-------------|-------------|-------------|
| <b>Flowline</b> | 801.44      | 800.84      | 800.84      |

**Table 39. Structure, Cross-section, and Flowline Details  
Bridge No 15870 (RS 33)on North Canadian River**

| Bridge No | Location                | Latitude | Longitude | Highway | Design Year | Length   |
|-----------|-------------------------|----------|-----------|---------|-------------|----------|
| b15870    | 2.5 MI E<br>Seminole Co | 35-23-36 | 096-24-06 | I-40    | 1962        | 1,687.75 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed62 | S-Rding00 | R-bed00 |
|---------|----------|----------|----------|---------|-----------|---------|
| W-A     | 0.00     | 757.00   | 802.00   | 802.00  | 9.67      | 789.33  |
| 1       | 61.25    | 752.77   | 802.77   | 792.00  | 19.33     | 779.67  |
| 2       | 162.00   | 753.03   | 803.03   | 792.00  | 22.00     | 777.00  |
| 3       | 262.00   | 752.70   | 803.70   | 792.00  | 21.67     | 777.33  |
| 4       | 362.00   | 752.83   | 803.83   | 792.00  | 23.33     | 775.67  |
| 5       | 462.75   | 753.38   | 804.34   | 788.00  | 24.75     | 774.25  |
| 6       | 563.50   | 752.64   | 804.64   | 788.00  | 25.25     | 773.75  |
|         | 583.50   |          |          | 788.00  | 25.50     | 773.50  |
| 7       | 663.50   | 752.31   | 805.31   | 788.00  | 25.41     | 773.59  |
| 8       | 763.50   | 752.44   | 805.44   | 788.00  | 26.00     | 773.00  |
|         | 783.50   |          |          | 790.00  | 25.67     | 773.33  |
| 9       | 864.25   | 751.99   | 805.99   | 790.00  | 25.25     | 773.75  |
| 10      | 964.25   | 753.24   | 806.24   | 790.00  | 25.50     | 773.50  |
| 11      | 1064.25  | 752.91   | 806.91   | 791.75  | 26.50     | 772.50  |
|         | 1084.25  |          |          | 791.75  | 26.33     | 772.67  |
| 12      | 1164.25  | 755.04   | 807.04   | 789.00  | 27.25     | 771.75  |
|         | 1184.25  |          |          | 788.00  | 27.41     | 771.59  |
| 13      | 1265.00  | 756.59   | 807.59   | 787.00  | 27.00     | 772.00  |
|         | 1285.00  |          |          | 786.50  | 26.58     | 772.42  |
| 14      | 1385.75  | 757.85   | 807.85   | 785.00  | 27.08     | 771.92  |
| 16      | 1585.75  | 763.65   | 808.65   | 776.00  | 40.67     | 758.33  |
| E-A     | 1687.75  | 780.00   | 808.00   | 806.00  | 9.41      | 789.59  |

| Year     | 1969   | 1975   | 1980   | 1989   | 1990   | 1992   | 1995   |
|----------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 758.40 | 758.20 | 757.00 | 756.00 | 759.10 | 758.70 | 762.20 |

**Table 40. Structure, Cross-section, and Flowline Details  
Bridge No 15871 (RS 34) on North Canadian River**

| Bridge No | Location               | Latitude | Longitude | Highway | Design Year | Length   |
|-----------|------------------------|----------|-----------|---------|-------------|----------|
| b15871    | 2.5 Mi. E. Seminole Co | 35-23-36 | 96-24-06  | I-40    | 1963        | 1,668.50 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed63 | S-Rding00 | R-bed00 |
|---------|----------|----------|----------|---------|-----------|---------|
| W-A     | 0.00     | 758.00   | 802.58   | 802.00  | 10.17     | 801.33  |
|         | 20.00    |          |          | 794.00  | 16.25     | 795.25  |
| 1       | 61.25    | 731.52   | 803.58   | 791.75  | 20.17     | 791.83  |
|         | 81.25    |          |          | 791.75  | 20.58     | 791.67  |
| 2       | 162.00   | 742.41   | 802.91   | 791.75  | 20.75     | 791.75  |
|         | 182.00   |          |          | 791.75  | 21.50     | 791.00  |
| 3       | 262.00   | 742.56   | 803.58   | 792.00  | 22.67     | 789.83  |
|         | 282.00   |          |          | 791.75  | 23.42     | 789.08  |
| 4       | 362.00   | 742.21   | 803.71   | 788.00  | 24.33     | 788.42  |
|         | 382.00   |          |          | 788.00  | 24.67     | 788.33  |
| 5       | 462.75   | 742.99   | 804.99   | 786.00  | 25.33     | 787.92  |
|         | 482.75   |          |          | 786.00  | 24.75     | 788.75  |
| 6       | 563.50   | 743.02   | 804.52   | 788.25  | 25.25     | 789.25  |
|         | 583.50   |          |          | 788.25  | 25.67     | 789.08  |
| 7       | 663.50   | 742.69   | 805.19   | 788.25  | 26.17     | 788.58  |
|         | 683.50   |          |          | 788.25  | 25.33     | 789.42  |
| 8       | 763.50   | 741.82   | 805.32   | 788.00  | 26.25     | 788.50  |
|         | 783.50   |          |          | 788.00  | 26.08     | 788.67  |
| 9       | 864.25   | 743.60   | 806.60   | 788.00  | 25.75     | 789.75  |
|         | 884.25   |          |          | 788.00  | 25.17     | 790.33  |
| 10      | 965.00   | 744.12   | 806.12   | 789.00  | 25.75     | 790.25  |
| 11      | 1065.00  | 743.79   | 806.79   | 789.00  | 26.25     | 790.00  |
|         | 1085.00  |          |          | 787.00  | 27.25     | 789.00  |
| 12      | 1165.00  | 744.92   | 806.92   | 787.00  | 27.25     | 789.25  |
|         | 1185.00  |          |          | 787.00  | 27.08     | 789.67  |
| 13      | 1265.75  | 747.20   | 808.20   | 786.00  | 26.75     | 790.00  |
|         | 1285.75  |          |          | 786.00  | 26.67     | 790.08  |
| 14      | 1366.50  | 750.73   | 807.73   | 787.00  | 30.75     | 786.75  |
| 15      | 1466.50  | 753.90   | 808.40   | 780.00  | 37.75     | 780.25  |
|         | 1476.50  |          |          | 779.00  | 39.00     | 779.25  |
|         | 1561.50  |          |          | 777.00  | 41.08     | 777.42  |
| 16      | 1566.50  | 758.03   | 808.53   | 777.75  | 36.08     | 782.42  |
|         | 1571.50  |          |          | 777.75  | 41.00     | 777.50  |
| E-A     | 1668.50  | 766.00   | 809.20   | 809.75  | 10.42     | 808.08  |

| Year     | 1969   | 1975   | 1980   | 1989   | 1990   | 1992   | 1995   |
|----------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 777.90 | 776.50 | 777.50 | 777.50 | 775.30 | 776.20 | 777.50 |

**Table 41. Structure, Cross-section, and Flowline Details  
Bridge No 18361 (RS 35) on North Canadian River**

| Bridge No | Location         | Latitude | Longitude | Highway | Design Year | Length |
|-----------|------------------|----------|-----------|---------|-------------|--------|
| b18361    | 1.8 MI S JCT 140 | 35-22-30 | 96-22-12  | S.H.48  | 1972        | 590.50 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed72 | S-Rding87 | R-bed87 | S-Rding92 | R-bed92 | S-Rding97 | R-bed97 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|-----------|---------|
| S-A     | 0.00     | 765.00   | 793.92   | 791.81  |           |         | 8.90      | 790.65  | 10.00     | 789.55  |
| 1       | 70.25    | 760.40   | 793.40   | 782.76  | 21.40     | 779.06  | 21.20     | 779.26  | 22.00     | 778.46  |
|         | 110.25   |          |          | 782.76  |           |         | 20.90     | 780.01  |           |         |
| 2       | 140.25   | 760.98   | 795.98   | 781.86  | 21.30     | 779.61  | 21.20     | 779.71  | 22.00     | 778.91  |
| 3       | 210.25   | 760.62   | 795.62   | 784.57  | 21.90     | 779.01  | 21.50     | 779.41  | 22.50     | 778.41  |
|         | 295.25   |          |          | 779.10  |           |         | 23.50     | 776.96  |           |         |
| 4       | 305.25   | 758.93   | 795.93   | 772.76  | 29.90     | 770.56  | 28.00     | 772.46  | 28.50     | 771.96  |
|         | 342.25   |          |          | 768.19  |           |         | 40.00     | 760.46  |           |         |
|         | 352.75   |          |          | 768.19  | 37.30     | 763.16  |           |         | 43.00     | 757.46  |
| 5       | 400.25   | 755.95   | 795.98   | 770.00  | 36.50     | 763.96  | 34.70     | 765.76  | 36.00     | 764.46  |
|         | 454.25   |          |          | 767.29  |           |         | 40.40     | 760.06  |           |         |
| 6       | 495.25   | 755.66   | 795.66   | 760.00  | 24.10     | 776.36  | 27.60     | 772.86  | 27.50     | 772.96  |
|         | 542.88   |          |          | 760.00  | 20.70     | 779.76  |           |         |           |         |
| N-A     | 590.50   | 760.00   | 795.08   | 790.00  |           |         | 9.90      | 789.65  | 9.50      | 790.05  |

| Year     | 1973   | 1975   | 1981   | 1983   | 1987   | 1989   | 1990   | 1992   | 1994   |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 764.06 | 764.66 | 761.96 | 761.46 | 763.16 | 762.46 | 762.66 | 760.06 | 763.46 |



**Table 42. Structure, Cross-section, and Flowline Details  
Bridge No 10570 (RS 36) on North Canadian River**

| Bridge No | Location            | Latitude | Longitude | Highway | Design Year | Length |
|-----------|---------------------|----------|-----------|---------|-------------|--------|
| b10570    | 4.2 MI NW Hughes Co | 35-20-00 | 96-18-00  | S.H. 27 | 1946        | 810.00 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed46 | S-Rding01 | R-bed01 | S-Rding99 | R-bed99 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|
| S-A     | 0.00     | 727.00   | 770.34   | 770.34  | 8.53      | 774.31  | 8.40      | 774.44  |
| 1       | 52.08    | 724.75   | 770.34   | 747.75  | 22.96     | 759.88  | 22.90     | 759.94  |
|         | 65.08    |          |          | 747.75  |           |         |           |         |
|         | 97.08    |          |          | 747.75  |           |         |           |         |
|         | 109.08   |          |          | 747.75  |           |         |           |         |
|         | 118.08   |          |          | 747.75  |           |         |           |         |
|         | 119.08   |          |          | 747.75  | 21.65     | 761.19  | 21.00     | 761.84  |
|         | 142.08   |          |          | 747.75  |           |         |           |         |
|         | 147.08   |          |          | 747.75  |           |         |           |         |
|         | 151.08   |          |          | 747.75  |           |         |           |         |
| 2       | 152.92   | 721.42   | 772.93   | 747.75  | 25.26     | 757.58  | 26.00     | 756.84  |
|         | 164.92   |          |          | 747.75  |           |         | 24.00     | 758.84  |
|         | 167.92   |          |          | 747.75  | 23.62     | 759.22  |           |         |
|         | 170.92   |          |          | 747.75  |           |         |           |         |
|         | 172.92   |          |          | 747.75  |           |         |           |         |
|         | 177.92   |          |          | 747.75  |           |         |           |         |
|         | 184.92   |          |          | 747.75  |           |         |           |         |
|         | 194.92   |          |          | 747.75  | 31.16     | 751.68  |           |         |
|         | 198.92   |          |          | 747.75  |           |         | 30.50     | 752.34  |
|         | 202.92   |          |          | 747.75  |           |         |           |         |
|         | 213.92   |          |          | 747.75  | 23.95     | 758.89  |           |         |
|         | 219.92   |          |          | 747.75  |           |         | 27.90     | 754.94  |
|         | 220.92   |          |          | 747.75  |           |         |           |         |
| 3       | 253.75   | 713.73   | 772.93   | 747.75  | 34.77     | 748.07  | 36.00     | 746.84  |
|         | 278.75   |          |          | 747.75  |           |         |           |         |
|         | 283.75   |          |          | 747.75  | 35.76     | 747.08  |           |         |
|         | 293.75   |          |          | 747.75  |           |         |           |         |
|         | 295.75   |          |          | 745.17  |           |         |           |         |
|         | 303.79   |          |          | 745.17  |           |         |           |         |
|         | 304.75   |          |          | 745.17  |           |         |           |         |
|         | 343.75   |          |          | 745.17  |           |         | 33.00     | 749.84  |
|         | 344.75   |          |          | 742.58  | 33.13     | 749.71  |           |         |
| 4       | 354.59   | 715.12   | 772.93   | 742.58  | 33.79     | 749.05  | 37.00     | 745.84  |
|         | 366.59   |          |          | 745.17  |           |         | 33.10     | 749.74  |

|     |        |        |        |        |       |        |       |        |
|-----|--------|--------|--------|--------|-------|--------|-------|--------|
|     | 367.59 |        |        | 745.17 |       |        |       |        |
|     | 384.59 |        |        | 745.17 |       |        | 33.50 | 749.34 |
|     | 389.59 |        |        | 745.17 |       |        |       |        |
|     | 390.59 |        |        | 745.17 |       |        |       |        |
|     | 392.59 |        |        | 745.17 |       |        |       |        |
|     | 399.59 |        |        | 745.17 |       |        |       |        |
|     | 409.59 |        |        | 745.17 |       |        | 36.00 | 746.84 |
|     | 413.59 |        |        | 745.17 |       |        |       |        |
|     | 416.59 |        |        | 745.17 |       |        |       |        |
|     | 417.59 |        |        | 745.17 |       |        |       |        |
|     | 429.59 |        |        | 745.17 |       |        |       |        |
|     | 430.59 |        |        | 745.17 |       |        | 34.30 | 748.54 |
|     | 433.59 |        |        | 745.17 | 36.18 | 746.66 |       |        |
| 5   | 455.42 | 720.49 | 772.93 | 745.17 | 35.10 | 747.74 | 34.90 | 747.94 |
|     | 476.42 |        |        | 745.17 |       |        | 28.30 | 754.54 |
|     | 493.42 |        |        | 745.17 |       |        |       |        |
|     | 520.42 |        |        | 745.17 |       |        |       |        |
|     | 520.42 |        |        | 745.17 |       |        |       |        |
|     | 543.42 |        |        | 745.17 |       |        |       |        |
| 6   | 556.25 | 716.35 | 772.93 | 745.17 | 21.65 | 761.19 | 22.00 | 760.84 |
|     | 600.25 |        |        | 747.55 |       |        |       |        |
|     | 645.25 |        |        | 747.55 |       |        |       |        |
| 7   | 657.09 | 717.07 | 772.93 | 747.55 | 22.96 | 759.88 | 23.00 | 759.84 |
|     | 696.09 |        |        | 747.55 |       |        |       |        |
|     | 697.09 |        |        | 747.55 |       |        |       |        |
|     | 702.09 |        |        | 747.55 |       |        |       |        |
| 6   | 556.25 | 716.35 | 772.93 | 745.17 | 21.65 | 761.19 | 22.00 | 760.84 |
|     | 705.09 |        |        | 747.55 |       |        |       |        |
|     | 723.09 |        |        | 747.55 |       |        | 22.80 | 760.04 |
|     | 724.09 |        |        | 747.55 | 22.30 | 760.54 |       |        |
| 8   | 757.92 | 717.83 | 770.34 | 747.55 | 22.96 | 759.88 | 23.00 | 759.84 |
| N-A | 810.00 | 720.00 | 770.34 | 770.34 | 6.23  | 776.61 | 5.50  | 777.34 |

Table 42. (Continued)

| S-Rding98 | R-bed98 | S-Rding97 | R-bed97 | S-Rding96 | R-bed96 | S-Rding95 | R-bed 95 |
|-----------|---------|-----------|---------|-----------|---------|-----------|----------|
| 8.10      | 774.74  | 8.20      | 774.64  | 5.40      | 777.44  | 7.70      | 775.14   |
| 22.90     | 759.94  | 22.96     | 759.88  | 23.10     | 759.74  | 22.80     | 760.04   |
|           |         | 22.30     | 760.54  |           |         |           |          |
|           |         |           |         | 22.60     | 760.24  |           |          |
|           |         |           |         |           |         | 21.10     | 761.74   |
| 20.80     | 762.04  |           |         |           |         |           |          |
| 26.10     | 756.74  | 24.60     | 758.24  | 23.00     | 759.84  | 24.60     | 758.24   |
| 24.30     | 758.54  |           |         |           |         |           |          |
|           |         | 31.49     | 751.35  |           |         |           |          |
|           |         | 28.54     | 754.30  |           |         |           |          |
| 29.90     | 752.94  |           |         |           |         |           |          |
| 25.30     | 757.54  |           |         |           |         |           |          |
| 35.00     | 747.84  | 33.79     | 749.05  | 22.30     | 760.54  | 34.70     | 748.14   |
| 36.10     | 746.74  |           |         |           |         |           |          |
|           |         |           |         |           |         | 37.20     | 745.64   |
|           |         |           |         |           |         |           |          |
|           |         |           |         |           |         | 31.80     | 751.04   |
| 32.00     | 750.84  | 36.08     | 746.76  | 36.10     | 746.74  | 34.60     | 748.24   |
|           |         | 35.10     | 747.74  |           |         |           |          |
|           |         |           |         |           |         | 32.00     | 750.84   |
|           |         |           |         |           |         | 34.80     | 748.04   |
|           |         |           |         | 41.00     | 741.84  |           |          |
|           |         |           |         |           |         |           |          |
|           |         |           |         |           |         |           |          |

|       |        |       |        |       |        |       |        |
|-------|--------|-------|--------|-------|--------|-------|--------|
| 34.70 | 748.14 |       |        |       |        |       |        |
|       |        |       |        |       |        | 41.60 | 741.24 |
|       |        |       |        | 38.00 | 744.84 |       |        |
|       |        |       |        |       |        |       |        |
|       |        |       |        |       |        |       |        |
| 34.00 | 748.84 | 37.07 | 745.77 | 33.00 | 749.84 | 37.90 | 744.94 |
|       |        |       |        |       |        |       |        |
|       |        |       |        | 35.20 | 747.64 |       |        |
|       |        |       |        | 34.20 | 748.64 |       |        |
|       |        |       |        | 35.00 | 747.84 |       |        |
| 22.20 | 760.64 | 22.30 | 760.54 | 34.10 | 748.74 | 22.30 | 760.54 |
|       |        |       |        | 26.30 | 756.54 |       |        |
|       |        |       |        | 24.20 | 758.64 |       |        |
| 22.70 | 760.14 | 22.63 | 760.21 | 25.80 | 757.04 | 22.50 | 760.34 |
|       |        |       |        |       |        |       |        |
|       |        |       |        |       |        | 22.30 | 760.54 |
|       |        |       |        |       |        |       |        |
|       |        |       |        | 20.30 | 762.54 |       |        |
|       |        |       |        |       |        |       |        |
|       |        |       |        |       |        |       |        |
| 23.30 | 759.54 | 22.96 | 759.88 | 22.70 | 760.14 | 22.90 | 759.94 |
| 6.00  | 776.84 | 6.23  | 776.61 | 7.70  | 775.14 | 5.10  | 777.74 |

Table 42. (Continued)

| S-Rding94 | R-bed94 | S-Rding93 | R-bed93 | S-Rding92 | R-bed92 | S-Rding87 | R-bed87 |
|-----------|---------|-----------|---------|-----------|---------|-----------|---------|
| 7.30      | 775.54  | 7.10      | 775.74  | 7.50      | 775.34  |           |         |
| 22.60     | 760.24  | 22.50     | 760.34  | 23.10     | 759.74  | 20.40     | 762.44  |
| 21.30     | 761.54  |           |         |           |         |           |         |
|           |         |           |         |           |         |           |         |
|           |         |           |         |           |         |           |         |
| 24.00     | 758.84  |           |         |           |         |           |         |
|           |         |           |         | 22.10     | 760.74  |           |         |
| 29.90     | 752.94  | 25.40     | 757.44  | 26.00     | 756.84  | 20.60     | 762.24  |
|           |         |           |         |           |         |           |         |
| 30.80     | 752.04  |           |         |           |         |           |         |
|           |         |           |         | 25.00     | 757.84  |           |         |
|           |         |           |         |           |         |           |         |
| 28.20     | 754.64  |           |         |           |         |           |         |
|           |         |           |         |           |         |           |         |
|           |         |           |         |           |         |           |         |
|           |         | 37.40     | 745.44  |           |         |           |         |
| 35.30     | 747.54  | 36.40     | 746.44  | 36.00     | 746.84  | 29.60     | 753.24  |
|           |         |           |         |           |         |           |         |
|           |         |           |         |           |         |           |         |
|           |         | 39.50     | 743.34  |           |         |           |         |
|           |         |           |         |           |         | 34.60     | 748.24  |
|           |         |           |         | 43.20     | 739.64  |           |         |
|           |         |           |         |           |         |           |         |
| 36.80     | 746.04  | 36.30     | 746.54  | 32.30     | 750.54  | 30.30     | 752.54  |
|           |         |           |         |           |         |           |         |
|           |         |           |         |           |         |           |         |
|           |         |           |         |           |         |           |         |
|           |         | 25.00     | 757.84  |           |         |           |         |
|           |         |           |         | 27.10     | 755.74  |           |         |
|           |         |           |         |           |         |           |         |

|       |        |       |        |       |        |       |        |
|-------|--------|-------|--------|-------|--------|-------|--------|
|       |        |       |        |       |        |       |        |
|       |        |       |        |       |        |       |        |
|       |        |       |        |       |        |       |        |
|       |        |       |        | 31.80 | 751.04 |       |        |
|       |        |       |        |       |        |       |        |
| 33.00 | 749.84 | 37.50 | 745.34 | 30.60 | 752.24 | 30.00 | 752.84 |
|       |        |       |        |       |        |       |        |
|       |        |       |        |       |        |       |        |
|       |        |       |        |       |        |       |        |
| 22.40 | 760.44 | 22.30 | 760.54 | 22.20 | 760.64 | 19.60 | 763.24 |
|       |        |       |        |       |        |       |        |
| 22.50 | 760.34 | 22.00 | 760.84 | 22.80 | 760.04 | 19.80 | 763.04 |
| 22.30 | 760.54 |       |        |       |        |       |        |
|       |        |       |        |       |        |       |        |
|       |        |       |        | 22.60 | 760.24 |       |        |
|       |        |       |        |       |        |       |        |
|       |        |       |        |       |        |       |        |
| 22.80 | 760.04 | 22.30 | 760.54 | 23.10 | 759.74 | 20.40 | 762.44 |
| 5.10  | 777.74 | 5.30  | 777.54 | 5.60  | 777.24 |       |        |

| Year     | 1954   | 1960   | 1961   | 1962   | 1964   | 1965   | 1966   | 1971   |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 750.84 | 747.84 | 748.84 | 748.84 | 748.04 | 748.74 | 748.54 | 745.84 |

| Year     | 1973   | 1981   | 1983   | 1987   | 1989   | 1991   | 1992   | 1994   |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 742.84 | 746.44 | 746.84 | 748.24 | 746.84 | 746.84 | 743.34 | 745.94 |

**Table 43. Structure, Cross-section, and Flowline Details  
Bridge No 21128 (RS 37) on North Canadian River**

| Bridge No | Location           | Latitude | Longitude | Highway | Design Year | Length |
|-----------|--------------------|----------|-----------|---------|-------------|--------|
| b21128    | 2.9 S Okfuskee C/L | 35-15-48 | 96-12-24  | U.S. 75 | 1985        | 800.34 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed85 | S-Rding87 | R-bed87 | S-Rding00 | R-bed00 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|
| S-A     | 0.00     | 651.88   | 710.00   | 710.00  |           |         | 8.00      | 710.75  |
|         | 50.85    |          |          | 695.00  | 25.50     | 693.88  |           |         |
| 1       | 100.17   | 649.45   | 714.95   | 696.25  | 27.50     | 692.50  | 24.75     | 695.25  |
|         | 120.17   |          |          | 693.75  |           |         | 23.00     | 697.63  |
| 2       | 200.17   | 646.02   | 916.52   | 695.00  | 30.60     | 691.28  | 27.90     | 693.98  |
| 3       | 300.17   | 643.01   | 718.01   | 693.75  | 38.40     | 684.73  | 41.00     | 682.13  |
|         | 320.17   |          |          | 693.75  |           |         | 42.70     | 681.05  |
| 4       | 400.17   | 642.92   | 719.42   | 685.00  | 41.30     | 683.70  | 38.90     | 686.10  |
|         | 410.17   |          |          | 685.00  |           |         | 38.10     | 686.90  |
|         | 450.85   |          |          | 685.00  | 46.80     | 678.20  |           |         |
| 5       | 500.17   | 642.99   | 720.99   | 685.00  | 45.50     | 680.75  | 43.00     | 683.25  |
| 6       | 600.17   | 664.98   | 722.48   | 691.75  | 39.70     | 687.80  | 32.00     | 695.50  |
| 7       | 700.17   | 672.39   | 723.89   | 691.75  | 36.70     | 692.68  | 33.80     | 695.58  |
|         | 750.85   |          |          | 696.25  | 35.60     | 694.40  |           |         |
|         | 766.95   |          |          | 705.00  | 10.80     | 719.20  |           |         |
| N-A     | 800.34   | 720.00   | 725.46   | 725.00  |           |         | 6.67      | 724.58  |

| Year     | 1985   | 1987   | 1989   | 1991   | 1995   |
|----------|--------|--------|--------|--------|--------|
| Flowline | 678.70 | 680.70 | 680.00 | 680.00 | 684.17 |

**Table 44. Structure, Cross-section, and Flowline Details  
Bridge No 14189 (RS 38) on North Canadian River**

| Bridge No | Location           | Latitude | Longitude | Highway | Design Year | Length |
|-----------|--------------------|----------|-----------|---------|-------------|--------|
| b14189    | 1.4 MI N Hughes Co | 35-18-36 | 96-02-06  | S.H. 84 | 1958        | 322.50 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed58 | S-Rding87 | R-bed87 |
|---------|----------|----------|----------|---------|-----------|---------|
| S-A     | 0.00     | 629.38   | 667.67   | 670.00  |           |         |
| 1       | 41.25    | 629.38   | 667.94   | 656.25  | 15.40     | 659.60  |
| 2       | 81.25    | 628.13   | 668.14   | 656.25  | 15.40     | 659.60  |
| 3       | 121.25   | 628.13   | 668.26   | 656.25  | 15.40     | 659.60  |
| 4       | 161.25   | 628.13   | 668.30   | 656.25  | 15.50     | 659.50  |
| 5       | 201.25   | 628.13   | 668.26   | 656.25  | 15.50     | 659.50  |
| 6       | 241.25   | 628.13   | 668.14   | 658.75  | 15.50     | 659.50  |
| 7       | 281.25   | 626.25   | 667.94   | 658.75  | 14.20     | 660.80  |
| N-A     | 322.50   | 626.25   | 667.67   | 665.00  |           |         |

| Year     | 1965   | 1970   | 1975   | 1985   | 1987   | 1989   | 1991   | 1992   |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| Flowline | 656.40 | 656.50 | 656.60 | 656.50 | 659.50 | 659.00 | 659.00 | 654.50 |



**Table 45. Structure, Cross-section, and Flowline Details  
Bridge No 14200 (RS 39) on North Canadian River**

| Bridge No | Location           | Latitude | Longitude | Highway | Design Year | Length |
|-----------|--------------------|----------|-----------|---------|-------------|--------|
| b14200    | 1.7 MI N Hughes Co | 35-18-48 | 96-02-06  | S.H. 84 | 1958        | 504.50 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed58 | S-Rding87 | R-bed87 | S-Rding92 | R-bed92 | S-Rding97 | R-bed97 | S-Rding00 | R-bed00 |
|---------|----------|----------|----------|---------|-----------|---------|-----------|---------|-----------|---------|-----------|---------|
| S-A     | 0.00     | 615.00   | 668.10   | 665.00  |           |         | 10.00     | 664.62  | 9.00      | 665.62  | 7.42      | 665.20  |
|         | 17.21    |          |          | 656.00  | 46.60     | 628.02  |           |         |           |         |           |         |
| 1       | 51.63    | 633.30   | 668.35   | 646.25  |           |         | 39.00     | 634.75  | 39.00     | 634.75  | 30.33     | 641.42  |
|         | 56.63    |          |          | 646.25  |           |         |           |         |           |         |           |         |
|         | 71.63    |          |          | 646.25  |           |         |           |         |           |         | 57.08     | 614.67  |
|         | 81.63    |          |          | 646.25  |           |         |           |         | 42.00     | 631.75  |           |         |
|         | 142.25   |          |          | 643.75  |           |         |           |         |           |         |           |         |
|         | 147.25   |          |          | 643.75  |           |         |           |         |           |         |           |         |
| 2       | 152.25   | 633.94   | 668.74   | 643.75  | 35.80     | 639.20  | 51.00     | 624.00  | 35.00     | 640.00  | 54.08     | 618.92  |
|         | 172.25   |          |          | 643.75  |           |         |           |         |           |         |           |         |
|         | 242.25   |          |          | 645.00  |           |         |           |         |           |         |           |         |
| 3       | 252.25   | 634.21   | 669.21   | 645.00  | 27.00     | 648.00  | 35.90     | 639.10  | 31.00     | 644.00  | 31.42     | 641.58  |
| 4       | 352.25   | 633.74   | 668.74   | 652.50  | 25.00     | 649.38  | 24.90     | 649.48  | 28.00     | 646.38  | 25.00     | 647.38  |
|         | 372.25   |          |          | 652.50  |           |         |           |         |           |         |           |         |
|         | 447.88   |          |          | 655.00  |           |         |           |         |           |         |           |         |
| 5       | 452.88   | 633.35   | 668.35   | 655.00  | 19.00     | 655.38  | 21.00     | 653.38  | 20.00     | 654.38  | 19.25     | 653.13  |
| N-A     | 504.50   | 615.00   | 668.10   | 667.50  |           |         | 10.00     | 664.62  | 9.00      | 665.62  | 7.17      | 665.45  |

**Table 45. (Continued)**

| <b>S-Rding04</b> | <b>R-bed04</b> | <b>S-Rding05</b> | <b>R-bed05</b> |
|------------------|----------------|------------------|----------------|
| 8.00             | 664.62         | 8.00             | 664.62         |
|                  |                |                  |                |
| 32.58            | 639.17         | 32.42            | 639.33         |
| 40.75            | 631.00         |                  |                |
|                  |                | 43.00            | 628.75         |
|                  |                |                  |                |
| 36.75            | 636.25         |                  |                |
|                  |                | 36.67            | 636.33         |
| 41.42            | 631.58         | 39.25            | 633.75         |
| 33.33            | 639.67         |                  |                |
| 37.67            | 635.33         |                  |                |
| 36.42            | 636.58         | 29.25            | 643.75         |
| 24.33            | 648.04         | 24.17            | 648.21         |
|                  |                | 20.25            | 652.13         |
|                  |                | 20.75            | 651.63         |
| 16.50            | 655.88         | 19.33            | 653.04         |
| 7.75             | 664.87         | 7.58             | 665.04         |

| <b>Year</b>     | <b>1960</b> | <b>1961</b> | <b>1962</b> | <b>1965</b> | <b>1966</b> | <b>1969</b> | <b>1970</b> | <b>1971</b> | <b>1973</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 640.15      | 639.75      | 641.05      | 638.85      | 637.75      | 624.25      | 624.75      | 636.75      | 629.75      |

| <b>Year</b>     | <b>1981</b> | <b>1983</b> | <b>1985</b> | <b>1987</b> | <b>1989</b> | <b>1990</b> | <b>1994</b> | <b>1995</b> | <b>2005</b> |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Flowline</b> | 633.75      | 635.25      | 620.25      | 625.15      | 619.75      | 619.55      | 620.75      | 620.75      | 628.75      |

**Table 46. Structure, Cross-section, and Flowline Details  
Bridge No 15585 (RS 40) on North Canadian River**

| Bridge No | Location              | Latitude | Longitude | Highway | Design Year | Length |
|-----------|-----------------------|----------|-----------|---------|-------------|--------|
| b15585    | 8.6 MI N Pittsburg Co | 35-13-18 | 95-35-48  | U.S. 69 | 1962        | 801.80 |

| Pier-No | Distance | Pier-Btm | Pier-Top | R-bed62 | S-Rding87 | R-bed 87 | S-Rding D/S90 | R-bed D/S90 | S-Rding U/S90 | R-bed U/S90 |
|---------|----------|----------|----------|---------|-----------|----------|---------------|-------------|---------------|-------------|
| S-A     | 0.00     | 500.00   | 607.14   | 606.00  | 8.50      | 606.00   | 8.50          | 606.00      | 10.00         | 604.50      |
| 1       | 101.25   | 501.50   | 607.31   | 572.00  | 46.00     | 568.50   | 46.00         | 568.50      | 47.00         | 567.50      |
| 2       | 201.25   | 502.70   | 607.72   | 538.00  | 76.00     | 538.50   | 77.50         | 537.00      | 77.00         | 537.50      |
| 3       | 301.25   | 502.50   | 607.81   | 528.00  | 85.00     | 529.50   | 85.00         | 529.50      | 85.50         | 529.00      |
|         | 351.25   |          |          | 530.00  | 87.00     | 527.50   | 86.00         | 528.50      | 86.50         | 528.00      |
| 4       | 401.25   | 503.50   | 608.14   | 530.00  | 91.50     | 523.00   | 92.00         | 522.50      | 90.00         | 524.50      |
|         | 451.25   |          |          | 530.00  | 88.00     | 526.50   | 87.50         | 527.00      | 86.00         | 528.50      |
| 5       | 501.25   | 502.50   | 607.81   | 530.00  | 91.00     | 523.50   | 89.00         | 525.50      | 86.00         | 528.50      |
| 6       | 601.25   | 503.00   | 607.72   | 538.00  | 78.00     | 536.50   | 78.50         | 536.00      | 76.00         | 538.50      |
| 7       | 701.25   | 503.00   | 609.31   | 574.00  | 45.00     | 569.50   | 44.00         | 570.50      | 44.50         | 570.00      |
| N-A     | 802.50   | 500.00   | 607.14   | 608.00  | 9.20      | 605.30   | 9.00          | 605.50      | 9.90          | 604.60      |

| S-Rding93 | R-bed93 |
|-----------|---------|
| 8.00      | 606.50  |
| 45.00     | 569.50  |
| 77.00     | 537.50  |
| 84.00     | 530.50  |
| 85.00     | 529.50  |
| 90.00     | 524.50  |
| 86.00     | 528.50  |
| 89.00     | 525.50  |
| 78.00     | 536.50  |
| 44.00     | 570.50  |
| 8.00      | 606.50  |

| Year     | 1985   | 1987   | 1989   | 1990.00 | 1992   | 1994   |
|----------|--------|--------|--------|---------|--------|--------|
| Flowline | 527.50 | 523.50 | 523.00 | 524.50  | 526.50 | 529.50 |

## **APPENDIX B**

### **FLOW PATH OF NORTH CANADIAN RIVER IN OKLAHOMA**

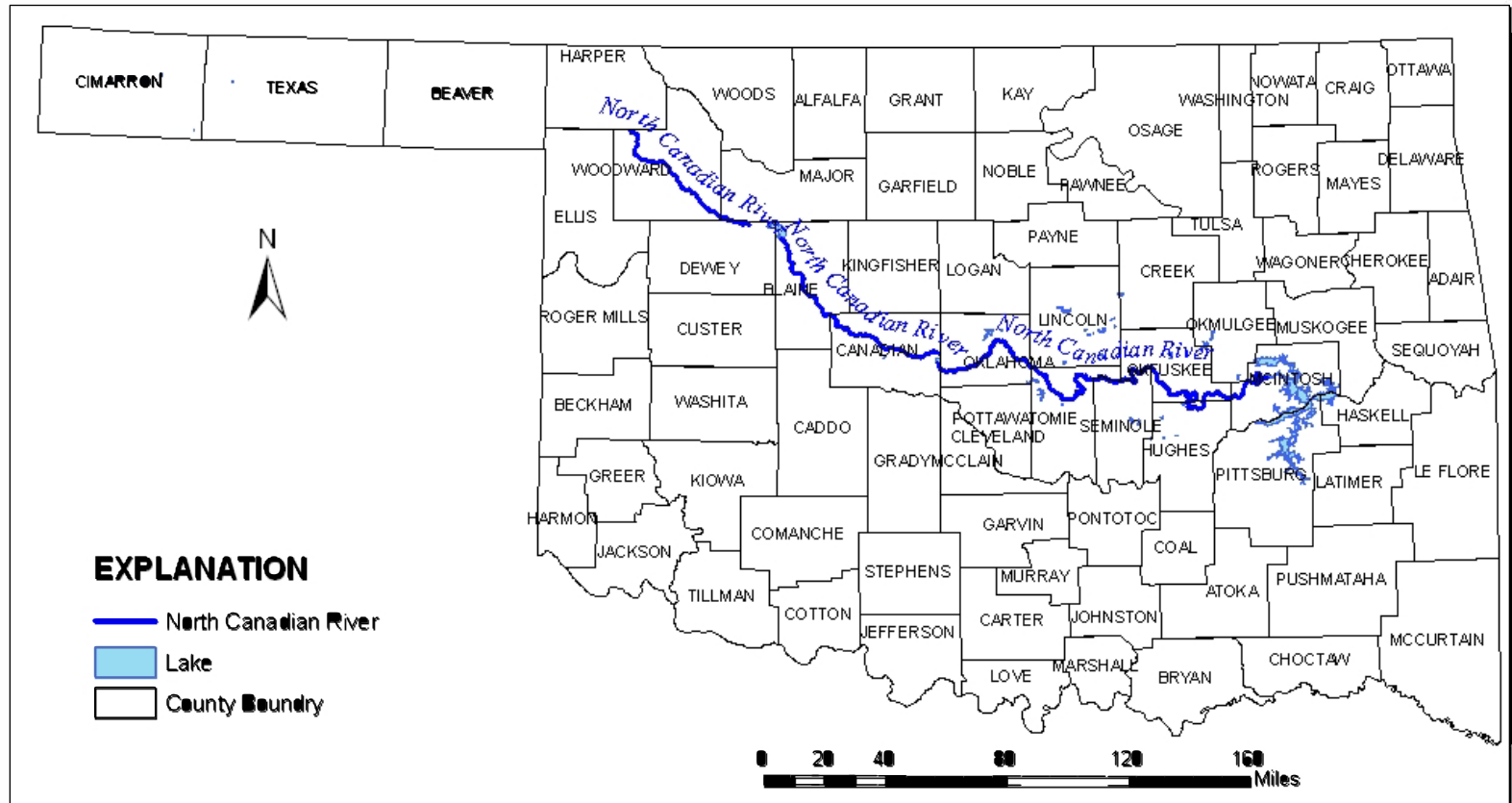


Figure B-1. Flowpath of North Canadian River in Oklahoma

**QUAD MAP LEGEND  
NORTH CANADIAN RIVER, OKLAHOMA**

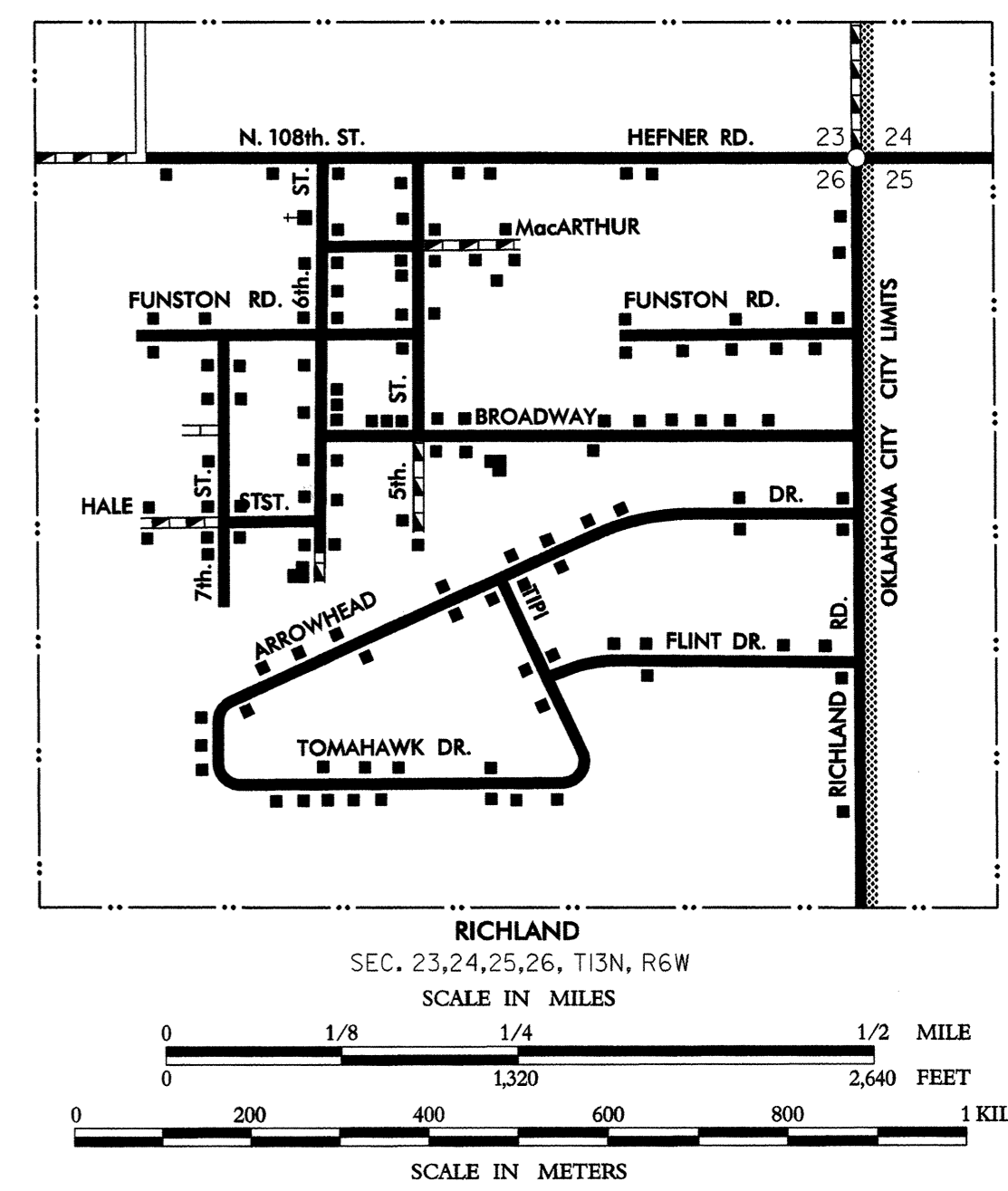
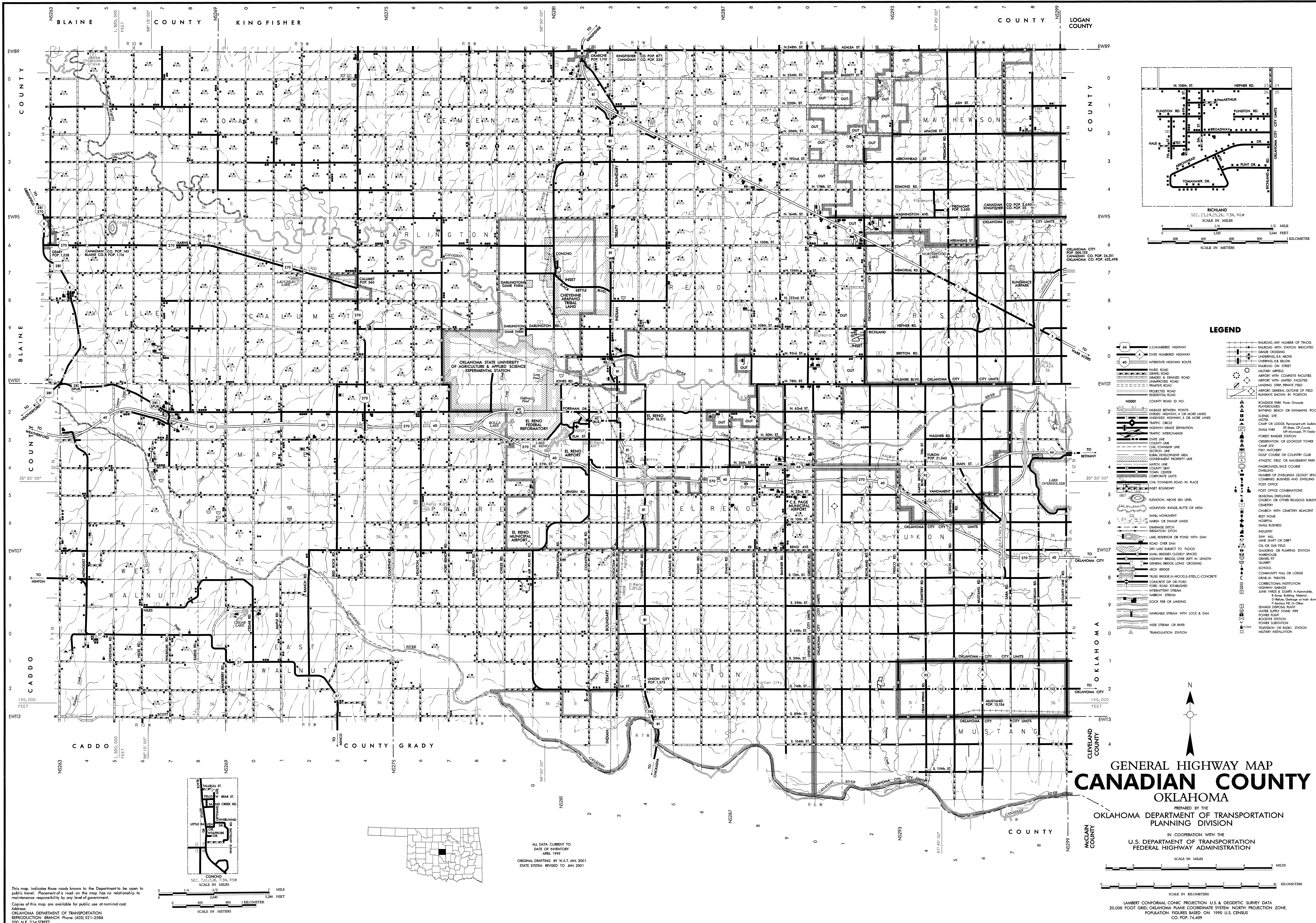
Source: <http://www.okladot.state.ok.us/hqdiv/p-r-div/maps/2003county/index.htm>

| <b>County Name</b> |
|--------------------|
| Woodward           |
| Major              |
| Dewey              |
| Blaine             |
| Canadian           |
| Oklahoma           |
| Pottawatomie       |
| Seminole           |
| Okfuskee           |
| Hughes             |
| McIntosh           |
| Pittsburg          |
| Haskell            |









**LEGEND**

- U.S. NUMBERED HIGHWAY
- STATE NUMBERED HIGHWAY
- INTERSTATE HIGHWAY ROUTE
- RAVINE ROAD
- GRAVEL ROAD
- PRIMITIVE ROAD
- PROJECTED ROAD
- RESIDENTIAL ROAD
- COUNTY ROAD ID NO.
- MEASURE BETWEEN POINTS
- UNDIVIDED HIGHWAY, 3 OR MORE LANES
- TRAFFIC CIRCLE
- ROADWAY GRADE SEPARATION
- TRAFFIC INTERCHANGE
- STATE LINE
- COUNTY LINE
- CIVIL TOWNSHIP LINE
- RURAL DEVELOPMENT AREA
- GOVERNMENT PROPERTY LINE
- MATCH LINE
- COUNTY SEAT
- CORNER CENTER
- CORPORATE LIMITS
- WATER TOWNSHIP ROAD IN PLACE
- FEET BOUNDARY
- ELEVATION ABOVE SEA LEVEL
- MOUNTAIN RANGE, BUTTE OR MESA
- SMALL MONUMENT
- MARSH OR SWAMP LANDS
- DRAINAGE DITCH
- IRRIGATION DITCH
- LAKE, RESERVOIR OR POND WITH DAM
- ROAD OVER DAM
- DRY LAKE SUBJECT TO FLOOD
- SMALL BRIDGES CLOSELY SPACED
- HIGHWAY BRIDGE OVER 200 FT. IN LENGTH
- GENERAL BRIDGE LONG CROSSING
- ARCH BRIDGE
- TRUSS BRIDGE WOOD-STEEL-CONCRETE
- CONCRETE DIP OR FORD
- FOOD STORE ESTABLISHED
- PERMITTED STREAM
- NARROW STREAM
- LOCK PER OR LANDING
- NAVIGABLE STREAM WITH LOCK & DAM
- WIDE STREAM OR RIVER
- TRIANGULATION STATION
- RAILROAD, ANY NUMBER OF TRACKS
- RAILROAD WITH STATION INDICATED
- GRADE CROSSING
- UNDERPASS, R.R. ABOVE
- CROSSING, R.R. BELOW
- RAILROAD ON STREET
- MILITARY AIRFIELD
- AIRPORT WITH CONCRETE FACILITIES
- AIRPORT WITH LIMITED FACILITIES
- LANDING STRIP PRIVATE FIELD
- RUNWAYS GENERAL OUTLINE OF FIELD
- RUNWAYS SHOWN IN POSITION
- ROADSIDE PARK
- PARKING
- BATHING BEACH OR SWIMMING POOL
- SCENIC SITE
- MOTEL
- CAMP OR LODGE, Permanent with buildings
- CAMP OR LODGE, SP-Shell, Or-Country
- SMALL PARK
- FOREST RANGER STATION
- FOREST WATCHTOWER
- GOLF COURSE OR COUNTRY CLUB
- ATHLETIC FIELD OR AMUSEMENT PARK
- FRAGRANCES, RACE COURSE
- DWELLING
- NUMBER OF DWELLINGS CLOSELY SPACED
- CORNERED BUSINESS AND DWELLING
- POST OFFICE
- POST OFFICE COMBINATIONS
- SEASONAL DWELLINGS
- CHURCH OR OTHER RELIGIOUS BUILDING
- CENTER
- CHURCH WITH CEMETERY ADJACENT
- REST HOME
- HOSPITAL
- SMALL BUSINESS
- INDUSTRY
- SAW MILL
- WINE SHED OR DRIFT
- OIL OR GAS FIELD
- GASOLINE OR PUMPING STATION
- WAREHOUSE
- GRAVEL PIT
- QUARRY
- SCHOOL
- COMMUNITY HALL OR LODGE
- CINEMA THEATER
- CORRECTIONAL INSTITUTION
- HIGHWAY GARAGE
- JUNK YARDS & DUMPS A, Automobiles
- JUNK YARDS & DUMPS B, Station
- Junk, Building Material
- Ditch, Openings or trash dumps
- SEWAGE DISPOSAL PLANT
- WATER SUPPLY STAND PIPE
- POWER PLANT
- SOCCER STATION
- POWER SUBSTATION
- TELEVISION OR RADIO STATION
- MILITARY INSTALLATION

**GENERAL HIGHWAY MAP**  
**CANADIAN COUNTY**  
 OKLAHOMA

PREPARED BY THE  
 OKLAHOMA DEPARTMENT OF TRANSPORTATION  
 PLANNING DIVISION

IN COOPERATION WITH THE  
 U.S. DEPARTMENT OF TRANSPORTATION  
 FEDERAL HIGHWAY ADMINISTRATION

SCALE IN MILES  
 0 1 2 3 4 5

SCALE IN KILOMETERS  
 0 1 2 3 4 5

LAMBERT CONFORMAL CONIC PROJECTION U.S. & GEODETIC SURVEY DATA  
 20,000 FOOT GRID, OKLAHOMA PLANE COORDINATE SYSTEM NORTH PROJECTION ZONE  
 POPULATION FIGURES BASED ON 1990 U.S. CENSUS  
 CO. POP. 74,409

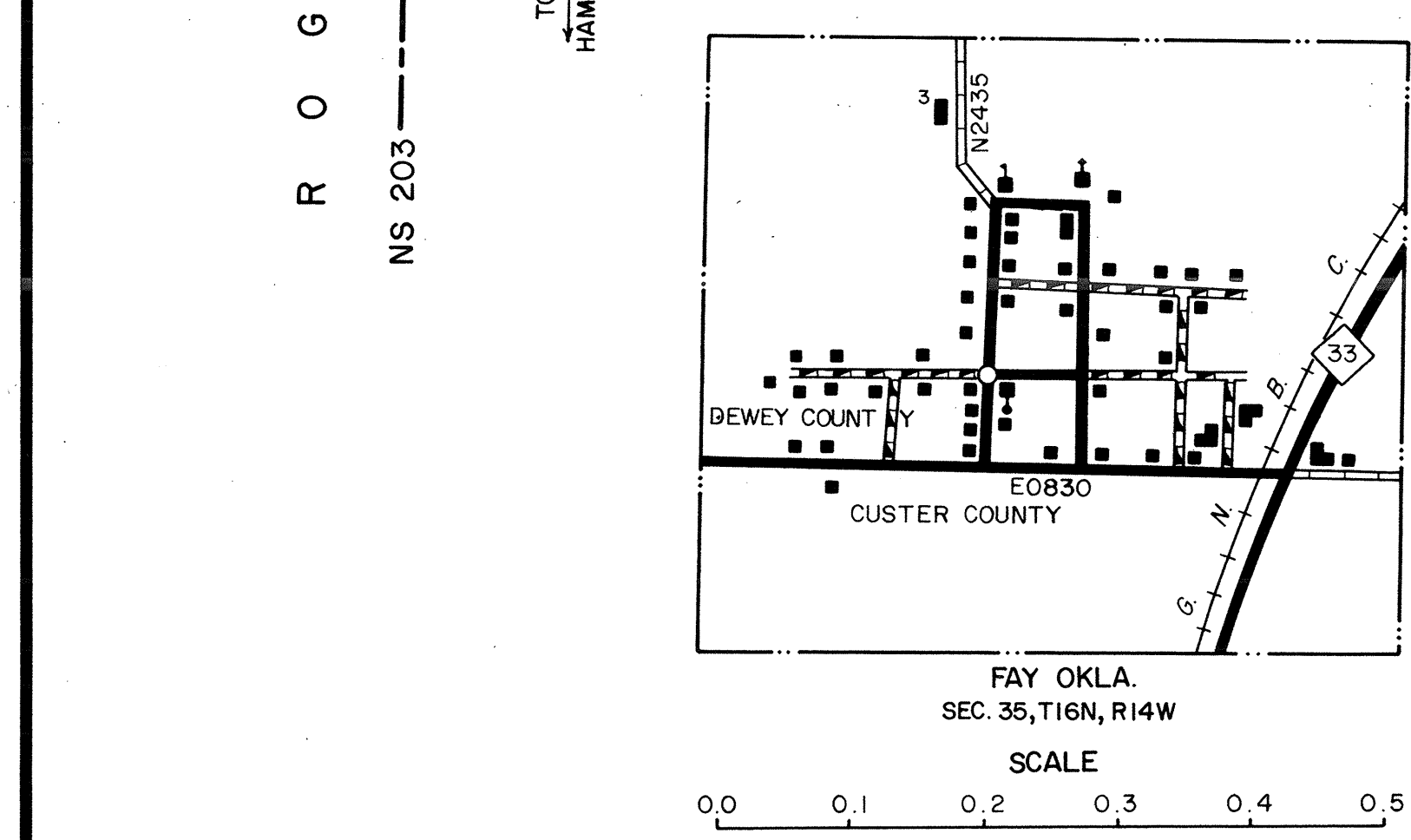
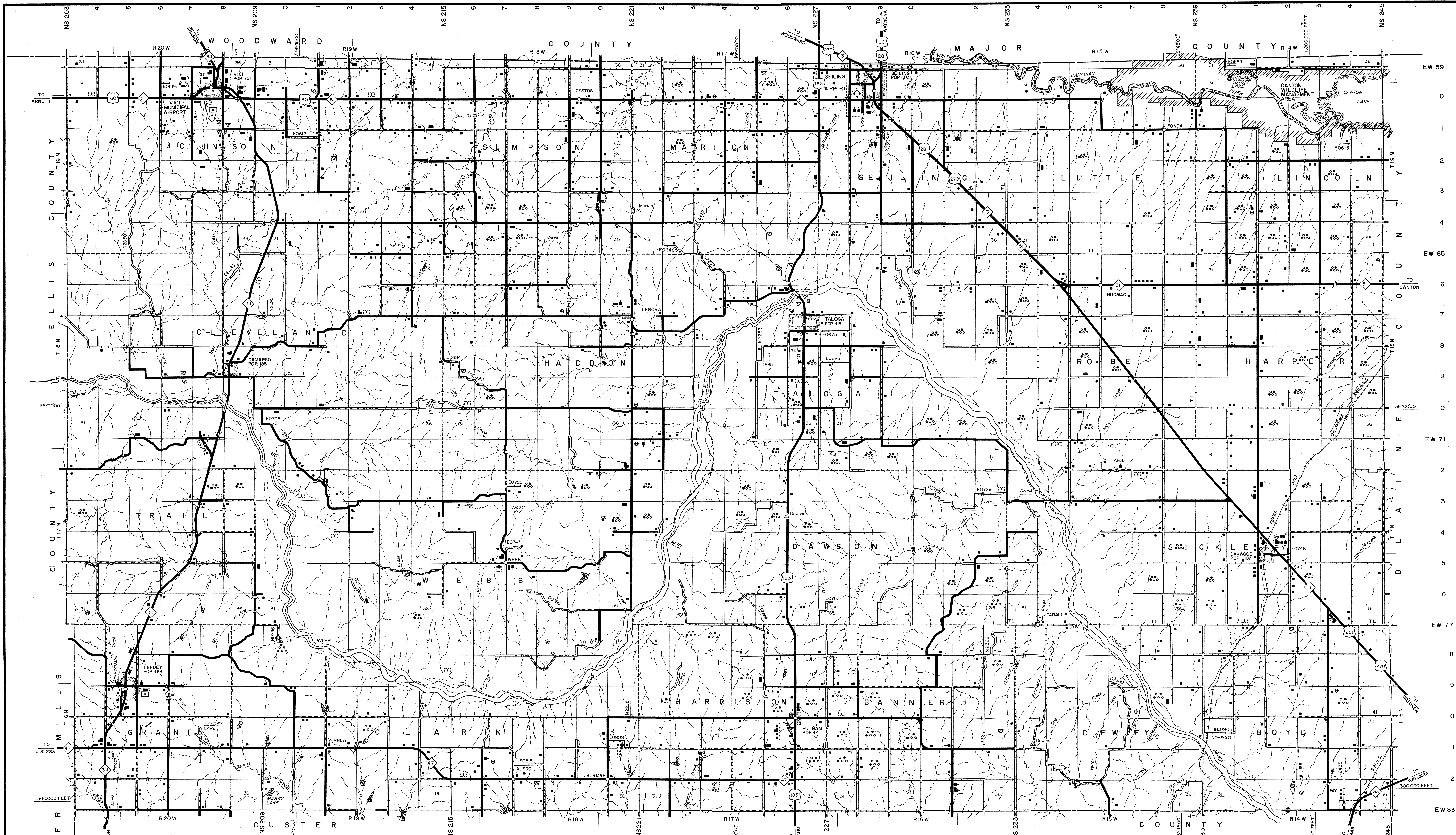
ALL RIGHTS RESERVED COMPUTER GENERATED

This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government.  
 Copies of this map are available for public use at nominal cost.  
 Address:  
 OKLAHOMA DEPARTMENT OF TRANSPORTATION  
 REPRODUCTION BRANCH Phone (405) 521-2586  
 200 N.E. 21st STREET  
 OKLAHOMA CITY, OKLAHOMA 73105-3204

ALL DATA CURRENT TO  
 DATE OF INVENTORY  
 APRIL 1999  
 ORIGINAL DRAFTING BY W.A.T. JAN. 2001  
 STATE SYSTEM REVISED TO JAN. 2001

NOT FOR RESALE

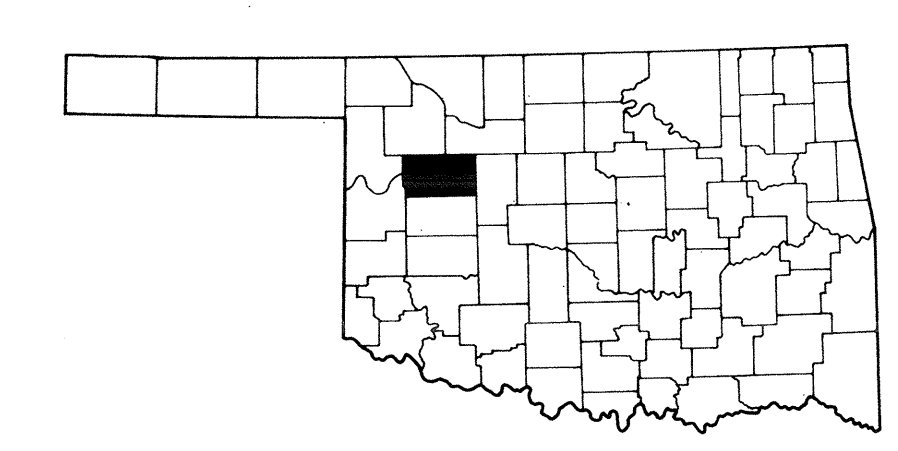




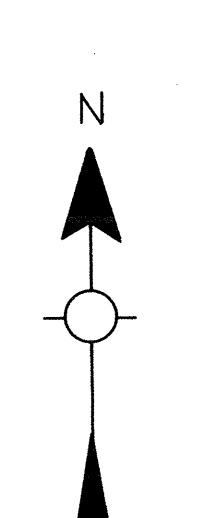
This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government. Copies of this map are available for public use at nominal cost. Address: OKLAHOMA DEPARTMENT OF TRANSPORTATION REPRODUCTION BRANCH Phone (405) 521-2588 200 N.E. 21st STREET OKLAHOMA CITY, OKLAHOMA 73105

**LEGEND**

- ELEVATION ABOVE SEA LEVEL
- MOUNTAIN RANGE, BUTTE OR MESA
- SMALL MONUMENT
- MARSH OR SWAMP LANDS
- DRAINAGE DITCH
- IRRIGATION DITCH
- LAKE, RESERVOIR OR POND WITH DAM
- ROAD OVER DAM
- DRY LAKE SUBJECT TO FLOOD
- SMALL BRIDGES CLOSELY SPACED
- GENERAL BRIDGE OVER 20 FT IN LENGTH
- ARCH BRIDGE
- TRUSS BRIDGE, W. Wood, S. Steel, C. Concrete
- CONCRETE DIP OR FORD
- FORD ROAD ESTABLISHED
- INTERMITTENT STREAM
- NARROW STREAM
- DOCK PIER OR LANDING
- NAVIGABLE STREAM WITH LOCK & DAM
- WIDE STREAM OR RIVER
- TRIANGULATION STATION
- U.S. NUMBERED HIGHWAY
- STATE NUMBERED HIGHWAY
- INTERSTATE HIGHWAY ROUTE
- PAVED ROAD
- GRAVEL ROAD
- UNIMPROVED ROAD
- PRIMITIVE ROAD
- PROJECTED ROAD
- RESIDENTIAL ROAD
- COUNTY ROAD ID NO. N8001
- MILEAGE BETWEEN POINTS
- DIVIDED HIGHWAY, 4 OR MORE LANES
- UNDIVIDED HIGHWAY, 3 OR MORE LANES
- TRAFFIC CIRCLE
- HIGHWAY GRADE SEPARATION
- TRAFFIC INTERCHANGE
- STATE LINE
- COUNTY LINE
- RURAL DEVELOPMENT AREA
- GOVERNMENT PROPERTY LINE
- MATCH LINE
- COUNTY SEAT
- CORPORATE LIMITS
- CIVIL TOWNSHIP, ROAD IN PLACE
- INSET BOUNDARY
- RAILROAD, ANY NUMBER OF TRACKS
- RAILROAD WITH STATIONS INDICATED
- GRADE CROSSING
- OVERPASS, R.R. ABOVE
- OVERPASS, R.R. BELOW
- RAILROAD ON STREET
- MILITARY AIRFIELD
- AIRPORT WITH COMPLETE FACILITIES
- AIRPORT WITH LIMITED FACILITIES
- LANDING STRIP, PRIVATE FIELD
- AIRPORT - GENERAL OUTLINE OF FIELD
- RUNWAYS SHOWN IN POSITION
- ROADSIDE PARK, Picnic Grounds
- PLAYGROUNDS
- BATHING BEACH OR SWIMMING POOL
- SCENIC SITE
- MOTEL
- CAMP OR LODGE, Permanent With Buildings
- CAMP OR LODGE, Temporary
- SMALL PARK
- FOREST RANGER STATION
- OBSERVATION OR LOOKOUT TOWER
- CAMP SITE
- FISH HATCHERY
- GOLF COURSE OR COUNTRY CLUB
- ATHLETIC FIELD OR AMUSEMENT PARK
- FAIRGROUNDS, RACE COURSE
- DWELLING
- NUMBER OF DWELLINGS CLOSELY SPACED
- COMBINED BUSINESS AND DWELLING
- POST OFFICE
- SEASONAL DWELLINGS
- CHURCH OR OTHER RELIGIOUS BUILDING
- CEMETERY
- CHURCH WITH CEMETERY ADJACENT
- REST HOME
- HOSPITAL
- SMALL BUSINESS
- INDUSTRY
- SAW MILL
- MINE SHAFT OR DRIFT
- OIL OR GAS FIELD
- GAUGING OR PUMPING STATION
- WAREHOUSE
- GRAVEL PIT
- QUARRY
- SCHOOL
- COMMUNITY HALL OR LODGE
- DRIVE-IN THEATER
- CORRECTIONAL INSTITUTION
- HIGHWAY GARAGE
- TANK YARDS & SHUMPS
- A-Automobile
- B-Building Material
- D-Refuse, Garbage or Trash Dump
- F-Sanitary Fill, G-Other
- SEWAGE DISPOSAL PLANT
- WATER SUPPLY STAND PIPE
- POWER PLANT
- BOOSTER STATION
- POWER SUBSTATION
- TELEVISION OR RADIO STATION
- MILITARY INSTALLATION



ALL DATA CURRENT TO DATE OF INVENTORY OCT. 1988  
 ORIGINAL DRAFTING BY M.J. MAY 1989  
 STATE SYSTEM REVISED TO JAN. 1992



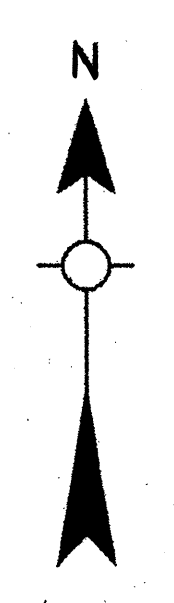
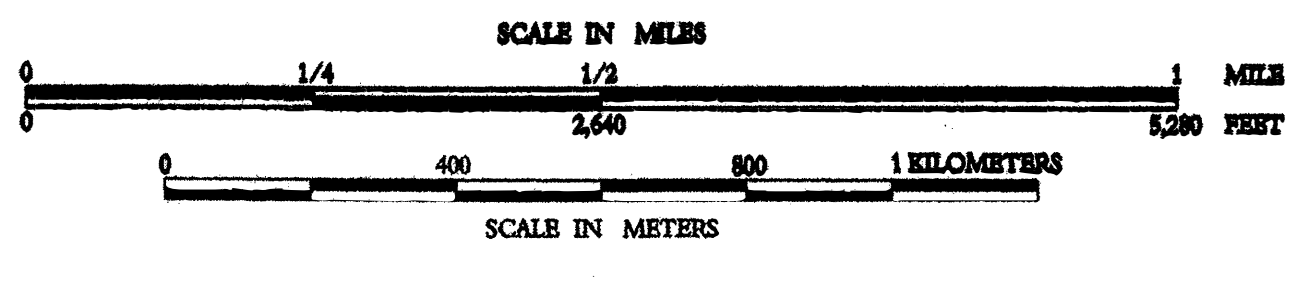
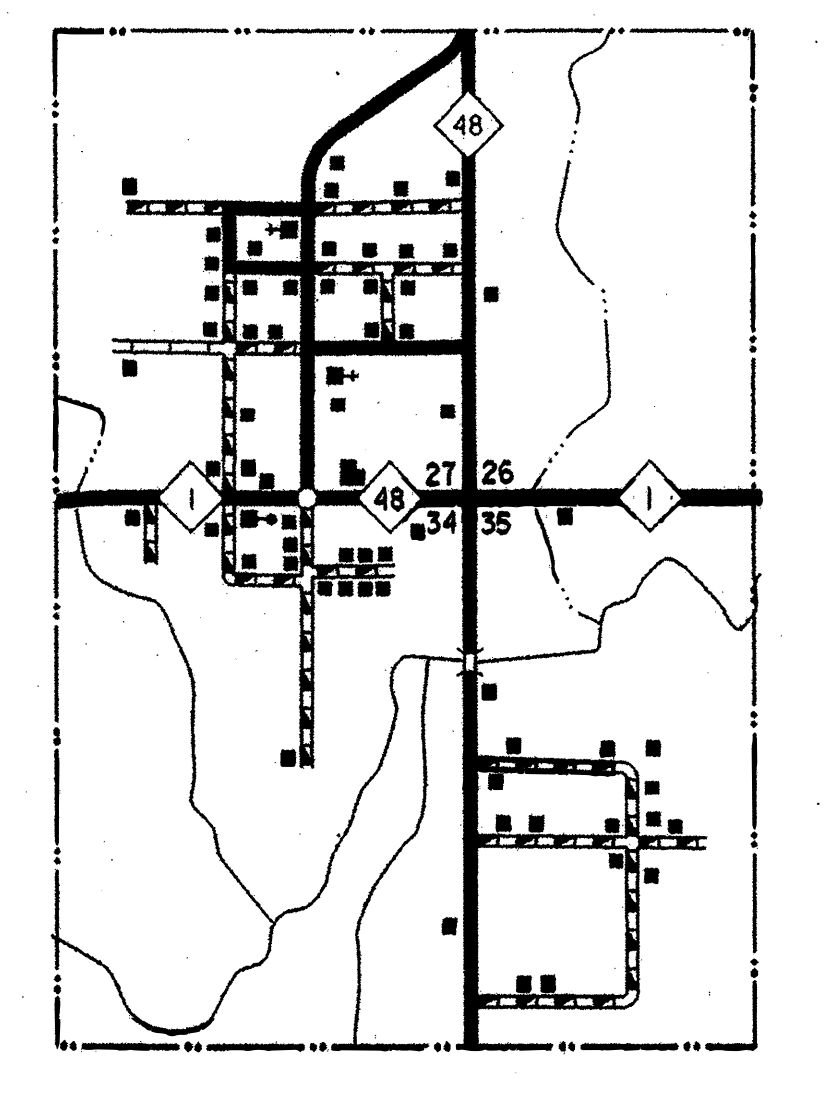
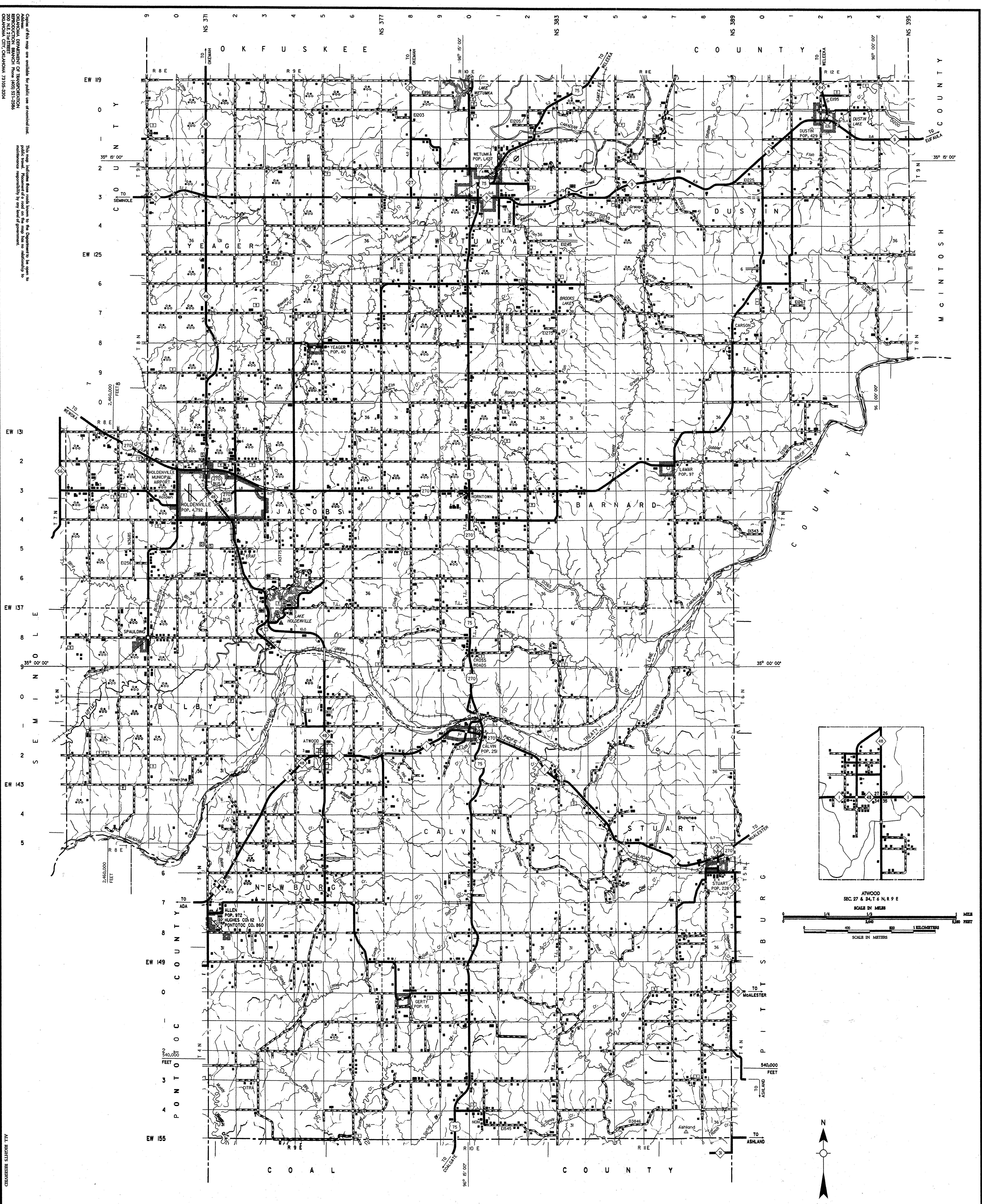
**GENERAL HIGHWAY MAP  
 DEWEY COUNTY  
 OKLAHOMA**  
 PREPARED BY THE  
**OKLAHOMA DEPARTMENT OF TRANSPORTATION  
 PLANNING DIVISION**  
 IN COOPERATION WITH THE  
**U.S. DEPARTMENT OF TRANSPORTATION  
 FEDERAL HIGHWAY ADMINISTRATION**

SCALE 0 1 2 3 4 5 MILES  
 LAMBERT CONFORMAL CONIC PROJECTION U.S. COAST & GEODETIC SURVEY DATA  
 20,000 FOOT GRID OKLAHOMA PLANE COORDINATE SYSTEM NORTH PROJECTION ZONE  
 POPULATION FIGURES BASED ON 1990 U.S. CENSUS  
 CO. POP. 5,551  
 ALL RIGHTS RESERVED



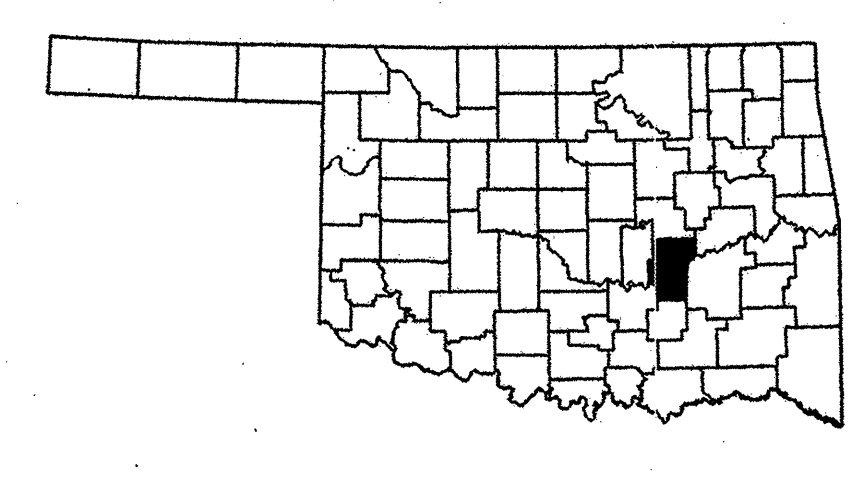






**LEGEND**

- |  |  |   |  |
|--|--|---|--|
| <ul style="list-style-type: none"> <li> U.S. NUMBERED HIGHWAY</li> <li> STATE NUMBERED HIGHWAY</li> <li> INTERSTATE HIGHWAY ROUTE</li> <li> PAVED ROAD</li> <li> GRAVEL ROAD</li> <li> GRADED &amp; DRAINED ROAD</li> <li> UNIMPROVED ROAD</li> <li> PRIVATE ROAD</li> <li> PROJECTED ROAD</li> <li> RESIDENTIAL ROAD</li> <li> COUNTY ROAD NO. 10</li> <li> MILEAGE BETWEEN POINTS</li> <li> DIVIDED HIGHWAY, 4 OR MORE LANES</li> <li> UNDIVIDED HIGHWAY, 2 OR MORE LANES</li> <li> TRAFFIC CIRCLE</li> <li> HIGHWAY GRADE SEPARATION</li> <li> TRAFFIC INTERCHANGE</li> <li> STATE LINE</li> <li> COUNTY LINE</li> <li> TOWNSHIP LINE</li> <li> TOWNSHIP CENTER</li> <li> COMPACTS LIMITS</li> <li> CIVIL TOWNSHIP, ROAD IN PLACE</li> <li> INLET BOUNDARY</li> </ul> | <ul style="list-style-type: none"> <li> RAILROAD, ANY NUMBER OF TRACKS</li> <li> RAILROAD WITH STATION INDICATED</li> <li> GRADE CROSSING, R.R. ABOVE</li> <li> GRADE CROSSING, R.R. BELOW</li> <li> RAILROAD ON STREET</li> <li> MILITARY AIRFIELD</li> <li> AIRPORT WITH CONCRETE FACILITIES</li> <li> AIRPORT WITH LIMITED FACILITIES</li> <li> LANDING STRIP, PRIVATE FIELD</li> <li> AIRPORT, GENERAL OUTLINE OF FIELD</li> <li> RUNWAYS SHOWN IN POSITION</li> <li> ROADSIDE PARK, PICNIC GROUNDS</li> <li> PARK, AMUSEMENT PARK, ETC.</li> <li> BATHING BEACH OR SWIMMING POOL</li> <li> SCENIC SITE</li> <li> CAMP OR LODGE, PERMANENT WITH BUILDINGS</li> <li> SMALL PARK (1/4-MILE OR LESS)</li> <li> FOREST RANGER STATION, 7 1/2-TRIPLE PARK</li> <li> OBSERVATION OR LOOKOUT TOWER</li> <li> CAMP SITE</li> <li> FISH HATCHERY</li> <li> GOLF COURSE OR COUNTRY CLUB</li> <li> ATHLETIC FIELD OR AMUSEMENT PARK</li> <li> FAIRGROUNDS, RACE COURSE</li> <li> DWELLING</li> <li> NUMBER OF DWELLINGS CLOSELY SPACED</li> <li> COMMERCIAL BUSINESS AND DWELLING</li> <li> POST OFFICE</li> <li> POST OFFICE COMBINATIONS</li> </ul> | <ul style="list-style-type: none"> <li> ELEVATION ABOVE SEA LEVEL</li> <li> MOUNTAIN RANGE, BUTTE OR MESA</li> <li> SMALL MONUMENT</li> <li> MARSH OR SWAMP LANDS</li> <li> DRAINAGE DITCH</li> <li> LAKE, RESERVOIR OR POND WITH DAM</li> <li> ROAD OVER DAM</li> <li> DRY LAKE SUBJECT TO FLOOD</li> <li> SMALL BRIDGES CLOSELY SPACED</li> <li> HIGHWAY BRIDGE, OVER SOFT, IN LENGTH</li> <li> ORIGINAL BRIDGE, LOW CROSSING</li> <li> ARCH BRIDGE</li> <li> TRUSS BRIDGE, WOOD-STEEL-CONCRETE</li> <li> CONCRETE DIP OR FORD</li> <li> FORD ROAD ESTABLISHED</li> <li> INTERMITTENT STREAM</li> <li> NARROW STREAM</li> <li> DOCK, PIER OR LANDING</li> <li> NAVIGABLE STREAM WITH LOCK &amp; DAM</li> <li> WIDE STREAM OR RIVER</li> <li> TRIANGULATION STATION</li> </ul> | <ul style="list-style-type: none"> <li> SEASONAL DWELLING</li> <li> CHURCH OR OTHER RELIGIOUS BUILDING</li> <li> CEMETERY</li> <li> CHURCH WITH CEMETERY ADJACENT</li> <li> REST HOME</li> <li> HOSPITAL</li> <li> SMALL BUSINESS</li> <li> INDUSTRY</li> <li> SAW MILL</li> <li> MINE SHAFT OR DRIFT</li> <li> OIL OR GAS FIELD</li> <li> GAUGING OR PUMPING STATION</li> <li> WAREHOUSE</li> <li> QUARRY</li> <li> QUARRY PIT</li> <li> QUARRY</li> <li> SCHOOL</li> <li> COMMUNITY HALL OR LODGE</li> <li> DRIVE-IN THEATRE</li> <li> CORRECTIONAL INSTITUTION</li> <li> HIGHWAY GARAGE</li> <li> AUTOMOBILE</li> <li> TRUCK</li> <li> BUS</li> <li> FERRY</li> <li> SEWAGE DISPOSAL PLANT</li> <li> WATER SUPPLY STAND PIPE</li> <li> POWER PLANT</li> <li> BOOSTER STATION</li> <li> TELEVISION OR RADIO STATION</li> <li> MILITARY INSTALLATION</li> </ul> |
|--|--|---|--|

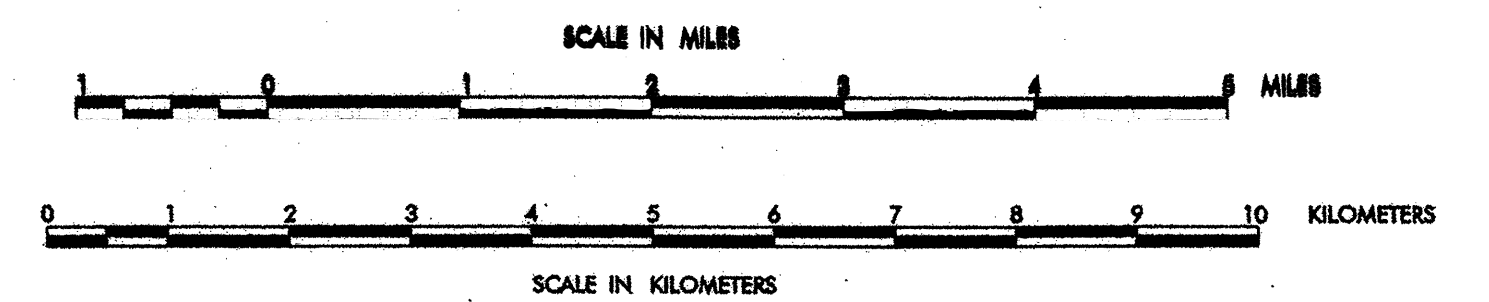


ALL DATA CURRENT TO DATE OF INVENTORY  
JUNE 1978  
ORIGINAL DRAWING BY E.O.B. JAN. 1974  
STATE SYSTEM REVISED TO MARCH 1978

**GENERAL HIGHWAY MAP  
HUGHES COUNTY  
OKLAHOMA**

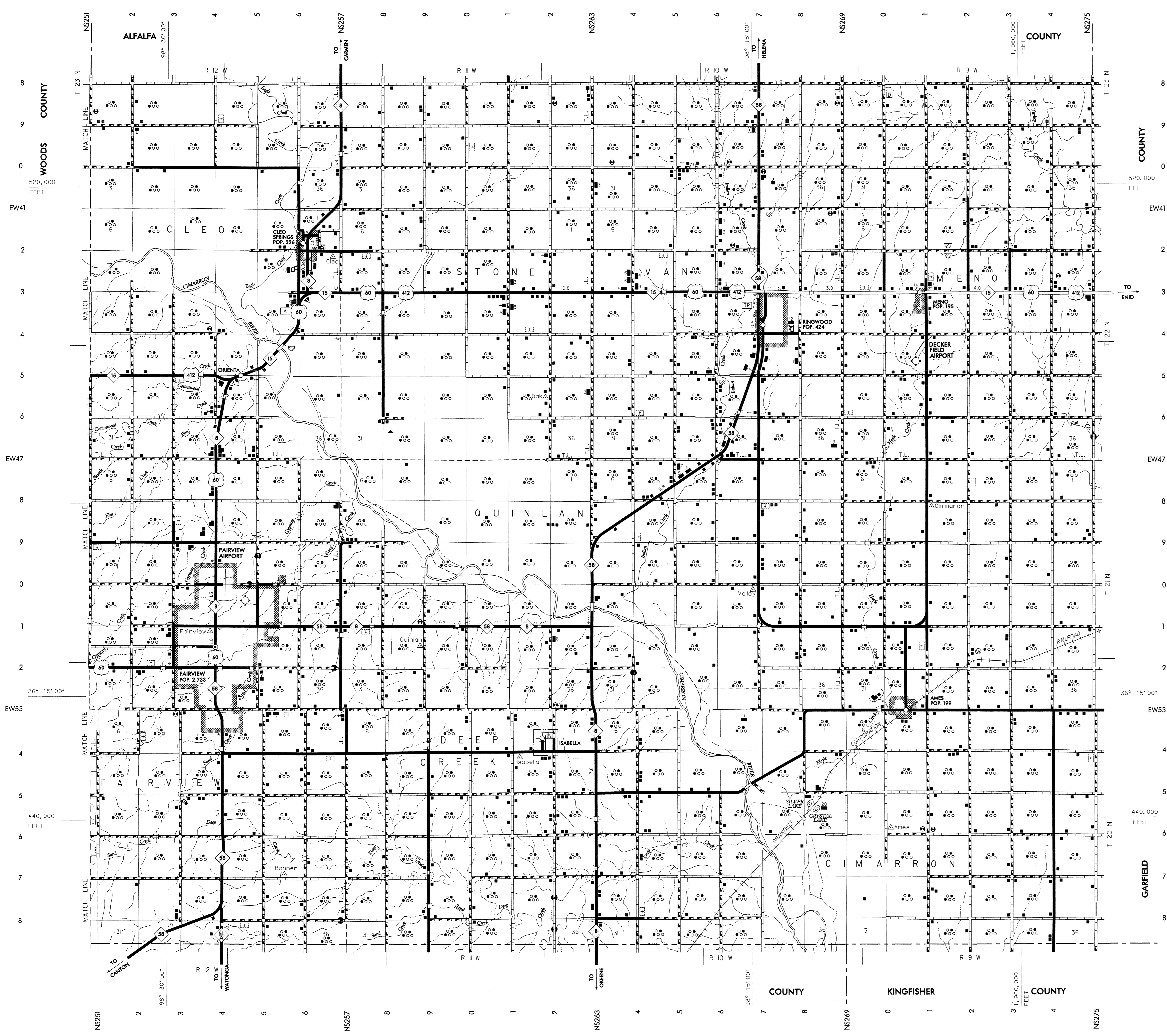
PREPARED BY THE  
**OKLAHOMA DEPARTMENT OF TRANSPORTATION  
PLANNING DIVISION**

IN COOPERATION WITH THE  
**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION**

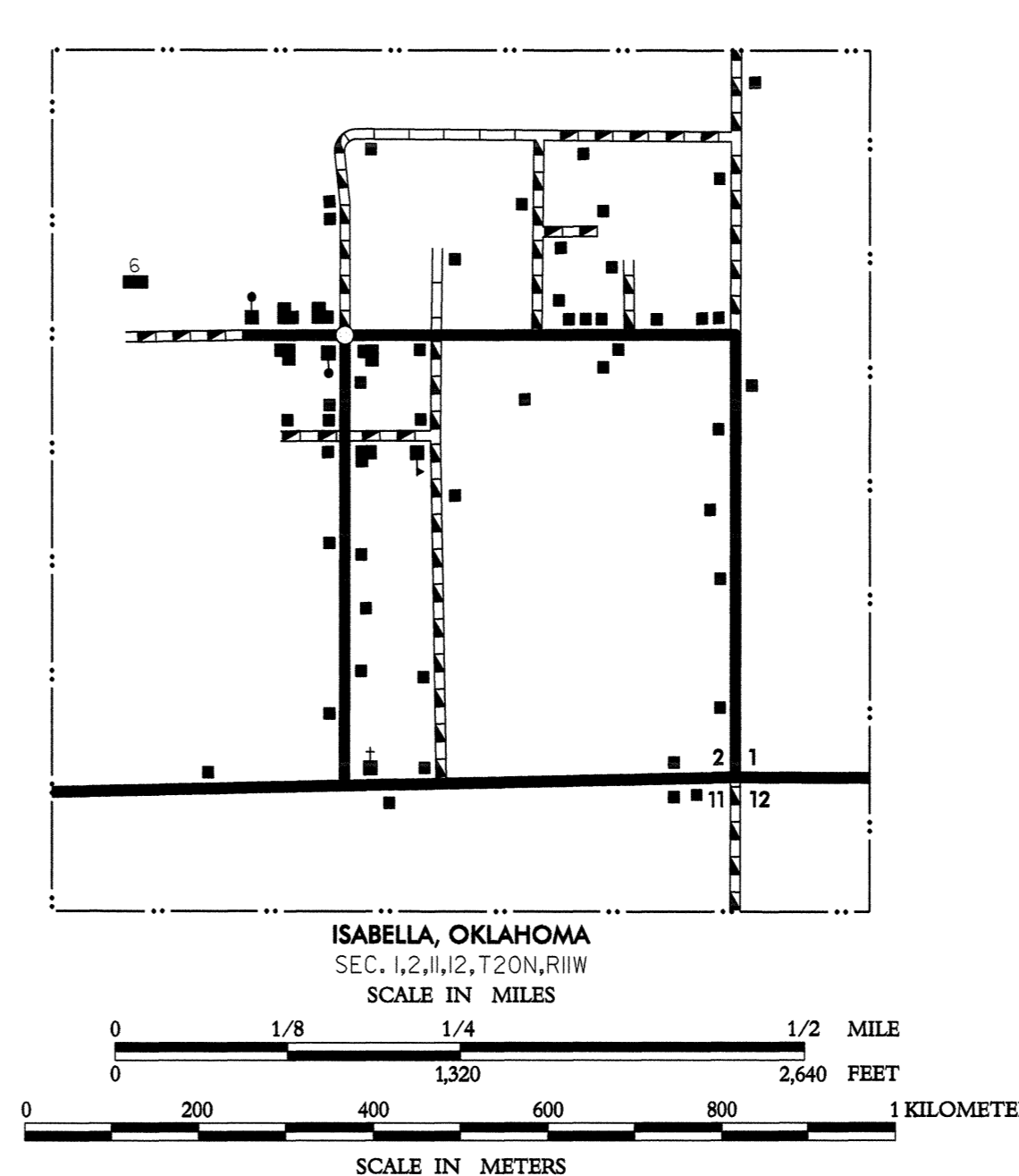


LAURENT CONFORMAL CONIC PROJECTION U.S. & GEODETIC SURVEY DATA  
20,000 FOOT GRID, OKLAHOMA PLANE COORDINATE SYSTEM, SOUTH PROJECTION ZONE  
POPULATION FIGURES BASED ON 1970 U.S. CENSUS  
CO. POP. 13,028



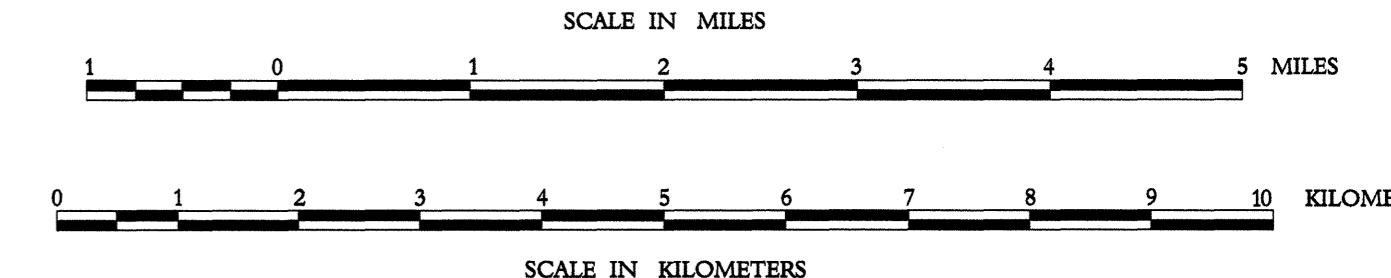


- ### LEGEND
- US NUMBERED HIGHWAY
  - STATE NUMBERED HIGHWAY
  - INTERSTATE HIGHWAY ROUTE
  - PAVED ROAD
  - GRAVEL ROAD
  - GRADED & DRAINED ROAD
  - UNIMPROVED ROAD
  - PRIMITIVE ROAD
  - PROJECTED ROAD
  - RESIDENTIAL ROAD
  - COUNTY ROAD ID NO.
  - MILEAGE BETWEEN POINTS
  - DIVIDED HIGHWAY, 4 OR MORE LANES
  - UNDIVIDED HIGHWAY, 3 OR MORE LANES
  - TRAFFIC CIRCLE
  - HIGHWAY GRADE SEPARATION
  - TRAFFIC INTERCHANGE
  - STATE LINE
  - COUNTY LINE
  - CIVIL TOWNSHIP AREA
  - SECTION LINE
  - RURAL DEVELOPMENT AREA
  - GOVERNMENT PROPERTY LINE
  - MATCH LINE
  - COUNTY SEAT
  - TOWN CENTER
  - CORPORATE LIMITS
  - CIVIL TOWNSHIP, ROAD IN PLACE
  - INSET BOUNDARY
  - ELEVATION ABOVE SEA LEVEL
  - MOUNTAIN RANGE, BUTTE OR MESA
  - SMALL NONIRRIGATED MARSH OR SWAMP LANDS
  - DRAINAGE DITCH
  - IRRIGATION DITCH
  - LAKE, RESERVOIR OR POND WITH DAM
  - ROAD OVER DAM
  - DRY LAKE SUBJECT TO FLOOD
  - SMALL BRIDGE, CLOSEST SPACED
  - HIGHWAY BRIDGE, OVER 20FT. IN LENGTH
  - GENERAL BRIDGE, LONG CROSSING
  - ARCH BRIDGE
  - TRUSS BRIDGE, WOOD-STEEL, C-CONCRETE
  - CONCRETE DIP OR FORD
  - FORD ROAD ESTABLISHED
  - INTERMITTENT STREAM
  - NARROW STREAM
  - DOCK PIER OR LANDING
  - NAVIGABLE STREAM WITH LOCK & DAM
  - WIDE STREAM OR RIVER
  - TRIANGULATION STATION
  - RAILROAD, ANY NUMBER OF TRACKS
  - RAILROAD WITH STATION INDICATED
  - GRADE CROSSING
  - UNDERPASS, R.R. ABOVE
  - OVERPASS, R.R. BELOW
  - RAILROAD ON STREET
  - WETLAND AREA
  - AIRPORT WITH COMPLETE FACILITIES
  - AIRPORT WITH LIMITED FACILITIES
  - LANDING STRIP, PRIVATE FIELD
  - AIRPORT, GENERAL OUTLINE OF FIELD
  - RUNWAYS SHOWN IN POSITION
  - RANGES, PARK, PARK GROUNDS
  - BATHING BEACH OR SWIMMING POOL
  - SCENIC SITE
  - MOTEL
  - CAMP OR LODGE, Permanent with Buildings
  - SMALL PARK
  - NP-Monument, NP-Trail, Park
  - FOREST RANGER STATION
  - OBSERVATION OR LOOKOUT TOWER
  - CAMP SITE
  - FISH HATCHERY
  - GOLF COURSE OR COUNTRY CLUB
  - ATHLETIC FIELD OR AMUSEMENT PARK
  - FAIRGROUNDS, RACE COURSE
  - DWELLING
  - NUMBER OF DWELLINGS CLOSELY SPACED
  - COMBINED BUSINESS AND DWELLING
  - POST OFFICE
  - POST OFFICE COMBINATIONS
  - SEASONAL DWELLINGS
  - CHURCH OR OTHER RELIGIOUS BUILDING
  - CEMETERY
  - CHURCH WITH CEMETERY ADJACENT
  - REST HOME
  - HOSPITAL
  - SMALL BUSINESS
  - INDUSTRY
  - SAW MILL
  - MINE SHAFT OR DRIFT
  - OIL OR GAS FIELD
  - GAUGING OR PUMPING STATION
  - WAREHOUSE
  - GRANITE PIT
  - QUARRY
  - SCHOOL
  - COMMUNITY HALL OR LODGE
  - DRIVE-IN THEATER
  - CORRECTIONAL INSTITUTION
  - HIGHWAY GAUGE
  - AIRSTRIP, BUILDING, MATERIAL, 6-STRIP, BUILDING MATERIAL, 8-STRIP, BUILDING MATERIAL, 6-STRIP, BUILDING MATERIAL, 8-STRIP, BUILDING MATERIAL
  - SEWAGE DISPOSAL PLANT
  - WATER SUPPLY STAND PIPE
  - POWER PLANT
  - ROCKET STATION
  - POWER SUBSTATION
  - TELEVISION OR RADIO STATION
  - MILITARY INSTALLATION

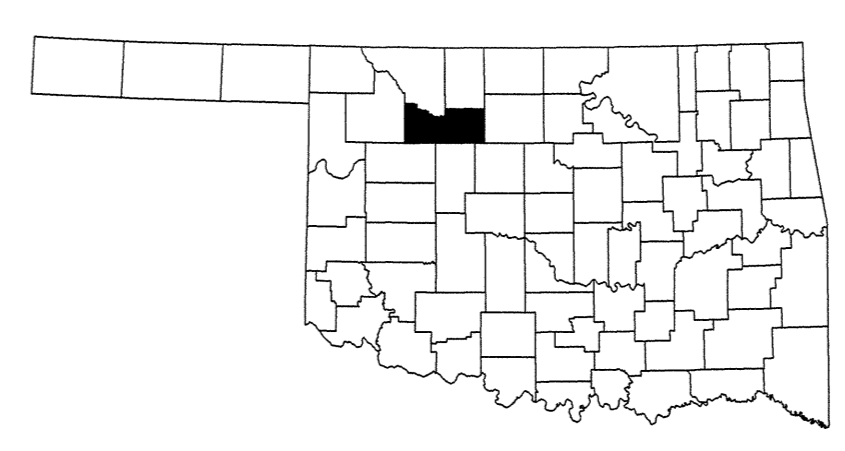


## GENERAL HIGHWAY MAP MAJOR COUNTY OKLAHOMA

PREPARED BY THE  
OKLAHOMA DEPARTMENT OF TRANSPORTATION  
PLANNING DIVISION  
IN COOPERATION WITH THE  
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION



ALL DATA CURRENT TO  
DATE OF INVENTORY  
FEBRUARY, 2000  
ORIGINAL DRAFTING BY W.A.T. JANUARY, 2002  
STATE SYSTEM REVISED TO JANUARY, 2002

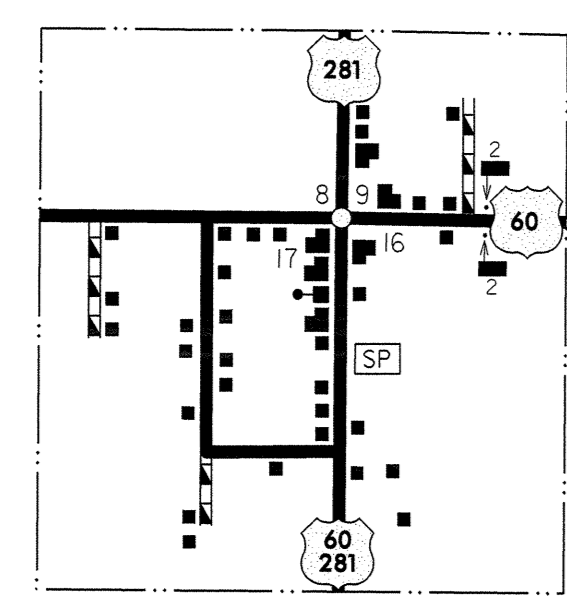
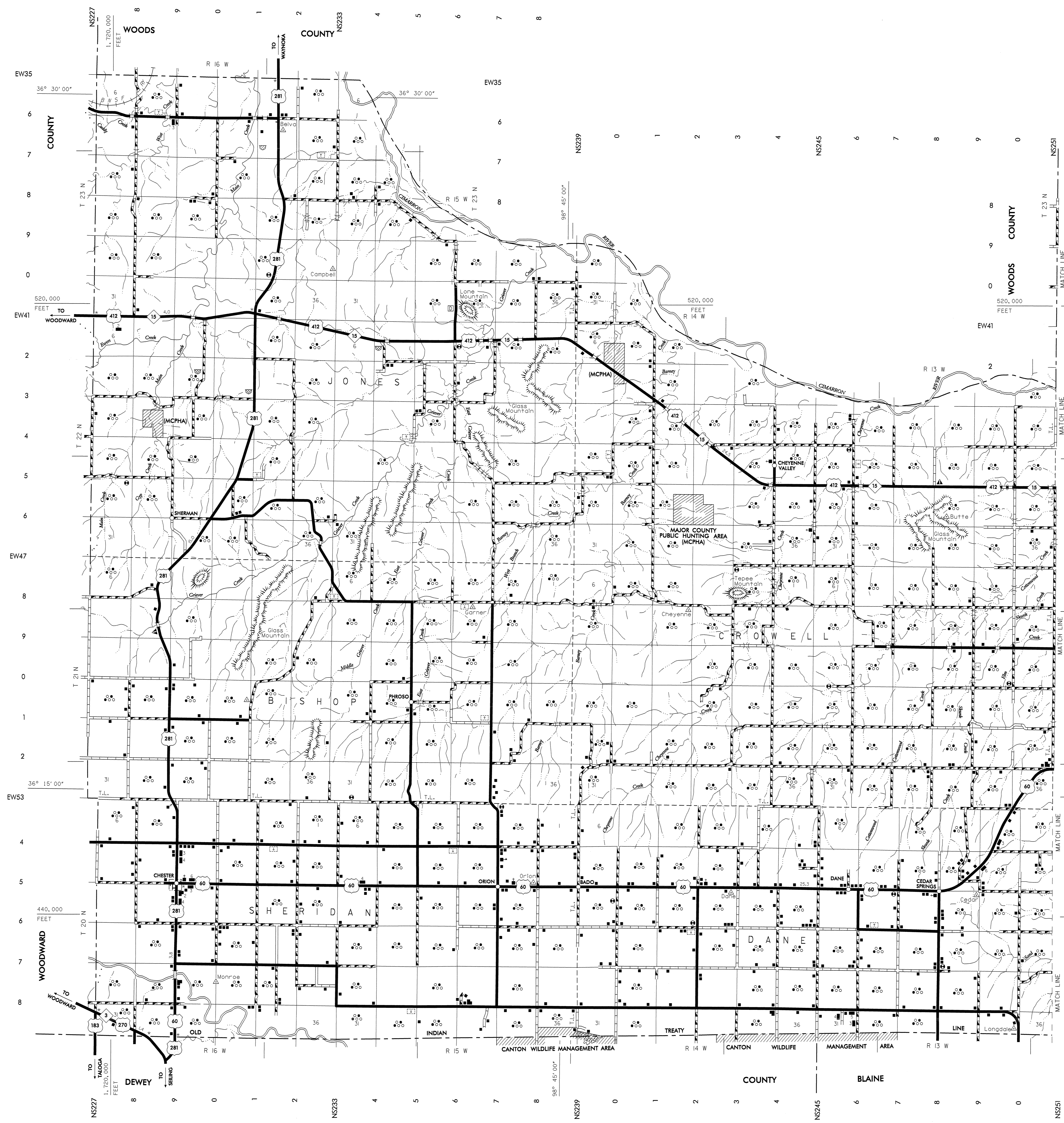


SHEET 1 OF 2 SHEETS

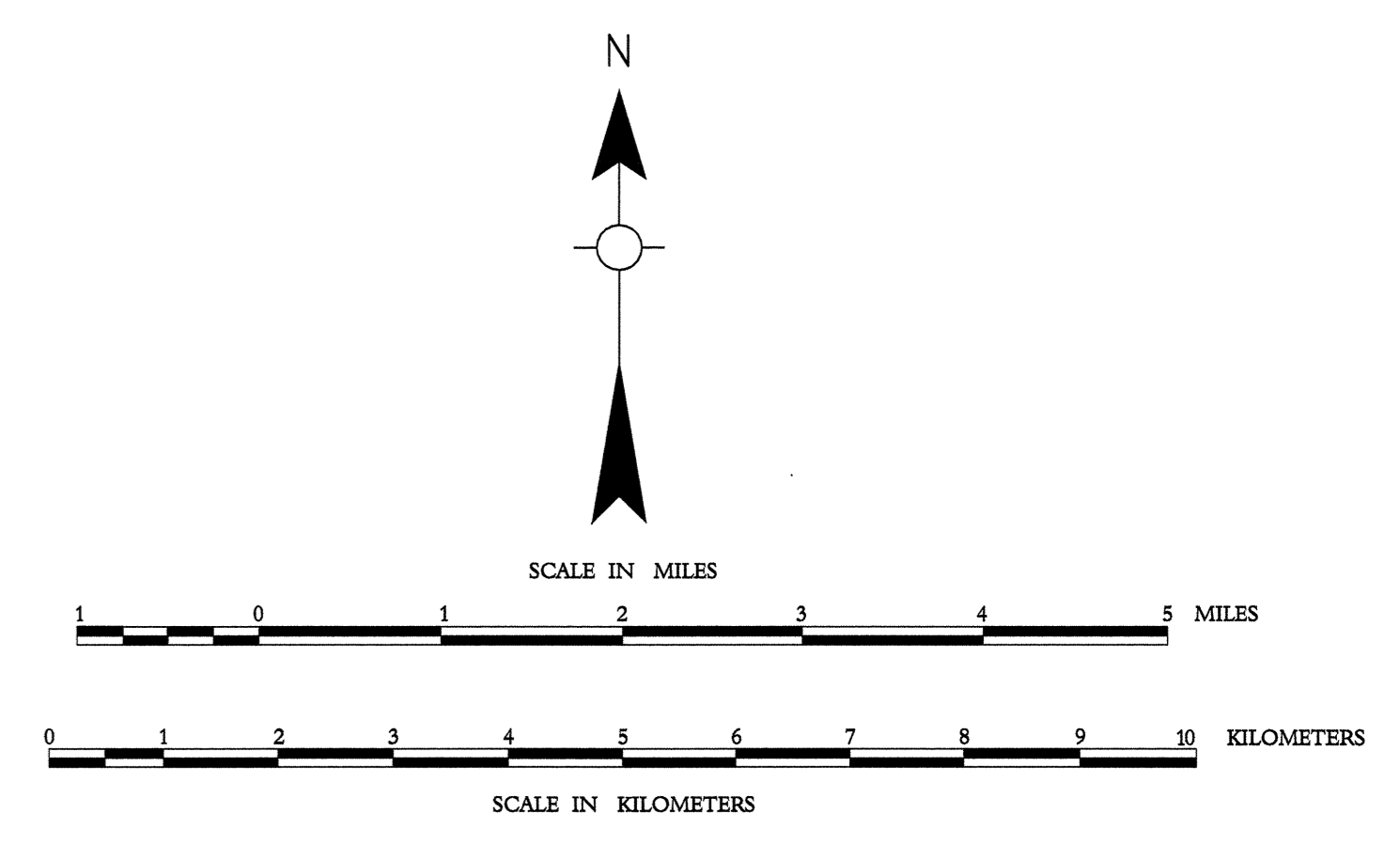
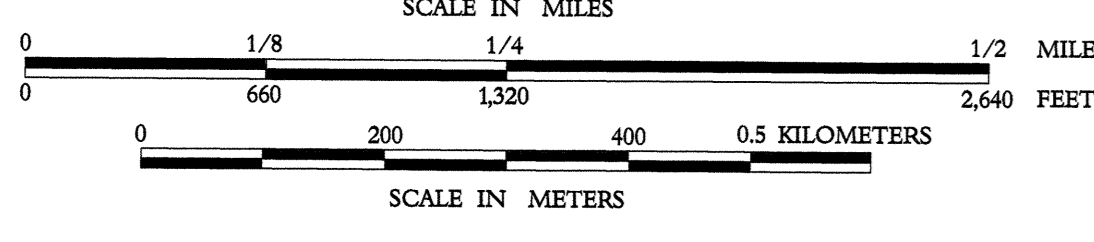
Copies of this map are available for public use at nominal cost. This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government.  
Address:  
OKLAHOMA DEPARTMENT OF TRANSPORTATION  
REPRODUCTION BRANCH Phone (405) 521-2386  
200 N.E. 21st STREET  
OKLAHOMA CITY, OKLAHOMA 73105-3204

LAMBERT CONFORMAL CONIC PROJECTION U.S. & GEODETIC SURVEY DATA  
20,000 FOOT GRID; OKLAHOMA PLANE COORDINATE SYSTEM, NORTH PROJECTION ZONE  
POPULATION FIGURES BASED ON 2000 U.S. CENSUS  
CO. POP. 7,545





CHESTER, OKLAHOMA  
 SEC. 5, 6, 7, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.



Copies of this map are available for public use at nominal cost. This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government.  
 Address: OKLAHOMA DEPARTMENT OF TRANSPORTATION  
 REPRODUCTION BRANCH Phone (405) 521-2586  
 200 N.E. 21st STREET  
 OKLAHOMA CITY, OKLAHOMA 73103-3204

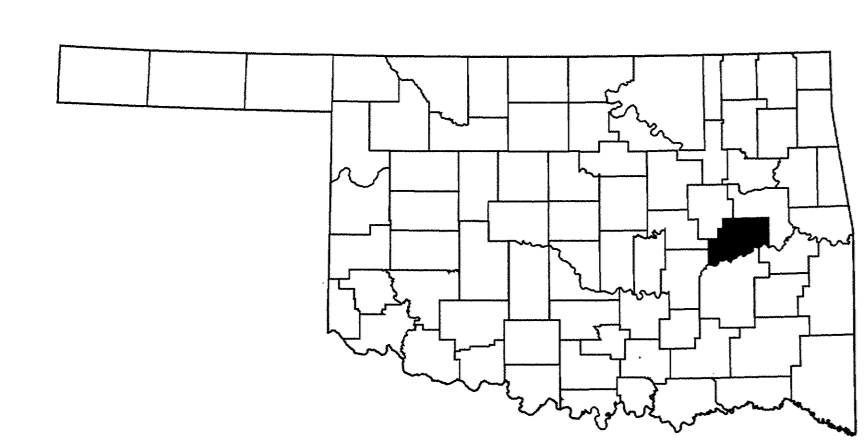
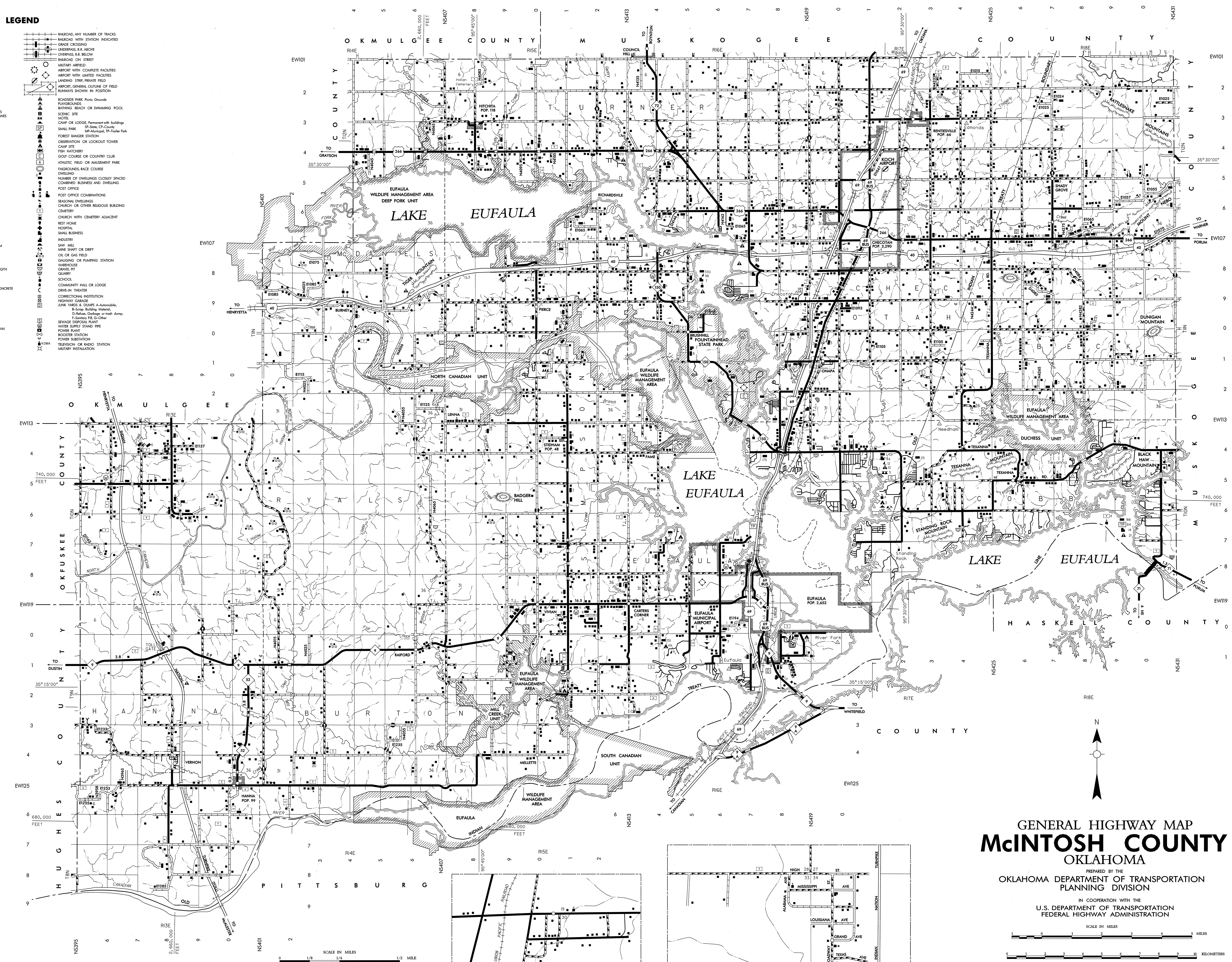
SHEET 2 OF 2 SHEETS

ALL RIGHTS RESERVED  
 COMPUTER GENERATED



LEGEND

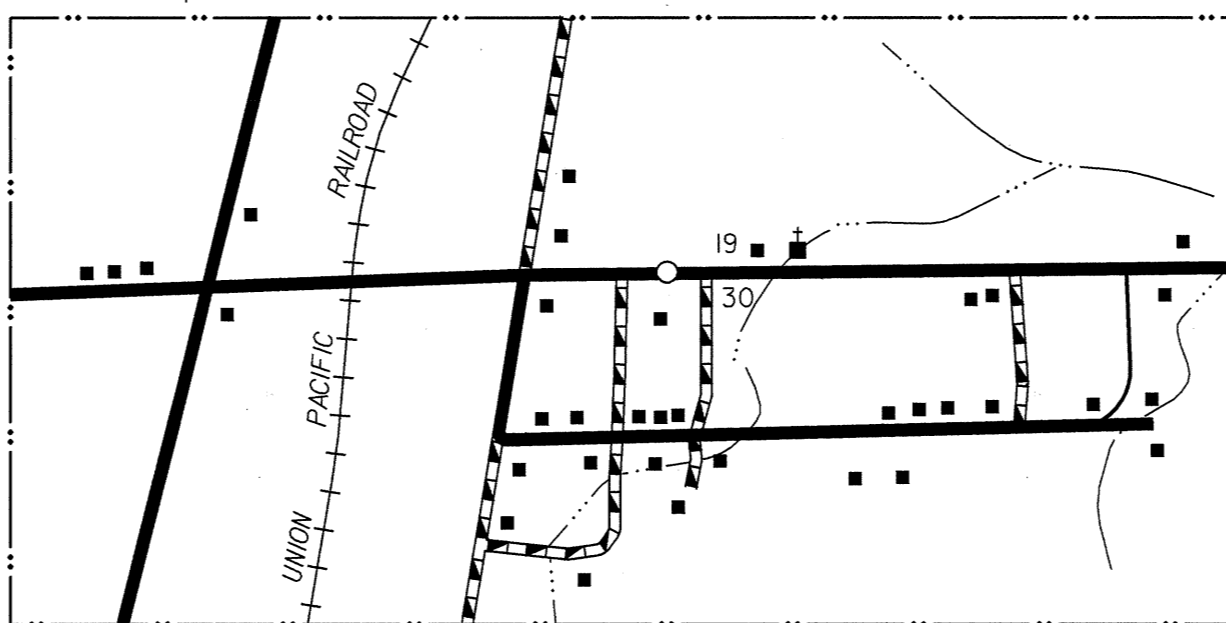
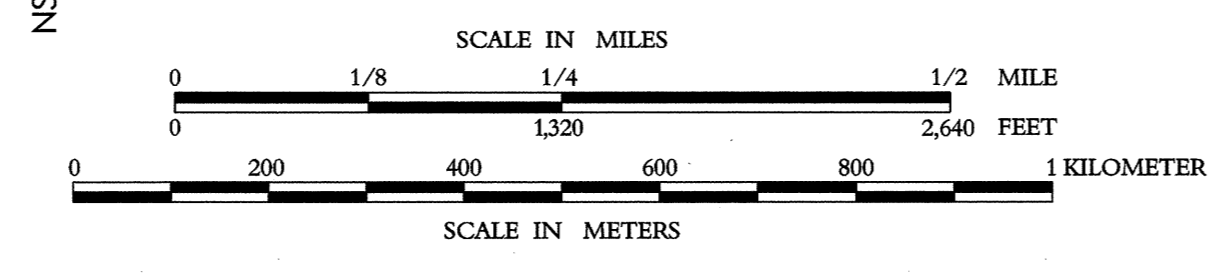
- RAILROAD, ANY NUMBER OF TRACKS
- RAILROAD WITH STATION INDICATED
- GRADE CROSSING
- UNDERPASS, R.R. ABOVE
- OVERPASS, R.R. BELOW
- RAILROAD ON STREET
- MILITARY AIRFIELD
- AIRPORT WITH COMPLETE FACILITIES
- AIRPORT WITH LIMITED FACILITIES
- LANDING STRIP, PRIVATE FIELD
- AIRPORT, GENERAL OUTLINE OF FIELD
- RAILROAD STATION, IN POSITION
- ROADSIDE PARK, Public Grounds
- PLAYGROUND
- BATHING BEACH OR SWIMMING POOL
- SCENIC SITE
- MOTEL
- CAMP OR LODGE, Permanent with buildings
- 3/4 Store, C of Groceries
- MP-Municipal, TP-Trailer Park
- FOREST KANGAROO STATION
- OBSERVATION OR LOOKOUT TOWER
- CAMP SITE
- FISH HATCHERY
- GOLF COURSE OR COUNTRY CLUB
- ATHLETIC FIELD OR AMUSEMENT PARK
- FACED GRADES, RACE COURSE
- DWELLINGS
- NUMBER OF DWELLINGS, CLOSELY SPACED
- COURTNEED BUSINESS AND DWELLING
- POST OFFICE
- POST OFFICE COMBINATIONS
- SEASONAL DWELLINGS
- CHURCH OR OTHER RELIGIOUS BUILDING
- CEMETERY
- CHURCH WITH CEMETERY ADJACENT
- BEST HOME
- HOSPITAL
- SHALE BUSINESS
- INDUSTRY
- SAW MILL
- MINE, SHIFT OR DRIFT
- OIL OR GAS FIELD
- GASOLINE OR PUMPING STATION
- WAREHOUSE
- QUARRY
- SCHOOL
- COMMUNITY HALL OR LODGE
- DAMS-IN THEATER
- CONVENTIONAL INSTITUTION
- HOVARIY GARAGE
- JUNK YARDS & DUMPS A-Automobile, B-School Building, Millinery, C-Factory, D-Other
- SEWAGE DISPOSAL PLANT
- WATER SUPPLY STAND PIPE
- POWER PLANT
- ROCKET STATION
- POWER SUBSTATION
- TELEVISION OR RADIO STATION
- MILITARY INSTALLATION



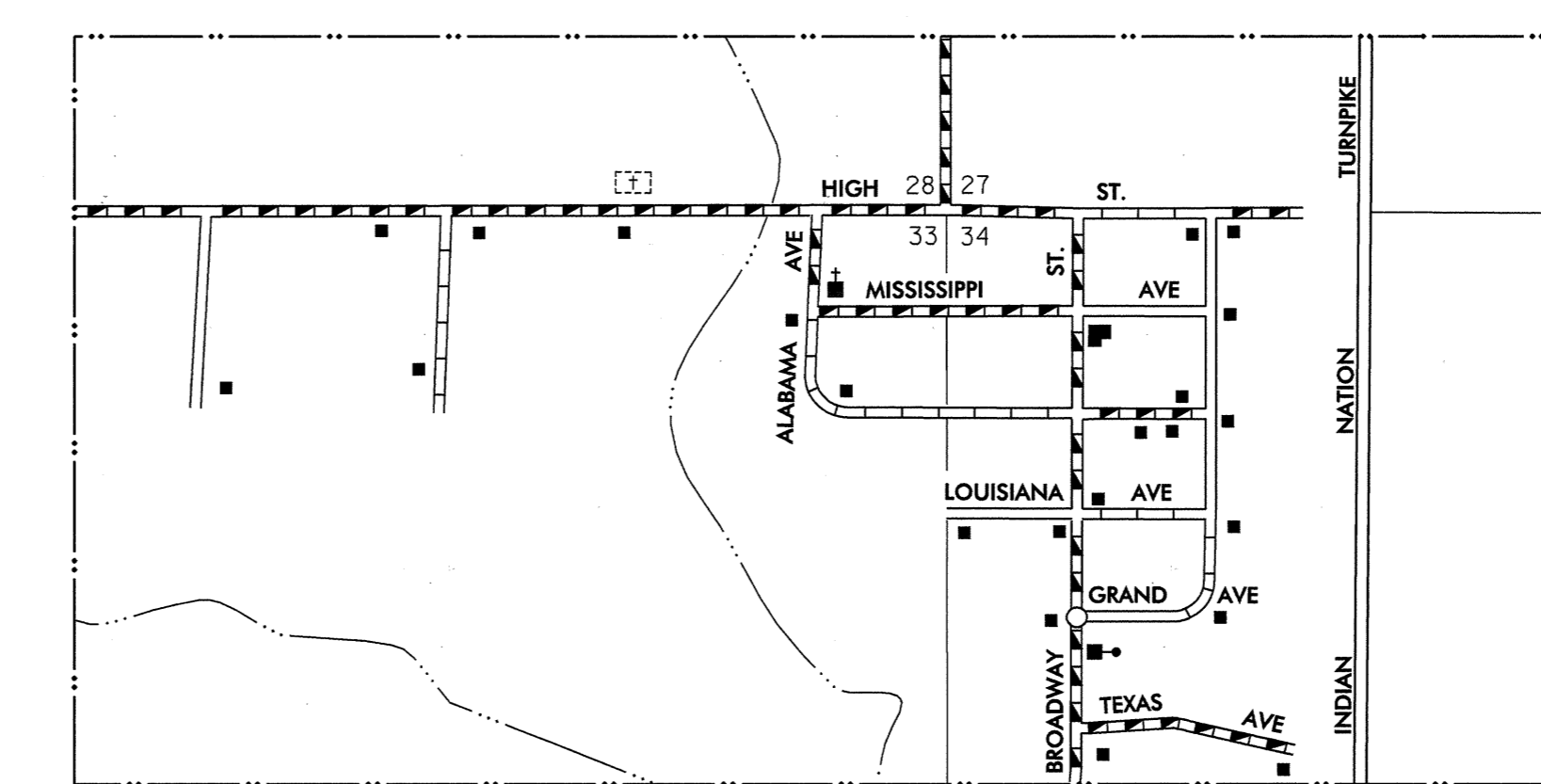
ALL DATA CURRENT TO DATE OF INVENTORY NOVEMBER 1999  
 ORIGINAL DRAFTING BY ALLR MAY 2000  
 STATE SYSTEM REVISED TO NOVEMBER 1999

Copies of this map are available for public use at nominal cost.  
 Address: OKLAHOMA DEPARTMENT OF TRANSPORTATION  
 REPRODUCTION BRANCH Phone (405) 521-2586  
 500 N.E. 21st STREET  
 OKLAHOMA CITY, OKLAHOMA 73105-3204

This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government.



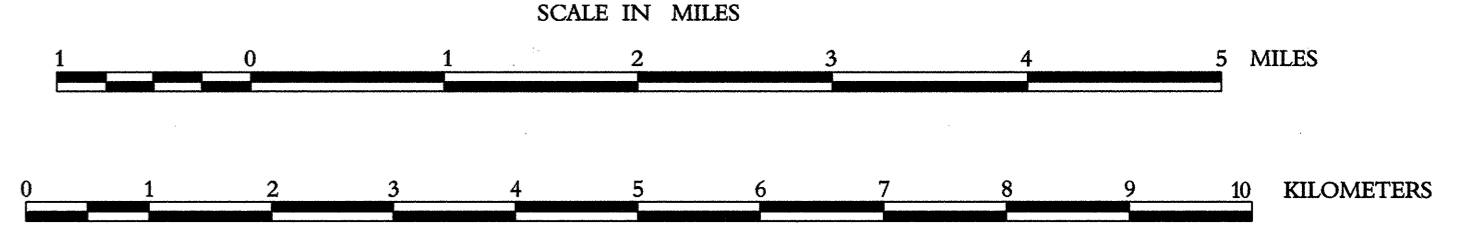
Ocala, Oklahoma  
 SEC. 19, 30, T11N, R17E



Vernon, Oklahoma  
 SEC. 33, 34, T19 N, R13E

GENERAL HIGHWAY MAP  
**McINTOSH COUNTY**  
 OKLAHOMA

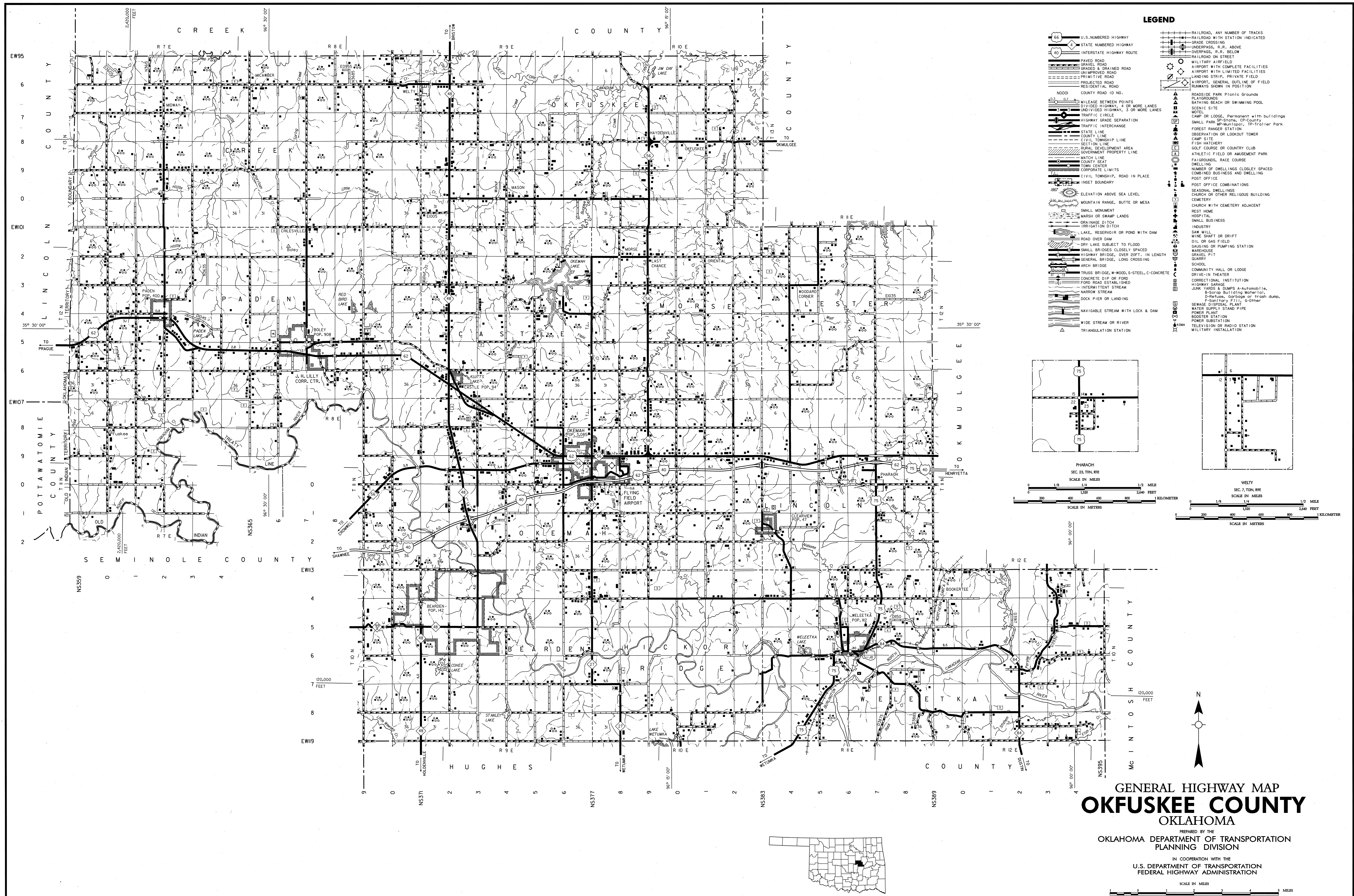
PREPARED BY THE  
 OKLAHOMA DEPARTMENT OF TRANSPORTATION  
 PLANNING DIVISION  
 IN COOPERATION WITH THE  
 U.S. DEPARTMENT OF TRANSPORTATION  
 FEDERAL HIGHWAY ADMINISTRATION



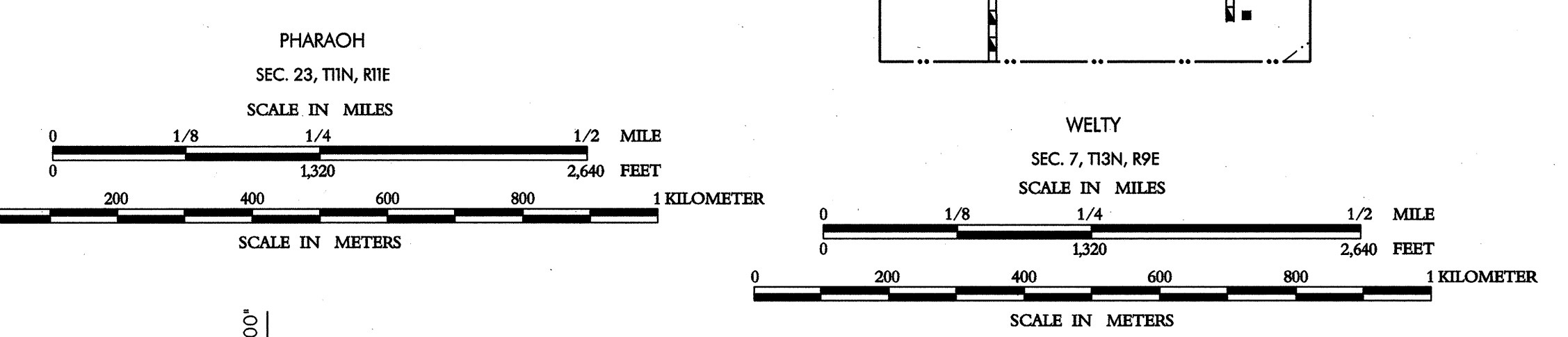
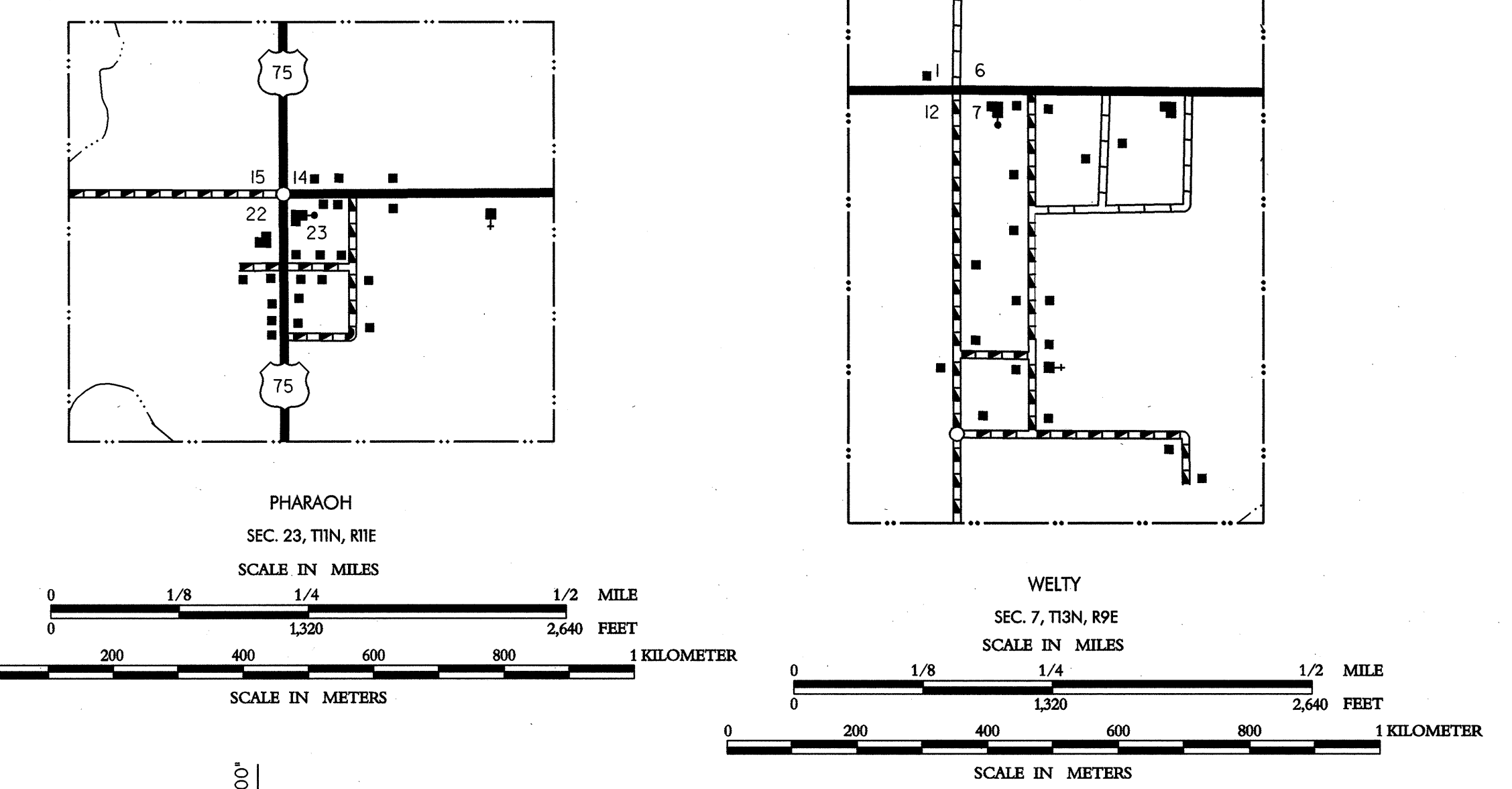
LAMBERT CONFORMAL CONIC PROJECTION U.S. & GEODETIC SURVEY DATA  
 20,000 FOOT GRID, OKLAHOMA PLANE COORDINATE SYSTEM, NORTH PROJECTION ZONE.  
 POPULATION FIGURES BASED ON 1990 U.S. CENSUS.  
 CO. POP. 16,779

NOT FOR RESALE



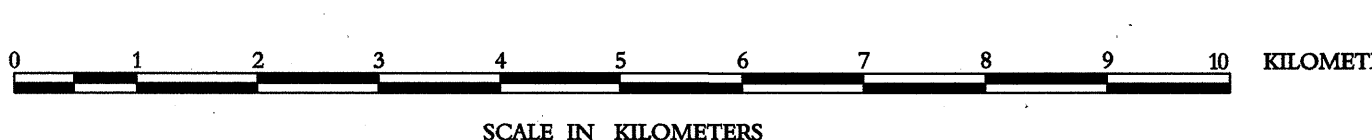
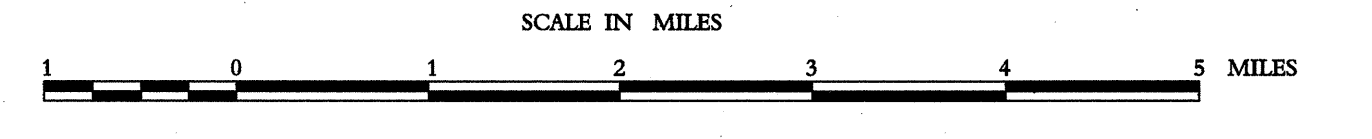


- LEGEND**
- U.S. NUMBERED HIGHWAY
  - STATE NUMBERED HIGHWAY
  - INTERSTATE HIGHWAY ROUTE
  - PAVED ROAD
  - GRAVEL ROAD
  - GRASS & DRAINED ROAD
  - UNIMPROVED ROAD
  - PRIMITIVE ROAD
  - PROJECTED ROAD
  - RESIDENTIAL ROAD
  - NOODI COUNTY ROAD ID NO.
  - MILEAGE BETWEEN POINTS
  - DIVIDED HIGHWAY, 4 OR MORE LANES
  - UNDIVIDED HIGHWAY, 3 OR MORE LANES
  - TRAFFIC CIRCLE
  - HIGHWAY GRADE SEPARATION
  - TRAFFIC INTERCHANGE
  - STATE LINE
  - CIVIL TOWNSHIP LINE
  - SECTION LINE
  - RURAL DEVELOPMENT AREA
  - GOVERNMENT PROPERTY LINE
  - MATCH LINE
  - COUNTY SEAT
  - TOWN CENTER
  - CORPORATE LIMITS
  - CIVIL TOWNSHIP, ROAD IN PLACE
  - INSET BOUNDARY
  - ELEVATION ABOVE SEA LEVEL
  - MOUNTAIN RANGE, BUTTE OR MESA
  - SMALL MONUMENT
  - MARSH OR SWAMP LANDS
  - IRRIGATION DITCH
  - LAKE, RESERVOIR OR POND WITH DAM
  - ROAD OVER DAM
  - DRY LAKE SUBJECT TO FLOOD
  - SMALL BRIDGES CLOSELY SPACED
  - HIGHWAY BRIDGE, OVER 20FT., IN LENGTH
  - GENERAL BRIDGE, LONG CROSSING
  - ARCH BRIDGE
  - TRUSS BRIDGE, W-WOOD, S-STEEL, C-CONCRETE
  - CONCRETE DIP OR FORD
  - FORD ROAD ESTABLISHED
  - INTERMITTENT STREAM
  - NARROW STREAM
  - DOCK PIER OR LANDING
  - NAVIGABLE STREAM WITH LOCK & DAM
  - WIDE STREAM OR RIVER
  - TRIANGULATION STATION
  - RAILROAD, ANY NUMBER OF TRACKS
  - RAILROAD WITH STATION INDICATED
  - GRADE CROSSING
  - UNDERPASS, R.R. ABOVE
  - OVERPASS, R.R. BELOW
  - RAILROAD ON STREET
  - MILITARY AIRFIELD
  - AIRPORT WITH COMPLETE FACILITIES
  - AIRPORT WITH LIMITED FACILITIES
  - LANDING STRIP, PRIVATE FIELD
  - AIRPORT, GENERAL OUTLINE OF FIELD
  - RUNWAYS SHOWN IN POSITION
  - ROADSIDE PARK Picnic Grounds
  - PLAYGROUNDS
  - BATHING BEACH OR SWIMMING POOL
  - SCENIC SITE
  - MOTEL
  - CAMP OR LODGE, Permanent with buildings
  - SMALL PARK, SP-System, CP-County
  - MP-Multiplot, TP-Trolley Park
  - FOREST RANGER STATION
  - OBSERVATION OR LOOKOUT TOWER
  - CAMP SITE
  - FISH HATCHERY
  - GOLF COURSE OR COUNTRY CLUB
  - ATHLETIC FIELD OR AMUSEMENT PARK
  - FAIRGROUNDS, RACE COURSE
  - DWELLING
  - NUMBER OF DWELLINGS CLOSELY SPACED
  - COMBINED BUSINESS AND DWELLING
  - POST OFFICE
  - POST OFFICE COMBINATIONS
  - SEASONAL DWELLINGS
  - CHURCH OR OTHER RELIGIOUS BUILDING
  - CEMETERY
  - CHURCH WITH CEMETERY ADJACENT
  - REST HOME
  - HOSPITAL
  - SMALL BUSINESS
  - INDUSTRY
  - SAW MILL
  - MINE SHAFT OR DRIFT
  - OIL OR GAS FIELD
  - GALUING OR PUMPING STATION
  - WAREHOUSE
  - GRAVEL PIT
  - QUARRY
  - SCHOOL
  - COMMUNITY HALL OR LODGE
  - DRIVE-IN THEATER
  - CORRECTIONAL INSTITUTION
  - HIGHWAY GARAGE
  - JUNK YARDS & DUMPS A-Automobile, B-Scrap Building Material, C-Refuse, Garbage or Trash dump, G-Other
  - Sanitary P-Fill, G-Other
  - WATER SUPPLY STAND PIPE
  - POWER PLANT
  - BOOSTER STATION
  - POWER SUBSTATION
  - TELEVISION OR RADIO STATION
  - MILITARY INSTALLATION



**GENERAL HIGHWAY MAP  
OKFUSKEE COUNTY  
OKLAHOMA**

PREPARED BY THE  
OKLAHOMA DEPARTMENT OF TRANSPORTATION  
PLANNING DIVISION  
IN COOPERATION WITH THE  
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION



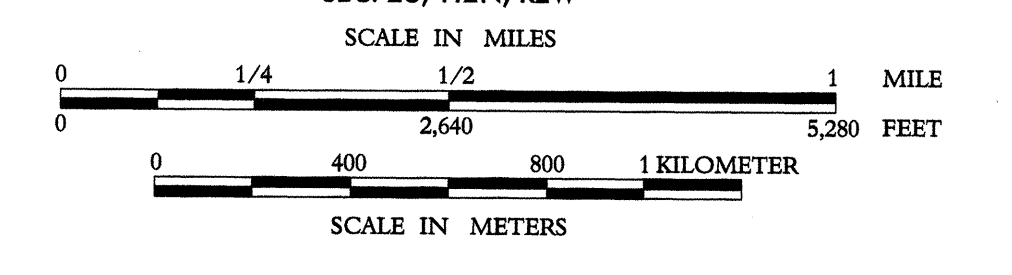
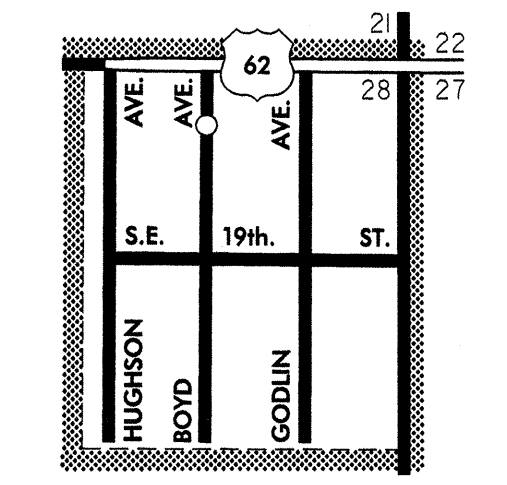
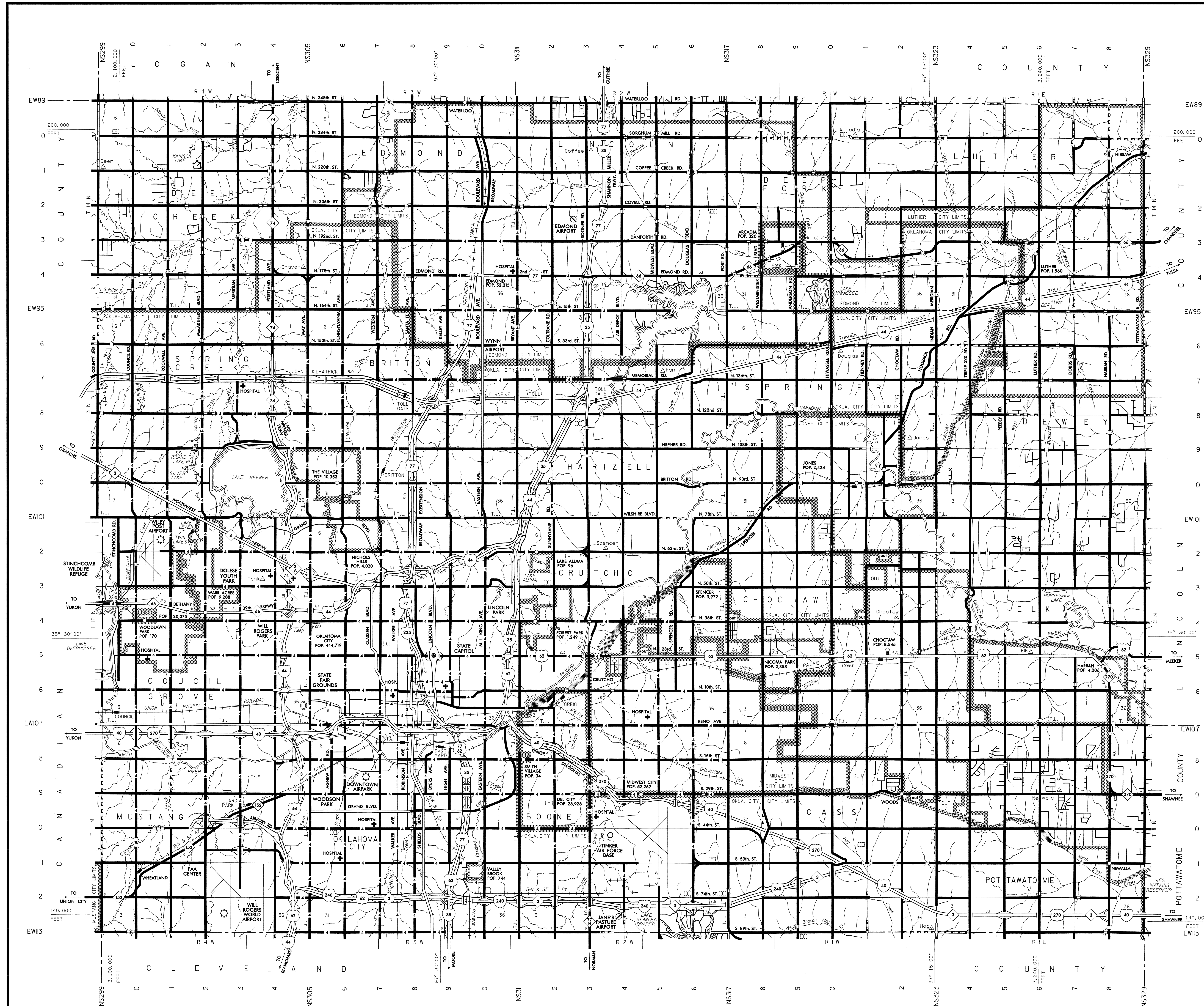
ALL DATA CURRENT TO  
DATE OF PRINTING  
NOV 1990  
ORIGINAL DRAFTING BY R.G.A. JULY 1995  
STATE SYSTEM REVISED TO JAN 1997

LAMBERT CONFORMAL CONIC PROJECTION U.S. & GEODETIC SURVEY DATA  
20,000 FOOT GRID, OKLAHOMA PLANE COORDINATE SYSTEM NORTH PROJECTION ZONE.  
POPULATION FIGURES BASED ON 1990 U.S. CENSUS  
CO. POP. 11,551

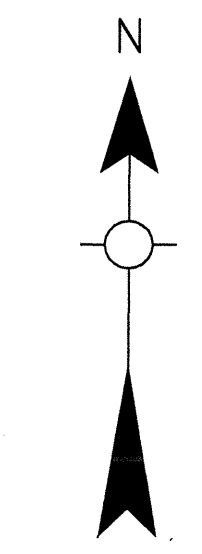
Copies of this map are available for public use at nominal cost. This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government.  
Address:  
OKLAHOMA DEPARTMENT OF TRANSPORTATION  
REPRODUCTION BRANCH Phone (405) 521-2586  
200 N.E. 21st STREET  
OKLAHOMA CITY, OKLAHOMA 73105-3204

NOT FOR RESALE





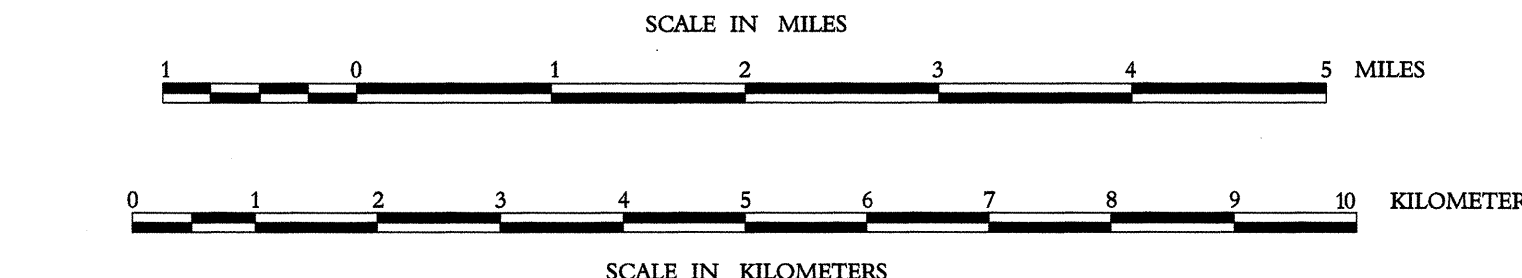
- LEGEND**
- 66 U.S. NUMBERED HIGHWAY
  - STATE NUMBERED HIGHWAY
  - INTERSTATE HIGHWAY ROUTE
  - PAVED ROAD
  - GRAVEL ROAD
  - GRADE & GRADED ROAD
  - UNPAVED ROAD
  - PRIVATE ROAD
  - PROJECTED ROAD
  - RESIDENTIAL ROAD
  - COUNTY ROAD ID. NO.
  - WEDGE BETWEEN POINTS
  - DIVIDE BETWEEN 4 OR MORE LANES
  - UNDIVIDED HIGHWAY, 3 OR MORE LANES
  - HIGHWAY GRADE SEPARATION
  - TRAFFIC INTERCHANGE
  - COUNTY LINE
  - CITY TOWNSHIP LINE
  - SECTION LINE
  - RURAL DEVELOPMENT AREA
  - GOVERNMENT PROPERTY LINE
  - MATCH LINE
  - COASTAL SEAT
  - TOWN CENTER
  - CORPORATE LIMITS
  - CIVIL TOWNSHIP, ROAD IN PLACE
  - INSURANCE BOUNDARY
  - ELEVATION ABOVE SEA LEVEL
  - ACQUITTAY RANGE, BUTTE OR MESA
  - SMALL MOUNTAIN
  - MARSH OR SWAMP LANDS
  - DRAINAGE DITCH
  - IRREGULAR DITCH
  - LAKE, RESERVOIR OR POND WITH DAM
  - ROAD OVER DAM
  - DRY LAKE SUBJECT TO FLOOD
  - SMALL BRIDGE, CLOSELY SPACED
  - HIGHWAY BRIDGE OVER RIFT IN LENGTH
  - GENERAL BRIDGE, LONG CROSSING
  - ARCH BRIDGE
  - TRUSS BRIDGE, WOODS-STEEL-CONCRETE
  - CONCRETE OR IR FOR
  - POND ROAD ESTABLISH
  - INTRINSIC STREAM
  - NARROW STREAM
  - DOCK PIER OR LANDING
  - NAVIGABLE STREAM WITH LOCK & DAM
  - WIDE STREAM OR RIVER
  - TRANSLATION STATION
  - RAILROAD, ANY NUMBER OF TRACKS
  - RAILROAD WITH STATION INDICATED
  - GRADE CROSSING
  - UNDERPASS, R.R. ABOVE
  - CROSSING, R.R. BELOW
  - RAILROAD ON STREET
  - MILITARY AIRFIELD
  - AIRPORT WITH COMPLETE FACILITIES
  - AIRPORT WITH LIMITED FACILITIES
  - LANDING STRIP, PRIVATE FIELD
  - AIRPORT, GENERAL OUTLINE OF FIELD
  - RUNWAYS SHOWN IN POSITION
  - ROADSIDE PARK
  - PARKING AREAS
  - BATHING BEACH OR SWIMMING POOL
  - SCENIC SITE
  - NOTE
  - CAMP OR LODGE, Permanent with buildings
  - SMALL PARK
  - FOREST RANGER STATION
  - OBSERVATION OR LOOKOUT TOWER
  - CAMP SITE
  - FISH HATCHERY
  - GOLF COURSE OR COUNTRY CLUB
  - ATHLETIC FIELD OR AMUSEMENT PARK
  - PARKING, RACE COURSE
  - NUMBER OF DWELLINGS, CLOSELY SPACED
  - COMBINED BUSINESS AND DWELLING
  - POST OFFICE
  - POST OFFICE COMBINATIONS
  - SEASONAL DWELLINGS
  - CHURCH OR OTHER RELIGIOUS BUILDING
  - CEMETERY
  - CHURCH WITH CEMETERY ADJACENT
  - REST HOME
  - HOSPITAL
  - SMALL BUSINESS
  - INDUSTRY
  - SAW MILL
  - MINE SHAFT OR DRIFT
  - OIL OR GAS FIELD
  - CRACKING, OR PULPING STATION
  - WAREHOUSE
  - GRAVEL PIT
  - QUARRY
  - SCHOOLS
  - COMMUNITY HALL OR LODGE
  - DRIVE-IN THEATER
  - CORRECTIONAL INSTITUTION
  - HIGHWAY GRADE
  - JUNK YARDS & DUMPS A-Automobiles, B-Building, C-Construction, D-Railroad, E-Excavation or trash dump, F-Furniture, G-Gasoline
  - SEWAGE DISPOSAL PLANT
  - WATER SUPPLY STAND PIPE
  - POWER PLANT
  - BOOSTER STATION
  - POWER SUBSTATION
  - TELEVISION OR RADIO STATION
  - MILITARY INSTALLATION



**GENERAL HIGHWAY MAP  
OKLAHOMA COUNTY  
OKLAHOMA**

PREPARED BY THE  
**OKLAHOMA DEPARTMENT OF TRANSPORTATION  
PLANNING DIVISION**

IN COOPERATION WITH THE  
**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION**

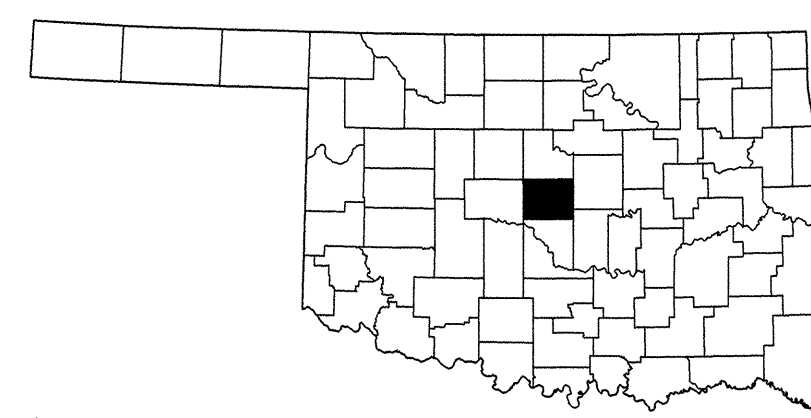


LAMBERT CONFORMAL CONIC PROJECTION U.S. & GEODETIC SURVEY DATA  
20,000 FOOT GRID; OKLAHOMA PLANE COORDINATE SYSTEM NORTH PROJECTION ZONE  
POPULATION FIGURES BASED ON 1990 U.S. CENSUS  
CO. POP. 599,611

ALL RIGHTS RESERVED COMPUTER GENERATED

OKLAHOMA CITY POP. 444,719  
IN OKLAHOMA CO. POP. 391,137  
IN CANADIAN CO. POP. 18,716  
IN CLEVELAND CO. POP. 17,295  
IN MCCLAIN CO. POP. 109  
IN POTTAWATOMIE CO. POP. 64

ALL DATA CURRENT TO  
DATE OF INVENTORY  
JANUARY 1995  
ORIGINAL DRAFTING BY W.A.T. APRIL 1999  
STATE SYSTEM REVISED TO APRIL 1999

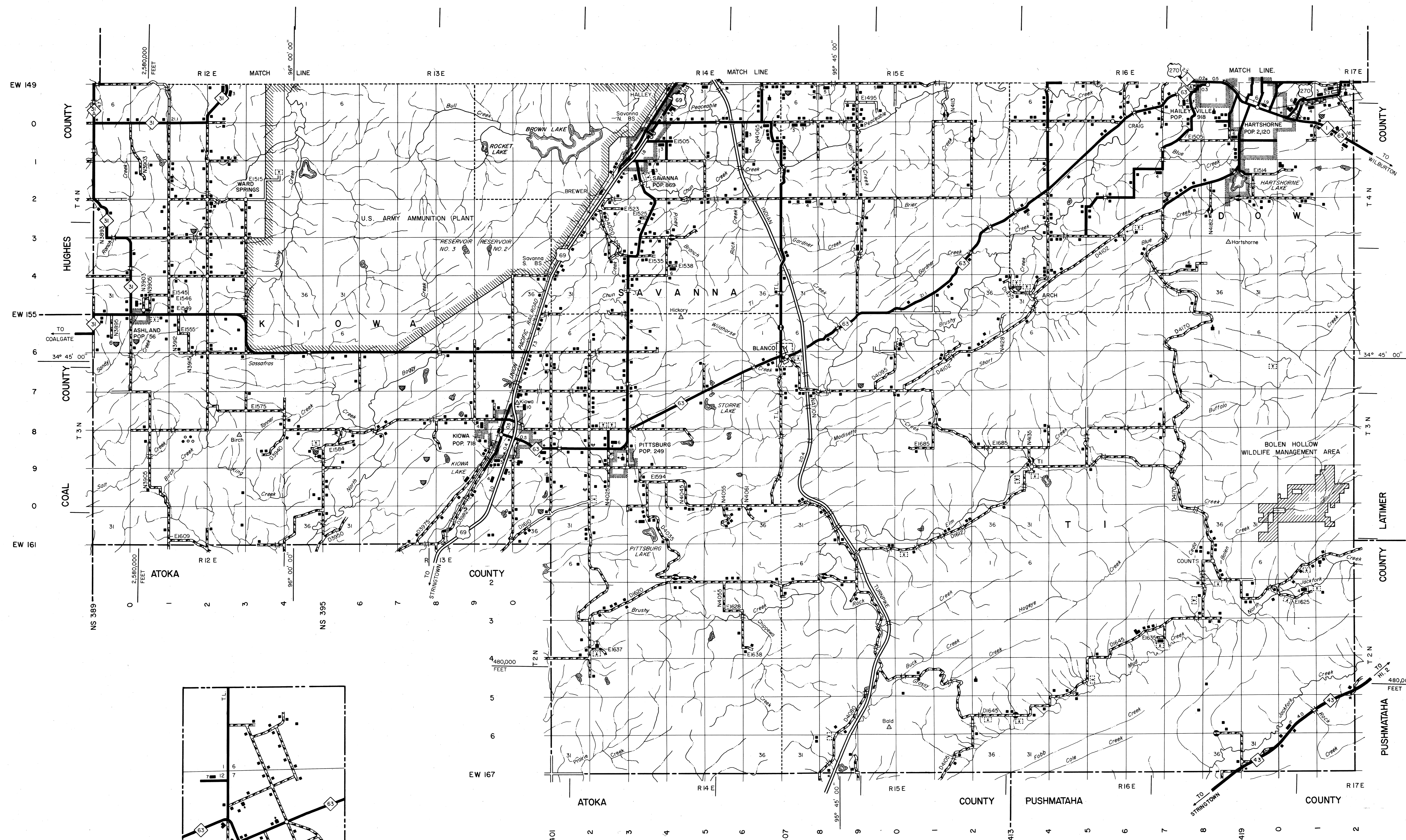


Copies of this map are available for public use at nominal cost.  
Address:  
OKLAHOMA DEPARTMENT OF TRANSPORTATION  
REPRODUCTION BRANCH Phone (405) 521-2586  
200 N.E. 21st STREET  
OKLAHOMA CITY, OKLAHOMA 73105-3204

This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government.

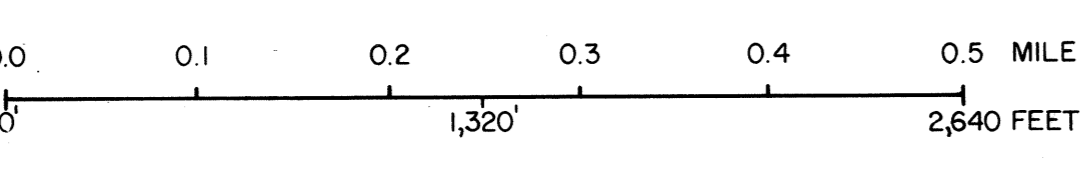
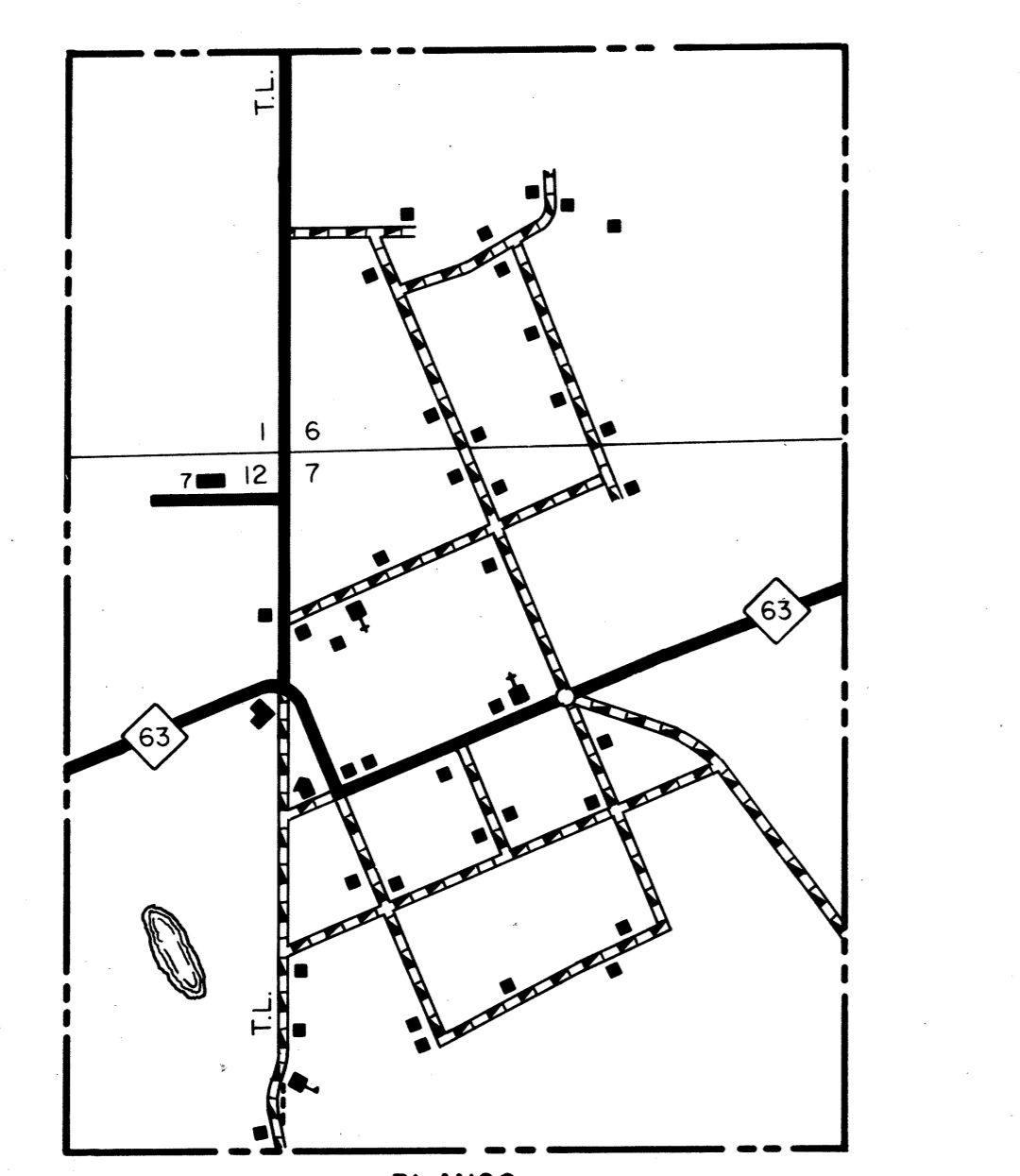
NOT FOR RESALE



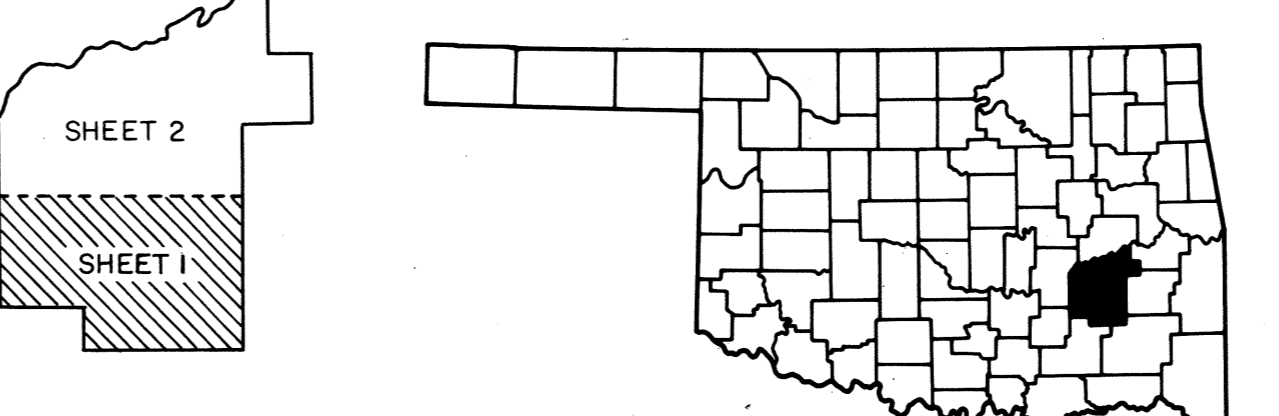


**LEGEND**

|  |   |  |  |
|--|---|--|--|
|  | U.S. NUMBERED HIGHWAY                         |  | RAILROAD WITH STATIONS INDICATED           |
|  | STATE NUMBERED HIGHWAY                        |  | GRADE CROSSING                             |
|  | INTERSTATE HIGHWAY ROUTE                      |  | OVERPASS R.R. ABOVE                        |
|  | PAVED ROAD                                    |  | OVERPASS R.R. BELOW                        |
|  | GRADED AND DRAINED ROAD                       |  | RAILROAD ON STREET                         |
|  | UNIMPROVED ROAD                               |  | MILITARY AIRFIELD                          |
|  | PRIMITIVE ROAD                                |  | AIRPORT WITH COMPLETE FACILITIES           |
|  | PROJECTED ROAD                                |  | AIRPORT WITH LIMITED FACILITIES            |
|  | RESIDENTIAL ROAD                              |  | LANDING STRIP - PRIVATE FIELD              |
|  | COUNTY ROAD ID NO.                            |  | AIRPORT - GENERAL OUTLINE OF FIELD         |
|  | MILEAGE BETWEEN POINTS                        |  | RUNWAYS SHOWN IN POSITION                  |
|  | DIVIDED HIGHWAY, 4 OR MORE LANES              |  | ROADSIDE PARK Picnic Grounds               |
|  | UNDIVIDED HIGHWAY, 3 OR MORE LANES            |  | PLAYGROUNDS                                |
|  | TRAFFIC CIRCLE                                |  | BATHING BEACH OR SWIMMING POOL             |
|  | HIGHWAY GRADE SEPARATION                      |  | SCENIC SITE                                |
|  | TRAFFIC INTERCHANGE                           |  | MOTEL                                      |
|  | STATE LINE                                    |  | CAMP OR LODGE - Permanent With Buildings   |
|  | COUNTY LINE                                   |  | SMALL PARK - State, CP-County              |
|  | SECTION LINE                                  |  | SMALL PARK - MP-Municipal, TP-Trailer Park |
|  | CIVIL TOWNSHIP LINE                           |  | FOREST RANGER STATION                      |
|  | RURAL DEVELOPMENT AREA                        |  | OBSERVATION OR LOOKOUT TOWER               |
|  | GOVERNMENT PROPERTY LINE                      |  | CAMP SITE                                  |
|  | MATCH LINE                                    |  | FISH HATCHERY                              |
|  | COUNTY SEAT                                   |  | GOLF COURSE OR COUNTRY CLUB                |
|  | TOWN CENTER                                   |  | ATHLETIC FIELD OR AMUSEMENT PARK           |
|  | CORPORATE LIMITS                              |  | FAIRGROUNDS, RACE COURSE                   |
|  | CIVIL TOWNSHIP ROAD IN PLACE                  |  | DWELLING                                   |
|  | INSET BOUNDARY                                |  | NUMBER OF DWELLINGS CLOSELY SPACED         |
|  | ELEVATION ABOVE SEA LEVEL                     |  | COMBINED BUSINESS AND DWELLING             |
|  | MOUNTAIN RANGE, BUTTE OR MESA                 |  | POST OFFICE                                |
|  | SMALL MONUMENT                                |  | POST OFFICE COMBINATIONS                   |
|  | MARSH OR SWAMP LANDS                          |  | SEASONAL DWELLINGS                         |
|  | DRAINAGE DITCH                                |  | CHURCH OR OTHER RELIGIOUS BUILDING         |
|  | IRRIGATION DITCH                              |  | CEMETERY                                   |
|  | LAKE, RESERVOIR OR POND WITH DAM              |  | CHURCH WITH CEMETERY ADJACENT              |
|  | ROAD OVER DAM                                 |  | REST HOME                                  |
|  | DRY LAKE SUBJECT TO FLOOD                     |  | HOSPITAL                                   |
|  | SMALL BRIDGES CLOSELY SPACED                  |  | SMALL BUSINESS                             |
|  | HIGHWAY BRIDGE OVER 20 FT. IN LENGTH          |  | INDUSTRY                                   |
|  | GENERAL BRIDGE - LONG CROSSING                |  | SAW MILL                                   |
|  | ARCH BRIDGE                                   |  | MINESHAFT OR DRIFT                         |
|  | TRUSS BRIDGE - W. Wood, S. Steel, C. Concrete |  | OIL OR GAS FIELD                           |
|  | CONCRETE DIP OR FORD                          |  | GAUGING OR PUMPING STATION                 |
|  | FORD ROAD ESTABLISHED                         |  | WAREHOUSE                                  |
|  | INTERMITTENT STREAM                           |  | GRAVEL PIT                                 |
|  | NARROW STREAM                                 |  | QUARRY                                     |
|  | DOCK PIER OR LANDING                          |  | SCHOOL                                     |
|  | NAVIGABLE STREAM WITH LOCK AND DAM            |  | COMMUNITY HALL OR LODGE                    |
|  | WIDE STREAM OR RIVER                          |  | DRIVE-IN THEATER                           |
|  | TRIANGULATION STATION                         |  | CORRECTIONAL INSTITUTION                   |
|  |   |  | HIGHWAY GARAGE                             |
|  |   |  | JUNK YARDS & DUMPS - Automobiles           |
|  |   |  | SEWAGE DISPOSAL PLANT                      |
|  |   |  | WATER SUPPLY STAND PIPE                    |
|  |   |  | POWER PLANT                                |
|  |   |  | BOOSTER STATION                            |
|  |   |  | POWER SUBSTATION                           |
|  |   |  | TELEVISION OR RADIO STATION                |
|  |   |  | MILITARY INSTALLATION                      |



ALL DATA CURRENT TO DATE OF INVENTORY JAN. 1987  
 ORIGINAL DRAFTING BY W.T. SEPT 1987  
 STATE SYSTEM REVISED TO JAN. 1993



# GENERAL HIGHWAY MAP PITTSBURG COUNTY OKLAHOMA

PREPARED BY THE  
**OKLAHOMA DEPARTMENT OF TRANSPORTATION  
 PLANNING DIVISION**

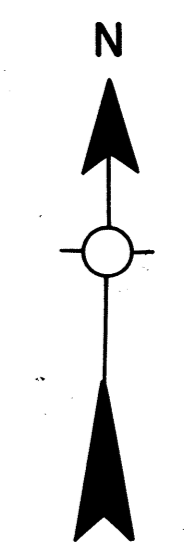
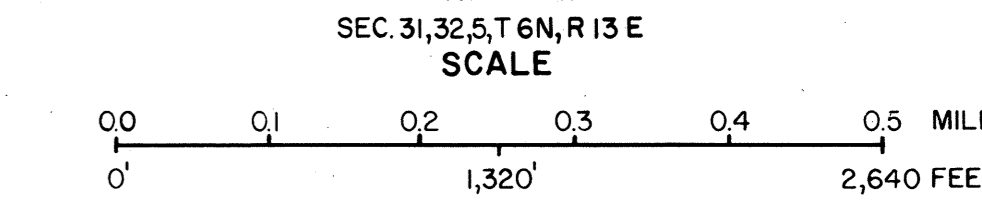
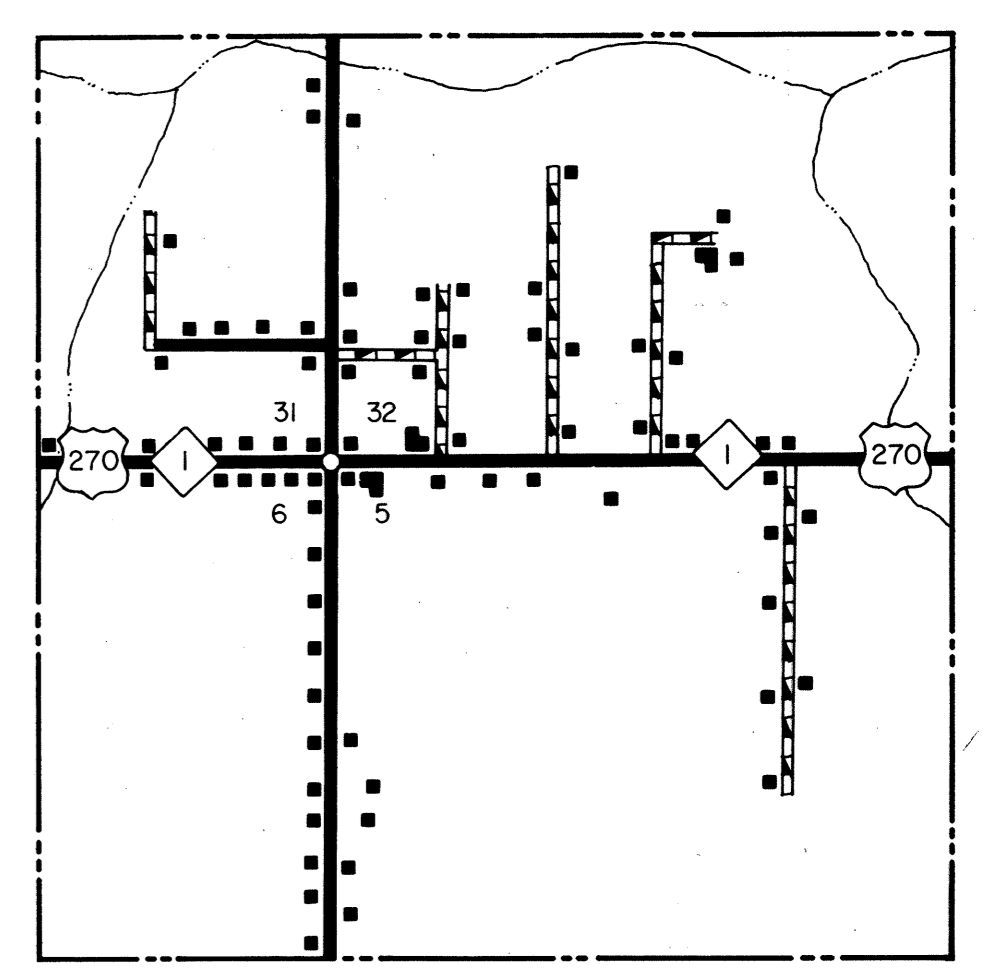
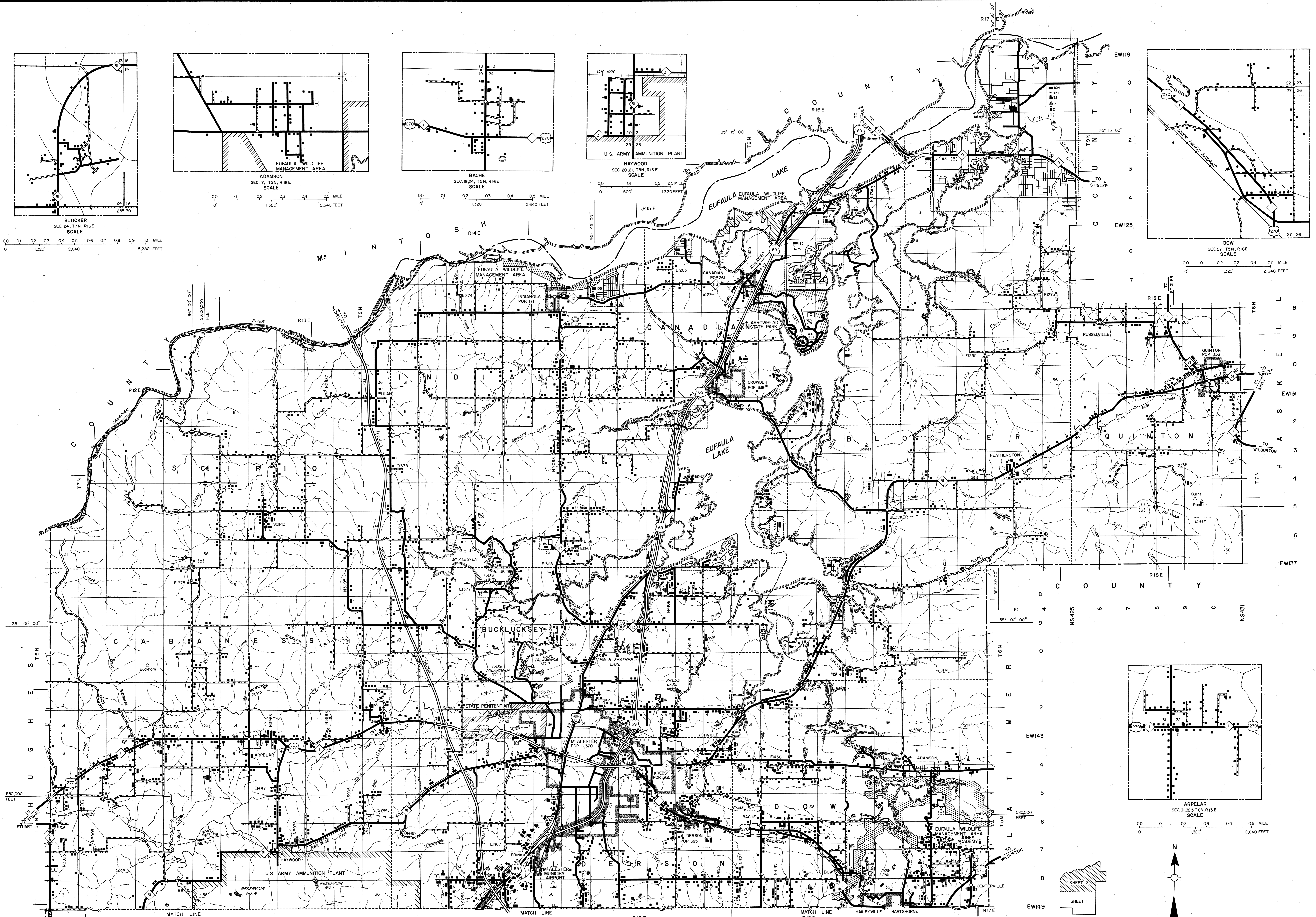
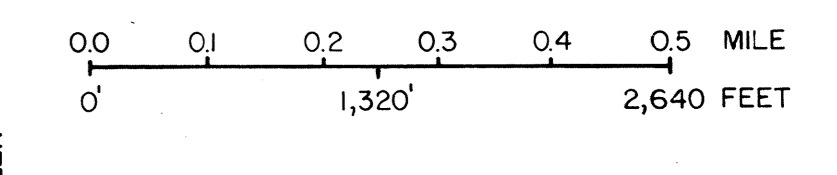
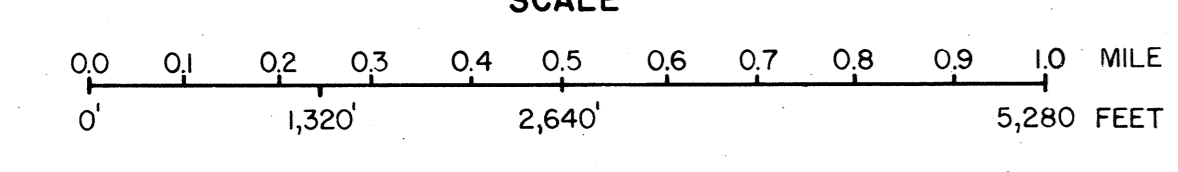
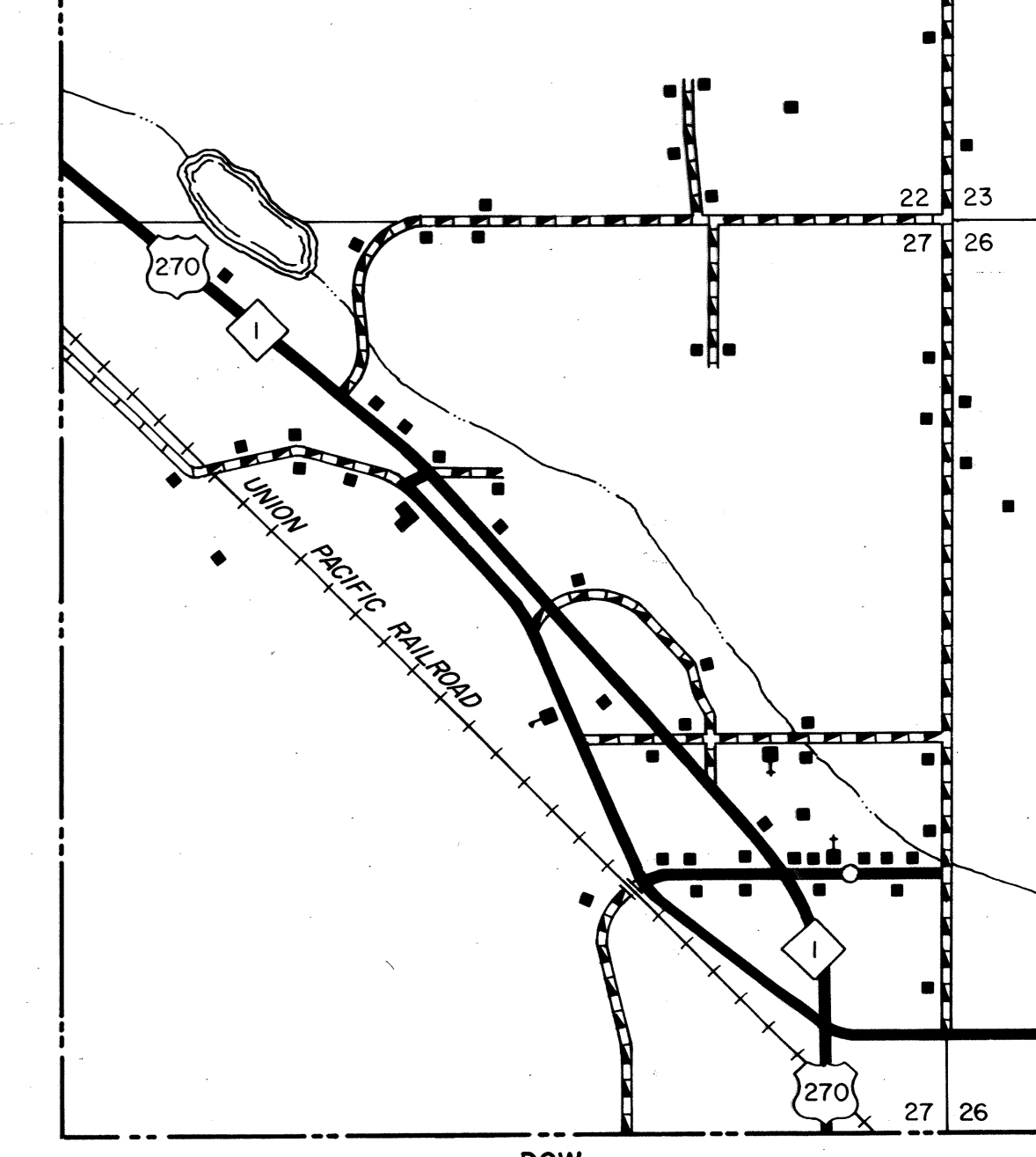
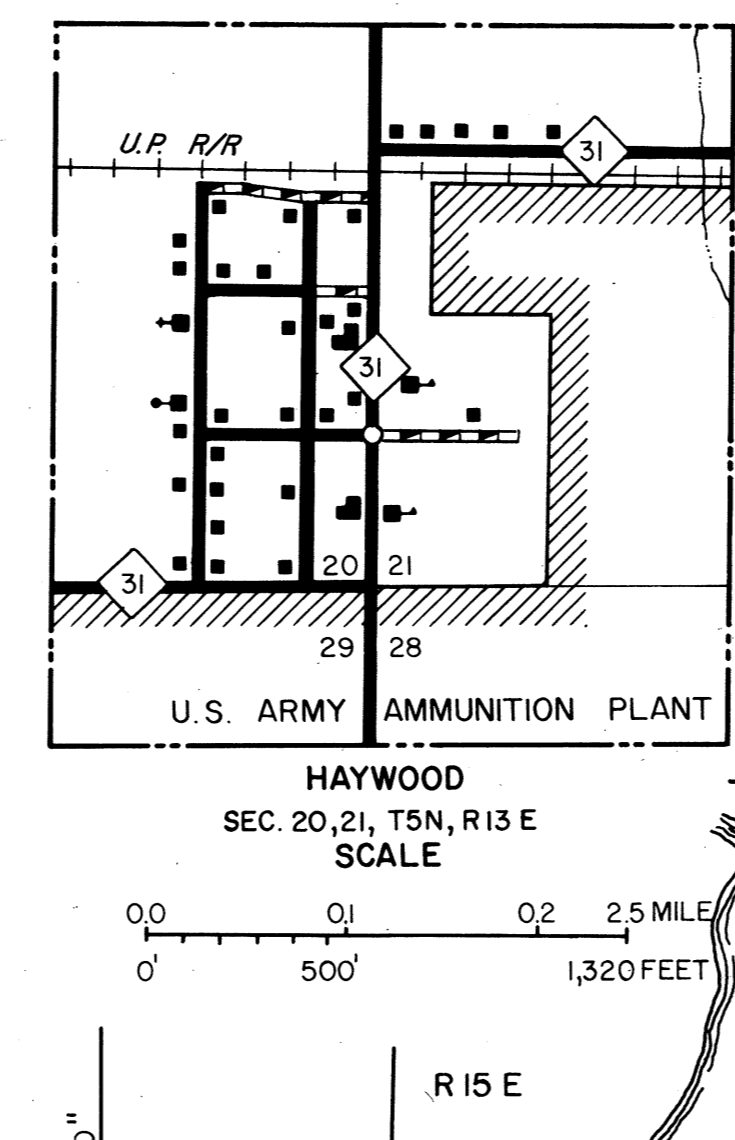
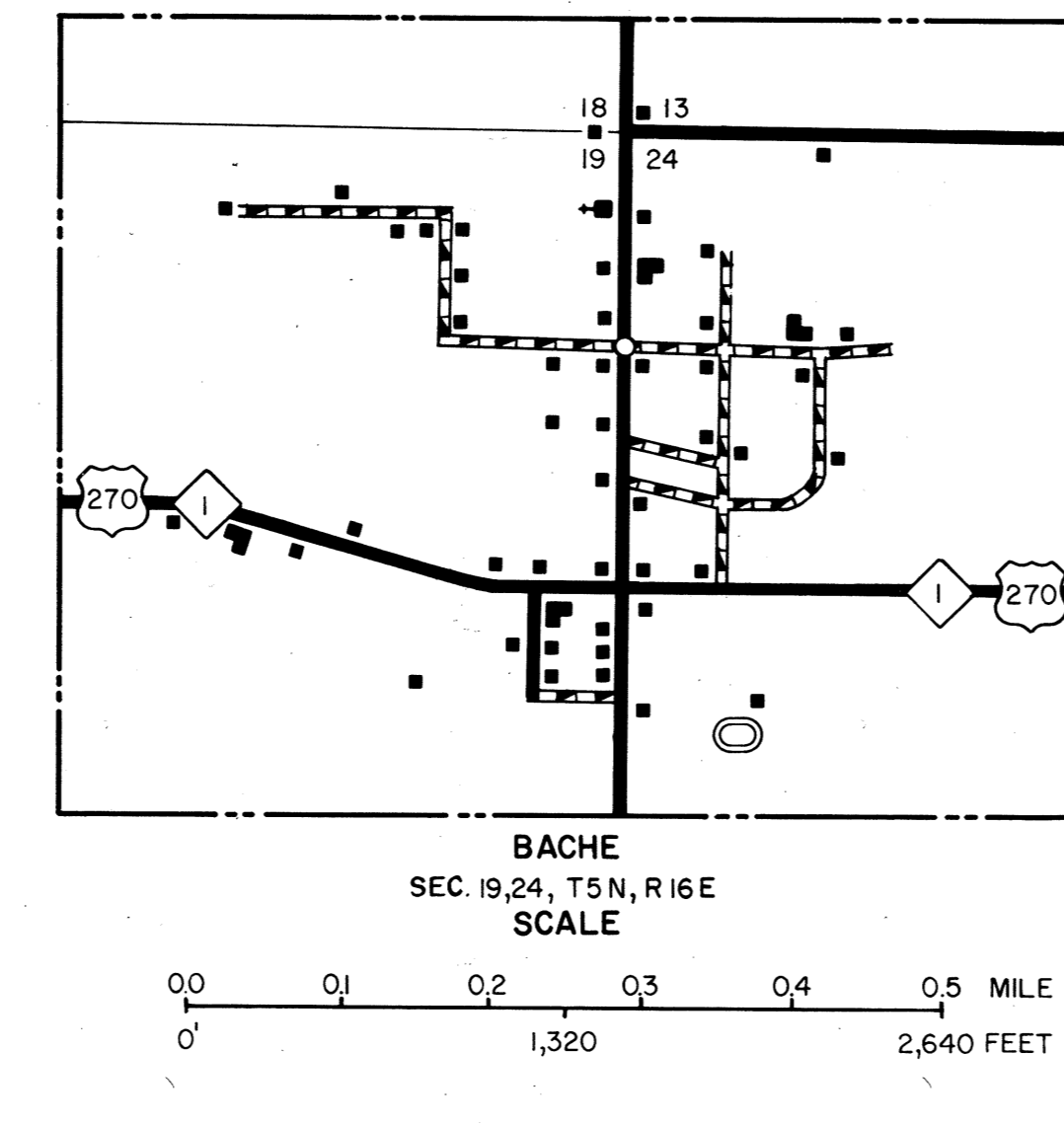
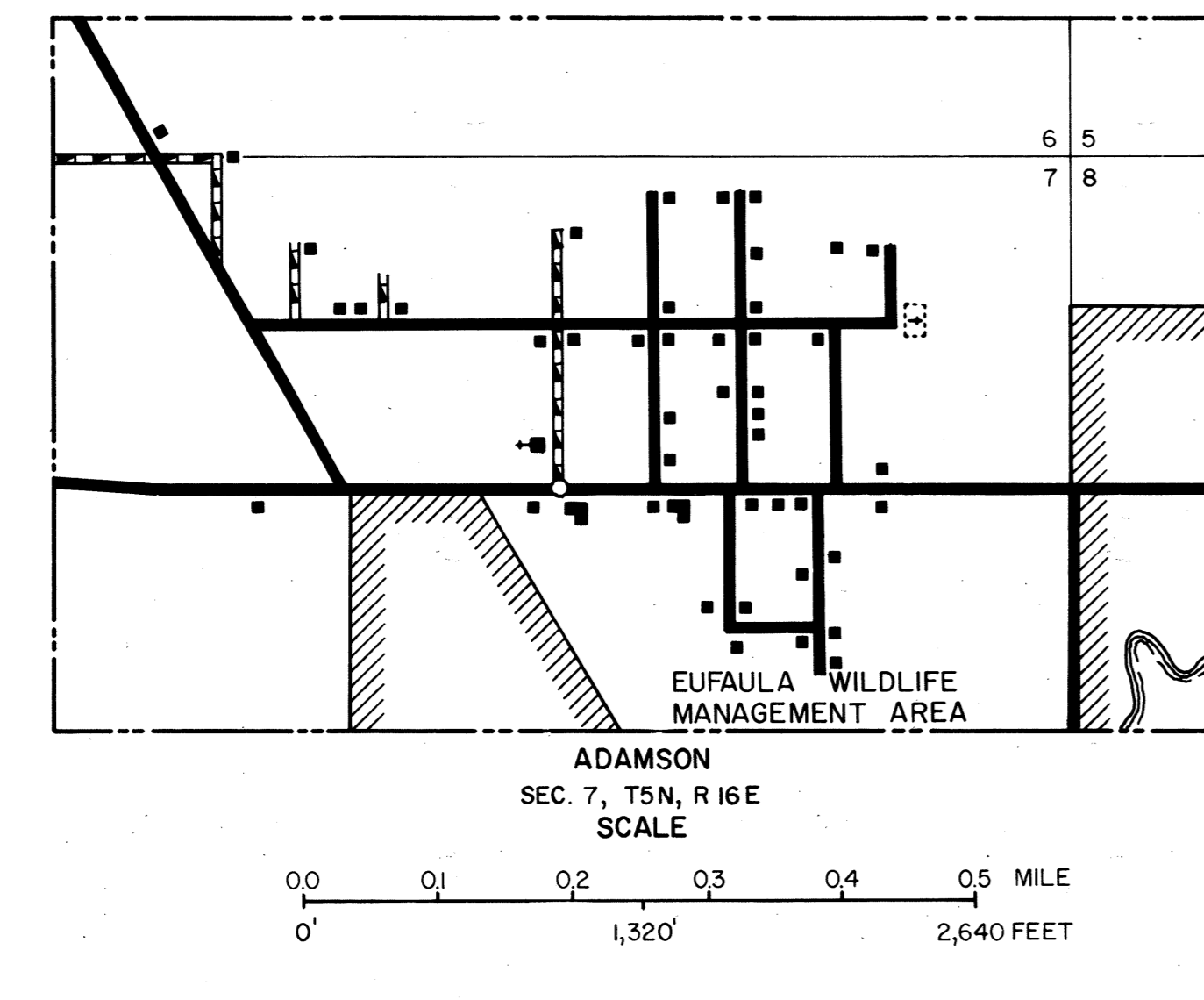
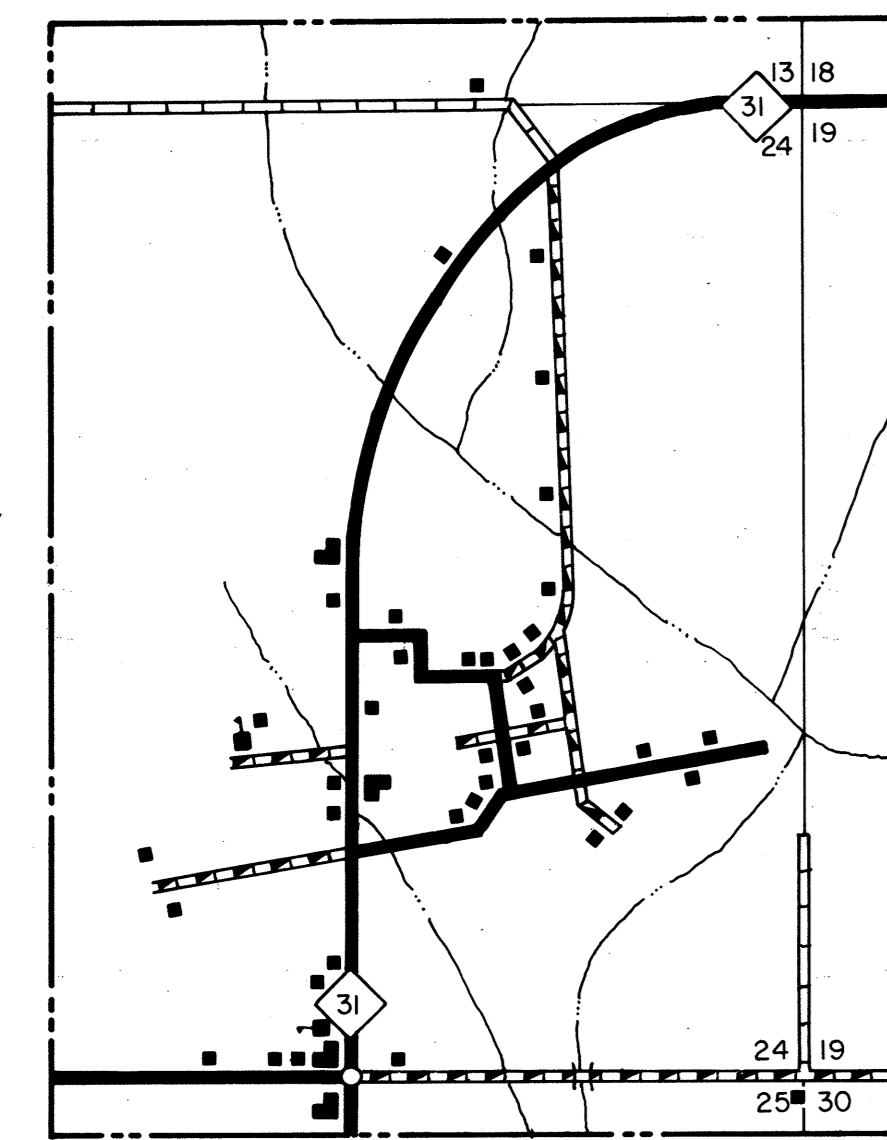
IN COOPERATION WITH THE  
**U.S. DEPARTMENT OF TRANSPORTATION  
 FEDERAL HIGHWAY ADMINISTRATION**

SCALE 1:250,000  
 LAMBERT CONFORMAL CONIC PROJECTION U.S. GEODETIC SURVEY DATA  
 20,000 FOOT GRID, OKLAHOMA PLANE COORDINATE SYSTEM SOUTH PROJECTION ZONE  
 POPULATION FIGURES BASED ON 1990 U.S. CENSUS  
 CO. POP. 40,581

This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government.  
 Copies of this map are available for public use at nominal cost.  
 Address: OKLAHOMA DEPARTMENT OF TRANSPORTATION  
 REPRODUCTION BRANCH Phone (405) 521-2586  
 200 N.E. 21st STREET  
 OKLAHOMA CITY, OKLAHOMA 73105

**NOT FOR RESALE**





Copies of this map are available for public use at nominal cost.  
Address: OKLAHOMA DEPARTMENT OF TRANSPORTATION  
REPRODUCTION BRANCH Phone (405) 521-2386  
200 N. E. 21st STREET  
OKLAHOMA CITY, OKLAHOMA 73105

This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government.

SHEET 2 OF 2 SHEETS

**NOT FOR RESALE**

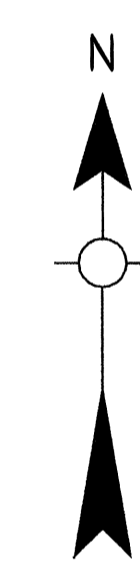
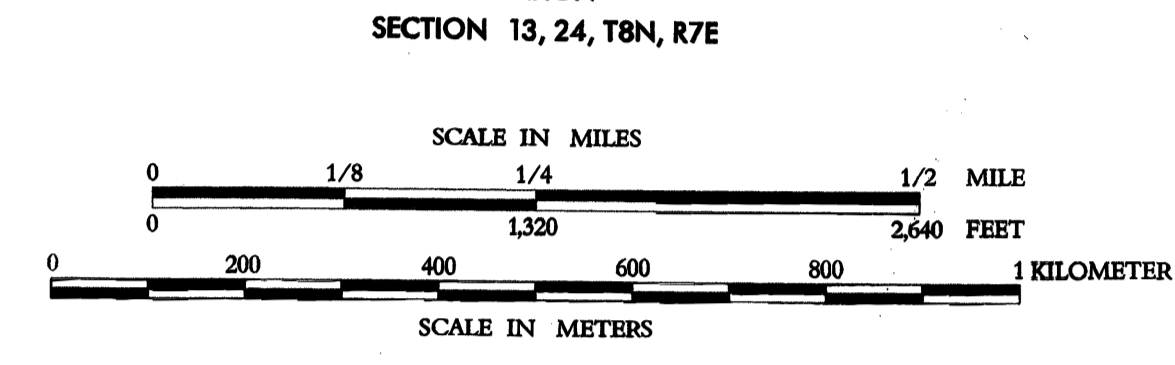
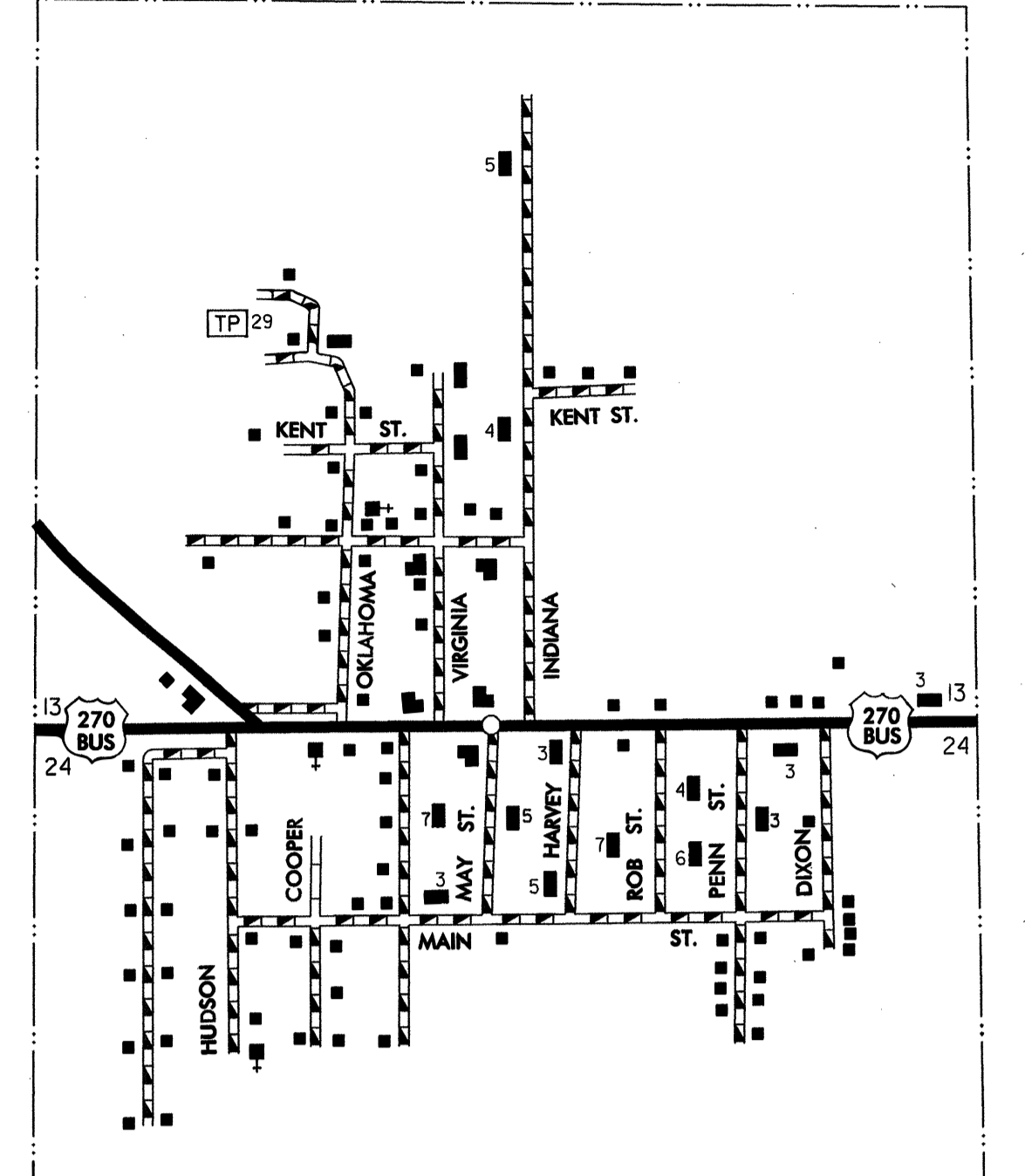
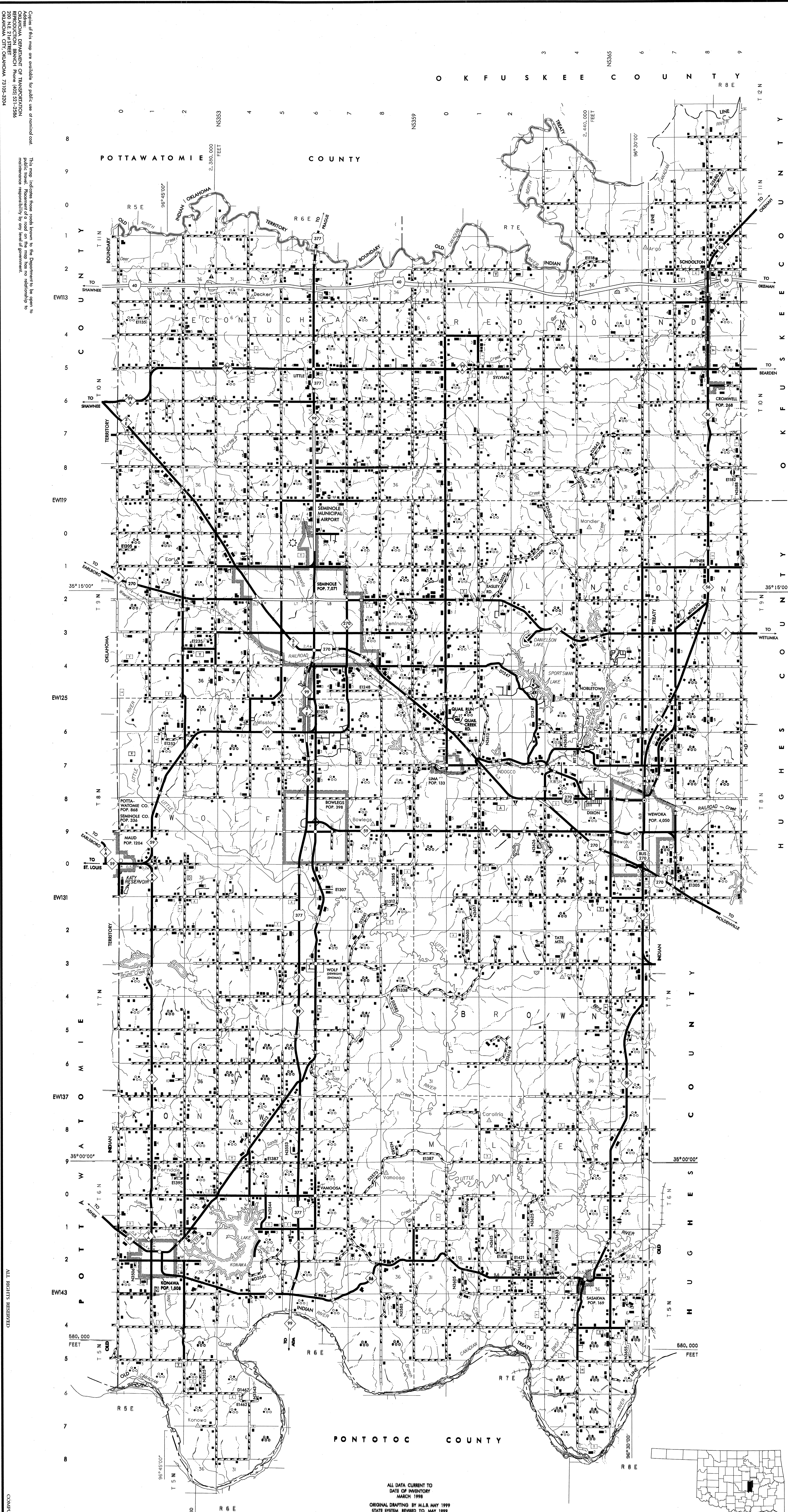
GENERAL HIGHWAY MAP PITTSBURG COUNTY OKLAHOMA

61









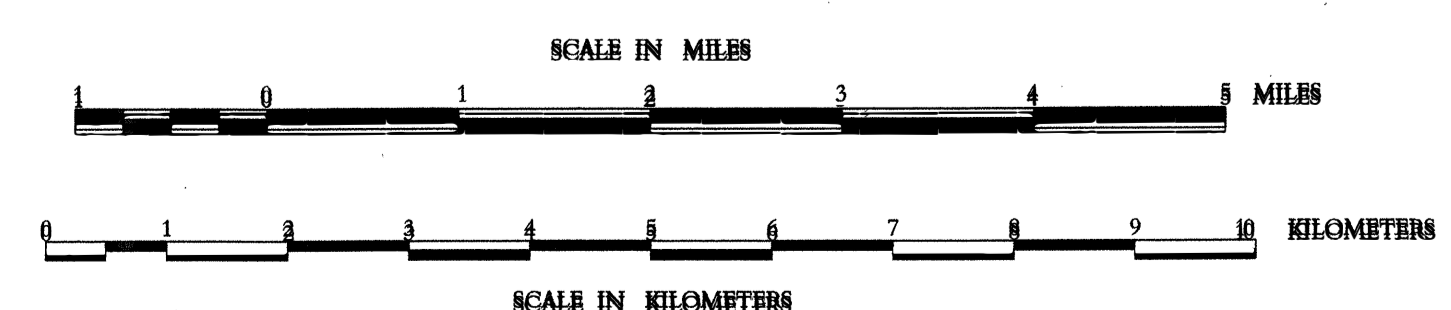
**LEGEND**

- U.S. NUMBERED HIGHWAY
- STATE NUMBERED HIGHWAY
- INTERSTATE HIGHWAY ROUTE
- PAVED ROAD
- GRAVEL ROAD
- UNIMPROVED ROAD
- PRIMITIVE ROAD
- PROJECTED ROAD
- RESIDENTIAL ROAD
- COUNTY ROAD ID NO.
- MILEAGE BETWEEN POINTS
- DIVIDED HIGHWAY, 4 OR MORE LANES
- DIVIDED HIGHWAY, 3 OR MORE LANES
- TRAFFIC CIRCLE
- HIGHWAY GRADE SEPARATION
- TRAFFIC INTERCHANGE
- STATE LINE
- COUNTY LINE
- CIVIL TOWNSHIP LINE
- SECTION LINE
- RURAL DEVELOPMENT AREA
- GOVERNMENT PROPERTY LINE
- WATER LINE
- COUNTY BEAT
- TOWN CENTER
- CORPORATE LIMITS
- CIVIL TOWNSHIP, ROAD IN PLACE
- INSET BOUNDARY
- ELEVATION ABOVE SEA LEVEL
- MOUNTAIN RANGE, BUTTE OR MESA
- SMALL MONUMENT
- MARSH OR SWAMP LANDS
- DRAINAGE DITCH
- IRRIGATION DITCH
- LAKE, RESERVOIR OR POND WITH DAM
- ROAD OVER DAM
- DRY LAKE SUBJECT TO FLOOD
- FORD ROAD ESTABLISHED
- INTERMITTENT STREAM
- NARROW STREAM
- DOCK PIER OR LANDING
- NAVIGABLE STREAM WITH LOCK & DAM
- HIDE STREAM OR RIVER
- TRIANGULATION STATION
- RAILROAD WITH STATION INDICATED
- GRADE CROSSING
- UNDERPASS, R.R. ABOVE
- OVERPASS, R.R. BELOW
- RAILROAD ON STREET
- AIRPORT WITH COMPLETE FACILITIES
- AIRPORT WITH LIMITED FACILITIES
- LANDING STRIP, PRIVATE FIELD
- AIRPORT, GENERAL OUTLINE OF FIELD
- RUNWAY, SHOWN IN POSITION
- ROADSIDE PARK, PICNIC GROUNDS
- BATHING BEACH OR SWIMMING POOL
- SCENIC SITE
- MOTEL
- CAMP OR LODGE, Permanent with buildings
- SMALL PARK, SP-3000, CP-County
- FOREST RANGER STATION
- OBSERVATION OR LOOKOUT TOWER
- CAMP SITE
- FISH HATCHERY
- GOLF COURSE OR COUNTRY CLUB
- ATHLETIC FIELD OR AMUSEMENT PARK
- FAIRGROUNDS, RACE COURSE
- DRILLING
- NUMBER OF DWELLINGS CLOSELY SPACED
- COMBINED BUSINESS AND DWELLING
- POST OFFICE
- POST OFFICE COMBINATIONS
- SEASONAL DWELLING
- CHURCH OR OTHER RELIGIOUS BUILDING
- CEMETERY
- CEMETERY WITH CEMETERY ADJACENT
- REST HOME
- HOSPITAL
- SMALL BUSINESS
- INDUSTRY
- SAW MILL
- SHAFT OR DRIFT
- OIL OR GAS FIELD
- GAUGING OR PUMPING STATION
- WAREHOUSE
- GRAVEL PIT
- QUARRY
- SCHOOL
- COMMUNITY HALL OR LODGE
- DRIVE-IN THEATER
- CORRECTIONAL INSTITUTION
- JUNK YARDS & DUMPS - Automobiles
- JUNK YARDS & DUMPS - Building Material
- B-Refrigerator, Refriggerator or Fresh Dump
- G-Other
- SEWAGE DISPOSAL PLANT
- DRILLING SUPPLY STAND PIPE
- POWER PLANT
- POWER SUBSTATION
- TELEVISION OR RADIO STATION
- MILITARY INSTALLATION

**GENERAL HIGHWAY MAP  
SEMINOLE COUNTY  
OKLAHOMA**

PREPARED BY THE  
**OKLAHOMA DEPARTMENT OF TRANSPORTATION  
PLANNING DIVISION**

IN COOPERATION WITH THE  
**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION**



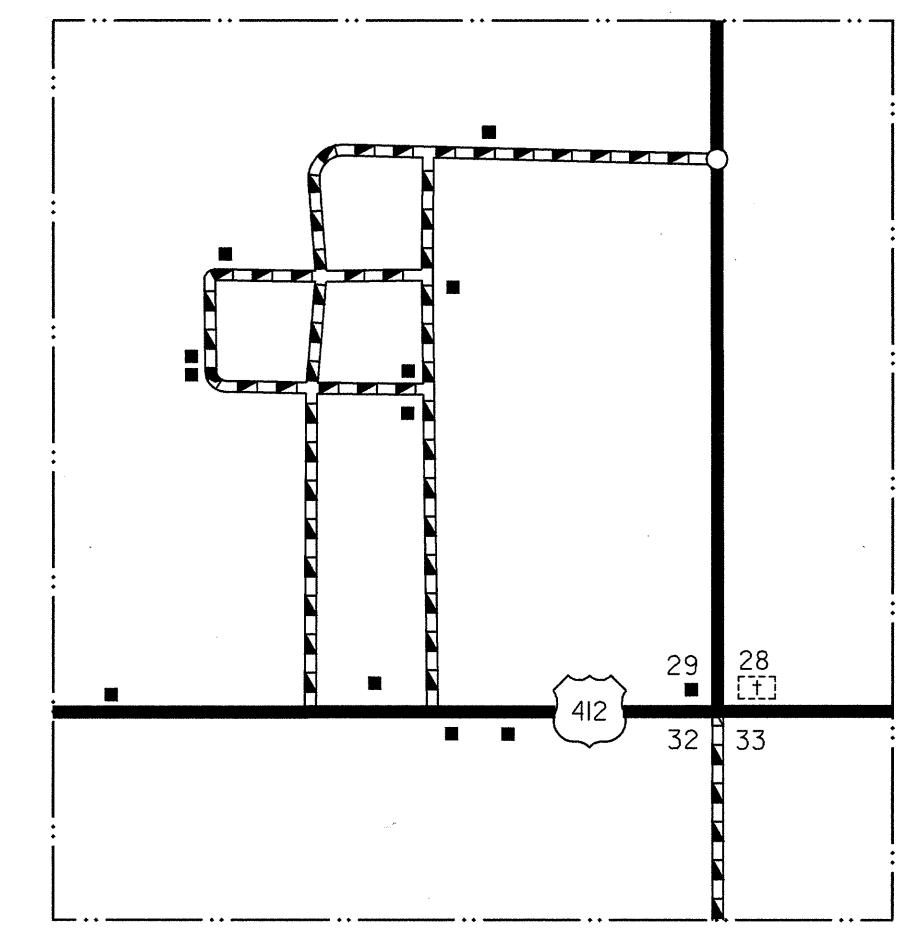
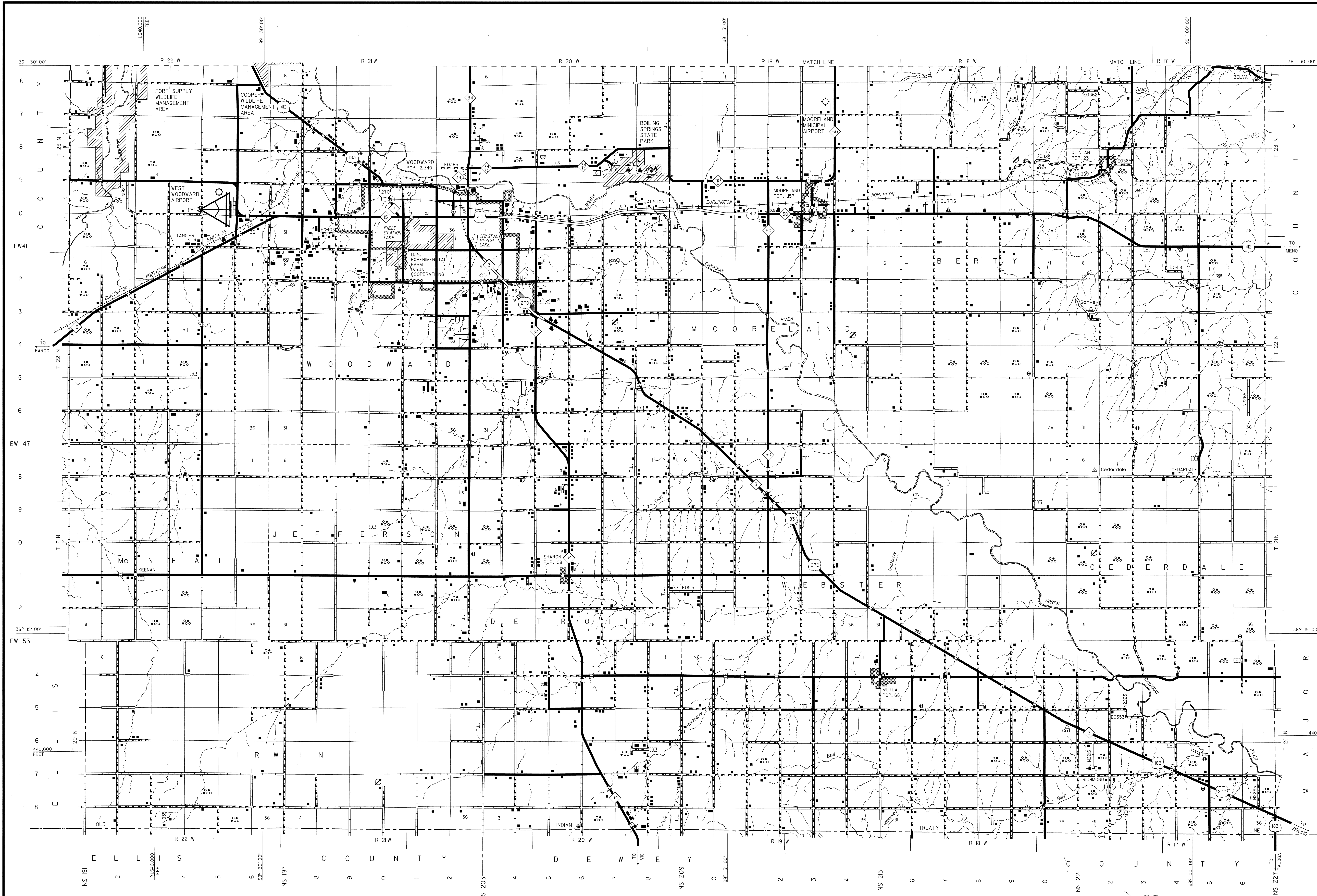
LAMBERT CONFORMAL CONIC PROJECTION U.S. & GEODETIC SURVEY DATA  
20,000 FOOT GRID; OKLAHOMA PLANE COORDINATE SYSTEM, SOUTH PROJECTION ZONE  
POPULATION FIGURES BASED ON 1990 U.S. CENSUS  
CO. POP. 25,412

ALL DATA CURRENT TO  
DATE OF INVENTORY  
MARCH 1998  
ORIGINAL DRAFTING BY M.L.S. MAY 1999  
STATE SYSTEM REVISED TO MAY 1999

Copyright of this map are available for public use at nominal cost.  
OKLAHOMA DEPARTMENT OF TRANSPORTATION  
PLANNING DIVISION  
REPRODUCTION BRANCH Phone (405) 521-2388  
100 EAST UNIVERSITY AVENUE  
OKLAHOMA CITY, OKLAHOMA 73102-3204

ALL RIGHTS RESERVED  
COMPUTER GENERATED





CURTIS  
SEC. 23, T23N, R17W  
SCALE  
0 0.1 0.2 0.3 0.4 0.5 MILE  
0 660 1320 2640 FEET

**LEGEND**

|   |   |  |   |
|---|---|--|---|
| <ul style="list-style-type: none"> <li> U.S. NUMBERED HIGHWAY</li> <li> STATE NUMBERED HIGHWAY</li> <li> INTERSTATE HIGHWAY ROUTE</li> <li> PAVED ROAD</li> <li> GRAVEL ROAD</li> <li> GRADED &amp; DRAINED ROAD</li> <li> UNIMPROVED ROAD</li> <li> PRIMITIVE ROAD</li> <li> PROJECTED ROAD</li> <li> RESIDENTIAL ROAD</li> <li> COUNTY ROAD ID NO.</li> <li> MILEAGE BETWEEN POINTS</li> <li> DIVIDED HIGHWAY, 4 OR MORE LANES</li> <li> UNDIVIDED HIGHWAY, 3 OR MORE LANES</li> <li> TRAFFIC CIRCLE</li> <li> HIGHWAY GRADE SEPARATION</li> <li> TRAFFIC INTERCHANGE</li> <li> STATE LINE</li> <li> COUNTY LINE</li> <li> CIVIL TOWNSHIP LINE</li> <li> SECTION LINE</li> <li> RURAL DEVELOPMENT AREA</li> <li> GOVERNMENT PROPERTY LINE</li> <li> MATCH LINE</li> <li> TOWN CENTER</li> <li> CORPORATE LIMITS</li> <li> CIVIL TOWNSHIP, ROAD IN PLACE</li> <li> INSET BOUNDARY</li> </ul> | <ul style="list-style-type: none"> <li> RAILROAD WITH STATION INDICATED</li> <li> GRADE CROSSING</li> <li> UNDERPASS, R.E. ABOVE</li> <li> OVERPASS, R.E. BELOW</li> <li> RAILROAD ON STREET</li> <li> MILITARY AIRFIELD</li> <li> AIRPORT WITH COMPLETE FACILITIES</li> <li> AIRPORT WITH LIMITED FACILITIES</li> <li> LANDING STRIP, PRIVATE FIELD</li> <li> AIRPORT, GENERAL OUTLINE OF FIELD</li> <li> RUNWAYS SHOWN IN POSITION</li> <li> ROADSIDE PARK</li> <li> PLAYGROUNDS</li> <li> BATHING BEACH OR SWIMMING POOL</li> <li> SCENIC SITE</li> <li> CAMP SITE</li> <li> MOTEL OR LODGE, Permanent with buildings</li> <li> SMALL PARK</li> <li> FOREST RANGER STATION</li> <li> OBSERVATION OR LOOKOUT TOWER</li> <li> CAMP SITE</li> <li> FISH HATCHERY</li> <li> GOLF COURSE OR COUNTRY CLUB</li> <li> ATHLETIC FIELD OR AMUSEMENT PARK</li> <li> FAIRGROUNDS, RACE COURSE</li> <li> DWELLING</li> <li> NUMBER OF DWELLINGS CLOSELY SPACED</li> <li> COMBINED BUSINESS AND DWELLING</li> <li> POST OFFICE</li> <li> POST OFFICE COMBINATIONS</li> </ul> | <ul style="list-style-type: none"> <li> ELEVATION ABOVE SEA LEVEL</li> <li> MOUNTAIN RANGE, BUTTE OR MESA</li> <li> SMALL MONUMENT</li> <li> MARSH OR SWAMP LANDS</li> <li> DRAINAGE DITCH</li> <li> IRRIGATION DITCH</li> <li> LAKE, RESERVOIR OR POND WITH DAM</li> <li> ROAD OVER DAM</li> <li> DRY LAKE SUBJECT TO FLOOD</li> <li> SMALL BRIDGES CLOSELY SPACED</li> <li> HIGHWAY BRIDGE, OVER 20FT. IN LENGTH</li> <li> GENERAL BRIDGE, LONG CROSSING</li> <li> ARCH BRIDGE</li> <li> TRUSS BRIDGE-WOOD-STEEL-CONCRETE</li> <li> CONCRETE DIP OR FORD</li> <li> FORD ROAD ESTABLISHED</li> <li> INTERMITTENT STREAM</li> <li> NARROW STREAM</li> <li> DOCK PIER OR LANDING</li> <li> NAVIGABLE STREAM WITH LOCK &amp; DAM</li> <li> WIDE STREAM OR RIVER</li> <li> TRIANGULATION STATION</li> </ul> | <ul style="list-style-type: none"> <li> SEASONAL DWELLINGS</li> <li> CHURCH OR OTHER RELIGIOUS BUILDING</li> <li> CEMETERY</li> <li> CHURCH WITH CEMETERY ADJACENT</li> <li> REST HOME</li> <li> HOSPITAL</li> <li> SMALL BUSINESS</li> <li> INDUSTRY</li> <li> SAW MILL</li> <li> MINE SHAFT OR DRIFT</li> <li> OIL OR GAS FIELD</li> <li> GAUGING OR PUMPING STATION</li> <li> WAREHOUSE</li> <li> GRAVEL PIT</li> <li> QUARRY</li> <li> SCHOOL</li> <li> COMMUNITY HALL OR LODGE</li> <li> DRIVE-IN THEATER</li> <li> CORRECTIONAL INSTITUTION</li> <li> HIGHWAY GARAGE</li> <li> WAREHOUSE</li> <li> JUNK YARD &amp; SCRAP A-Automobile</li> <li> B-Scrap Building Material</li> <li> D-Refuse Garbage or Trash Dump</li> <li> F-Sanitary Fill, C-Other</li> <li> SEWAGE DISPOSAL PLANT</li> <li> WATER SUPPLY STAND PIPE</li> <li> POWER PLANT</li> <li> BOOSTER STATION</li> <li> POWER SUBSTATION</li> <li> TELEVISION OR RADIO STATION</li> <li> MILITARY INSTALLATION</li> </ul> |
|---|---|--|---|

ALL DATA CURRENT TO DATE OF INVENTORY JANUARY 1984  
ORIGINAL DRAFTING BY R.G.R., APRIL 1986  
STATE SYSTEM REVISED TO AUGUST 1999

GENERAL HIGHWAY MAP  
**WOODWARD COUNTY**  
OKLAHOMA

PREPARED BY THE  
OKLAHOMA DEPARTMENT OF TRANSPORTATION  
PLANNING DIVISION

IN COOPERATION WITH THE  
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION

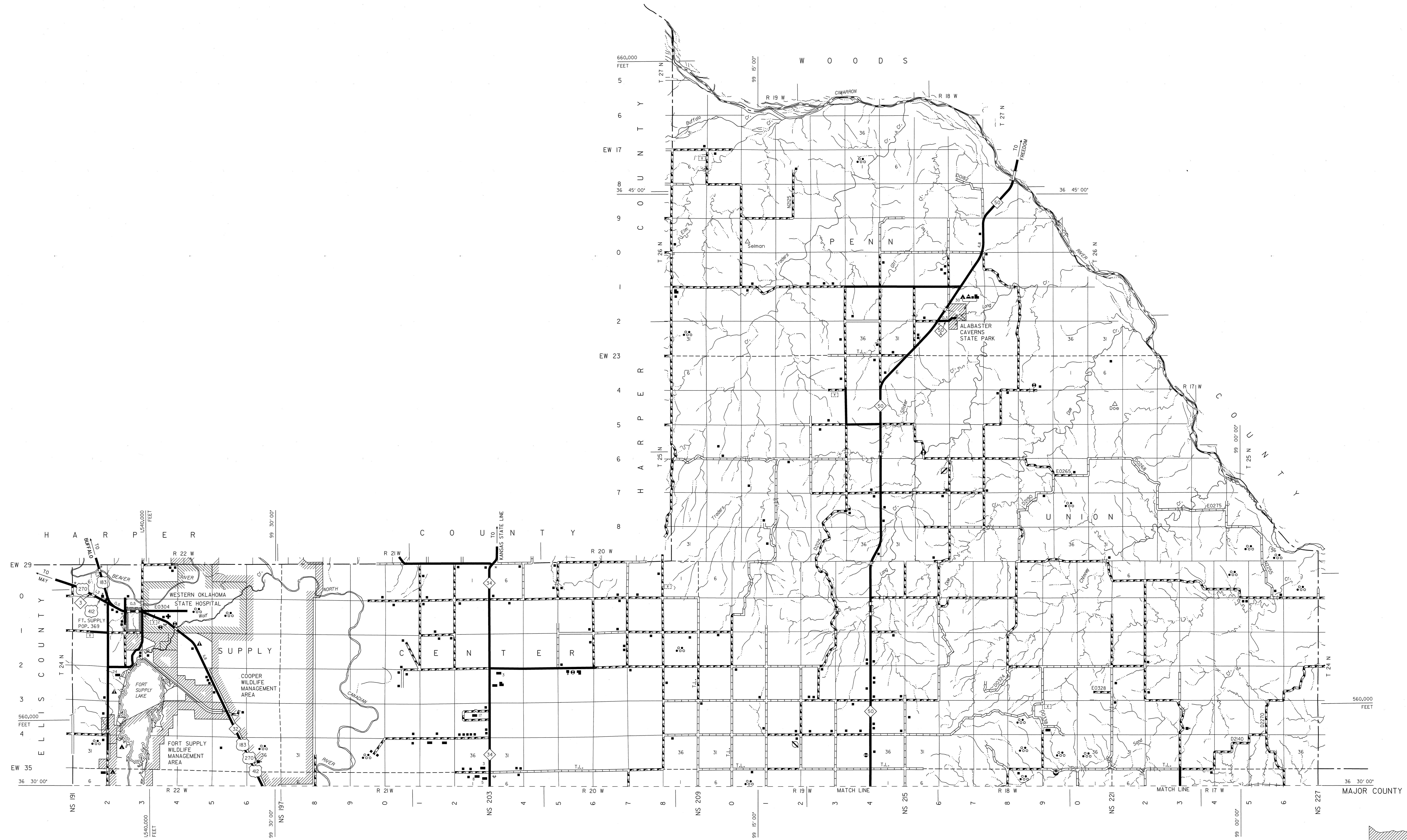
SCALE IN MILES  
0 1 2 3 4 5

SCALE IN KILOMETERS  
0 1 2 3 4 5

LAMBERT CONFORMAL CONIC PROJECTION U.S. & GEODETIC SURVEY DATA  
20,000 FOOT GRID; OKLAHOMA PLANE COORDINATE SYSTEM NORTH PROJECTION ZONE  
POPULATION FIGURES BASED ON 1990 U.S. CENSUS  
CO. POP. 18,974

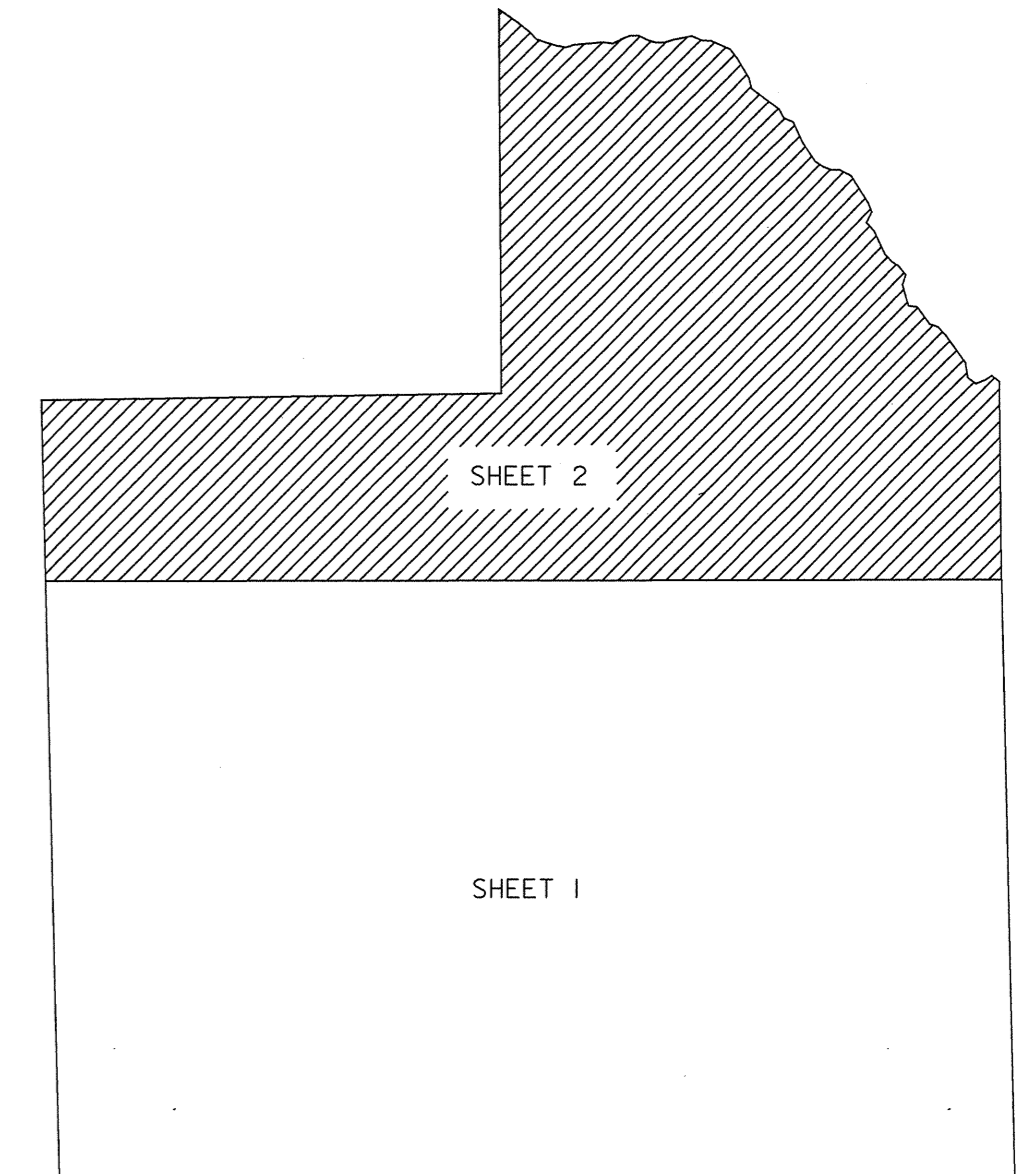
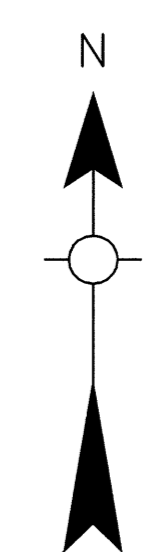
ALL RIGHTS RESERVED COMPUTER GENERATED





This map indicates those roads known to the Department to be open to public travel. Placement of a road on the map has no relationship to maintenance responsibility by any level of government.  
 Copies of this map are available for public use at nominal cost.  
 Address:  
 OKLAHOMA DEPARTMENT OF TRANSPORTATION  
 REPRODUCTION BRANCH Phone (405) 521-2586  
 200 N.E. 21st STREET  
 OKLAHOMA CITY, OKLAHOMA 73105-3204

ALL DATA CURRENT TO  
 DATE OF INVENTORY  
 JANUARY 1994  
 ORIGINAL DRAFTING BY R.G.A. APRIL 1996  
 STATE SYSTEM REVISED TO AUGUST 1999



ALL RIGHTS RESERVED SHEET 2 OF 2 SHEETS COMPUTER GENERATED