# CHANNEL-BED DEGRADATION IN MAJOR OKLAHOMA STREAMS

## VOLUME II of V: CIMARRON RIVER

**Final Report**
**ODOT Item Number 2191**

**by**

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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.

Natural alluvial rivers are seldom in a state of equilibrium. Streams are not inherently unstable but they are often out of equilibrium due to imposed conditions. 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. A determination of magnitude and rate of channel-bed degradation is important to understand the geomorphic response of the channel to the alterations imposed by reservoirs and other possible implications.

The river stations 10 (Bridge key b14518) and 11 (Bridge Key b14517) at I-35 have experienced 10.99 feet and 15.31 feet of channel-bed degradation, respectively in 46 years. When these bridges are reconstructed in the replacement cycle, it is recommended that a detailed hydraulic and geotechnical analysis should be performed.

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

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# SI (METRIC) CONVERSION FACTORS

## *Approximate Conversions to SI Units*

| Symbol | When you know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | **LENGTH** | | | |
| in | inches | 25.40 | millimeters | mm |
| ft | feet | 0.3048 | meters | m |
| yd | yards | 0.9144 | meters | m |
| mi | miles | 1.609 | kilometers | km |
| | **AREA** | | | |
| $in^2$ | square inches | 645.2 | square millimeters | $mm^2$ |
| $ft^2$ | square feet | 0.0929 | square meters | $m^2$ |
| $yd^2$ | square yards | 0.8361 | square meters | $m^2$ |
| ac | acres | 0.4047 | hectacres | ha |
| $mi^2$ | square miles | 2.590 | square kilometers | $km^2$ |
| | **VOLUME** | | | |
| fl oz | fluid ounces | 29.57 | milliliters | mL |
| gal | gallon | 3.785 | liters | L |
| $ft^3$ | cubic feet | 0.0283 | cubic meters | $m^3$ |
| $yd^3$ | cubic yards | 0.7645 | cubic meters | $m^3$ |
| | **MASS** | | | |
| oz | ounces | 28.35 | grams | g |
| lb | pounds | 0.4536 | kilograms | kg |
| T | short tons (2000 lb) | 0.907 | megagrams | Mg |
| | **TEMPERATURE (exact)** | | | |
| °F | degrees Fahrenheit | (°F-32)/1.8 | degrees Celsius | °C |
| | **FORCE and PRESSURE or STRESS** | | | |
| lbf | poundforce | 4.448 | Newtons | N |
| $lbf/in^2$ | poundforce per square inch | 6.895 | kilopascals | kPa |

## *Approximate Conversions from SI Units*

| Symbol | When you know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | **LENGTH** | | | |
| mm | millimeters | 0.0394 | inches | in |
| m | meters | 3.281 | feet | ft |
| m | meters | 1.094 | yards | yds |
| km | kilometers | 0.6214 | miles | mi |
| | **AREA** | | | |
| $mm^2$ | square millimeters | 0.00155 | square inches | $in^2$ |
| $m^2$ | square meters | 10.764 | square feet | $ft^2$ |
| $m^2$ | square meters | 1.196 | square yards | $yd^2$ |
| ha | hectacres | 2.471 | acres | ac |
| $km^2$ | square kilometers | 0.3861 | square miles | $mi^2$ |
| | **VOLUME** | | | |
| mL | milliliters | 0.0338 | fluid ounces | fl oz |
| L | liters | 0.2642 | gallon | gal |
| $m^3$ | cubic meters | 35.315 | cubic feet | $ft^3$ |
| $m^3$ | cubic meters | 1.308 | cubic yards | $yd^3$ |
| | **MASS** | | | |
| g | grams | 0.0353 | ounces | oz |
| kg | kilograms | 2.205 | pounds | lb |
| Mg | megagrams | 1.1023 | short tons (2000 lb) | T |
| | **TEMPERATURE (exact)** | | | |
| °C | degrees Fahrenheit | 9/5(°C)+32 | degrees Celsius | °F |
| | **FORCE and PRESSURE or STRESS** | | | |
| N | Newtons | 0.2248 | poundforce | lbf |
| kPa | kilopascals | 0.1450 | poundforce per square inch | $lbf/in^2$ |

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# I. INTRODUCTION

Natural alluvial rivers are seldom in a state of equilibrium. The fluvial process in an alluvial river is a dynamic system subject to continuous changes in discharge, flow characteristics, sediment injection by tributaries, bed material composition, and complex sediment characteristics. Man-made activities and natural events create the major factors which disturb a river's stability, causing readjustment of the energy slope, sediment load, and cross-sectional geometry. If the stream-bed continues to lower it is called "degradation" and it is called "aggradation" if the stream-bed rises.

A river channel is considered stable if the stream-bed does not change its average bed elevation over a relatively long river reach and long period of time. Whether 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 adjust to the quantities of sediment and water transported so that the river-bed neither degrades nor aggrades.

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 Cimarron River is a right-bank tributary of the Arkansas River. It extends over 698 miles (1123 km) across four states (New Mexico, Oklahoma, Colorado, and Kansas). The Cimarron River originates in Union County, New Mexico, near both the Colorado-New Mexico and Oklahoma-New Mexico state lines. The river enters the Oklahoma Panhandle near Kenton, then crosses the southeastern corner of Colorado and flows into Kansas. It then re-enters the Oklahoma Panhandle, crosses again into Kansas, and finally back into northwestern Oklahoma where it flows towards the Arkansas River at Keystone Reservoir located 15 miles west of Tulsa, Oklahoma. Along its way form northwestern Oklahoma to Keystone reservoir, Cimarron River flows through eleven counties: Harper, Woodward, Woods, Major, Kingfisher, Logan, Payne, Lincoln, Creek, Pawnee, and Osage.

With drainage area of about 18,927 square miles and only 14,000 square miles contributing to flows, the Cimarron River flows through three distinct topographical regions:

1) The upper, or headwater, portion of the basin includes the mountains and hilly plateau region of northeastern New Mexico, southeastern Colorado and the northwestern end of the Oklahoma panhandle;
2) The mid, or high plains, region of the basin extends from the mountainous area of Englewood, Kansas, and includes parts of

southeastern Colorado, the Oklahoma panhandle and southwestern Kansas; and

3) The lower half of the basin is located in north-west to north-east Oklahoma (OWRB, 1991). The basin elevation ranges from 8,000 feet in New Mexico to about 700 feet at its confluence with the Arkansas River within Keystone Lake. This study focuses on the lower half the basin in Oklahoma.

The focus of this study is the bottom 265.42 mile reach of the Cimarron River between State Highway (SH) 50 crossing in the Woods County near Oklahoma-Kansas boarder and Keystone Lake in Oklahoma (Fig. 1). The Cimarron River in the study reach is characterized by meandering, and a fine and course sand mix channel. The channel slope averages about 3 feet per mile and river-bank height varies from 15 to 60 feet.

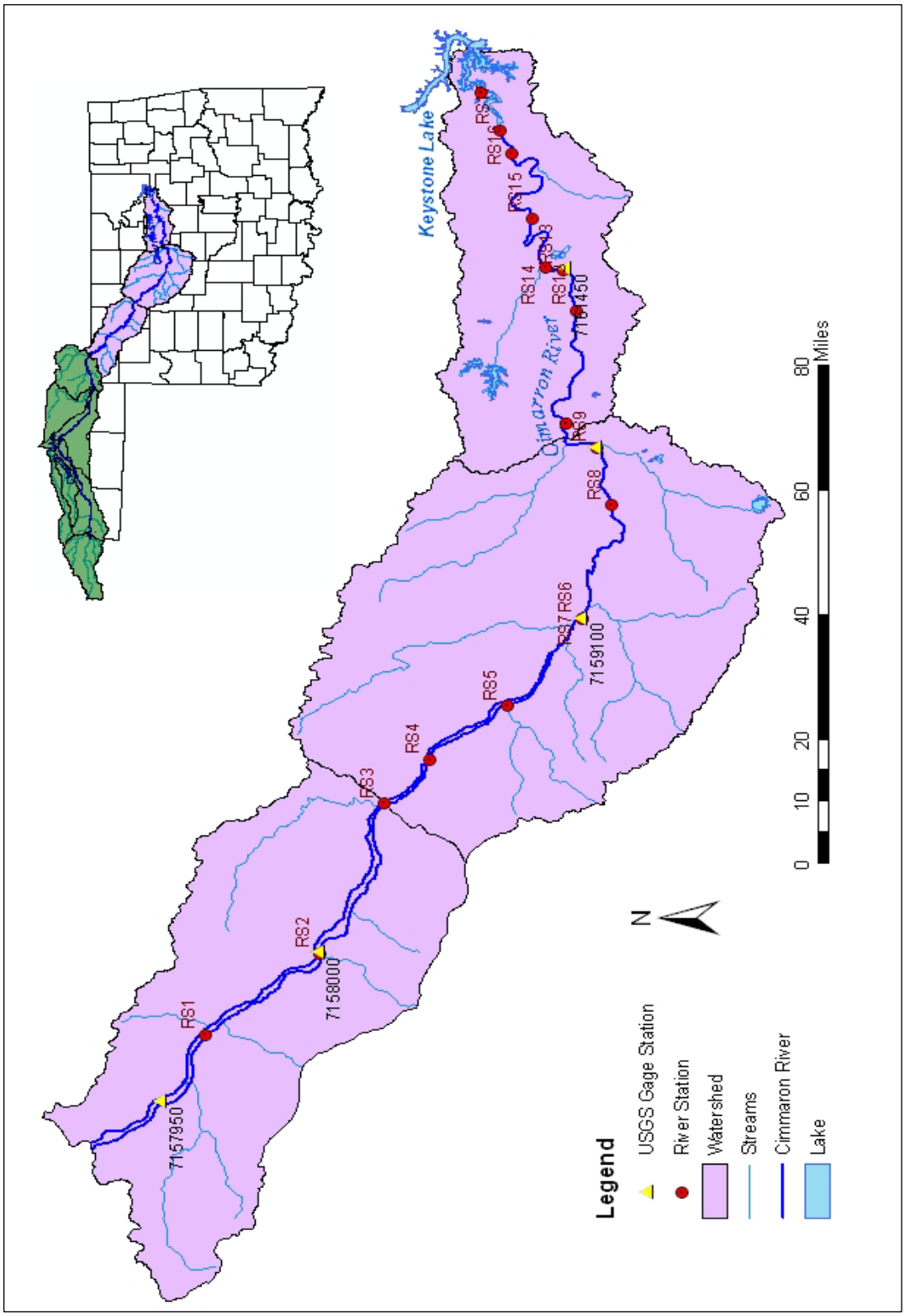



**Figure 1. Location of study points and USGS gage stations in Cimmaron River**

## III. HYDROLOGY

When the hydrology of the stream changes, the physical characteristics of the stream also change. Such changes include stream channel-bed degradation, stream widening, and stream bank erosion. As the stream profile degrades and the stream tries to accommodate higher flows, stream bank erosions increase along with increases in sediment loads. USGS stream flow gage stations have been considered for study of historical peak flows. The study reach of the Cimarron River in Oklahoma contains five active USGS gage stations.

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

| Data, Locations, and Descriptions | Data Available |
|---|---|
| USGS 07157950 Cimarron River near Buffalo, OK<br>Harper County, Oklahoma<br>Hydrologic Unit Code 11050001<br>Latitude 36°51'07", Longitude 99°18'54" NAD27<br>Drainage area 12,004 square miles<br>Contributing drainage area 7,191 square miles<br>Gage datum 1,599.67 feet above sea level NGVD29 | 1960-2007 |
| USGS 07158000 Cimarron River near Waynoka, OK<br>Woods County, Oklahoma<br>Latitude 36°31'02", Longitude 98°52'45" NAD27<br>Drainage area 13,334 square miles<br>Contributing drainage area 8,504 square miles<br>Gage datum 1,367.35 feet above sea level NGVD29 | 1937-2007 |
| USGS 07159100 Cimarron River near Dover, OK<br>Kingfisher County, Oklahoma<br>Hydrologic Unit Code 11050002<br>Latitude 35°57'06", Longitude 97°54'51" NAD27<br>Drainage area 15,713 square miles<br>Contributing drainage area 10,787 square miles<br>Gage datum 999.19 feet above sea level NGVD29 | 1973-2007 |
| USGS 07160000 Cimarron River near Guthrie, OK<br>Logan County, Oklahoma<br>Hydrologic Unit Code 11050002<br>Latitude 35°55'14", Longitude 97°25'32" NAD27<br>Drainage area 16,892 square miles<br>Contributing drainage area 11,966 square miles<br>Gage datum 896.50 feet above sea level NGVD29 | 1937-2007 |

**Table 1. Continued**

| | |
|---|---|
| USGS 07161450 Cimarron River near Ripley, OK<br>Payne County, Oklahoma<br>Hydrologic Unit Code 11050003<br>Latitude 35°59'09", Longitude 96°54'43" NAD27<br>Drainage area 17,979 square miles<br>Contributing drainage area 13,053 square miles<br>Gage datum 795.86 feet above sea level NGVD29 | 1987-2007 |

Annual peak discharge is the annual instantaneous maximum discharge. Changes in land use and urbanization can affect flood discharges which in turn, affect the size and stability of channels. Systematic increases or decreases in the magnitude of annual peak discharges along the with slope and width of the stream-channel can cause stream-beds to either degrade or aggrade. The maximum scour should occur during peak discharge due to greater stream power on the channel-bed and the shear stress (Capesius and Lehman, 2001). To study the channel-bed scour, annual peak discharges plots were downloaded from USGS gage stations to evaluate the historical flood occurrences. Large peak stream flows were recorded at different time periods. Table 2 shows the large peak flows at different USGS gage stations and Figures 2-6 graph peak flows at the 5 USGS gage stations.

**Table 2. Peak flows recorded at USGS gage stations**

| Locations | Peak flows (cfs) | Year |
|---|---|---|
| Buffalo | 26,400<br>22,900 | Sep. 26, 1973<br>Jul. 25, 1979 |
| Waynoka | 94,500<br>70,000 | May 16, 1957<br>Jul. 28,1950 |
| Dover | 123,000 | Oct. 3, 1986 |
| Guthrie | 158,000 | May 17, 1957 |
| Ripley | 141,000 | May 10, 1993 |

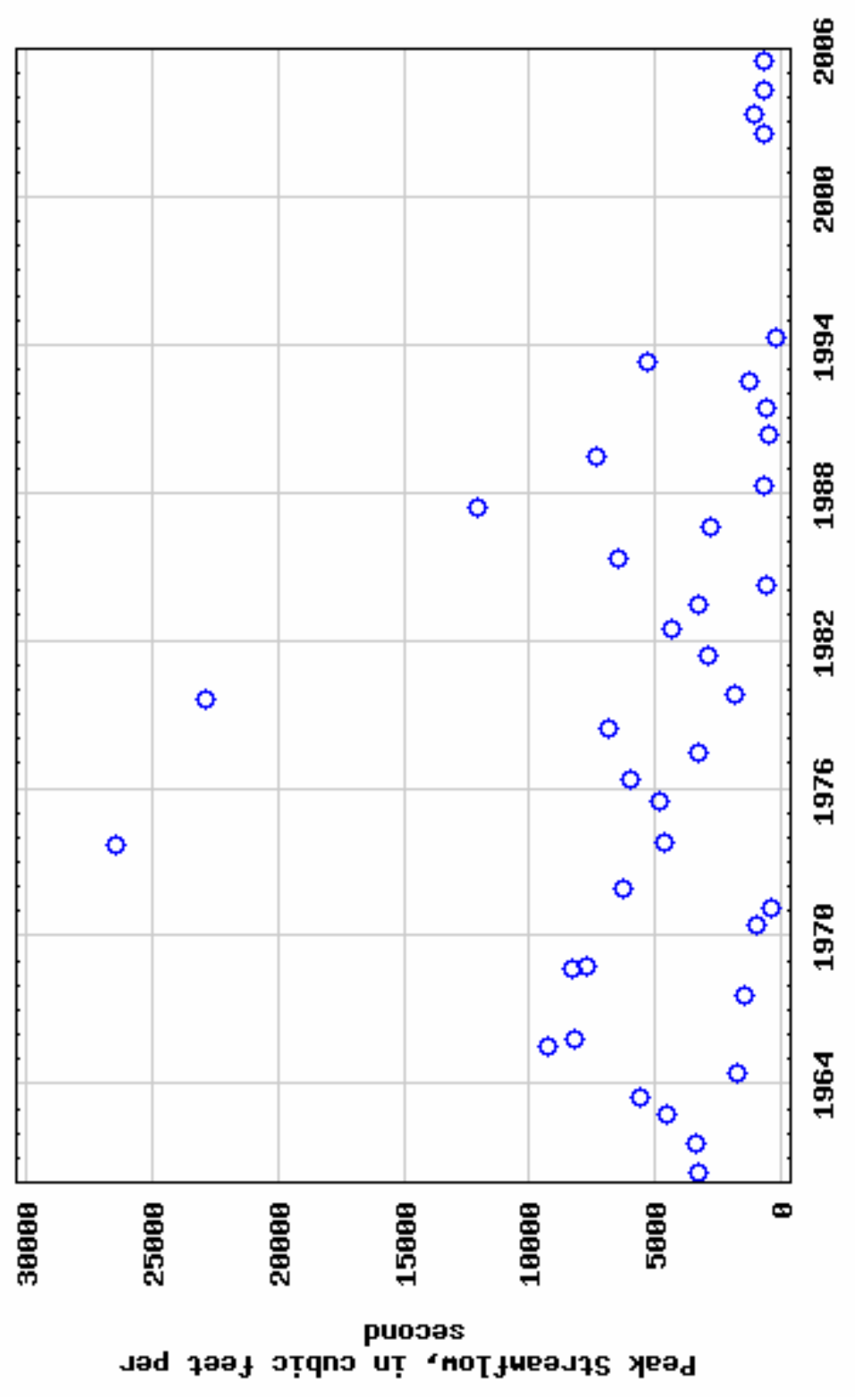



**Figure 2. Annual peak streamflow in Cimarron River at Buffalo (USGS 07157950), OK**

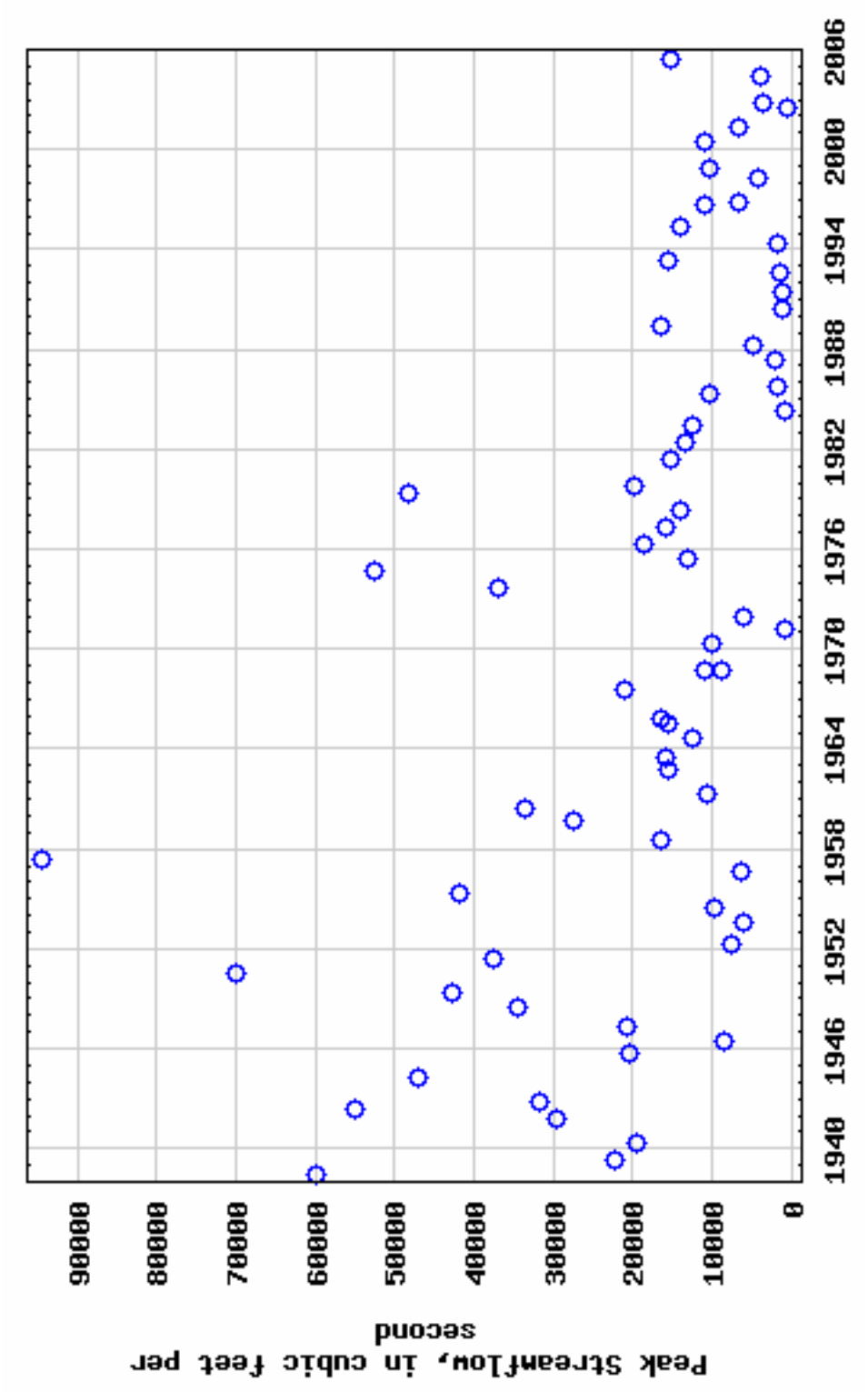



**Figure 3. Annual peak streamflow in Cimarron River at Waynoka (USGS 07158000), OK**

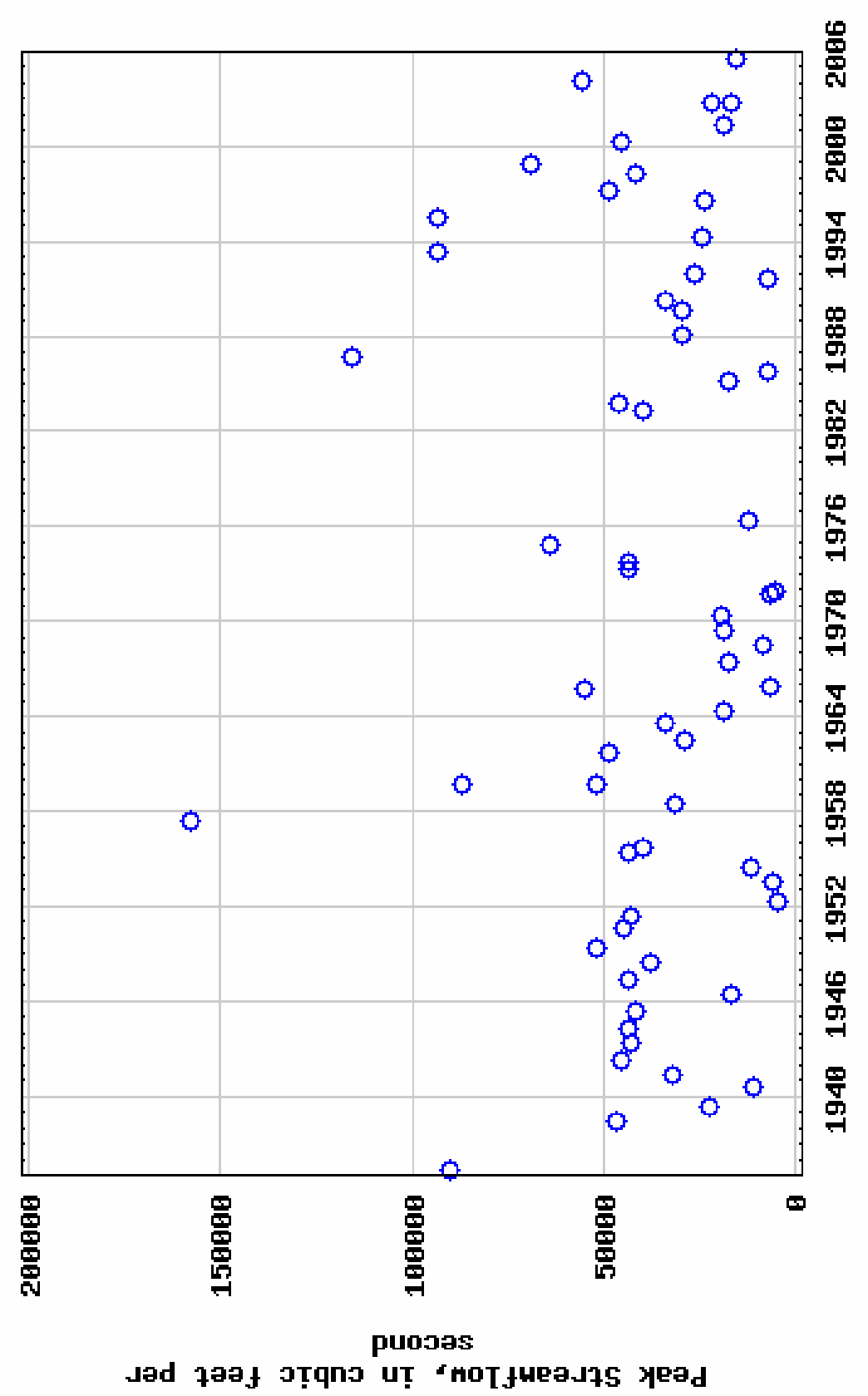



**Figure 4. Annual peak streamflow in Cimarron River at Dover (USGS 07159100), OK**

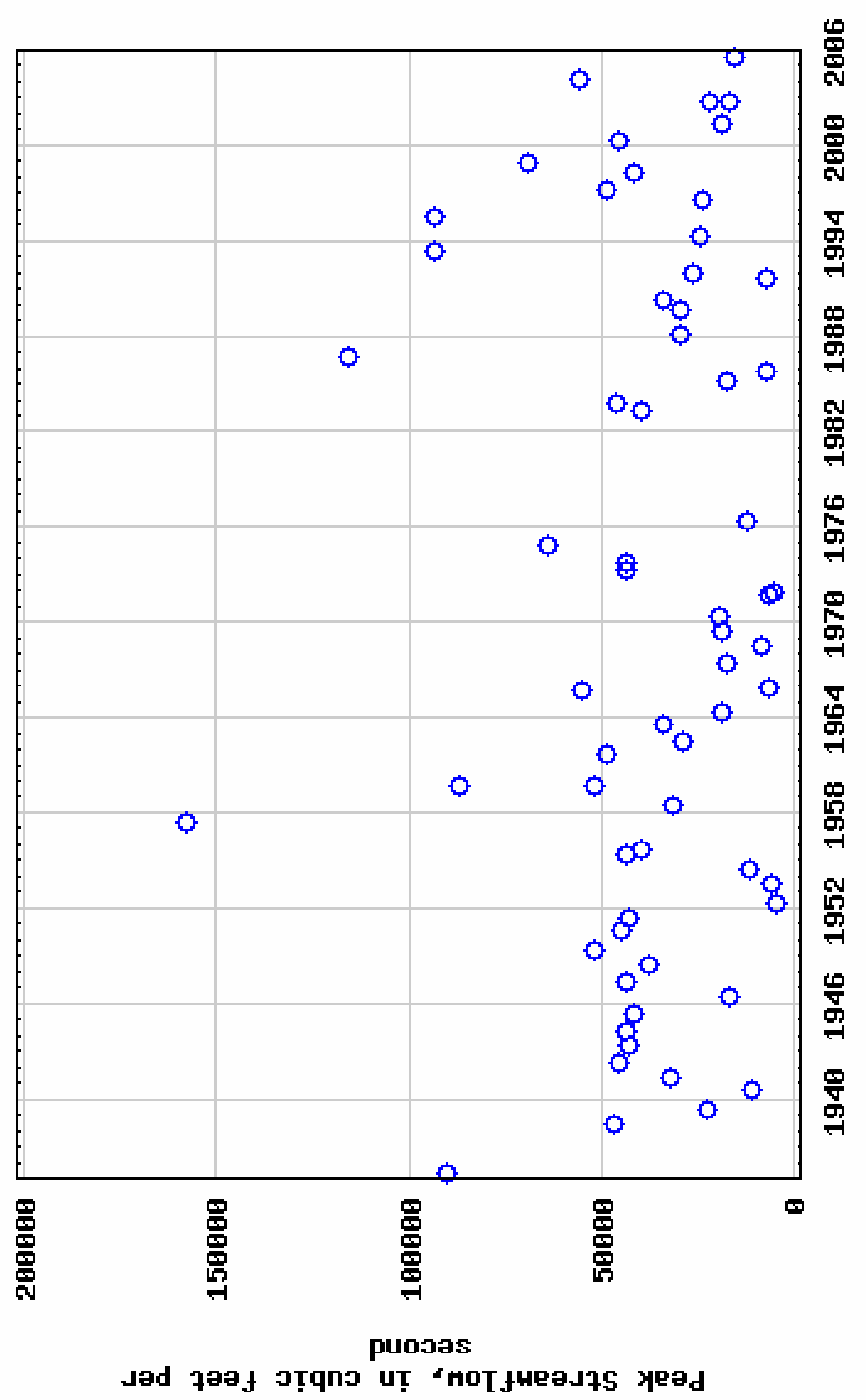



**Figure 5. Annual peak streamflow in Cimarron River at Guthrie (USGS 07160000), OK**

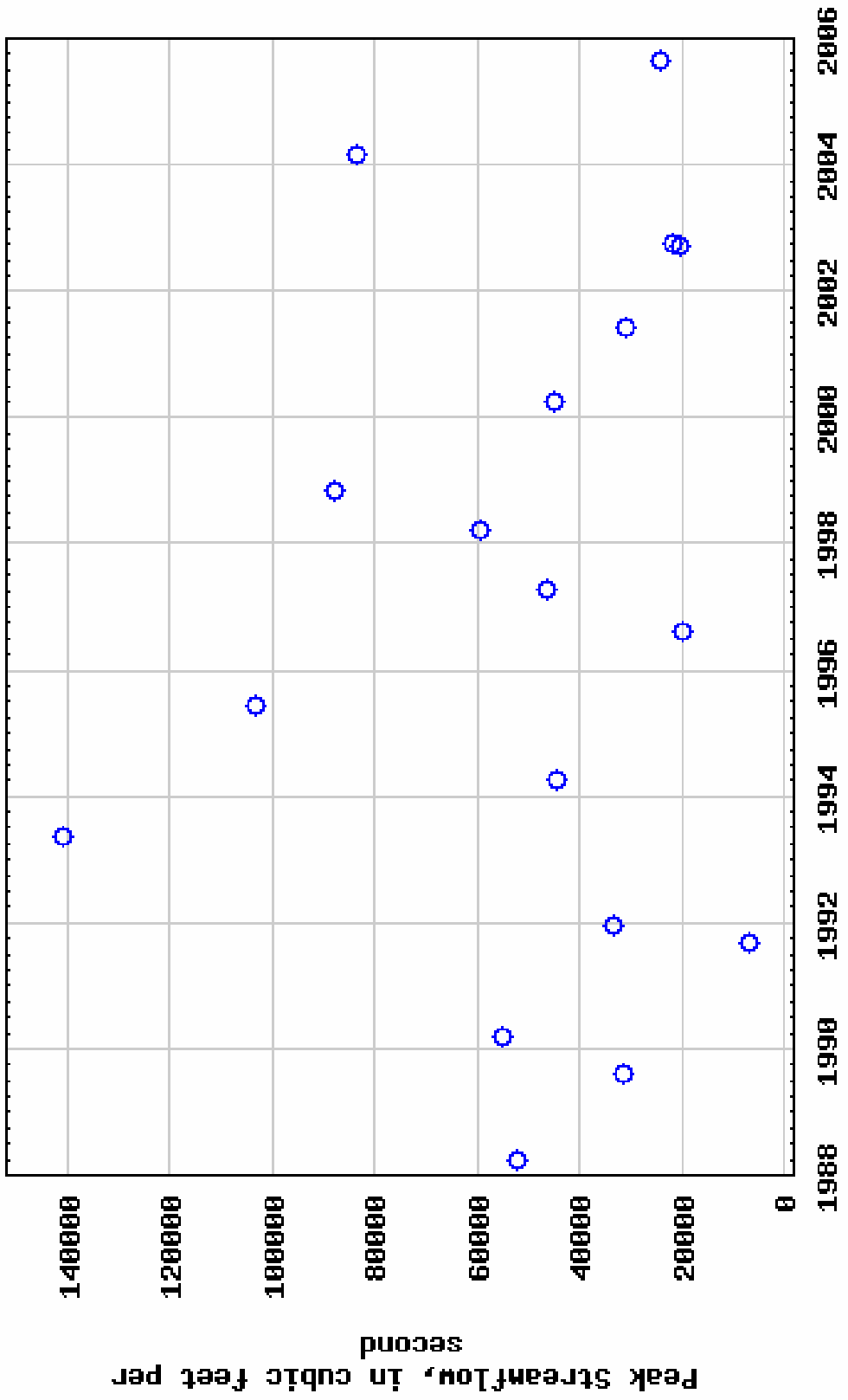



**Figure 6. Annual peak streamflow in Cimarron River at Ripley (USGS 07161450), OK**

Gilvear (1999) studied number of areas of fluvial geomorphology directly relevant and beneficial to river engineering:

1) The river channel as a three dimensional form with longitudinal, transverse, and vertical dimensions (x, y, z-directions) involving changes in morphology and amounts of water and sediment.
2) The fluvial process in response to water and sediment coming from the upstream watersheds.
3) The geomorphic stability of a river system altered by activities such as river training, removing riparian vegetation, land use, and climatic change etc.

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 7 using Geographic Information System (GIS). Sinuosity is defined as a ratio of total length between two river stations along the flowline to shortest length of the channel.

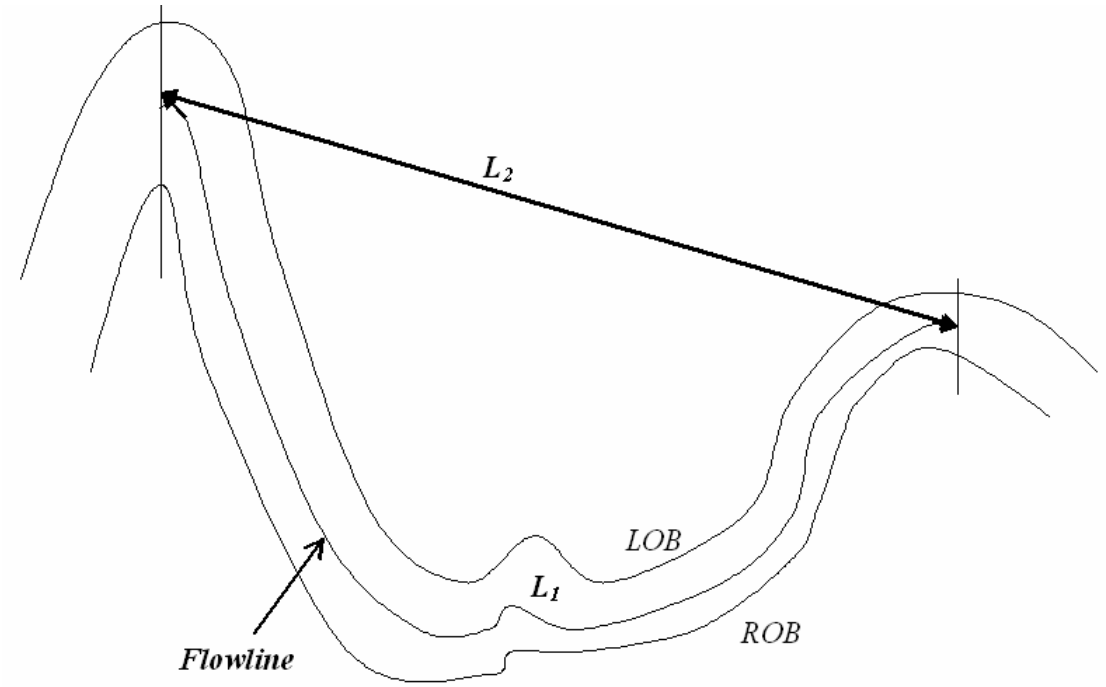
The Cimarron River in Oklahoma is found to be highly meandering (Sinuosity = 1.69) and slope is also found to be high, 3 feet per mile. River-bed geotechnical information for some of the stations was abstracted from construction detail drawings of each bridge crossing provided by Oklahoma Department of Transportation (ODOT). The Cimarron River along the study

reach is underlain primarily by erodible cretaceous sandstones and shales. Longitudinal and vertical changes of river channel-bed were also studied and will be discussed separately in another chapter.

**Table 3. Sinuosity and slope study of Cimarron River**

| Study of whole segment | | Study of River Stations | | |
|---|---|---|---|---|
| **Slope (ft /mile)** | **Sinuosity** | **River stations** | **Slope (ft/mile)** | **Sinuosity** |
| 3 | 1.69 | RS 1 to RS 2 | 5.49 | 1.23 |
| | | RS 2 to RS 3 | 4.53 | 1.36 |
| | | RS 3 to RS 4 | 3.59 | 1.38 |
| | | RS 4 to RS 5 | 4.12 | 1.17 |
| | | RS 5 to RS 6 | 3.76 | 1.36 |
| | | RS 6 to RS 7 | 172.17* | 1.00 |
| | | RS 7 to RS 8 | 2.21 | 1.67 |
| | | RS 8 to RS 9 | 2.45 | 1.27 |
| | | RS 9 to RS 10 | 3.54 | 1.61 |
| | | RS 10 to RS 11 | 180.00* | 0.93 |
| | | RS 11 to RS 12 | 1.87 | 1.41 |
| | | RS 12 to RS 13 | 2.93 | 1.26 |
| | | RS 13 to RS 14 | 1.21 | 1.29 |
| | | RS 14 to RS 15 | 1.27 | 2.01 |
| | | RS 15 to RS 16 | 1.86 | 2.36 |
| | | RS 16 to RS 17 | 2.36 | 1.28 |
| | | RS 17 to RS 18 | 0.23 | 1.62 |

* close bridge points




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

**Figure 7. Schematic diagram of sinuosity of natural channels**

## IV. ANALYSIS OF CROSS-SECTIONAL GEOMETRY

Field data measured over 50 years by ODOT was examined in this study. The historic cross-section data for this study was compiled into a single data set (Tables 8-25, in Appendix). These tables were used to plot cross-sectional geometries (Figs.8-22) and then display channel-bed elevation changes. Throughout the study reach, 18 river stations (RS) were examined. Fifteen structures were analyzed to study cross-sectional geometry and three structures for flowline. All of these structures or river stations (RS 1 to RS 18) are located in bridge crossings.

The study of cross-sectional geometries shows that the river bed-channel upstream of Interstate Highway (IH) 35 (RS 1- RS 9) is fairly aggraded in some areas and fairly degraded in others. As explained by Mussetter (2006), observations along the Cimarron River in the New Mexico-Oklahoma border area clearly show that both channel widening and narrowing may occur without a major change in the elevation of the channel-bed. Channel widening is not evaluated in this study because river station data are located in bridge crossings.

The data collected by ODOT shows channel-bed degradation below Interstate Highway 35 (RS 10- RS 17). The stratum of river-bed below I-35 is characterized by fine sandstone to shale. The maximum degradation along the study reach is recorded to be 15.31 feet at I-35. The stream-bed geology of this site is sandstone for few upper depths and then medium hard red bed. The river-bed degradation is evident for 50 miles downstream of I-35. As the Cimarron

River reaches Keystone Lake, it starts to aggrade and the maximum aggradation of about 17.5 ft is reached at SH 48.

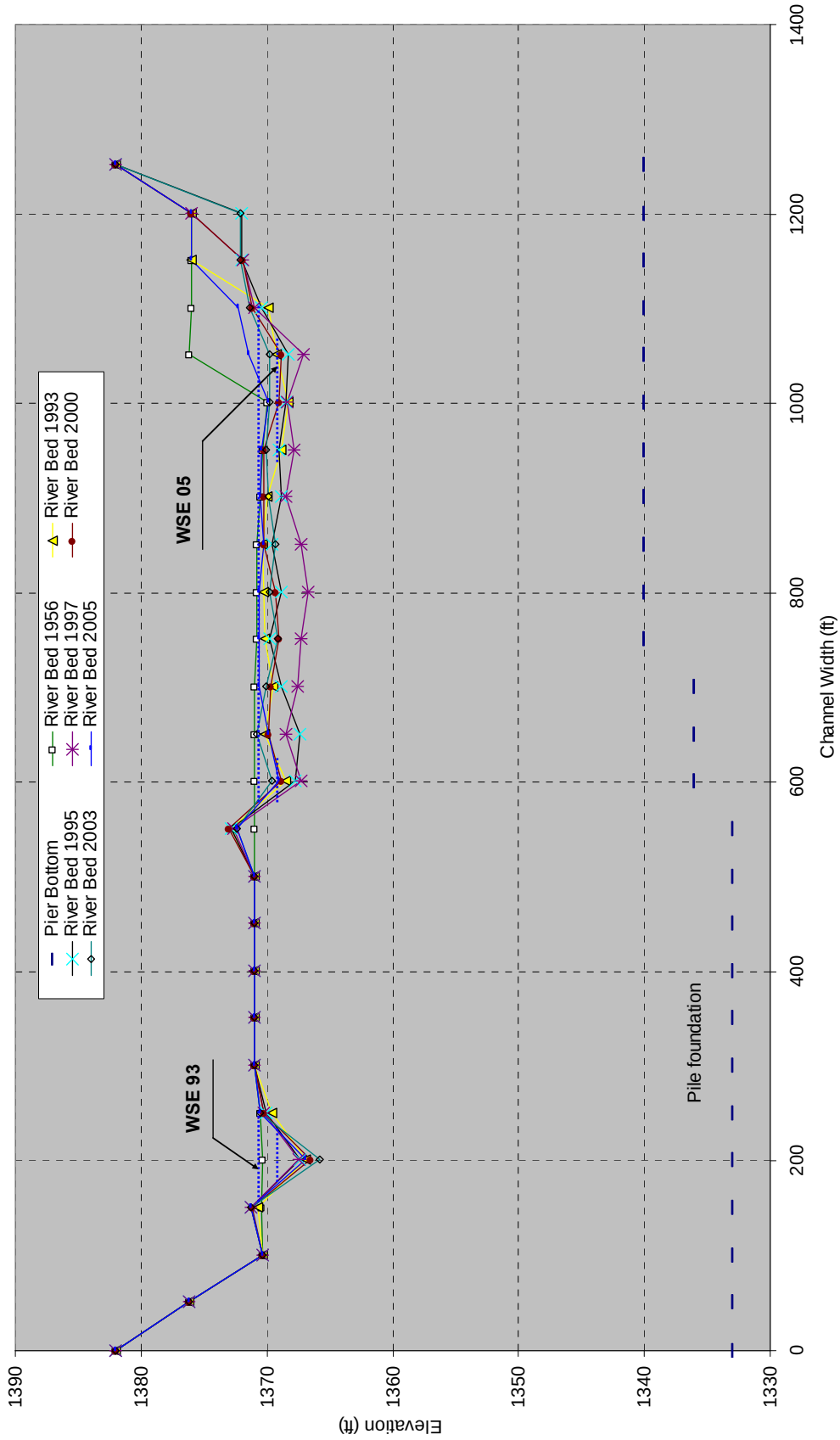



**Figure 8. Cross-section at bridge (Bridge No.13690 and RS 2) on US281, Cimarron River, OK**

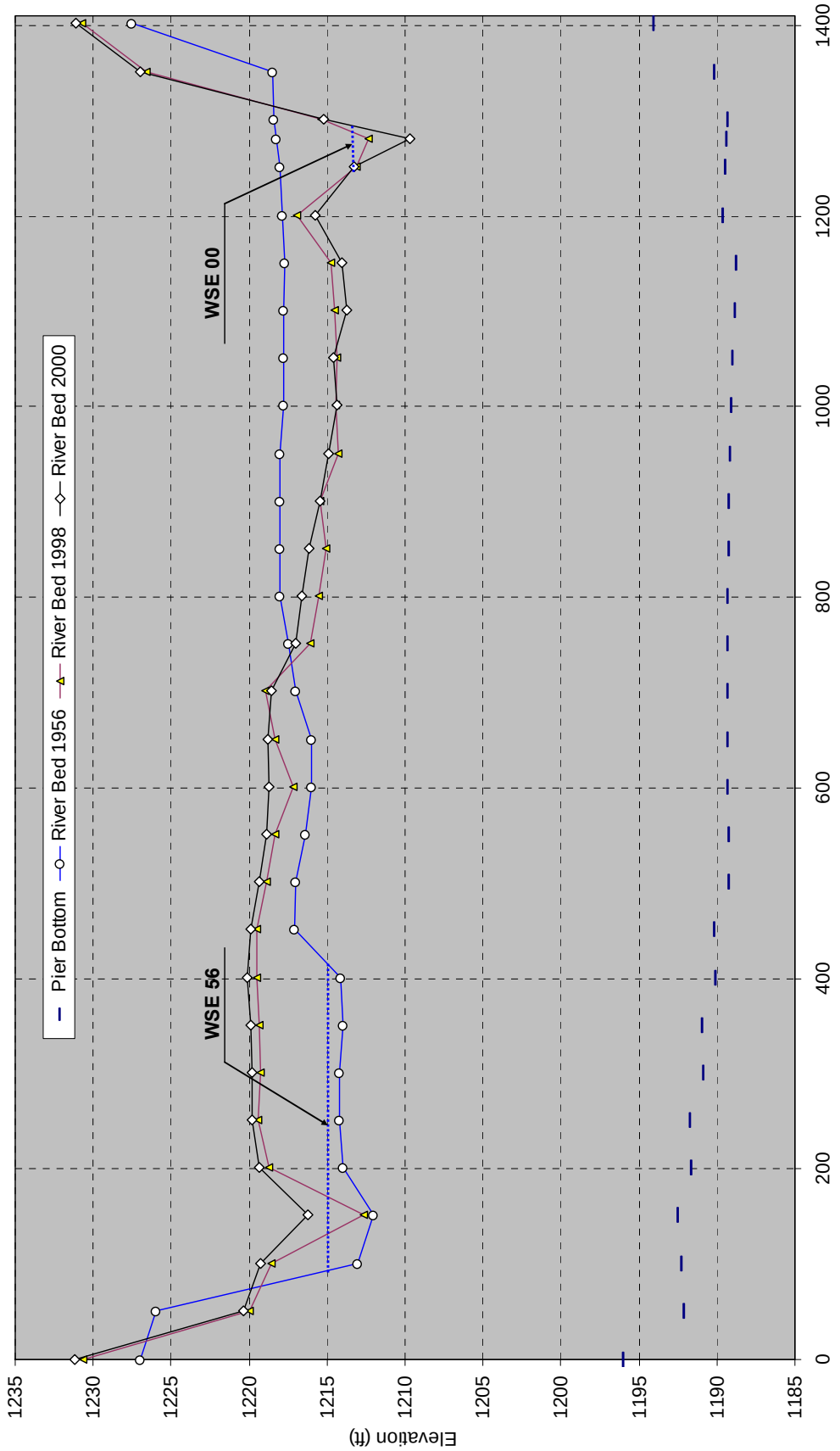



**Figure 9. Cross-section at bridge (Bridge No.13691 and RS 3) on US60, Cimarron River, OK**

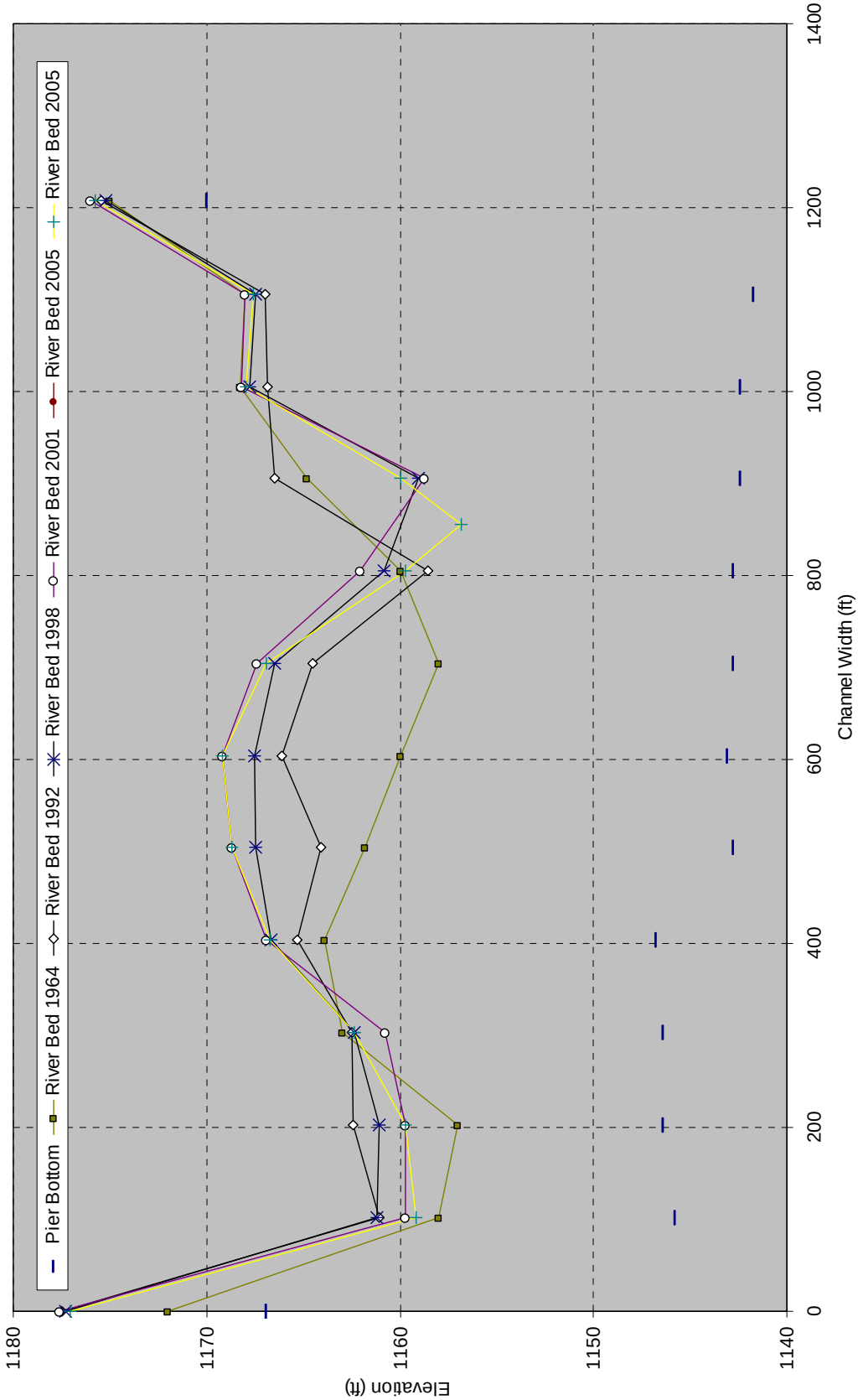



**Figure 10. Cross-section at bridge (Bridge No.16196 and RS 4) on SH 58, Cimarron River, OK**

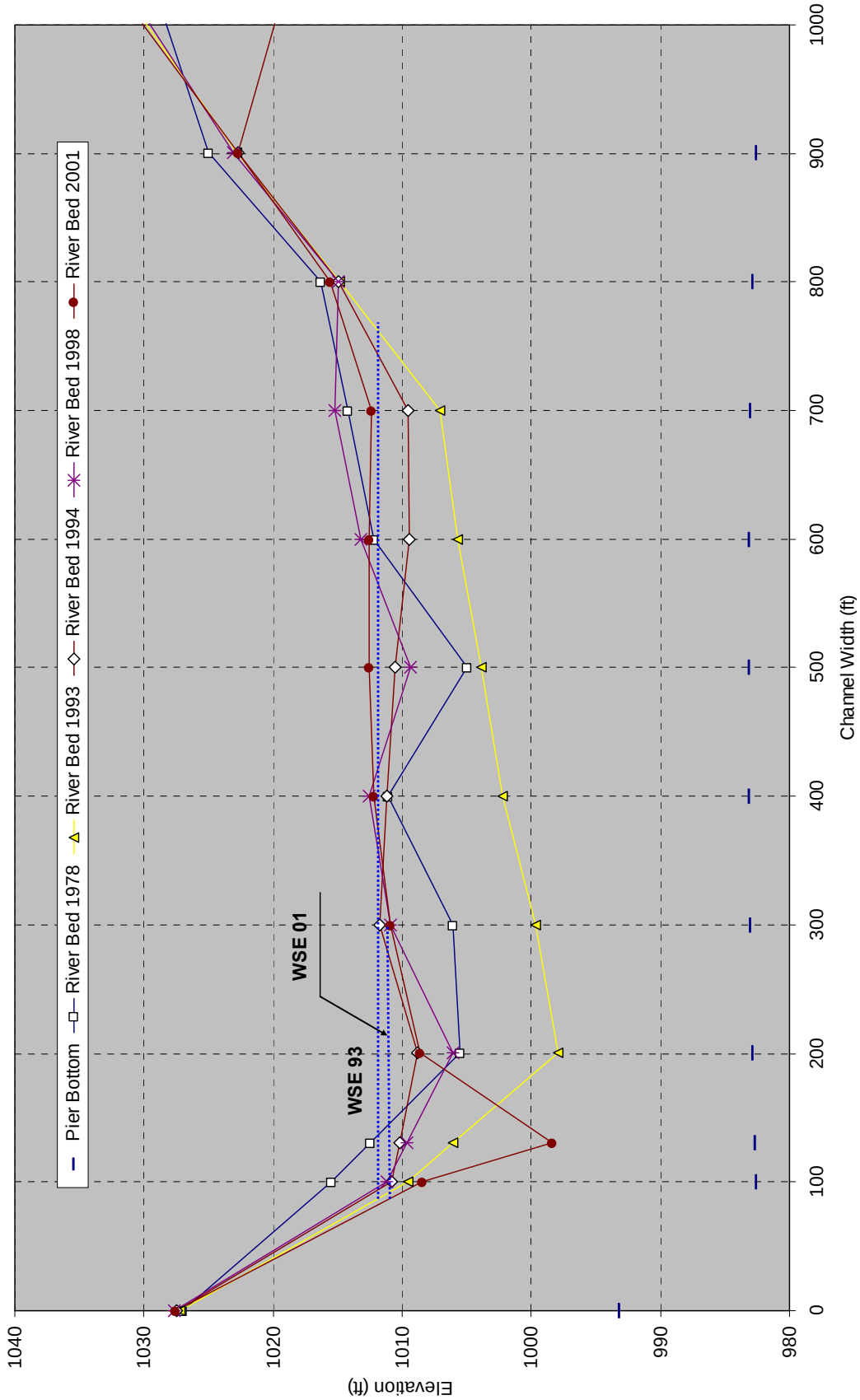



**Figure 11. Cross-section at bridge (Bridge No.19509 and RS 6) on US 81, Cimarron River, OK**

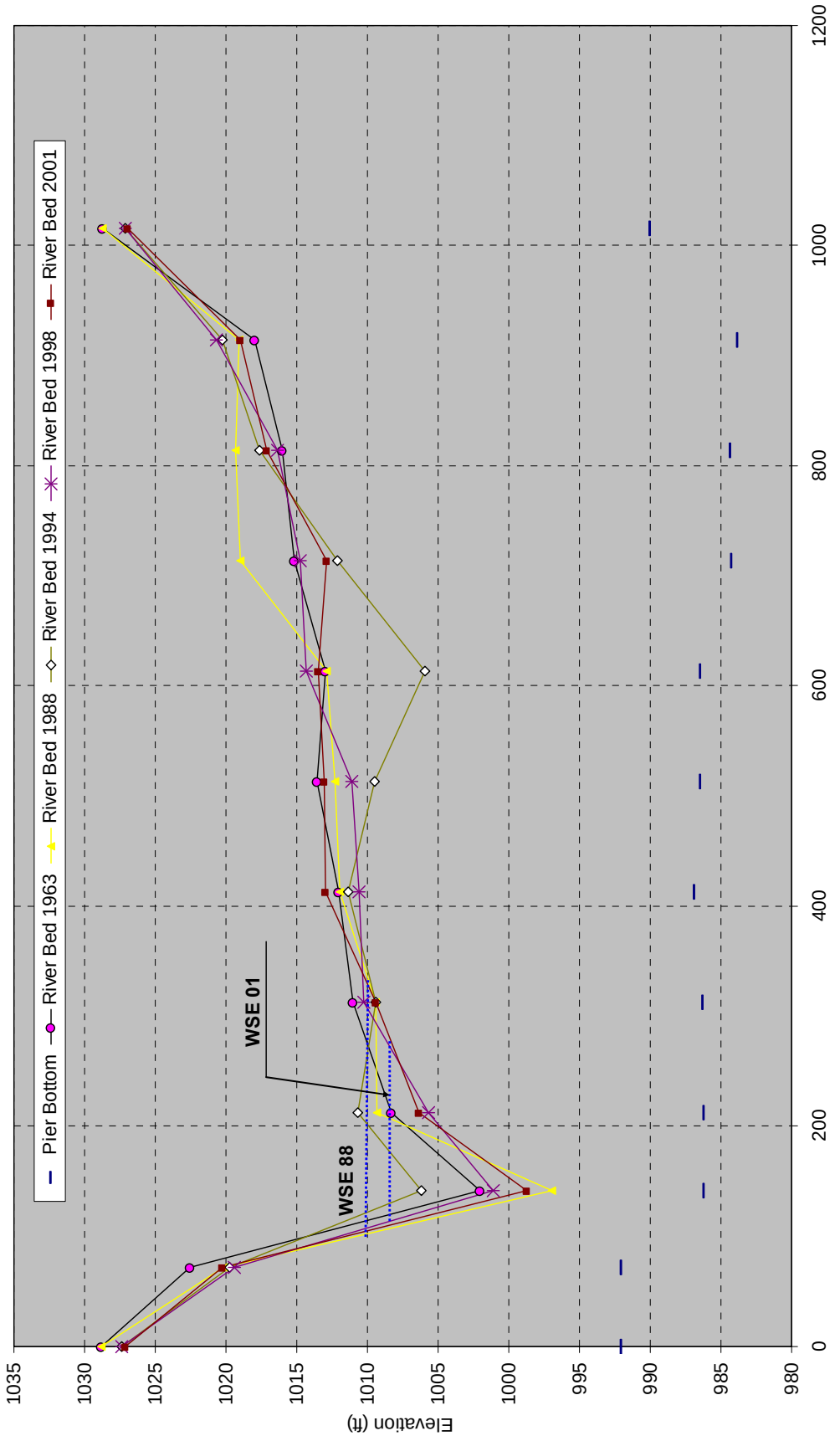



**Figure 12. Cross-section at bridge (Bridge No.15867 and RS 7) on US 81, Cimarron River, OK**

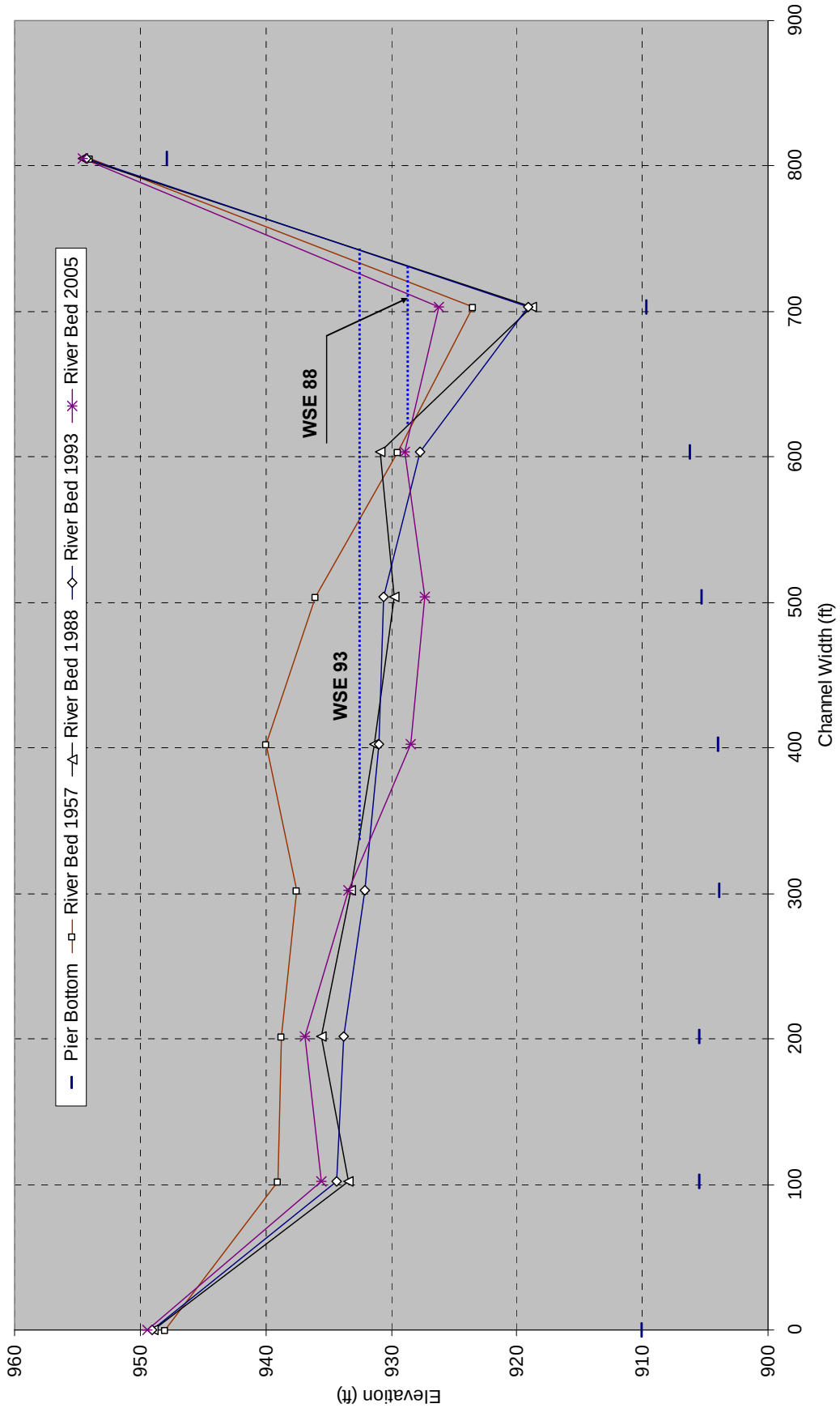



**Figure 13. Cross-section at bridge (Bridge No.13933 and RS 8) on SH 74, Cimarron River, OK**

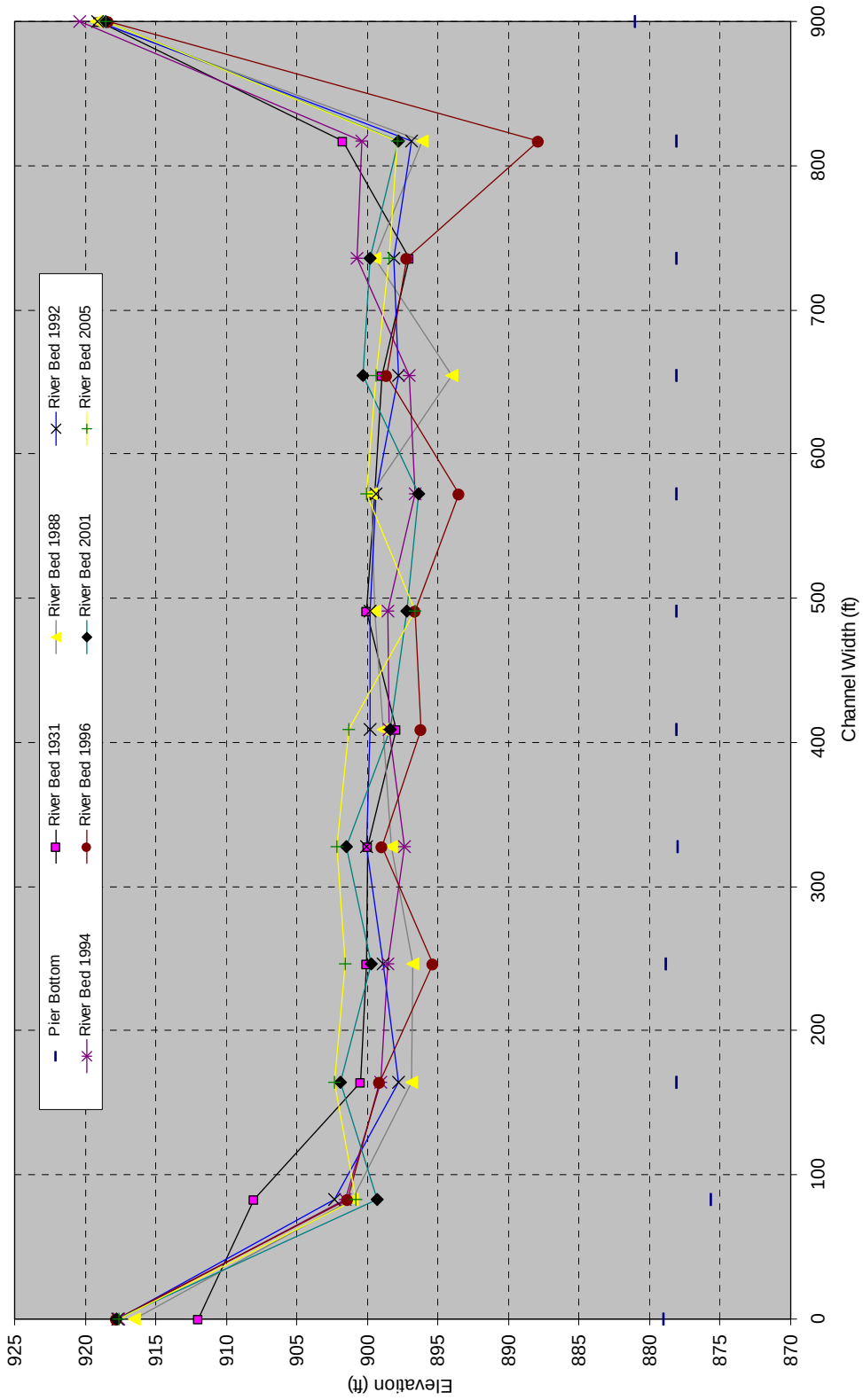



**Figure 14. Cross-section at bridge (Bridge No.03450 and RS 9) on US 77, Cimarron River, OK**

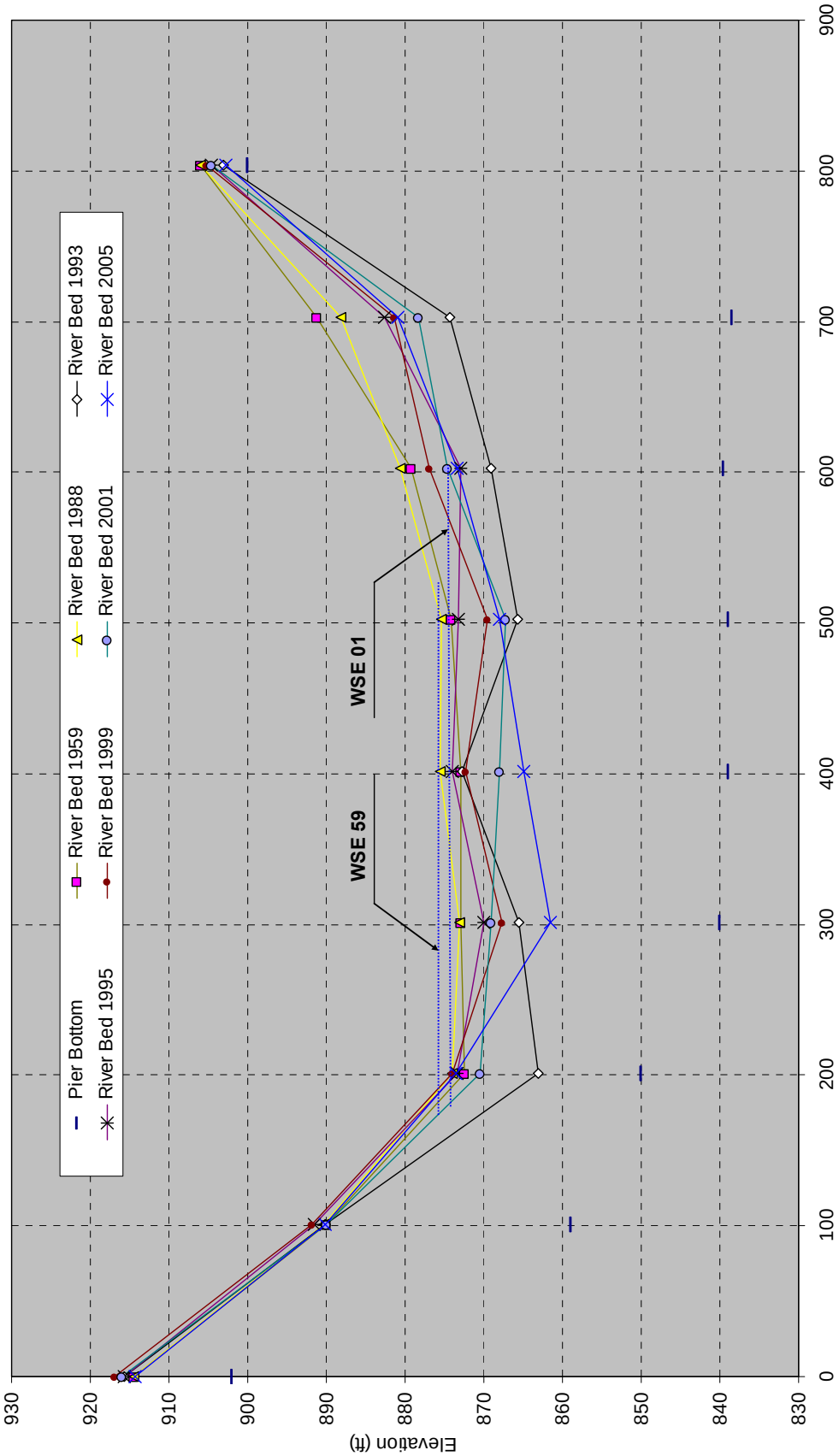



**Figure 15. Cross-section at bridge (Bridge No.14518 and RS 10) on I 35, Cimarron River, OK**

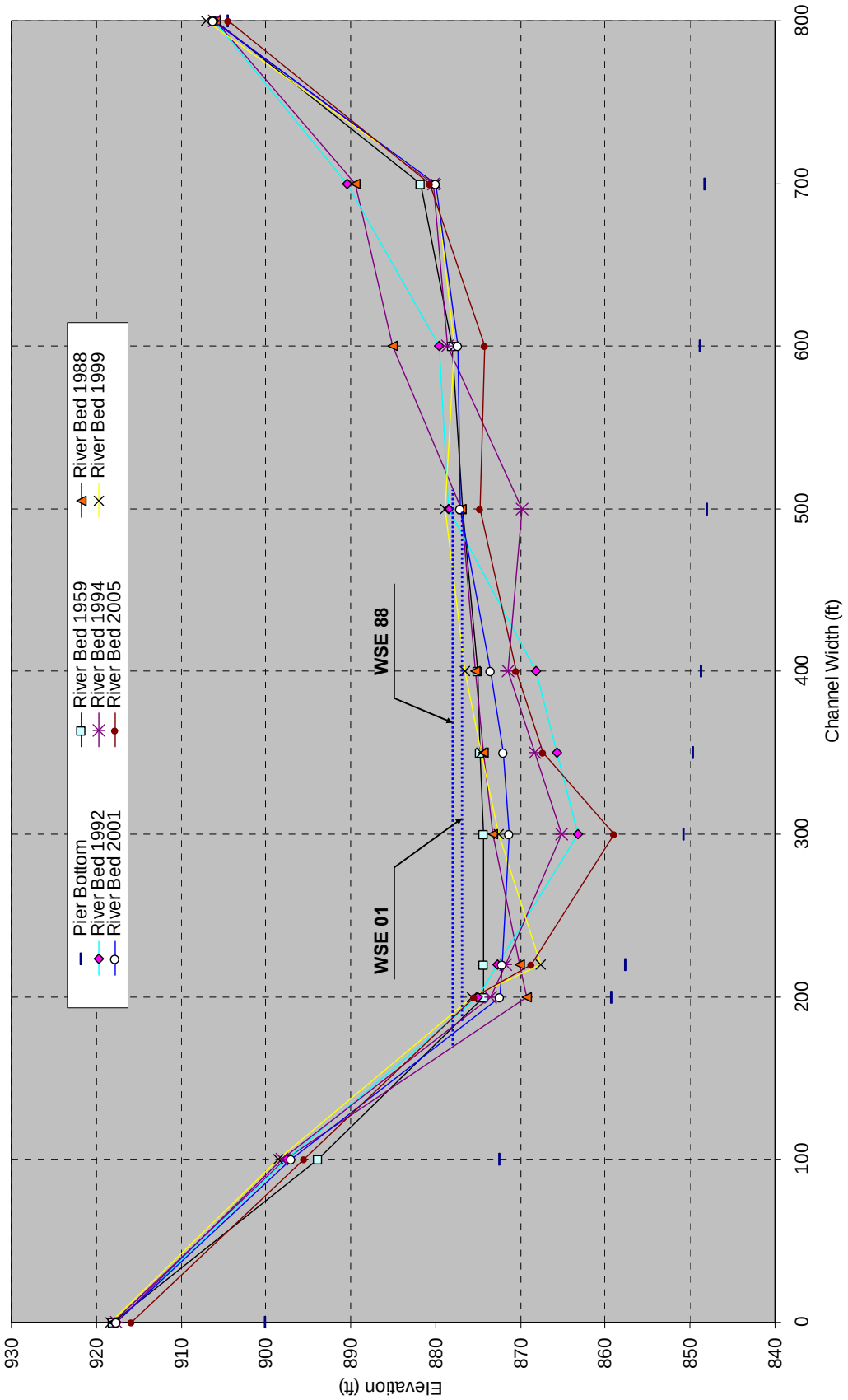



**Figure 16. Cross-section at bridge (Bridge No.14517 and RS 11) on I 35, Cimarron River, OK**

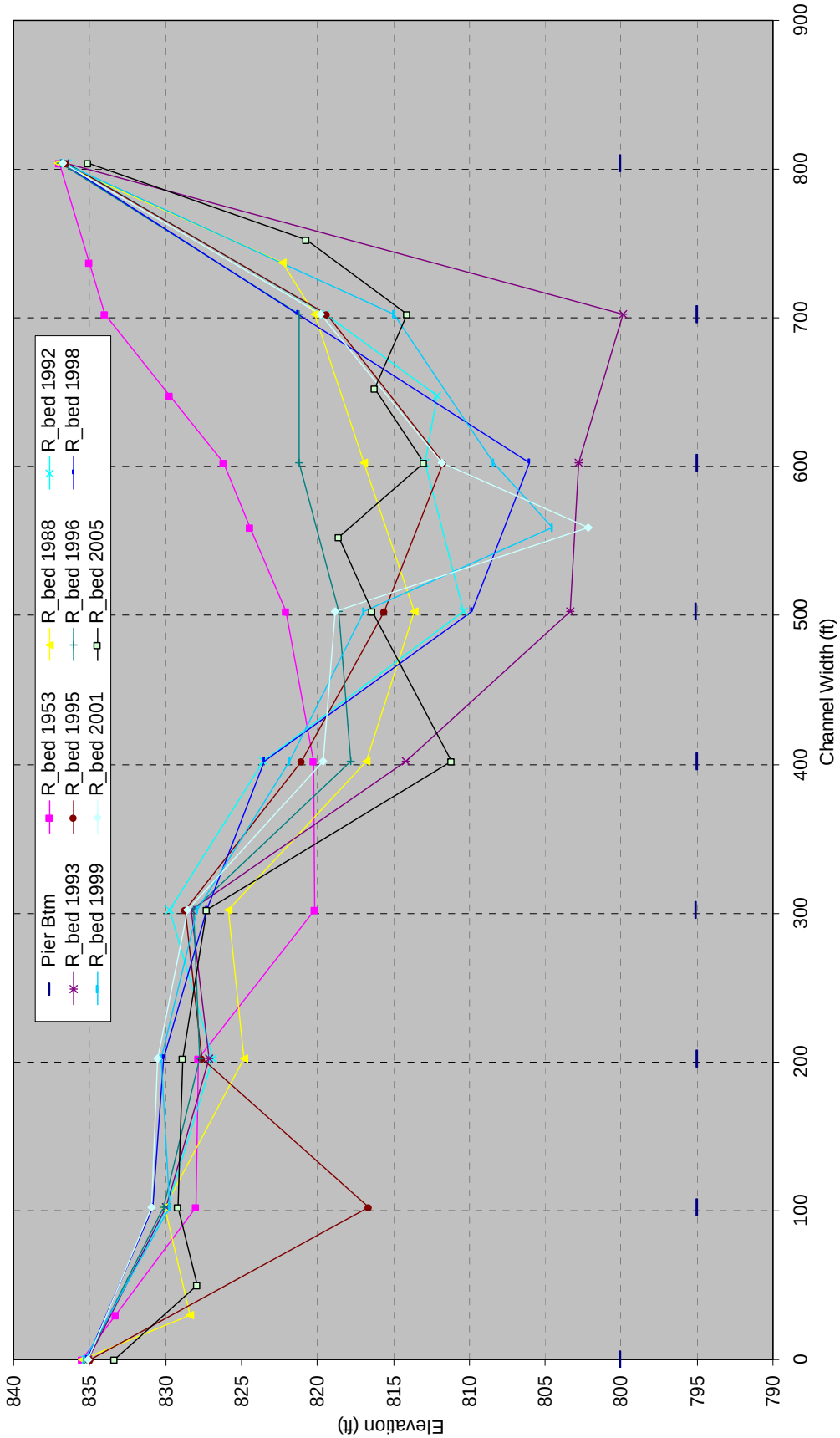



**Figure 17. Cross-section at bridge (Bridge No.13122 and RS 12) on US 177, Cimarron River, OK**

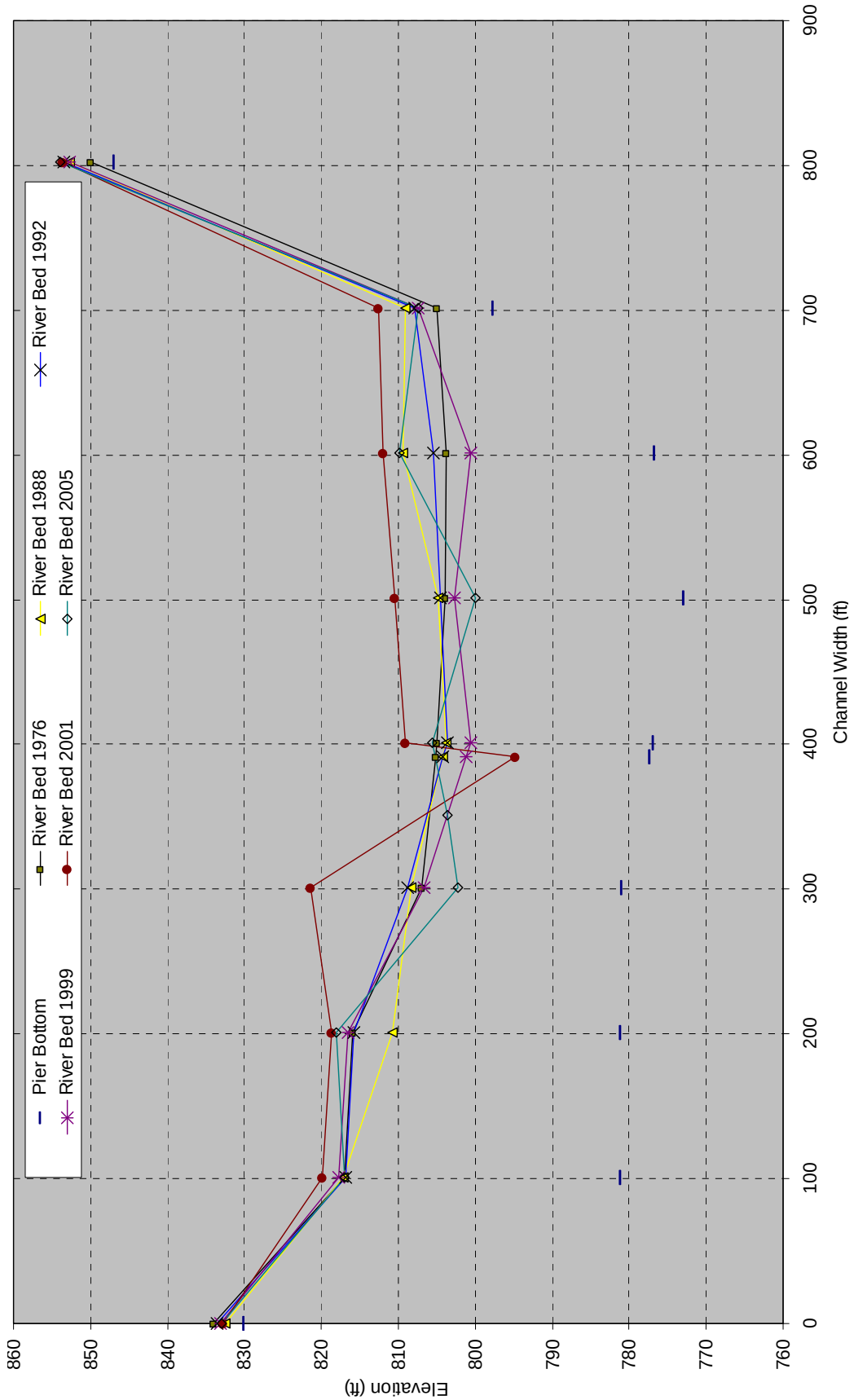



**Figure 18. Cross-section at bridge (Bridge No.19275 RS 13) on SH 33, Cimarron River, OK**

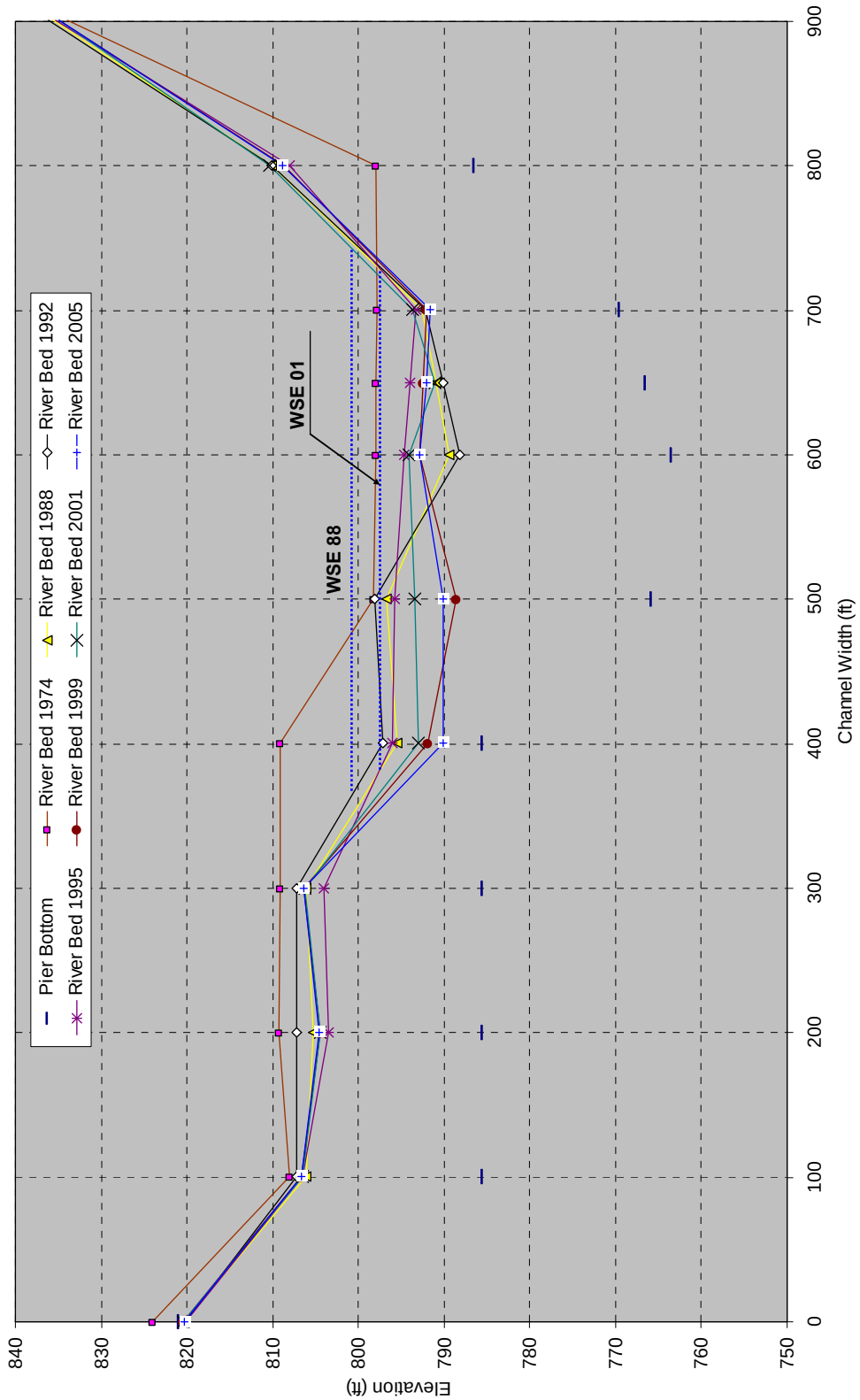



**Figure 19. Cross-section at bridge (Bridge No.18792 and RS 14) on SH 108, Cimarron River, OK**

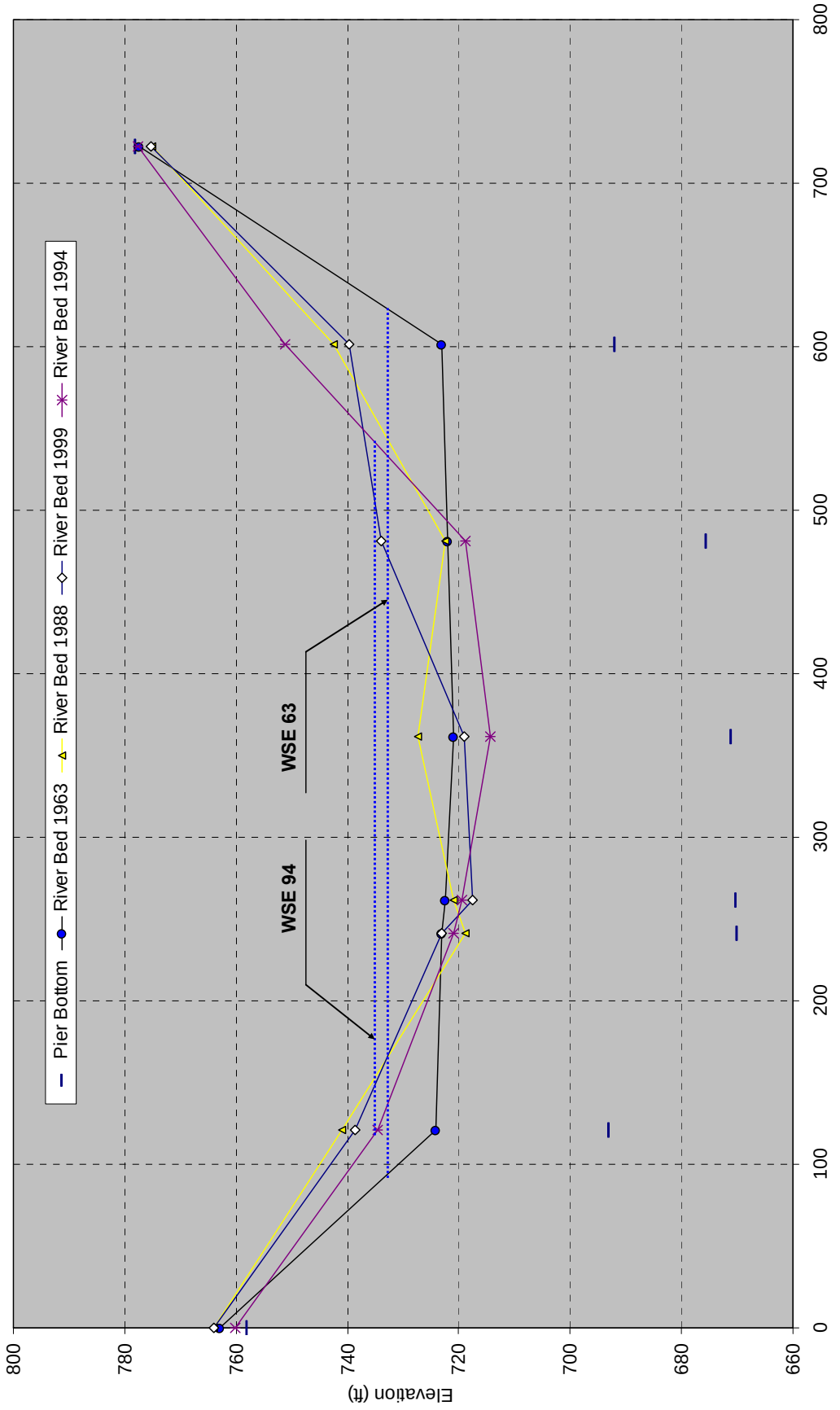



**Figure 20. Cross-section at bridge (Bridge No.15863 and RS 16) on SH 99, Cimarron River, OK**

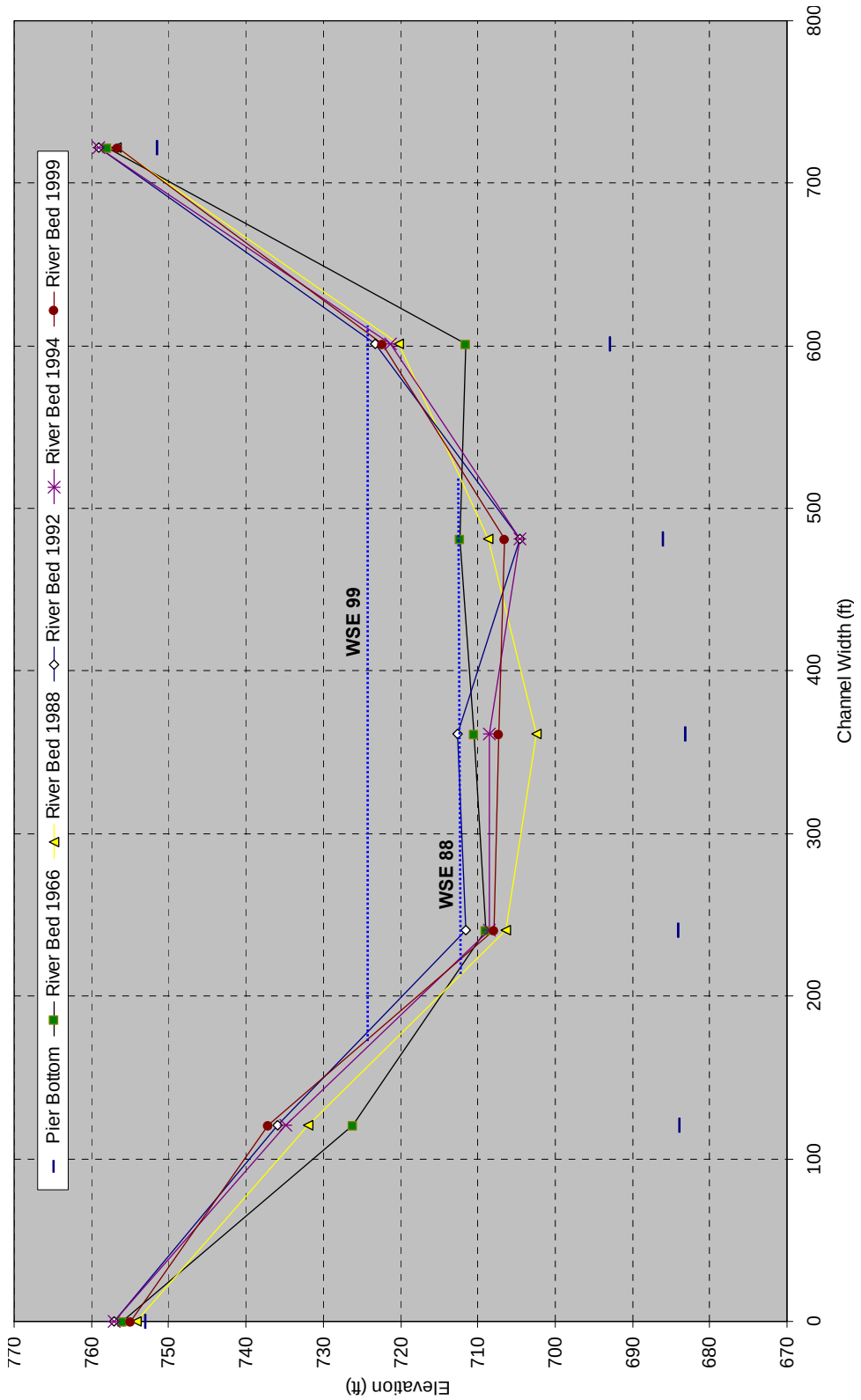



**Figure 21. Cross-section at bridge (Bridge No.16820 and RS 17) on SH 51, Cimarron River, OK**

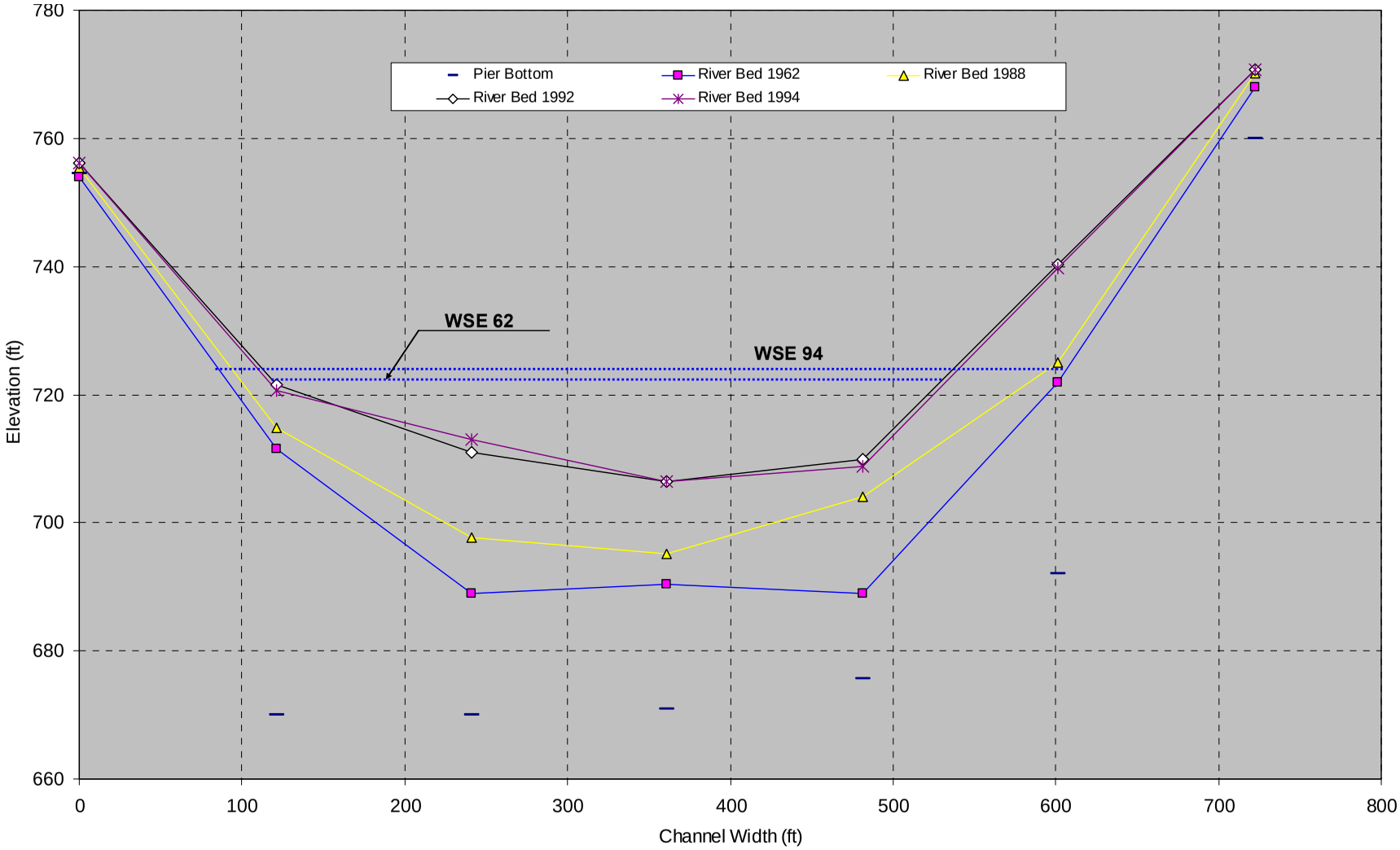



**Figure 22. Cross-section at bridge (Bridge No.15584 and RS 18) on SH 48, Cimarron River, OK**

## 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 4). The trend line of bed-elevation changes (Fig. 23) was plotted for the study reach. The trend shows that degradation is evident below I-35 and aggradation near Keystone Lake, indicates that the fluvial dynamics of the Cimarron River are not stable downstream of I-35.

To describe the nature of degradation phenomena along the Cimarron River, the best fit line of channel-bed elevation change rate was plotted along with the river length in miles. Based on the coefficient of correlation, the $R^2$ value, and the trendlines available in MS Excel, the spline function with sixth order equation was determined as the best fit line with $R^2$ value of 0.72 (Fig. 24).

Flowlines at each river station were interpolated for 5 year intervals from 1965 to 2005 (Table 5) and longitudinal profile of flowlines were then plotted in Microsoft Excel (Figs. 25-36). The study of river-bed elevation change elucidates that the Cimarron River below I-35 is not stable. River Station located at I-35 has experienced the greatest 15.31 feet of channel-bed degradation and 17.42 feet of aggradation at its confluence in the Keystone Lake.

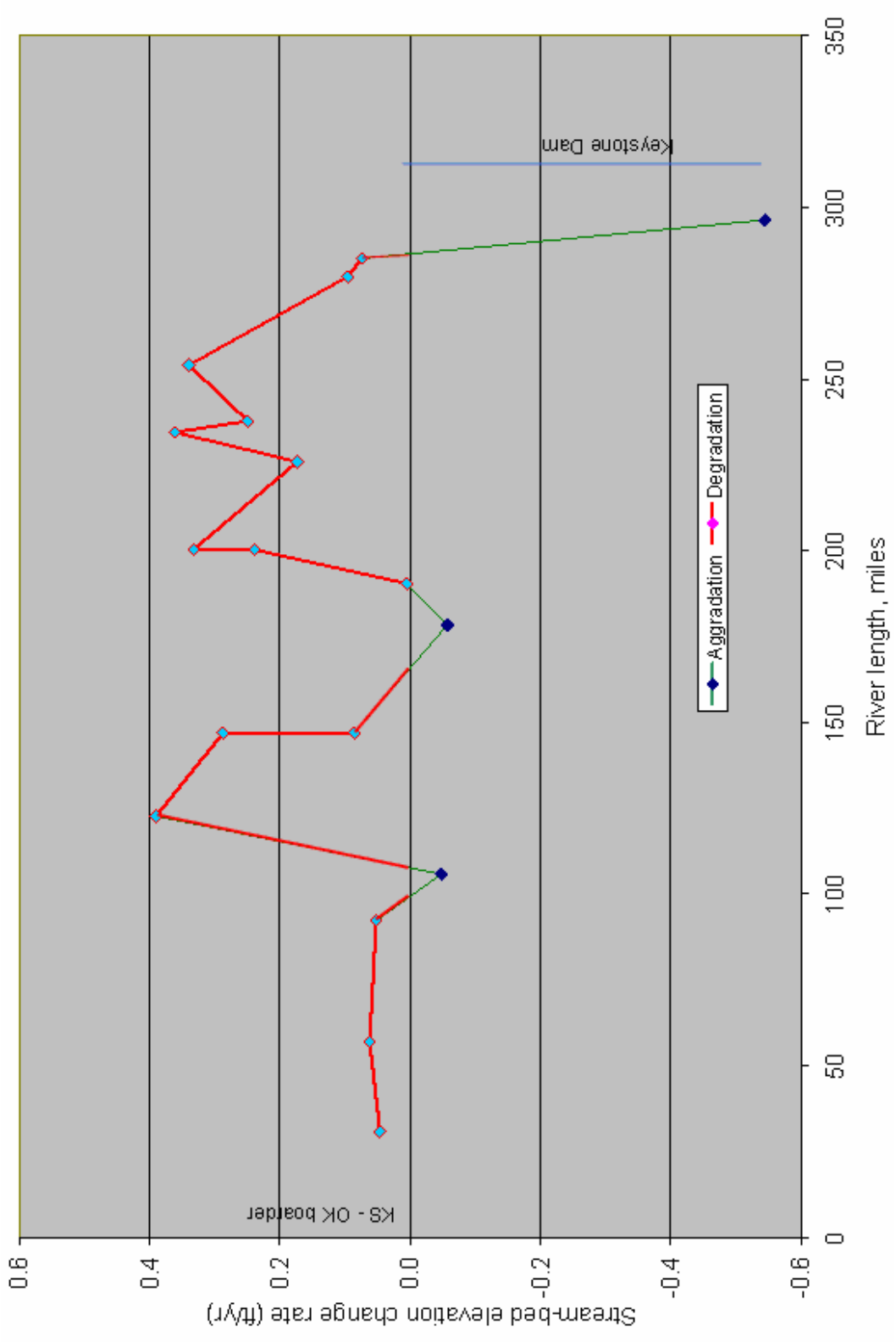



**Figure 23. Trend line of stream-bed elevation changes**

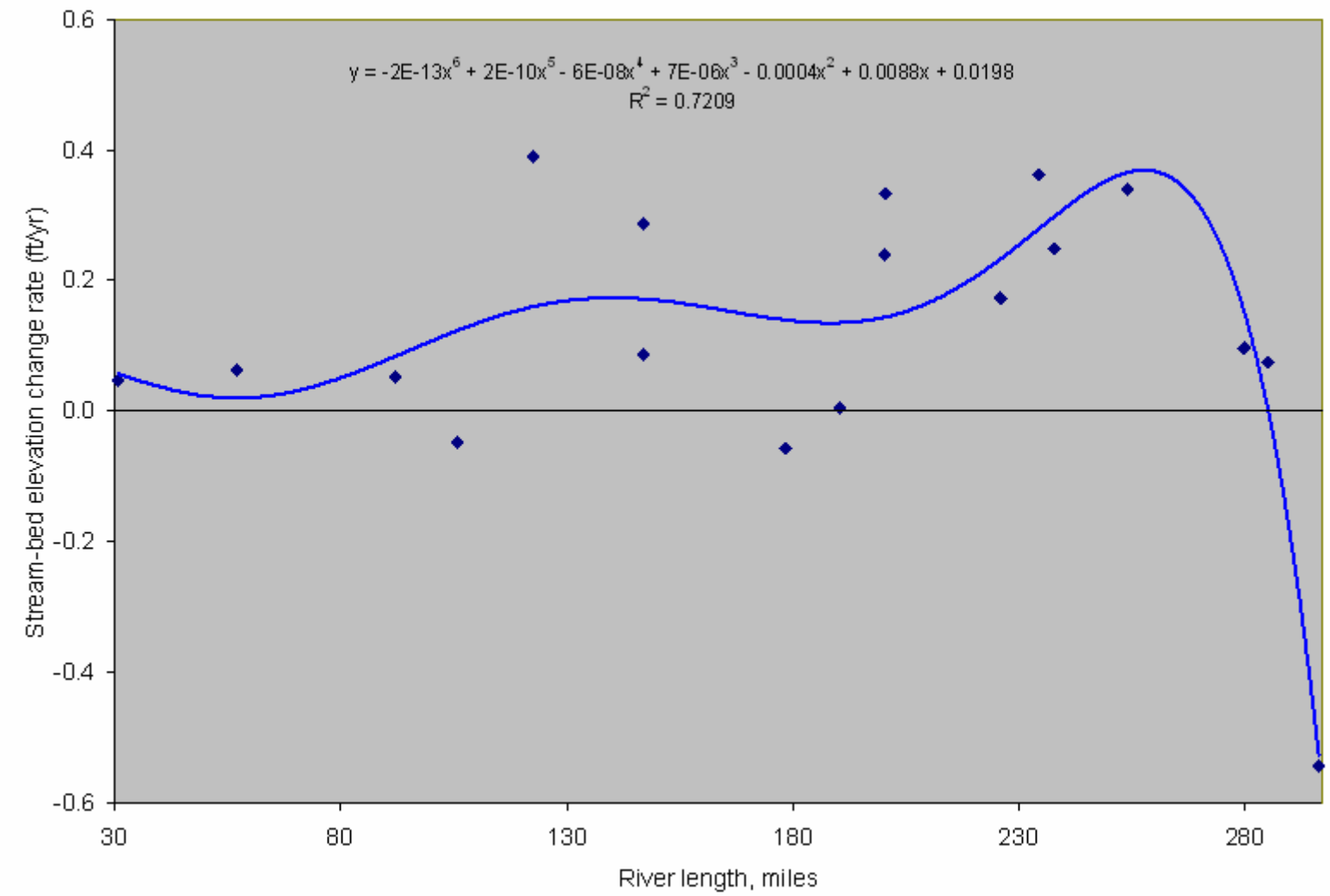



**Figure 24. The best fit line of stream-bed elevation change rate (ft/yr) versus river length in miles**

**Table 4. Summary – River bed elevation change rate – Cimarron River**

| Bridge No. | River Station | Miles | Bridge Installed | Highway | Stratum | Max. scour** (ft) | Duration (yr) | Scour Rate** (ft/yr) |
|---|---|---|---|---|---|---|---|---|
| *19364 | RS1 | 30.82 | 1977 | SH 50 | Sand to red bed | 1.20 | 26 | 0.046 |
| 13690 | RS2 | 56.95 | 1956 | US 281 | Sand to red bed | 3.06 | 49 | 0.062 |
| 13691 | RS3 | 92.18 | 1956 | US 60 | Sand to hard red bed | 2.30 | 44 | 0.052 |
| 16196 | RS4 | 105.81 | 1964 | SH 58 | Sand to red shale | -1.77 | 37 | -0.048 |
| *26904 | RS5 | 122.64 | 2003 | SH 51 | Sand to red shale | 1.17 | 3 | 0.390 |
| 19509 | RS6 | 146.86 | 1978 | US 81 | Sand to hard red bed | 6.61 | 23 | 0.287 |
| 15867 | RS7 | 146.88 | 1963 | US 81 | Sand to hard red bed | 3.27 | 38 | 0.086 |
| 13933 | RS8 | 178.28 | 1957 | SH 74 | Sand stone | -2.74 | 48 | -0.057 |
| 3450 | RS9 | 190.38 | 1931 | US 77 | Red bed shale | 0.40 | 74 | 0.005 |
| 14518 | RS10 | 200.28 | 1959 | I-35 | Sand to red bed | 10.99 | 46 | 0.239 |
| 14517 | RS11 | 200.29 | 1959 | I-35 | Sand to med. Hard red | 15.31 | 46 | 0.333 |
| 13122 | RS12 | 225.88 | 1953 | US 177 | Sand to red bed | 9.00 | 52 | 0.173 |
| 19275 | RS13 | 234.45 | 1976 | SH 33 | Fine sand to hard shale | 9.05 | 25 | 0.362 |
| 18792 | RS14 | 237.77 | 1974 | SH 108 | Fine sand to hard | 7.73 | 31 | 0.249 |
| *13238 | RS15 | 254.02 | 2004 | SH 18 | Sandstone to shale | 0.68 | 2 | 0.340 |
| 15863 | RS16 | 279.81 | 1963 | SH 99 | Sandstone to shale | 3.45 | 36 | 0.096 |
| 16820 | RS17 | 285.08 | 1966 | SH 51 | Sand to med. Hard shale | 2.45 | 33 | 1.074 |
| 15584 | RS18 | 296.24 | 1962 | SH 48 | Sandstone to shale | -17.42 | 32 | -0.544 |

*Bridges without cross section data

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

**Table 5. Interpolated flowline data for 5 years interval – Cimarron River**

| B-key | River Station | Miles | 1965 | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19364 | RS1 | 30.817 | 1511.00 | 1511.0 | 1511.00 | 1513.20 | 1511.00 | 1511.45 | 1512.00 | 1508.90 | 1510.40 |
| 13690 | RS2 | 56.953 | 1373.40 | 1370.7 | 1371.66 | 1372.50 | 1370.40 | 1371.17 | 1367.34 | 1366.54 | 1366.94 |
| 13691 | RS3 | 92.184 | 1212.48 | 1212.7 | 1213.02 | 1213.29 | 1213.50 | 1212.50 | 1212.08 | 1209.70 | 1207.32 |
| 16196 | RS4 | 105.812 | 1161.90 | 1162.5 | 1163.10 | 1162.82 | 1161.20 | 1158.40 | 1158.56 | 1158.86 | 1158.41 |
| 26904 | RS5 | 122.643 | | | | | | | | 1091.62 | 1089.10 |
| 19509 | RS6 | 146.864 | 1005.00 | 1005.0 | 1005.00 | 1004.38 | 1010.40 | 1010.20 | 1003.78 | 1003.53 | 998.13 |
| 15867 | RS7 | 146.879 | 1001.59 | 1000.5 | 999.57 | 998.55 | 997.54 | 1002.08 | 999.95 | 999.53 | 995.54 |
| 13933 | RS8 | 178.283 | 928.10 | 921.30 | 923.39 | 925.48 | 925.30 | 927.54 | 920.92 | 925.35 | 926.24 |
| 3450 | RS9 | 190.375 | 902.00 | 901.20 | 901.38 | 901.56 | 902.50 | 889.70 | 879.83 | 894.71 | 896.60 |
| 14518 | RS10 | 200.275 | 871.98 | 871.55 | 869.80 | 866.82 | 869.69 | 870.35 | 864.79 | 867.44 | 861.51 |
| 14517 | RS11 | 200.289 | 873.68 | 873.16 | 863.96 | 863.42 | 866.45 | 873.79 | 863.45 | 869.48 | 858.99 |
| 13122 | RS12 | 225.88 | 806.00 | 808.50 | 811.00 | 809.67 | 809.86 | 810.20 | 811.72 | 803.33 | 811.20 |
| 19275 | RS13 | 234.451 | 803.80 | 803.80 | 803.80 | 809.67 | 805.97 | 803.19 | 786.66 | 797.64 | 786.06 |
| 18792 | RS14 | 237.767 | 797.20 | 797.20 | 797.20 | 794.22 | 791.24 | 788.80 | 7936.25 | 789.85 | 790.07 |
| 27568 | RS15 | 254.015 | | | | | | | | 772.82 | 769.42 |
| 15863 | RS16 | 279.809 | 721.76 | 723.67 | 721.67 | 723.50 | 721.97 | 720.97 | 715.01 | 718.18 | 721.36 |
| 16820 | RS17 | 285.076 | 708.84 | 709.97 | 707.55 | 709.30 | 711.05 | 711.55 | 704.95 | 706.95 | 708.95 |
| 15584 | RS18 | 296.242 | 688.45 | 687.72 | 694.72 | 697.72 | 700.72 | 701.72 | 706.42 | 706.42 | 706.42 |

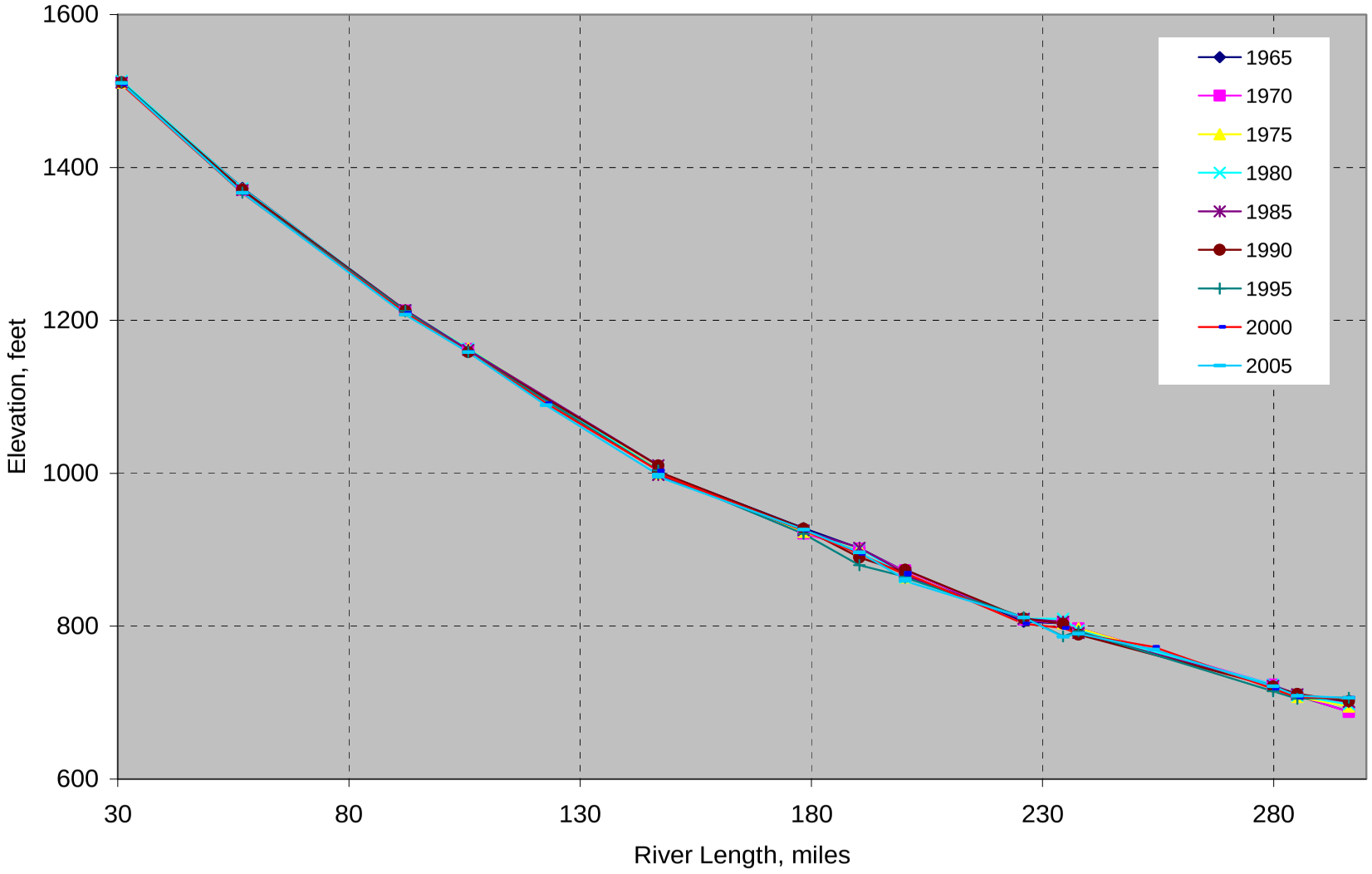



**Figure 25. Longitudinal profile of Cimarron River bed, Oklahoma**

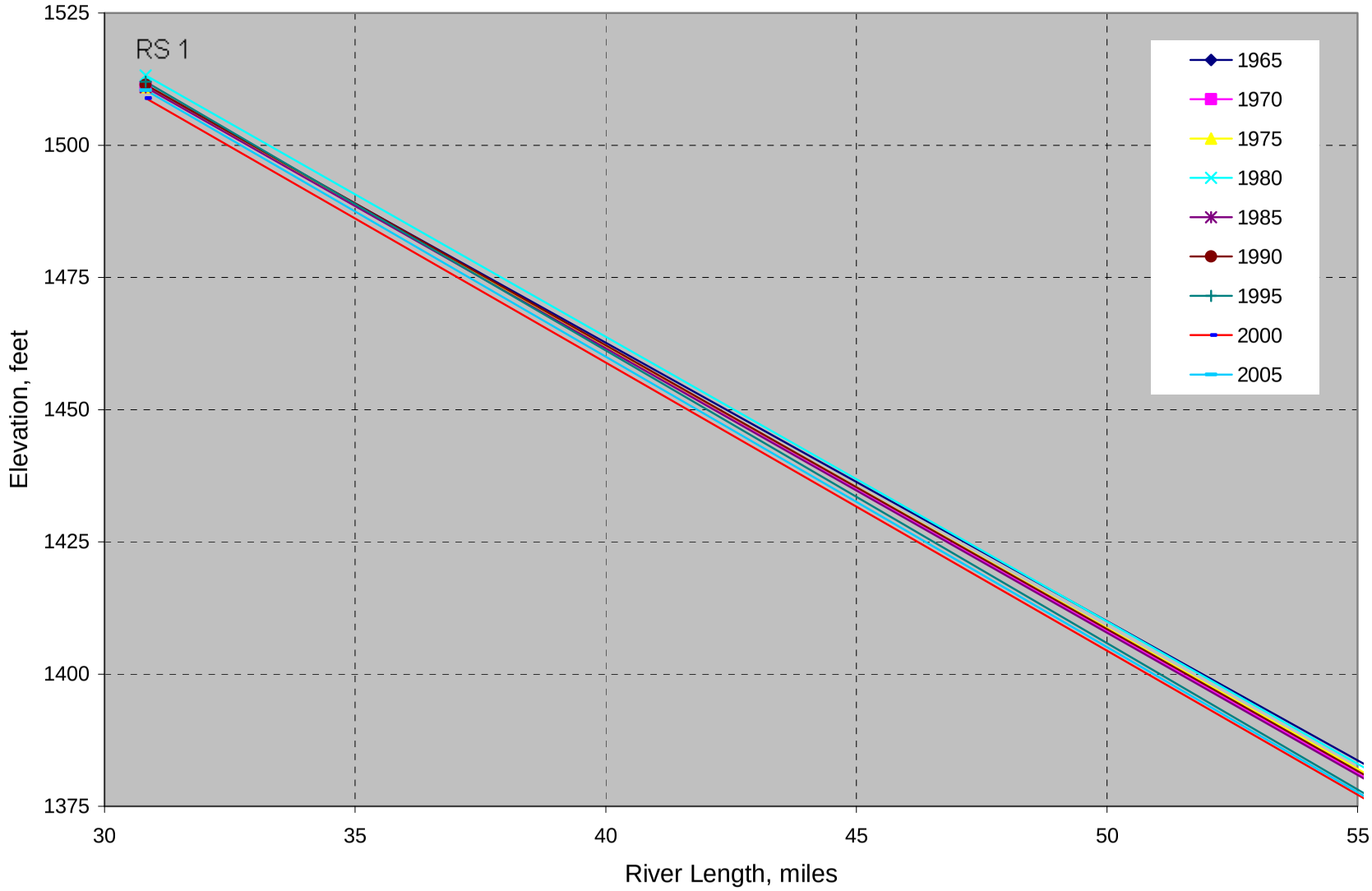



**Figure 26. Longitudinal profile of Cimarron River bed, Oklahoma**

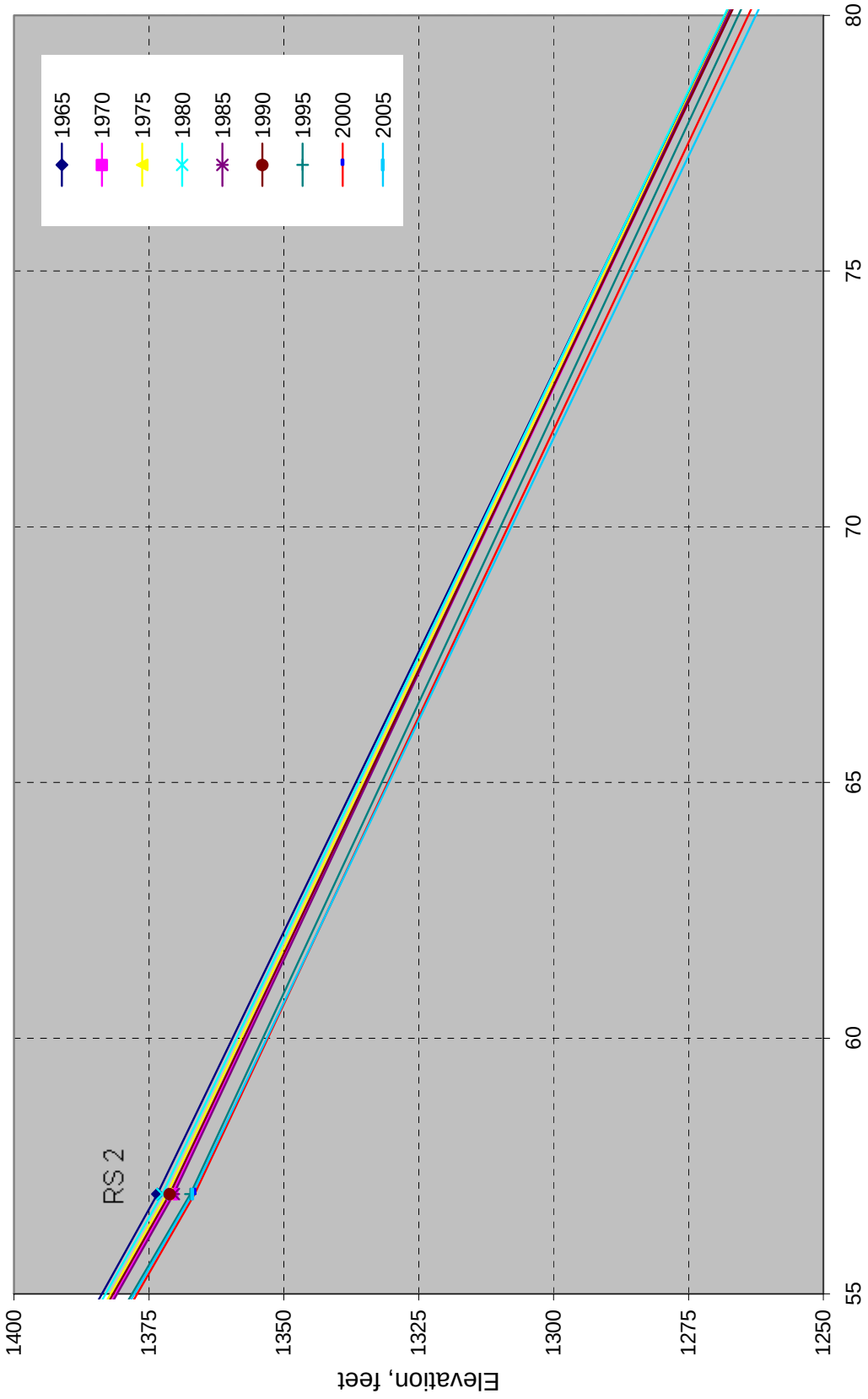



**Figure 27. Longitudinal profile of Cimarron River bed, Oklahoma**

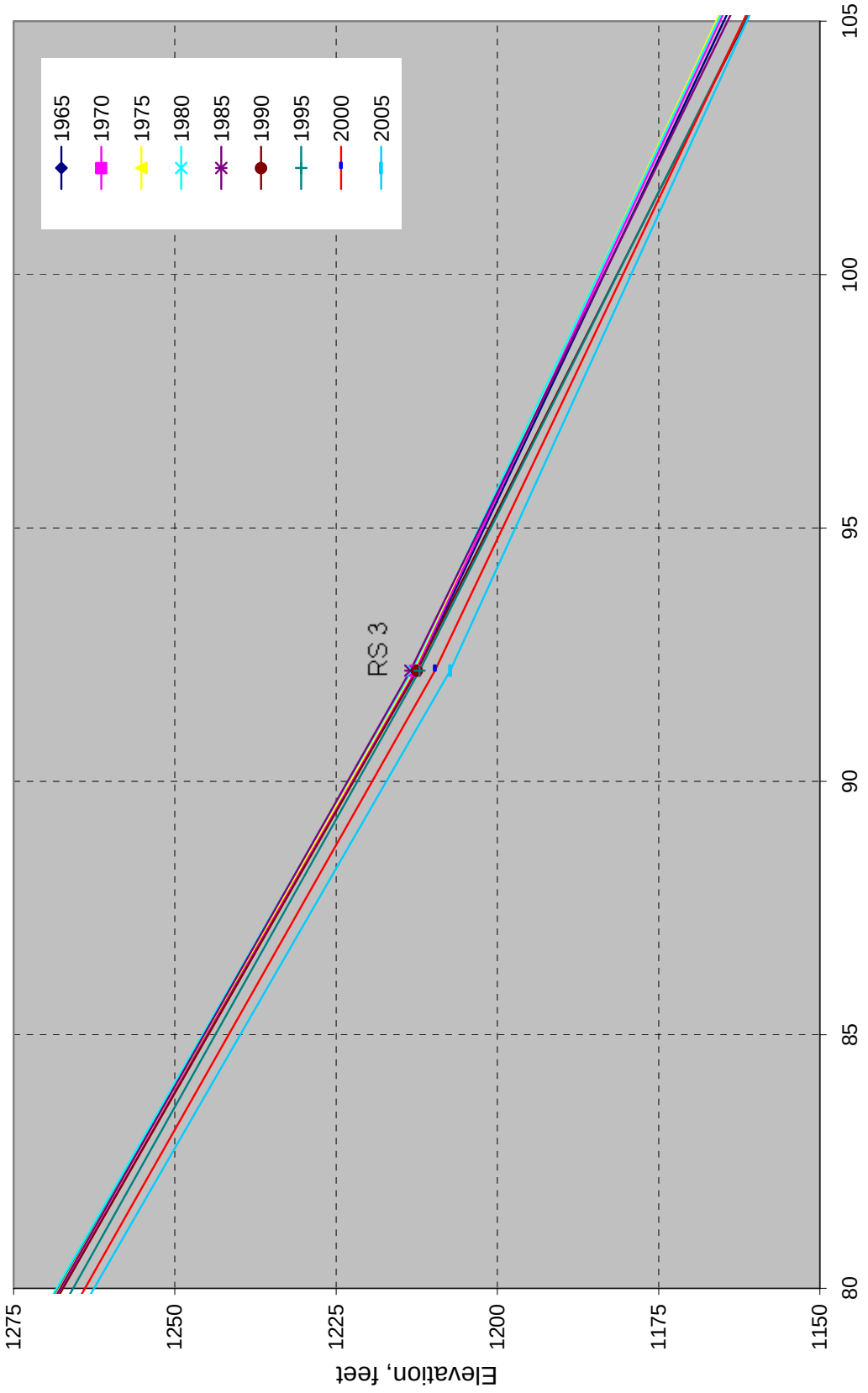



**Figure 28. Longitudinal profile of Cimarron River bed, Oklahoma**

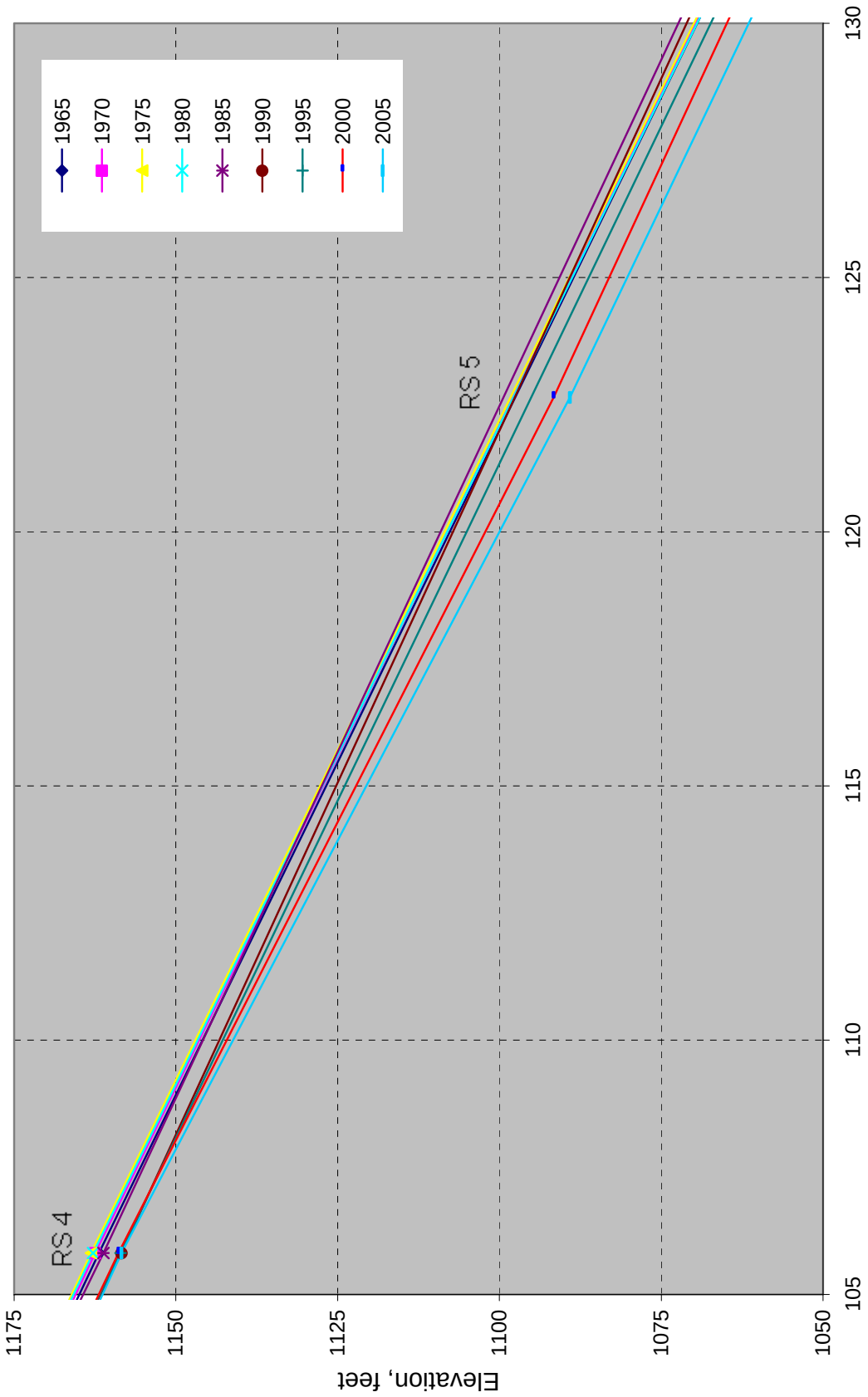



**Figure 29. Longitudinal profile of Cimarron River bed, Oklahoma**

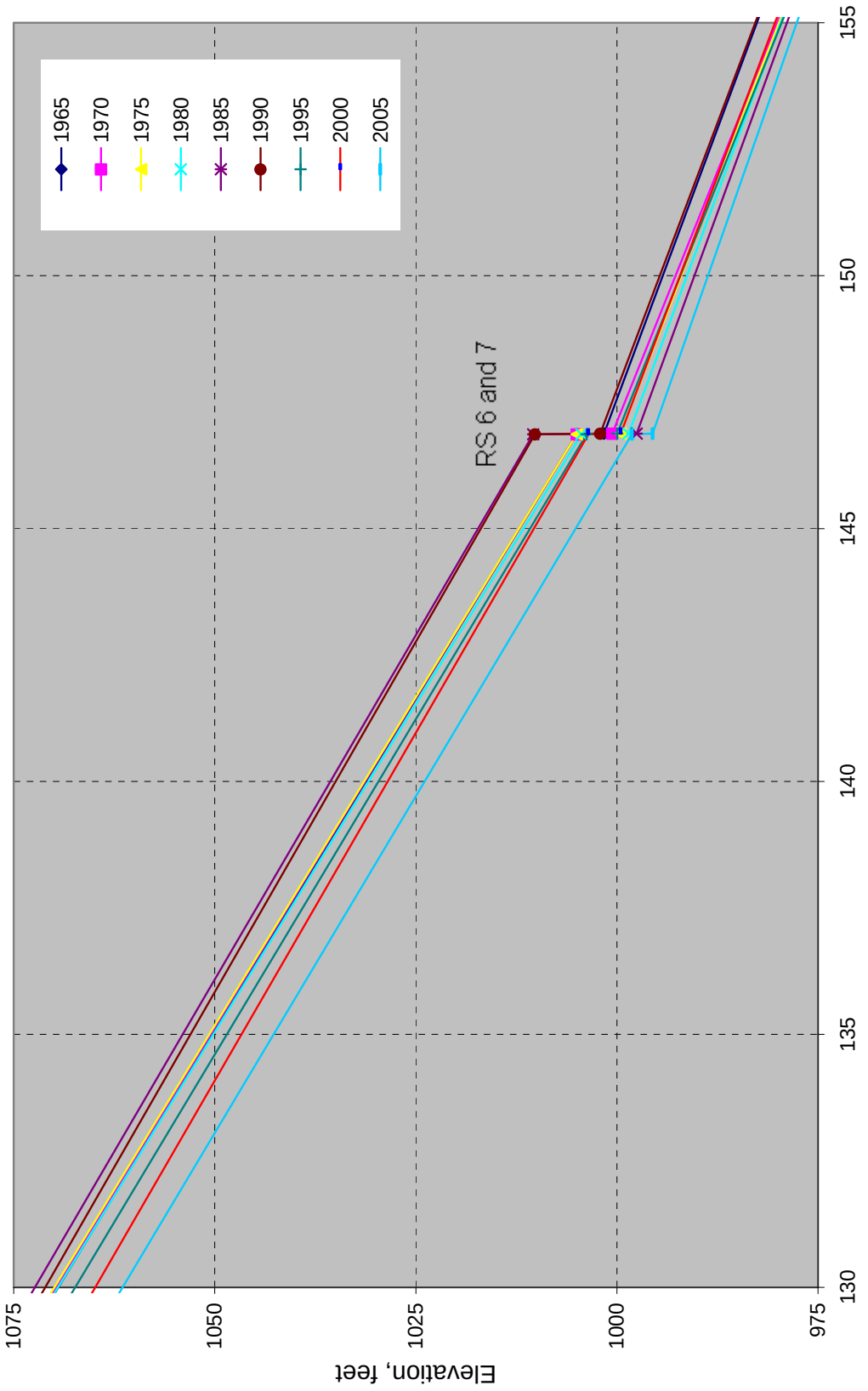



**Figure 30. Longitudinal profile of Cimarron River bed, Oklahoma**

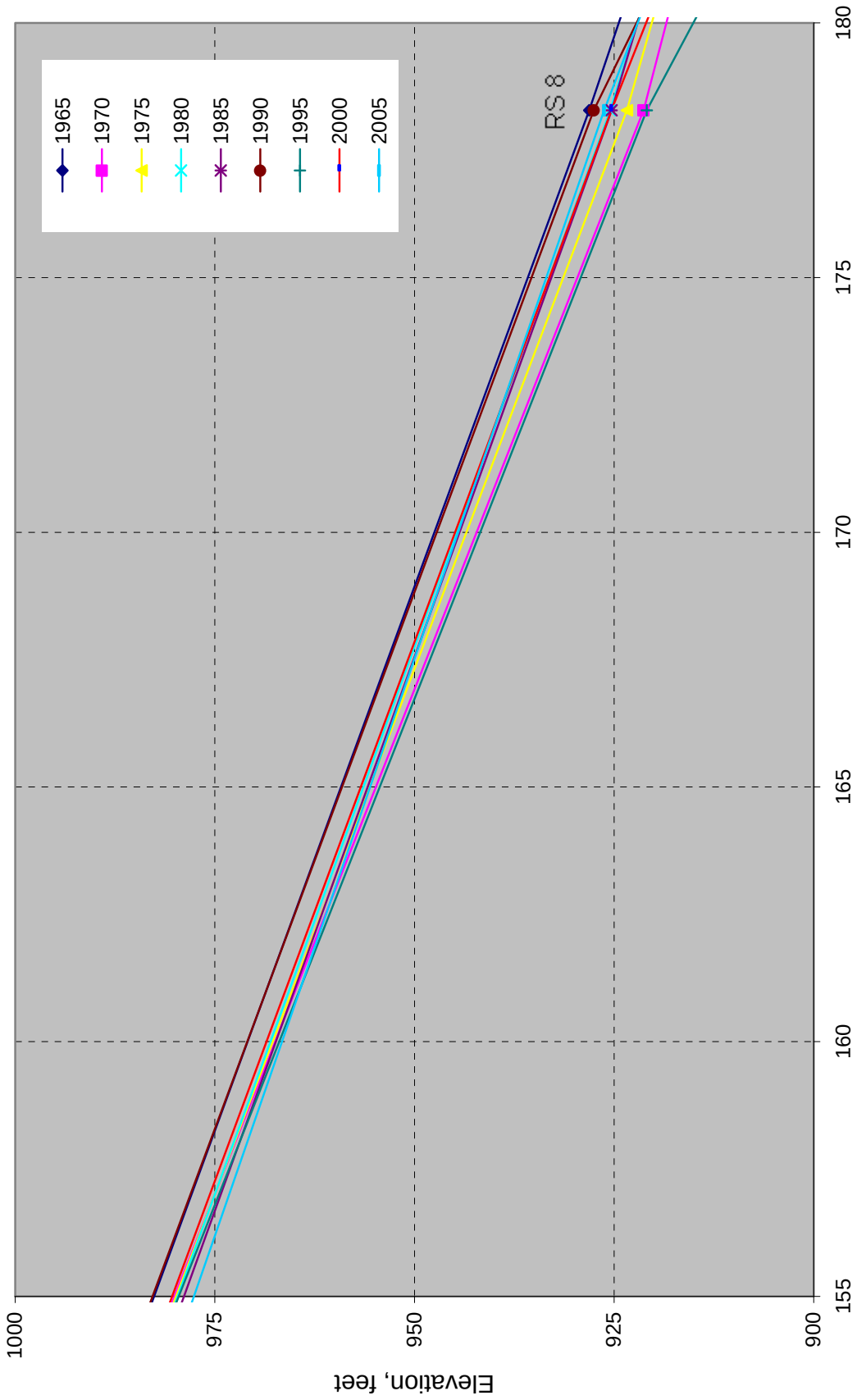



**Figure 31. Longitudinal profile of Cimarron River bed, Oklahoma**

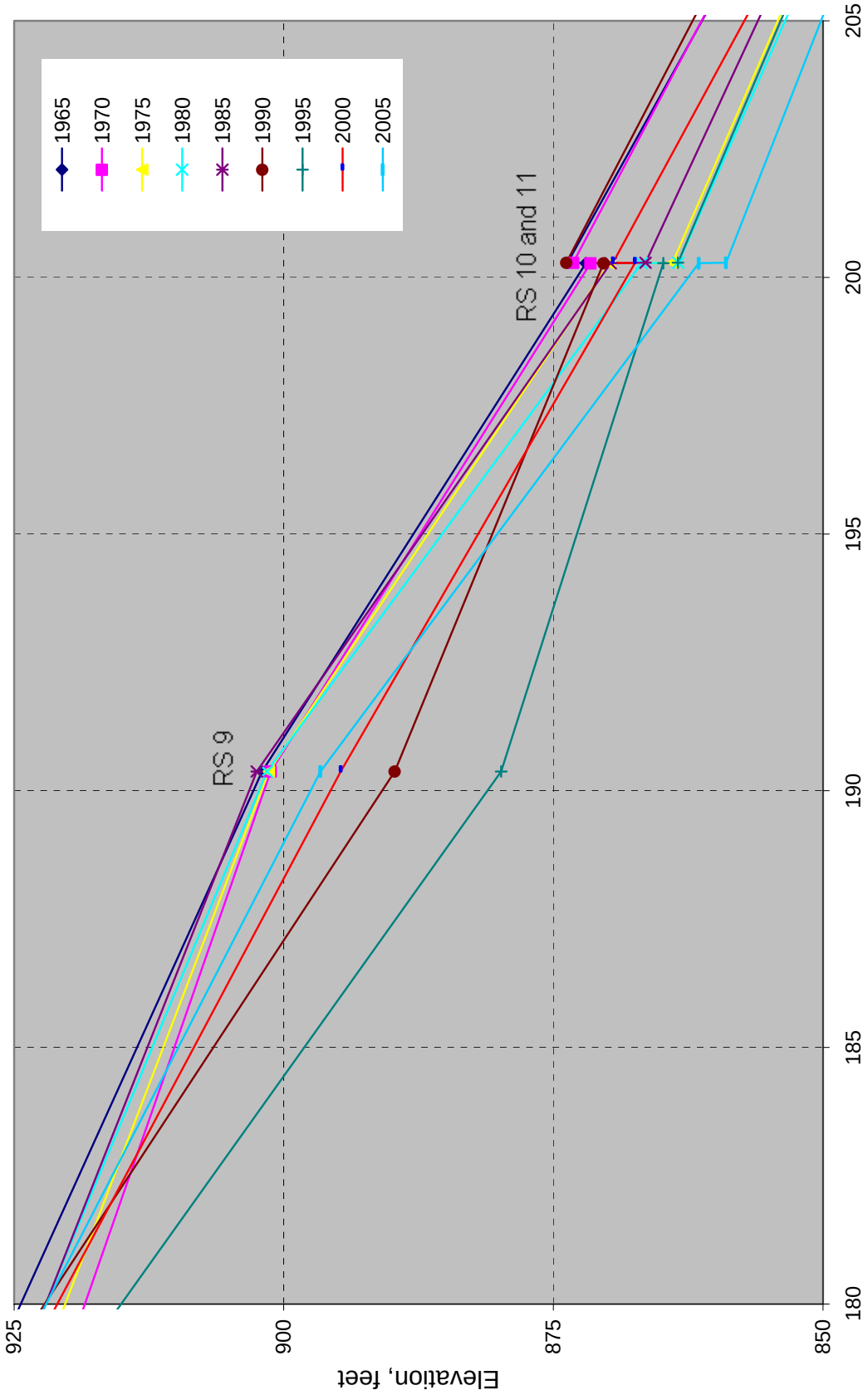



**Figure 32. Longitudinal profile of Cimarron River bed, Oklahoma**

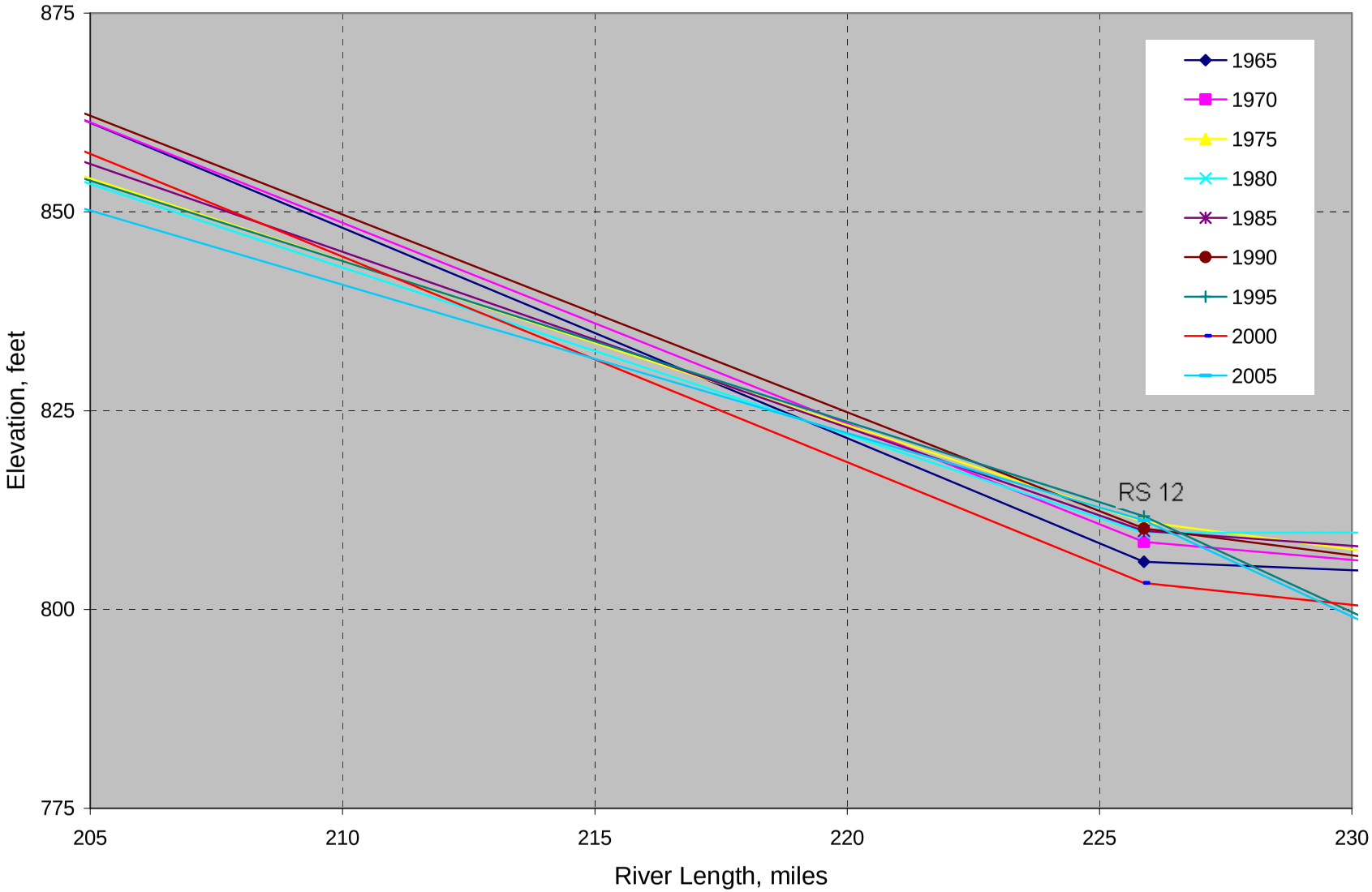



**Figure 33. Longitudinal profile of Cimarron River bed, Oklahoma**

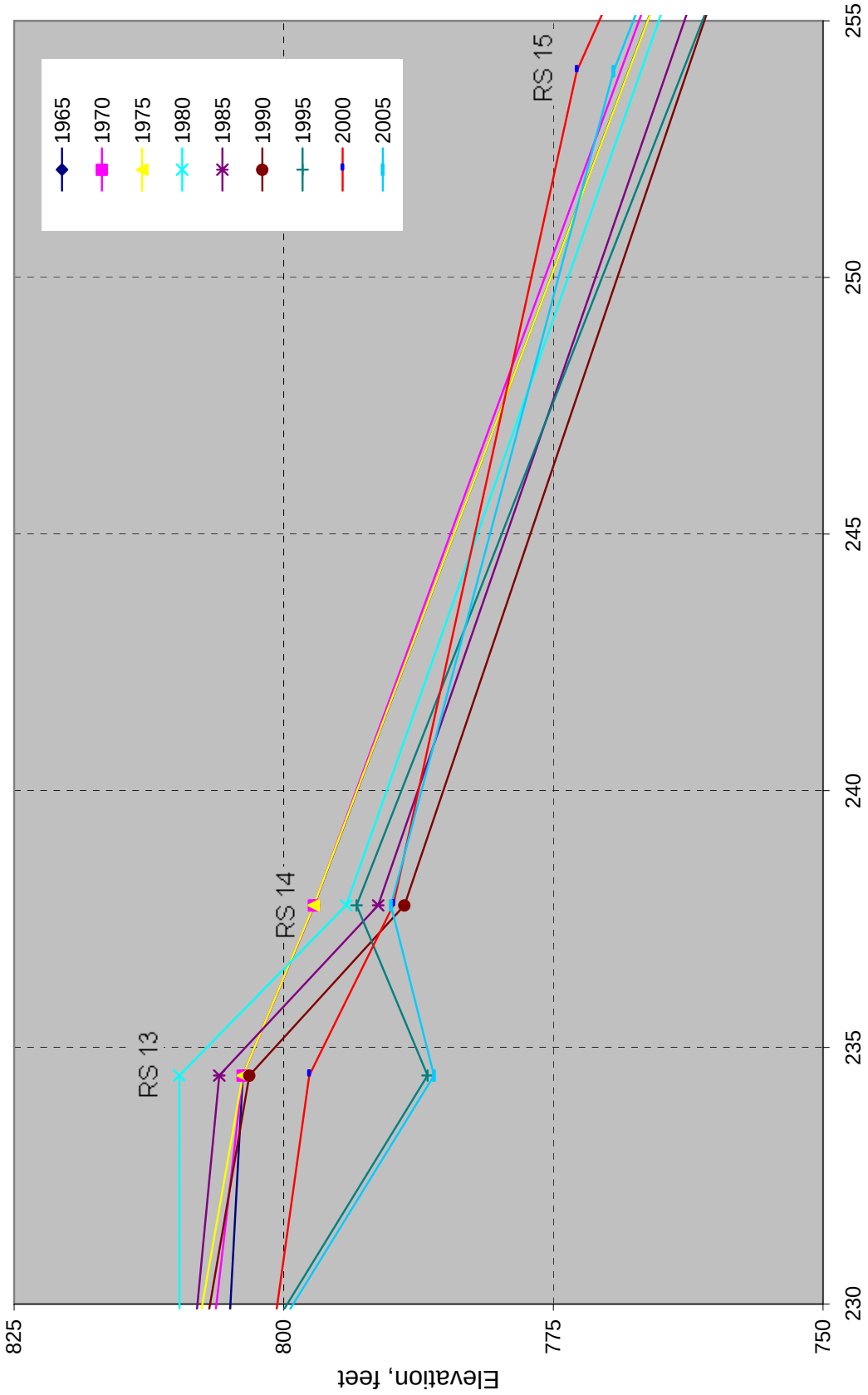



**Figure 34. Longitudinal profile of Cimarron River bed, Oklahoma**

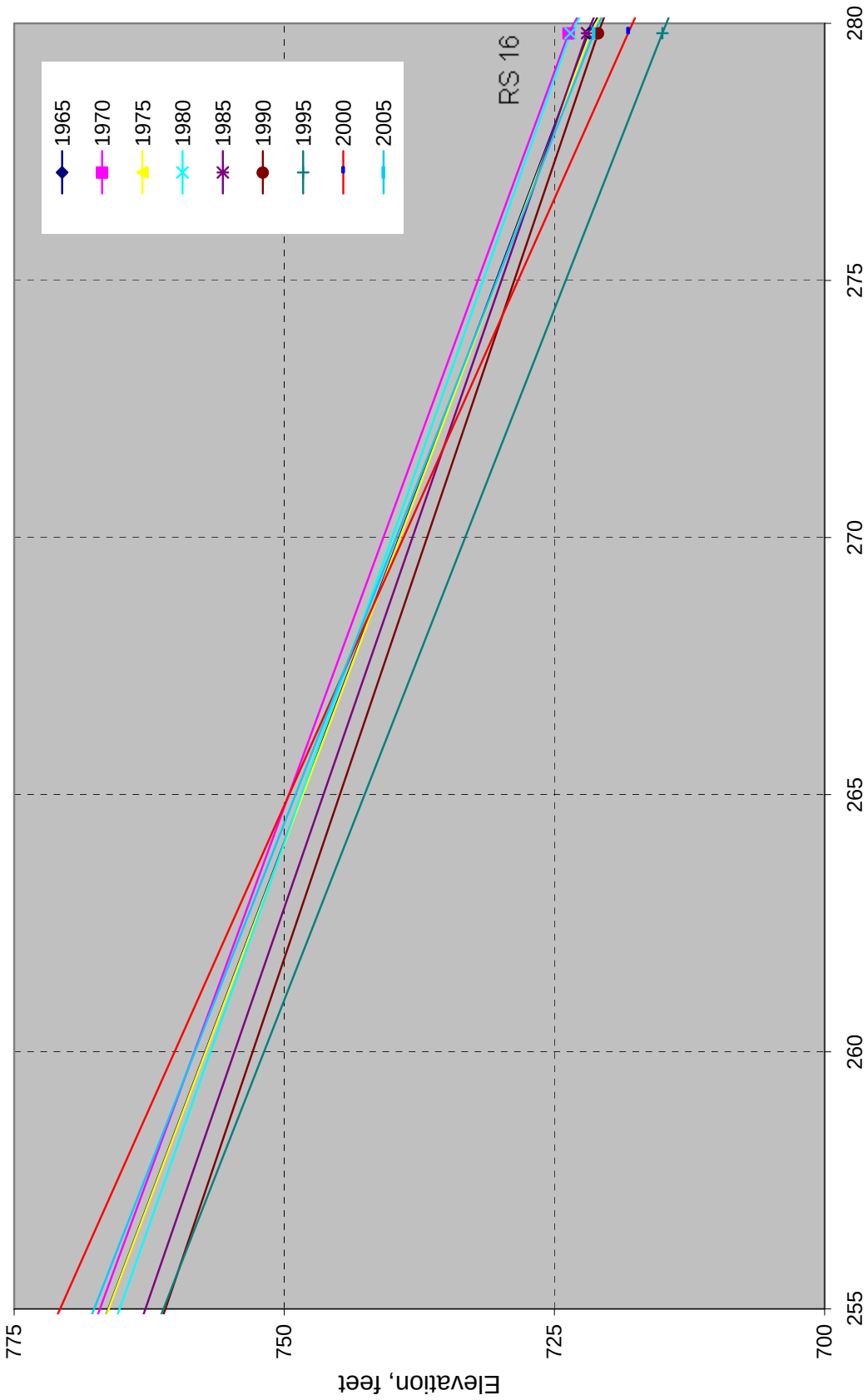



**Figure 35. Longitudinal profile of Cimarron River bed, Oklahoma**

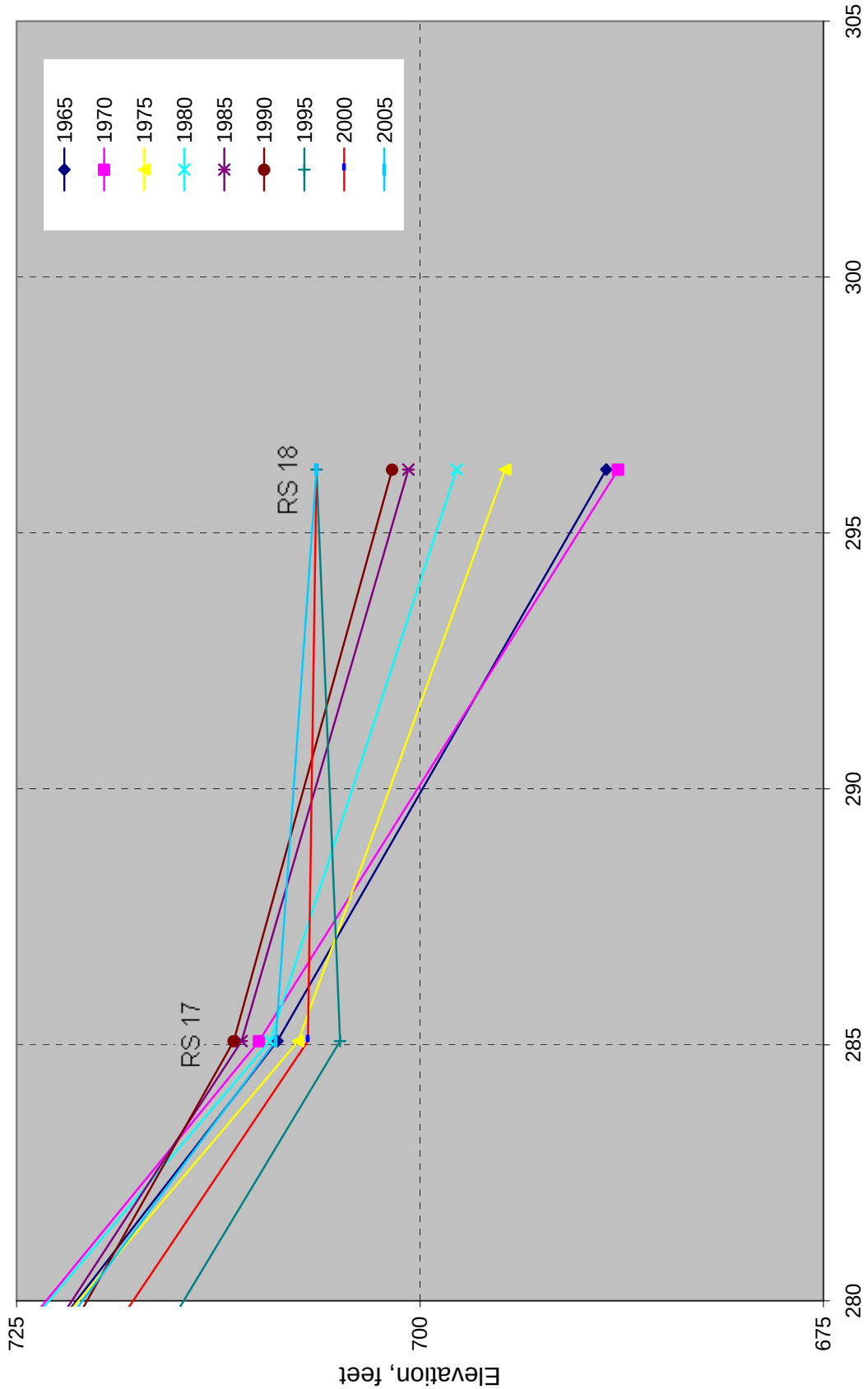



**Figure 36. Longitudinal profile of Cimarron River bed, Oklahoma**

## VI. DISCUSSION OF RESULTS

Table 6 presents the summary of bridges which has experienced degradation in Arkansas river. Along the 265.42-mile reach of Cimarron River, fifteen bridges have experienced degradation. Among these fifteen bridges, nine have experienced degradation in the range of 0-5 feet, four have experienced degradation in the range of 5-10 feet, and two have experienced degradation more than 10 feet. Sixth and seventh columns in Table 6 presents the service year of the bridges through 2007 and corresponding degradation in river bed. Twelve bridges in the study reach of Cimarron River have been serving from more then 30 years.

Table 7 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 service years more then 10 years are determined as critical. River station (RS) 10 (Bridge Key 15863) and 11 (Bridge Key 16820) on I-35 in the Cimarron River have experienced degradation of 10.99 feet and 15.31 feet, respectively in 46 years. Therefore, these two bridges are recommended for rehabilitation or replacement. A detailed hydraulic and geotechnical studies should be performed before reconstruction of these bridges.

## Table 6. Summary of river bed degradation, Cimarron River

| Bri_Key | River Station | Miles | Highway | Bridge Installed | Years of Construction through 2007 | Max. Scour (ft) | Duration (yr) | Scour Rate (ft/yr) |
|---|---|---|---|---|---|---|---|---|
| b19364 | RS1 | 30.82 | S.H. 50 | 1977 | 30 | 1.2 | 26 | 0.046 |
| b13690 | RS2 | 56.95 | U.S. 281 | 1956 | 51 | 3.06 | 49 | 0.062 |
| b13691 | RS3 | 92.18 | U.S.60 | 1956 | 51 | 2.3 | 44 | 0.052 |
| b26904 | RS5 | 122.64 | S.H. 51 | 2003 | 4 | 1.17 | 3 | 0.390 |
| b19509 | RS6 | 146.86 | U.S.81 | 1978 | 29 | 6.61 | 23 | 0.287 |
| b15867 | RS7 | 146.88 | U.S 81 | 1963 | 44 | 3.27 | 38 | 0.086 |
| b3450 | RS9 | 190.38 | U.S. 77 | 1931 | 76 | 0.4 | 74 | 0.005 |
| b14518 | RS10 | 200.28 | I.35 | 1959 | 48 | 10.99 | 46 | 0.239 |
| b14517 | RS11 | 200.29 | I.35 | 1959 | 48 | 15.31 | 46 | 0.333 |
| b13122 | RS12 | 225.88 | U.S. 177 | 1953 | 54 | 9 | 52 | 0.173 |
| b19275 | RS13 | 234.45 | S.H.33 | 1976 | 31 | 9.05 | 25 | 0.362 |
| b18792 | RS14 | 237.77 | S.H.108 | 1974 | 33 | 7.73 | 31 | 0.249 |
| b13238 | RS15 | 254.02 | S.H. 18 | 2004 | 3 | 0.68 | 2 | 0.340 |
| b15863 | RS16 | 279.81 | S.H. 99 | 1963 | 44 | 3.45 | 36 | 0.096 |
| b16820 | RS17 | 285.08 | S.H.51 | 1966 | 41 | 2.45 | 33 | 0.074 |

## Table 7. Summary of bridges with degradation in five river basins

| River Basin | Degradation in ≥10 years | | Degradation with all service year criteria | |
|---|---|---|---|---|
| | ≥ 5.0 feet | ≥ 10.0 feet | ≥ 5.0 feet | ≥ 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) The study of cross-sectional geometries and flowlines of the Cimarron River shows that the channel-bed upstream of I-35 (RS 1 to RS 9) is aggraded in some areas and degraded at other bridges.
2) The severe degradation of river bed at I-35 and below it covers a length of 50 miles. The study of river-bed elevation change indicates that the Cimarron River below I-35 is still in a state of non-equilibrium.
3) An aggradation of 17.42 feet of channel bed was observed at the confluence of Cimarron River and Keystone Lake.
4) The river stations 10 (Bridge Key b14518) and 11 (Bridge Key b14517) at I-35 have experienced 10.99 feet and 15.31 feet of channel-bed degradation, respectively in 46 years. Therefore, these bridges are recommended for rehabilitation or replacement. A detailed hydraulic and geotechnical analysis should be performed when these bridges are reconstructed.

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

## VIII. REFERENCES


Mussetter Engineering, Inc. (2006). Geomorphology of the Upper Gila River within the State of New Mexico. Report submitted to New Mexico Interstate Stream Commission.

Capesius, J. P. and Lehman, T. W. (2001). **"**Determination of Channel Change for Selected Streams, Maricopa County, Arizona." *US Geological Survey Water-Resources Investigations Report* 01-4209.

Kammerer, J.C. (1990). "Largest Rivers in the United States." *United States Geological Survey*, *Open File Report* 87-242.

David J. Gilvear (1999). "Fluvial geomorphology and river engineering: future roles utilizing a fluvial hydrosystems framework." *Geomorphology, 31,* 229–245.

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

OWRB. (1991). Hydrologic Investigation of the Cimarron River. Technical Report 91-1.

# APPENDIX A

## TABLES OF CROSS-SECTIONAL GEOMETRIES,

## CIMARRON RIVER, OK

**Table 8. Structure and flowline details**
**Bridge No. 19364 (RS 1) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b19364 | Woods-Woodward c/l | 36-45-24 | 99-07-00 | SH 50 | 1977 | 1401.9 |

| Year | 1977 | 1978 | 1982 | 1985 | 1987 | 1989 |
|---|---|---|---|---|---|---|
| Flowline | 1511 | 1514.9 | 1511.5 | 1511 | 1510.5 | 1511.3 |

| Year | 1991 | 1993 | 1994 | 1998 | 2000 | 2003 |
|---|---|---|---|---|---|---|
| Flowline | 1511.6 | 1513 | 1511.9 | 1512.3 | 1508.9 | 1509.8 |

**Table 9. Structure, cross-section, and flowline details**
**Bridge No. 13690 (RS 2) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b13690 | 0.9 mi N Major C/L | 36-30-48 | 98-52-48 | US 281 | 1956 | 1251 |

| Pier No | Distance | Pier -Btm | Top- Ppw | R-Bed56 | Data93 | R-Bed93 | Data94 | R-Bed94 | Data95 | R-Bed95 |
|---|---|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 1333 | 1390.48 | 1382 | | 1382 | | 1382 | | 1382 |
| 1 | 51.25 | 1333 | 1390.67 | 1376.2 | | 1376.2 | | 1376.2 | | 1376.2 |
| 2 | 101.25 | 1333 | 1390.84 | 1370.3 | | 1370.3 | | 1370.3 | | 1370.3 |
| 3 | 151.25 | 1333 | 1391 | 1370.45 | 16.8 | 1370.68 | 16.6 | 1371.4 | 16.7 | 1371.3 |
| 4 | 201.25 | 1333 | 1391.14 | 1370.3 | 20.8 | 1366.87 | 19.3 | 1368.84 | 20.8 | 1367.34 |
| 5 | 251.25 | 1333 | 1391.26 | 1370.5 | 18.2 | 1369.64 | | 1370.5 | 18.2 | 1370.06 |
| 6 | 301.25 | 1333 | 1391.37 | 1371 | | 1371 | | 1371 | | 1371 |
| 7 | 351.25 | 1333 | 1391.47 | 1371 | | 1371 | | 1371 | | 1371 |
| 8 | 401.25 | 1333 | 1391.54 | 1371 | | 1371 | | 1371 | | 1371 |
| 9 | 451.25 | 1333 | 1391.61 | 1371 | | 1371 | | 1371 | | 1371 |
| 10 | 501.25 | 1333 | 1391.65 | 1371 | | 1371 | | 1371 | | 1371 |
| 11 | 551.25 | 1333 | 1391.69 | 1371 | 15.8 | 1372.89 | 15.8 | 1372.89 | 15.8 | 1372.89 |
| 12 | 601.25 | 1336 | 1391.7 | 1371 | 20.2 | 1368.5 | 20.7 | 1368 | 21 | 1367.7 |
| 13 | 651.25 | 1336 | 1391.7 | 1371 | 18.5 | 1370.2 | 19.9 | 1368.8 | 21.3 | 1367.4 |
| 14 | 701.25 | 1336 | 1391.69 | 1371 | 19.2 | 1369.49 | 20.1 | 1368.59 | 19.8 | 1368.89 |
| 15 | 751.25 | 1340 | 1391.65 | 1370.8 | 18.5 | 1370.15 | 20.2 | 1368.45 | 18.9 | 1369.75 |
| 16 | 801.25 | 1340 | 1391.61 | 1370.8 | 18.4 | 1370.21 | 20.4 | 1368.21 | 19.8 | 1368.81 |
| 17 | 851.25 | 1340 | 1391.54 | 1370.8 | 18.2 | 1370.34 | 20.6 | 1367.94 | 18.9 | 1369.64 |
| 18 | 901.25 | 1340 | 1391.47 | 1370.5 | 18.5 | 1369.97 | 20 | 1368.47 | 19.6 | 1368.87 |
| 19 | 951.25 | 1340 | 1391.37 | 1370.3 | 19.5 | 1368.87 | 18.6 | 1369.77 | 19.3 | 1369.07 |
| 20 | 1001.25 | 1340 | 1391.26 | 1370 | 20 | 1368.26 | 18.5 | 1369.76 | 19.8 | 1368.46 |
| 21 | 1051.25 | 1340 | 1391.14 | 1376.2 | 18.9 | 1369.24 | 19.3 | 1368.84 | 19.8 | 1368.34 |
| 22 | 1101.25 | 1340 | 1391 | 1376 | 18.1 | 1369.9 | 17.6 | 1370.4 | 17.6 | 1370.4 |
| 23 | 1151.25 | 1340 | 1390.84 | 1376 | | 1376 | 16.8 | 1371.04 | 15.8 | 1372.04 |
| 24 | 1201.25 | 1340 | 1390.67 | 1376 | | 1376 | 15.6 | 1372.07 | 15.7 | 1371.97 |
| N-A | 1252.5 | 1340 | 1390.48 | 1382 | | 1382 | | 1382 | | 1382 |

**Table 9. (Continued)**

| Data96 | R-ed96 | Data97 | R-ed97 | Data98 | R-ed98 | Data99 | R-ed99 | Data00 | R-Bed00 | Data01 | R-Bed01 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1382 | | 1382 | | 1382 | | 1382 | | 1382 | | 1382 |
| | 1376.2 | | 1376.2 | | 1376.2 | | 1376.2 | | 1376.2 | | 1376.2 |
| | 1370.3 | | 1370.3 | | 1370.3 | | 1370.3 | | 1370.3 | | 1370.3 |
| 16.7 | 1371.3 | 16.7 | 1371.3 | 16.8 | 1371.2 | 16.8 | 1371.2 | 16.8 | 1371.2 | 16.8 | 1371.2 |
| 20.8 | 1367.34 | 20.7 | 1367.44 | 20.6 | 1367.54 | 21.6 | 1366.54 | 21.6 | 1366.54 | 21 | 1367.14 |
| 18.1 | 1370.16 | 18 | 1370.26 | 18.2 | 1370.06 | 17 | 1371.26 | 18 | 1370.26 | 18 | 1370.26 |
| | 1371 | | 1371 | | 1371 | | 1371 | | 1371 | | 1371 |
| | 1371 | | 1371 | | 1371 | | 1371 | | 1371 | | 1371 |
| | 1371 | | 1371 | | 1371 | | 1371 | | 1371 | | 1371 |
| | 1371 | | 1371 | | 1371 | | 1371 | | 1371 | | 1371 |
| | 1371 | | 1371 | | 1371 | | 1371 | | 1371 | | 1371 |
| 15.9 | 1372.79 | 16 | 1372.69 | 16.2 | 1372.49 | 16.1 | 1372.59 | 15.7 | 1372.99 | 16 | 1372.69 |
| 19.3 | 1369.4 | 21.4 | 1367.3 | 21.7 | 1367 | 19.6 | 1369.1 | 19.8 | 1368.9 | 21.7 | 1367 |
| 18.9 | 1369.8 | 20.2 | 1368.5 | 19.7 | 1369 | 18.8 | 1369.9 | 18.8 | 1369.9 | 18.3 | 1370.4 |
| 19 | 1369.69 | 21.1 | 1367.59 | 19.5 | 1369.19 | 19 | 1369.69 | 19 | 1369.69 | 18.7 | 1369.99 |
| 20.6 | 1368.05 | 21.4 | 1367.25 | 19.4 | 1369.25 | 19.3 | 1369.35 | 19.6 | 1369.05 | 18.8 | 1369.85 |
| 18.9 | 1369.71 | 21.9 | 1366.71 | 18.3 | 1370.31 | 19.1 | 1369.51 | 19.3 | 1369.31 | 18.9 | 1369.71 |
| 18.8 | 1369.74 | 21.3 | 1367.24 | 18 | 1370.54 | 19.6 | 1368.94 | 18.3 | 1370.24 | 19 | 1369.54 |
| 18.4 | 1370.07 | 20 | 1368.47 | 18.1 | 1370.37 | 19.1 | 1369.37 | 18.2 | 1370.27 | 19 | 1369.47 |
| 21.8 | 1366.57 | 20.5 | 1367.87 | 18 | 1370.37 | 19.5 | 1368.87 | 18.1 | 1370.27 | 18.8 | 1369.57 |
| 19.5 | 1368.76 | 19.9 | 1368.36 | 19.9 | 1368.36 | 18.7 | 1369.56 | 19.2 | 1369.06 | 19.9 | 1368.36 |
| 18.5 | 1369.64 | 21 | 1367.14 | 19.7 | 1368.44 | 18.5 | 1369.64 | 19.3 | 1368.84 | 19.1 | 1369.04 |
| 17.2 | 1370.8 | 17 | 1371 | 12.1 | 1375.9 | 16.8 | 1371.2 | 16.8 | 1371.2 | 16.8 | 1371.2 |
| 15.8 | 1372.04 | 15.9 | 1371.94 | 16 | 1371.84 | 15.8 | 1372.04 | 15.9 | 1371.94 | 15.9 | 1371.94 |
| | 1376 | | 1376 | | 1376 | | 1376 | | 1376 | | 1376 |
| | 1382 | | 1382 | | 1382 | | 1382 | | 1382 | | 1382 |

**Table 9. (Continued)**

| Data02 | R-Bed02 | Data03 | R-Bed03 | Data05 | R-Bed05 |
|---|---|---|---|---|---|
| | 1382 | | 1382 | | 1382 |
| | 1376.2 | | 1376.2 | | 1376.2 |
| | 1370.3 | | 1370.3 | | 1370.3 |
| 16.8 | 1371.2 | 16.7 | 1371.3 | 16.7 | 1371.3 |
| 23.4 | 1364.74 | 22.3 | 1365.84 | 21.2 | 1366.94 |
| 17.8 | 1370.46 | 17.7 | 1370.56 | 17.7 | 1370.56 |
| | 1371 | | 1371 | | 1371 |
| | 1371 | | 1371 | | 1371 |
| | 1371 | | 1371 | | 1371 |
| | 1371 | | 1371 | | 1371 |
| | 1371 | | 1371 | | 1371 |
| 16.6 | 1372.09 | 16.3 | 1372.39 | 16.3 | 1372.39 |
| 19.6 | 1369.1 | 19.1 | 1369.6 | 19.7 | 1369 |
| 18.9 | 1369.8 | 17.9 | 1370.8 | 18.8 | 1369.9 |
| 21.8 | 1366.89 | 18.6 | 1370.09 | 18.1 | 1370.59 |
| 19.2 | 1369.45 | 19.5 | 1369.15 | 18 | 1370.65 |
| 20.4 | 1368.21 | 18.8 | 1369.81 | 18 | 1370.61 |
| 19.1 | 1369.44 | 19.2 | 1369.34 | 18.3 | 1370.24 |
| 19.6 | 1368.87 | 18.6 | 1369.87 | 17.9 | 1370.57 |
| 18.1 | 1370.27 | 18.3 | 1370.07 | 17.9 | 1370.47 |
| 18.9 | 1369.36 | 18.5 | 1369.76 | 18.4 | 1369.86 |
| 18.7 | 1369.44 | 18.4 | 1369.74 | 16.7 | 1371.44 |
| 16.8 | 1371.2 | 16.6 | 1371.4 | 15.7 | 1372.3 |
| 16 | 1371.84 | 15.7 | 1372.14 | | 1376 |
| 15.8 | 1371.87 | 15.6 | 1372.07 | | 1376 |
| | 1382 | | 1382 | | 1382 |

| Year | 1956 | 1965 | 1969 | 1970 | 1974 | 1979 | 1982 | 1985 |
|---|---|---|---|---|---|---|---|---|
| Flowline | 1370 | 1373.4 | 1374.2 | 1370.7 | 1371.2 | 1373.5 | 1370.5 | 1370.4 |

| Year | 1987 | 1989 | 1992 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|---|---|
| Flowline | 1373.5 | 1371.9 | 1369.7 | 1367.94 | 1367.34 | 1366.57 | 1366.71 | 1367 |

| Year | 1999 | 2000 | 2001 | 2002 | 2003 | 2005 |
|---|---|---|---|---|---|---|
| Flowline | 1366.54 | 1366.54 | 1367 | 1364.74 | 1365.84 | 1366.94 |

**Table 10. Structure, cross-section, and flowline details**
**Bridge No. 13691 (RS 3) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b13691 | 1.8 MI S JCT SH 8 | 36-22-30 | 98-26-54 | US 60 | 1956 | 1400.9 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed56 | Data98 | R-Bed98 | Data00 | R-Bed00 |
|---|---|---|---|---|---|---|---|---|
| S-A | 0.00 | 1196.00 | 1238.38 | 1227.00 | 4.75 | 1230.63 | 7.20 | 1231.18 |
| 1 | 51.25 | 1192.11 | 1238.57 | 1226.00 | 15.58 | 1219.99 | 18.20 | 1220.37 |
| 2 | 101.25 | 1192.28 | 1238.74 | 1213.00 | 17.16 | 1218.58 | 19.50 | 1219.24 |
| 3 | 151.25 | 1192.44 | 1238.90 | 1212.00 | 23.25 | 1212.65 | 22.70 | 1216.20 |
| 4 | 201.25 | 1191.59 | 1239.05 | 1214.00 | 17.33 | 1218.72 | 19.70 | 1219.35 |
| 5 | 251.25 | 1191.72 | 1239.18 | 1214.20 | 16.75 | 1219.43 | 19.40 | 1219.78 |
| 6 | 301.25 | 1190.84 | 1239.30 | 1214.20 | 17.00 | 1219.30 | 19.50 | 1219.80 |
| 7 | 351.25 | 1190.94 | 1239.40 | 1214.00 | 17.08 | 1219.32 | 19.50 | 1219.90 |
| 8 | 401.25 | 1190.03 | 1239.49 | 1214.10 | 17.00 | 1219.49 | 19.40 | 1220.09 |
| 9 | 451.25 | 1190.11 | 1239.57 | 1217.10 | 17.08 | 1219.49 | 19.70 | 1219.87 |
| 10 | 501.25 | 1189.17 | 1239.63 | 1217.00 | 17.75 | 1218.88 | 20.30 | 1219.33 |
| 11 | 551.25 | 1189.22 | 1239.68 | 1216.40 | 18.33 | 1218.35 | 20.80 | 1218.88 |
| 12 | 601.25 | 1189.25 | 1239.71 | 1216.00 | 19.58 | 1217.13 | 21.00 | 1218.71 |
| 13 | 651.25 | 1189.27 | 1239.73 | 1216.00 | 18.43 | 1218.30 | 20.90 | 1218.83 |
| 14 | 701.25 | 1189.28 | 1239.74 | 1217.00 | 17.75 | 1218.99 | 21.20 | 1218.54 |
| 15 | 751.25 | 1189.27 | 1239.73 | 1217.50 | 20.67 | 1216.06 | 22.70 | 1217.03 |
| 16 | 801.25 | 1189.25 | 1239.71 | 1218.00 | 21.16 | 1215.55 | 23.10 | 1216.61 |
| 17 | 851.25 | 1189.22 | 1239.68 | 1218.00 | 21.58 | 1215.10 | 23.50 | 1216.18 |
| 18 | 901.25 | 1189.17 | 1239.63 | 1218.00 | 21.16 | 1215.47 | 24.20 | 1215.43 |
| 19 | 951.25 | 1189.11 | 1239.57 | 1218.00 | 22.25 | 1214.32 | 24.70 | 1214.87 |
| 20 | 1001.25 | 1189.03 | 1239.49 | 1217.80 | 22.08 | 1214.41 | 25.10 | 1214.39 |
| 21 | 1051.25 | 1188.94 | 1239.40 | 1217.80 | 22.00 | 1214.40 | 24.80 | 1214.60 |
| 22 | 1101.25 | 1188.84 | 1239.30 | 1217.80 | 21.75 | 1214.55 | 25.60 | 1213.70 |

**Table 10. (Continued)**

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed56 | Data98 | R-Bed98 | Data00 | R-Bed00 |
|---|---|---|---|---|---|---|---|---|
| 23 | 1151.25 | 1188.72 | 1239.18 | 1217.70 | 21.43 | 1214.75 | 25.10 | 1214.08 |
| 24 | 1201.25 | 1189.59 | 1239.05 | 1217.90 | 19.08 | 1216.97 | 23.30 | 1215.75 |
| 25 | 1251.25 | 1189.44 | 1238.90 | 1218.00 | 22.75 | 1213.15 | 25.60 | 1213.30 |
| | 1281.25 | 1189.34 | 1238.80 | 1218.24 | 23.50 | 1212.30 | 29.10 | 1209.70 |
| 26 | 1301.25 | 1189.28 | 1238.74 | 1218.40 | 20.33 | 1215.41 | 23.50 | 1215.24 |
| 27 | 1351.25 | 1190.11 | 1238.57 | 1218.50 | 9.00 | 1226.57 | 11.60 | 1226.97 |
| N-A | 1402.50 | 1194.00 | 1238.38 | 1227.50 | 4.67 | 1230.71 | 7.30 | 1231.08 |

| Year | 1956 | 1984 | 1989 | 1990 | 1991 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|
| Data | | 23.00 | 23.00 | 24.00 | 25.00 | 24.00 | 27.00 |
| Flowline | 1212.00 | 1213.50 | 1213.50 | 1212.50 | 1211.50 | 1212.50 | 1212.00 |

**Table 11. Structure, Cross-section, and Flowline details**
**Bridge No. 16196 (RS 4) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| B16196 | 0.4 mi N JCT SH 8 | 36-16-48 | 98-19-06 | SH 58 | 1964 | 1205.1 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-bed63 | Data92 | R-bed92 | Data98 | R-bed 98 | Data01 | R-bed01 |
|---|---|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 1166.93 | 1187.48 | 1172 | 7 | 1177.48 | 7.16 | 1177.32 | 9.9 | 1177.58 |
| 1 | 102 | 1145.75 | 1187.8 | 1158 | 23.7 | 1161.1 | 23.58 | 1161.22 | 28.1 | 1159.7 |
| 2 | 202 | 1146.38 | 1188.43 | 1157 | 23 | 1162.43 | 24.33 | 1161.10 | 28.7 | 1159.73 |
| 3 | 302.75 | 1146.42 | 1188.47 | 1163 | 23 | 1162.47 | 23.08 | 1162.39 | 27.7 | 1160.77 |
| 4 | 403.5 | 1146.77 | 1188.82 | 1163.9 | 20.5 | 1165.32 | 19.16 | 1166.66 | 21.9 | 1166.92 |
| 5 | 504.25 | 1142.76 | 1188.81 | 1161.8 | 21.7 | 1164.11 | 18.33 | 1167.48 | 20.1 | 1168.71 |
| 6 | 604.25 | 1143.05 | 1189.1 | 1160 | 20 | 1166.1 | 18.58 | 1167.52 | 19.9 | 1169.2 |
| 7 | 704.25 | 1142.76 | 1188.81 | 1158 | 21.3 | 1164.51 | 19.33 | 1166.48 | 21.4 | 1167.41 |
| 8 | 805 | 1142.77 | 1188.05 | 1160 | 26.5 | 1158.55 | 24.25 | 1160.80 | 26 | 1162.05 |
| 9 | 905.75 | 1142.42 | 1188.47 | 1164.8 | 19 | 1166.47 | 26.43 | 1159.04 | 29.7 | 1158.77 |
| 10 | 1005.75 | 1142.38 | 1188.43 | 1168.25 | 18.6 | 1166.83 | 17.67 | 1167.76 | 20.2 | 1168.23 |
| 11 | 1105.75 | 1141.75 | 1187.8 | 1168 | 17.8 | 1167 | 17.33 | 1167.47 | 19.8 | 1168 |
| N-A | 1207.75 | 1170 | 1187.48 | 1175 | 9 | 1175.48 | 9.25 | 1175.23 | 11.5 | 1175.98 |

| Year | 1965 | 1975 | 1984 | 1987 | 1990 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|
| Flowline | 1161.9 | 1163.1 | 1162.6 | 1158.4 | 1158.4 | 1158.4 | 1158.4 |

**Table 12. Structure and flowline details**
**Bridge No. 26904 (RS 5) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design Year | Length |
|---|---|---|---|---|---|---|
| b26904 | 2.64 E Blaine c/l | 36-07-30 | 98-09-42 | SH 51 | 2003 | 1181.8 |

| | R-Bed03 | Data05 | West bank top rail | R-Bed05 |
|---|---|---|---|---|
| **Flowline** | 1090.27 | 25.75 | 1114.9 | 1089.1 |

**Table 13. Structure, Cross-section, and Flowline Details**
**Bridge No. 19509 (RS 6) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| B19509 | 6.9 mi N JCT SH 33 | 35-57-06 | 97-54-48 | US 81 | 1978 | 1002 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-bed78 | Data92 | R-bed92 | Wes92 | Data93 |
|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 993.13 | 1038.99 | 1027 | 10.8 | 1028.19 | 1011.6 | 11.8 |
| 1 | 100.26 | 982.57 | 1039.32 | 1015.5 | 22.3 | 1017.02 | 1011.6 | 29.8 |
| | 130.26 | 982.645 | 1039.392 | 1012.5 | | 1014.21 | 1011.63 | |
| 2 | 200.26 | 982.82 | 1039.56 | 1005.5 | 31.9 | 1007.66 | 1011.6 | 41.6 |
| 3 | 300.26 | 983 | 1039.75 | 1006.1 | 28.2 | 1011.55 | 1011.6 | 40.1 |
| 4 | 400.26 | 983.11 | 1039.86 | 1011.1 | 26.7 | 1013.16 | 1011.6 | 37.36 |
| 5 | 500.26 | 9836.15 | 1039.9 | 1005 | 27.6 | 1012.3 | 1011.6 | 36 |
| 6 | 600.26 | 983.11 | 1039.86 | 1012.2 | 23.1 | 1016.76 | 1011.6 | 34.2 |
| 7 | 700.26 | 983 | 1039.745 | 1014.2 | 24 | 1015.75 | 1011.6 | 32.7 |
| 8 | 800.2 | 982.82 | 1039.57 | 1016.3 | 26.4 | 1016.17 | 1011.6 | 24.7 |
| 9 | 900.26 | 982.57 | 1039.32 | 1025 | 18.2 | 1021.12 | 1011.6 | 16.5 |
| N-A | 1000.51 | 991.31 | 1038.99 | 1028.3 | 9.2 | 1029.79 | 1011.6 | 9.1 |

| R-bed93 | Data94 | R-bed94 | Data96 | R-bed96 | Data98 | R-bed98 | Data01 | R-bed01 |
|---|---|---|---|---|---|---|---|---|
| 1027.2 | 11.48 | 1027.51 | 11.2832 | 1027.707 | 11.316 | 1027.674 | 11.4 | 1027.59 |
| 10095 | 28.536 | 1010.78 | 2978.24 | 1009.538 | 28.1096 | 1011.21 | 30.9 | 1008.42 |
| 1006.1 | | 1010.2 | | 1006.294 | | 1009.678 | 41 | 998.392 |
| 997.96 | 30.7336 | 1008.83 | 40.836 | 998.724 | 33.4156 | 1006.104 | 30.9 | 1008.66 |
| 999.65 | 28.0112 | 1011.74 | 38.2886 | 1001.472 | 28.8312 | 1010.919 | 28.8 | 1010.95 |
| 1002.3 | 28.6672 | 1011.19 | 35.4896 | 1004.37 | 27.2896 | 1012.57 | 27.7 | 1012.16 |
| 1003.9 | 29.356 | 1010.54 | 36.7032 | 1003.197 | 30.5368 | 1009.363 | 27.3 | 1012.6 |
| 1005.7 | 30.4056 | 1009.45 | 36.9344 | 1003.026 | 26.6992 | 1013.161 | 27.3 | 1012.56 |
| 1007.1 | 30.176 | 1009.57 | 31.6896 | 1008.36 | 24.5672 | 1015.183 | 27.4 | 1012.35 |
| 1014.9 | 24.6328 | 1014.94 | 23.2224 | 1016.348 | 24.6 | 1014.97 | 24 | 1015.57 |
| 1022.8 | 16.564 | 1022.476 | 16.3016 | 1023.018 | 16.2688 | 1023.051 | 16.6 | 1022.72 |
| 1029.9 | 19.1552 | 1019.83 | 9.3808 | 1029.609 | 9.4464 | 1029.544 | 8.9 | 1030.09 |

| Year | 1985 | 1988 | 1990 | 1991 | 1992 | 1993 | 1994 | 1996 |
|---|---|---|---|---|---|---|---|---|
| Flowline | 1010.35 | 1001.92 | 1010.1 | 1008.1 | 1007.7 | 997.96 | 1008.83 | 998.724 |

| Year | 1998 | 2001 |
|---|---|---|
| Flowline | 1006.1 | 998.392 |

**Table 14. Structure, cross-section, and flowline details**
**Bridge No. 15867 (RS 7) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b15867 | 6.9 MI N JCT SH33 | 35-57-06 | 97-54-48 | US 81 | 1963 | 1015.15 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed63 | Data88 | R-Bed88 | Data92 | R-Bed92 | Data94 | R-Bed94 |
|---|---|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 992 | 1038.99 | 1028.78 | | 1028.78 | 11.7 | 1027.29 | 11.61 | 1027.38 |
| 1 | 71.5 | 992 | 1039.06 | 1022.5 | 16.4 | 1020.16 | 20.7 | 1018.36 | 19.32 | 1019.74 |
| 2 | 141.79 | 986.22 | 1039.43 | 1002 | 40 | 996.93 | 32.2 | 1007.23 | 33.26 | 1006.17 |
| 3 | 212.08 | 986.22 | 1039.43 | 1008.3 | 27.6 | 1009.33 | 28.6 | 1010.83 | 28.73 | 1010.70 |
| 4 | 312.83 | 986.27 | 1039.48 | 1011 | 27.6 | 1009.38 | 28.4 | 1011.08 | 30.11 | 1009.37 |
| 5 | 412.83 | 986.84 | 1039.85 | 1012 | 25.4 | 1011.95 | 28.7 | 1011.15 | 28.50 | 1011.35 |
| 6 | 512.83 | 986.4 | 1039.61 | 1013.6 | 24.85 | 1012.26 | 27.2 | 1012.41 | 30.11 | 1009.50 |
| 7 | 613.58 | 986.48 | 1039.69 | 1013 | 24.3 | 1012.89 | 24.2 | 1015.49 | 33.78 | 1005.91 |
| 8 | 714.33 | 984.24 | 1039.45 | 1015.2 | 18 | 1018.95 | 24.9 | 1014.55 | 27.36 | 1012.09 |
| 9 | 814.33 | 984.32 | 1039.53 | 1016 | 17.7 | 1019.33 | 25.9 | 1013.63 | 21.94 | 1017.59 |
| 10 | 914.33 | 983.78 | 1038.99 | 1018 | 17.4 | 1019.09 | 19.6 | 1019.39 | 18.70 | 1020.29 |
| N-A | 1015.33 | 990 | 1038.78 | 1028.75 | | 1028.75 | 11.5 | 1027.28 | 11.68 | 1027.10 |

| R-Bed94 | Data96 | R-Bed96 | Data98 | R-Bed98 | Data01 | R-Bed01 | Data01/10 | R-Bed01/10 |
|---|---|---|---|---|---|---|---|---|
| 1027.38 | 11.5784 | 1027.412 | 11.58 | 1027.41 | 11.8 | 1027.19 | 11.9 | 1027.09 |
| 1019.74 | 18.2696 | 1020.79 | 19.68 | 1019.38 | 18.6 | 1020.46 | 18.8 | 1020.26 |
| 1006.17 | 45.428 | 994.002 | 38.31 | 1001.12 | 42.4 | 997.03 | 40.7 | 998.73 |
| 1010.70 | 35.8832 | 1003.547 | 33.72 | 1005.71 | 29.1 | 1010.33 | 33.1 | 1006.33 |
| 1009.37 | 33.4888 | 1005.991 | 29.19 | 1010.29 | 28.2 | 1011.28 | 30.1 | 1009.38 |
| 1011.35 | 35.6864 | 1004.164 | 29.22 | 1010.63 | 27.6 | 1012.25 | 26.9 | 1012.95 |
| 1009.50 | 31.7832 | 1007.827 | 28.47 | 1011.14 | 27.3 | 1012.31 | 26.6 | 1013.01 |
| 1005.91 | 31.816 | 1007.874 | 25.39 | 1014.30 | 26.8 | 1012.89 | 26.2 | 1013.49 |
| 1012.09 | 25.6168 | 1013.833 | 24.73 | 1014.72 | 26.7 | 1012.75 | 26.6 | 1012.85 |
| 1017.59 | 20.7624 | 1018.768 | 23.19 | 1016.34 | 22.4 | 1017.13 | 22.4 | 1017.13 |
| 1020.29 | 18.4008 | 1020.589 | 18.34 | 1020.65 | 20.2 | 1018.79 | 20 | 1018.99 |
| 1027.10 | 11.4472 | 1027.333 | 11.68 | 1027.10 | 12.1 | 1026.68 | 11.8 | 1026.98 |

| Year | 1963 | 1988 | 1992 | 1994 | 1996 | 1998 | 2001 |
|---|---|---|---|---|---|---|---|
| Flowline | 1002 | 996.93 | 1007.23 | 1005.91 | 994.002 | 1001.12 | 998.73 |

**Table 15. Structure, cross-section, and flowline details**
**Bridge No. 13933 (RS 8) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design Yr | Length |
|---|---|---|---|---|---|---|
| b13933 | 1.1M N JCT SH 33 | 35-53-06 | 97-35-24 | SH 74 | 1957 | 803.1 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed57 | Data88 | R-Bed88 | Data93 | R-Bed93 | Data05 | R-Bed05 |
|---|---|---|---|---|---|---|---|---|---|---|
| S.A | 0 | 910 | 957.98 | 948 | 9 | 948.98 | 8.9 | 949.08 | 8.6 | 949.38 |
| 1 | 102 | 905.47 | 958.33 | 939 | 24.9 | 933.43 | 24 | 934.33 | 22.8 | 935.53 |
| 2 | 202 | 905.39 | 959.25 | 938.75 | 23.7 | 935.55 | 25.5 | 933.75 | 22.4 | 936.85 |
| 3 | 302 | 903.87 | 959.73 | 937.5 | 26.5 | 933.23 | 27.6 | 932.13 | 26.3 | 933.43 |
| 4 | 402.75 | 903.92 | 960.38 | 940 | 29 | 931.38 | 29.4 | 930.98 | 31.9 | 928.48 |
| 5 | 503.5 | 905.28 | 961.14 | 936 | 31.4 | 929.74 | 30.5 | 930.64 | 33.8 | 927.34 |
| 6 | 603.5 | 906.2 | 962.06 | 929.5 | 31.2 | 930.86 | 34.4 | 927.66 | 33.1 | 928.96 |
| 7 | 703.5 | 909.68 | 962.54 | 923.5 | 43.7 | 918.84 | 43.4 | 919.14 | 36.3 | 926.24 |
| N-A | 805.5 | 947.79 | 963.6 | 954 | 9 | 954.6 | 9.3 | 954.3 | 9 | 954.6 |

| Year | 1957 | 1960 | 1965 | 1970 | 1981 | 1984 | 1985 | 1990 |
|---|---|---|---|---|---|---|---|---|
| Flowline | 923.5 | 929.5 | 928.1 | 921.3 | 925.9 | 926.9 | 925.3 | 927.54 |

**Table 16. Structure, cross-section, and flowline details**
**Bridge No. 03450 (RS 9) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Highway | Design year | Length |
|---|---|---|---|---|---|---|
| b03450 | 2.8 MI N JCT SH 33 | 35-46-00 | 97-25-36 | US 77 | 1931 | 899 |

| Pier-No | Distance | Pier-Btm | Top-Crb | Top-Ppw | R-Bed31 | Data88 | R-Bed88 | Data88 | R-Bed88 | Data92 | R-Bed92 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 879 | 927.5 | 930.5 | 912 | 10.6 | 916.9 | 11 | 916.5 | 12.8 | 917.7 |
| 1 | 82.87 | 875.6 | 927.5 | 930.5 | 908 | 26.7 | 900.8 | 26.4 | 901.1 | 28.2 | 902.3 |
| 2 | 164.49 | 878.03 | 927.5 | 930.5 | 900.5 | 40.8 | 886.7 | 30.6 | 896.9 | 32.7 | 897.8 |
| 3 | 246.11 | 878.8 | 927.5 | 930.5 | 900.1 | 34.4 | 893.1 | 30.7 | 896.8 | 31.6 | 898.9 |
| 4 | 327.73 | 878.01 | 927.5 | 930.5 | 900 | 38.2 | 889.3 | 29.2 | 898.3 | 30.4 | 900.1 |
| 5 | 409.35 | 878.03 | 927.5 | 930.5 | 898 | 31.4 | 896.1 | 28.6 | 898.9 | 30.7 | 899.8 |
| 6 | 490.97 | 878.03 | 927.5 | 930.5 | 900.1 | 30 | 897.5 | 28 | 899.5 | 30.7 | 899.8 |
| 7 | 572.59 | 878.03 | 927.5 | 930.5 | 899.5 | 29.2 | 898.3 | 27.8 | 899.7 | 31.1 | 899.4 |
| 8 | 654.21 | 878.03 | 927.5 | 930.5 | 899 | 33.4 | 894.1 | 33.5 | 894 | 32.7 | 897.8 |
| 9 | 735.83 | 878.03 | 927.5 | 930.5 | 897 | 26 | 901.5 | 28 | 899.5 | 32.4 | 898.1 |
| 10 | 817.45 | 878.03 | 927.5 | 930.5 | 901.7 | 29.9 | 897.6 | 31.4 | 896.1 | 33.6 | 896.9 |
| N-A | 900.2 | 881 | 927.5 | 930.5 | 919 | 9.3 | 918.2 | 8.3 | 919.2 | 11.4 | 919.1 |

| Data93 | R-Bed93 | Data94 | R-Bed94 | Data95 | R-Bed95 | Data96 | R-Bed96 | Data01 | R-Bed01 | Data05 | R-Bed05 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12.7 | 917.8 | 12.86 | 917.64 | 9.68 | 920.82 | 12.73 | 917.77 | 12.7 | 917.8 | 12.9 | 917.6 |
| 28.7 | 901.8 | 28.90 | 901.60 | 29.19 | 901.31 | 29.09 | 901.41 | 31.2 | 899.3 | 29.7 | 900.8 |
| 46.3 | 884.2 | 31.46 | 899.04 | 50.67 | 879.83 | 31.39 | 899.11 | 28.6 | 901.9 | 28.2 | 902.3 |
| 39.7 | 890.8 | 31.98 | 898.52 | 45.76 | 884.74 | 35.16 | 895.34 | 30.8 | 899.7 | 28.9 | 901.6 |
| 35.6 | 894.9 | 33.10 | 897.40 | 34.60 | 895.90 | 31.55 | 898.95 | 29 | 901.5 | 28.3 | 902.2 |
| 31.8 | 898.7 | 32.01 | 898.49 | 38.87 | 891.63 | 34.34 | 896.16 | 32.1 | 898.4 | 29.2 | 901.3 |
| 37.8 | 892.7 | 31.91 | 898.59 | 36.74 | 893.76 | 33.92 | 896.58 | 33.3 | 897.2 | 33.9 | 896.6 |
| 40.4 | 890.1 | 33.92 | 896.58 | 37.88 | 892.62 | 36.97 | 893.53 | 34.1 | 896.4 | 30.4 | 900.1 |
| 40.7 | 889.8 | 33.42 | 897.08 | 40.18 | 890.32 | 31.85 | 898.65 | 30.2 | 900.3 | 31.1 | 899.4 |
| 35.7 | 894.8 | 29.78 | 900.72 | 35.42 | 895.08 | 33.26 | 897.24 | 30.7 | 899.8 | 32 | 898.5 |
| 36.9 | 893.6 | 30.08 | 900.42 | 42.15 | 888.35 | 42.57 | 887.93 | 32.7 | 897.8 | 32.6 | 897.9 |
| 9.9 | 920.6 | 10.14 | 920.36 | 9.84 | 920.66 | 12.14 | 918.36 | 12 | 918.5 | 12 | 918.5 |

| Year | 1950 | 1955 | 1960 | 1965 | 1970 | 1981 | 1984 | 1985 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|
| Flowline | 905.7 | 903.5 | 903 | 902 | 901.2 | 901.6 | 902.4 | 902.5 | 889.7 | 900.4 |

**Table 17. Structure, cross-section, and flowline details**
**Bridge No. 14518 (RS 10) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b14518 | Logan-Payne c/l | 35-59-00 | 97-21-12 | I 35 | 1959 | 803.1 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed59 | Data88 | R-Bed88 | Data90 | R-Bed90 | Data92 | R-Bed92 | Data93 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 902 | 925.13 | 914.5 | | 914.5 | 9.2 | 915.93 | 10.6 | 914.53 | 9.4 |
| 1 | 101 | 859 | 923.43 | 890 | 33.1 | 890.33 | 25.2 | 898.23 | 38.7 | 884.73 | 33.3 |
| 2 | 201 | 850 | 922.31 | 872.5 | 48.3 | 874.01 | 47.2 | 875.11 | 44.3 | 878.01 | 59.2 |
| 3 | 301 | 840 | 920.71 | 873 | 47.6 | 873.11 | 45.6 | 875.11 | 48.9 | 871.81 | 55.2 |
| 4 | 401.75 | 839 | 919.68 | 873 | 44.1 | 875.58 | 44.9 | 874.78 | 46.9 | 872.78 | 46.9 |
| 5 | 502.5 | 839 | 917.96 | 874.2 | 42.6 | 875.36 | 47.6 | 870.36 | 44.4 | 873.56 | 52.2 |
| 6 | 602.5 | 839.5 | 916.85 | 879.3 | 36.3 | 880.55 | 46.5 | 870.35 | 46.3 | 870.55 | 47.8 |
| 7 | 702.5 | 838.5 | 915.25 | 891.2 | 27.1 | 888.15 | 37.9 | 877.35 | 27.2 | 888.05 | 41 |
| N-A | 803.5 | 900 | 914.23 | 906 | | 906 | 10.3 | 903.93 | 9.8 | 904.43 | 11.2 |

| R-bed93 | Data94 | R-Bed94 | Data95 | R-Bed95 | Data95 | R-Bed95 | Data96 | R-Bed96 | Data99 | R-Bed99 |
|---|---|---|---|---|---|---|---|---|---|---|
| 915.73 | 9.19 | 915.94 | 9.32 | 915.81 | 9.51 | 915.62 | 9.32 | 915.81 | 8.2 | 916.93 |
| 890.13 | 31.86 | 891.57 | 32.04 | 891.39 | 31.82 | 891.61 | 32.04 | 891.39 | 31.6 | 891.83 |
| 863.11 | 42.32 | 879.99 | 51.79 | 870.52 | 48.87 | 873.44 | 51.79 | 870.52 | 48.3 | 874.01 |
| 865.51 | 54.99 | 865.72 | 50.15 | 870.56 | 50.68 | 870.03 | 50.15 | 870.56 | 53 | 867.71 |
| 872.78 | 51.38 | 868.30 | 49.00 | 870.68 | 45.76 | 873.92 | 49.00 | 870.68 | 47.4 | 872.28 |
| 865.76 | 48.03 | 869.93 | 53.17 | 864.79 | 44.77 | 873.19 | 53.17 | 864.79 | 48.4 | 869.56 |
| 869.05 | 41.41 | 875.44 | 44.67 | 872.18 | 43.95 | 872.90 | 44.67 | 872.18 | 40 | 876.85 |
| 874.25 | 33.76 | 881.49 | 37.98 | 877.27 | 32.64 | 882.61 | 37.98 | 877.27 | 33.8 | 881.45 |
| 903.03 | 9.58 | 904.65 | 9.74 | 904.49 | 9.68 | 904.55 | 9.74 | 904.49 | 9 | 905.23 |

**Table 17. (Continued)**

| Data01 | R-bed01 | Data05 | R-bed05 |
|---|---|---|---|
| 9.1 | 916.03 | 10.8 | 914.33 |
| 33.5 | 889.93 | 33.2 | 890.23 |
| 51.8 | 870.51 | 48.8 | 873.51 |
| 51.6 | 869.11 | 59.2 | 861.51 |
| 51.7 | 867.98 | 54.8 | 864.88 |
| 50.8 | 867.16 | 50 | 867.96 |
| 42.2 | 874.65 | 43.5 | 873.35 |
| 37 | 878.25 | 34.3 | 8850.95 |
| 9.6 | 904.63 | 11.4 | 902.83 |

| Year | 1970 | 1978 | 1981 | 1984 | 1991 |
|---|---|---|---|---|---|
| Flowline | 871.55 | 868.75 | 865.85 | 868.55 | 869.75 |

**Table 18. Structure, cross-section, and flowline details**
**Bridge No. 14517 (RS 11) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b14517 | Logan-Payne c/l | 35-59-00 | 97-21-12 | I.35 | 1959 | 803.1 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed59 | Data88 | R-Bed88 | Data90 | R-Bed90 | Data92 | R-Bed92 |
|---|---|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 900 | 926.77 | 918 | | 918 | 8.7 | 918.07 | 9.2 | 917.57 |
| 1 | 100 | 872.4 | 924.41 | 893.8 | 26.7 | 897.71 | 26.2 | 898.21 | 26.8 | 897.61 |
| 2 | 200 | 859.29 | 923.29 | 874.3 | 54 | 869.29 | 49.5 | 873.79 | 48.2 | 875.09 |
| | 220 | 857.57 | 922.97 | 874.3 | | 870.09 | | 873.91 | | 872.73 |
| 3 | 300 | 850.69 | 921.69 | 874.3 | 48.4 | 873.29 | 47.3 | 874.39 | 58.4 | 863.29 |
| | 350 | 849.68 | 921.18 | 874.70 | | 874.33 | | 875.63 | | 865.73 |
| 4 | 400 | 848.66 | 920.66 | 875.1 | 45.3 | 875.36 | 43.8 | 876.86 | 52.5 | 868.16 |
| 5 | 500 | 847.94 | 918.94 | 876.8 | 42 | 876.94 | 44.4 | 874.54 | 40.4 | 878.54 |
| 6 | 600 | 848.83 | 917.83 | 878 | 32.8 | 885.03 | 35.4 | 882.43 | 38.3 | 879.53 |
| 7 | 700 | 848.23 | 916.23 | 881.8 | 26.7 | 889.53 | 25.7 | 890.53 | 25.8 | 890.43 |
| N-A | 800 | 904.5 | 915.21 | 906 | | 906 | 8.6 | 906.61 | 9.1 | 906.11 |

| Data93 | R-Bed93 | Data94 | R-Bed94 | Data95 | R-Bed95 | Data96 | R-Bed96 | Data99 | R-Bed99 |
|---|---|---|---|---|---|---|---|---|---|
| 9.1 | 917.67 | 9.09 | 917.68 | 9.18 | 917.59 | 9.09 | 917.68 | 8.41 | 918.36 |
| 26.4 | 898.01 | 26.34 | 898.07 | 26.24 | 898.17 | 6.04 | 918.37 | 25.9 | 898.51 |
| 48.1 | 875.19 | 49.82 | 873.47 | 47.23 | 876.06 | 47.76 | 875.53 | 47.6 | 875.69 |
| | 873.59 | | 871.802 | | 874.52 | | 874.41 | 55.3 | 867.67 |
| 54.5 | 867.19 | 56.55 | 865.14 | 53.30 | 868.39 | 51.79 | 869.90 | 49.1 | 872.59 |
| | 869.28 | | 868.33 | 57.73 | 863.45 | 52.91 | 868.27 | | 874.58 |
| 49.3 | 871.36 | 49.13 | 871.53 | 46.41 | 874.25 | 45.46 | 875.20 | 44.1 | 876.56 |
| 49.5 | 869.44 | 49.13 | 869.81 | 50.18 | 868.76 | 42.28 | 876.66 | 40.1 | 878.84 |
| 42.9 | 874.93 | 39.23 | 878.60 | 44.77 | 873.06 | 40.84 | 876.99 | 40.1 | 877.73 |
| 36.3 | 879.93 | 35.95 | 880.28 | 34.44 | 881.79 | 36.11 | 880.12 | 36.3 | 879.93 |
| 9.2 | 906.01 | 9.09 | 906.12 | 9.02 | 906.19 | 8.99 | 906.22 | 8.2 | 907.01 |

**Table 18. (Continued)**

| Data01 | R-bed01 | Data05 | R-bed05 |
|---|---|---|---|
| 9.1 | 917.67 | 10.9 | 915.87 |
| 27.4 | 897.01 | 28.9 | 895.51 |
| 50.9 | 872.39 | 47.9 | 875.39 |
| | 872.17 | 54.3 | 868.67 |
| 50.4 | 871.29 | 62.7 | 858.99 |
| 49.10 | 872.08 | 53.8 | 867.375 |
| 47.2 | 873.46 | 50.2 | 870.46 |
| 41.8 | 577.14 | 44.2 | 874.74 |
| 40.4 | 877.43 | 43.6 | 874.23 |
| 36.3 | 879.93 | 35.6 | 880.63 |
| 9 | 906.21 | 10.8 | 904.41 |

| Year | 1970 | 1975 | 1978 | 1981 | 1984 | 1991 |
|---|---|---|---|---|---|---|
| Flowline | 873.16 | 863.96 | 864.46 | 862.9 | 865.5 | 872.96 |

**Table 19. Structure, cross-section, and flowline details**
**Bridge No. 13122 (RS 12) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b13122 | 1.5 mi N Lincoln c/l | 35-57-30 | 97-01-54 | US 177 | 1953 | 803.1 |

| Pier-No | Distance | Pier-Btm | Top-Crb | Top-Rail | R-Bed53 | Data88 | R-Bed88 | Data92 | R-Bed92 | Data93 | R-Bed93 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 800 | 843.97 | 846.63 | 835.5 | 8.5 | 835.47 | 11.4 | 835.23 | 11.5 | 835.13 |
| | 30 | | 844.23 | 846.89 | 833.29 | 15.80 | 828.43 | | | | |
| 1 | 102 | 794.99 | 844.84 | 847.5 | 828 | 14.8 | 830.04 | 17.6 | 829.90 | 17.5 | 830.00 |
| 2 | 202 | 794.95 | 845.73 | 848.39 | 827.8 | 20.9 | 824.83 | 21.5 | 826.89 | 21.3 | 827.09 |
| 3 | 302 | 795.03 | 846.05 | 848.71 | 820.2 | 20.2 | 825.85 | 19 | 829.71 | 20.4 | 828.31 |
| 4 | 402.25 | 795 | 846.44 | 849.1 | 820.25 | 29.7 | 816.74 | 25.5 | 823.60 | 34.9 | 814.20 |
| 5 | 502.5 | 795.03 | 846.05 | 848.71 | 822.1 | 32.4 | 813.65 | 38.3 | 810.41 | 45.4 | 803.31 |
| | 559.50 | | 845.87 | 848.53 | 824.44 | | | | | | |
| 6 | 602.5 | 794.96 | 845.73 | 848.39 | 826.2 | 28.8 | 816.93 | 35.5 | 812.89 | 45.6 | 802.79 |
| | 647.5 | | 845.33 | 847.99 | 829.71 | | | 35.9 | 812.09 | | |
| 7 | 702.5 | 794.99 | 844.84 | 847.5 | 834 | 24.7 | 820.14 | 28 | 819.50 | 47.6 | 799.90 |
| | 737.50 | | 844.54 | 847.20 | 835.03 | 22.20 | 822.34 | | | | |
| N-A | 804.5 | 800 | 843.97 | 846.63 | 837 | 6.9 | 837.07 | 10.2 | 836.43 | 10 | 836.63 |

| Data95 | R-Bed95 | Data96 | R-Bed96 | Data98 | R-Bed98 | Data99 | R-Bed99 | Data01 | R-Bed01 |
|---|---|---|---|---|---|---|---|---|---|
| 11.68 | 834.95 | 11.45 | 835.18 | 11.45 | 835.18 | 11.30 | 835.33 | 11.5 | 835.13 |
| | | | | | | | | | |
| 30.86 | 816.64 | 17.35 | 830.15 | 16.70 | 830.80 | 17.80 | 829.70 | 16.6 | 830.9 |
| 20.80 | 827.59 | 20.63 | 827.76 | 18.24 | 830.15 | 18.10 | 830.29 | 17.9 | 830.49 |
| 19.98 | 828.73 | 20.57 | 828.14 | 21.45 | 827.26 | 20.80 | 827.91 | 20.2 | 828.51 |
| 28.08 | 821.02 | 31.29 | 817.81 | 25.62 | 823.48 | 27.30 | 821.80 | 29.5 | 819.6 |
| 33.10 | 815.61 | 30.08 | 818.63 | 38.90 | 809.81 | 31.80 | 816.91 | 29.9 | 818.81 |
| | | | | | | 44.00 | 804.53 | 46.40 | 802.13 |
| 36.67 | 811.72 | 27.22 | 821.17 | 42.38 | 806.01 | 40.00 | 808.39 | 36.6 | 811.79 |
| | | | | | | | | | |
| 28.14 | 819.36 | 26.27 | 821.23 | 26.24 | 821.26 | 32.50 | 815.00 | 27.7 | 819.8 |
| | | | | | | | | | |
| 10.14 | 836.49 | 9.74 | 836.89 | 9.84 | 836.79 | 9.90 | 836.73 | 9.9 | 836.73 |

| Year | 1965 | 1984 | 1990 |
|---|---|---|---|
| Flowline | 806 | 808.6 | 810.2 |

**Table 20. Structure, cross-section, and flowline details**
**Bridge No. 19275 (RS 13) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b19275 | 18.1 mi E Logan C/L | 35-59-06 | 96-54-54 | SH33 | 1976 | 801.8 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed76 | Data88 | R-Bed88 | Data92 | R-Bed92 | Data93 | R-Bed93 |
|---|---|---|---|---|---|---|---|---|---|---|
| W-A | 0 | 830 | 843.55 | 834.00 | 11 | 832.55 | 10 | 833.55 | 11 | 832.55 |
| 1 | 101.29 | 781.18 | 845.48 | 817.00 | 28.4 | 817.08 | 28.6 | 816.88 | 29.9 | 815.58 |
| 2 | 201.29 | 781.1 | 847.4 | 816.00 | 36.7 | 810.7 | 31.6 | 815.8 | 32.6 | 814.8 |
| 3 | 301.29 | 781.02 | 849.32 | 807.00 | 41 | 808.32 | 40.5 | 808.82 | 43.2 | 806.12 |
|  | 391.29 | 777.348 | 851.048 | 805.20 |  | 804.198 |  | 804.16 |  | 790.39 |
| 4 | 401.29 | 776.94 | 851.24 | 805.00 | 47.5 | 803.74 | 47.6 | 803.64 | 62.6 | 788.64 |
| 5 | 501.29 | 772.86 | 853.16 | 803.90 | 48.3 | 804.86 | 48.6 | 804.56 | 63.7 | 789.46 |
| 6 | 601.29 | 776.78 | 855.08 | 803.80 | 45.7 | 809.38 | 49.6 | 805.48 | 61.5 | 793.58 |
| 7 | 701.29 | 797.7 | 857 | 805.00 | 47.9 | 809.1 | 49.2 | 807.8 | 48.6 | 808.4 |
| E-A | 802.58 | 847 | 858.96 | 850.00 | 6.3 | 852.66 | 5.5 | 853.46 | 6.6 | 852.36 |

| Data99 | R-bed99 | Data01 | R-bed01 |
|---|---|---|---|
| 10.4 | 833.15 | 10.7 | 832.85 |
| 27.8 | 817.68 | 25.6 | 819.88 |
| 30.9 | 816.5 | 28.7 | 818.7 |
| 42.6 | 806.72 | 27.9 | 821.42 |
|  | 801.158 | 56.3 | 794.75 |
| 50.7 | 800.54 | 42.2 | 809.04 |
| 50.4 | 802.76 | 42.7 | 810.46 |
| 54.5 | 800.58 | 43.1 | 811.98 |
| 49.6 | 807.4 | 44.4 | 812.6 |
| 6.3 | 852.66 | 5.3 | 853.66 |

| Year | 1977 | 1991 | 1976 | 1977 | 1988 | 1991 | 1992 | 1993 | 1999 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Flowline** | 811.9 | 802.08 | 803.80 | 811.9 | 803.74 | 802.08 | 803.64 | 788.64 | 800.54 | 794.748 |

**Table 21. Structure, cross-section, and flowline details**
**Bridge No. 18792 (RS 14) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b18792 | 2.6 MI N JCT SH 33 | 36-01-24 | 96-54-18 | SH 108 | 1974 | 899.9 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed74 | Data88 | R-Bed88 | Data92 | R-Bed92 | Data93 | R-Bed93 | Data95 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 821 | 831.15 | 824 | 10.8 | 820.35 | 11 | 820.15 | 10.8 | 820.35 | 10.96 |
| 1 | 100.25 | 785.57 | 832.15 | 808 | 26.1 | 806.05 | 25 | 807.15 | 25.7 | 806.45 | 25.68 |
| 2 | 200.25 | 785.57 | 833.15 | 809.2 | 27.9 | 805.25 | 26 | 807.15 | 29.7 | 803.45 | 29.65 |
| 3 | 300.25 | 785.57 | 834.15 | 809.1 | 28 | 806.15 | 27 | 807.15 | 31.1 | 803.05 | 30.14 |
| 4 | 400.25 | 785.57 | 835.15 | 809.1 | 39.6 | 795.55 | 38 | 797.15 | 42.3 | 792.85 | 39.06 |
| 5 | 500.25 | 765.87 | 836.15 | 798.2 | 39.4 | 796.75 | 38 | 798.15 | 62.9 | 773.25 | 40.38 |
| 6 | 600.25 | 763.57 | 837.15 | 798 | 47.7 | 789.45 | 49 | 788.15 | 41 | 796.15 | 42.44 |
|  | 650.25 | 766.57 | 837.65 | 797.9 |  | 791 |  | 790.15 |  | 796.2 |  |
| 7 | 700.25 | 769.57 | 838.15 | 797.8 | 45.6 | 792.55 | 46 | 792.15 | 41.9 | 796.25 | 44.90 |
| 8 | 800.25 | 786.57 | 839.15 | 798 | 29 | 810.15 | 29 | 810.15 | 30.7 | 808.45 | 31.06 |
| N-A | 900.5 | 821 | 840.15 | 834 | 4.5 | 835.65 | 4 | 836.15 | 4.6 | 835.55 | 4.89 |

| R-Bed95 | Data98 | R-Bed98 | Data99 | R-Bed99 | Data01 | R-Bed01 | Data05 | R-Bed05 |
|---|---|---|---|---|---|---|---|---|
| 820.19 | 10.824 | 820.326 | 10.7 | 820.45 | 10.7 | 820.45 | 10.8 | 820.35 |
| 806.47 | 25.5512 | 806.5988 | 25.5 | 806.65 | 25.6 | 806.55 | 25.5 | 806.65 |
| 803.50 | 28.8312 | 804.3188 | 28.7 | 804.45 | 28.7 | 804.45 | 28.6 | 804.55 |
| 804.01 | 28.044 | 806.106 | 27.8 | 806.35 | 27.9 | 806.25 | 27.8 | 806.35 |
| 796.09 | 41.0656 | 794.0844 | 43.3 | 791.85 | 42.2 | 792.95 | 45 | 790.15 |
| 795.77 | 44.4768 | 791.6732 | 47.5 | 788.65 | 42.7 | 793.45 | 46.08 | 790.07 |
| 794.71 | 47.9208 | 789.2292 | 44.3 | 792.85 | 43.1 | 794.05 | 44.25 | 792.9 |
| 793.977 |  | 791.2708 |  | 792.45 | 46.6 | 791.05 | 45.58 | 792.07 |
| 793.25 | 44.8376 | 793.3124 | 46.1 | 792.05 | 44.4 | 793.75 | 46.5 | 791.65 |
| 808.09 | 28.9296 | 810.2204 | 30.4 | 808.75 | 28.8 | 810.35 | 30.33 | 808.82 |
| 835.26 | 4.8216 | 835.3284 | 5.2 | 834.95 | 5.3 | 834.85 | 5.25 | 834.9 |

| Year | 1974 | 1988 | 1992 | 1993 | 1995 | 1998 | 1999 | 2001 | 2005 |
|---|---|---|---|---|---|---|---|---|---|
| Flowline | 797.8 | 789.45 | 788.15 | 773.25 | 793.25 | 789.2292 | 788.65 | 791.05 | 790.07 |

**Table 22. Structure and flowline details**
**Bridge No. 27568 (RS 15) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b27568 | 4.6 mi N of JCT SH 33 | 36-03-06 | 96-46-00 | SH 18 | 2005 | 902.1 |

| Year | 2004 | 2005 |
|---|---|---|
| Flowline | 770.1 | 769.42 |

**Table 23. Structure, cross-section, and flowline details**
**Bridge No. 15863 (RS 16) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b15863 | 4.4 mi ES Payne c/l | 36-05-36 | 96-34-48 | SH 99 | 1963 | 763.1 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed63 | Data88 | R-Bed88 | Data92 | R-Bed92 | Data94 | R-Bed94 |
|---|---|---|---|---|---|---|---|---|---|---|
| S.A | 0.00 | 758.00 | 775.14 | 763.00 | 8.10 | 764.04 | 15.00 | 760.14 | 15.00 | 760.14 |
| 1 | 121.25 | 693.00 | 777.57 | 724.20 | 33.50 | 741.07 | 45.00 | 732.57 | 43.00 | 734.57 |
| 2 | 241.25 | 670.00 | 779.97 | 723.00 | 58.10 | 718.87 | 59.00 | 720.97 | 59.00 | 720.97 |
| | 261.25 | 670.24 | 780.55 | 722.52 | | 720.91 | | 723.23 | | 719.39 |
| 3 | 361.25 | 671.00 | 782.37 | 721.00 | 52.00 | 727.37 | 52.00 | 730.37 | 68.00 | 714.37 |
| 4 | 481.25 | 675.58 | 784.77 | 722.00 | 59.30 | 722.47 | 54.00 | 730.77 | 66.00 | 718.77 |
| 5 | 601.25 | 692.00 | 789.17 | 723.00 | 43.80 | 742.37 | 37.00 | 752.17 | 38.00 | 751.17 |
| N-A | 722.50 | 778.00 | 789.60 | 777.50 | 11.60 | 775.00 | 12.00 | 777.60 | 12.00 | 777.60 |

| Data99 | R-bed99 |
|---|---|
| 8.2 | 763.94 |
| 36.00 | 738.57 |
| 53.90 | 723.07 |
| 60.00 | 717.558 |
| 60.30 | 719.07 |
| 47.90 | 733.87 |
| 46.50 | 739.67 |
| 11.40 | 775.20 |

| Year | 1970 | 1975 | 1984 | 1985 | 1990 |
|---|---|---|---|---|---|
| Flowline | 723.67 | 721.67 | 724.97 | 721.97 | 720.97 |

**Table 24. Structure, cross-section, and flowline details**
**Bridge No. 16820 (RS 17) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b16820 | 3.5 mi E JCT SH 99 | 36-07-06 | 96-30-48 | SH 51 | 1966 | 722.1 |

| Pier-No | Distance | Pier-btm | Top-Ppw | R-Bed66 | Data88 | R-Bed88 | Data92 | R-Bed92 | Data94 | R-Bed94 | Data99 | R-Bed99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W-A | 0 | 753 | 771 | 756 | 13.9 | 754.1 | 14 | 757 | 14.00 | 757.00 | 13 | 755 |
| 1 | 121 | 683.8 | 770.84 | 726.2 | 35.9 | 731.94 | 35 | 735.84 | 36.00 | 734.84 | 30.7 | 737.14 |
| 2 | 241 | 684.05 | 763.55 | 709 | 54.2 | 706.35 | 52 | 711.55 | 55.00 | 708.55 | 52.7 | 707.85 |
| 3 | 361 | 683.05 | 763.55 | 710.5 | 58.1 | 702.45 | 51 | 712.55 | 55.00 | 708.55 | 53.3 | 707.25 |
| 4 | 481 | 686.05 | 763.55 | 712.3 | 51.9 | 708.65 | 59 | 704.55 | 59.00 | 704.55 | 54 | 706.55 |
| 5 | 601 | 692.8 | 763.3 | 711.5 | 40.1 | 720.2 | 40 | 723.3 | 42.00 | 721.30 | 37.9 | 722.4 |
| E-A | 722 | 751.5 | 771 | 758 | 11.3 | 756.7 | 12 | 759 | 12.00 | 759.00 | 11.4 | 756.6 |

| Year | 1975 | 1985 | 1990 | 1991 | 1966 | 1975 | 1985 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|---|---|
| Flowline | 707.55 | 711.05 | 711.55 | 704.55 | 709 | 707.55 | 711.05 | 702.45 | 711.55 |

| Year | 1991 | 1992 | 1994 | 1999 |
|---|---|---|---|---|
| Flowline | 704.55 | 704.55 | 704.55 | 706.55 |

**Table 25. Structure, cross-section, and flowline details**
**Bridge No. 15584 (RS 18) on Cimarron River**

| Bridge No. | Location | Latitude | Longitude | Road | Design year | Length |
|---|---|---|---|---|---|---|
| b14584 | 0.3 mi S Pawnee c/l | 36-09-24 | 96-24-00 | SH 48 | 1962 | 743 |

| Pier-No | Distance | Pier-Btm | Top-Ppw | R-Bed62 | Data88 | R-Bed88 | Data92 | R-Bed92 | Data94 | R-Bed94 |
|---|---|---|---|---|---|---|---|---|---|---|
| S-A | 0 | 754.5 | 769.19 | 754 | 10.8 | 755.39 | 13 | 756.19 | 13.00 | 756.19 |
| 1 | 121.25 | 670 | 771.62 | 711.5 | 53.9 | 714.72 | 50 | 721.62 | 51.00 | 720.62 |
| 2 | 241.25 | 670 | 774.02 | 689 | 73.3 | 697.72 | 63 | 711.02 | 61.00 | 713.02 |
| 3 | 361.25 | 671 | 776.42 | 690.4 | 78.3 | 695.12 | 70 | 706.42 | 70.00 | 706.42 |
| 4 | 481.25 | 675.58 | 778.82 | 689 | 71.8 | 704.02 | 69 | 709.82 | 70.00 | 708.82 |
| 5 | 601.25 | 692 | 781.22 | 722 | 53.3 | 724.92 | 41 | 740.22 | 41.50 | 739.72 |
| N-A | 722.5 | 760 | 783.64 | 768 | 10.4 | 770.24 | 13 | 770.64 | 13.00 | 770.64 |

| Year | 1969 | 1970 | 1975 | 1985 | 1990 |
|---|---|---|---|---|---|
| Flowline | 687.72 | 687.72 | 694.72 | 700.72 | 701.72 |

# APPENDIX B

## FLOWPATH OF CIMARRON RIVER IN OKLAHOMA

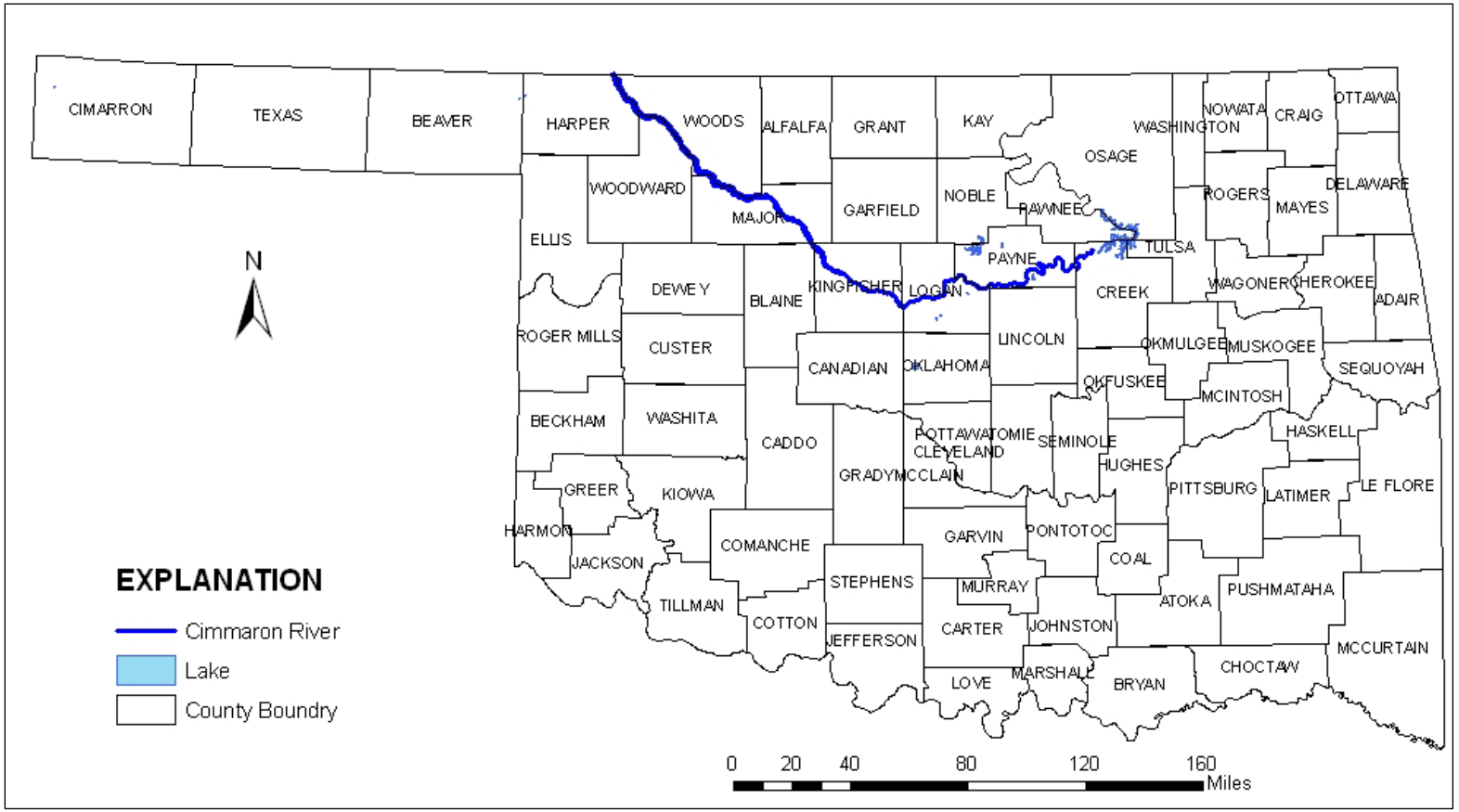
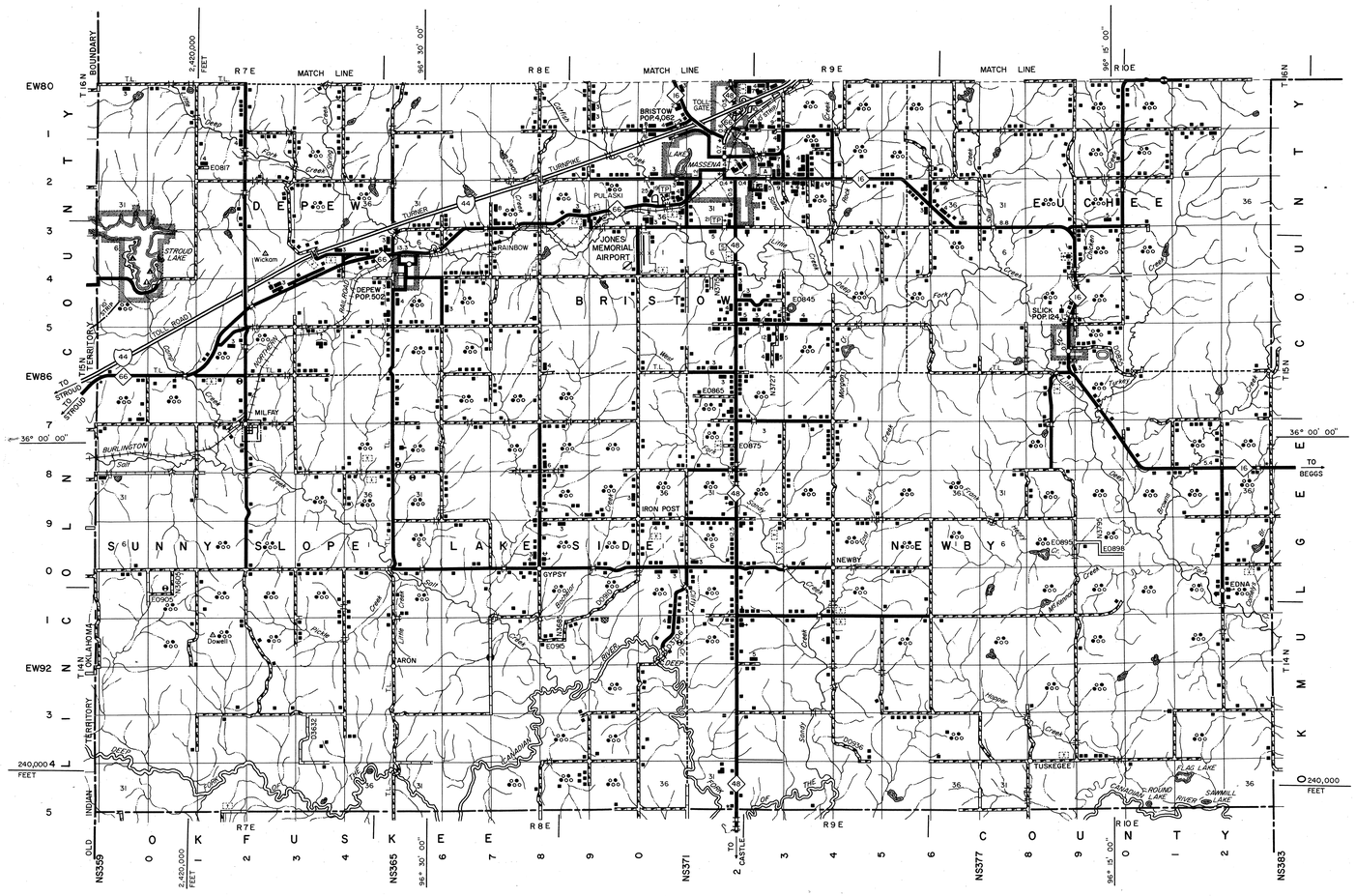



**Figure B-1. Flowpath of Cimarron River in Oklahoma**

**QUAD MAP LEGEND**
**CIMARRON RIVER, OKLAHOMA**

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

| County Name |
|---|
| Harper |
| Woodward |
| Woods |
| Major |
| Kingfisher |
| Logan |
| Payne |
| Lincoln |
| Creek |
| Pawnee |
| Osage |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INDIAN TERRITORY
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240,000 FEET
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96° 15' 00"
36° 00' 00"
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EW86
EW92
NS359
NS365
NS371
NS377
NS383
BRISTOW POP 4,056
DEPEW POP 502
EDEN POP 204
SLICK POP 124
JONES MEMORIAL AIRPORT
STROUD LAKE
MASSENA LAKE
TOLL GATE
RAINBOW
PULASKI
Wickom
EOBIT
MILFAY
EO845
EO865
EO875
EO885
EO895
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C O U N T Y
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GYPSY
IRON POST
ARON
TUSKEGEE
EDNA
TO BEGGS
TO CASTLE
TO STROUD
TO STROUD
Deep Fork
Sand Creek
Polecat Creek
Turkey Creek
Mill Creek
Salt Creek
Dry Creek
Rock Creek
Sandy Creek
Bull Creek
Little Deep Fork
Big Deep Fork
Indian Creek
Cedar Creek
Horse Creek
Hickory Creek
Spring Creek
Coon Creek
Fox Creek
Wolf Creek
Bear Creek
Owl Creek
Crazy Horse Creek
Bird Creek
Big Creek
Little Creek
Sand Creek
Mud Creek
Muddy Creek
Dog Creek
Cow Creek
Elk Creek
Buck Creek
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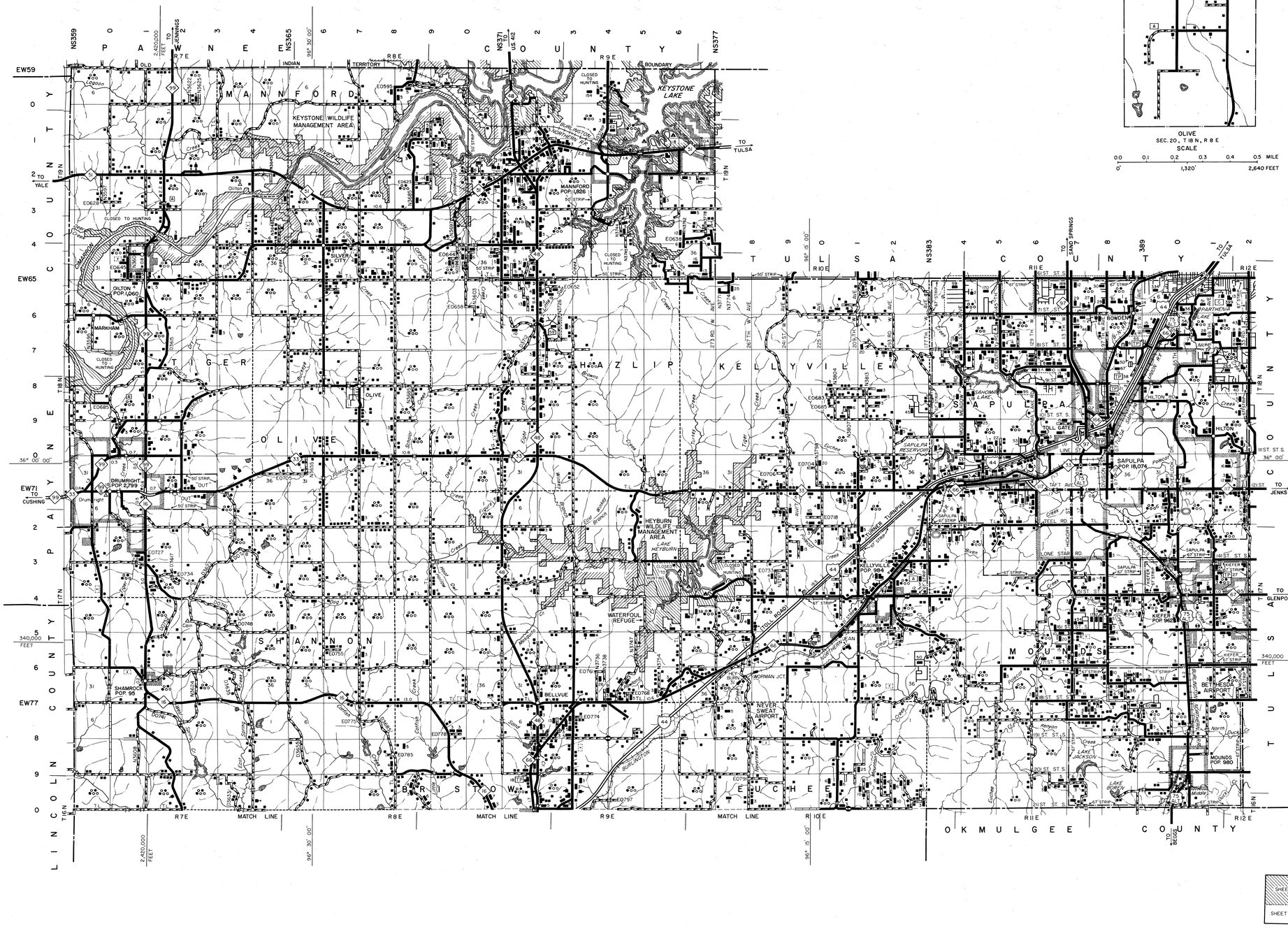
Lake Creek
Pond Creek
Willow Creek
Walnut Creek
Maple Creek
Oak Creek
Pine Creek
Cedar







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OKLAHOMA CITY, OKLAHOMA 73105

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SHEET 2 OF 2 SHEETS



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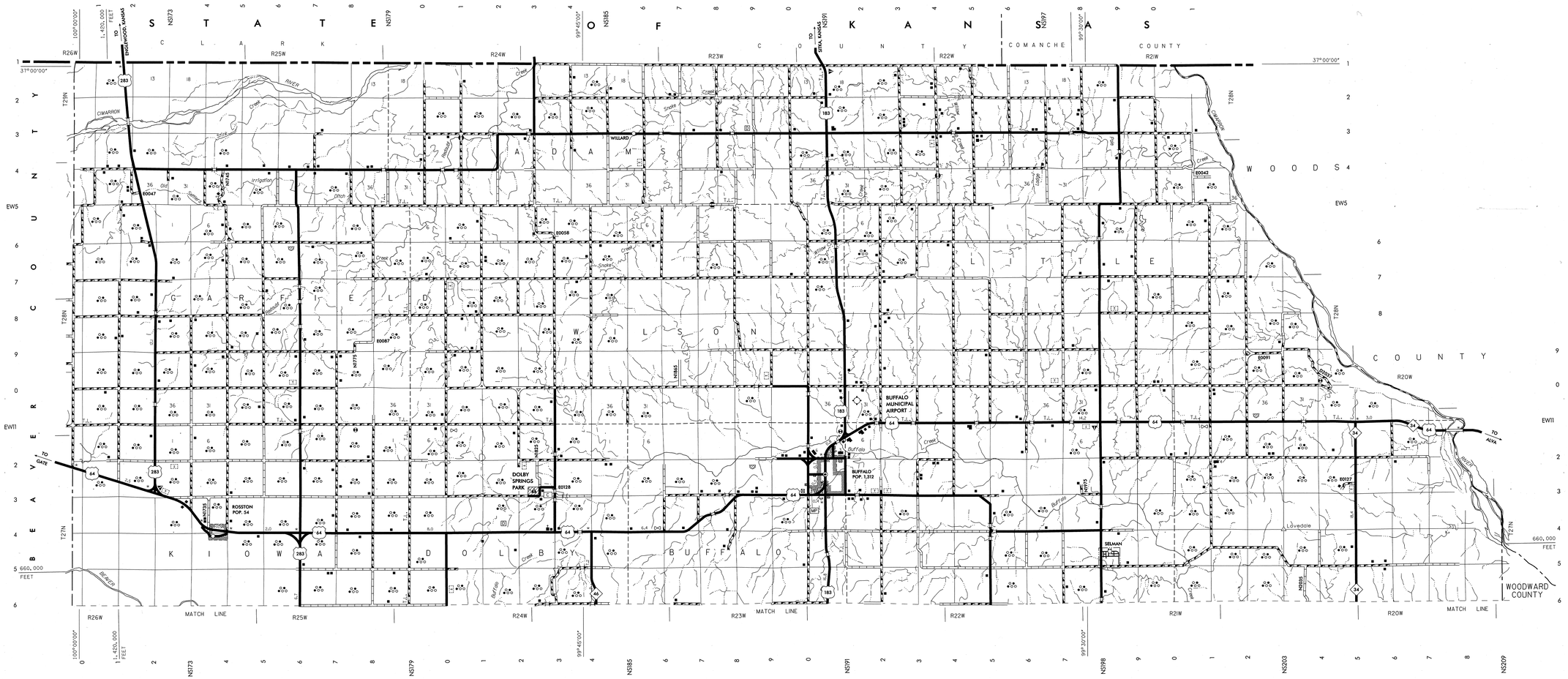


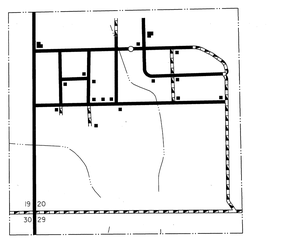


SELMAN
SEC. 20, T27N, R21W
SCALE IN MILES
0 1/8 1/4 1/2 MILE
0 1,320 2,640 FEET
0 200 400 600 800 1 KILOMETER
SCALE IN METERS

N

SHEET 2

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200 N.E. 21st STREET
OKLAHOMA CITY, OKLAHOMA 73105-3204

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SHEET 2 OF 2 SHEETS

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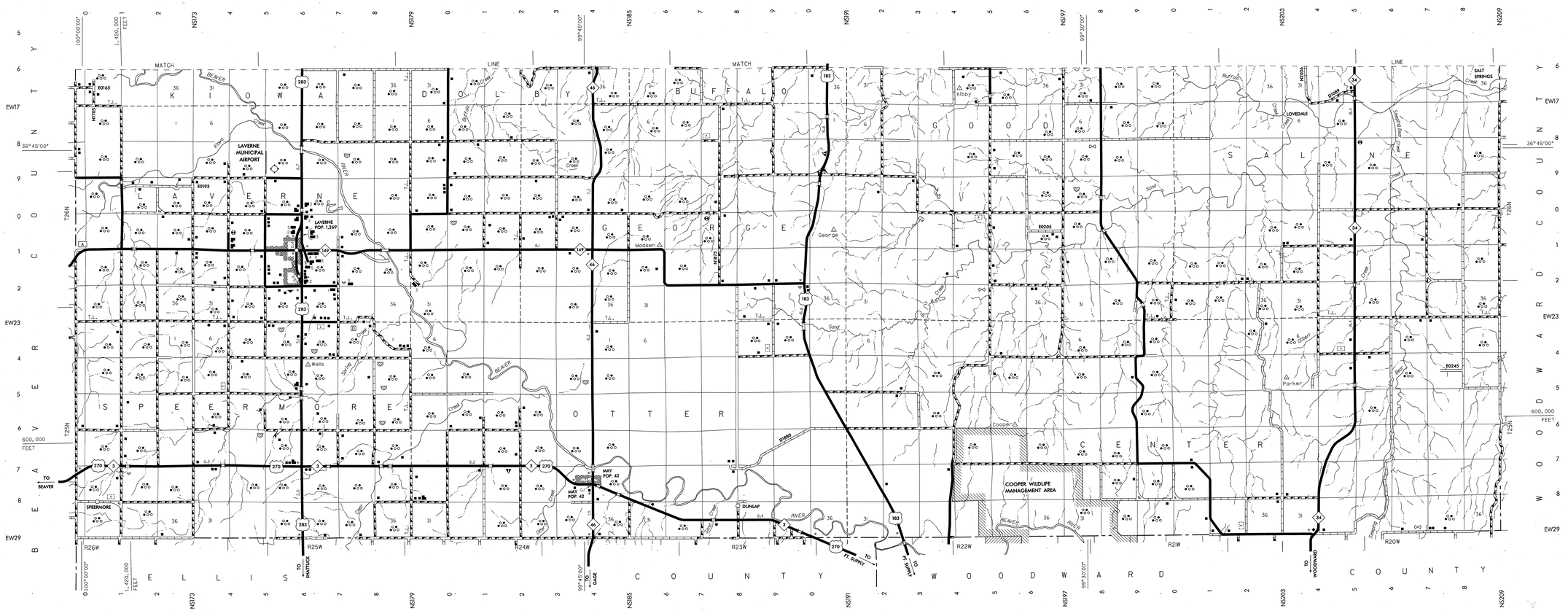


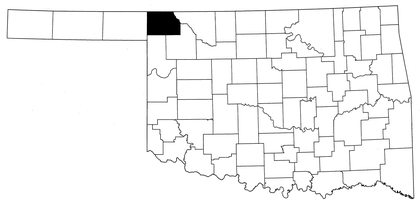

## LEGEND

- U.S.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 LINE
- SECTION LINE
- RURAL DEVELOPMENT AREA
- GOVERNMENT PROPERTY LINE
- MATCH LINE
- COUNTY SEAT
- TOWN CENTER
- CORPORATE LIMITS
- CIVIL TOWNSHIP, ROAD IN PLACE
- INSET BOUNDARY

- 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–State, CP–County MP–Municipal, TP–Trailer 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

- 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 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

- 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
- JUNK YARDS & DUMPS A–Automobile, B–Scrap 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






N

# GENERAL HIGHWAY MAP
# HARPER 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
1 0 1 2 3 4 5 MILES

0 1 2 3 4 5 6 7 8 9 10 KILOMETERS
SCALE IN KILOMETERS

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. 4,063

ALL DATA CURRENT TO
DATE OF INVENTORY
MAY 1999

ORIGINAL DRAFTING BY M.L.B. OCTOBER 1999
STATE SYSTEM REVISED TO OCTOBER 1999

SHEET 1 OF 2 SHEETS

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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.

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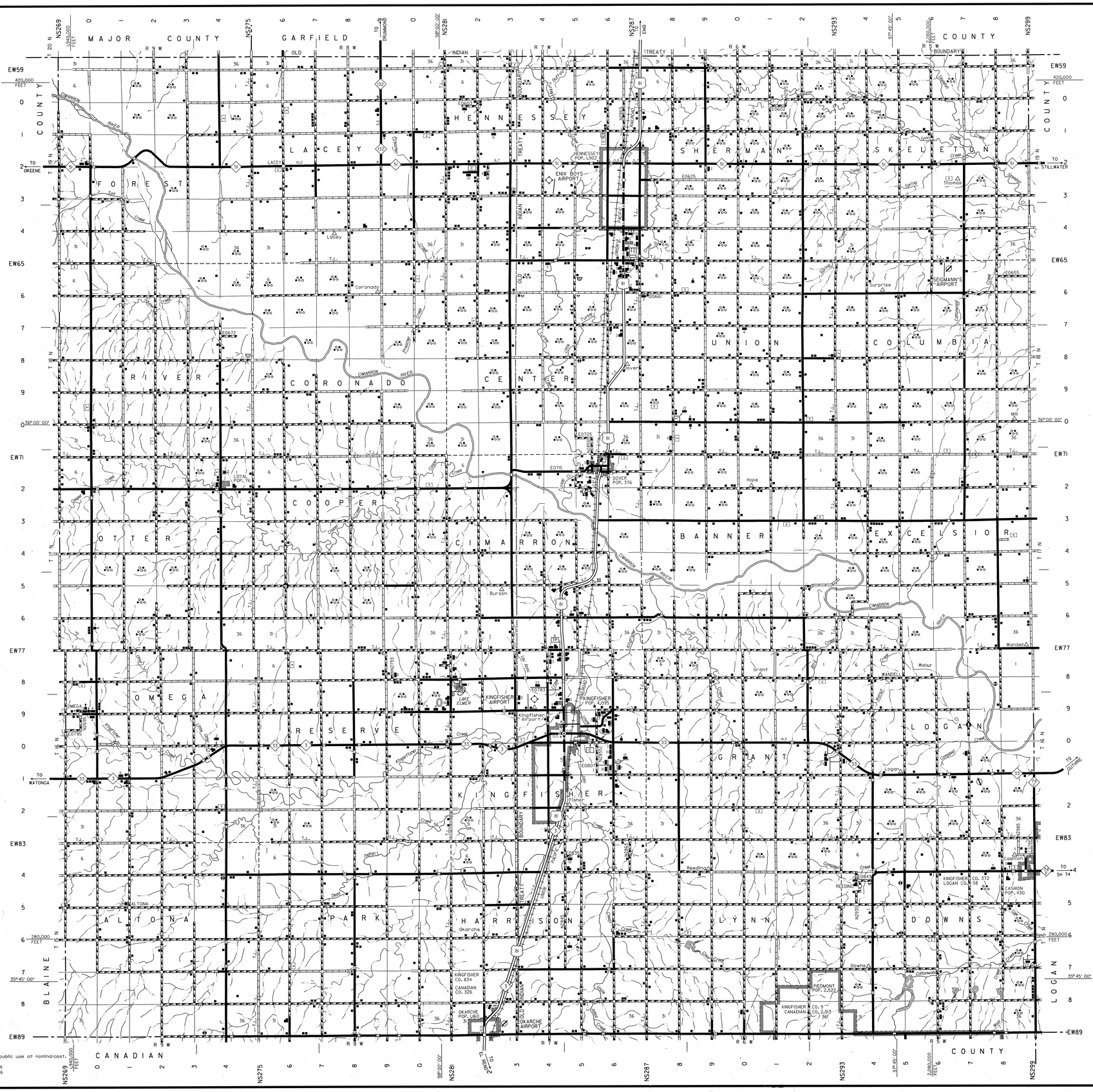


## LEGEND

- U.S.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 LINE
- SECTION LINE
- RURAL DEVELOPMENT AREA
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- MATCH LINE
- COUNTY SEAT
- TOWN CENTER
- CORPORATE LIMITS
- CIVIL TOWNSHIP, ROAD IN PLACE
- INSET BOUNDARY
- ELEVATION ABOVE SEA LEVEL
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- 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
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- RAILROAD WITH STATION INDICATED
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- CAMP SITE
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- NUMBER OF DWELLINGS CLOSELY SPACED
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- POST OFFICE
- POST OFFICE COMBINATIONS
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- CHURCH OR OTHER RELIGIOUS BUILDING
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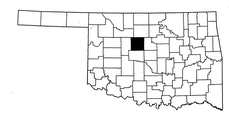

ALL DATA CURRENT TO DATE OF INVENTORY DECEMBER 1993

ORIGINAL DRAFTING BY W.T. NOV. 1995
STATE SYSTEM REVISED TO NOV. 1995

N

# GENERAL HIGHWAY MAP
# KINGFISHER 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 0.5 0 1 2 3 4 5 MILES

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. 13,212

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OKLAHOMA CITY, OKLAHOMA 73105

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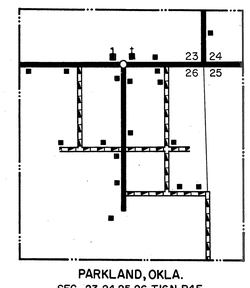
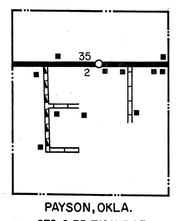
PAYNE COUNTY · CIMARRON · IOWA · PAWNEE · PONCA · LOGAN COUNTY · TOHEE · UNION · NORTH FORK · KEOKUK · SOUTH FORK · KEOKUK · CREEK COUNTY · OKLAHOMA · WELLSTON · MCKINLEY · CHANDLER · FOX · BRYAN · NORTH · WICHITA · MILLS · CHOCTAW · SEMINOLE · KICKAPOO · SOUTH · WICHITA · CHOCTAW · SEMINOLE · POTTAWATOMIE COUNTY

TOWNS AND PLACES: CUSHING CITY LIMITS · AGRA POP. 334 · TRYON POP. 514 · AVERY · ELBA · CRAWFORD · PARKLAND · BELTON · DUDLEY · CARNEY POP. 558 · FALLIS POP. 49 · HIBSAW · INGRAM · WELLSTON POP. 912 · WARWICK POP. 160 · CHANDLER POP. 2,596 · KENDRICK POP. 171 · STROUD POP. 2,666 · MIDWAY DOWNS · DAVENPORT POP. 979 · DAGGETT · KEYWEST · CLEMATIS · JIM THORPE MEMORIAL PARK · SPARKS POP. 202 · ARLINGTON · ROSSVILLE · PAYSON · WILZETTA · PRAGUE POP. 2,308 · BARTA · FOWLER · JACKTOWN · MEEKER POP. 1,003 · MIDWAY · HARRAH · BELLMONT · PRAGUE MUNICIPAL AIRPORT · CHANDLER MUNICIPAL AIRPORT · STROUD MUNICIPAL AIRPORT · MERRICK · TOLLGATE · SEWARD · MIDLOTHIAN · SOWARD LAKE · CHANDLER LAKE · MEEKER LAKE · POPLIN LAKE · PRAGUE LAKE · CLARK LAKE · STROUD LAKE

ROADS: TO GUTHRIE · TO EDMOND · TO OKLA. CITY · TO CUSHING · TO DRUMRIGHT · TO BRISTOW · TO DEPEW · TO PADEN · TO SEMINOLE · TO MCLOUD · TO SHAWNEE · TO HARRAH · TURNER TURNPIKE (TOLL) · NORTHERN OKLAHOMA RAILROAD · BURLINGTON NORTHERN RAILROAD · GOW RAILROAD · SOWARD RAILROAD · 2 STRIP · 90' STRIP




PARKLAND, OKLA.
SEC. 23,24,25,26,T16N,R4E
SCALE
0.0 0.1 0.2 0.3 0.4 0.5 MILE
0' 1,320' 2,640 FEET




PAYSON, OKLA.
SEC. 2,35,T12N,R4E
SCALE
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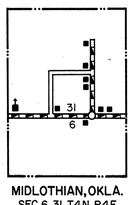
0' 1,320' 2,640 FEET




MIDLOTHIAN, OKLA.
SEC.6,31,T4N R4E
SCALE
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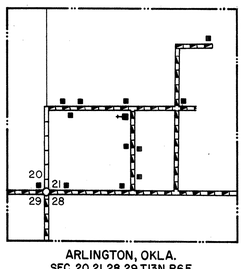
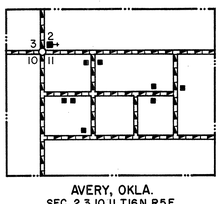
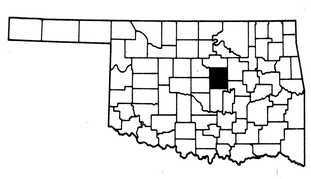
0' 1,320' 2,640 FEET




ARLINGTON, OKLA.
SEC. 20,21,28,29,T13N R6E
SCALE
0.0 0.1 0.2 0.3 0.4 0.5 MILE
0' 1,320' 2,640 FEET




AVERY, OKLA.
SEC. 2,3,10,11,T16N,R5E
SCALE
0.0 0.1 0.2 0.3 0.4 0.5 MILE
0' 1,320' 2,640 FEET



ALL DATA CURRENT TO DATE OF INVENTORY
**MARCH 1990**

ORIGINAL DRAFTING BY W.T. OCT. 1991
STATE SYSTEM REVISED TO JAN. 1992

## LEGEND

- U.S. NUMBERED HIGHWAY
- STATE NUMBERED HIGHWAY
- INTERSTATE HIGHWAY ROUTE
- PAVED ROAD
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- GRADED & DRAINED ROAD
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- POWER SUBSTATION
- KOMA TELEVISION OR RADIO STATION
- MILITARY INSTALLATION

N

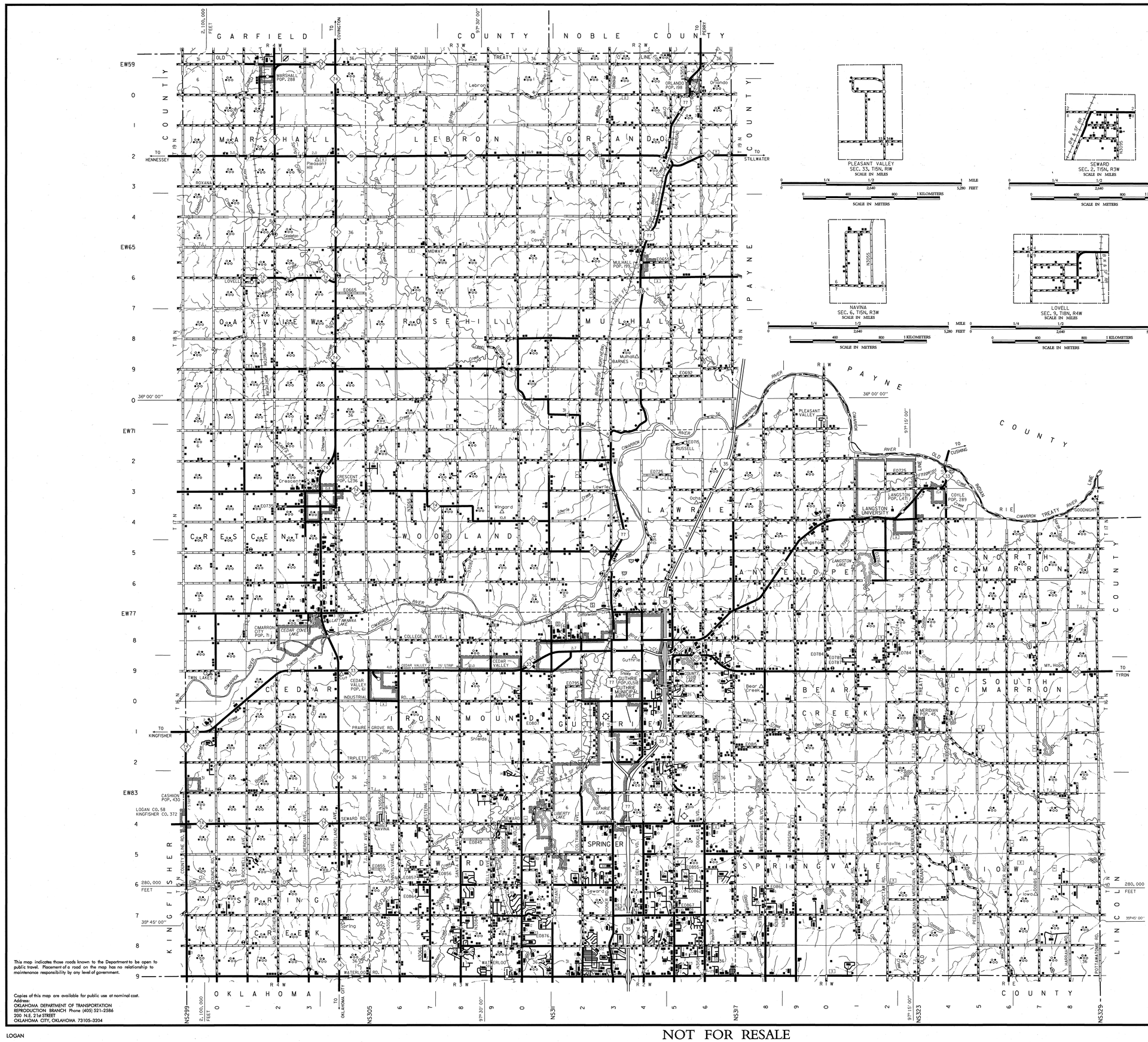
# GENERAL HIGHWAY MAP
# LINCOLN COUNTY
## OKLAHOMA

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

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

SCALE
1 ½ 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. 29,216




PLEASANT VALLEY
SEC. 33, T15N, R1W
SCALE IN MILES
SCALE IN METERS

SEWARD
SEC. 2, T15N, R3W
SCALE IN MILES
SCALE IN METERS

WATERLOO
SEC. 35, T15N, R3W
SCALE IN MILES
SCALE IN METERS

NAVINA
SEC. 6, T15N, R3W
SCALE IN MILES
SCALE IN METERS

LOVELL
SEC. 9, T18N, R4W
SCALE IN MILES
SCALE IN METERS

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ALL DATA CURRENT TO DATE OF INVENTORY FEB. 1996

ORIGINAL DRAFTING BY W.A.T. SEPT. 1997
STATE SYSTEM REVISED TO SEPT. 1997

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# GENERAL HIGHWAY MAP
# LOGAN COUNTY
## OKLAHOMA

PREPARED BY THE
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PLANNING DIVISION

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

SCALE IN MILES
SCALE IN KILOMETERS

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. 29,011

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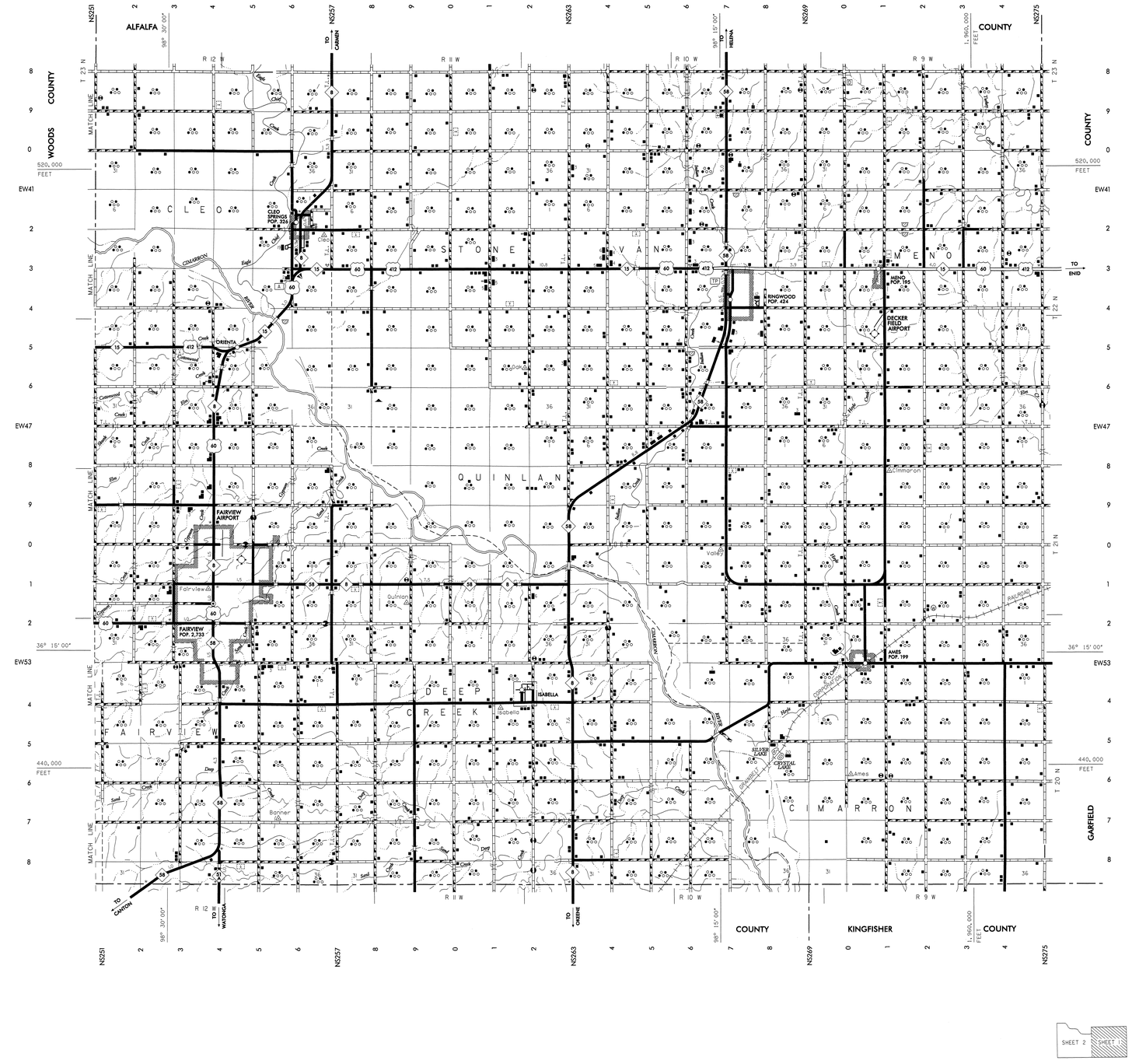


## LEGEND

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- COUNTY 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
- 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 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 SP-State, CP-County
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- FOREST RANGER STATION
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- FISH HATCHERY
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- FAIRGROUNDS, RACE COURSE
- DWELLING
- NUMBER OF DWELLINGS CLOSELY SPACED
- COMBINED BUSINESS AND DWELLING
- POST OFFICE
- POST OFFICE COMBINATIONS
- SEASONAL DWELLINGS
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- CHURCH WITH CEMETERY ADJACENT
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- SMALL BUSINESS
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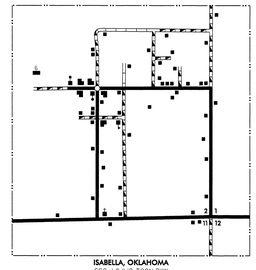
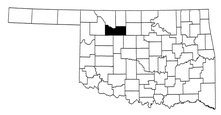
- KOMA TELEVISION OR RADIO STATION
- MILITARY INSTALLATION



ALL DATA CURRENT TO DATE OF INVENTORY FEBRUARY, 2000

ORIGINAL DRAFTING BY W.A.T. JANUARY, 2002
STATE SYSTEM REVISED TO JANUARY, 2002

SHEET 1OF 2 SHEETS

N

# 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

SCALE IN MILES
1 0 1 2 3 4 5 6 MILES
0 1 2 3 4 5 6 7 8 9 10 KILOMETERS
SCALE IN KILOMETERS

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

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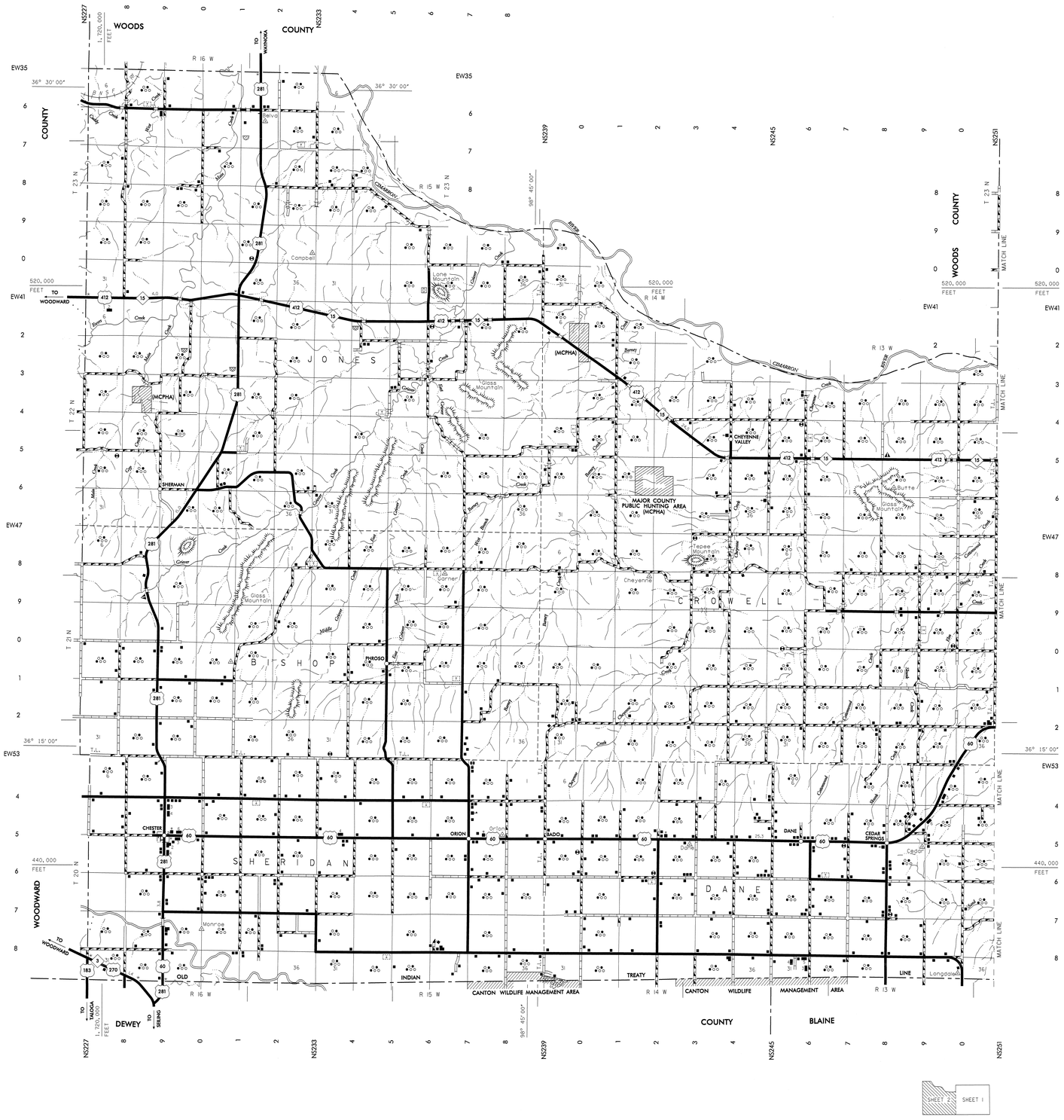
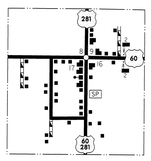
NOT FOR RESALE

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SHEET 2 OF 2 SHEETS

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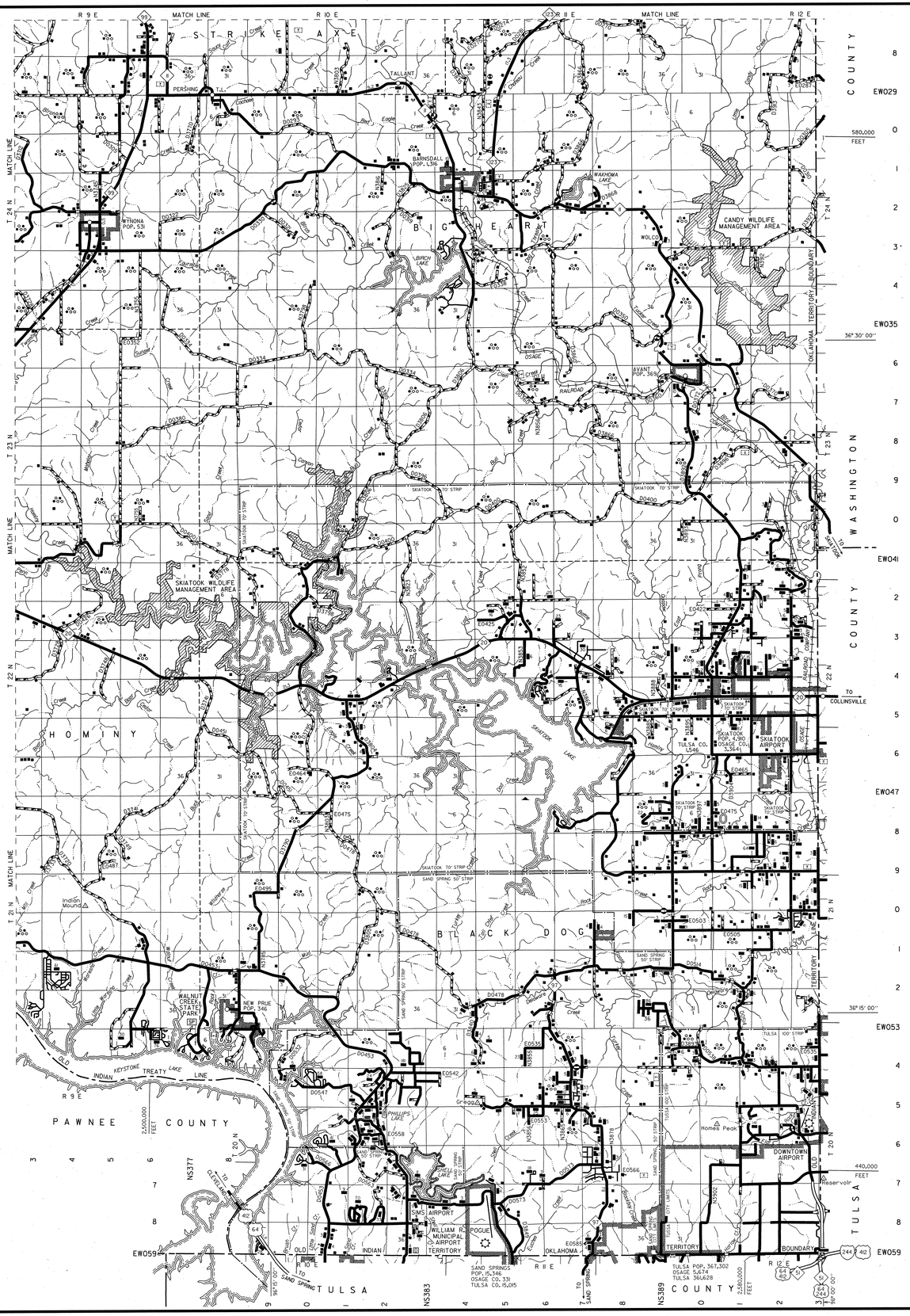


## LEGEND

- U.S. NUMBERED HIGHWAY
- STATE NUMBERED HIGHWAY
- INTERSTATE HIGHWAY ROUTE
- PAVED ROAD
- GRAVEL ROAD
- GRADED & DRAINED ROAD
- UNIMPROVED ROAD
- PRIMITIVE ROAD
- PROJECTED ROAD
- RESIDENTIAL ROAD
- N0001 COUNTY ROAD ID NO.
- 0.3 0.7 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 LINE
- SECTION LINE
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- CORPORATE LIMITS
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- 1867 ELEVATION ABOVE SEA LEVEL
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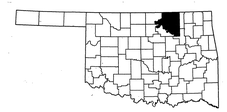
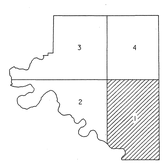
- KOMA TELEVISION OR RADIO STATION
- MILITARY INSTALLATION

ALL DATA CURRENT TO
DATE OF INVENTORY
MARCH 1995

ORIGINAL DRAFTING BY W.A.T. MAY 1996
STATE SYSTEM REVISED TO MAY 1996






N

# GENERAL HIGHWAY MAP
# OSAGE 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 0.5 0 1 2 3 4 5 MILES

LAMBERT CONFORMAL CONIC PROJECTION U.S.& GEODETIC SURVEY DATA
20,000 FOOT GRIDs OKLAHOMA PLANE COORDINATE SYSTEM NORTH PROJECTION ZONE.
POPULATION FIGURES BASED ON 1990 U.S. CENSUS
CO. POP. 41,645

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SHEET 1OF 4 SHEETS

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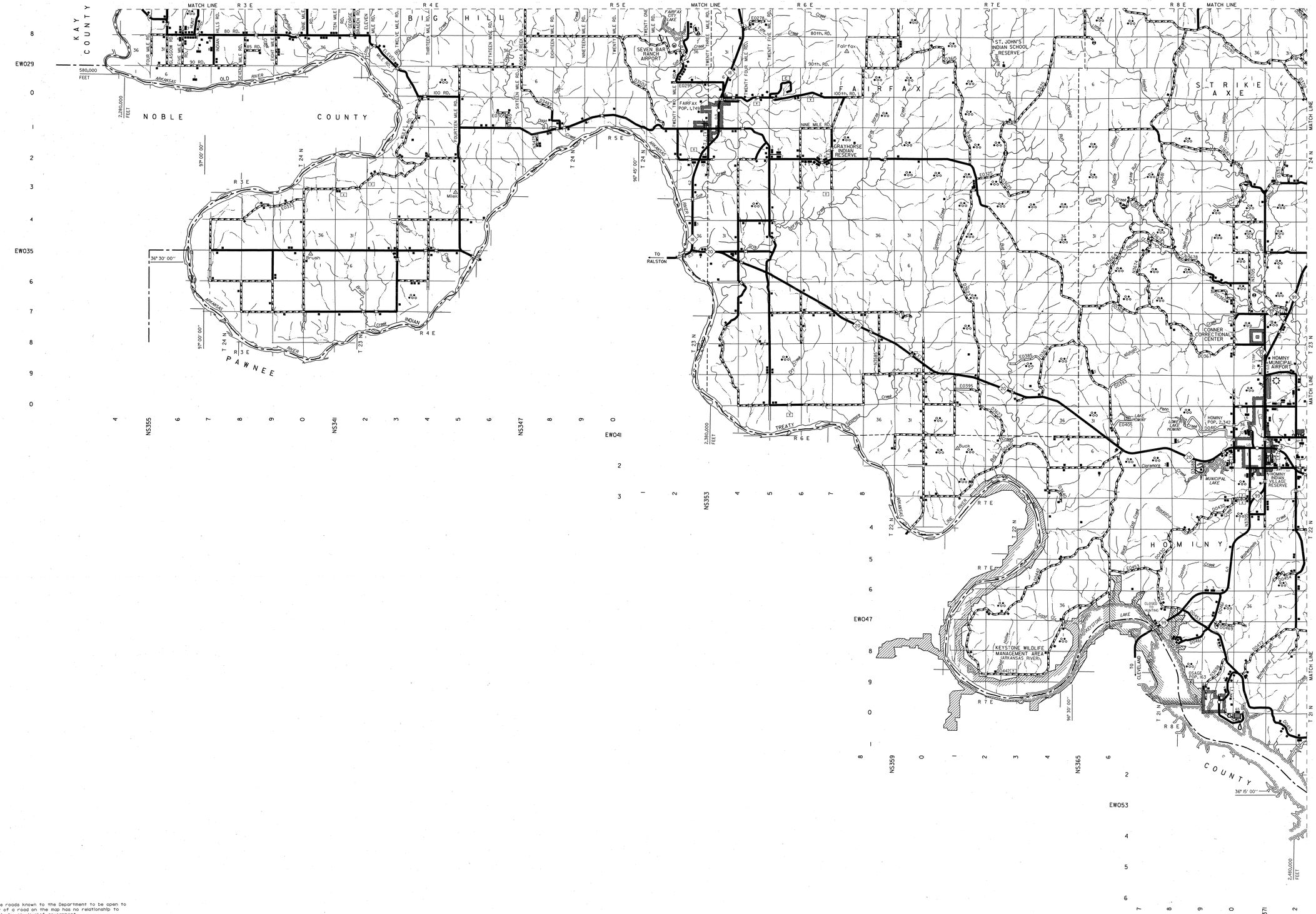


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SHEET 2 OF 4 SHEETS MARCH 1995 COMPUTER GENERATED



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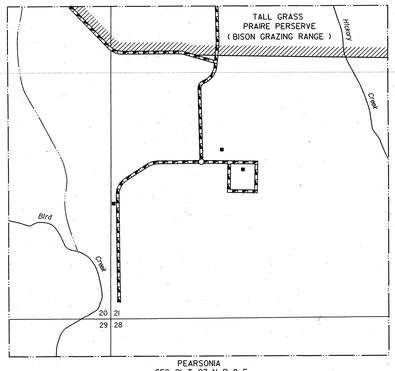
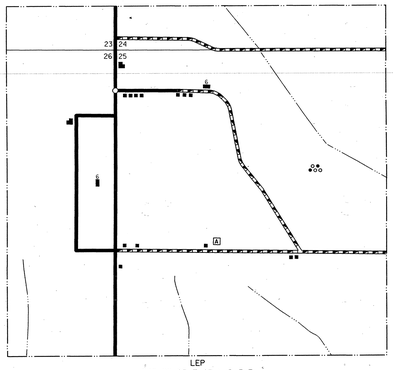
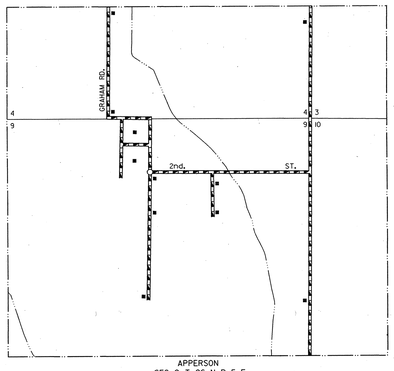


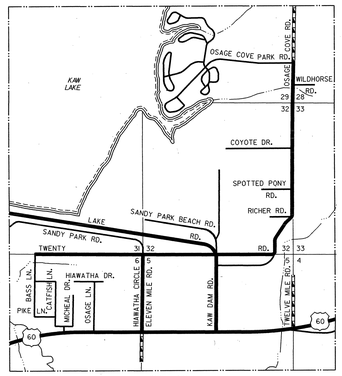

PEARSONIA
SEC. 21, T 27 N, R 8 E




LEP
SEC. 26, 25, T 27 N, R 5 E

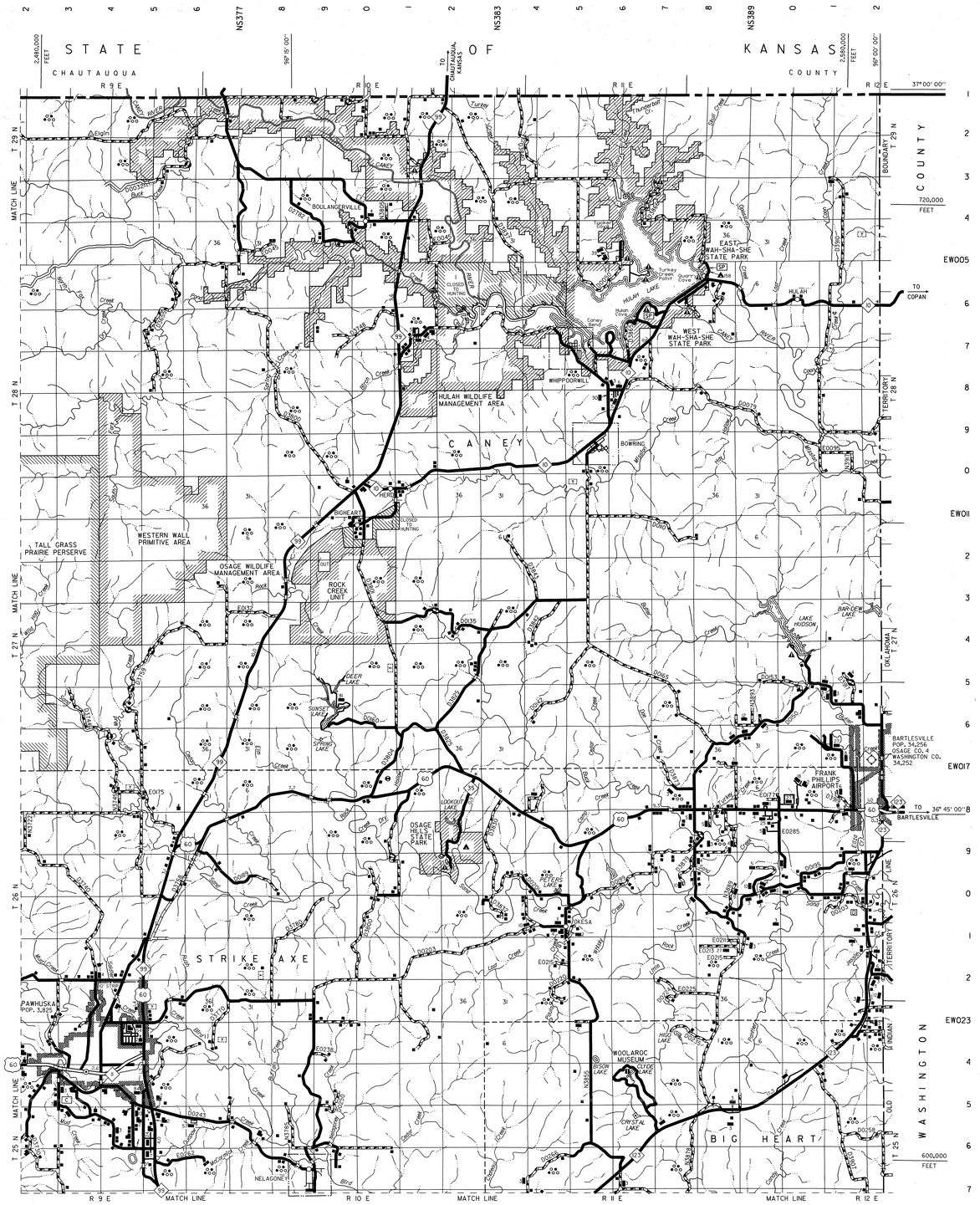



APPERSON
SEC. 9, T 26 N, R 5 E




INSET NO. I


STATE OF KANSAS
COWLEY COUNTY
CHAUTAUQUA COUNTY
NS353
NS359
NS365
NS371
NS341
NS347
NS335
37° 00' 00"
36° 45' 00"
97° 00' 00"
96° 30' 00"
2,360,000 FEET
2,460,000 FEET
2,280,000 FEET
720,000 FEET
6000,000 FEET
R 3 E
R 4 E
R 5 E
R 6 E
R 7 E
R 8 E
T 29 N
T 28 N
T 27 N
T 26 N
T 25 N
EW005
EW011
EW017
EW023
MATCH LINE
TREATY LINE
ADAMS RANCH AIRPORT
ADAMS LAKE
GRAINOLA POP. 58
COOPER RANCH AIRPORT
KAW WILDLIFE MANAGEMENT AREA
FRANTEN LAKE
JOHN DAHL WILDLIFE MANAGEMENT AREA
TALL GRASS PRAIRIE PERSERVE
BISON GRAZING RANGE
WEBB CITY POP. 93
SHIELER POP. 487
McKINNEY AIRPORT
PEARSONIA
BURBANK POP. 165
PHILLIPS LAKE
CARTER NINE
APPERSON
INSET NO. I
PAWHUSKA MUNICIPAL AIRPORT
BLUESTEM LAKE
LITTLE CHIEF
KAY COUNTY
BIG HILL
STRIKE AXE
FAIRFAX
CANEY
ARKANSAS RIVER
KAW LAKE
TO PONCA CITY
TO KAW CITY
TO CEDAR VALE, KANSAS
Evans
Boots
Charley
Burbank
Osage
Webb City
Shieler
Pearsonia
Pawhuska
Lake Pawhuska
Bluestem Lake
Adams Lake
Franten Lake
Phillips Lake
Carter Nine
Lake Bluestem
Kaw Lake
Indian Hills Lake
Lake Sherwin
Lake Kay
Lake Ponca
Lake Ponca Park
Lake Ponca Park Addition
Lake Ponca Park Addition No. 2
Lake Ponca Park Addition No. 3
Lake Ponca Park Addition No. 4
Lake Ponca Park Addition No. 5
Lake Ponca Park Addition No. 6
Lake Ponca Park Addition No. 7
Lake Ponca Park Addition No.


STATE OF KANSAS
CHAUTAUQUA COUNTY
WASHINGTON COUNTY
2,480,000 FEET
2,560,000 FEET
720,000 FEET
600,000 FEET
37°00'00"
90°15'00"
90°00'00"
R 9 E
R 10 E
R 11 E
R 12 E
T 29 N
T 28 N
T 27 N
T 26 N
T 25 N
MATCH LINE
TO CHAUTAUQUA, KANSAS
TO COPAN
TO 36°45'00" BARTLESVILLE
TERRITORY
OKLAHOMA
EAST WAH-SHA-SHE STATE PARK
WEST WAH-SHA-SHE STATE PARK
HULAH LAKE
HULAH WILDLIFE MANAGEMENT AREA
WHIPPOORWILL
CANEY
BOWRING
HERD
BIGHEART
BIG HEART
WESTERN WALL PRIMITIVE AREA
TALL GRASS PRAIRIE PERSERVE
OSAGE WILDLIFE MANAGEMENT AREA
ROCK CREEK UNIT
OSAGE HILLS STATE PARK
STRIKE AXE
PAWHUSKA POP. 3,825
NELAGONEY
BOULANGERVILLE
BARTLESVILLE POP. 34,256 OSAGE CO. 4 WASHINGTON CO. 34,252
FRANK PHILLIPS AIRPORT
WOOLAROC MUSEUM
LAKE HUDSON
BARNSDALL LAKE
DEER LAKE
SUNSET LAKE
SPRING LAKE
LOOKOUT LAKE
PETERS LAKE
DIXON LAKE
RIDGE LAKE
CRYSTAL LAKE
EWO05
EWO11
EWO17
EWO23
NS377
NS383
NS389
EO132
EO135
EO175
EO215
EO238
EO243
EO285
EO295
EO305
EO315
EO325
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EO345
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EO375
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EO455
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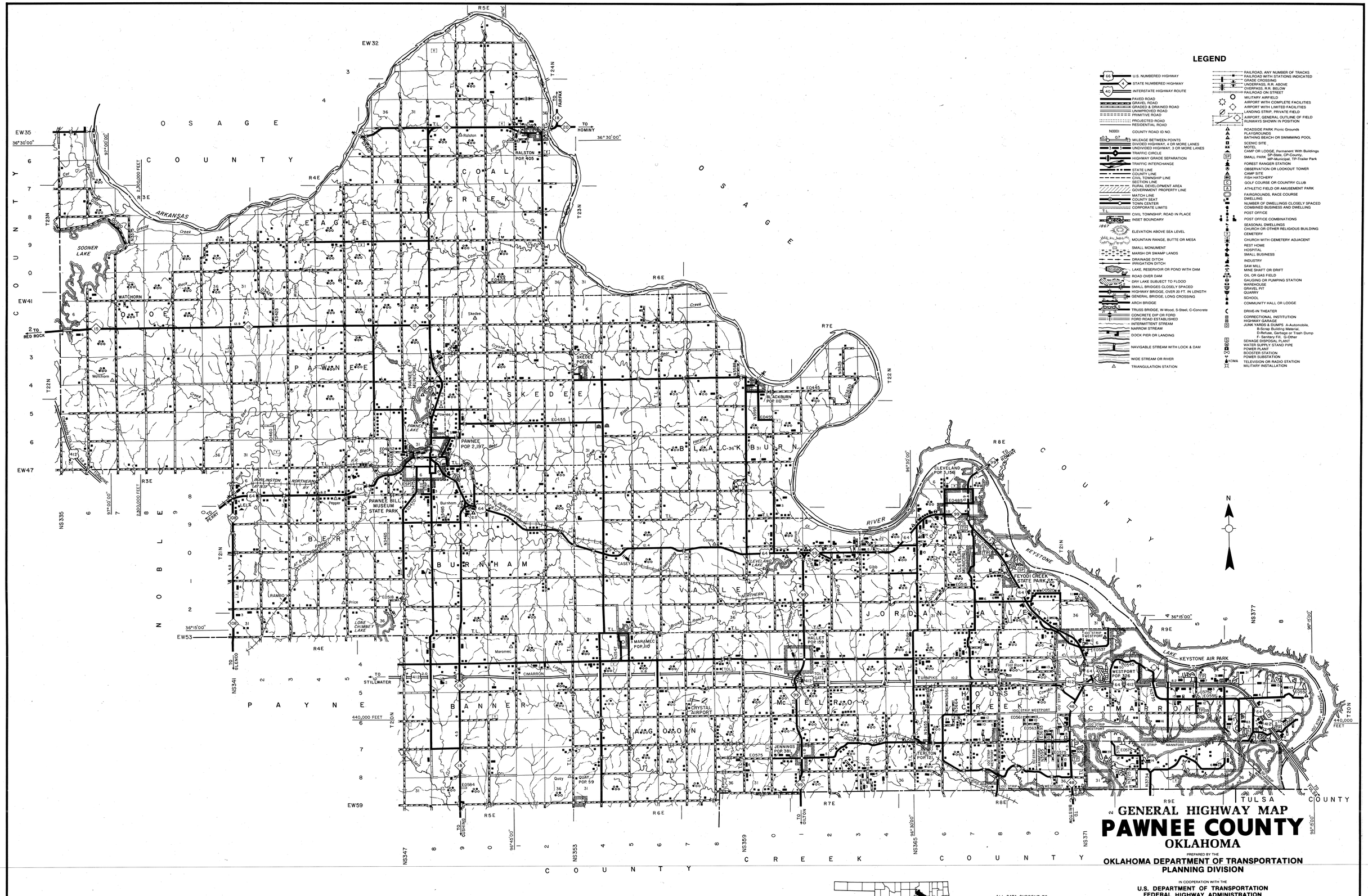
EO655
EO665
EO675

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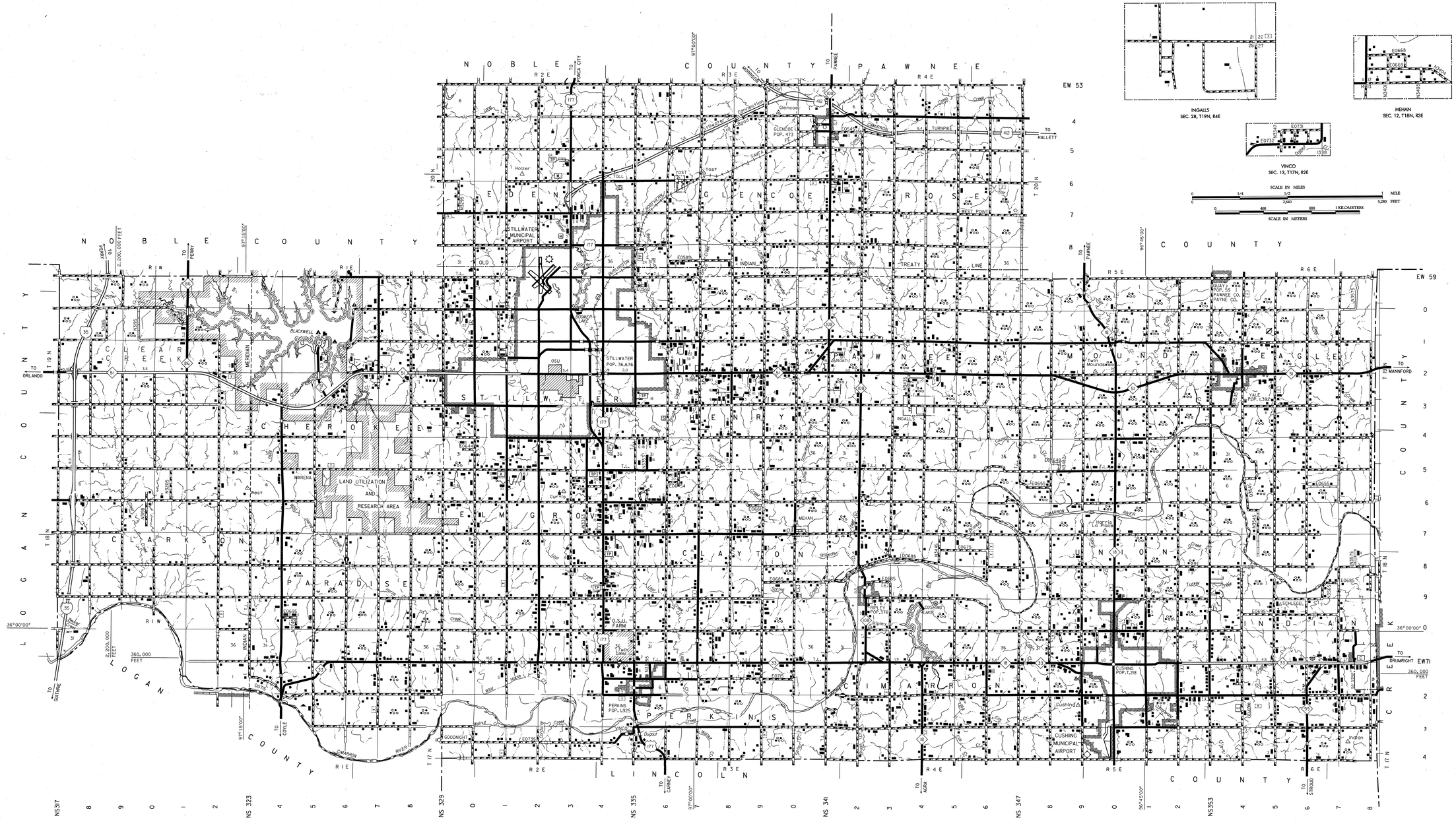











SCALE IN MILES

SCALE IN METERS

## LEGEND

- U.S.NUMBERED HIGHWAY
- STATE NUMBERED HIGHWAY
- INTERSTATE HIGHWAY ROUTE
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- TELEVISION OR RADIO STATION
- MILITARY INSTALLATION



ALL DATA CURRENT TO DATE OF INVENTORY NOVEMBER 1993

ORIGINAL DRAFTING BY R.S.W.R.G.R DEC. 1997
STATE SYSTEM REVISED TO DEC. 1997

# GENERAL HIGHWAY MAP
# PAYNE 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

SCALE IN KILOMETERS

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. 61,507

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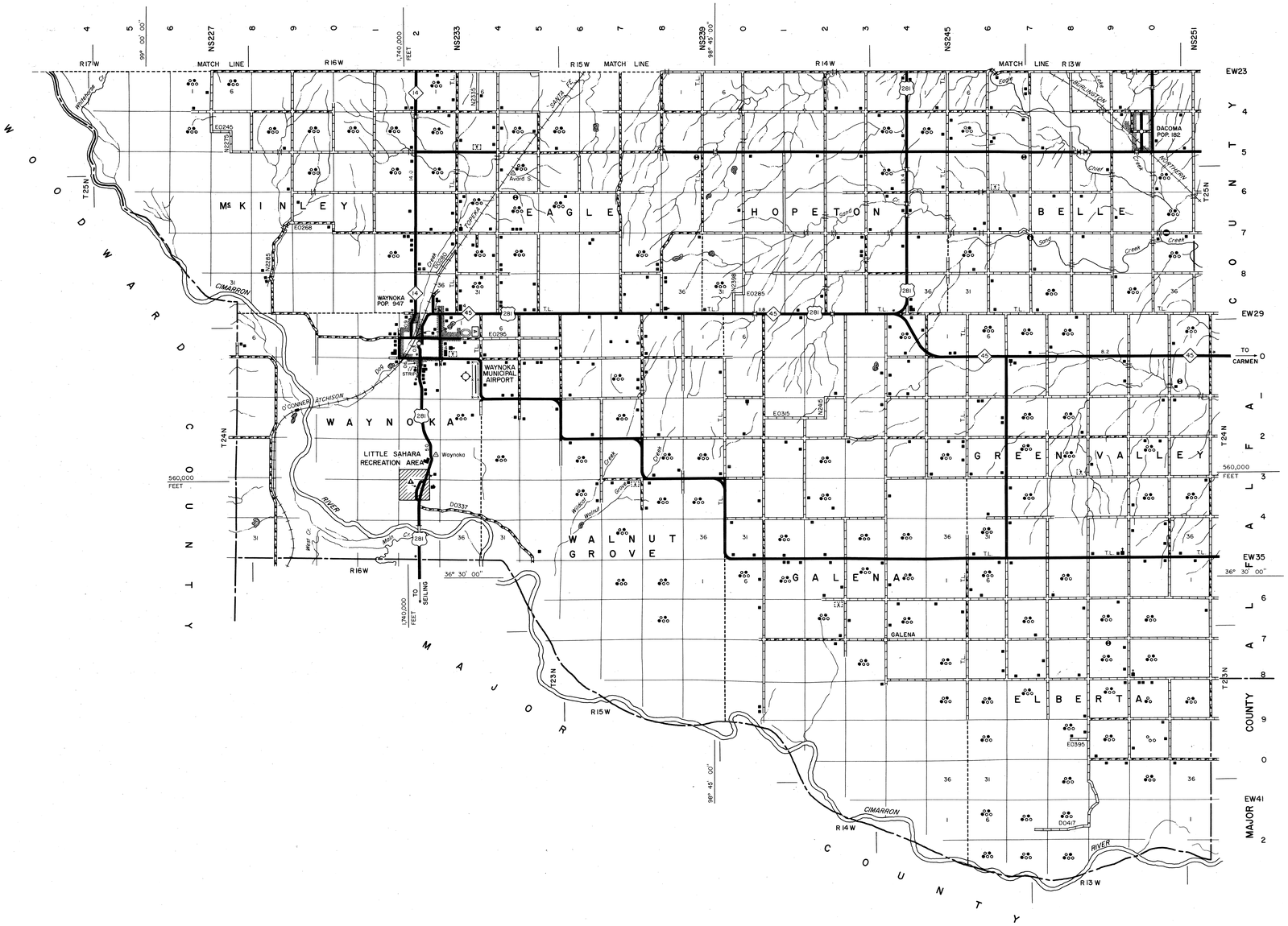


## LEGEND

- U.S. NUMBERED HIGHWAY
- STATE NUMBERED HIGHWAY
- INTERSTATE HIGHWAY ROUTE
- PAVED ROAD
- GRAVEL ROAD
- GRADED & DRAINED ROAD
- UNIMPROVED ROAD
- PRIMITIVE ROAD
- PROJECTED ROAD
- RESIDENTIAL ROAD
- N0001 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 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
- 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 20 FT. 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 STATIONS 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-State, CP-County, MP-Municipal, TP-Trailer 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
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- GAUGING OR PUMPING STATION
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- JUNK YARDS & DUMPS: A-Automobile, B-Scrap Building Material, D-Refuse, Garbage or Trash Dump, F- Sanitary Fill, G-Other
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- WATER SUPPLY STAND PIPE
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- BOOSTER STATION
- POWER SUBSTATION
- KOMA TELEVISION OR RADIO STATION
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OKLAHOMA CITY, OKLAHOMA 73105

ALL DATA CURRENT TO
**DATE OF INVENTORY**
**AUG. 1987**

ORIGINAL DRAFTING BY W.T. JULY 1988
STATE SYSTEM REVISED TO JAN. 1992

SHEET 2
SHEET 1

SHEET 1 OF 2 SHEETS

# GENERAL HIGHWAY MAP
# WOODS 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 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. 9,103

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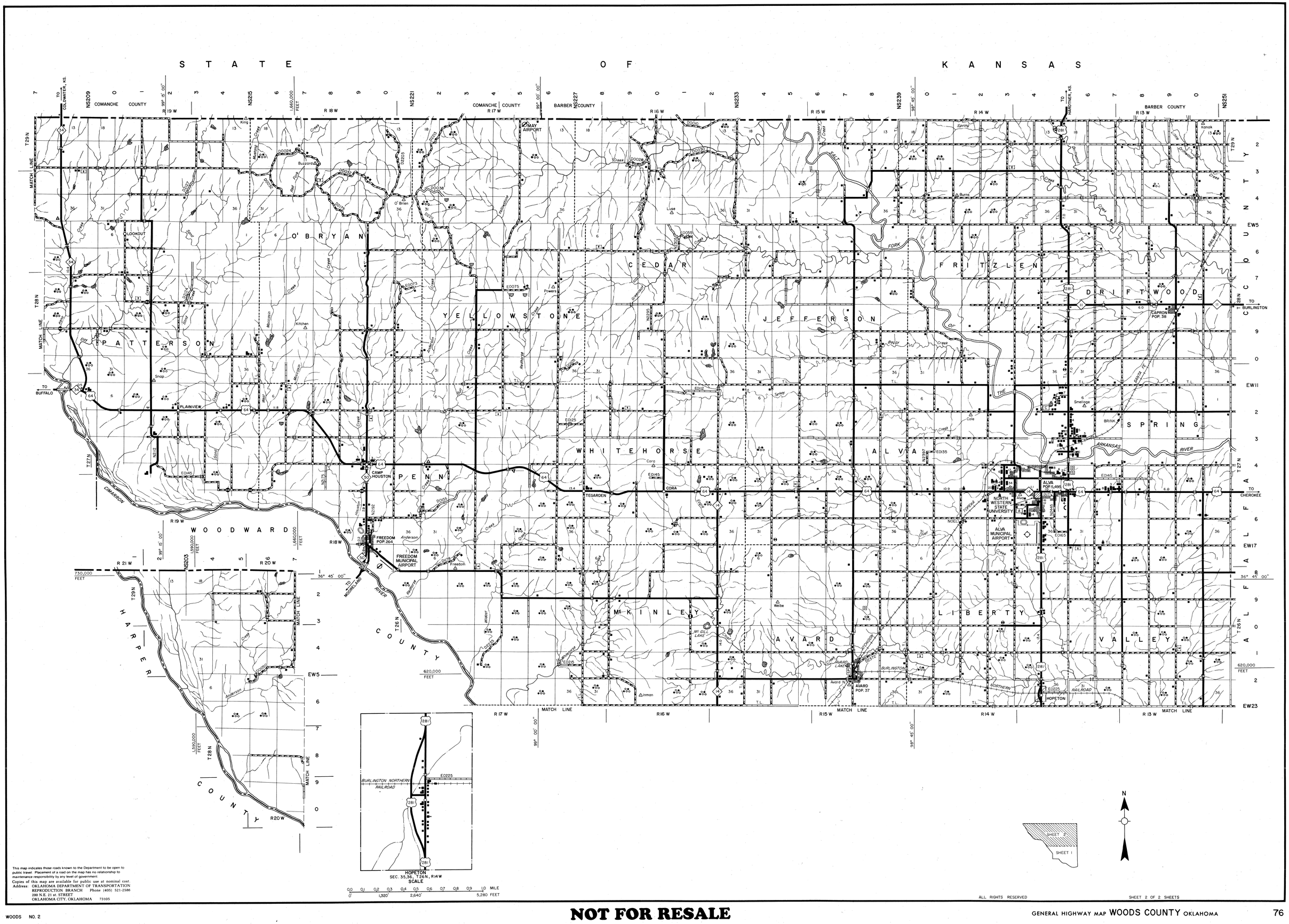


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SHEET 2 OF 2 SHEETS



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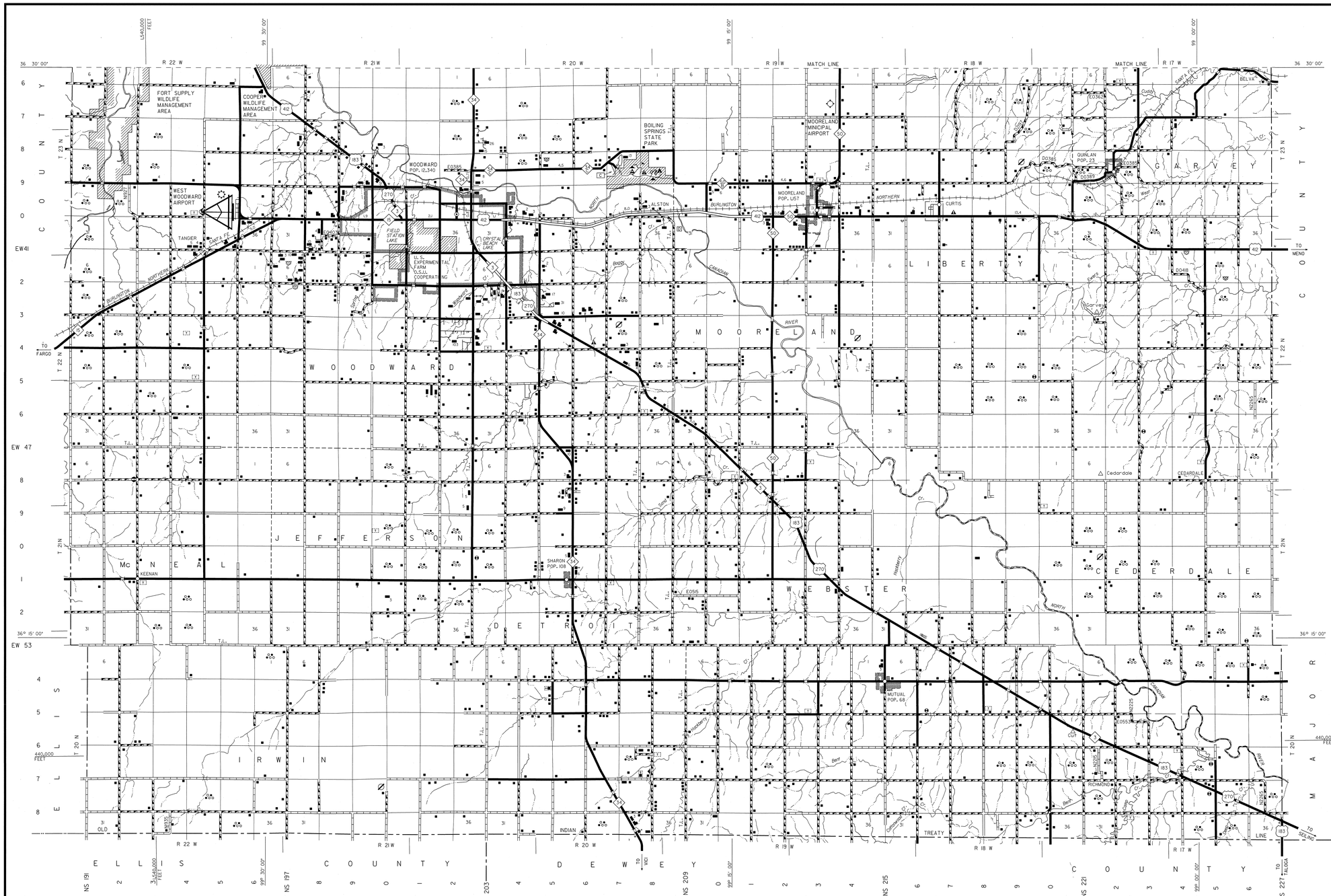


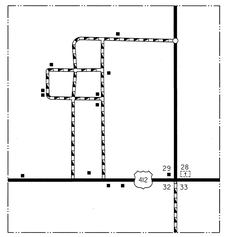


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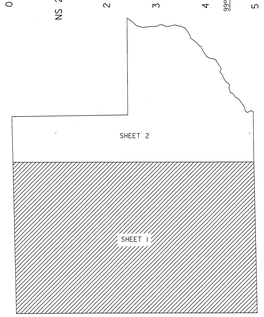


# GENERAL HIGHWAY MAP
# WOODWARD COUNTY
## OKLAHOMA

PREPARED BY THE
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PLANNING DIVISION

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

SCALE IN MILES
1 0 1 2 3 4 5 MILES

0 1 2 3 4 5 6 7 8 9 10 KILOMETERS
SCALE IN KILOMETERS

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 18,976

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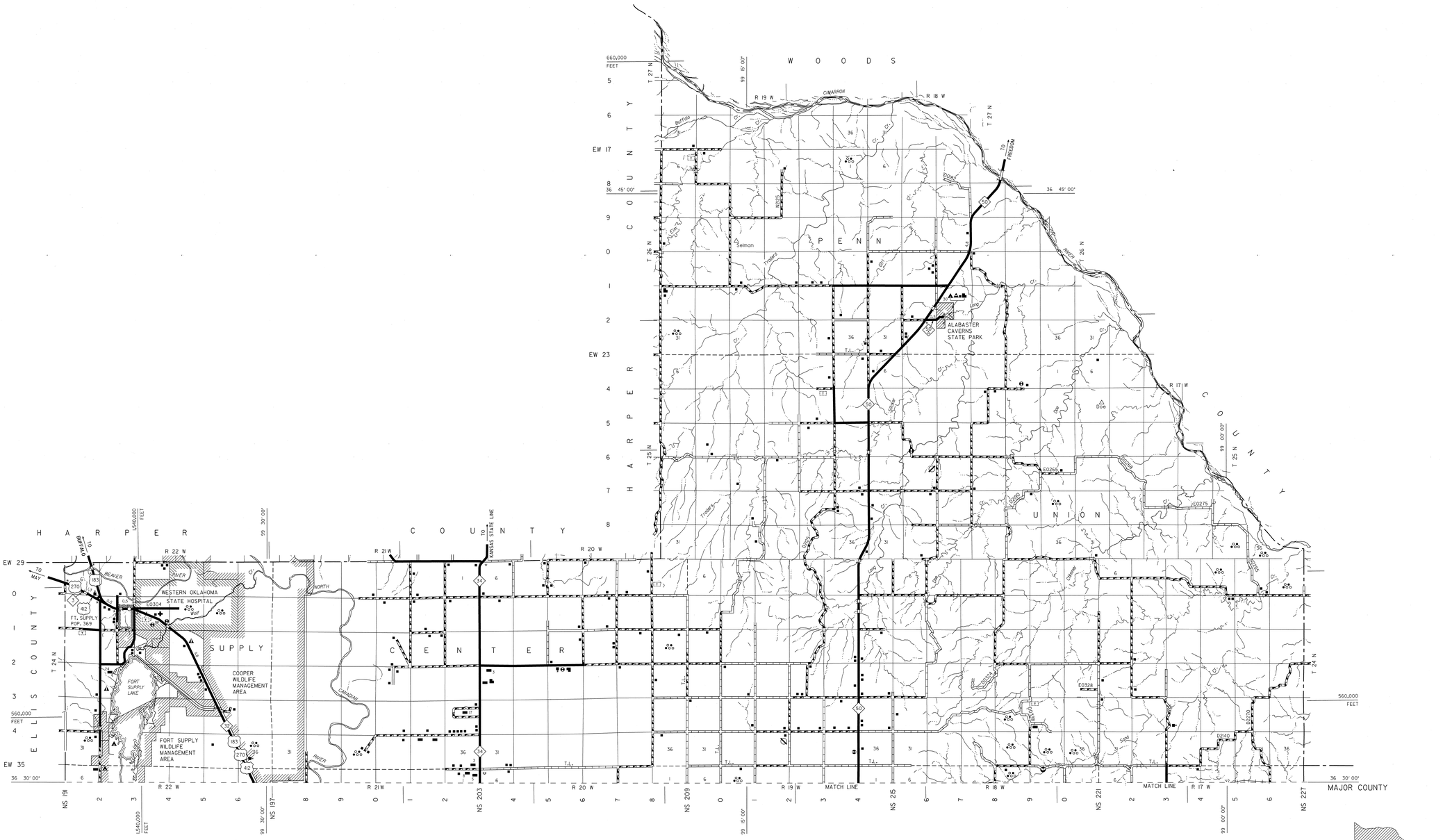


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