

HISTORY OF WEATHER OBSERVATIONS
Albuquerque, New Mexico
1849 - 1958

September 2005

Prepared by:
Gary K. Grice
Information Manufacturing Corporation
Rocket Center, West Virginia

**This report was prepared for the Midwestern Regional Climate Center under the
auspices of the Climate Database Modernization Program, NOAA' National
Climatic Data Center, Asheville, North Carolina**

TABLE OF CONTENTS

ACKNOWLEDGMENTS	ii
LIST OF ILLUSTRATIONS	iii
INTRODUCTION	
Historical Overview	1
Goal of the Study	3
LOCATION OF OBSERVATIONS	4
Weather Observations by Army Surgeons	4
Formal Signal Service Observations	6
Voluntary/Cooperative Observers	7
Weather Bureau Observations	11
INSTRUMENTATION	
Weather Observations by Army Surgeons	14
Formal Signal Service Observations	15
Voluntary/Cooperative Observers	17
Weather Bureau Observations	22
OTHER OBSERVATIONS	43
INCIDENTAL NOTE	43
BIBLIOGRAPHY	
References	44
APPENDIX	46

ACKNOWLEDGMENTS

Charlie Liles, Meteorologist in Charge of the National Weather Service Forecast Office in Albuquerque, NM was essential to this work. Charlie made available all archives in the office and took time to review various documents for relevancy and accuracy. In addition Charlie read the final draft of the report. Charlie's insight, expertise, and generosity are greatly appreciated.

LIST OF ILLUSTRATIONS

Figures

1. Topographical Map of Albuquerque	4
2. Hospital at the Post at Albuquerque	6
3. Location of Signal Service Office	7
4. Downtown Volunteer/Cooperative Observers	8
5. Volunteer/Cooperative Observers Outside Downtown Albuquerque	9
6. Weather Bureau Observing Stations	12
7. Albuquerque Plaza (Southwest)	16
8. Albuquerque Plaza (Southeast)	17
9. University of New Mexico Observation Sites	19
10. University of New Mexico	20
11. Kimo Theatre Building	23
12. Instruments on Kimo Building Roof	24
13. Instruments on Kimo Building Roof	24
14. Federal Building	25
15. Weather Instruments at TWA Field	26
16. Weather Instruments at TWA Field	26
17. Wind Instruments at TWA Field	28
18. Weather Instruments at TWA Field	29
19. Map of Municipal Airport Administration Building	30
20. Schematic of Weather Instruments at Administration Building	30
21. Weather Bureau Operational Area in Airport Administration Building	31
22. Weather Bureau Operational Area in Airport Administration Building	32
23. Weather Bureau Operational Area in Airport Administration Building	32
24. Weather Instruments at Administration Building	33
25. Weather Instruments at Administration Building	34
26. Upper-Air Instrument Shelter	35
27. Upper-Air Instrument Shelter	35
28. Weather Instruments at Administration Building	36
29. Weather Instruments at Administration Building	37
30. Weather Instruments at Administration Building	37
31. Schematic of Instruments on TWA Express Building	38
32. Weather Instruments on TWA Express Building	38
33. Weather Instruments on TWA Express Building	39
34. Rain Gages at Administration Building	40
35. Wind Instruments on Administrative Building	41
36. Wind Instruments on Administrative Building	41
37. Cover Sheet for Signal Service Inspection Report	43

HISTORY OF WEATHER OBSERVATIONS

Albuquerque, New Mexico

1849 – 1958

Gary Grice

INTRODUCTION

Historical Overview

People began to appear along the New Mexico Rio Grande Valley as early as 500 A.D. By the 15th Century, at least 15,000 people were cultivating the Middle Rio Grande Valley, including the Albuquerque area. In 1540, Francisco Vasquez de Coronado marched through Albuquerque in search of the mythical Seven Cities of Cibola, and one year later, returned on his trip back to Mexico.

In 1706, Don Francisco Cuervo y Valdez, provisional governor for the territory, petitioned the Spanish crown for permission to establish a villa at the present site of Albuquerque. He proposed naming the new settlement, San Francisco Xavier de Albuquerque - in honor of the Duke who was responsible for preliminary approval of Cuervo's application. Eventually, the name was shortened to “Albuquerque” with the first “r” removed.

The original 18 families in Albuquerque lived in a walled village in present day Old Town. When Mexico declared its independence from Spain in 1821, the new government opened New Mexico to trade with the Americans, and settlers from the United States began to settle along the Rio Grande Valley. Following the war with Mexico in 1846, General Stephen Kearny arrived in New Mexico with U.S. troops to protect U.S. citizens, establishing a military outpost in Albuquerque in 1848.

The military outpost, named the Post of Albuquerque, was in existence until 1867. It was located in rented adobe buildings in and just west of the Plaza, eventually becoming department headquarters in 1852. A second outpost, called Camp Vigilance, was established just east of the Plaza as a temporary Federal encampment from 1852 to 1853.

During the Civil War (1862), the Confederate Army briefly occupied Albuquerque. Following the arrival of the railroad in 1880, the population of the town increased significantly, and in 1885, Albuquerque was incorporated as a town. In 1912, New Mexico was admitted to the Union as the 47th state.

Albuquerque grew rapidly during the early 20th Century, primarily as a result of its location on the Rio Grande River in central New Mexico. The city also was a transportation center between the West Coast and the central and eastern U.S., most notably Route 66.

Airplanes first appeared in Albuquerque in 1911, with early flying primarily confined to aerial demonstrations. The occurrence of airplanes in Albuquerque increased during the decade, especially during and after World War I. In 1918 an airstrip was built near the current intersection of Wyoming and Lomas streets, approximately five miles northeast of the location of the first Airport Administration Building at Kirtland Field (location of the Weather Bureau office from 1939 through 1958; see Figure 6), and in 1923, another more permanent field was constructed approximately 500 yards east of the University of New Mexico (approximately two and one-half miles north of the Airport Administration Building location).

In 1928, an airfield was opened four miles east of the Airport Administration Building location. Although privately run, this field initially was called Albuquerque Airport since it was used by the city. It also was called Speakman-Franklin Field after the responsible founding individuals. This field expanded during the late 1920s, becoming known as the East Mesa Airport. As air travel became more convenient in the late 1920s, two of the larger airlines established routes through Albuquerque as part of their cross-country flights. Western Air Express flew primarily from Los Angeles to Kansas City with Transcontinental Air Transport primarily flying from New Mexico eastward. The city of Albuquerque was the center of competition.

Both airlines originally flew out of the East Mesa Airport, but in mid 1929, Western Air Express built an airport on the West Mesa to be closer to downtown Albuquerque and farther away from the mountains.

The financial strain of the Depression resulted in the merger of Transcontinental Air Transport and Western Air Express on 16 July 1930, to become Transcontinental and Western Air (TWA). The merger was accomplished for the resultant airline to become eligible for a U.S. Government airmail route. As a result, facilities of Transcontinental Air Transport at the East Mesa Airport were closed in 1930 and all TWA air traffic moved to the West Mesa Airport. After the transfer of activity to the West Mesa (TWA) Airport, the East Mesa Airport was unofficially called Oxnard Field. On 23 January 1933, the Weather Bureau began taking weather observations at the West Mesa Airport.

During the 1930s, business declined sharply at Oxnard Field (East Mesa Airport). Primary use of the field was for aviation instruction and as a stopover for military flights. In the mid 1930s, Albuquerque officials began applying for funds from the Works Progress Administration (WPA) for the construction of a modern airport on the east mesa. Following considerable effort, and a few failed attempts, ground officially was broken on 28 February 1937 for the construction of a new airport on the east mesa approximately three miles west of the old Oxnard Field.

The new airport was completed in mid 1939, and on 31 July 1939, the Weather Bureau moved its observing site from the TWA Airport to the Airport Administration Building at the new east mesa facility.

On 7 January 1941, construction began on the Albuquerque Army Air Base at the new municipal airport, and later in the year, troops and airplanes were being shipped to the rapidly developing Army air field. In February 1942, the base was officially named for Col. Roy C. Kirtland who was one of the first students to fly with the Wright brothers. Subsequently, the airport's runways were used both by the military and civilian airlines. The Weather Bureau office remained at the Airport Administration Building through the time period of this study, i.e., through 1958.

Earliest observations at Albuquerque began in 1849 and were taken by U.S. Army surgeons. These observations stopped in 1867 when the post was closed. A gap in weather observing occurred from 1867 until 1878 when a U.S. Signal Service telegraph repair office took limited observations. No record could be found of Smithsonian Institution observations at Albuquerque during the 1850s through early 1870s.

The weather observing path at Albuquerque in the late 19th and early 20th Centuries differs from most Weather Bureau offices. The normal course that evolved at many offices across the country, i.e., Signal Service observations beginning in the late 1800s that transferred to Weather Bureau observations around the beginning of the 20th Century, was not followed at Albuquerque. Signal Service observations began in late 1878 and lasted a little over one year. An observing gap existed from 1879 until 1888 when Voluntary/Cooperative Observing began. Weather Bureau observations did not begin until 1931.

Goal of the Study

The goal of this study is to document the primary weather observational path at Albuquerque, NM leading to the Weather Bureau observing program in the first half of the 20th Century. Descriptions of Albuquerque weather observations since the late 1950s are available through easily obtainable climatic records, with the challenge being to identify and define the roots of the path that began in the 1800s and continued through times of significant transition in the early 1900s. Extrinsic observations, i.e., those by Voluntary (or Cooperative) observers, are considered in relation to the beginning of the central observational stream eventually established by the Army surgeons, Signal Service, or Weather Bureau. This does not minimize the importance of these collateral observations, but rather focuses on the original events that led to the routine, formal weather observing program of modern times.

LOCATION OF OBSERVATIONS

Albuquerque is located along the Rio Grande River valley with the Sandia Mountains located approximately 11 miles to the east of the Plaza/Old Town (Figure 1). The terrain slopes from around 4,940 feet at the river to over 6,000 feet at the base of the mountains, then rising abruptly to over 9,000 feet at the mountains. West of the Plaza/Old Town, the terrain slopes down to the river then rises to over 6,000 feet approximately 8 miles west. Arroyos extend generally east-west on both sides of the Rio Grande River. Cold air drainage is common from the higher elevations toward the Rio Grande Valley, especially during winter nights. Temperature readings, especially minimum temperatures during the cooler months, can differ significantly based on the elevation of the observing site and location with respect to arroyos and/or the Rio Grande River.

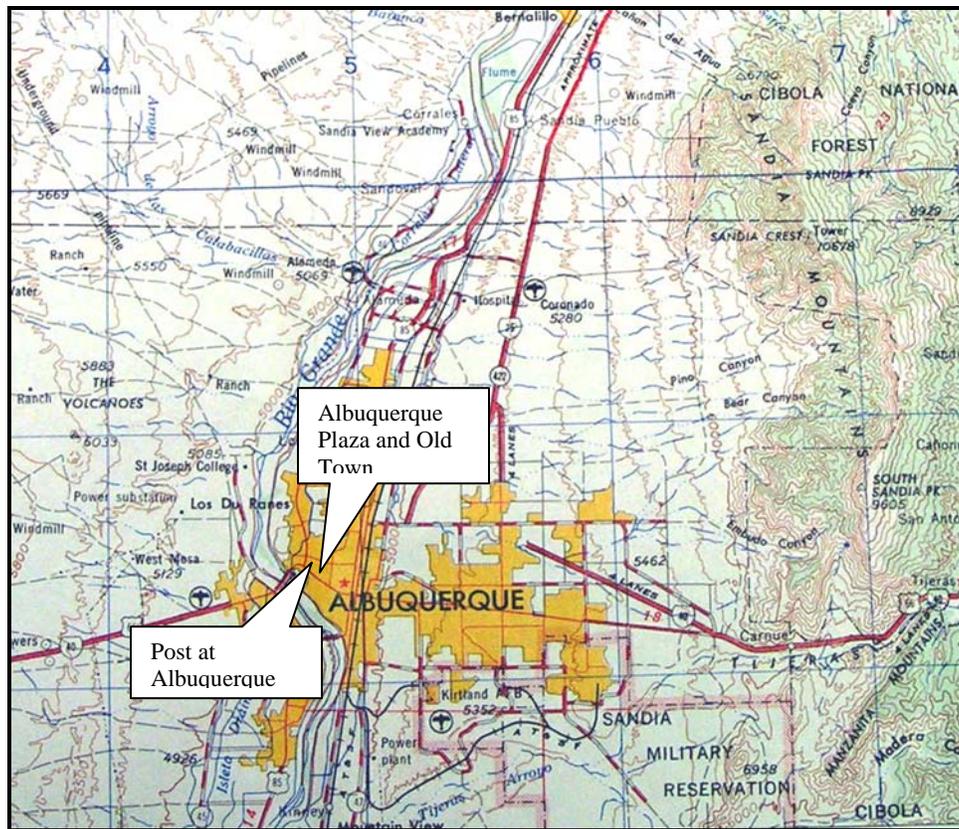


Figure 1. Topographical map (prepared by the Army Map Service and USGS) of the Albuquerque, New Mexico area for 1962. North is at the top of the page. Distance is approximately 30 miles across the map (horizontal).

Weather Observations by Army Surgeons (1849 – 1867)

First observation for Albuquerque in the National Climatic Data Center database was on 1 September 1849, continuing through 31 July 1867. Although

coordinates for the site were listed on the observation forms, no specific location was given. Most likely, the observations were taken at the military outpost established at Albuquerque by General Kearny in 1848 since the period of observations agrees closely with the existence of the post.

As usual during the mid 1800s, latitude/longitude coordinates on the weather observation forms for Albuquerque were inconsistent and inaccurate due to the infancy of the science of surveying. Listed coordinates for the post in September 1849 were 35°6'N, 106°45'W with an elevation of 5,000 feet above sea level. On the November 1849 observation form, the coordinates were changed to 35°11'N, 106°45'W with an elevation of 4,756 feet. In March 1852, the coordinates were changed again to 35°4'20"N, 106°45'W and the listed elevation changed back to 5,000 feet.

The May 1852 observation form lists "Camp Vigilance near Albuquerque, NM" as the observing site. Based on this form, it is possible some of the observations may have been taken at Camp Vigilance, as well as at the Post of Albuquerque. However, most of the observations had to be at the Post at Albuquerque since Camp Vigilance was a temporary military facility in existence only in 1852 and 1853.

In November 1852 the coordinates were changed to 34°31'27"N, 106°51'6"W and the elevation changed back to 4,756 feet. In April 1861, the elevation was changed to 4,750 feet. Actual ground elevation for the general area (based on USGS topographical maps) is approximately 4,960 feet.

Very little information exists with regard to the location of the Post at Albuquerque or Camp Vigilance. Two publications (see references by Dr. William Glenn Robertson and Byron A. Johnson) were most definitive with both stressing that quality descriptions of the two facilities did not exist.

From available data, the Post at Albuquerque began on 17 November 1846 when a detachment of Dragoons camped near the Plaza. Additional troops were assigned to the city with town buildings rented for soldier quarters. Even at its height, this post was not the typical consolidated facility, but was contained in various buildings within the city. Buildings used for actual operations of the post primarily were located immediately to the west of the Plaza, but east of the Rio Grande River. Although a drawing of the hospital was made in the mid 1860s (Figure 2), the exact location was not known. Most likely the hospital was located near the west side of the Plaza, with approximate coordinates of 35°5'48"N, 106°40'15"W, and an elevation of approximately 4,950 feet. The exact location of Camp Vigilance is not known with the best estimated location to be just east of the Plaza.

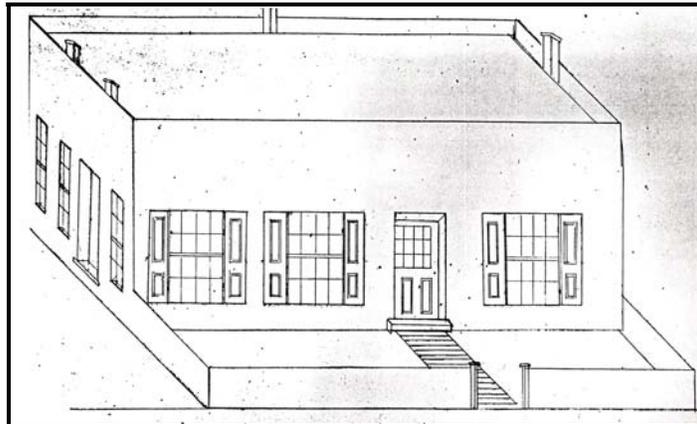


Figure 2. Drawing of the hospital at the Post at Albuquerque. Drawing made in the mid 1860s, but the hospital may have been built in the early 1850s. No information was available on exact location of the hospital (likely near the Plaza) or orientation of the building. From the National Archives and Records Administration.

No observations were found from 30 November 1861 until 1 December 1862, with most of this interruption likely the result of the invasion by Confederate forces from Texas. When observations resumed in December 1862, new coordinates were listed as $34^{\circ}5'50''\text{N}$, $106^{\circ}37'52''\text{W}$, with no elevation listed. On the July 1864 form, the station elevation was listed as 5,032.8 feet. Another gap in observations was from March 1866 until September 1866. The last observation (in the NCDC database) for the Post of Albuquerque was 31 July 1867 and the post was closed 20 August 1867.

Formal Signal Service Observations (1878 – 1879)

The Signal Service office in Albuquerque was established 1 July 1876. Being primarily a telegraph repair office, this station did not initially contain weather instruments, and weather observations did not commence until 1 October 1878. The office was located on the south side of the plaza, or public square (actual building was not listed; see Figure 3). Listed coordinates for the station were $35^{\circ}2' \text{N}$ $106^{\circ}40' \text{W}$. Elevation was listed as 5,026 feet above sea level. GPS coordinates for the Signal Service office location (southeast Plaza) are $35^{\circ}5'45''\text{N}$ $106^{\circ}40'10''\text{W}$ with an elevation of 4,959 feet.

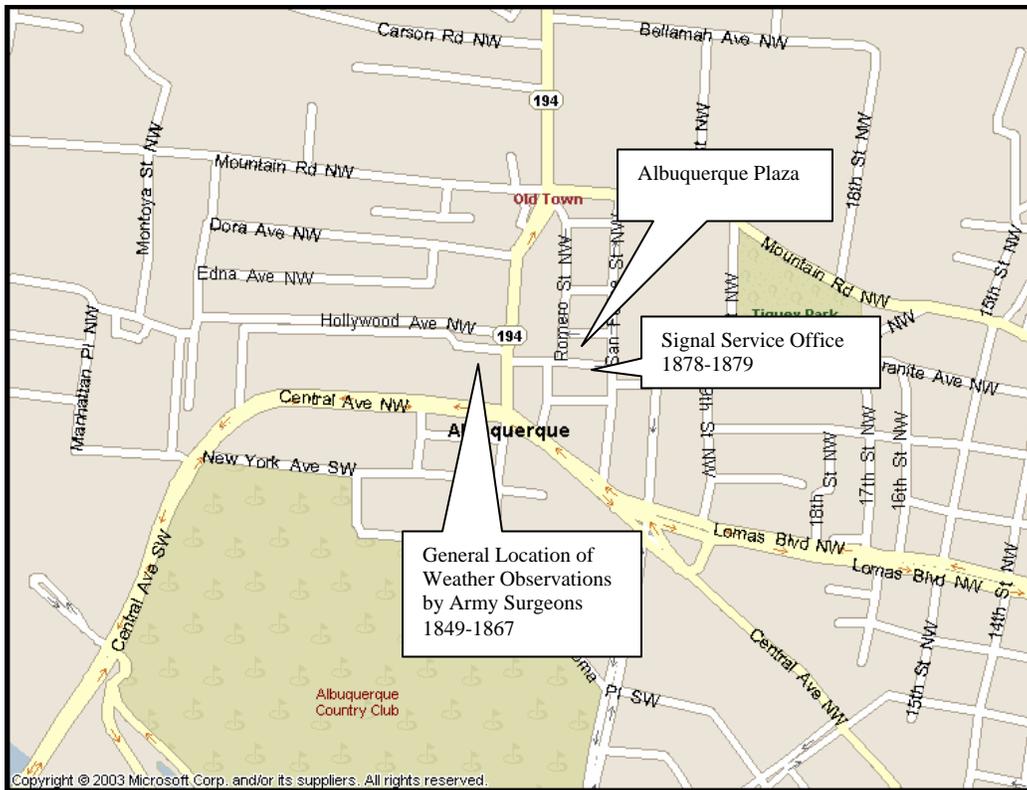


Figure 3. Location of Signal Service office 1878-1879. Exact location not certain but office was on the south side of the Plaza, most likely on the southeast side. Also shown is the approximate location of the Army hospital during the mid 1800s. Locations are plotted on a current map of Albuquerque with north at the top of the page. Distance from left to right side of the map is approximately one and one-quarter miles.

Last weather observation at this office was on 20 November 1879 (this date is from a Signal Service inspection report; last observation in the NCDC database was 30 September 1879).

Voluntary/Cooperative Observers (1888 – 1931)

From 1888 until the Weather Bureau office was established in Albuquerque in 1931, a number of Voluntary/Cooperative Observers took weather observations in the area (Figure 4 and Figure 5). Thanks to the hard work and dedication of these individuals, an almost continuous weather observing record exists for the approximately 43 years prior to the establishment of the routine Weather Bureau observing program.



Figure 4. Volunteer/Cooperative Observers near downtown Albuquerque during late 1800s and early 1900s. Distance from left side of map to right side is approximately two and one-half miles. North is at the top of the map. Stations plotted on a current map of Albuquerque.

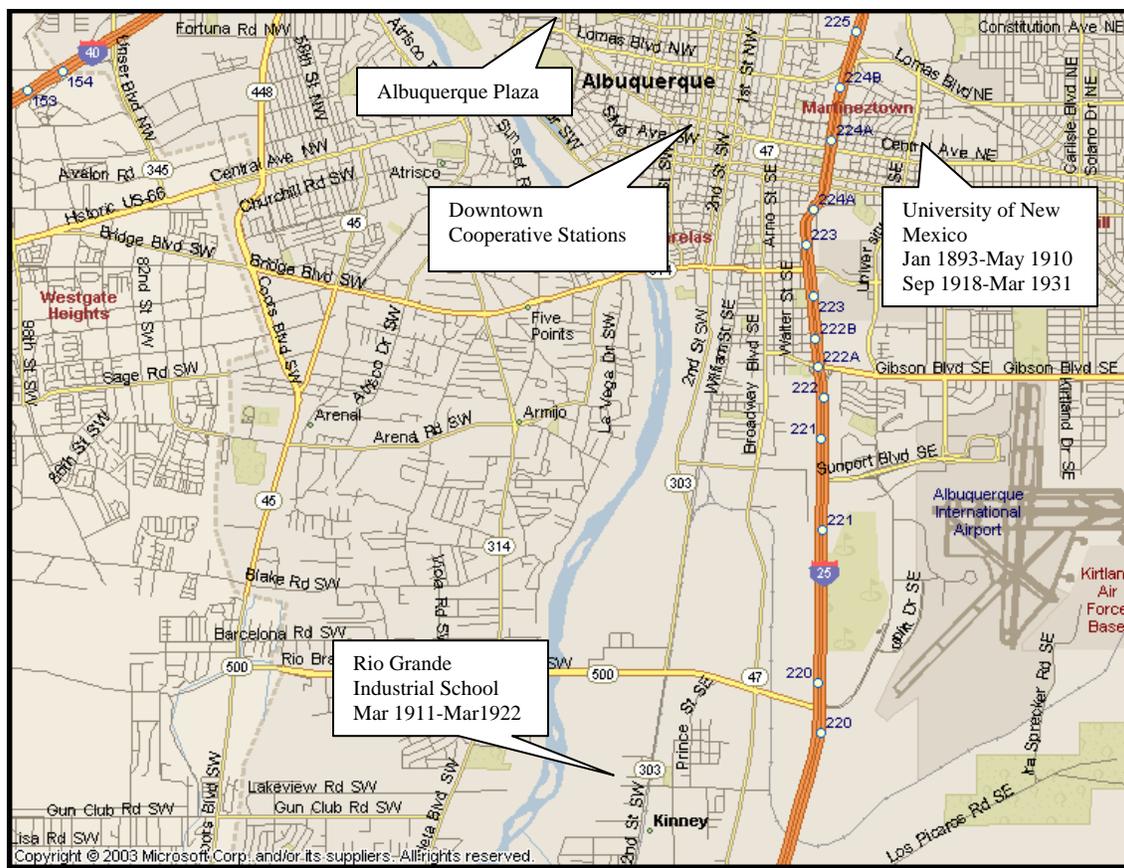


Figure 5. Volunteer/Cooperative Observers outside downtown Albuquerque during late 1800s and early 1900s. Distance from left side of map to right side is approximately eight miles. North is at the top of the map. Stations plotted on a current map of Albuquerque.

*4th Street and W. Gold Avenue - Saul M. Rowe, S.S. Beattie, and W.S. Burke
June 1888 – December 1892*

After the Signal Service office ceased taking weather observations in Albuquerque on 20 November 1879, no observations were available until 1 June 1888 (based on the NCDC database). Mr. Saul M. Rowe was a Signal Service Voluntary Observer in Albuquerque with listed coordinates 35°4'32"N 106°39'13"W (no elevation given). Mr. Rowe took weather observations until 31 May 1890. Beginning 1 June 1890, the new observer was S.S. Beattie for the same location, i.e., the latitude/longitude did not change. Between October 1890 and December 1891 (all data missing between these two dates), the observer changed to W.S. Burke. W.S. Burke continued to take observations through 31 December 1892, the last file on this station in the NCDC database. During 1892, the elevation of the station was listed as 5,000 feet above sea level. GPS coordinates for this site are 35°5'3"N 106°39'6"W. The GPS ground elevation for this site is 4,958 feet. This location currently is in downtown Albuquerque.

University of New Mexico – M.R. Gaines and Others
January 1893 – May 1910

Based on available documentation, weather observations at the University of New Mexico initially were taken at the Main Building (Hodgin Hall) then moved to the Hadley Climatological Laboratory after its completion on 1 February 1900 (exact date of transfer not known but prior to 30 April 1906). The Hadley Laboratory was located approximately 200 feet southeast of the Main Building. The Main Building was located just north of the current intersection of Mesa Street with Central Avenue (see Figure 9). The Hadley Laboratory burned in 1910 and was not replaced. The Main Building was remodeled in 1904 and still exists today.

Listed coordinates for this station in 1906 (Hadley Climatological Laboratory) were 35°5'N 106°39'W, with an elevation of 5,200 feet above sea level. This location was listed as one and one-half miles east of the previous location (4th Street and W. Gold Avenue). GPS coordinates for the Main Building site are 35°4'52"N 106°37'32"W with an elevation of 5,150 feet.

This station was an early observing site as part of the monthly weather bulletins published by the Territorial Weather Service of New Mexico beginning in the early 1890s. The *Monthly Review of the New Mexico Weather and Crop Service for the Month of January 1895* contained the following explanation of this service:

“The 31st Legislative Assembly of this Territory, which has just adjourned, showed its appreciation of the work of the U.S. Weather Bureau by passing a bill establishing a local Weather and Crop Service and providing for the publication of its reports.’

‘...That there be and hereby is established in the Territory of New Mexico a Weather and Crop Service, cooperating with the Weather Bureau of the U.S. Department of Agriculture, for the purpose of collecting and preserving meteorological data and crop statistics, and to promote and disseminate a general knowledge of the climatology of the Territory and its productive resources.’

‘...That the said director shall establish voluntary stations of observation throughout the Territory, to the number of one or more in each county, which shall be equipped with instruments furnished by the U.S. Weather Bureau, and shall appoint observers thereat who are willing to perform the necessary duties without expense to the Territory...”

This service eventually became part of the Weather Bureau’s Climate and Crop Service publications in the late 1890s.

*1216 W. Central Avenue – Pitt Ross
January 1906 – January 1916*

Listed coordinates for this station were 35°5'N 106°40'W, with an elevation of 4,960 feet above sea level. This location was listed as two miles west of the University of New Mexico station. GPS coordinates for this site are 35°5'17"N 106°39'40"W with an elevation of 4,954 feet.

*Rio Grande Industrial School – A.C. Heyman
March 1911 – March 1922*

Listed coordinates for this station were 35°1'N 106°40'W, with an elevation of 4,950 feet above sea level. This location was listed as five miles south of the station at 1216 W. Central Avenue. Description of the observing site in the Substation History was, "Level valley, foothills about one mile east. Rio Grande one-half mile west." No specific location was found for this station. Approximate location was determined from a 1942 Weather Bureau document.

*5th Street and W. Central Avenue – U.S. Forest Service (Observer Harry M. Frank)
August 1916 – August 1918*

Listed coordinates for this station were 35°5'N 106°39'W, with an elevation of 4,960 feet above sea level. This location was listed as five miles north of the station at the Rio Grande Industrial School. This station was maintained by the office of the District Forester and was located at the home of Mr. Harry M. Frank, a clerk for the Forest Service. GPS coordinates for the site are 35°5'5"N 106°39'10"W, with the elevation 4,958 feet. This location is currently in downtown Albuquerque.

*University of New Mexico – R.S. Rockwood and Others
September 1918 – March 1931*

This observing site was located at the Main Building (the Hadley Climatological Laboratory burned in 1910) of the University of New Mexico on East Central Avenue, just north of the intersection with Mesa Street. The office was located in Room 32 on the 3rd floor of the building. Listed coordinates for this station were 35°5'N 106°37'W, with an elevation of the barometer at 5,196 feet above sea level. GPS coordinates for this site are 35°4'52"N 106°37'32"W with a ground elevation of 5,150 feet. This location was listed as one and one-half miles five miles east of the station at 5th Street and W. Central Avenue.

Weather Bureau Observations (1931 -1958)

NOTE – All Weather Bureau station elevations in this report are for office barometers unless otherwise indicated. All elevations related to barometers in this report are above sea level unless otherwise indicated.

Figure 6 shows the location of Albuquerque Weather Bureau stations from 1 April 1931 through 1958.

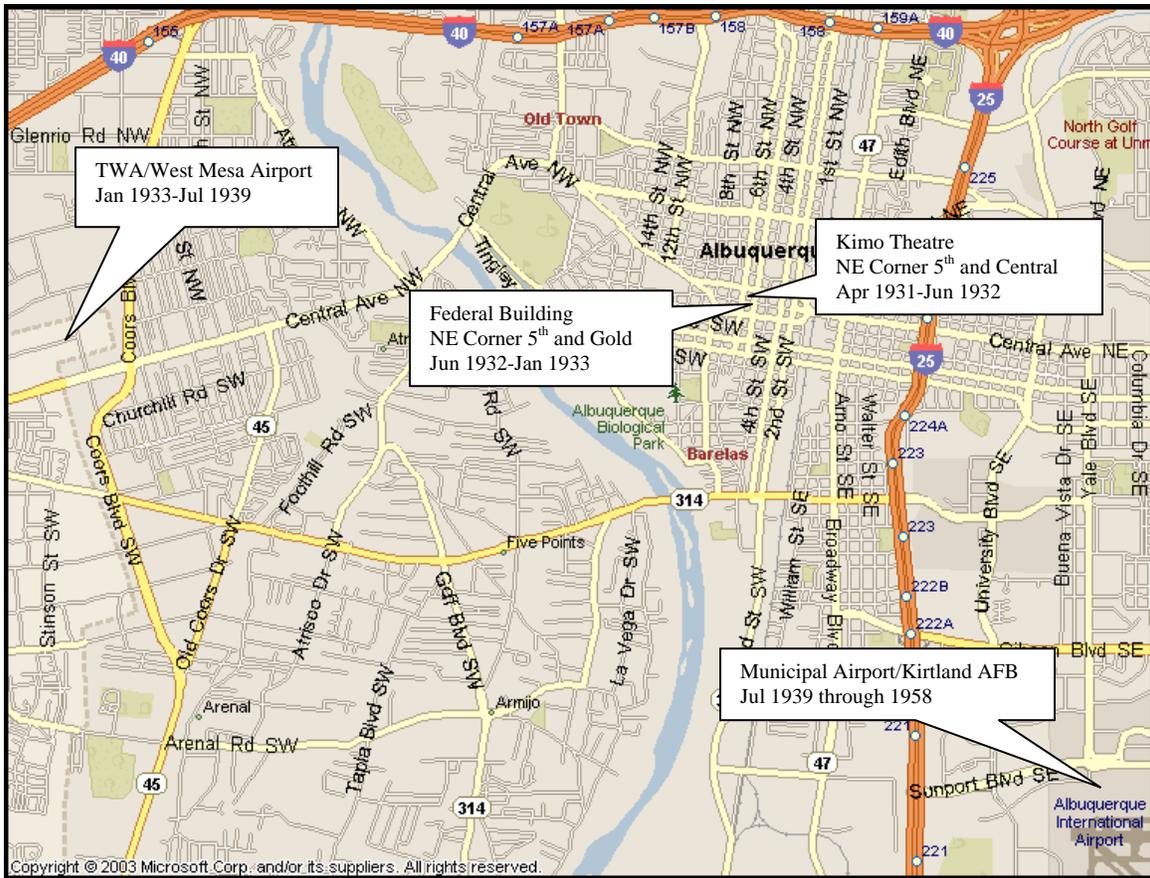


Figure 6. Weather Bureau observing stations from 1 April 1931 through 1958. Distance from left side of map to right side is approximately six miles. North is at the top of the map. Stations plotted on a current map of Albuquerque.

1 April 1931 – 29 June 1932

- Second floor of Kimo Theatre Building (Rooms 105-107), 419-423 West Central Avenue (northeast corner of 5th Street and Central Avenue)
- Elevation 4,972 feet above sea level (GPS ground elevation 4,956 feet)
- Listed coordinates 35°5'N 106°39'W (GPS coordinates 35°5'5"N 106°39'10"W)

29 June 1932 – 23 January 1933

- Rooms 412 – 414 of the Federal Building at Gold and 5th Streets (300 feet south of Kimo Theater Building)
- Added rooms 410 and 411 July 1932
- Elevation 5,000 feet above sea level (GPS ground elevation 4,956 feet)
- Listed coordinates 35°5'N 106°39'W (GPS coordinates 35°5'2"N 106°39'10"W)

Weather Bureau Observations – Airport Offices

23 January 1933 – 31 July 1939

- On the first floor (and only floor) of the TWA (Transcontinental and Western Air) Office and Depot Building at the TWA Airport (West Mesa Airport), (3.8 miles west of the Federal Building)
- By late 1933, the name of the building was changed to TWA Airport Administration Building
- Weather Bureau office was in the southeast corner of the building
- Elevation 5,098 feet above sea level, recomputed to 5,105 feet in December 1933 (GPS elevation 5,121 feet)
- Listed coordinates 35°5'N 106°43'W (GPS coordinates 35°5'6"N 106°42'58"W)

31 July 1939 through 1958

- First floor of the Administration Building at the Municipal Airport (6 miles east southeast of TWA Airport)
- Airport named for Col. Roy C. Kirtland in February 1942
- Located 2.3 miles south of Central Avenue on Yale Avenue
- Elevation 5,314 feet above sea level (ground elevation 5,310 feet)
- Listed coordinates 35°2'50" N 106°37'15"W

INSTRUMENTATION

Weather Observations by Army Surgeons

The first observation available in the National Climate Data Center (NCDC) database for Albuquerque was on 1 September 1849, taken by U.S. Army surgeons at the Post at Albuquerque.

Initial weather measurements/observations taken by the Army surgeons consisted of the following parameters:

1. Temperature (Fahrenheit) – Measured four times daily (Sunrise, 9:00 a.m., 3:00 p.m., and 9:00 p.m.).
2. Clearness of the sky – Four times daily (the amount of clear sky at the hour of observation expressed from “0” to “10,” with “0” indicating no clear sky and “10” indicating no clouds)
3. Wind direction and force – Four times daily (direction expressed on an eight-point compass and wind force expressed on a scale from “0” for calm conditions, to “10” for a “violent hurricane”; e.g., SW4)
4. Clouds – Four times daily (direction from which the clouds were moving (eight-point compass) and cloud movement expressed on the same scale used for the force of the surface wind, i.e., “0” for no movement to “10” for movement corresponding to a “violent hurricane,” e.g., NE2 or SE1)
5. Wet bulb – Sunrise and 3:00 p.m.
6. Daily rainfall – Beginning and ending (did not include amount initially)
7. Significant weather recorded in the “Remarks” section.

Based on available information, this station initially had the following weather instruments: thermometer, psychrometer, and likely a wind vane. In February 1850, the station started recording 24 hour rainfall. A note on the February 1850 observation stated: “A rain gage was not received at this post until the middle of the month. I did not make a requisition for one before because it was not until that date I learned that there were any (precipitation) in the country.”

A note on the observation form on 16 October 1849 stated that weather observations were taken at the hospital. No specific information could be found regarding the instruments at the post; however, descriptions and observing instructions issued by the Army Surgeon General’s office in Washington D.C. provide general information for the late 1840s and early 1850s. Those descriptions are contained in the report on Fort Union, NM (see reference).

Wet bulb temperatures ceased to be recorded beginning 1 March 1850 and a note was included that stated: “Observations on (sic) wet bulb omitted as of now, according to received circular.” No weather observations were listed in the NCDC database from 1 August 1851 until 1 March 1852. Beginning on 1 March 1852, only clearness of the sky, wind, and clouds were recorded, i.e., temperature and wet bulb

temperatures were not measured. A note on the June 182 form stated: “No barometer or thermometer on hand.” Temperature measurements resumed 1 November 1852, but wet bulb temperatures were not resumed, primarily due to a change in observation forms (furnished by the Army Surgeon General’s Office) which did not include a column for wet bulb readings.

In 1856, the Army Surgeon General’s Office changed the observing forms to a format that would be used by field surgeons at Albuquerque until the post closed in 1867. The new form consisted of columns for temperature, hygrometric readings, winds, weather, rainfall, and remarks. Surgeons at Albuquerque did not begin recording hygrometric readings until 1 August 1856.

Observations were missing for June 1855 through October 1855. On the November 1855 form the following note was included: “The quantity of rain could not be measured after my arrival at this post, as the rain gauge had been stolen and the frame broken down. The observations were taken by Dr. Keum___ (last part of name unintelligible) until November 25th.” Since rainfall measurements were included for November 1855, it is possible this message refers to the missing observations, i.e., June 1855 through October 1855.

No observations were available from 30 November 1861 until 1 December 1862, likely the result of the Confederate army occupying Albuquerque and much of southern New Mexico. When observations resumed 1 December 1862, no rainfall measurements were taken until October 1863. Recordings were made regarding the occurrence of precipitation, but actual daily measurements were absent. The last observation for the Post at Albuquerque was 31 July 1867.

At least one observing form (May 1852) listed the name of the observing station as “Camp Vigilance near Albuquerque.” Camp Vigilance was a temporary military facility just east of the Plaza at Albuquerque (best estimate based on available documented sources) during the years 1852 and 1853. Since the hospital for the Post at Albuquerque was located very near the Plaza (most likely just west of the Plaza), it is possible some of the weather observations for the post may have been taken at Camp Vigilance during the years 1852 and 1853.

Formal Signal Service Observations

First observations at the Signal Service office were on 1 October 1878. Since this office primarily was a telegraph repair station, it was supplied a complete set of telegraph instruments and repair tools. A conflict exists between information contained in the Signal Service Annual Reports for this station and observations made by the Signal Service observers. The Signal Service Annual reports stated that beginning in 1878 a maximum thermometer, minimum thermometer, and rain gage were provided to the station. The reports also indicated that beginning on 1 October 1878, observations were made at this station daily at the hour of sunset for current temperature and daily rainfall and telegraphed to Signal Service Headquarters. In addition maximum and minimum

temperatures, daily rainfall, and wind direction and state of the weather for the previous 24 hours, were reported monthly by mail to the headquarters office. Weather observation forms in the NCDC database show that observations were taken once daily (at sunset) for temperature (hour of sunset), atmospheric moisture (mean daily humidity only in October 1879), daily rainfall, and wind direction. No recordings were made for maximum/minimum temperatures.

The Signal Service conducted three inspection reports of this station in the late 1870s -- 20 July 1877, 3 October 1878, and late 1879 (exact date unknown, but immediately after the station ceased taking weather observations). The 1877 report stated no meteorological instruments were at this station because it was a “telegraph station only.” The 1878 report stated the station had a thermometer (4 feet above ground) and a hygrometer, both in good condition. The 1879 inspection report stated the station had a thermometer, a hygrometer and an anemoscope (indicating the existence and direction of the wind). All meteorological instruments were reported to be in good condition. Both reports (1878 and 1879) stated “no instrument shelter at this station.”

Available documents state the Signal Service office was located on the south side of the Albuquerque Plaza, with the exact location unknown. Most likely, the office was located on the southeast part of the Plaza. Figure 7 and Figure 8 show the general exposure of the terrain near the southern part of the Plaza.

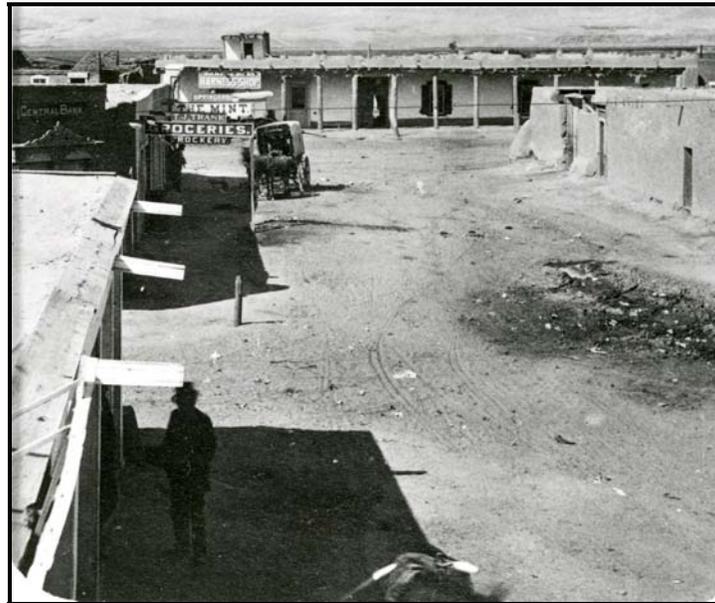


Figure 7. Photograph from the southwest part of the Albuquerque Plaza looking west (circa 1882). Terrain sloped gently down toward the Rio Grande River approximately one-half mile in the distance. Rio Grande Boulevard is the street that runs left to right in the background of the photograph. Signal Service office likely was located on the southeast Plaza (not in picture) and the Army Post hospital during the 1850s and 1860s likely was located near or west of Rio Grande Boulevard. From the Albuquerque Museum.



Figure 8. Photograph of the southeast Plaza from the northwest Plaza. View is southeast (circa 1880). Signal Service office likely was in one of these buildings. Terrain sloped gently upward from right to left. From the Albuquerque Museum.

Weather observations at this station were discontinued 20 November 1879 according to Signal Service inspection reports. Last observation in the NCDC was 30 September 1879). Subsequent Signal Service observations in Albuquerque were taken by Voluntary Observers, and ensuing observations by Weather Bureau Cooperative Observers, until the Weather Bureau began full operations in 1931.

Voluntary/Cooperative Observers (1888 – 1931)

*4th Street and W. Gold Avenue - Saul M. Rowe, S.S. Beattie, and W.S. Burke
June 1888 – December 1892*

Mr. Saul M. Rowe began recording rainfall in May 1888, with beginning/ending times and daily amount. On 2 June 1888, Mr. Rowe began recording wind (direction and force) and relative humidity at 7:00 a.m., 2:00 p.m., and 7:00 p.m., as well as rainfall. By April 1889 (exact date unknown due to data gaps), Mr. Rowe began temperature readings at 7:00 a.m., 2:00 p.m., and 7:00 p.m. Through the observation period, observing consistency was sporadic, and by 3 November 1889, only maximum/minimum temperatures and irregular precipitation amounts were recorded. The consistency of the observations improved after May 1890 (taken by S.S. Beattie), and beginning with the December 1891 observations (taken by W.S. Burke), current weather was also recorded.

The June 1889 form lists daily evaporation along with the following note: “This (evaporation) is measured from a glass jar. Copl. Dutton asked to supply evaporating pan.” The evaporation readings were taken in the morning and also during the afternoon. Last evaporation measurements were made 31 October 1889.

On several observation forms (e.g., April 1892 – June 1892), height of the thermometers were indicated to be 20 feet above ground and the rain gage was indicated to be at ground level, i.e., height of the rain gage above ground was zero feet. Weather Bureau station history forms indicated a standard eight inch rain gage was located at this site with the height three feet above ground.

Last observation for this site (in the NCDC database) was 31 December 1892.

*University of New Mexico – M.R. Gaines and Others
January 1893 – May 1910*

Figure 9 shows the location of the Main Building (Hodgin Hall) and Hadley Climatological Laboratory. Initial observations were taken near the Main Building then moved to the Hadley Laboratory after 1 February 1900 but before 30 April 1906. The Hadley Laboratory burned in 1910 and was not replaced. Hodgin Hall was remodeled into the pueblo style in 1904 and still exists today. Figure 10 shows Hadley Laboratory location.

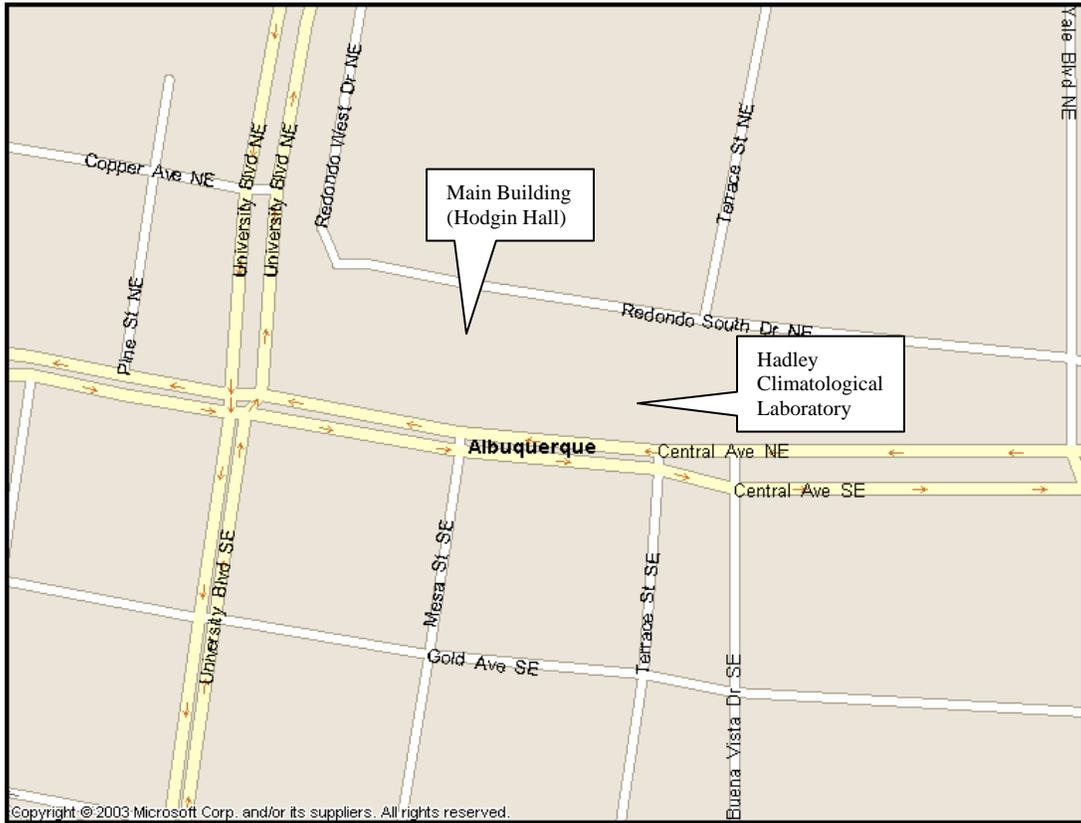


Figure 9. Location of Main Building (Hodgin Hall) and Hadley Climatological Laboratory on the University of New Mexico campus. North is at the top of the page. Horizontal distance across the map is approximately one-third mile. Building locations plotted on a current map of Albuquerque.



Figure 10. Location of the Hadley Climatological Laboratory before it burned in 1910 (photo taken July 2005). Hodgin Hall is located to the left and out of the picture. View is northeast. Photograph shows downward slope from right (east) to left (west). Photo by the author.

A Weather Bureau inspection report prepared 24 April 1897, indicated the station (at the Main Building) had a maximum thermometer (thermometer manufacturer difficult to interpret but appears to be by “Qucen Co.”) and a minimum thermometer (made by Schneider Brothers of New York). Both were indicated to be “Weather Bureau property.” The thermometers were housed in a “Weather Bureau shelter” that stood on supports against a north stone wall of a building (name of building not specified) opposite a room that was never heated. Based on an old map of the campus, the instrument shelter likely was approximately 50 feet northeast (or less) of the Main Building. The thermometers were four feet above ground.

The 1897 report stated the rain gage was an “old-fashioned Weather Bureau type” and the inspector recommended the gage be replaced. The gage was situated over open ground 40 feet from the nearest small tree and 100 feet from the nearest building. It was attached to a post with the top of the gage four feet above ground.

A Weather Bureau inspection report prepared on 30 April 1906, indicated the weather instruments were on the roof of the Hadley Climatological Laboratory. The report stated the station had maximum/minimum thermometers, instrument shelter, and a standard eight inch rain gage.

The report also stated the maximum/minimum thermometers were issued by the U.S. Government. The thermometers were in a cotton region instrument shelter on top of the science hall, and approximately 10 feet above the roof. The report also stated that the

rain gage was located approximately 100 feet from the building (no direction indicated) with the top of the gage five feet above ground.

In 1942, the Official in Charge of the Albuquerque Weather Bureau office prepared an informal document entitled, "To the Future Officials in Charge of Albuquerque and to the Users of This Book" (climatological summary book; located in the National Weather Service Forecast Office). In that document, the author made the following statement with regard to early observations in general, and observations at the University in particular: "It was evident in many of the older records, especially those made at the University during the first decade of this century, that the observations were made by a variety of untrained persons who had not been properly instructed in the method of reading and recording weather instruments."

*1216 W. Central Avenue - Pitt Ross
January 1906 – January 1916*

Weather Bureau records indicated only daily precipitation was recorded at this site and the record was intermittent.

*Rio Grande Industrial School – A.C. Heyman
March 1911 – March 1922*

Weather Bureau records indicated maximum/minimum thermometers and a standard eight inch rain gage were located at this station. The thermometers were four feet above ground in a cotton region instrument shelter and the rain gage three feet above ground. After July 1916, only temperatures were recorded.

*5th Street and W. Central Avenue – U.S. Forest Service (Observer Harry M. Frank)
August 1916 – August 1918*

Weather Bureau records indicated only a standard eight inch rain gage was located at this station. An inspection report on 5 October 1917, indicated the rain gage was 3 feet above ground. The report stated the following: "The gage is exposed in the backyard of the home and is somewhat encroached upon by buildings and trees, so I advised raising the gage to the top of a line fence (5 feet to top of gage) and placing midway between trees and garage to be erected at alley end of lot, which will give about 20 foot clear space for gage to any obstruction." No information was found as to whether this change occurred. Another note on the report stated: "Records of downtown rainfall station began August 1910, and transferred to Forest Service June 1916."

*University of New Mexico – R.S. Rockwood and Others
September 1918 – March 1931*

NOTE – Although Weather Bureau Station History forms and station location tables in the Local Climatological Data state observations began at this site in September 1918, the

Weather Bureau Original Monthly Record of Observations forms indicate observations did not begin at this site until 1 February 1919.

The following information regarding weather instruments at the University of New Mexico for this period was based on three Weather Bureau inspection reports made 24-26 February 1919, 6 November 1923, and on 27 September 1927.

Barometer – A standard mercurial barometer made by Green. Elevation of the barometer was 5,196 feet above sea level.

Instrument Shelter – The instrument shelter was located on the roof of the Main Building (Hodgin Hall) at the University of New Mexico. The bottom of the shelter was eight feet above the roof and the roof was composed of tar and gravel. The exposed thermometer, maximum/minimum thermometers, and psychrometer (whirling type) were 48 feet above ground. The shelter also contained a thermograph.

Rain Gage – The standard eight inch rain gage was on the roof of the building and approximately 39 feet above ground. A Weather Bureau inspection report on 27 September 1927 stated: “Gage is on roof of building but portion of building extends upward 12 feet higher with straight walls. This wall is 10 feet south of present location. A new flat roofed building is being erected and the gage will be placed thereon when completed.” However, cover sheets for the forms entitled “Original Monthly Record of Observations” indicated the elevation of the rain gage did not change from 1927 through 1930 (last rain gage elevation at the university was listed on the December 1930 form), i.e., the move likely did not occur.

Wind Instruments – The anemometer and wind vane (4 foot) were on the roof of Hodgin Hall and located 59 feet above ground.

Additional Equipment/Information – A sunshine recorder also was located at this station. The station also had a double register. Weather Bureau inspection reports on 24 February 1919 and on 6 November 1923 stated that installation and exposure of the instruments was good. The 1919 report stated the double roof of the instrument shelter was to be replaced.

Weather Bureau Observations

1 April 1931 – 29 June 1932 – Weather Bureau office in Kimo Theatre Building, 419 - 423 (Rooms 105 – 107) West Central Avenue (Figure 11)

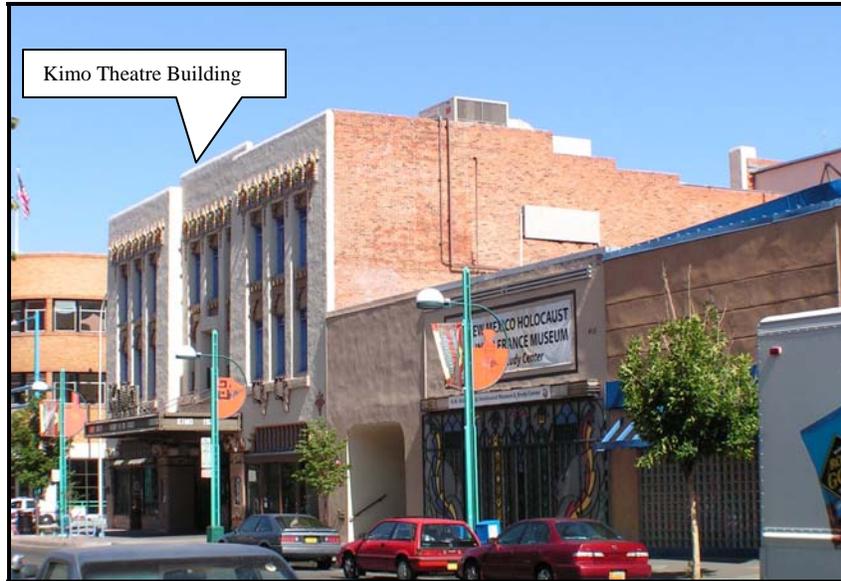


Figure 11. Kimo Theatre Building (July 2005) looking northwest. Weather Bureau weather instruments were located on the roof of the building from 1 April 1931 through 23 January 1933. Photograph by the author.

Barometer – Elevation of the barometer was 4,972 feet above sea level.

Instrument Shelter – The instrument shelter was a standard type and was located on the roof of the Kimo Theatre Building (Figure 12). Exposed and maximum/minimum thermometers were 9 feet above the roof and 51 feet above ground. The psychrometer was 8 feet above the roof and 50 feet above ground.



Figure 12. Instrument shelter on top of the roof of the Kimo Building (circa 1932). View is toward the south. Person in the picture was a Weather Bureau Junior Observer. From the files of the National Weather Service Forecast Office in Albuquerque, NM.

Rain/Snow Gages – Tipping bucket and standard eight-inch rain gages were 4 feet above the roof and 45 feet above ground (Figure 13).



Figure 13. Tipping bucket and standard eight-inch rain gage on top of the Kimo Theatre Building (circa 1932). View is toward the south. Person in the picture was a Weather Bureau employee. From the files of the National Weather Service Forecast Office in Albuquerque, NM.

Wind Instruments – The anemometer was 19 feet above the roof and 66 feet above ground. The wind vane was 21 feet above the roof and 67 feet above ground.

29 June 1932 – 23 January 1933 – Weather Bureau office in the Federal Building (Figure 14) at Gold and 5th Streets (Rooms 412- 414)

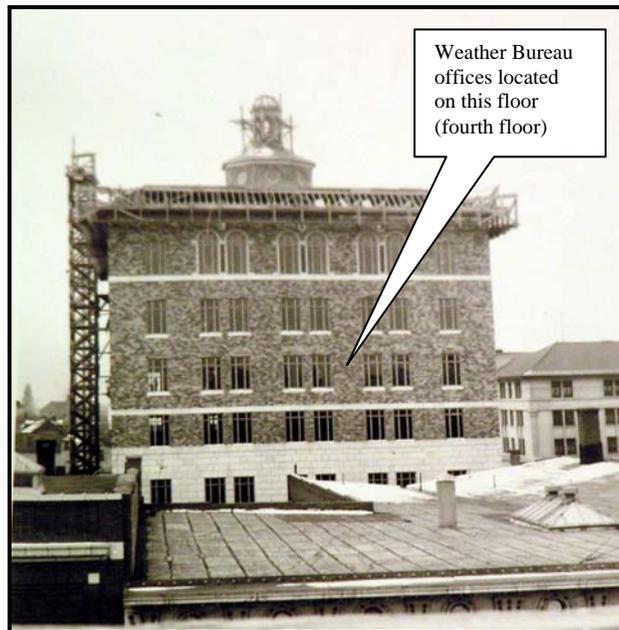


Figure 14. Federal Building (circa 1933) from the roof of the Kimo Theatre. View is toward the south. From the files of the National Weather Service Forecast Office in Albuquerque, NM.

Barometer – The barometer was moved to the Federal Building (4th floor) and the elevation was 5,001 feet above sea level.

Instrument Shelter – Instrument shelter and all attendant instruments remained on the roof of the Kimo Theatre Building.

Rain/Snow Gages – The rain/snow gages remained on the roof of the Kimo Theatre Building.

Wind Instruments – The wind instruments remained on the roof of the Kimo Theatre Building.

Weather Bureau Observations – Airport Offices

23 January 1933 – 31 July 1939 – Weather Bureau office on the 1st floor (southeast corner of the building) of the TWA (Transcontinental and Western Air) Office and Depot Building (Figures 15 and 16) at the TWA Airport (West Mesa Airport)

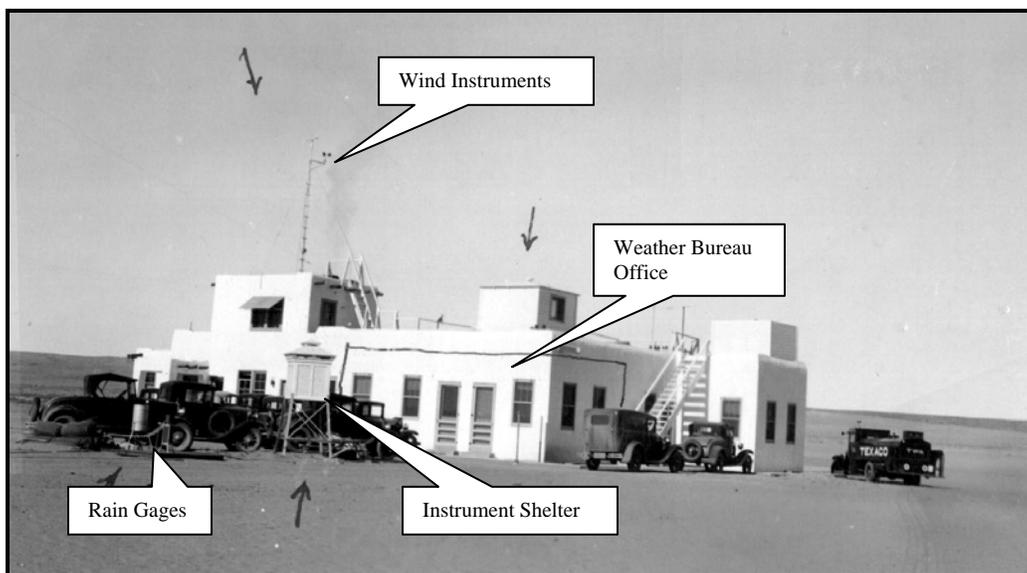


Figure 15. TWA Office and Depot Building (15 February 1933) with Weather Bureau office and weather instruments. View is west. From the official station history files at the National Climatic Data Center.

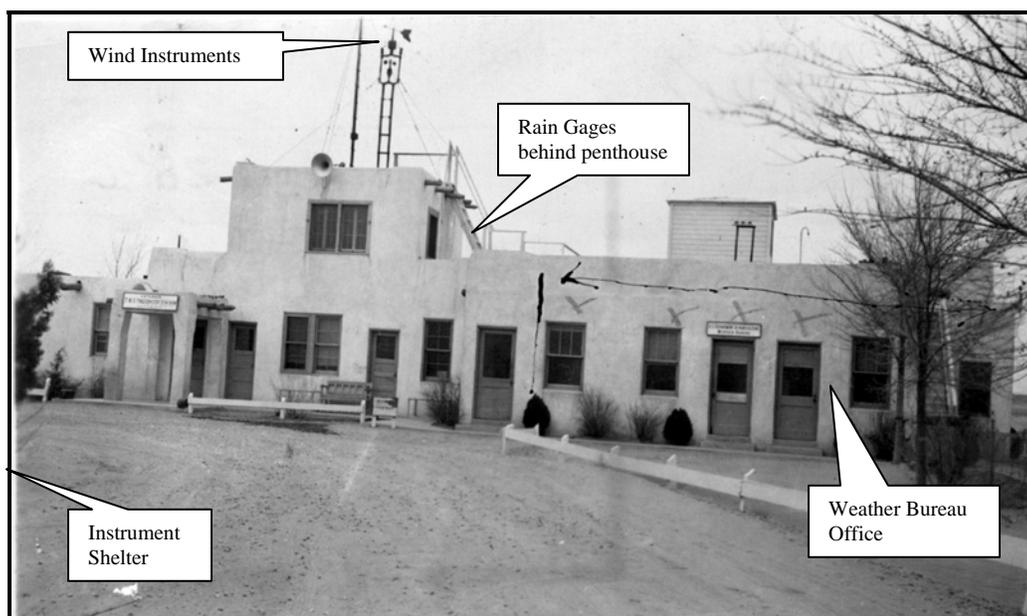


Figure 16. TWA Office and Depot Building on 15 February 1937. Rain gages were moved to the roof (northwest of the second floor penthouse) on 15 August 1934, but the instrument shelter remained in previous position on the ground. View is northwest. From the official station history files at the National Climatic Data Center.

Barometer – The barometers (mercurial and aneroid) were installed in the barometer box that was fastened to the south wall of the General Office Room at the airport. Elevation of the barometers was 5,098 feet above sea level. In

December 1933, the elevation of the barometer was recomputed to be 5,105 feet. A barograph (Richards) was located on a shelf adjacent to the other two barometers.

Instrument Shelter – The instrument shelter (large type) was located 38 feet south of the southeast corner of the TWA Depot and Office Building. The Depot and Office Building was a one story building and was the nearest obstruction. The shelter was over sandy ground. Door of the shelter opened to true north. Exposed and maximum/minimum thermometers were five feet above ground. The psychrometer was four feet above ground. A thermograph was installed by 15 November 1933. Weather Bureau records indicated no troublesome local influences existed. A note was attached to the cover sheet of the monthly record of observations form for June 1934 that stated: “Dry thermometer broken since June 18.”

Rain/Snow Gages – Tipping bucket and standard eight inch rain gages were located 59 feet southeast of the southeast corner of the TWA Office and Depot Building. The top of the gages were three feet above ground. The instrument shelter (10 feet high) was the nearest object and was 15 feet northwest of the gages.

On 15 August 1934, the rain gages were moved to the roof of the Office and Depot Building because the gages were filling with sand at their ground location. The gages were 3 to 4 feet above the roof and 15 feet above ground (see Figure 16).

Wind Instruments – The wind instruments were mounted on the penthouse of the TWA Office and Depot Building (Figures 15, 16 , and 17). The penthouse was a 12 foot by 17 foot superstructure 8 feet above the main building. Exposure of the wind instruments was rated as good, with the nearest obstruction the TWA hangar that was 36 feet high and 300 feet from the wind instruments (Figure 18). The anemometer was 18 feet above the roof and 39 feet above ground. The wind vane was 20 feet above the roof and 41 feet above ground. The anemometer was a three-cup type and the wind vane (metal) three feet in length.



Figure 17. Close-up view of wind instruments on top of the TWA Office and Depot Building (circa 1933). Live chimney was located to the right of the wind instruments and extended slightly above the superstructure. View is south. From the official station history files at the National Climatic Data Center.

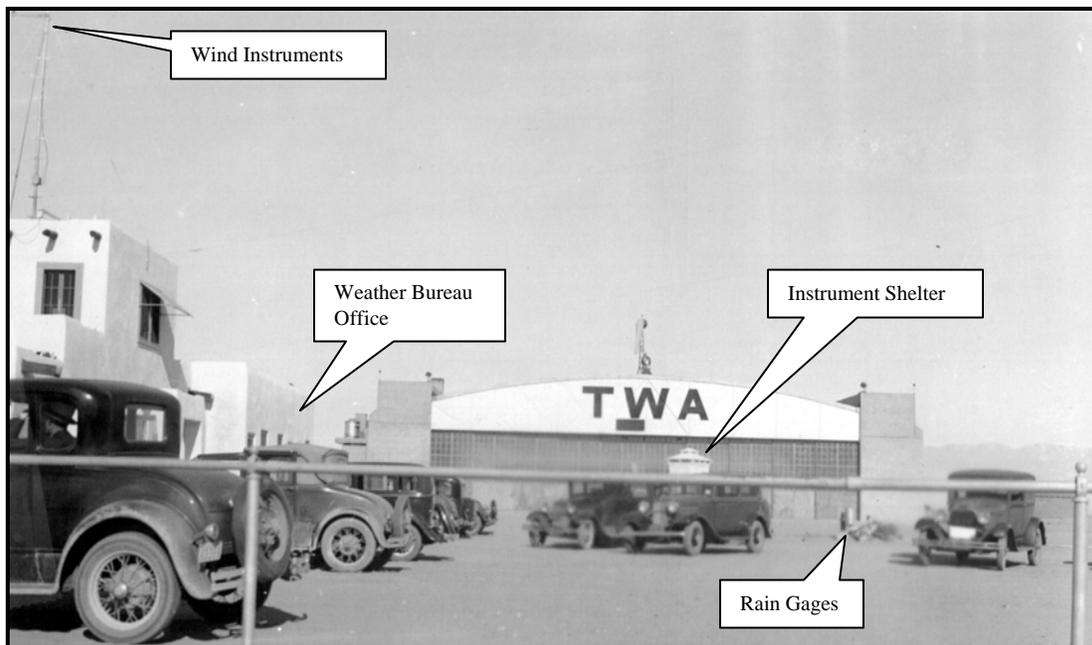


Figure 18. TWA hangar (looking northeast) from the Office and Depot Building (circa 1933). Note location of instrument shelter and rain gages with respect to the parking lot. From the official station history files at the National Climatic Data Center.

Additional Equipment/Information – A sunshine recorder was located on the southeast corner of the penthouse. The office also had a hygrothermograph.

31 July 1939 through 1958 – Weather Bureau office in the Administration Building at the Municipal Airport (named Kirtland Airfield in February 1942). Weather Bureau office was in the north corner of the building.

Figure 19 shows the location of Weather Bureau instruments at the Municipal Airport Administration Building on 6 September 1943. Figure 20 shows the arrangement of the instruments on the same date which is representative (with the exception of the weighing, or recording rain gage that was added in late 1940 or early 1941) through the 1940s.

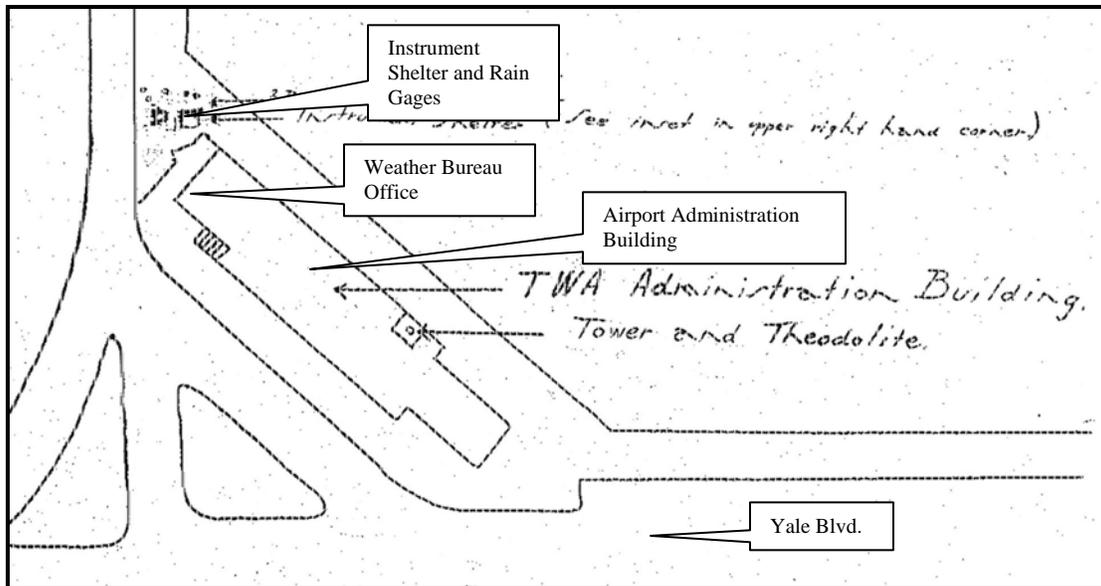


Figure 19. Location of Weather Bureau instruments (6 September 1943) with respect to the Municipal Airport Administration Building. North is to the left of the page. From the official station history files at the National Climatic Data Center.

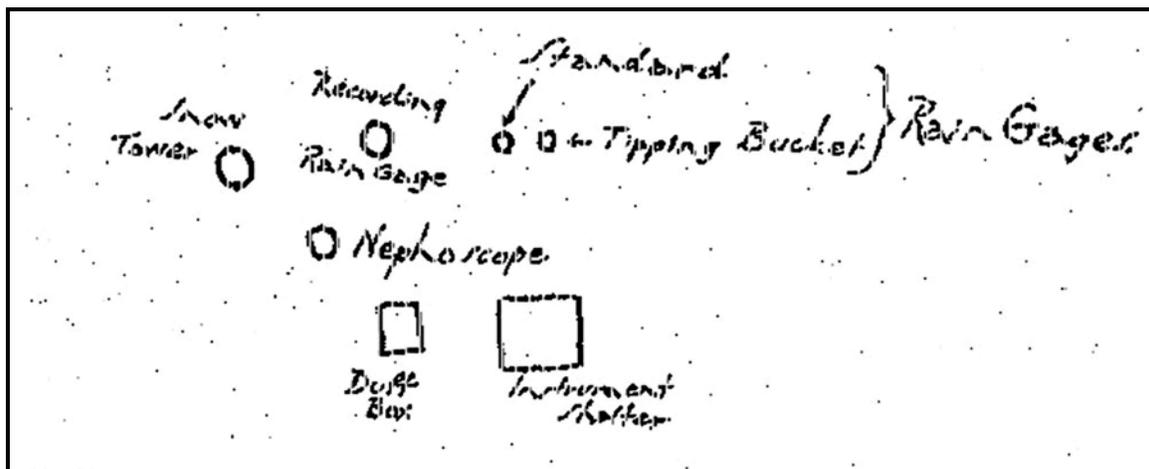


Figure 20. Arrangement of weather instruments near the Municipal Airport Administration Building (6 September 1943). Arrangement is representative (with the exception of the weighing, or recording rain gage that was added in late 1940 or early 1941) through the 1940s. North is to the left. From the official station history files at the National Climatic Data Center.

Barometer – Two mercurial barometers (operational and extra; both by H.J. Green, Fortin types) were mounted on the northeast wall of the operational area. They were mounted on a studded wall which was supported by a concrete floor and concrete ceiling. Elevation of the barometer was 5,314 feet above sea level.

The barograph (Friez four day) was located on a shelf adjacent to the left of the mercurial barometer. The office also had an aneroid barometer. An altimeter setting indicator (Wallace and Tierman) was installed on the southeast wall of the operational office by 6 September 1943. Figure 21 depicts the location of the barometers in 1943.

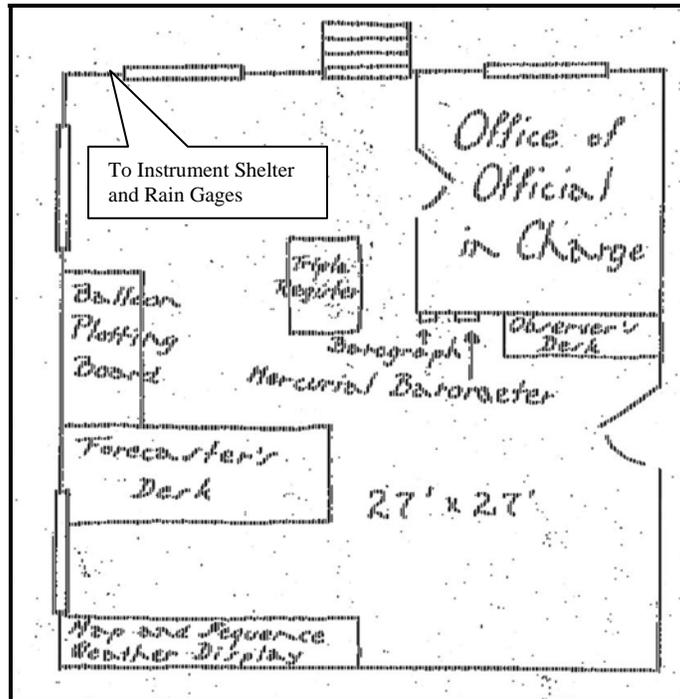


Figure 21. Weather Bureau operational area in the Municipal Airport Administration Building (6 September 1943). North is to the left part of the figure. From the official station history files at the National Climatic Data Center.

In September 1949, the operational office was rearranged and the barometers were moved. Figures 22 and 23 show where the barometers were located after that date. The mercurial barometers were moved to the southwest wall of the operational room and the barograph moved to the south wall.

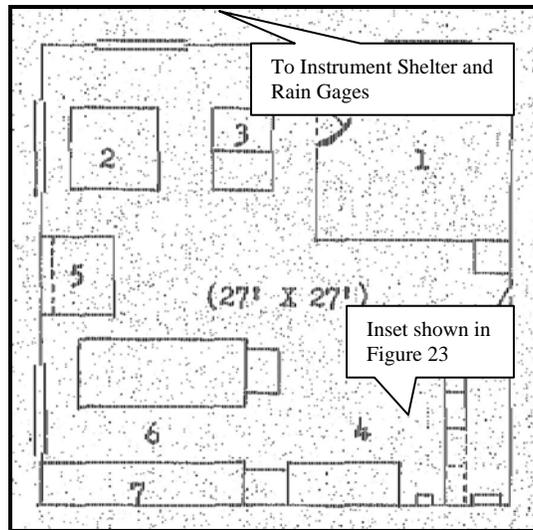


Figure 22. Large-scale view of Weather Bureau operational area in the Administration Building on 14 September 1949 (numbers on the drawing not explained by the author). North is to the left of the page. From the official station history files at the National Climatic Data Center.

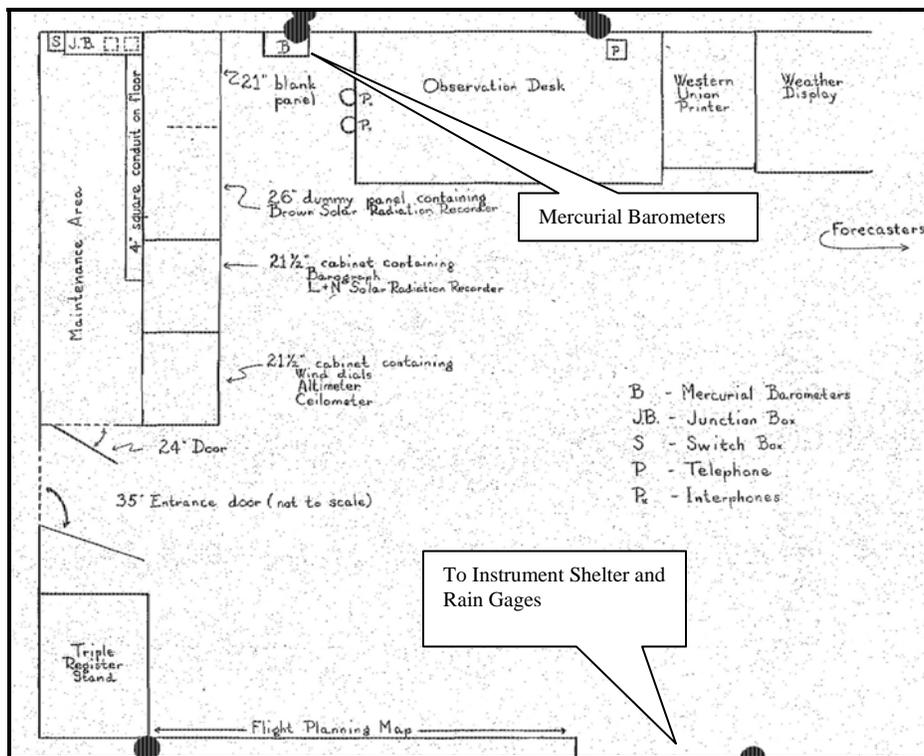


Figure 23. Enlargement of inset depicted in Figure 22 (inset is rotated 180° to orientation in Figure 22). North is to the right of the page. From the official station history files at the National Climatic Data Center.

A drawing of the operational area for 9 December 1957 (in the NCDC database), suggested the mercurial barometer was moved a few feet along the southwest wall. However, no confirmation was mentioned in any of the routine instrument forms in the NCDC database.

Instrument Shelter – The instrument shelter (large type) was located 50 feet east northeast of the Administration Building and over 150 feet from a chimney 40 feet high. Exposed and maximum/minimum thermometers (Taylor & Green) were six feet above ground. The psychrometer (Friez) was five feet above ground. Weather Bureau records indicated no troublesome influences existed (i.e., in the late 1930s and 1940s) and that the exposure was very good. A thermograph (Friez 7 day) was installed by 1 April 1940, with the elevation 6 feet above ground.

Figure 24 depicts the exposure of the weather instruments in 1944 and Figure 25 shows the exposure in 1949.



Figure 24. Instrument shelter, rain gages, and wind instruments at the Municipal Airport Administration Building on 7 April 1944. View is southwest. From the official station history files at the National Climatic Data Center.



Figure 25. Instrument shelter and rain gages at the Municipal Airport Administration Building in 1949. View is northeast. Photo taken from the roof of the Administration Building. From the official station history files at the National Climatic Data Center.

A second instrument shelter, cotton region type for use in the upper-air program, was located approximately 600 feet east southeast of the primary instrument shelter. The upper-air shelter was four feet above ground. No specific information could be found regarding when the upper-air instrument shelter was installed, but the start date was prior to 6 September 1943. Figures 26 and 27 depict the location of this shelter, especially with respect to the nearby TWA hangar.



Figure 26. Instrument shelter used for the upper-air program (circa 1951). TWA hangar is in the background. View is northwest. From the official station history files at the National Climatic Data Center.



Figure 27. Instrument shelter used for the upper-air program (circa 1954). View is southwest. From the files of the National Weather Service Forecast Office in Albuquerque, NM.

During the 1950s, exposure of the primary instrument shelter (near the Administration Building) changed as new buildings were built in the immediate

vicinity, hard-surfaced areas increased around the instruments, and airport traffic (airplanes and trucks) became more pronounced. By 1953 (Figure 28) a building was built immediately east of the instrument shelter and rain gages, with another building immediately to the south, and by late 1956, the shelter and gages were encompassed by buildings and activity on the airport (Figure 29). Also, Weather Bureau station description forms during the 1950s expressed concerns regarding exposure of the instruments due to the close proximity (within 75 feet) of airplane exhausts (Figure 30).



Figure 28. Exposure of the instrument shelter and rain gages on 22 September 1953 from the roof of the Administration Building. Note the new buildings immediately east and south of the weather instruments. On 23 June 1958, the instrument shelter and rain gages were moved to the roof of the TWA Express Building on the right side of the photograph. View is towards the east. From the official station history files at the National Climatic Data Center.

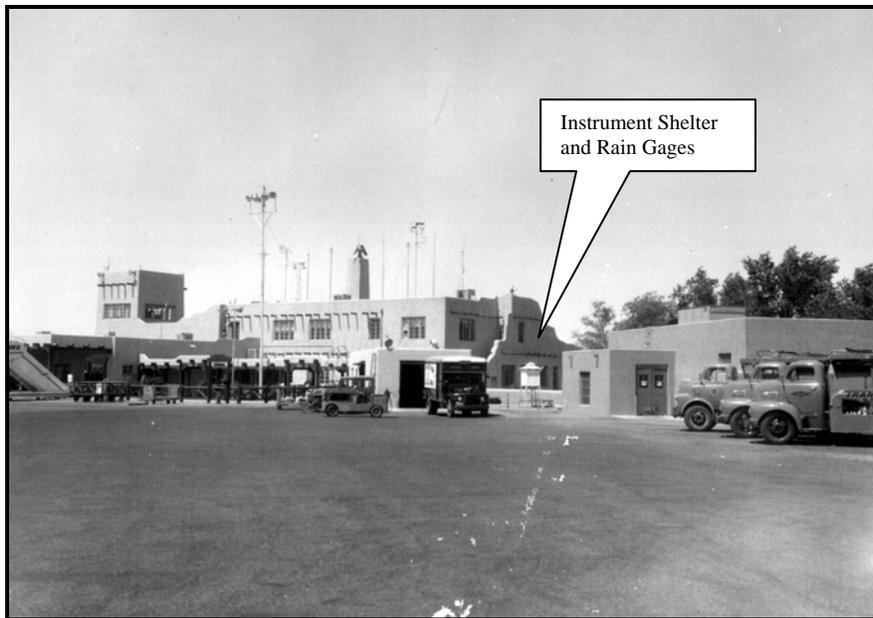


Figure 29. Exposure of instrument shelter and rain gages on 28 August 1956. Note low structures on three sides of shelter and large adjacent hard-surfaced areas. View is northwest. From the official station history files at the National Climatic Data Center.



Figure 30. Location of weather instruments with respect to airplane ground traffic (circa early 1950s). View is northwest. From the Albuquerque Museum.

On 23 June 1958, the instrument shelter and rain gages were moved to the roof of the TWA Express Building 33 feet south southeast of the ground site (Figures 31, 32, and 33) . Exposed and maximum/minimum thermometers were 16 feet above ground.

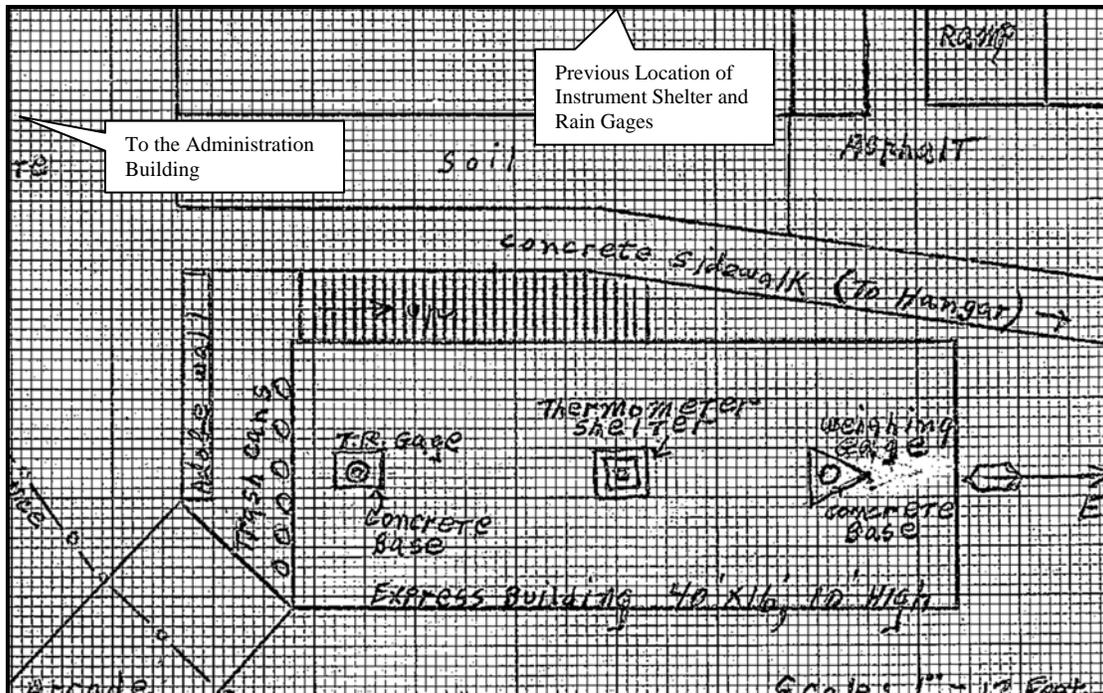


Figure 31. Schematic showing location of instrument shelter and rain gages on top of the TWA Express Building on 23 June 1958. North is at the top of the page. From the official station history files at the National Climatic Data Center.



Figure 32. Instrument shelter and rain gages on top the TWA Express Building on 23 June 1958. View is southeast. Weather Bureau note associated with this photograph stated: "Exhaust from parked aircraft common immediately to the right of the instrument group." From the official station history files at the National Climatic Data Center.



Figure 33. Instrument shelter and rain gages on top the TWA Express Building on 23 June 1958. View is northeast. From the official station history files at the National Climatic Data Center.

Rain/Snow Gages – Tipping bucket (Friez) and standard eight inch (Jenks) rain gages were three feet above ground. A weighing rain gage (Freiz dual traverse) was installed between 1 July 1940 and 1 September 1941 at an elevation five feet above ground. The rain/snow gages were located 10 feet to the east of the instrument shelter. This arrangement of the rain gages continued through the 1940s. During the early 1950s (exact date unknown), both the weighing and tipping bucket rain gages were moved (compare Figure 25 with Figure 28), with the weighing gage moved approximately 20 feet farther west and the tipping bucket rain gage approximately 30 feet northwest from previous locations. The standard rain gage, which is shown in previous pictures and diagrams, was not depicted in Figure 28 or subsequent photographs.

During the 1950s, exposure of the rain gages was affected by growing trees north of the instrument complex (Figure 34) and newly completed buildings to the south and east (Figure 28). On 23 June 1958, the rain gages were moved to the roof of the TWA Express Building 33 feet south southeast of the ground site. Elevation of the tipping bucket gage was 13 feet above ground and elevation of the weighing rain gage was 15 feet above ground. Although some instrument forms indicated the standard eight inch rain gage was moved to the TWA Express Building roof on 23 June 1958, none of the three figures (Figures 31, 32, or 33) showed the presence of a standard rain gage. The first Weather Bureau form to indicate the standard rain gage was moved to the Express Building was the Form, WBAN-10 D on 31 March 1960.

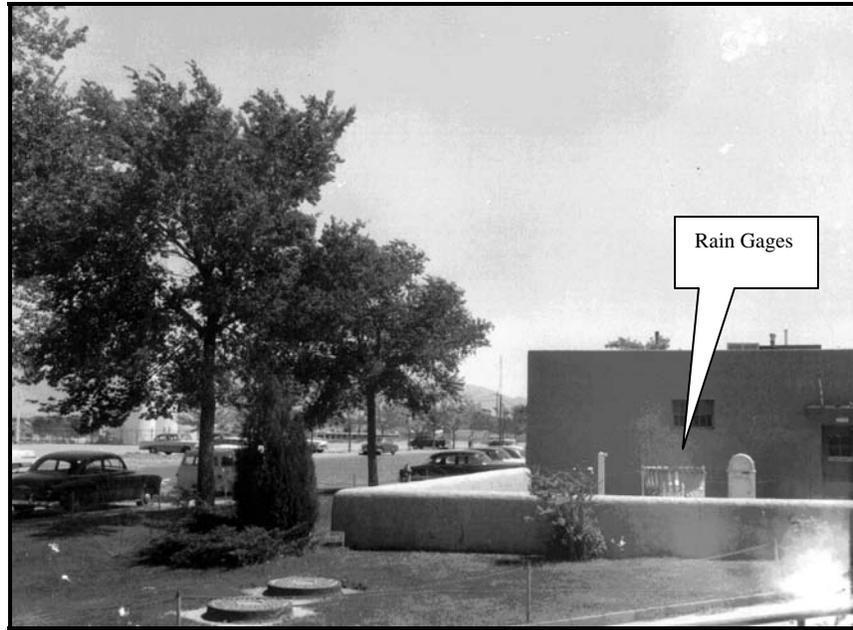


Figure 34. Exposure of the rain gages on 28 August 1956, showing large trees just north of the instruments. View is towards the east. From the official station history files at the National Climatic Data Center.

Wind Instruments – The wind instruments were mounted on the roof of the Administration Building. The anemometer (3 cup but changed to a Marvin 4 cup around 1 September 1941) was 34 feet above ground and 19 feet above the roof. The wind vane (3 foot wood type but changed to a 6 foot wood type between 1 July 1940 and 1 September 1941 and changed to a 4 foot wood vane by 15 October 1941) was 22 feet above the roof and 37 feet above ground. A chimney 50 feet to the west of the instruments was 5 feet higher than the anemometer and wind vane. The influence of this chimney was judged as “negligible.”

On 15 October 1941, the wind instruments were raised approximately 10 feet to clear all obstructions resulting from the second story addition to the Administration Building. The anemometer was 45 feet above ground and the wind vane 47 feet above ground.

On 15 August 1949, an “anemometer cup-wheel” replaced the previous wind instruments. Anemometer and wind vane were 23 feet above the roof and 48 feet above ground. Two anemometers and two wind vanes were mounted on one new support. Figure 35 shows the wind instruments in 1949 and Figure 36 shows the wind instruments in 1956.



Figure 35. Wind instruments on top of the Administration Building in 1949. Wind instruments on the left belonged to TWA. Wind instruments on the right belonged to the Weather Bureau. The lower anemometer and upper wind vane were wired to the triple register. The upper anemometer and lower wind vane were wired directly to the reading dials in the instrument cabinet in the Weather Bureau office. View is toward the northeast. From the official station history files at the National Climatic Data Center.



Figure 36. Weather Bureau wind instruments on top of the Administration Building in July 1956. View is towards the east. From the official station history files at the National Climatic Data Center.

On 1 March 1960, new wind instruments were installed at 23 feet above ground and became the official wind observations (exact location not indicated). The old instruments remained.

Additional Equipment/Information – A triple register (Friez) was located at this site. The pyrhellometer (Eppley Normal Incidence) was installed 14 August 1949 on top of the outer permanent wall (on the roof) near the theodolite platform at 38 feet above ground. The station also had an Eppley 180° pyrhellometer (installed 14 August 1949) located 38 feet above ground. The station also had a sunshine recorder, as well as a nephoscope.

OTHER OBSERVATIONS

A Cooperative Station was established on 1 September 1926 at Los Griegos, NM (35°10'N 106°40'W, elevation 4,970 feet), approximately 4 miles northwest of downtown Albuquerque. Observations were taken by State Engineers until 31 March 1932, using the following instruments: 1) Standard rain gage; 2) Maximum/Minimum thermometers (type of instrument shelter not indicated); 3) Psychrometer; 4) Anemometer; and 5) Class "A" Evaporation Station. Description of the surrounding land in the Substation History was, "In salt grass pasture, near slough of valley bottom, one-half mile east of Rio Grande."

INCIDENTAL NOTE

Adolphus W. Greely was the Chief Signal Officer for the Division of Telegrams and Reports for the Benefit of Commerce and Agriculture, from 1887 until the agency was transferred to the Weather Bureau in 1891. He also was the leader of the ill-fated expedition to Lady Franklin Bay in Canada's Northwest Territories in 1881. On 20 July 1877, then Lieutenant Greely inspected the Signal Service office at Albuquerque (Figure 37). Lieutenant Greely gave the office a good report.

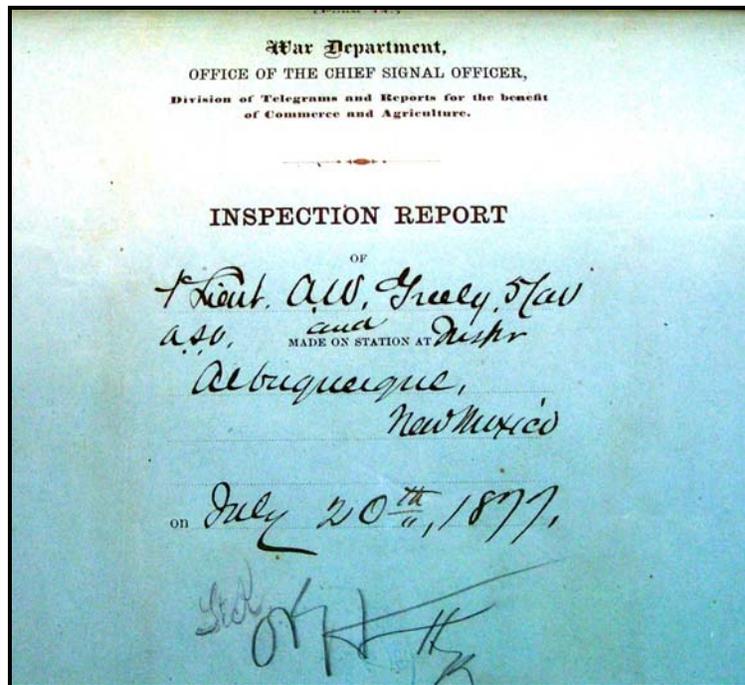


Figure 37. Cover sheet for the inspection report of the Signal Service Office in Albuquerque, NM for 20 July 1877, showing the signature of Lieutenant A.W. Greely as the inspecting officer. From the National Archives and Records Administration.

BIBLIOGRAPHY

References

- Alberts, Don, 1987. *Balloons to Bombers: Aviation in Albuquerque, 1882 – 1945*. The Albuquerque Museum, Albuquerque, NM.
- Army Surgeon General, 1844. *Directions for Taking Meteorological Observations Adopted by the Medical Department of the United States Army*. War Department, Government Printing Office, Washington.
- Army Surgeon General, 1845. *Annual Report of the Army Surgeon General, 1844*. War Department, Government Printing Office, Washington.
- Army Surgeon General, 1850. *Regulations for the Medical Department of the Army*. War Department, C. Alexander Printer, Washington.
- Army Surgeon General, 1851. *Meteorological Register from 1831 to 1842 Inclusive*. War Department, C. Alexander, Washington.
- Army Surgeon General, 1856. *Regulations for the Medical Department of the Army*. U.S. Army Surgeon General's Office. War Department, Government Printing Office, Washington.
- Chief Signal Officer, 1871, 1873, 1875, 1880, 1885, 1886. *Signal Service Station Inspection Reports*. War Department, National Archives and Records Administration, Washington D.C.
- Chief Signal Officer, 1872 through 1892. *Annual Report of the Chief Signal Officer* (for the years 1871 through 1891). War Department, Government Printing Office, Washington D.C.
- Frank Leslie's Popular Monthly*, 1878. The United States Signal Service (author unknown). September 1878, pages 337-345.
- Hooker, Van Dorn, 2000. *Only in New Mexico: An Architectural History of the University of New Mexico, The First Century, 1889-1989*. The University of New Mexico Press, Albuquerque, NM.
- Hoshour, Harvey S. 1980. *The Kimo*. Historic Structure Report Prepared for the State of New Mexico, Albuquerque, NM.
- Johnson, Byron A., 1980. *Old Town, Albuquerque, New Mexico: A Guide to its History and Architecture*. Albuquerque Museum, Albuquerque, NM.

- Midwestern Regional Climate Center (Gary Grice), 2005. *History of Weather Observations in Fort Union, New Mexico 1851-1891*. National Climatic Data Center, Asheville, NC.
- National Weather Service, 1982. *Substation History (New Mexico)*. Department of Commerce, Government Printing Office, Washington D.C.
- Robertson, Dr. William Glenn, 1981. *The Post of Albuquerque 1846 – 1867*. The Albuquerque Museum, Albuquerque, NM.
- Simmons, Marc, 1982. *Albuquerque: A Narrative History*. University of New Mexico Press, Albuquerque, NM.
- Weather Bureau, 1893 through 1934. *Annual Report of the Chief of the Weather Bureau (for the years 1892 through 1934)*. Government Printing Office, Washington DC.
- Weather Bureau, 1895, *Monthly Review of the New Mexico Weather and Crop Service for the Month of January 1895*. Department of Agriculture. New Mexican Printing Company, Santa Fe, NM.
- Weather Bureau, 1936 through 1940. *United States Meteorological Yearbook (for the years 1935 through 1939)*. Department of Agriculture, Government Printing Office, Washington DC.
- Weather Bureau, 1941 through 1943. *United States Meteorological Yearbook (for the years 1940 through 1942)*. Department of Commerce, Government Printing Office, Washington DC.
- Weather Bureau, 1956. *Substation History (New Mexico)*. Department of Commerce, Government Printing Office, Washington D.C.

APPENDIX

Methodology

Station history files at the National Climatic Data Center (NCDC) provided critical information beginning in 1849, i.e., during observations taken by the Army surgeons at the Post at Albuquerque, and continued into the early part of the 20th Century under the U.S. Weather Bureau.

Entries from local Climate Record Books at the NCDC provided the backbone for locations and general exposures for instrument shelters (especially thermometers), rain gages, and anemometers/wind vanes for the Albuquerque office from 1931 into the late 1950s. Information on Volunteer/Cooperative Observers from 1888 until 1931 came from inspection forms and substation history forms in the NCDC database.

Also helpful were cover sheets of the Original Monthly Record of Observations, beginning in July 1919 (Cooperative Observations at the University of New Mexico) through December 1948. These forms provided a near continuous record of elevations for station barometers, thermometers, rain gages, and wind instruments. Numerous Station History reports prepared in the 1940s and early 1950s were instrumental in defining specific instrument elevation heights at the Weather Bureau offices, especially at the airport offices.

Weather Bureau officials routinely documented station history and instrument status through forms entitled, Description of Topography and Exposure of Instruments, Report of Elevation and Position of Instruments, and Surface Weather Observations. Information on these forms provided significant detail especially with respect to the stations at the TWA Airport and at Kirtland Field.

Tracking office locations and instrument exposures on a yearly basis was important to ensure no information gaps existed. This yearly information was obtained from the Annual Reports of the Weather Bureau from 1931 through 1943. Information consistency for the mid to late 1940s was maintained from the wealth of historical records during the 1950s.

Signal Service Inspection Reports provided information for the Albuquerque office in the late 1870s. These inspection reports were available from the National Archives and Records Administration (NARA). Descriptions were fairly complete considering the office took limited weather observations.

The National Weather Service Forecast Office in Albuquerque possesses log books and photographs for the station beginning in 1931. These records were beneficial in answering specific questions regarding the Weather Bureau stations.

General historic information for the Albuquerque area was found on various web sites. The book entitled, *The Post of Albuquerque 1846 – 1867* by Dr. William Robertson, provided best available information on the old post, as well as on Camp Vigilance. The book, *Old Town, Albuquerque, New Mexico: A Guide to its History and Architecture* by Byron A. Johnson, gave excellent insight into the history of the Albuquerque Plaza, as well as information on the Post at Albuquerque. History of the Albuquerque airports primarily was obtained from the book entitled *Balloons to Bombers: Aviation in Albuquerque, 1882 – 1945* by Don Alberts.

Archives at the Albuquerque Museum, Special Additions Library of the Albuquerque Public Library, and the Center for Southwest Research were helpful in answering specific questions regarding station location and station moves.

Other information and data sources checked (by person, telephone, or through the Internet) during this study were the NOAA Library, University of New Mexico Zimmerman Library, the Albuquerque Public Library, New Mexico State University Library, Chavez history Library, State of New Mexico Library, and State of New Mexico Archives. Also, relevant information regarding the Weather Bureau, Signal Service, and Army Medical Department was obtained from the Dallas, TX Public Library, Oklahoma State University Library, and the National Library of Medicine at Bethesda, MD.