

**HISTORY OF WEATHER OBSERVATIONS
Manhattan, Kansas
1855-2004**

June 2005

**Prepared by:
Stephen R. Doty
Information Manufacturing Corporation
Rocket Center, West Virginia**

**Prepared in conjunction with:
Mary Knapp
Kansas State Climatologist
Kansas State University
Manhattan, Kansas**

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

CONTENTS

Acknowledgements	iii
List of Illustrations	iv
Introduction	
Executive Summary	1
Goal of Study	1
Location of Observations	
Location maps	2
Chronology of Locations and Elevations	
Manhattan/Manhattan No. 2	3
Manhattan No. 1	4
Agronomy Farm	4
Observers and Instrumentation	
Manhattan/Manhattan No. 2	5
Manhattan No. 1	20
Agronomy Farm	22
Appendices	
Appendix 1, Observer Stories	
Benjamin F. Mudge	25
Ernest R. Nichols	26
Appendix 2, Methodology	27
References and Data Sources	28

ACKNOWLEDGEMENTS

The author would like to thank Mary Knapp, the Kansas State Climatologist for valuable assistance in the development of this report. Her tours of the Kansas State University campus and the surrounding area gave a special insight into the history of weather observing in Manhattan.

The author would also like to thank Glen Conner and Gary Grice for their advice and direction as it concerned the formulation of this report and its contents. And a special thanks to Joe Elms and the staff of the Climate Database Modernization Program at the National Climatic Data Center for their support and assistance.

LIST OF ILLUSTRATIONS

Maps	Page
1. The locations of weather observing sites at Manhattan and Manhattan No. 2, Kansas, 1855-2004.	2
2. The locations of weather observing sites known as Manhattan No 1, 1883-1921 and Agronomy Farm 1937-1970.	3

Figures

1. Kansas State Agricultural College (earlier Bluemont Central College,) circa 1867.	6
2. A view of the campus of Kansas State Agricultural College, circa 1895.	7
3. The instrument shelter located in Manhattan, Kansas in November 1929.	12
4. The instrument shelter located in Manhattan, Kansas in September 1937.	13
5. The instrument shelter located in Manhattan, Kansas in August 1941.	14
6. An aerial view of the campus of Kansas State College, Manhattan, Kansas, in 1944.	15
7. An aerial view of the campus of Kansas State College, Manhattan, Kansas, in 1965.	16
8. A sketch of the Manhattan, Kansas observing site in April 1957.	17
9. A sketch of the Manhattan, Kansas observing site located on the grounds of Kansas State College as of 15 April 1970.	18
10. A sketch of the Manhattan, Kansas observing site located on the grounds of Kansas State University as of 6 March 1980.	19
11. The Manhattan, Kansas observing site on the campus of Kansas State University as of June 2004.	20
12. A sketch of the Manhattan, Kansas observing site located at the Kansas State College Agronomy Farm as of April 1957.	23
13. A sketch of the Manhattan, Kansas observing site located at the Kansas State College Agronomy Farm as of October 1967.	24
14. Ernest R. Nichols, President of Kansas State Agricultural College, 1900-1909.	26

**HISTORY OF WEATHER OBSERVATIONS
Manhattan, Kansas
1855 – 2004**

**Stephen R. Doty
Information Manufacturing Corporation**

INTRODUCTION

Executive Summary

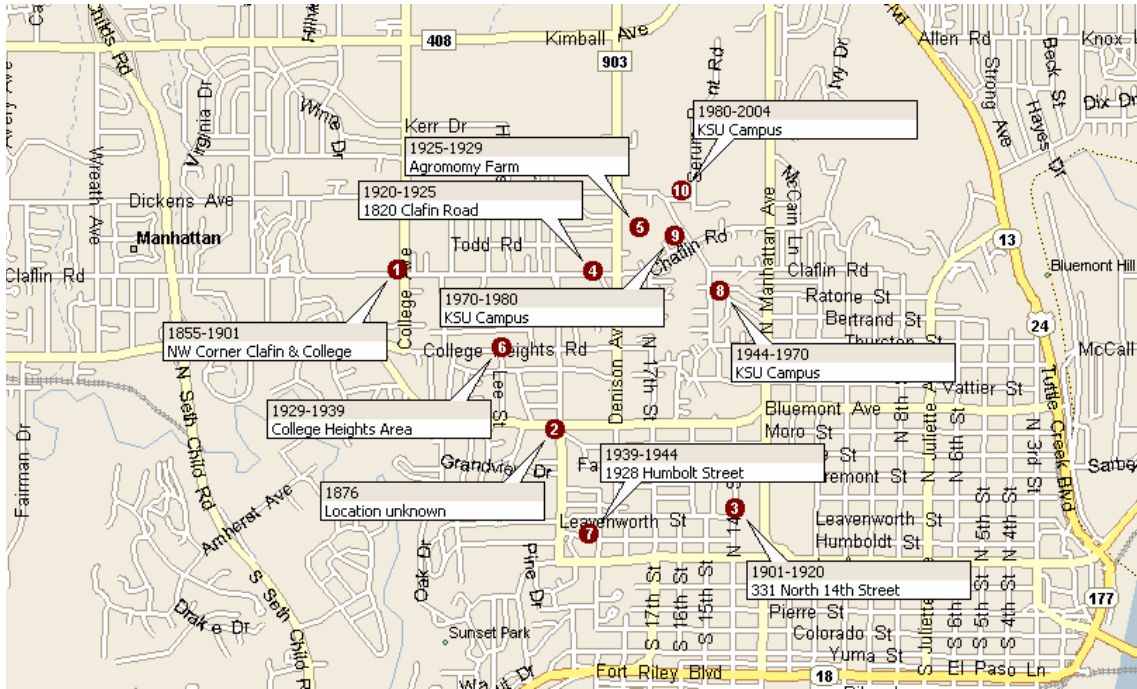
Through the efforts of a long series of volunteer observers, weather observations in Manhattan, Kansas, have been taken continually since 1855. Isaac Goodnow was the first observer being located on the campus of Bluemont Central College. Bluemont Central College became Kansas State Agricultural College in 1863, Kansas State College of Agriculture and Applied Science in 1931, and Kansas State University in 1975. Observations continue to this day on the campus of KSU. These locations were known officially as Manhattan and/or Manhattan No. 2, being combined to just Manhattan in 1970. A second observing site officially known as Manhattan No. 1 was in existence from 1885 until 1921. These observations were taken from the observer's residences in Manhattan. A third site, officially named the Agronomy Farm, was in existence from 1937 until 1970 located on the campus of Kansas State University.

Goal of Study

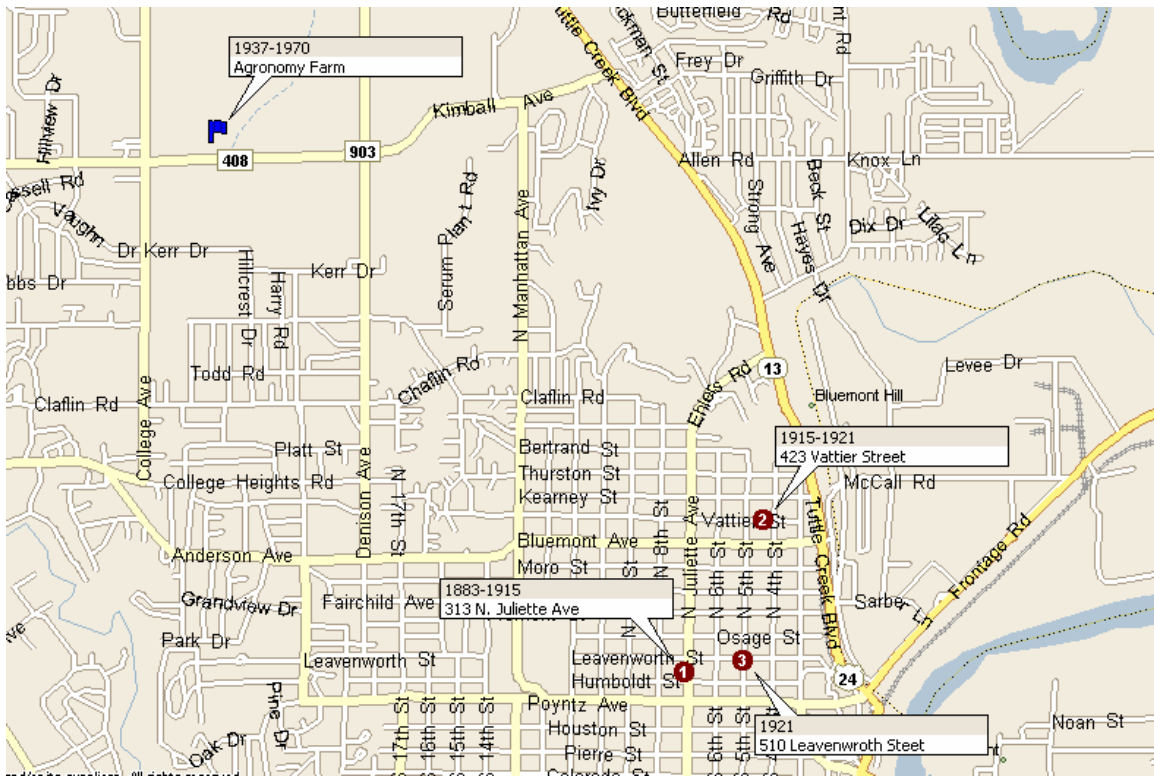
The goal of this study is to document the primary weather observational path at Manhattan, Kansas, leading to the current and on-going National Weather Service's Cooperative observers. Throughout the research for and preparation of this study, the goal was to produce a document that future studies can use to evaluate the validity of the data that were collected here, judge the trustworthiness of the observers who collected them, and determine the climatological significance of the whatever variability may be discerned.

LOCATION OF OBSERVATIONS

Location maps



Map 1. The locations of weather observing sites at Manhattan and Manhattan No. 2, Kansas, 1855-2004. North is to top of map.



Map 2. The locations of weather observing sites known as Manhattan No 1, 1883-1921 (numbered sites) and Agronomy Farm 1937-1970 (Blue flag). North is to top of map.

Chronology of locations and elevations

The following lists the chronology of weather station locations in Manhattan, Kansas, 1855 until 2004: (The elevations and latitude and longitude entries derived using U. S. Geological Survey maps as presented on topozone.com.)

Manhattan and Manhattan No. 2

1855 – September 1901 – Elevation 1,106 feet - 39° 11' 49"N, 96° 36' 53" W
 - Bluemont Central College (name changed to Kansas State Agricultural College in 1863) campus at northwest corner of Claflin and College Avenues

January 1876 – July 1876
 - Location unknown.

September 1901 – December 1920 – Elevation 1,066 feet - 39° 11' 35"N, 96° 34' 51"W
 - Location was at observer's residence at 331 North 14th Street.

December 1920 – April 1925 – Elevation 1,083 feet - 39° 11' 36"N, 96° 35' 07"W

- Location was at the observer's residence at Ambrose Todd House, 1820 Claflin Road

April 1925 – September 1929 – Elevation 1,073 feet - 39° 11' 43"N, 96° 35' 03"W

- Location was at the Agronomy Farm, two blocks northeast of previous location

Official station name changed to **Manhattan No. 2** effective October 1929.

October 1929 – March 1939 – Elevation 1,115 feet - 39° 11' 23"N, 96° 35' 13"W

April 1939 – May 1944 – Elevation 1,083 feet - 39° 10' 48"N, 96° 35' 11"W

- Residence at 1928 Humboldt Street.

-

May 1944 – April 1970 – Elevation 1,040 feet, 39° 11' 36"N, 96° 34' 46"W

- northeast part of campus, one block north and half block east of Willard Hall (today that would place this site just east of the junction of Petticoat Lane and Campus Creek)

Official station name changed to **Manhattan** effective April 1970.

April 1970 – March 1980 – Elevation 1,065 feet - 39° 11' 38"N, 96° 34' 58"W

- Location listed as northern part of campus, one block north of Claflin Road, 150 feet west of Dykstra Veterinary Hospital.

March 1980 – December 2004 – Elevation 1,063 feet - 39° 11' 50"N, 96° 34' 53"W

- Instruments located north of Call Hall and southeast of Veterinary Medicine Complex which includes Coles, Moiser, and Trotter Halls.

Manhattan No. 1

July 1883 – April 1915 – Elevation 1,020 feet, 39° 10' 58"N, 96° 34' 00"W

- Residence at 313 North Juliette Avenue.

April 1915 – August 1921 – Elevation 1,017 feet, 39° 11' 16"N, 96° 33' 43"W

- Residence at 423 Vattier Street until March 1921, then 510 Leavenworth Street.

Agronomy Farm

October 1937 – March 1970 – Elevation 1,000 feet, 39° 12' 17"N, 96° 35' 41"W

Note: Elevation was 1,000 feet from June 1964 until October 1967, then 1,005 feet until March 1970.

- Instruments located on the north side of Kimball Avenue, two tenths of a mile east of College Avenue.

OBSERVERS AND INSTRUMENTATION

Manhattan and Manhattan No. 2:

1855 – 1863:

The exact location of the instruments on the campus of Bluemont Central College, name changed to Kansas State Agricultural College in 1863, is not known. The location is simply listed as “on campus” but always with the remark that the site(s) were well exposed.

Isaac T. Goodnow, a Smithsonian Institution volunteer observer, was the founder of Bluemont Central College in Manhattan, Kansas. He began entering weather observations in his diary as early as 1855. These data from 1856 until December 1858 were transcribed to Weather Bureau 1009 forms by the Kansas State Climatologist Office for ease of use. He began using Smithsonian forms to record his observations in 1861. The exact location and types of instruments used by Professor Goodnow are not known but one might suspect that he obtained standard Smithsonian instruments upon becoming affiliated with them in 1860 or 1861. He was recording temperatures three times a day, rain and snow reports, and he included reports on clouds, winds, and causal phenomena. Professor Goodnow concluded his observations in June 1863.

1859 – 1860:

Reverend N. O. Preston, a professor at Bluemont Central College, also was recording the weather. He seemed to be filling in for Mr. Goodnow during the late 1850's and early 1860's.

1863 – 1865:

Henry L. Denison, another Smithsonian observer, recorded observations from July 1863 until 19 September 1865.

1866 – 1873:

Professor Benjamin Franklin Mudge, a Professor of Natural History and Natural Science at Kansas State Agricultural College, was the next Smithsonian observer in Manhattan. He observed from May 1866 until August 1873. See Figure 1 for a view of the campus and the surrounding area which is rather barren of foliage.



Figure 1. Kansas State Agricultural College (earlier Bluemont Central College) circa 1867. View is looking northwest, building is facing College Street. Image courtesy of Mary Knapp, Kansas State Climatologist

1873 – 1878:

The next Smithsonian observer in Manhattan was Professor William. K Kedzie. He was a professor of Chemistry and Physics beginning a long association with the Physics Department. Professor Kedzie became the first U. S. Army Signal Service volunteer observer in Manhattan in 1876. Professor Kedzie observed from September 1873 until August 1878.

1878:

During the period May through August 1878, Reverend Arthur J. Blain recorded observations as a Signal Service volunteer observer.

1878 – 1885:

Professor George Henry Failyer assumed the observing duties in September 1878, continuing this task until October 1885. He was a professor of Chemistry, Physics, Mineralogy, and Geology.

1885 – 1887:

Professor E. B. Cowgill, a Signal Service observer, began observing in October 1885. He was a professor of Mechanics, Physics, and Engineering. He continued his observing until August 1887.

1887 – 1889:

A physics graduate student, F. J. Rogers, was the Signal Service volunteer observer from August 1887 until August 1889. Mr. Rogers later became a Professor of Physics at Stanford University.

1889 – 1897:

Mr. C. M. Breese began observing in August 1889, a duty he continued until August 1897. See Figure 2 for a photograph of the campus circa 1895. Notice that a few trees are now appearing on the campus.

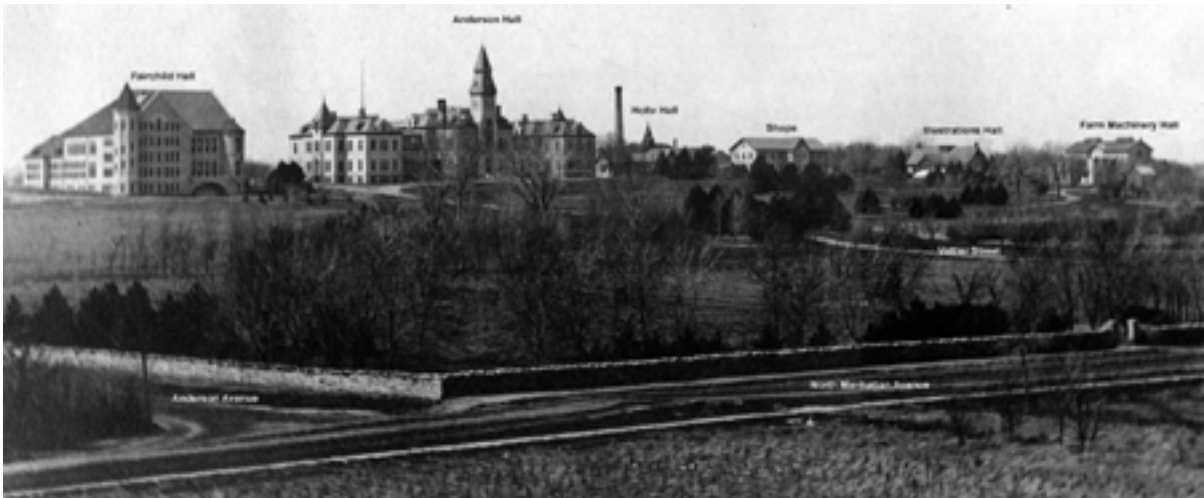


Figure 2. A view of the campus of Kansas State Agricultural College, circa 1895. Image courtesy of Mary Knapp, Kansas State Climatologist.

1897 – 1901:

Professor Ernest R. Nichols, a Signal Service volunteer observer, took observations from September 1897 until September 1901. He was a Professor of Physics, later becoming the President of the College.

Information as to the exact types of instruments used and the precise location of these instruments is not known. The following information was extracted from the observational forms themselves:

Thermometer – On the observational form of August 1876, Professor Kedzie listed his thermometers as “Green, numbers 3353, 3550, and 3942. He also listed a hygrometer, number 161, as on station. The entry on the November 1885 form noted that the thermometers, exposed, maximum, minimum, and wet bulb, were all made by Green. In January 1890, the observer listed his thermometers as being made by J. N. J Green (handwriting difficult to read). He had numbers 8259, 5228, and 8639. The thermometers were four and a half feet above the ground. In January 1892, the observer continued to list his thermometers as “H. J. Green” but the serial numbers were not entered.

Rain gage – In September 1876, the gage was listed as a “Green – with graduated glass.” An 1885 entry on the observational form indicated that the rain gage was one foot above the ground. In 1890, the observer listed the kind of rain-gage and the diameter of the funnel as “Area, 1/5000 of an acre”. The height of the top of the gage above the ground was given as 18 inches. By January 1892 the gage had changed to a “Signal Service” gage located one foot above the ground.

Barometer - Professor Cowgill noted that he had a J. H. J. Green barometer in November 1885. An Aneroid barometer was added in 1889.

1876:

Observations were found as taken by Sergeant Harry F. McFarland, U. S. Army Signal Service. No information as been found on his location or types of instruments in use. His first observational form was from January 1876 and the last July 1876. It is interesting to note that he did not take observations for the first half of July 1876 due to illness. Did this illness contribute to this being his last month to take observations, we may never know.

1901 – 1920:

Professor J. O. Hamilton with the Physics Department was the Weather Bureau volunteer observer from September 1901 until December 1920. His instruments were in the garden in the back of his residence at 331 North 14th Street (originally known as No. 6 Park Road.) This was a half mile south of the main entrance to the college. The instrument site was listed as being on a hill above the level of the surrounding country which was rolling. The ground to the south of the location slopes very gently to the Kansas River which was located over a mile away. The ground to the north slopes upward gently to an elevation of 30 feet in less than a mile.

Professor Hamilton, who was well informed in meteorology, also had instruments several rain gages at the experiment farm. Evaporation measurements were made at the farm location. Professor Hamilton had to relinquish the observing duties in 1920 due to pressures of other duties.

Thermometer – In 1907, the instruments and shelter were listed as “standard.” The shelter was located over sod, 300 feet from the highest object, five feet above the ground, with the door opening to the east. The 1914 inspection report has the shelter located in the back yard garden. The shelter was over bare ground and no objects were listed as being near enough to interfere with sunshine or air circulation. The shelter was four feet above the ground, with the door opening to the north. By the inspection of 1919 the shelter was in bad repair and needed to be replaced. A summary report prepared in 1952 listed the shelter as a Cotton Region Shelter, it is not known where this information might have been found as it was not listed on any inspection reports from this period.

Rain gage – The 1907 station report lists the gage as being a standard tipping bucket. It was five feet above the ground and 300 feet from the highest object. In 1914, the station history entry lists the gage as being “standard.” It was located on the ground 25 feet west of the shelter. There were no high objects near by to interfere with the exposure. The top of the gage was two feet above the ground. In 1919, the gage tube was found to have a leak and it was replaced.

Other instruments – It was reported in a 1952 Weather Bureau summary report that the station, in 1903, also had a quadruple register, barograph, thermograph, sunshine recorder, and a tipping bucket gage.

1920 – 1925:

In December 1920, the observational site was moved to Ambrose Todd House at 1820 Clafin Street, the residence of Edward C. Converse. Professor Converse was an instructor at the College working under the supervision of Professor Hamilton the previous observer. The instruments were located in the rear of the residence which was located three-quarters of a mile northwest of the Administration Building of the College. This placed the site about midway between the College proper and the experiment farm and three-quarters of a mile northwest of the corn and wheat region station in the charge of Dr. J. H. Blachley. The location was considerably higher than the region station.

Thermometer – The shelter was located over sod having the base of the shelter four feet above the ground. The shelter faced south but in May 1921 the shelter was turned so it would face north and new braces were installed to steady the shelter. There were no obstructions noticed in 1921. The shelter, though moved in 1925, was over bare ground, continued to

face north, and was still at four feet above the ground. Exposure was still considered satisfactory. A summary report prepared in 1952 listed the shelter as a Cotton Region Shelter, it is not known where this information might have been found as it was not listed on any inspection reports from this period. By May 1925 the station also had a thermograph, hygograph, and a sling psychrometer all the property of the College.

Rain gage – The rain gage was entirely in the open being located in a truck patch according to the 1921 inspection report. The top of the gage was three feet above the ground. Conditions remained the same upon the move in 1925. Exposure was still considered satisfactory. The serial number of the gage was No. 6236.

Other instruments – The “Class A” evaporation site also had an evaporation pan and an anemometer.

1925-1929:

On 25 April 1925, the instruments were moved about the distance of two city blocks southeast into the enclosure of the “Class A” evaporation station being now located on the Agronomy Farm in April 1925. Professor Edward C. Converse continued to be the observer until his death. Professor Converse died during the winter of 1926-27, his last observations being taken in January 1927. His son, Charles E. Converse, assumed the observational duties at the time of his father’s death. The younger Mr. Converse was a senior student at the College. Instruments remained in the same location at the site of the “Class A” evaporation station. In the November 1928 station inspection the site was found to be grown up with grass and weeds as high as the top of the evaporation pan. The observer was given instructions to keep the weeds and grass from growing more than a few inches tall. Charles Converse continued observing until May 1929.

Mr. V. C. Hubbard and Mr. Austin G. Goth followed Charles Converse as the observers at the evaporation station. The station was finally closed in September 1929 when, as the inspector noted in November 1929 that the “College authorities concluded that a sufficient length of record had been obtained and a continuance of the record was not desired.”

Thermometer – The shelter, moved from the previous location, was over bare ground, continued to face north, and was still at four feet above the ground. Exposure was still considered satisfactory.

Rain gage – The top of the gage was three feet above the ground. Exposure was still considered satisfactory. The serial number of the gage was No. 6236.

Other instruments – The “Class A” evaporation site also had an evaporation pan and an anemometer.

1929 – 1939: (Name changed to Manhattan No. 2)

After the observing program was closed at the evaporation site, the instruments were moved to the rear of the residence of Professor G. E. Raburn on 1 October 1929. Professor Raburn was an instructor in the Physics Department at the College. (The name of the school changed to Kansas State College of Agriculture and Applied Science in 1931.) He lived in the College Heights area of Manhattan. This location was approximately one and a half mile south and one mile west of the evaporation site. The country was rolling and the instruments were on ground slightly above the average elevation in the area.

Thermometer – The shelter was three feet, ten inches above the ground and faced north. It was located over bare ground. The maximum thermometer was found to be defective in the November 1929 inspection and was replaced. See Figure 3 for a photograph of the shelter in 1929. Note the supports where were built by the local observer at a cost savings over the supports furnished by the Weather Bureau Central Office. The October 1937 inspection found the shelter as before. The shelter was noted as being old but still serviceable. See Figure 4. A thermograph, belonging to the College, was also present in November 1929 and was again listed in the 1937 inspection report.

Rain gage – The gage was located so that the top was three feet above the ground. In 1929 the gage was found to be of the standard construction but was owned privately. The gage from the previous site, No. 6236, could not be located as the previous observers had left Manhattan. The present observer was asked to investigate the situation and recover the correct gage if it could be found.

The inspection of October 1937 found that the gage, now listed as an eight-inch gage, was in good condition. The gage was still three feet above the ground. However, an object 50 feet east of the gage and some 20 feet high was noted. A concrete support had been constructed for the gage.

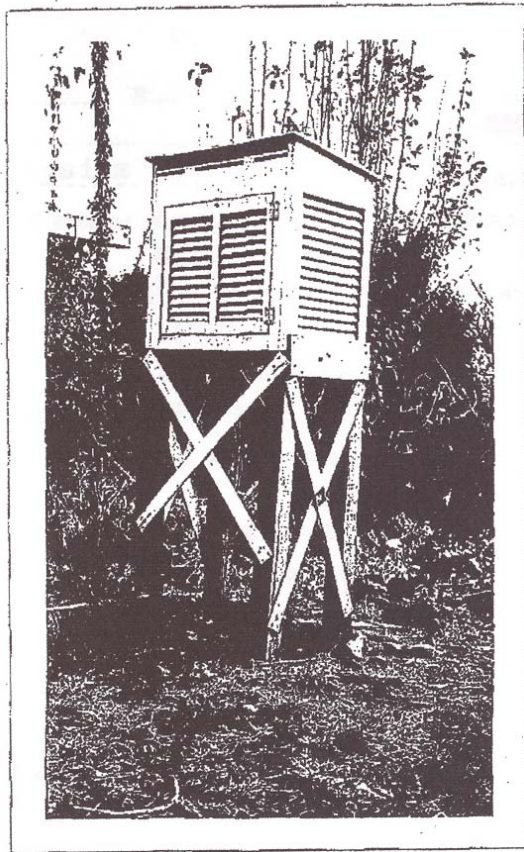


Figure 3. The instrument shelter located in Manhattan, Kansas in November 1929. The camera was pointed towards the southeast. Notice that the shelter door hinges have been moved from the bottom of the door to the side. Source: Official station history files at the National Climatic Data Center.

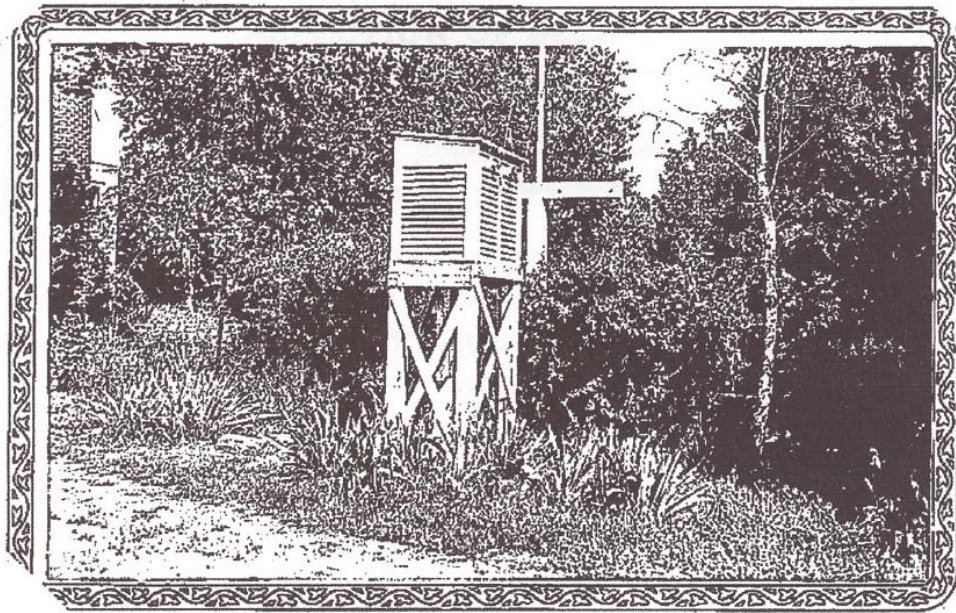


Figure 4. The instrument shelter located in Manhattan, Kansas in September 1937. The camera was pointed to the northeast. Footings were found rotted and it was recommended that they be replaced. Trees to the west of the shelter did not interfere with air circulation.

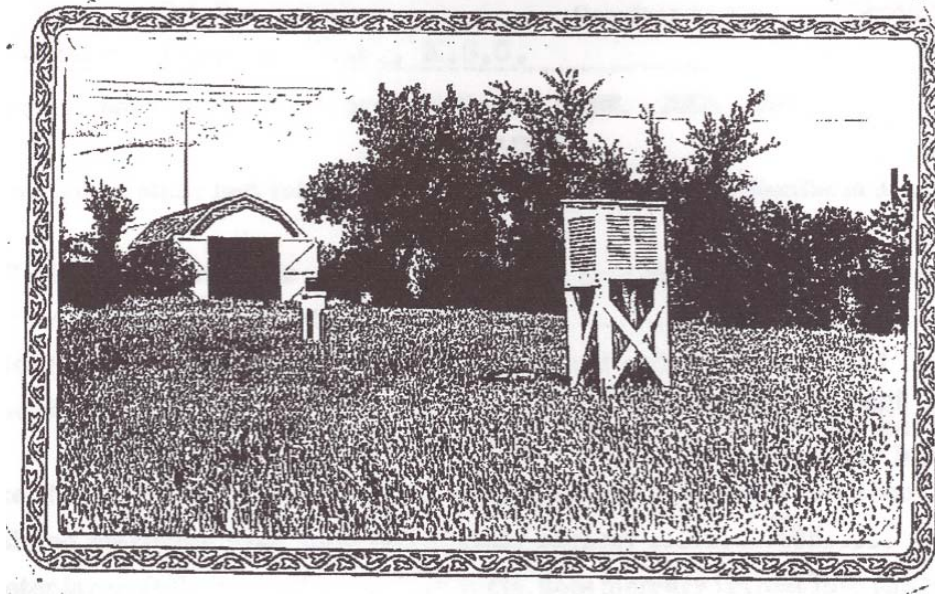
Source: Official station history files at the National Climatic Data Center.

1939 – 1944:

On 1 April 1939, the site was moved to the residence of the new Weather Bureau volunteer observer, Professor A B. Cardwell. This site was at 1928 Humboldt Street on the western edge of the city. The grounds were much above the general level of the city being located near the highest point in the city. Exposure of the instruments was considered entirely satisfactory. Professor Cardwell left Manhattan in May 1944.

Thermometer – The shelter was located in the yard of the observer. It faced north and was three and a half feet above the ground which was sod. In 1941, the shelter was in need of painting and in need of additional bracing. See Figure 5. A thermograph, belonging to the College was also present in August 1941.

Rain gage – The gage was a standard eight-inch gage being three and a half feet above the ground.



**Figure 5. The instrument shelter located in Manhattan, Kansas in August 1941. The home of the observer, adjacent to these grounds, is not shown in the picture. Camera is pointed to towards the Northeast.
Source: Official station history files of the National Climatic Data Center.**

1944 – 1970:

The instruments were located on the campus in the area where Petticoat Lane and Campus Creek Road currently meet or just north of King Hall. Professor Leo E. Hudiburg assumed the observer role on 22 May 1944. He was closely associated with the previous observer, Professor Cardwell, also being located in the Physics Department at the College. Professor Hudiburg continued observing until May 1945, when Professor R. Brackett became the volunteer Weather Bureau observer. His efforts continued through March 1946 when Professor Alvin B. Cardwell began. Professor Cardwell was assisted by R. S. Dildine, James C. Smith, and Wesley Wilson through June 1953. From June 1953 until April 1957 Professor Stuart E. Whitcomb was the observer. All of these men were associated with the Physics Department at the College.

An aerial view of the college campus is presented in Figures 6 and 7. Figure 6 is from 1944 while Figure 7 is from 1965. Notice the growth in the “urbanization” that took place over this 20 year period.

On 8 April 1957, the observing was assumed by the “Physics Department” as opposed to just an individual. The observers over the next 13 years included Jasper E. Pallesen, Frank Lawson, James A. Blodgett, Darrell S. Metcalfe, Warren S. Battle, Professor H. S. Laude, Floyd Wilson, Quinton Kidd, Professor L. Dean Bark, and Mike Caughron. See Figure 8 for a sketch of the observing site.

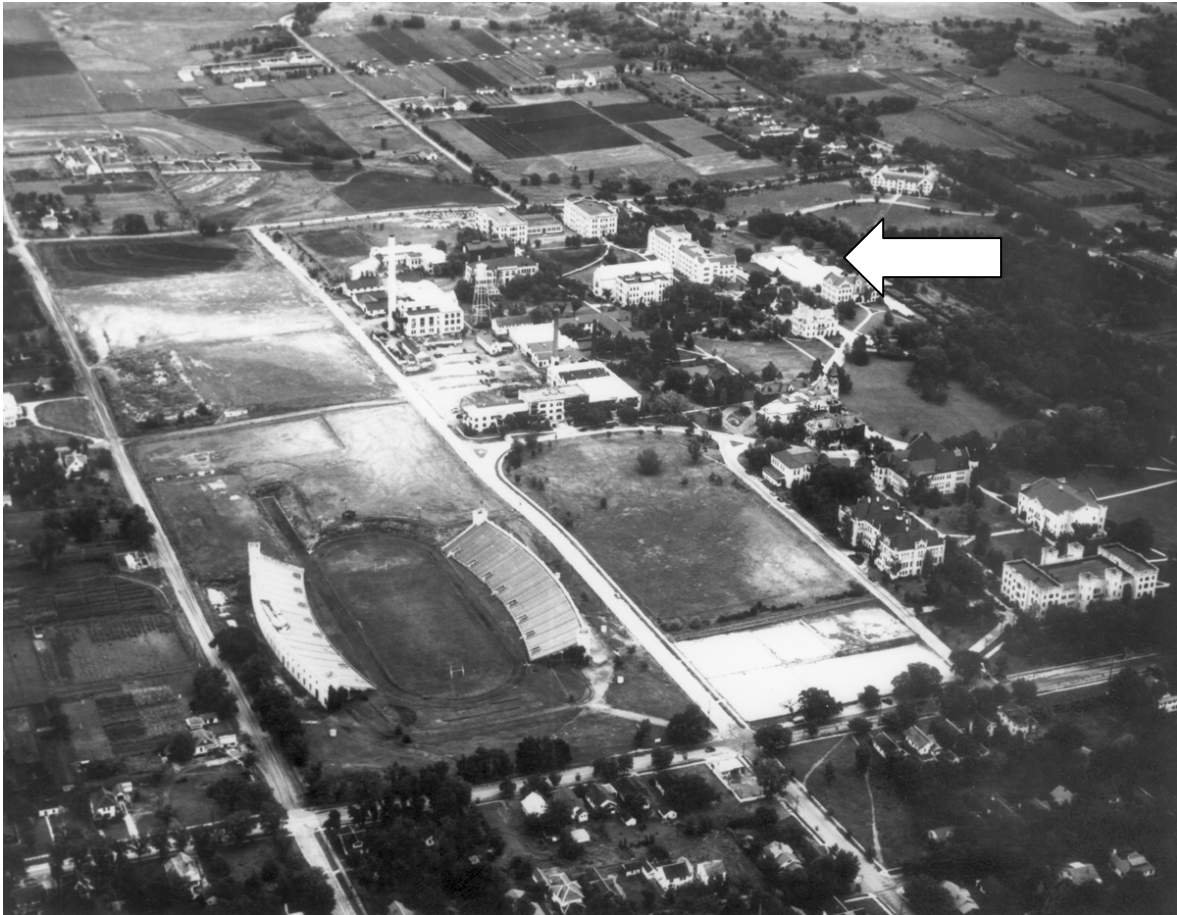


Figure 6. An aerial view of the campus of Kansas State College, Manhattan, Kansas, in 1944. The arrow indicates the approximate location of the weather instruments.

Image courtesy of Mary Knapp, Kansas State Climatologist.



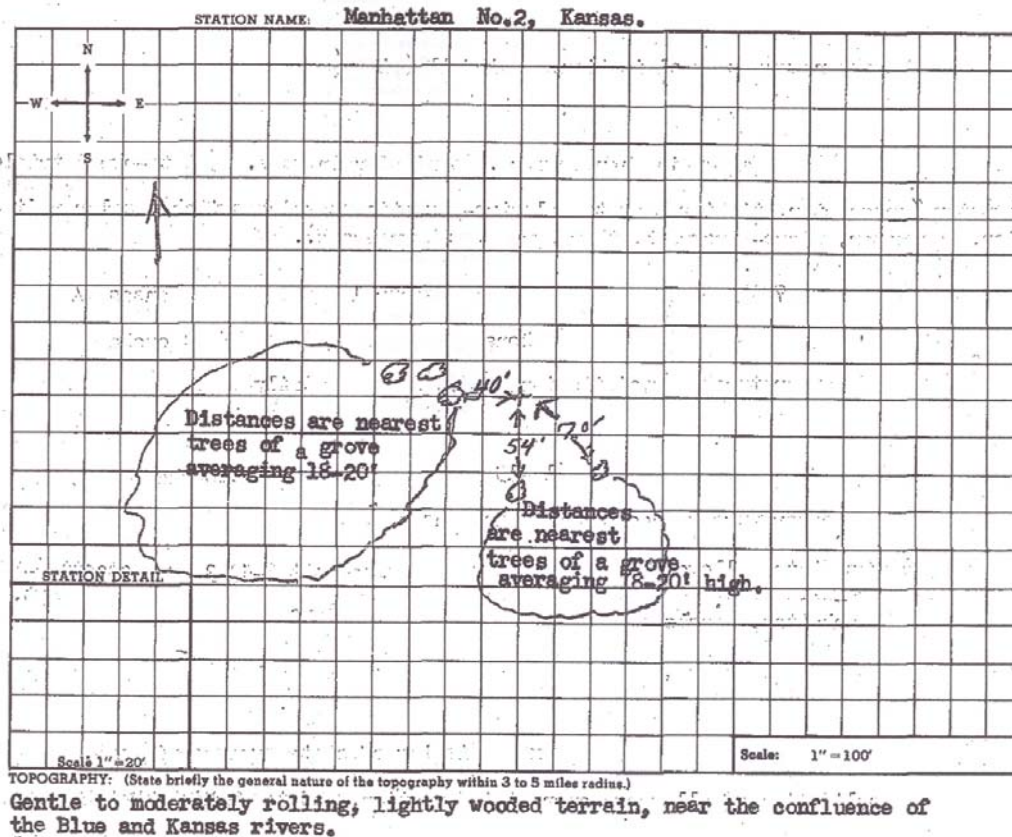
Figure 7. An aerial view of the campus of Kansas State College, Manhattan, Kansas, in 1965. The arrow indicates the approximate location of the weather instruments.

Image courtesy of Mary Knapp, Kansas State Climatologist

Thermometer – The Cotton Region Shelter was four and a half feet above the ground being located over sod. The 1951 inspection reports lists only a maximum and minimum thermometer being present. No information on the shelter was provided. In June 1968, maximum and minimum temperatures were obtained from a thermograph so as to get midnight readings.

Rain gage – The top of the gage was four feet above the ground. The nearest highest object was 150 feet from the gage at a height of 100 feet. In 1951, the gage was listed as being an eight-inch gage.

Other instruments – The station had the following state owned instruments: triple-register (anemometer, tipping bucket gage, electromagnetic sunshine switch), barometer, micro-barograph, thermograph and a hygrograph.



**Figure 8. A sketch of the Manhattan, Kansas observing site in April 1957.
 Source: Official station history files at the National Climatic Data Center.**

1970 – 1980: (Named changed to Manhattan)

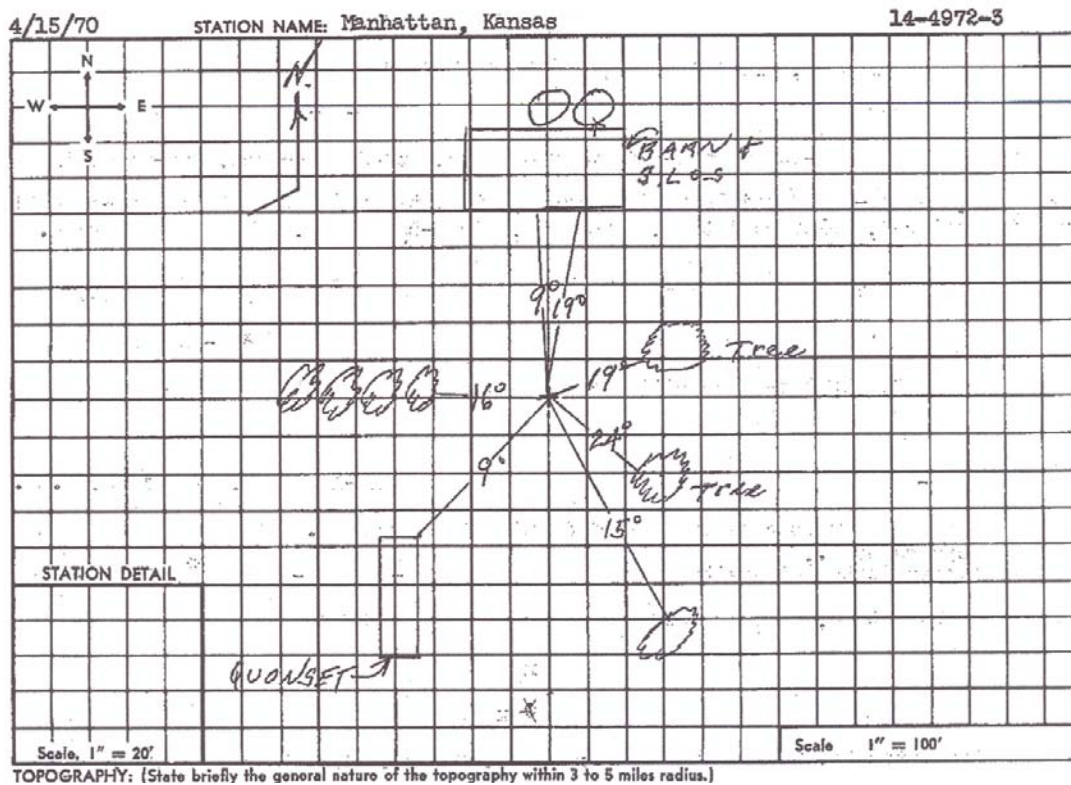
Sometime between 1966 and 1970, the station was relocated to a spot one block north of Claflin Road and 150 feet east of Dykstra Veterinary Hospital (now Dykstra Hall.) See Figure 9 for a sketch of the station as of 15 April 1970. The official name of the observer was simply entered as “Physics Department” allowing for a series of observers. The name changed from Kansas State College to Kansas State University in 1975.

Thermometer – Standard maximum and minimum thermometers were located in a Cotton Region Shelter.

Rain gage – The gage was listed as a standard eight-inch gage.

Other instruments – The station had the following state owned instruments: triple-register (anemometer, tipping bucket gage, electro-

magnetic sunshine switch), barometer, micro-barograph, thermograph and a hygrograph.



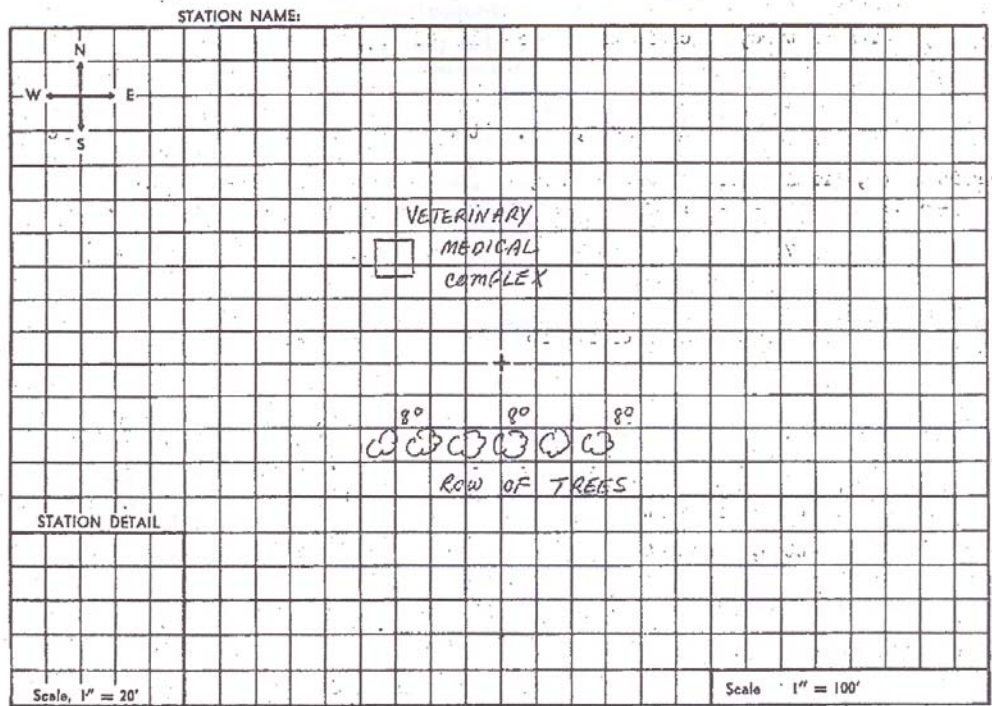
**Figure 9. A sketch of the Manhattan, Kansas observing site on the grounds of Kansas State University as of 15 April 1970.
Source: Official station history files at the National Climatic Data Center.**

1980 – 2004:

The instruments were located north of Call Hall and south of the Veterinary Medical Complex on 6 March 1980, see Figure 10. The Physics Department continued to be listed as the primary observer. On 15 May 1989, the instruments were moved 300 feet east. In 1994 the observing duties were assumed by the “KSU Weather Data Library Staff” allowing for a series of observers. See Figure 11 for a photograph of the observing site as of June 2004.

Thermometer – Standard maximum and minimum thermometers were located in a Cotton Region Shelter.

Rain gage – The gage was listed as a standard eight-inch gage.



TOPOGRAPHY: (State briefly the general nature of the topography within 3 to 5 miles radius.)
 Station site is the Kansas State University (campus southeast portion of Riley

Figure 10. A sketch of the Manhattan, Kansas observing site located on the grounds of Kansas State College as of 6 March 1980.
Source: Official station history files at the National Climatic Data Center.



**Figure 11. The Manhattan, Kansas observing site on the campus of Kansas State University as of June 2004. View looking northwest, the buildings in the background are in the Veterinary Medical Complex.
Source: Photograph by author.**

Manhattan No. 1

1883 – 1915:

In July 1883, C. P. Blachly established an observing program at his residence at 313 North Juliette Street in Manhattan. Originally a Signal Service observer he later became a Weather Bureau cooperative observer. He continued to observe until April 1915. The instruments were located in the back yard of the residence according to the 1914 inspection report. The inspector also noted that this location was about 15 feet lower than the other observer in town, Professor J. O. Hamilton, and was about a mile distance.

Thermometer – Mr. Blachly listed his exposed thermometer as a “poole” as he began observing in 1883. In March 1885, the exposed thermometer was listed as a Green number 8834. In December 1891, he added a

remark beside his “poole” entry as being “tested.” In 1906, the shelter and thermometers were listed as simply “U. S. Weather Bureau.” The shelter was over sod, four feet above the ground, with the door opening to the south. In 1914, a tree 15 feet high was reported to be 15 feet southeast of the shelter and a 50 foot high barn was 50 feet west.

Rain gage – The observer had a “homemade” gage with the top located two feet above the ground as observations were begun in July 1883. Mr. Blachly’s entry on the December 1891 form indicated the gage was now at seven feet above the ground. The height was again listed in December 1892. In 1906, the rain gage was simply listed as “U. S. Weather Bureau.” The top of the gage was four feet above the ground and low trees were located within 30 feet. The 1914 inspection report indicates that the gage was 50 feet southwest of the shelter. A 25 foot high Elm tree was 25 southwest and a 15 foot high building was 25 feet north. The top of the gage was listed as two and a half feet above the ground.

Barometer – A “Wilder” barometer was being used in July 1883 and was in use until at least December 1891.

1915 – 1921:

Dr. J. H. Blachly, the son of the previous observer and a dentist, observed for the Weather Bureau from his residence at 423 Vattier Street until March 1921. This location was eight blocks northeast of the previous location. The instruments were located in the rear of the residence. Dr. Blachly moved to 510 Leavenworth Street on March 15, 1921. This location was six blocks south and one block west of previous location. The station was closed at the end of August 1921.

Thermometer – The shelter and thermometers were simply listed as “standard” in the 1916 inspection. The shelter was located over bare ground, 25 feet north of a one story house. The door opened to the south and the floor of the shelter was three feet above the ground. It was noted that the shelter was not shaded by any object and that it had good air circulation. The shelter at the new location in March 1921 was over sod with the bottom of the shelter at three feet.

Rain gage – In 1914, the “standard” rain gage was located on the ground 15 feet north of the shelter with the top of the gage at three feet. No objects were near enough to interfere with its exposure. The inspection report of 1916 indicated that the gage was now 30 feet south of the shelter and 10 feet east of a row of young fruit trees that “in a year or two will affect its exposure.” Dr. Blachly was made known of this and he promised to either trim the trees or move the gage farther east.

In 1919, the inspector again visited the location to find that the cherry tree had grown sufficiently high to warrant moving the gage about 24 feet west and north. At this location exposure would be satisfactory until the apple tree to the east grows tall enough to interfere. There was no other location suitable on the property and the observer mentioned that he might be moving in the future.

The May 1921 inspection report notes that the gage, still with the top at three feet, was near some small trees that would soon interfere with the exposure.

Other instruments – Dr. Blachly also had a mercurial barometer.

Agronomy Farm

1937 – 1970:

In October 1937, a weather observing station was established at the College Agronomy Farm. This location was eight-tenths of a mile north of the intersection of Claflin and College Streets and one tenth of a mile east. The instruments were moved 200 yard south southwest on 1 June 1964 and moved 150 yards north northeast on 11 October 1967. The station was closed on 1 March 1970. See Figure 12 for a sketch of the instrument locations in April 1957 and see Figure 13 for a sketch prepared in October 1967.

From 1937 until 1957 the observers of record were Darrell S. Metcalf, Warren R. Battle, and Dr. H. H. Laude. Beginning in April 1957 the observer was listed as the “Department of Agronomy.” The Physics Department assumed the observing duties from November 1966 until October 1967 when the Agronomy Department again resumed the effort.

Thermometer – The station was equipped with a maximum and minimum thermometer housed in a Cotton Region Shelter.

Rain gage – The station was equipped with a standard rain gage. A College owned recording six-inch gage was also installed.

Other instruments – The station also had the following instruments, evaporation equipment (discontinued after June 1964), anemometer, soil temperature equipment (installed in September 1956), and a hygrothermograph.

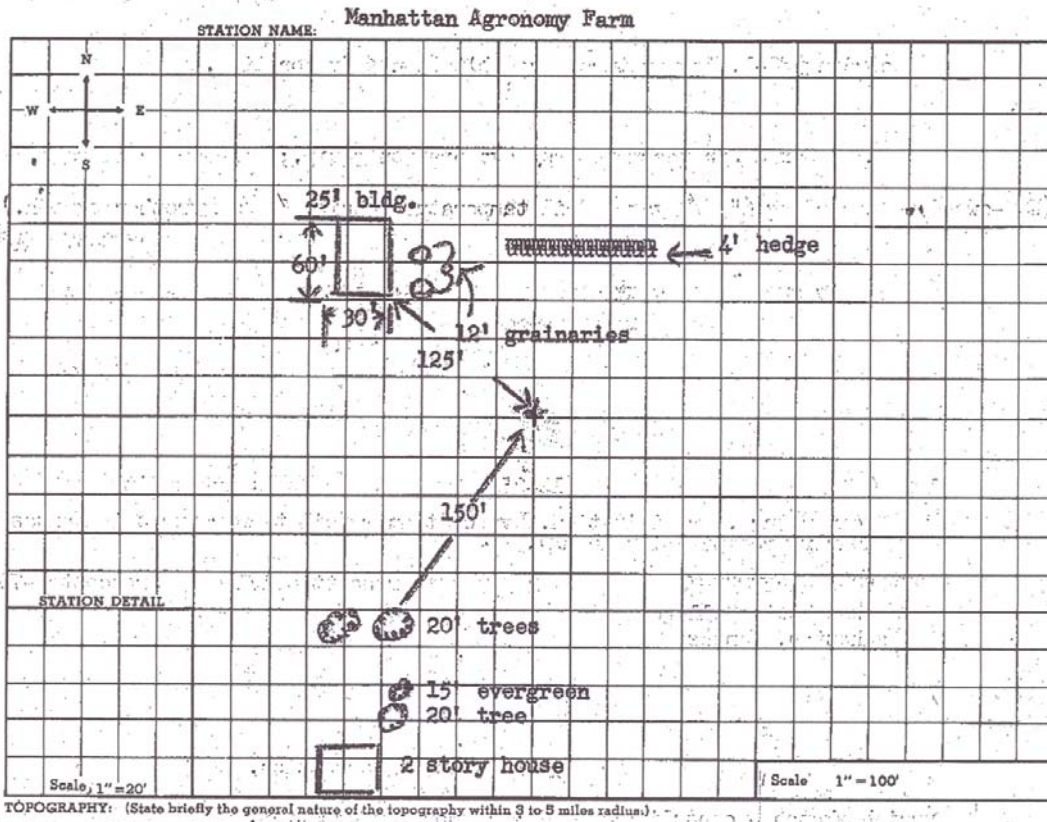


Figure 12 A sketch of the Manhattan, Kansas observing site located at the Kansas State College Agronomy Farm as of April 1957.
Source: Official station history files at the National Climatic Data Center.

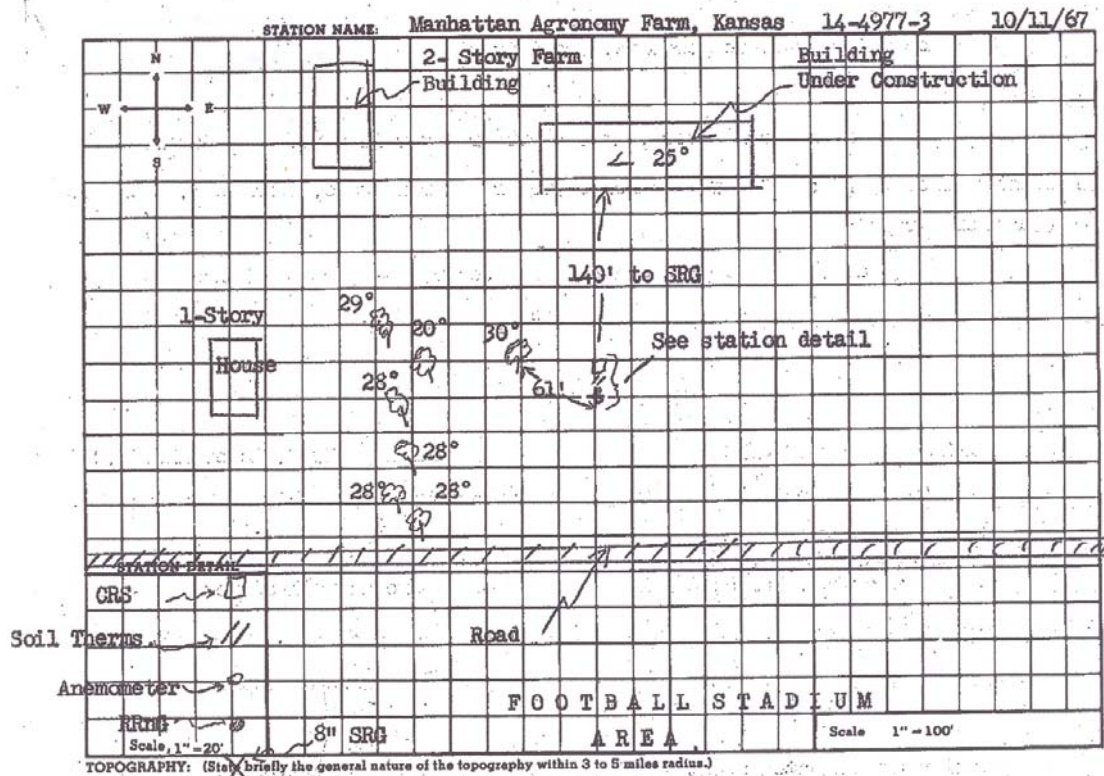


Figure 13. A sketch of the Manhattan, Kansas observing site located at the Kansas State College Agronomy Farm as of October 1967. See lower left hand corner for sketch of the instrument placement.
 Source: Official station history files at the National Climatic Data Center.

APPENDICES

Appendix 1 – Observer Stories

Benjamin Franklin Mudge

August 11, 1817 - November 21, 1879

Benjamin F. Mudge was the weather observer in Manhattan, Kansas, from May 1866 until August 1873. A brief snapshot of his activities follows:

“Benjamin Franklin Mudge was a geologist who, in 1864, was invited to deliver a series of lectures before the legislature. The body passed legislation to organize a state geological survey and decided to make Mudge state geologist, "an honor," he said, was "entirely unsought, yet thoroughly enjoyed." Mudge was elected professor of geology and associated sciences at the Kansas State Agricultural College. He published the first "Geology of Kansas," a 65-page report issued in 1866, and the first geological map of the state in 1875.”

“Born in Maine in 1817, Mudge grew up in Massachusetts, attending academies there and graduating from Wesleyan University in Connecticut in 1840. Mudge studied natural science and history, but also completed the classical course and studied law. He was admitted to the bar and embarked on a political and legal career, but Mudge always maintained his interest in geology and natural history.”

“During the summer of 1861, in order to demonstrate his antislavery convictions, Mudge moved his family to Quindaro, Wyandotte County, Kansas, a bustling river town with a reputation as an important point on the Underground Railroad and as a stronghold of the free-state movement during the preceding years.”

“After leaving the agricultural college in 1873, Mudge collected specimens for Yale University and was named geologist under the State Board of Agriculture. Mudge also was a founding member of the Kansas Natural History Society, which became the Kansas Academy of Science.”

“Mudge, who gathered the nucleus of the college's mineral collection, was later remembered as a one of the foremost pioneer scientists of Kansas. A biographer said he was "Outstanding not only as a great explorer and collector of geological and paleontological specimens," he "also was recognized as an enthusiastic and inspiring teacher and was highly esteemed by the people of the State.””

From www.kshs.org/places/capitol/mudge_benjamin.htm as of May 2005.

Ernest R. Nichols

September 11, 1858 – November 26, 1938

Dr. Ernest R. Nichols was the weather observer in Manhattan, Kansas, from September 1897 until September 1901. It is little wonder that he gave up his observational duties in 1901 as documented in the following short article taken from www.lib.ksu/depts/spec/findaids/us1990-27.html in January 2005.



Figure 14. Ernest R. Nichols, President of Kansas State Agricultural College, 1900-1909.

Image courtesy of Mary Knapp, Kansas State Climatologist

“The Ernest R. Nichols Papers, 1900-1909, cover the years in which Nichols was president of the Kansas State Agricultural College. He had come to K.S.A.C. in 1890 as an instructor in the Department of Physics. When Thomas E. Will was removed from the presidency in 1899, Nichols was appointed acting president until 1900, when he was officially given the position. He was considered a strong administrator and was able to control the financial business of the college, which had been left to the individual departments before. Because of the financial losses and debts accumulated by the college, it became unfeasible for the practice to continue. Because of the firm grip on spending, and the increasingly authoritarian style of Nichols administration, some members of the faculty began to complain about their loss of effective control in college matter. The resentment increased through the years, and played a part in the resignation Nichols. He resigned in 1908, effective July 1909, due to controversies and personality conflicts between himself and the faculty and Board of Regents.”

An honorary degree of Ph. D. was conferred upon Nichols upon his leaving in 1909 and the naming of Nichols Gymnasium was announced. In 1910, he managed the Thurston Teachers Agency and participated in business ventures in Chicago, Illinois. He suffered a paralyzing stroke in 1929 and died in November 1938.

Appendix 2 - Methodology

The primary sources of information for this study were the Manhattan observers' daily weather records themselves. Copies of their monthly reports were available from the National Climatic Data Center's on-line system called WSSRD. These monthly reports were considered the primary sources because they were written by the original observers and not altered by subsequent readers. Station history files at the Data Center also provide details as to station and instrument history. A variety of secondary sources held information about the city and its weather observers including the history files at the Kansas State Climatologist office.

All these sources were gleaned to obtain a glimpse of the lives of the observers, the location of the observation site, and the historical environment that produced the climatic history of Manhattan, Kansas. Maps, drawings, and photographs were included when appropriate to illustrate the information.

The street maps were generated using Microsoft's Streets and Trips software. Elevations, latitude, and longitude were determined from the United States Geological Survey maps available on Topozone.com.

REFERENCES AND DATA SOURCES

Observational forms as found in the National Climatic Data Center archives

Station history forms as found in the National Climatic Data Center files

History files at the Kansas State Climatologist office, Kansas State University

Web sites for Kansas State University Library and the Kansas Historical Society