

**HISTORY OF WEATHER OBSERVATIONS
Florence, South Carolina
1882-2005**

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NOAA's National Climatic Data Center, Asheville, North Carolina**

CONTENTS

	Page
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	2
Observers and Instrumentation	4
Appendices	
Appendix 1, Observer Stories	
Herbert K. Gilbert	19
Appendix 2, Methodology	20
References and Data Sources	20

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LIST OF ILLUSTRATIONS

Maps	Page
1. The location of weather observing sites in the Florence, South Carolina, vicinity, 1882-2005.	2
Figures	
1. Layout of downtown Florence, South Carolina, circa 1893.	4
2. Layout of downtown Florence, South Carolina, circa 1918.	7
3. Southwest view of Civil Aviation Administration Building, Florence, South Carolina, airport, 25 November 1941.	9
4. Northwest view of Civil Aviation Administration Building, Florence, South Carolina, airport, 25 November 1941.	10
5. Instrument location at Florence Army Air Base, Florence, South Carolina, 9 April 1943.	11
6. The location of weather instruments at the Florence, South Carolina, airport as of 8 June 1947.	12
7. Diagram of the Weather Bureau office and instruments at the Florence Airport, Florence, South Carolina, 16 March 1950.	13
8. Diagram of the Weather Bureau office and instruments at the Florence Airport, Florence, South Carolina, 26 October 1953.	14
9. Diagram of the instruments at the Florence Airport, Florence, South Carolina, 19 January 1983.	15
10. Diagram of the Florence Municipal Airport, Florence South Carolina, circa 1995, indicating the location of the ASOS instruments.	17
11. Aerial photograph of the Florence, South Carolina, airport, circa 2000.	18
12. The Automated Surface Observing System at Florence, South Carolina Regional Airport, circa 2000.	18
13. Herbert K. Gilbert, Florence, South Carolina, circa 1930's.	19

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**Stephen R. Doty
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INTRODUCTION

Executive Summary

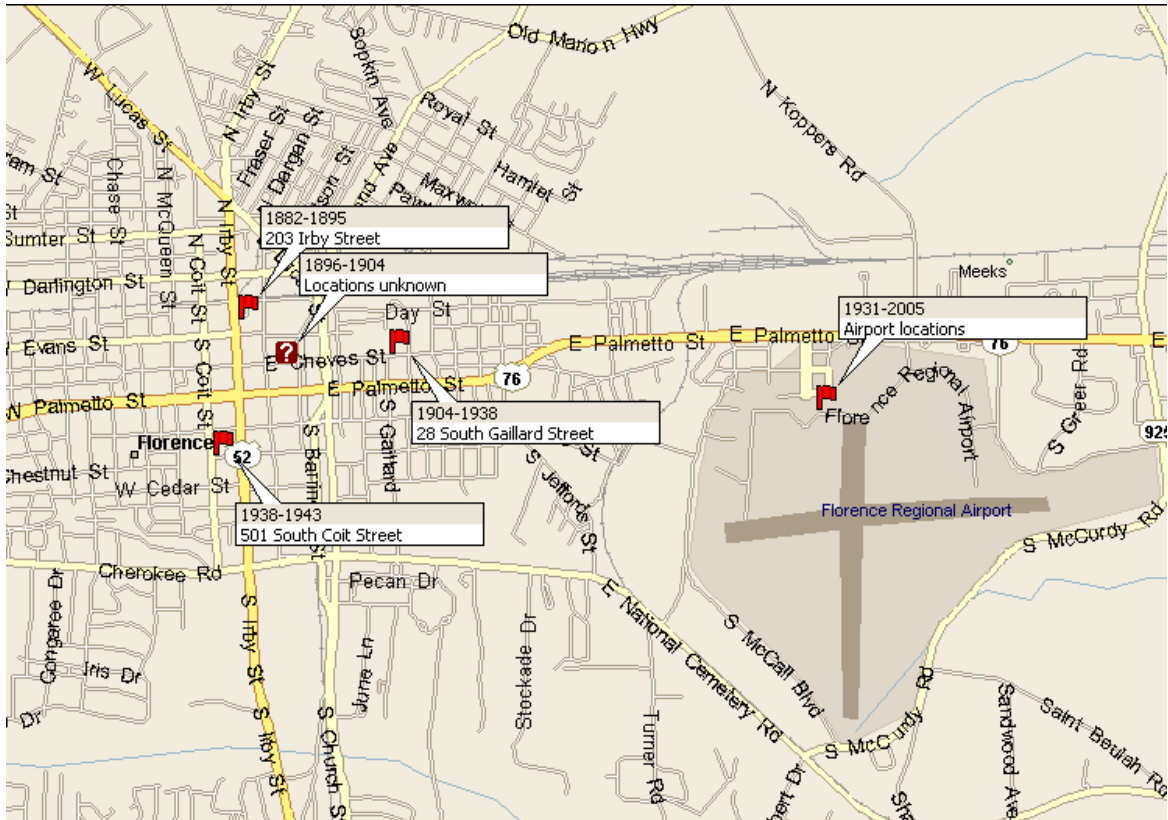
Weather observations in downtown Florence, South Carolina, were begun in 1882 by volunteer observer Paris H. Walsh. During 1896 Herbert K. Gilbert recorded the observations followed by J. A. Avant in late 1896 and continuing into 1897. Mr. Gilbert began observing again in late 1897 continuing until 1903. For the next year Howell DeBarry was the volunteer observer in Florence. In 1904 Herbert Gilbert became the observer for the third time, a service he would provide until 1943. In total Mr. Gilbert recorded observations for over 46 years. In April 1931 the Federal government began taking observations at the Florence Airport. This observational program continues to this date.

Goal of Study

The goal of this study is to document the primary weather observational path at Florence, South Carolina. 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 location of weather observing sites in the Florence, South Carolina, vicinity, 1882-2005.

Chronology of locations and elevations

The following lists the chronology of weather station locations at Florence, South Carolina, during the period 1882-2005: (The latitude and longitude entries, when listed to seconds, were derived using U. S. Geological Survey maps as presented on Topozone.com.)

The following lists the chronology of weather station locations in Florence, South Carolina, from 1882 until 2005:

April 1882 – December 1895 – Elevation 136 feet – 34° 11' 54"N 79° 46' 05"W

- Paris H. Walsh, 203 Irby Street

February 1896 – August 1896 – Elevation 136 feet – 34° 12'N 79° 46'W

- Herbert K. Gilbert

September 1896 – August 1897 – Elevation 133 feet – 34° 12'N 79° 46'W

- John Arthur Avant

September 1897 – May 1903 – Elevation 136 feet – 34° 12'N 79° 46'W

- Herbert K. Gilbert

June 1903 – February 1904 – Elevation 136 feet – 34° 12'N 79° 46'W

- Howell DeBarry

March 1904 – June 1938 – Elevation 136 feet – 34° 11' 39"N 79° 45' 28"W

- Herbert K. Gilbert, 28 South Gaillard Street (1914 & 1923)

June 1938 – December 1943 – Elevation 136 feet - 34° 11' 26"N 79° 46' 12"W

- Herbert K. Gilbert, 501 South Coit Street

April 1931 – 1942 – Elevation 146 feet - 34° 12'N 79° 44'W

- Civil Aviation Administration (CAA) Building, Florence Airport

1942 – June 1947 - Elevation 146 feet - 34° 12'N 79° 44'W

- Main Hanger, Florence Army Air Base

June 1947 – March 1962 – Elevation 146 feet - 34° 12'N 79° 44'W

- CAA-Weather Bureau Building, Florence Municipal Airport

March 1962 – February 1989 – Elevation 146 feet - 34° 12'N 79° 44'W

- Flight Service Station Building, Florence Municipal Airport

February 1989 – February 1999 – Elevation 146 feet - 34° 12'N 79° 44'W

- Air Traffic Control Tower, Florence Municipal Airport

February 1999 – December 2005 – Elevation 146 feet - 34° 11' 14"N 79° 43' 51"W

- Florence Regional Airport, ASOS instruments

OBSERVERS AND INSTRUMENTATION

City Locations:

1882-1895:

Beginning in April 1882 Paris H. Walsh began observing the weather in Florence, a service he provided until December 1895. He was a Cotton Region program and U. S. Army Signal Service volunteer observer. He lived at 203 Irby Street. See Figure 1. Mr. Walsh was employed by the Atlantic Coast Line Railroad as a time keeper and later a bookkeeper.

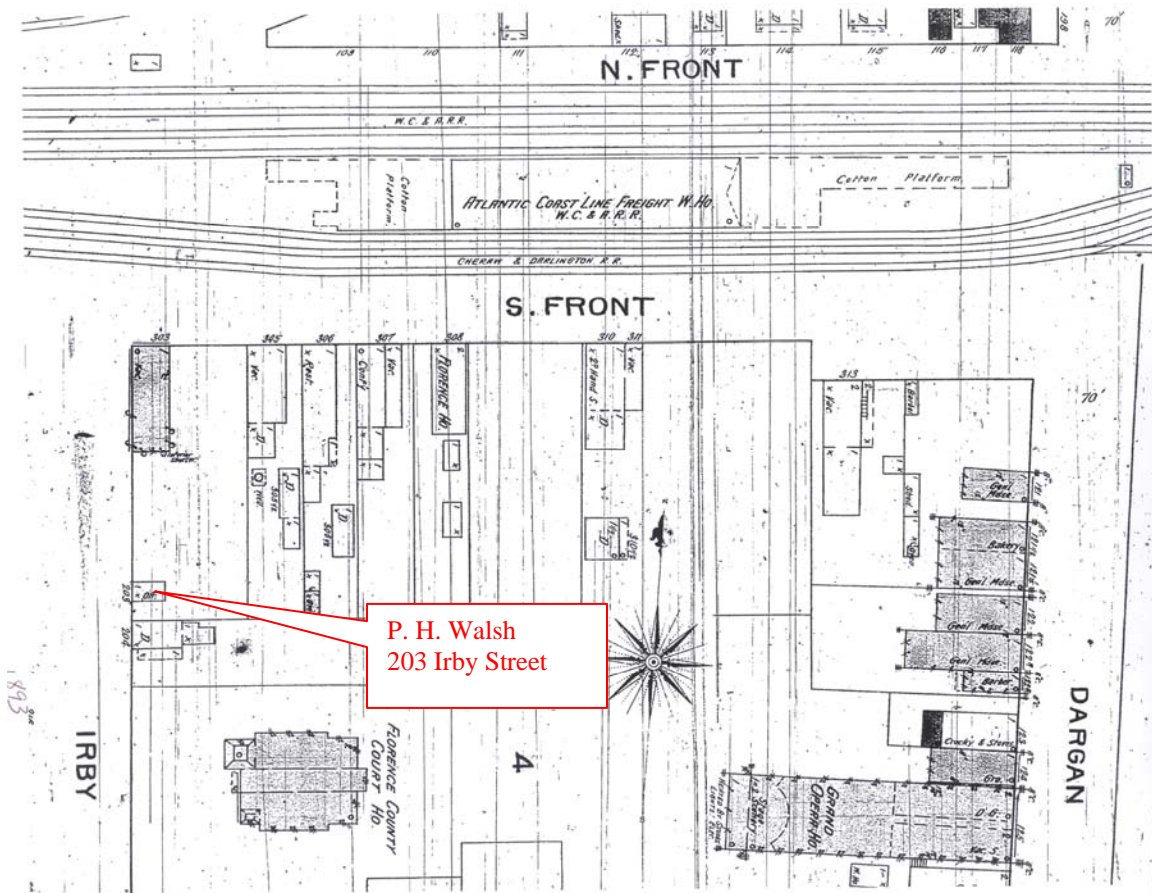


Figure 1. Layout of downtown Florence, South Carolina, circa 1893. North is to the top.

Source: Florence County Library.

Thermometer – Maximum and minimum thermometers were housed in a Cotton Region Shelter. Observations were taken at 5:00pm daily.

Rain gage – A standard eight-inch rain gage was in use. Rainfall was recorded at 5:00pm daily

1896-1896:

From February 1896 until August 1896, Herbert K. Gilbert was recording observations. The exact location is unknown.

Thermometer – Maximum and minimum thermometers were housed in a Cotton Region Shelter.

Rain gage – A standard eight-inch rain gage was in use.

1896-1897:

John Arthur Avant recorded observations for the Cotton Region program from September 1896 until August 1897. His exact location is unknown. Mr. Avant was a stenographer and typewriter.

Thermometer – Maximum and minimum Weather Bureau thermometers were located on the north side of a brick building about four and a half feet above the ground. In June 1897 the shelter was described as a “slotted box about 3 ft square on north side of building.” Observations were taken at 7:40am.

Rain gage – A standard eight-inch rain gage was in use located about 6 feet from building. Observations were taken at 7:40am.

1897-1903:

In September 1897 Herbert K. Gilbert again began observing the weather under the auspices of the Cotton Region program. The exact location of these observations is unknown.

Thermometer – Maximum and minimum thermometers were housed in a Cotton Region Shelter.

Rain gage – A standard eight-inch rain gage was in use.

1903-1904:

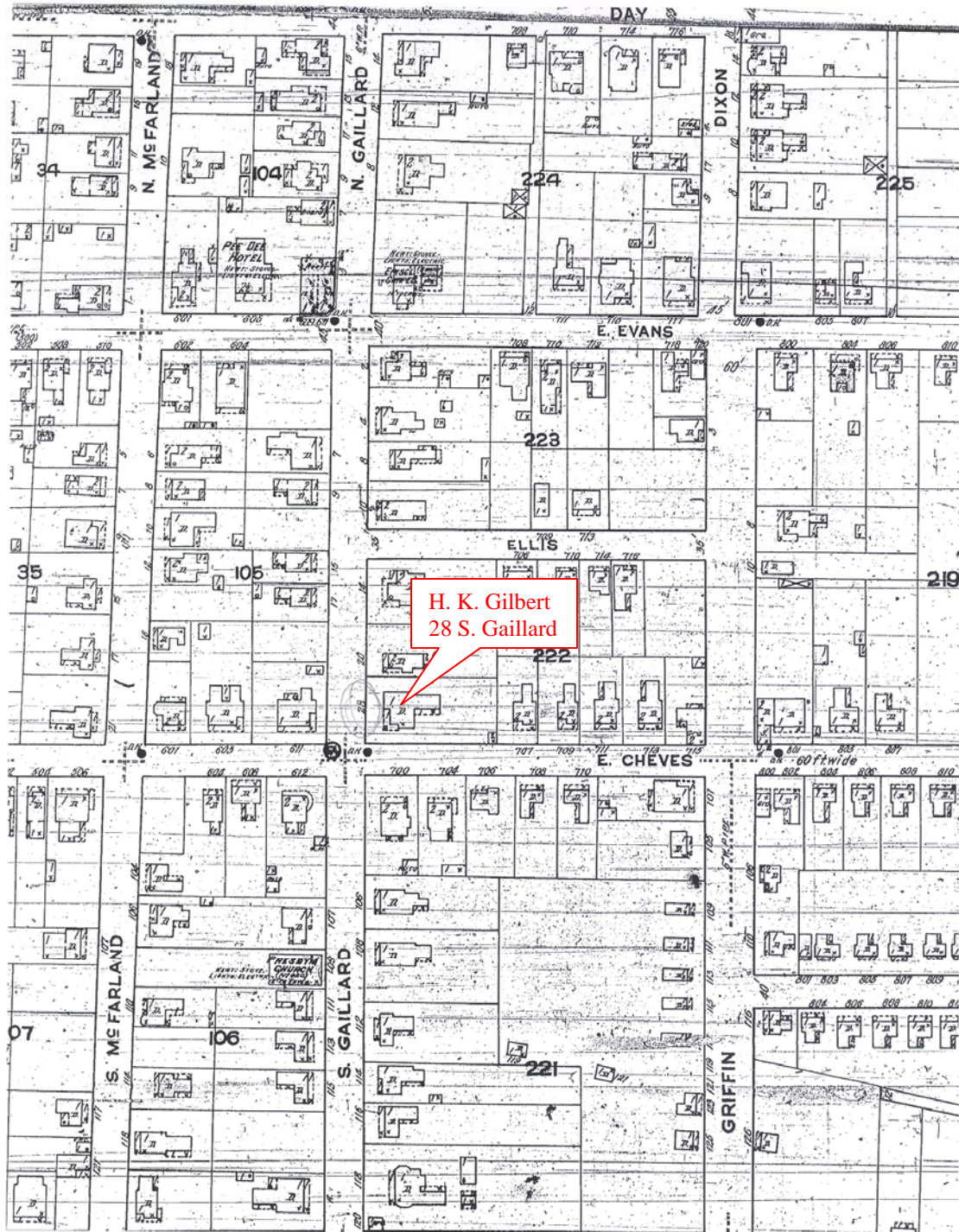
Howell DeBarry served as a Weather Bureau volunteer observer from June 1903 until February 1904. The exact location is unknown.

Thermometer – Maximum and minimum thermometers were housed in a Cotton Region Shelter.

Rain gage – A standard eight-inch rain gage was in use.

1904-1938:

Beginning in March 1904 Herbert K. Gilbert became a Weather Bureau volunteer observer. He lived at 28 South Gaillard Street. See Figure 2. This was a move of approximately one-half mile northeast of previous location. Mr. Gilbert continued observing at this location until June 1938.



1918

Figure 2. Layout of downtown Florence, South Carolina, circa 1918. North is to the top.

Source: Florence County Library.

Thermometer – Maximum and minimum thermometers were housed in a Cotton Region Shelter. The shelter was over cultivated ground 20 feet

east of building. Door opened to the south and the floor of the shelter was five feet above the ground. Observations were taken at 7:30am.

The station inspection of 17 February 1923 found the shelter over plowed ground in the garden at one half foot above the ground, in need of painting, and not well braced. "The observer was directed to erect instrument shelter in conformity with existing instructions and according to specifications drawn up by the inspector. The door of the shelter was to open toward the north." The maximum thermometer was broken on about 10 February 1923 when the shelter was being moved. A new thermometer was supplied on 17 February 1923.

By 5 March 1923 the shelter had been repaired being over cultivated ground, 30 feet northeast of a two-story building. The door opened to the north and the floor of the shelter was at four feet above the ground. Observations were now taken at 7:30am and 6:00pm.

On 10 May 1934 the shelter was found located within three feet of a small garage and somewhat sheltered by trees. The bottom of the shelter was three and a half feet above the ground which was listed as "bare ground, very little grass." The townsend support would not hold the maximum thermometer in proper position and a new support was required. It was recommended that the shelter be relocated. In April 1936 the shelter was listed as in need of painting. It now faced northwest and the bottom of the shelter was four feet above the ground.

Rain gage – A standard eight-inch rain gage was in use being located on the ground with the top 30 inches from the ground. Observations were taken at 7:30am. On 17 February 1923 the gage was noted to be three and a half feet above the ground with satisfactory exposure. On 5 March 1923 the gage was located 50 feet northeast of a two-story building. The top of the gage was at three and a half feet above the ground.

On 10 May 1934 the gage was found to be two feet above the ground with an unsatisfactory exposure. The gage had no box support and it sat in the lawn too near the house, garage, and small trees. It was recommended that the gage be moved. In April 1936 the gage was located three and two-tenths feet above the ground in a satisfactory exposure location. The gage was reset using a new rain gage box support.

1938-1943:

In June 1938 (this might have been as early as 1934?) Mr. Gilbert moved to 501 South Coit Street continuing his service as a Weather Bureau volunteer observer. He

observed through December 1943 when ill health forced him to resign. In all Mr. Gilbert observed for over 46 years.

Thermometer – Maximum and minimum thermometers were housed in a Cotton Region Shelter. The shelter faced northwest and the bottom was four feet above the mostly bare ground. The shelter was located 5 feet west of garage in back garden and was 40 feet southwest of the rain gage. In June 1938 the shelter was in need of painting.

Rain gage – A standard eight-inch rain gage was located 25 feet south of a one-story dwelling and 50 feet northeast of a pecan tree that was 50 feet high. The gage top was three and two-tenths feet above the ground.

Florence Airport

1931-1942:

On 1 April 1931 the Civil Aviation Administration (CAA) established a weather observing program at the Florence Airport. The observations were taken from the CAA Building. See Figure 3. This location was approximately three miles east of the downtown observing sites. Observations continued at this location until 1942.



Figure 3. Southwest view of Civil Aviation Administration Building, Florence, South Carolina, airport, 25 November 1941.

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



Figure 4. Northwest view of Civil Aviation Administration Building, Florence, South Carolina, airport, 25 November 1941. Wind instruments were mounted on tower.

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

Thermometer – The maximum and minimum thermometers were located in a Cotton Region Shelter north of the building. The shelter opened to the north and was approximately five feet above bare ground. See Figure 3.

Barometer – No information has been found.

Rain gage – The standard eight-inch rain gage was located in wooden box just north of the building. See Figure 3.

Wind equipment – The wind instruments were located on a beacon tower. See Figure 4.

1942-1947:

In 1942 the observational program was moved to the Main Hangar on what was now known as Florence Army Air Base. This was a move of 2,200 feet northwest from previous location. The Weather Bureau offices were located on the second floor in the southwest corner of the hangar building. Observations continued from this location until 5 June 1947.

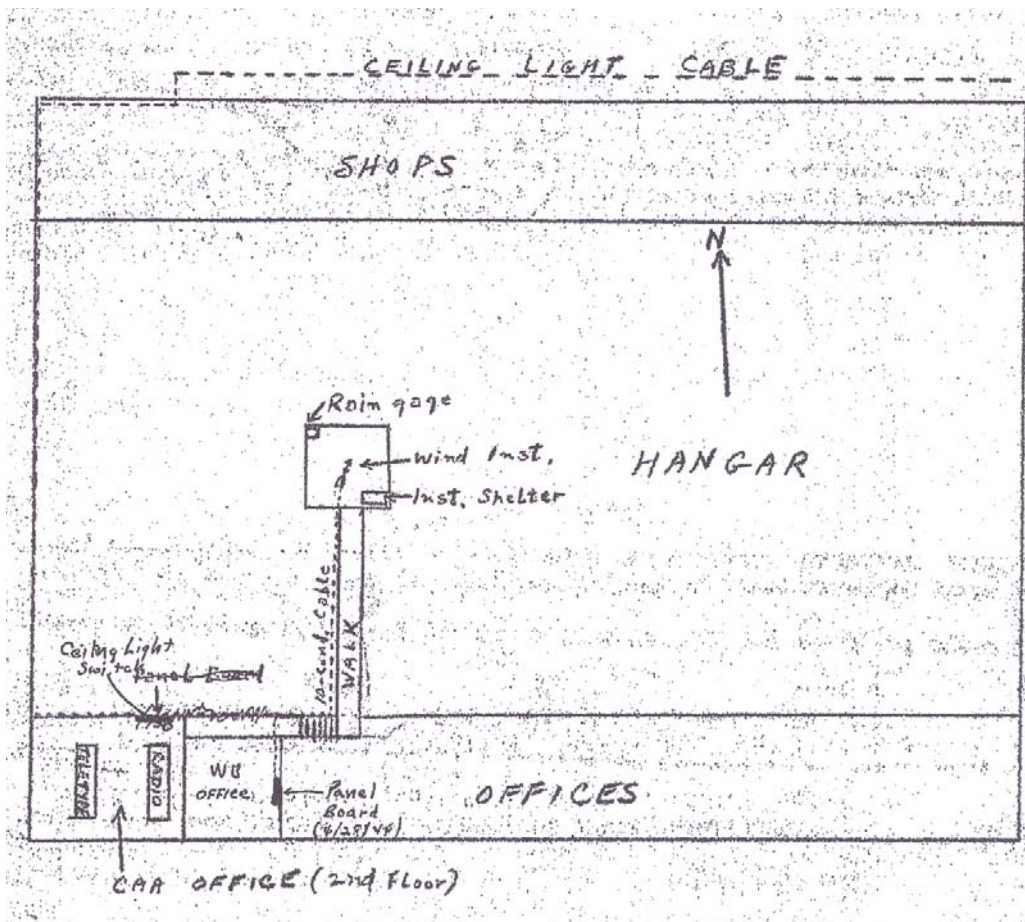


Figure 5. Instrument location at Florence Army Air Base, Florence, South Carolina, 9 April 1943.

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

Thermometer – The Cotton Region shelter was mounted on the roof 54 feet above the ground and four feet above the roof. The shelter was mounted over a wood platform as no ground exposure was possible. The shelter faced north and no chimneys or other influences except radiation from the roof were noted. See Figure 5.

Barometer - The mercurial barometer, serial number 1013, was at 161.28 feet above mean sea level. It was a Fortin type made by H. J. Green.

Rain gage – The standard eight-inch rain gage was mounted on the roof platform with a wood box support. See Figure 5.

Wind equipment – The wind instruments were located on a standard ten-foot high support mounted on a platform on the peak of the hangar roof. The three-cup anemometer was 60.5 feet above the ground and 10.5 feet above the roof. The vane was a standard three-foot metal vane. By 15 April 1945 the height had been changed to 68 feet above the ground and 16 feet above the roof. See Figure 5.

1947-1962:

The Weather Bureau moved to new quarters in the CAA-WB building at Florence Army Air Base on 5 June 1947. See Figure 6. This was a move of 1,000 feet east from previous location. In the mid-1950's the airport name was changed to Gilbert Field. This location was used until 7 March 1962.



Figure 6. The location of weather instruments at the Florence, South Carolina, airport as of 8 June 1947.

Source: Official station history files, National Climatic Data Center.

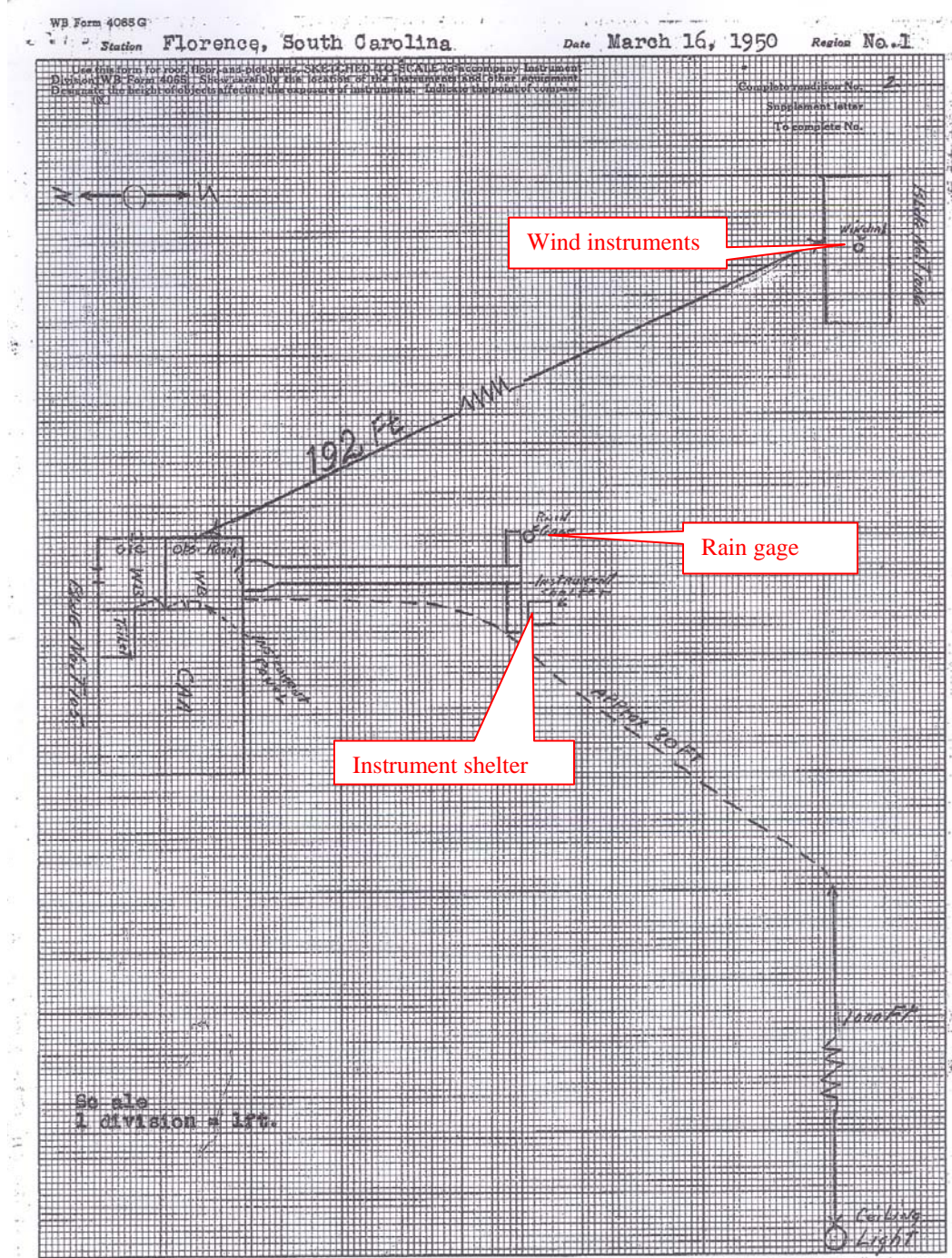


Figure 7. Diagram of the Weather Bureau office and instruments at the Florence Airport, Florence, South Carolina, 16 March 1950. Note that north is to the left of the diagram.

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

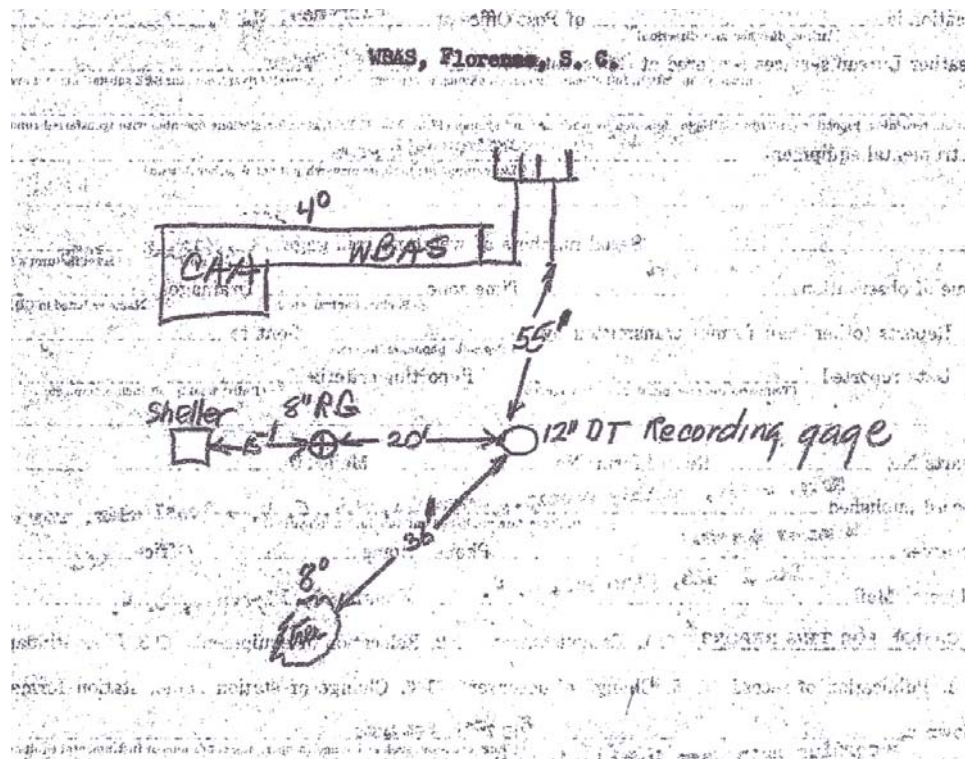


Figure 8. Diagram of the Weather Bureau office and instruments at the Florence Airport, Florence, South Carolina, 26 October 1953. North is to the top of the diagram.

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

Thermometer – The maximum and minimum thermometers were housed in a Cotton Region Shelter at a height of five feet above the ground. Exposure was over sod, approximately 40 feet south of office and 50 feet east of asphalt roadway. The surrounding terrain was sod covered with the exception of a concrete foundation, approximately 20x60 feet located about 20 feet south of the shelter. Overall exposure was rated as excellent. See Figures 7 and 8.

Barometer – The mercurial barometer, serial number 1013, was 148.49 feet above mean sea level. On 25 February 1961 the inspector found the barometer to be too inaccurate, varying from the inspection barometer by approximately 0.020 inches. A new barometer was ordered but was not installed at this location.

Rain gage - The standard eight-inch rain gage was located so that the top was three and eight-tenths feet above the ground. It was housed in a wooden support. Exposure was rated as excellent. See Figures 7 and 8. A weighing rain gage (Friez 12 inch dual traverse) was installed 30 feet

east of the instrument shelter on 28 October 1953 at a height of four feet above the ground. See Figure 8.

Wind equipment – The wind equipment were located on the roof of the transformer house at a height of 13.6 feet above the roof and 23 feet above the ground. The transformer house building was 160 feet southeast of the Weather Bureau office. See Figure 8. An inspection of 25 February 1961 found that the wind orientation was incorrect. The inspector noted “When the wind was coming from apprx 59-60 degrees True, an indication of apprx 44-45 degrees True was being recorded. Adjusted this date.”

1962-1989:

The Weather Bureau office moved once again on 7 March 1962 to the Terminal Annex at Gilbert Drive and Avenue D. This was a move of 500 feet southeast from previous location. The Federal Aviation Administration-Flight Service Station (FAA-FSS) assumed the observation program on 1 April 1965.

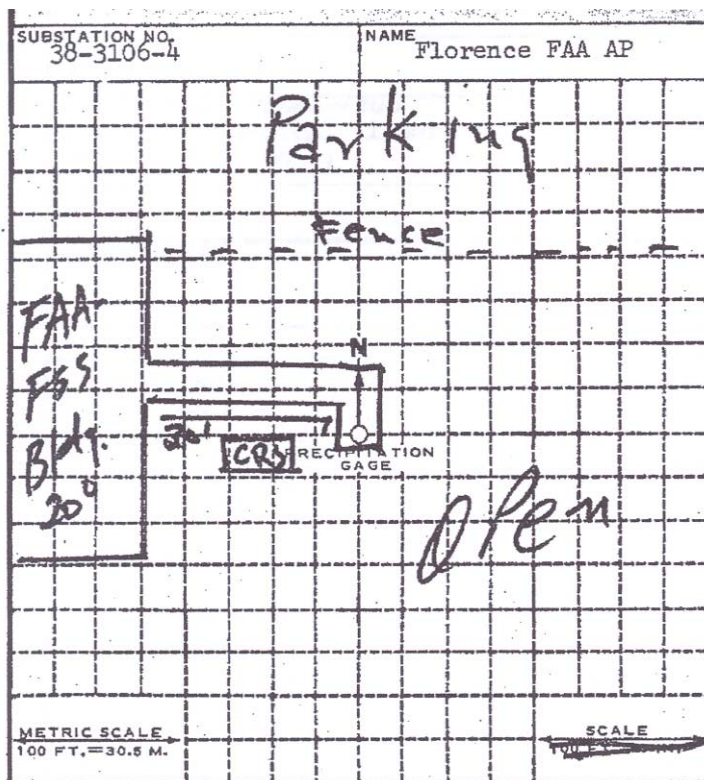


Figure 9. Diagram of the instruments at the Florence Airport, Florence, South Carolina, 19 January 1983. North is to the top of the diagram. Source: Official station history files at the National Climatic Data Center.

Thermometer – The maximum and minimum thermometers were housed in a Cotton Region Shelter located five feet above the ground. See Figure 9. The shelter was 24 feet east of the building. The maximum and minimum thermometers were placed in a standby status on 28 February 1965 and were removed on 1 August 1969. A Cotton Region Shelter and maximum and minimum thermometers were reinstalled as backup on 19 January 1983.

An HO-62 hygrothermometer was installed on 28 February 1965 at a height of four feet above the ground. The hygrothermometer was located 1,700 south of the building. The instrument was changed to an HO-83 on 14 June 1985.

Barometer – The mercurial barometer, serial number 865, was located 149.55 feet above mean sea level. By 1986 the barometer had been removed.

Rain gage – The standard eight-inch gage was located so that the top was three feet above the ground. The gage was 30 feet east of the building. A weighing rain gage, removed 27 February 1965, was four feet above the ground. See Figure 9.

Wind equipment – The wind instrument, an F420C system, was located at a height of 21 feet above the ground being located 1,700 feet south of the building.

1989-1999:

Federal Aviation Administration (FAA) Air Traffic Control Tower personnel assumed the observing duties on 22 February 1989 when the FAA-FSS was closed. See Figure 10. The name of the airport changed to the Florence Regional Airport in January 1993.

Thermometer – An HO-83 hygrothermometer was being used. A Cotton Region Shelter and maximum and minimum thermometers were being used as backup.

Rain gage – A standard eight-inch gage was being used.

1999-2005:

On 24 February 1999 the Automated Surface Observing System (ASOS) instruments were commissioned. The ASOS wind mast height was 33 feet and 5 inches above the ground. See Figures 10, 11, and 12.

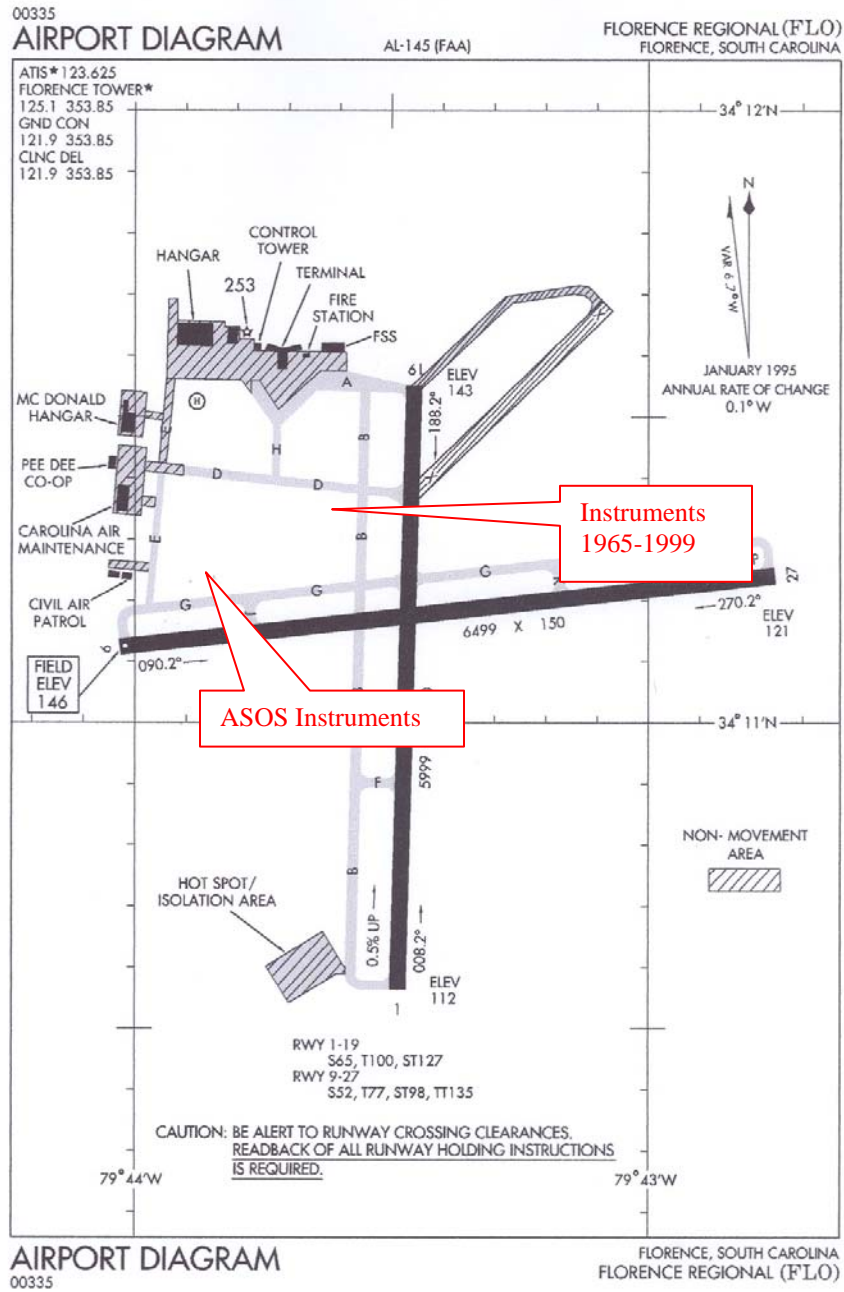


Figure 10. Diagram of the Florence Municipal Airport, Florence South Carolina, circa 1995, indicating the location of the ASOS instruments.



Figure 11. Aerial photograph of the Florence, South Carolina, airport, circa 2000.
Source: www.scaeronautics.com/aerial.asp?faaid=FLO.



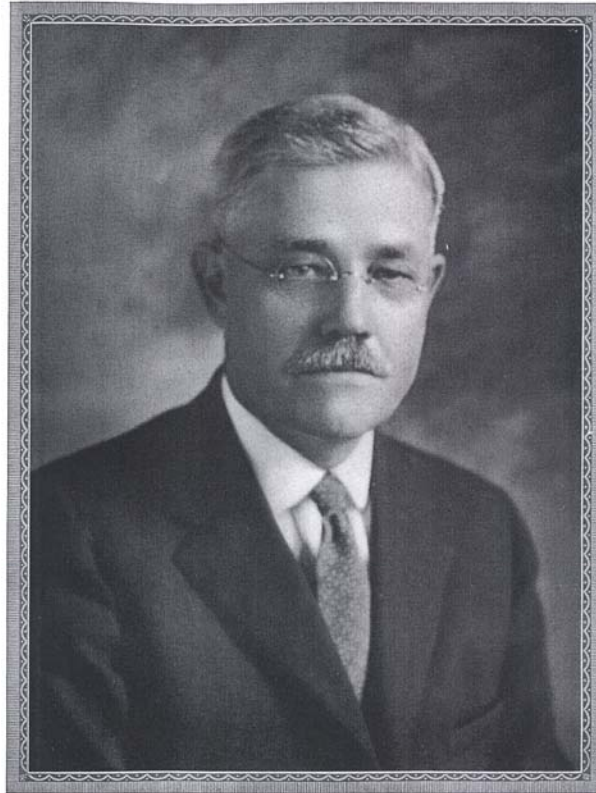
Figure 12. The Automated Surface Observing System at Florence, South Carolina Regional Airport, circa 2000. View is looking north.
Source: National Climatic Data Center web site.

APPENDICES

Appendix 1 – Observer Stories

Herbert K. Gilbert

David Wallace's *History of South Carolina* (1934) details the life of Mr. Gilbert. He was born in Charleston, South Carolina, on 21 March 1873. He received his early education in the city. He became associated with the Atlantic Coast Line railroad serving a clerk in the store department and later became the district storekeeper. A staunch Democrat he was elected mayor of Florence in 1907. He served as mayor for seven terms well into the 1930's. "Mr. Gilbert has ever given his best energies and his fullest measure of enthusiasm, with the result that he is esteemed and respected as are few men and is in a position to render valuable service to all whose privilege it is to know him."



H. K. Gilbert

**Figure 13. Herbert K. Gilbert, Florence, South Carolina, circa 1930's.
Source: Florence County Library.**

The book *Rise Up So Early; A History of Florence County South Carolina* written by Wayne King and published in 1981, details the early history of the airport. Mr. Gilbert played a major role in establishing this facility which later was named after him.

“One of the most spectacular events of the decade was the solo flight of Charles A. Lindbergh across the Atlantic Ocean in 1927. The feat stimulated tremendous interest in commercial air travel. This interest was manifested in Florence by the construction of an airport. The principal supporter of this project was the Florence mayor, H. K. Gilbert. At a city council meeting in March, 1928, the mayor “brought up the matter of the city purchasing a site for an airport.” Maintaining that the “time was right now” for the measure, the mayor, with the councils’ full approval, appointed a feasibility committee. The next month, under the mayor’s leadership, the city council authorized him to purchase from the Lucas and Brunson Realty Company “143 acres of land, more or less,” for fifty dollars per acre. Construction began in the next year. In September, 1929, the city council contracted with J. E. Lund for \$1,000 to level the airport site, clear trees for the runway, and improve the road leading to it from the highway. Realizing that the county would also benefit from the airport, the city council resolved to request funds from the county government to help “in defraying expenses.” Years later the airport was renamed Gilbert Field to honor the role played by Mayor H. K. Gilbert in its establishment.”

Appendix 2 - Methodology

The primary sources of information for this study were the Florence observers’ daily weather records themselves. Copies of these reports were available from the National Climatic Data Center’s on-line system called WSSRD. These reports were considered the primary sources because they were written by the original observers and not altered by subsequent readers.

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 Florence, South Carolina. 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 archives

Florence County Library, South Carolina Room, Ms. Margaret Collar

The History of South Carolina, David. D. Wallace, 1934

Rise Up So Early; A History of Florence County South Carolina, Wayne King, 1981