Introduction to the Project of Publishing the Daily Weather Observations for Richmond Back to 1879

The Wakefield Division of the National Weather Service inherited a logbook with only mean temperatures without any daily temperatures or any average maximum or minimum temperatures from 1880 to 1910. The source of some of this information was published in the October 1904 “Climate and Crop: Virginia Section” Volume XIV Richmond Virginia number 10, page 3 and the February 1905 “Climate and Crop: Virginia Section” Volume XV Richmond Virginia number 2, page 3. Both of these were published by Edward A. Evans (b. December 4, 1857 d. March 28, 1930). Evans was the Virginia section director for United States Weather Bureau. Below is a link to these documents.

https://glenallenweather.com/upload/richmondclimate/richwebsite/oldrec/virginiaclimatedataoct1904feb1905.pdf

Note the asterisks placed in front of the means from February 1893 October 1897 in the above link. During this time temperatures, taken at Bon Air which is about 7 miles west of Richmond, were problematic. Thus, Evans interpolated the temperatures between February, 1893 and October, 1897. However, later, Evans added a footnote in the Wakefield logbook on page 11 not to use the interpolated values. So the interpolated values are not used in the table at the end of this introduction to the Richmond observations.

No one knew if there were daily weather observations to support monthly mean temperatures. It was troubling to find the Wakefield Division of the National Weather Service was using this data without knowledge of its source and history and no observations to support the mean temperatures. The source of the daily observations was found to be the *Richmond Times* newspaper. It was also discovered that these observations could be obtained from the Library of Congress Archives of the *Richmond Times*. See the link below.

https://chroniclingamerica.loc.gov/lccn/sn84024738/1880-09-01/ed-1/seq-1/

This is the first time that the daily weather records from the *Richmond Times* now called the *Richmond Times* Dispatch have been entered into spreadsheets, checked, published and made available on the Internet.

The lack of adding machines and calculators in the late 1880s and 1890s is thought to have resulted in a number of mathematical mistakes in the early weather records published by the paper. William S. Burroughs the inventor of the adding machine had sold only 284 machines in 1895 and 972 machines were sold in 1900. It is doubtful that the newspaper staff had an adding machine before 1895.

This project consisted of copying the 17 years of daily high and low temperatures into an Excel spreadsheet and checking the mean temperatures for accuracy. The only temperatures used were from the *Richmond Times* newspaper records. Most of the monthly newspaper reports are very legible and are included for documentation. A few changes were made, for example, where high and low temperatures were reversed. A copy of the spreadsheet work and a copy of the newspaper’s weather data are included for documentation. The data accuracy has been much improved by this work by correcting 74 months with math errors of 0.5°F or more. Many probably don’t realize a 1°F math error

on the mean temperature in a 30 day month would be equal to a 12 days with observations that were off by 5°F. There are 60 months with more than 1°F error in the math.

Of the approximate 465 weather files from the newspaper there are less than 20 that show some problem and only one month, February 1896, is missing. Below is an example of some of the files that were a problem.

A copy of the monthly means showing the difference in what Wakefield is using which hasn't been corrected for the math errors.

https://glenallenweather.com/upload/richmondclimate/richwebsite/oldrec/meantemps1.htm

Notes about the *Richmond Times* weather data.

1881 Jan 01- The minimum temperature has no negative sign (- 6°F) but the annual summary has the lowest temperature for 1881 as being - 6°F on January 1, 1881. (Corrected mean was 33.31°F)
1881 May 16- Maximum and minimum temperatures are the same 67°F on a clear day (Error ?).
May 13th has a Minimum of 83°F also an (Error)- The highest minimum on record is 81°F in July 12, 2011. The next warmest May night was only 74°F on May 31, 1991 (75°F used closer to the truth- Mean of 68.42°F Used)
1882 Dec. 06- Maximum and minimum are the same 45 °F on a cloudy day.
1883 Nov. 23- Max. and min. are the same 68 °F on a cloudy day with showers. (Mean used 51.17°F)
1883 Dec. 09- Maximum and minimum are reversed and a heavy frost was reported with a 49°F for a low temperature so the temperature must have been closer to 30°F. (Mean used 41.34°F)
1895 October 06 Maximum and minimum temperatures are the same 57°F on a partly cloudy day
1885 December is not a clear copy but still readable.
1886 December- Tape is over numbers and is very poor and hard to read.
1890 December- Richmond's mean is 42.63 and 1.2°F warmer than Norfolk which would be unusual.
1891 November 30th should be 8°F not 4°F as the proofreaders made a mistake. See November for the note that William Pleasants sent to the proofreader of the *Richmond Times*. (Mean used 49.05°F)
1898 September- First 10 days maximum temperatures are missing.
1896 February is the only month without weather data.
1896 July- The corrected mean temperature is 78.8°F; the old Wakefield logbook has 72.86°F.
1896 August shows some very very high temperatures from August 5 to August 12.
1897 February has 5 days the unit number of the minimum temperatures cannot be read.
1897 Oct 25 Cannot read the unit digit for the maximum but the Weather Bureau has 57°F.
1898 Dec 12th max. changed to 42°F changes the mean from 40.6 to 40.44°F.
1899 Dec mean 40.16°F based on the original records

Note the large difference in mean temperatures in 1897. This was because before 1897 the newspaper temperatures are being compared against the math corrected newspaper temperatures but in 1897 the newspaper temperatures are compared to John C. Shafer temperatures which were taken about 4-miles NNW of Richmond. This shows the *Richmond Times* temperatures tend to be warmer.

The US Weather Bureau established its first Richmond office in April of 1896 but the first observations weren't taken until October 5, 1897. The NCEI and xmACIS2 has records from January 1, 1897. They chose to use the weather observations taken by John C. Shafer to complete the year of 1897. The Weather Bureau did not use their own readings for October through December of 1897 because they didn't want to mix data sources for the year 1897. The Shafer's observations were taken at Westbrook about 4 miles NW of Richmond. Ginter's estate was later turned into a sanitorium, the Lewis Ginter Westbrook property where John Shafer took his observations. Note the Lewis Ginter Westbrook property had many trees on the property that also added to the difference in the temperatures there.

https://glenallenweather.com/upload/richmondclimate/WestbrookSanitorium.pdf

Comparing the records of Shafer, Chimborazo, Ashland and the three months of 1897 that Weather Bureau had observations, it was found that Ashland had the best comparison. Shafer's temperatures were lower than the Weather Bureau temperatures and the *Richmond Times.*

https://glenallenweather.com/upload/richmondclimate/richwebsite/1897ChimborazoData.pdf

https://glenallenweather.com/upload/richmondclimate/richwebsite/1897AshlandData.pdf

Shafer's records are first listed in the Virginia Climatological Records in April 1895. The original records of Shafer were also found and checked
(See the Link Below)

https://glenallenweather.com/upload/richmondclimate/richwebsite/1897ShaferData.pdf

1888 to **1896**

Data shows very large temperature ranges and are thought to be roof top observations. Who took these observations and where were the observations taken?

The 1870 US Census page 521 lists William Henry Pleasants' residence as Marshall Ward District, Richmond City. His age and occupation are listed as 43 and working as a clerk at the Dispatch Office. So we know he was already working as a clerk for the *Richmond Times* in 1870. The earliest observations were started in 1875 observing sunrise temperatures, and the newspaper started recording the sunrise temperatures starting in 1879 which are comparable to the minimum temperatures. In December of 1879 the high and low as well as the sunrise temperatures were recorded as the Dispatch Newspaper office must have obtained a maximum and minimum thermometer and started publishing the observatioms probably taken on the newspaper building's roof in December 1879.

There are at least 4 reasons it is thought observations were made on the roof of the *Richmond Times* building**:**

1. The *Richmond Times* building was used to take observations later by the Weather Bureau itself from May 31, 1900 to June 30, 1905 during the time the Weather Bureau didn't have its own building.

2. The temperature ranges of Pleasants' data are large as one would expect and has a bias toward warmer temperatures. Also on sunny days and clear nights the temperature ranges are greater than expected.

3. The headings of all the weather data entered in the newspaper said, "The readings of the thermometer were taken in an elevated portion of the city, the position of the instrument being free from any influence of refracted heat."

4. The NCEI, under station locations, estimates a height above the ground of 50 feet for William H. Pleasants' temperature observations and for the "Times Building" they list a height of 115 feet. The 1880 US Census lists William Henry Pleasants as an Insuance Agent with The Guarantee Company of North America. The branch office was located at 1104-1/2 Main Street in Richmond, Virginia that was located near the Richmond Dispatch office. We know he was still at least a volunteer observer in 1890 from the following document. (See link)

https://glenallenweather.com/upload/richmondclimate/richwebsite/oldrec/Mainstreet.JPG

This reference indicates William Henry Pleasants moved to Bon Air during August 1894. See the quote below: **(Ref. Feb. 1895 Virginia NCEI State Report)**

> **"The reports hitherto given for Richmond, by Mr. William Pleasants are made from Bon Air, and have been since Sep. of 1894: In this report, and hereafter they will be credited to Bon Air. Major Lewis Ginter has had instruments provided and has arranged to have records made and reported from his place outside of Richmond. "**

Note: Richmond is not listed in the Feb. issue but Bon Air is and after the above statement Wm H. Pleasants was listed as the Observer at Bon Air where he had moved.

This is important to understand the purple in the table.

The purple is the average sunrise temperature, NOT the mean which was used before acquiring a maximum and minimum thermometer. Feb., May, and Sep. 1880 were omitted in some tables as the values are not s*ensible* values for a mean temperature for the month. The purple values are more comparable to the average minimum.

The table in the link below shows the math corrected mean and the mean being used by the Wakefield Division of the National Weather Service and the difference between them.

https://glenallenweather.com/upload/richmondclimate/richwebsite/oldrec/meantemps1.htm

See the Daily Observations 1880-1898 in the link below

https://glenallenweather.com/upload/richmondclimate/richwebsite/oldrec/00-1880-98.htm

Below is the link to Richmond's weather observations from the NCEI for October 1897 to March 1954. But observations including and after 1930 were taken at the Richmond International Airport.

There is a better precipitation record taken by the railroad. This was mandated by Major Edmond Trewbridge Dana Myers the president of Richmond Fredericksburg and Potomac and the Washington Southern Railroad to keep precipitation records starting in 1871 for Richmond, Virginia. We should also thank Foya Nunn Hibbard, an associate meteorologist, who was responsible for having the Richmond precipitation records from 1872 to 1940 published in the NCEI records. Hibbard was born in Ohio on November 23, 1886 and lived in the Weather Bureau Building from 1934 to 1945 in Chimborazo Park. See the link below to view Richmond's precipitation records.

https://glenallenweather.com/upload/richmondclimate/precip1871-86.htm

Virginia Climatological Records became a part US Climate Review in July 1909- Volume XIX Richmond, VA June 1906 No.6 p 44 has an Index of Earlier Publication articles. See the link below-

https://glenallenweather.com/upload/richmondclimate/richwebsite/oldrec/index1906.pdf

Some early observations were taken from Westbrook Farm which is a part of Joseph Byant Park see the following link-

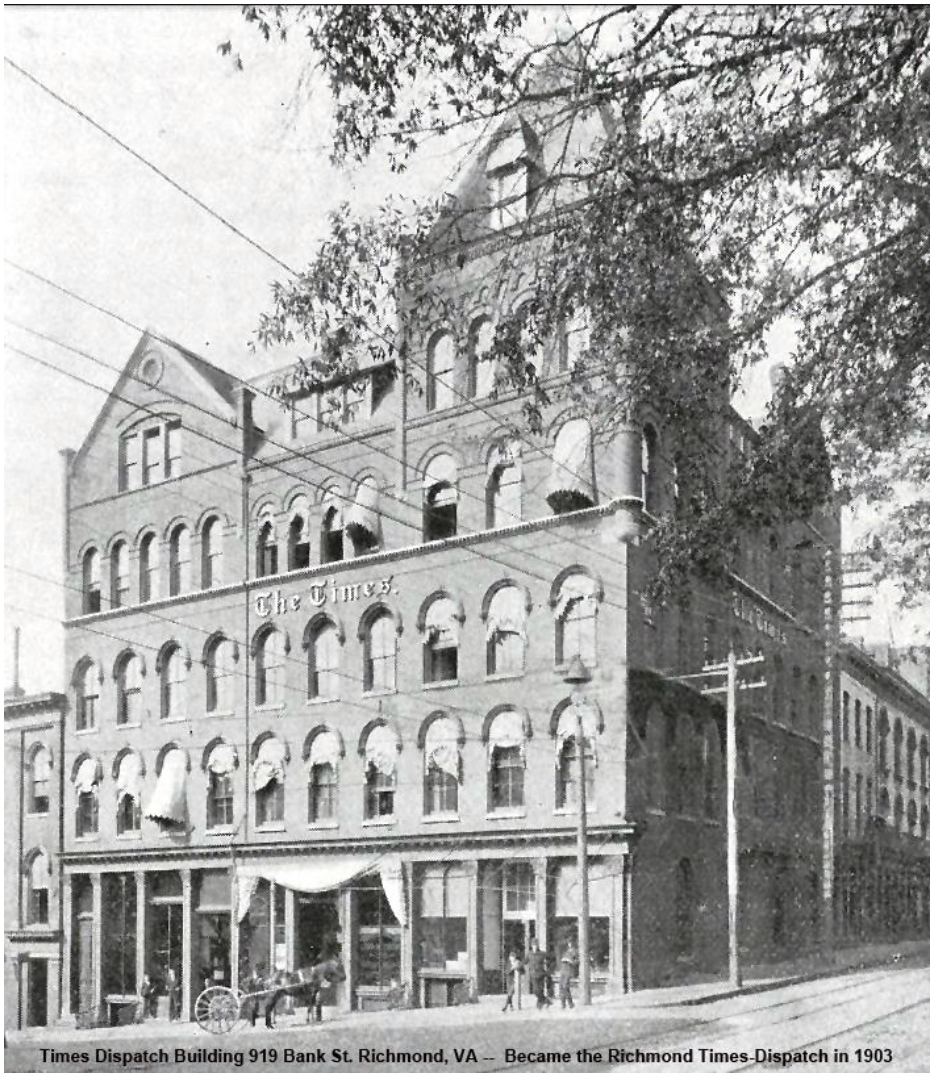
https://glenallenweather.com/upload/richmondclimate/richwebsite/oldrec/WestbrookFarm.pdf

Comparing the records of Shafer, Chimborazo, Ashland and the three months of 1897 that Weather Bureau had observations, it was found that Ashland had the best comparison. Shafer's temperatures were lower. The Weather Bureau temperatures were warmer as they were roof top observations.

October 5, 1897- The office first occupied by the Bureau was located in the **Virginia State Library Building**, room # 28, second floor. While in this location the work was carried on in cooperation with the Virginia State Board of Agriculture. No meteorological observations were taken until April, 1896, when a daily journal was regularly kept under instructions from the Central office. The work pertained exclusively to that comprised in issues of climatological reports and the supervision of cooperative observers and crop correspondents and forecast display stations.

New Chamber of Commerce, Main Street.

On May 21 – 22nd 1897 the office was moved to the **Chamber of Commerce Building,** corner of ninth and Main street, and meteorological observations began at this location on October 5, 1897. The elevation of instruments were: barometer 143.6 ft. above mean sea level; dry thermometer 97.8 ft. above the ground; wet thermometer 97.8 ft. above the ground; rain gauge 89.4 ft. above the ground; anemometer 105.1 ft. above the ground; wind vane 106.7 ft. above the ground. The Chamber of Commerce building was a 6-story building. The height of one story is generally 10 to 14 feet. If the thermometers were at 97.8 feet they must have been placed on the tower where the flag was located or the highest part of the building. After all there must have been steps to the tower to raise and lower the flag. This adds additional proof that observations were made from the top of the Commerce Building. The original Chamber of Commerce Building was demolished in 1912.



Times Dispatch Building 919 Bank St. Richmond, VA -- Became the Richmond Times-Dispatch in 1903

The owners of the Times – -
https://glenallenweather.com/upload/richmondclimate/Richmond Times.JPG

May 29 – 30 – 31, 1900, the office was moved to the 4th floor, **The Times Building** corner of 10th and Bank Street, rooms # 22 – 23 – 24 and 25. Elevations in the new location were: Barometer (above mean sea level) 156.9 ft., instruments (above ground) dry thermometer 82.1 ft.; wet thermometer 82.1 ft.; rain gauge 76.2 ft.; anemometer 90.4 ft.; wind vane 92.4 ft. The Times building was only a 4-story building. The thermometers were moved to 82 feet on June 1, 1900 where the observations were taken which means only the roof around the towers was high enough to be 82 feet above the ground. Even if the floors averaged 14 feet between floors it would give a height of only 64 feet. So, observations must have been made on the north side of the towers. The former elevation before June 1, 1900 was 98 feet on the Chamber of Commerce building. (Ref. Original records Annual Summary for 1900 in the Virginia State Library)

The owners of the Times Newspaper- Lewis Ginter definitely had an interest in weather as he was the one who gave Willian H. Pleasants weather instruments when Pleasants moved from Richmond to Bon Air in August of 1894. (Ref. The February 1895 Virginia NCDC Climate Report-Now the NCEI) Lewis Ginter is also responsible 7

for having Captain John Clement Shafer, the son of his best friend take observations at his second home at the Westbrook Farm located 4 miles NW of Richmond in the current area just east of the Joseph Bryan Park.

Who was Capt. J.C. Shafer –

https://glenallenweather.com/upload/richmondclimate/CaptShafer.pdf

June 29 – 30th, 1905, the office was again moved, the new location being in the Mutual Assurance Society's Building, corner of Ninth and Main St., rooms # 916 – 917 – 918 and 919, ninth floor. The following elevations of instruments resulted: Barometer (above mean sea level) 214.8 ft. instruments, (above ground) dry thermometer 144.9 ft.; wet thermometer 144.9 ft.; rain gauge 138.3 ft.; anemometer 153.1 ft.; wind vane 154.0 ft.

MUTUAL ASSURANCE SOCIETY OF VIRGINIA.
Present Building, 1014 East Main Street.

During the year 1909 – first half, – arrangements were in progress for the erection of a Weather Bureau Building at this station, and said building was finally completed and accepted by the Bureau in January, 1910. On January 29, 1910 the work of moving the office from the Mutual Assurance Society building to the Weather Bureau was begun and the new quarters occupied the following day. Location: Chimborazo Park, Church Hill. Changes in elevation of instruments: Barometer …. thermometer dry 10.8 ft.; wet 10.8 ft.; rain gauge 3.4 ft.; anemometer 52.1 ft.; wind vane 52.7 ft.; all above ground level. The Weather Bureau building cost $15,489 and the land was donated. The first observations were made January 30, 1910 and the last June 30, 1953.

The US Weather Bureau office located at Chimborazo Park. (Credit: Cook Collection, Valentine Richmond History Center)

(Credit: Edith Shelton Collection, Valentine Richmond History Center)

Richmond, Virginia

Circa 1910

2003

Address – 3301 East Broad Street
Built – 1909 (first observation January 30, 1910)
Cost – Land Donated
Cost - Building $15,489
Closed – 1953 (last observation June 30, 1953)
Observers who lived in the building

Edward A. Evans (1910-1930)
William P. Stewart (1931-1933)
Foy N. Hibbard (1934-1945)
Stanley S. Schworm (1946-1953)

Comments

- Mr. Evans died March 28, 1930, from injuries received when struck by an automobile.
- Mr. Stewart retired June 30, 1933.
- Building still stands on the grounds of the Richmond National Battlefield Park where it serves as a visitor center.

Official records for Richmond have been kept by the Weather Bureau from October 5, 1897 to December 1910 at downtown locations.

Official records for Richmond have been kept by the Weather Bureau from January 1911 to December 1929 at Chimborazo Park.

Official records for Richmond kept at Richmond International Airport since January 1930 to present.

A Detailed Chart of the locations where Richmond's climate observations were taken –

http://www.glenallenweather.com/upload/richmondclimate/LocationChanges.pdf

The Chimborazo Park office was closed in 1959, and transferred to the National Park Service as part of the Chimborazo Medical Museum. The building still stands today as the visitor center at Chimborazo. You can still see the US Weather Bureau shield and nameplate across the top of the building, though they have been painted over and replaced with "Richmond National

Battlefield.” ***The US Weather Bureau office today, converted into the Visitor Center for the Richmond National Battlefield Park. (Credit: Dan Goff)***

Dedicated on October 15, 1927, the airport was named after Virginia explorer-aviator Admiral Richard Evelyn Byrd. But Byrd did not attend as he was planning a trip to Antarctica. Colonel Charles Lindbergh, who had just completed his trans-Atlantic flight 5 months earlier in the Spirit of St. Louis, was present as the airport's world famous first official visitor.

Weather Bureau also established an office at what was then known as Byrd Field in July 15, 1928 to 1984 when the airport was renamed Richmond International Airport.
Then from July 15, 1928 to August 3, 1930 Aviation Observations were taken as a branch of the city office of the Weather Bureau with the CAA personnel cooperating. From August 3, 1930 through May 26, 1935 the Weather Bureau Airforce Service used full time Weather Bureau observations. Starting in January 1930 the Airport observations became the official observations for Richmond as recorded by the NCEI in Asheville, NC. Observations were made by the personnel of the CAA Communications Station from May 27, 1935 to July 14, 1938, when the Weather Bureau reopened its Airport Station. The Airport office recorded observations in addition to the Chimborazo or City office, but the Airport was twice closed: once from May 27,1935 to July 14, 1938, and again from September 24, 1942 as observations were then made by the Army Base Weather Station during World War II until April 19, 1946 when the Weather Bureau Airport Station was again established.

On June 1, 1950 the Weather Bureau Airport Station moved into the new Terminal Building for Byrd Field. It was supplied with the regular airport station instruments and equipment and, in addition, had a triple register installed so that it would have automatic wind, sunshine, and precipitation records. Hourly airway observations are taken, also the six-hourly observations, and pilot balloon observations. The ground elevation of the present building is 167 feet, elevation of barometer 180 feet, anemometer 81 feet above the ground and 9 feet above the tower roof. Thermometers are in a standard shelter and are 6 feet above the ground. Automatic records of wind, sunshine, and rainfall were discontinued at the City Office when they began at the Airport Station, and a weighing recording precipitation gauge was put in use at the City Office. July 1, 1953 the city weather office closed and consolidated; all climatological records were discontinued at the Chimborazo Park city office location.
The staff and functions of the city office were relocated to Byrd Field when the Chimborazo Office was closed.

Bill Sammler, the Warning Coordination Meteorologist at the National Weather Service's Wakefield office, explained that opening of the Byrd Field office was driven by a need to provide meteorological support for aviation activities. However, it is unknown why the Chimborazo office closed.

Byrd Field received a WSR-3 Weather Service Radar, and it was commissioned on July 7, 1958. In the early 1990s, the National Weather Service (renamed from the Weather Bureau in 1969) began a campaign to modernize, automate, and consolidate their facilities, spending $4.4 billion to reduce their forecast offices from over 250 down to just 116. At the time, forecast offices were located in Norfolk, Richmond, Roanoke, and Sterling, and an opportunity was seen to combine the Richmond and Norfolk offices into one centrally-located space that could serve both regions. In addition, each of the new offices received new WSR-88D Doppler radar units which were located in Blacksburg, Sterling, and Wakefield. Had it been installed earlier, according to National Weather Service meteorologists interviewed at the time, the Doppler radar unit in Wakefield could have detected the 1993 Colonial Heights tornado earlier and allowed residents to receive earlier warnings and have additional time to prepare. It was also the first recorded F4 tornado in Virginia state history.
The Richmond International Airport office gave its last local forecast on August 5, 1994. The Sterling office temporarily handled forecasting duties for the region until the Wakefield office came online in August 1995. The observations previously taken by meteorologists at KRIC were replaced by an Automated Surface Observing System (ASOS) unit that was commissioned on October 1, 1995. The Norfolk office was closed around the same time, and its operations were also consolidated to Wakefield. The Wakefield Doppler radar was turned on in July 1994, and the office commissioned on August 17, 1995. The WSR-74 unit at Volens, Virginia, that was previously providing coverage for most of the state was decommissioned on December 1, 1995.

In 2007 the airport completed construction of a multimillion-dollar renovation that expanded the terminal building by 155,000 square feet, quadrupling the amount of usable floor space in the ticketing hall and baggage claim areas, doubling the space for security checkpoints and doubling the outdoor curbside loading/unloading zones to help ease vehicle congestion. The need to provide support for the aviation community led to the establishment of the Weather Bureau office at Richmond International, and though consolidation has closed the office, that same need drove the decision to install automated observing equipment at most of the commercial and general aviation airports around the Commonwealth.