

HISTORY OF WEATHER OBSERVATIONS
Fort Ridgely, Minnesota
1853 - 1867



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On the front cover is a close up of the Historical Marker at Fort Ridgely today.

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HISTORY OF WEATHER OBSERVATIONS

Fort Ridgely, Minnesota

1853 – 1867

INTRODUCTION

Goal of the Study

The goal of this study is to document the site and instrumentation of old Fort Ridgely. This period begins when the fort is under construction in 1853 and ends when the fort is abandoned in 1867.

Historical Overview

The site of Fort Ridgely is located in the present day Fort Ridgely State Park, in the far western tip of Nicollet County (Figure 1). The post was established to watch over the newly created Dakota reservations that were the result of the Traverse Des Sioux treaty of 1851. The post was the third to be built in Minnesota by the US government. In November 1852, near the junction of the Little Rock River and the Minnesota River, Colonel Lee and Captain Dana scouted the area for a location. The site chosen was one that would have adequate timber for building materials and fires and ample grass for grazing cattle. There was also a handy granite deposit nearby for construction. From the air the site looks like a raised wedge of prairie surrounded by forested ravines on three sides of the fort. The prairie extended to the northwest, and the broad Minnesota River valley was to the south. Another reason this site was chosen because of its accessibility from the Minnesota River, 175 feet below the plateau. It was ill chosen for defense and was on the opposite side of the river from the Upper and Lower Sioux Agencies.

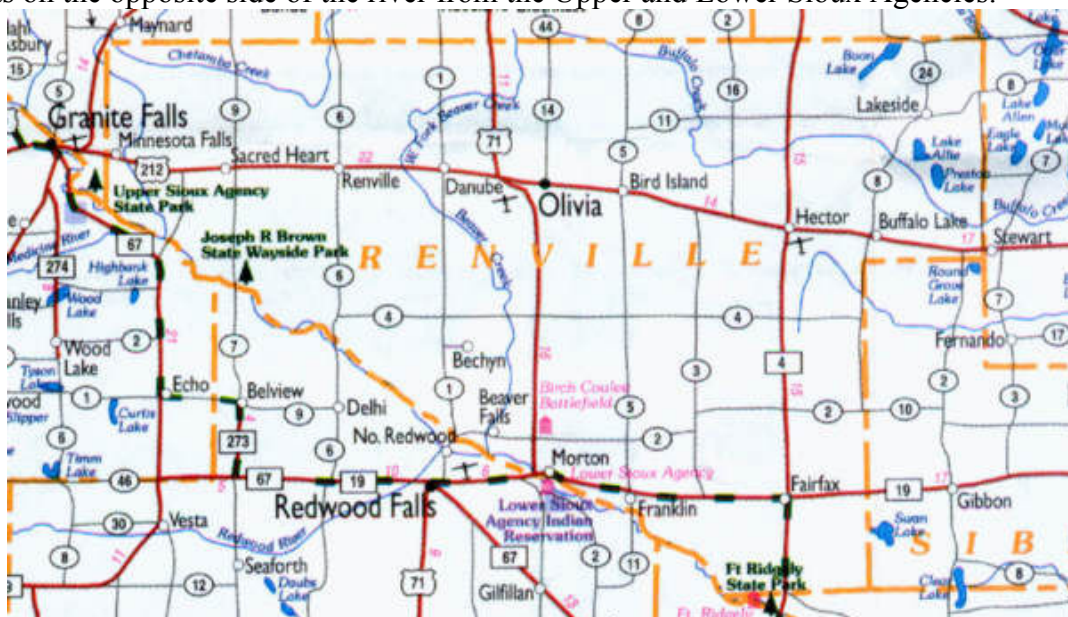


Figure 1. Fort Ridgely is located in Fort Ridgely State Park, in the western tip of Nicollet County.

In the spring of 1853, Major Samuel Wood took command of the post. Captain Dana, the same captain that scouted the location, assisted Wood in the construction. Soldiers were used as unskilled labor and civilian laborers were hired. The post was named Fort Ripley on June 27, 1853 after one of three brothers (or perhaps all three) that were killed in the Mexican War.

The original design was quite elaborate and would have made a very impressive-looking fort. Dana and Wood envisioned a wall of granite surrounding the post, with blockhouses and large granite buildings. The Army was wary of spending a large sum of money for new forts that would have a doubtful long lifespan. Due to the cost, only two buildings wound up being constructed out of granite: the enormous two story barracks and the commissary. Other more modest buildings out of wood surrounded a 300-foot wide parade area. While the permanent buildings were being constructed, six small log cabins were built on the north side of the complex behind the barracks site that would be used as temporary housing for the officers until their homes were built. A larger log cabin was used as a hospital and continued this function for the life of the fort.

A detailed description of the fort was by the Assistant Surgeon Alex. B. Hasson idescribed in the book: **Statistical Report of the Sickness and Mortality in the Army of the United States** in 1856: *This post was established in the spring of 1853. It is in or near latitude 44 30' north and longitude 17 45' west of Washington; but no observations have been made on the spot to determine its position exactly, nor have the distances to neighboring points been accurately measured. It is situated in an angle formed by the junction of a small stream, called the Rock River, with the Minnesota, and about half a mile from the left bank of the latter, upon the bluffs, by which the bottom is bounded...*

The valleys of Rock River and the Minnesota are sunk abruptly beneath the level of the surrounding country. The summits of the steep bluffs that bound them are continuous with the adjoining prairies, and at this place are elevated one hundred feet or more above the level of the rivers...

The country surrounding the post is for many miles a gently rolling prairie, occasionally interrupted by a small patch or a thin line of timber indicative of a lake or water course...

The nearest large body of timber is the "Big Woods," about forty miles distance to the south and east. The post is supplied with wood from the river-bottom in this vicinity, portions of which are very well covered., It consists principally of different species of oak, soft and sugar maple, ash, elm, hickory, butternut, hackberry, bass, cottonwood and white poplar."

There are further descriptions of the flower and fauna of the area, showing that the assistant surgeon had more than a passing fancy of his surroundings. One interesting comment he makes is "*Bones of the buffalo are sometimes found bleaching on the surrounding prairies; but it has been nine years since these animals visited this section of the county."*

Some of the first buildings to be constructed at the site were the log houses on the north end of the post. In the midst of these was the hospital. It was built of rough logs and, according to a 1857 report, had five rooms, only two of which were plastered. One room was the dispensary, one for a kitchen and the other three were wards for patients. It was not looked at as a favorable place to recover from an illness, despite the skill of the hospital staff. The roof leaked and this caused problems keeping medical supplies in good

condition. One ill soldier was admitted to the hospital, but left after an hour because he didn't like the look of the place. Colonel Abercrombie had permission in 1856 to build a small log or frame building as a temporary hospital, but it was never built.

The head surgeons' living quarters were about as far away from the hospital as one could get on the fort grounds. This building was located on the south side of the parade, with the large enlisted mens' barracks blocking the view of the hospital. Ironically enough, the leaky log hospital never burnt down during the life of the fort, but the surgeon's quarters did, along with the quartermaster's quarters that was part of the same structure. It appears that they were not rebuilt. Out of the three forts in Minnesota, Ripley is the only one where the hospital was not rebuilt or relocated during the life of the fort.

Fort Ridgely was one of the few forts in the 1860's to have a direct assault on it by Indians. The Sioux Outbreak of the autumn of 1862 is duly noted on the August 1862 form. On August 18 under remarks it is noted: "Outbreak of Indian Massacre at the Lower Sioux Agency at 6 A.M.) On August 20 it is noted that "Fort Ridgely attacked by Indians at 2:15pm. Finally on August 22, "Fort Ridgely attacked by the Sioux Indians at 2 P.M. During this entire time not a single observation was skipped. The impression of the log is that the notations may have been copied from another document.

After the Dakota were driven out of Minnesota in 1863-63, the writing was on the wall that the fort's closure was soon at hand. By 1867 the frontier had been pushed farther and farther west into the Dakotas. The last company withdrew from the fort on May 22, 1867. The post's ordinance Sergeant, William Howard, was left as the caretaker for the buildings until 1872. When he left, settlers rapidly carried off building materials from the structures, until eventually all that remained was a hunk of the Commissary building. It didn't take long after most of the fort was carried away for people to realize the forts' significance to the Minnesota Valley and the 1862 Dakota attack. In 1876, the State purchased the land where the fort buildings stood. A forty-two foot high granite and bronze obelisk was erected on August 20, 1896 at the site of the old flagpole. There was a push by Minnesotans to make the site a National Park, when that failed, the site became a State park in 1911. The Commissary building was rebuilt in the 1930's and now serves as the museum for Fort Ridgely.

In November 2010 Fort Ridgely became a National Weather Service Cooperative Station. After an absence of 143 years, the site once again is part of a nation-wide network of temperature and precipitation monitoring. The site had been a precipitation observer with Nicollet County Environmental Services since March 1992.



Figure 2. This is the only known photograph that shows the entire fort circa 1865. Note the absence of tall vegetation.

HISTORY OF WEATHER OBSERVATIONS

The era of systematic weather observing began with the Surgeon General's Office at the U.S. Army in 1819 by Surgeon General Joseph Lovell. The belief was that a soldier's health depended on the climate. Knowing what to expect in a given area would be beneficial. Fort Ridgely was the third fort in Minnesota. Like Ft. Snelling and Fort Ripley, the Surgeon was in charge of weather observations. Fort Snelling was the first of the fort sites established in Minnesota in 1819 with Fort Ripley the second in 1849. Meteorological operations began in July 1853 at Ft. Ridgely.

OBSERVERS

Similarly to other forts in Minnesota, Fort Ridgely had many surgical personnel pass through the doors of its hospital during the 14 years of operation. Under orders of the Surgeon General, the surgeon at each post was responsible for keeping a weather log. In the Fort Ridgely Meteorological Register, the records are for the most part, well kept and are filled with many interesting remarks. Clearly the people involved had more than a casual interest in their natural environment. It seems that the turnover was about the same at Ridgely as at Ft. Ripley where 22 different names are on the meteorological register over the span of 28 years. For Ft. Ridgely there are 10 names for the 14 years the fort was in service.

It is highly likely that the routine day-to-day weather observations were relegated to a hospital steward or orderly, with the senior staff signing the forms. In the document **Meteorological Register for Twelve Years From 1831 to 1842 Inclusive Compiled from Observations made by the Officers of the Medical Department at the Army at the Military Posts of the United States** the following is noted: "It is impossible for the Medical Officer to be at all times present to take the observations himself; hence the duty devolves in some measure upon the hospital steward, who though selected for his general intelligence, may not be so observant of the prescribed rules, nor feel the necessity of extreme accuracy in taking Meteorological Observations, as might be desired." In that mouthful of a sentence, one must wonder just how often the stewards were the actual observers.

The Meteorological Register for Fort Ridgely was analyzed for the medical personnel at the post in charge of the observations. The signatures were difficult to read on the meteorological forms. An oversize monthly summary book called: **Voluntary Observers Meteorological Reports by the War Department, Office of the Chief Signal Service Officer**, was useful for crosschecking names. Two volumes of this book are located in the Minnesota State Climatology Office.

Signatures on the Fort Ridgely Meteorological Register: 1853 to 1867.

<u>Surgical staff</u>	<u>Months forms were signed</u>
Asa Daniels	
C. G. Henry (sp?), Head Surgeon	7/1853-9/1853
Alex B. Hassan Asst. Surgeon	10/1853-6/1857*
N. S. Crowell Apr Surgeon	7/1857-8/1859
Robert Bartholow Asst Surgeon	9/1859-3/1860
R. F. Simpson	4/1860-3/1861
O. M. Meade	4/1861
Alfred Muller Asst. Surgeon	5/1861-3/1865
John A. Macdonald Apr. Surgeon	4/1865-8/1865
Alfred Muller Asst. Surgeon	9/1865-12/1866
E E Brawn	1/1867-3/1867
W.P. Lambert	4/1867

Last observation at the fort was at April 30, 1867.

***Was the Apr. Surgeon for Ft. Ripely from 11/1857 to 9/1858.**

LOCATION OF OBSERVATIONS

The location of the Fort Ridgely was first noted on the July 1853 form with the latitude of 44°2'N. and 17°1'W. Beginning with the February 1854 form the location is listed as: 44° 15'N and 17°45'W. This is the same location that is listed on the Meteorological Register for the rest of the life of the fort. Elevation is listed as 1230 feet above the Atlantic Ocean starting with the November 1859 form Actual coordinates with a GPS at the site in June 2008 were 44°27'13"N 94°44'1"W.

Instrumentation notes from the Fort Ridgely Meteorological Register.

Meteorological Observations began presumably in close proximity to the post hospital on July 3, 1853. The post hospital was in the center of a line of log buildings and was among some of the first structures built at the post. It is not known exactly where the thermometer was placed in 1853. One thermometer was furnished to C.G. Henry, Head Surgeon. The Surgeon Generals' office supplied Form No. 3 Meteorological Register to transcribe the observations. Four time daily temperature readings were noted at sunrise, 9 am, 3 pm and 9 pm. Also recorded at the same time was "clearness of the sky," and wind and clouds. Both wind direction and "wind force" were observed. A four times daily description of clouds began with the start of the instrumentation record too. A rain gauge or a snow gauge was put into use in July 1853. Again, exact location of this gauge is unknown.

FORM No. 3.
METEOROLOGICAL REGISTER.

Station *Fort Ridgely Minnesota Territory* Lat. $44^{\circ} 32'$ *North* Long. $112^{\circ} 12'$

1853	Barometer.				Thermometer attached.				Thermometer detached.				Clearness of the Sky.				Wind.				Clou			
	Sun rise	9 A. M.	3 P. M.	9 P. M.	Sun rise	9 A. M.	3 P. M.	9 P. M.	Sun rise	9 A. M.	3 P. M.	9 P. M.	Daily Mean.	Sun rise	9 A. M.	3 P. M.	9 P. M.	Sun rise	9 A. M.	3 P. M.	9 P. M.	Sun rise	9 A. M.	
1																								
2																								
3									41	59	71	68	60	2	16	6	7	Wb	Wb	Wb	Wb			
4									51	69	78	70	61	8	8	9	9	Wb	Wb	Wb	Wb	Wb	Wb	Wb
5									56	74	75	69	64	6	8	8	10	Wb	Wb	Wb	Wb	Wb	Wb	Wb
6									58	73	74	69	64	5	8	8	10	Wb	Wb	Wb	Wb	Wb	Wb	Wb
7									58	76	75	69	64	3	8	8	11	Wb	Wb	Wb	Wb	Wb	Wb	Wb
8									63	76	76	69	69	2	8	1	0	S. 1	S. 1	Wb	Wb	S. 1	S. 1	S. 1
9									63	77	75	69	69	6	2	1	2	Wb	Wb	Wb	Wb	Wb	Wb	Wb
10									63	76	74	69	69	5	8	1	10	Wb	Wb	Wb	Wb	Wb	Wb	Wb
11									63	77	74	69	69	10	10	7	10	S. 1	S. 1	Wb	Wb	S. 1	S. 1	S. 1
12									66	76	77	69	69	10	10	3	1	S. 1	S. 1	Wb	Wb	S. 1	S. 1	S. 1
13									62	77	78	69	70	0	0	1	1	Wb	Wb	Wb	Wb	Wb	Wb	Wb
14									61	75	78	71	71	4	8	8	10	Wb	Wb	Wb	Wb	Wb	Wb	Wb
15									61	75	77	70	71	1	8	3	6	Wb	Wb	Wb	Wb	Wb	Wb	Wb
16									57	70	75	75	66	9	9	4	4	Wb	Wb	S. 1	Wb	Wb	Wb	Wb
17									63	76	78	75	67	1	2	3	10	Wb	Wb	Wb	Wb	Wb	Wb	Wb
18									57	74	77	66	67	3	4	2	10	Wb	Wb	Wb	Wb	Wb	Wb	Wb
19									57	73	78	74	66	4	2	2	0	Wb	Wb	S. 1	Wb	Wb	Wb	Wb
20									64	75	75	74	64.5	4	2	8	10	Wb	Wb	S. 1	Wb	Wb	Wb	Wb
21									62	74	74	73	65	10	10	8	6	S. 1	S. 1	Wb	Wb	S. 1	S. 1	S. 1
22									64	77	78	71	71	1	1	2	5	Wb	Wb	Wb	Wb	Wb	Wb	Wb
23									62	70	74	73	65	0	7	7	7	Wb	Wb	Wb	Wb	Wb	Wb	Wb
24									67	77	78	69	68.5	3	3	1	2	Wb	Wb	Wb	Wb	Wb	Wb	Wb
25									58	75	78	78	65	10	10	8	8	Wb	Wb	Wb	Wb	Wb	Wb	Wb
26									58	74	76	67	69	7	10	10	9	Wb	Wb	Wb	Wb	Wb	Wb	Wb

Figure 3. This is the first observing form for Fort Ridgely when records began in July 1853. Only the top left part of the form is shown to improve readability. From WSSRD (Web Search Store Retrieve Display) National Climatic Data Center.

In August 1854 the form changed and eliminated the “Sunrise” reading and added three time daily hygrometer readings.

METEOROLOGICAL REGISTER.

Station *Fort Ridgely Minn* Lat. *44° 15' N* Long. *91° 15' W* Alt. of Bar.

1867 Month.	THERMOMETER.				HYGROMETER.				WINDS.						WEATHER.			RAIN.		
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	BEGAN.	ENDED.	QUANTITY.
	D.	F.	D.	F.	D.	F.	D.	F.	D.	F.	D.	F.	D.	F.						
1	54	52	22	27.00	27	32	22	27.00	S. N.	5	S. N.	2	S. N.	1	S.	S.	S.			
2	14	110	32	27.66	17	110	32	27.66	S. E.	2	S. E.	2	S. E.	1	S.	C.	S.			
3	26	112	32	33.33	26	112	32	33.33	S.	1	S.	0	S.	2	C.	C.	S.			
4	30	32	30	30.66	30	32	30	30.66	S. N.	1	S. N.	3	S. N.	3	C.	C.	S.	5 min	5.30 am	
5	13	15	23	18.33	15	25	15	18.33	S. N.	21	S. N.	21	S. N.	2	S.	S.	S.			
6	23	34	32	33.00	25	36	32	31.00	S.	2	S.	2	S.	2	S.	S.	S.			
7	30	110	30	30.00	20	30	30	30.00	S.	1	S.	1	S.	2	S.	S.	S.			
8	12	32	20	22.33	15	32	20	22.33	S.	2	S.	2	S.	1	S.	S.	S.			
9	27	115	37	33.66	27	115	37	33.66	S.	1	S.	1	S.	1	S.	S.	C.			
10	27	35	25	30.00	27	35	25	30.66	S.	23	S.	23	S.	2	S.	S.	S.			
11	21	20	22	18.33	21	20	22	18.33	S. N.	2	S. N.	1	S. N.	1	S.	S.	S.			
12	21	21	40	26.00	10	30	30	26.00	S.	2	S. E.	2	S. E.	3	S.	C.	S.			
13	111	117	115	117.00	35	115	115	117.33	S. E.	1	S. E.	1	S. E.	1	C.	C.	C.	3.30 am		
14	112	115	35	116.66	12	115	35	116.66	S.	1	S.	1	S.	3	C.	C.	C.			
15	37	25	35	13.33	37	115	35	11.00	S. N.	21	S. N.	21	S. N.	3	C.	S.	S.			
16	37	115	37	12.00	37	115	37	12.00	S. N.	11	S. N.	2	S. N.	1	S.	S.	S.			
17	111	113	113	113.00	112	111	113	113.33	S. N.	21	S. E.	2	S. E.	3	C.	C.	C.	5.30 am		
18	115	117	117	117.00	111	117	111	117.00	S. E.	21	S. N.	2	S. N.	1	C.	C.	C.			
19	112	63	20	14.66	110	111	113	115.66	S. N.	1	S.	5	S. N.	11	C.	C.	S.			
20	56	23	11	12.33	35	117	116	12.66	S. N.	3	S. N.	3	S. N.	1	S.	S.	S.			
21	12	113	112	112.33	120	113	112	116.66	S. E.	2	S. E.	23	S. E.	2	C.	C.	C.	11.00 am	6.00 am	0.3
22	32	35	31	33.66	32	35	31	33.66	S. E.	2	S. E.	2	S. E.	1	C.	C.	C.	5.00 am	10.00 am	
23	35	117	37	10.33	33	111	35	37.33	S. N.	1	S. N.	2	S. N.	1	C.	C.	S.			
24	37	32	117	10.00	36	113	118	12.53	S. N.	2	S. N.	2	S. N.	3	S.	C.	S.			
25	111	32	32	11.66	37	117	117	23.00	S. N.	2	S. N.	11	S. N.	11	S.	C.	S.			

Figure 4. This is the last observing form for Fort Ridgely from April 1867. Only the top left part of the form is shown to improve readability. From WSSRD (Web Search Store Retrieve Display) National Climatic Data Center.

Instrumentation Types and Exposure

Since many of the forts were active weather observers before the use of photography became widespread, few if any photos or sketches have been found. Instead, remarks about the instruments become very valuable. Listed are instruments used at Fort Ridgely and any information found about each.

Wind vane

Wind vanes were furnished to the forts, but few images exist of them. In fact, there are only three instances where a sketch shows the location of wind vanes. They are all in Minnesota’s three forts: Fort Snelling, Fort Ripley and Fort Ridgely. A wind vane can be seen in a sketch that dates from after the Surgeon’s quarters burned down in

August 23, 1862 and when a blockhouse was constructed on the northeast quadrant of the site in January 1864.

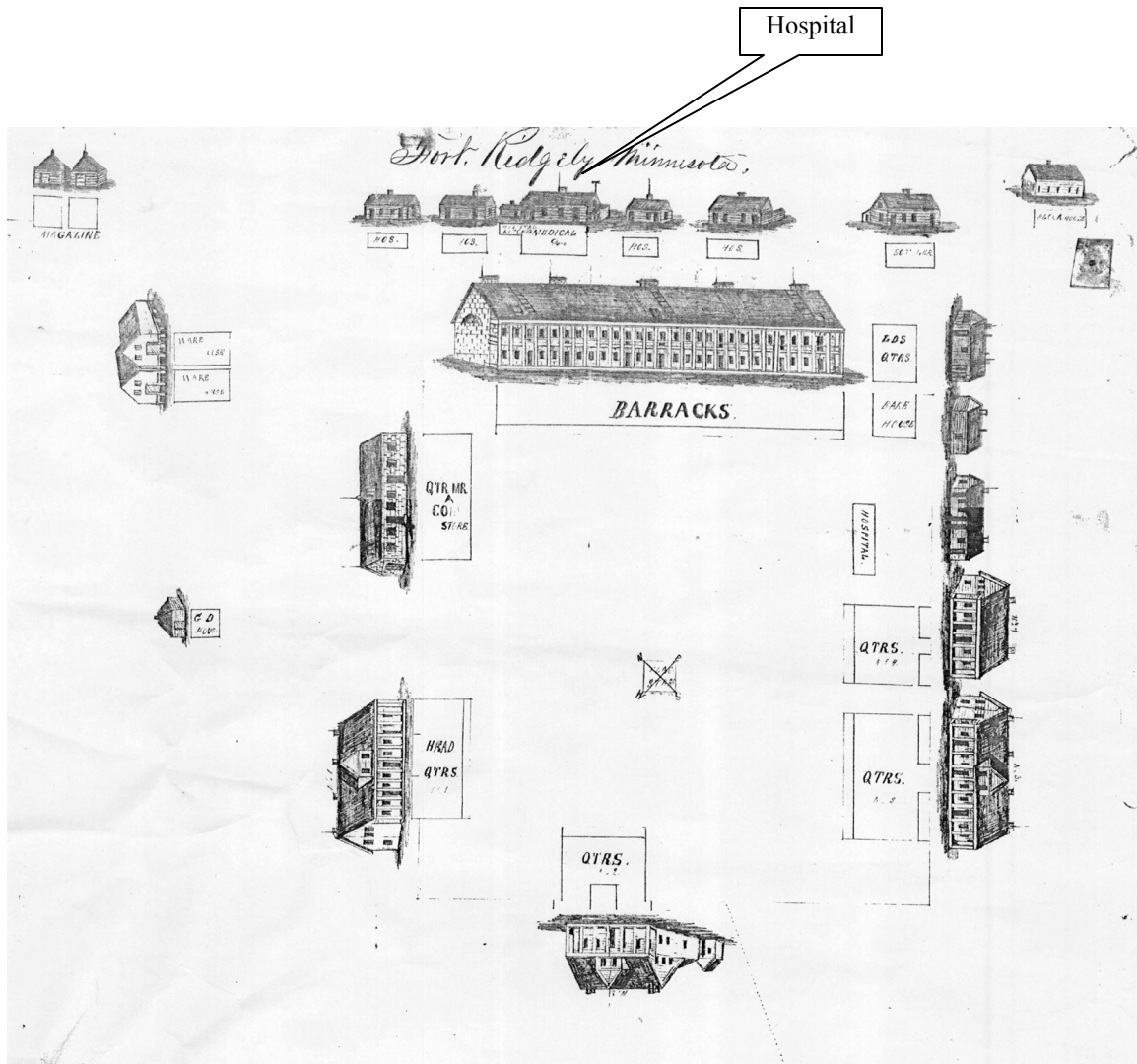


Figure 5. Undated drawing of Ft. Ridgely. This sketch was made after fire had destroyed the surgeons' quarters on August 23, 1862, and before a blockhouse was built in the NE quadrant of the site in January 1864. The old log hospital was situated north of the large stone barracks. From MN DNR files.

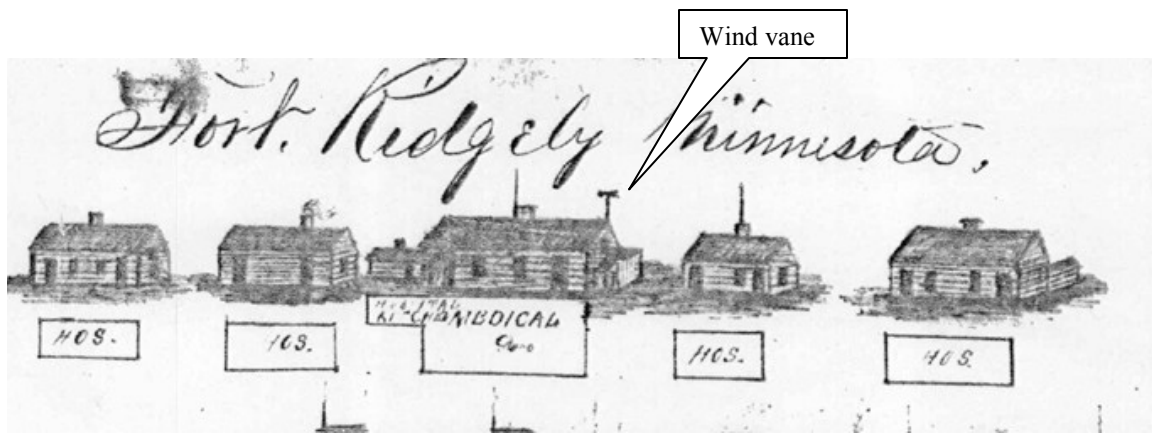


Figure 6. Close up of 1862-64 sketch showing hospital building (middle) with wind vane poking above the roofline. The other pole pointing up from the middle of the roof could be a lightning rod. The smaller building attached to the left side of the hospital appears to be a kitchen.

Thermometers

When Fort Ridgely was commissioned in 1853, Army Surgeon General instructions for thermometers involved a single thermometer read four times a day. These instructions did not change until 1868. On 10 August 1868, the following instructions were issued to Army field surgeons by the Surgeon General's Office regarding thermometer placement:

‘The thermometer should be placed in the open air, but under a roof of some kind, and should be well sheltered toward the South. It should be protected not only from the direct rays of the sun, but from the influences of all surfaces which strongly reflect the sun's heat, and of all bodies, such as thick walls, large rocks, etc., which become great reservoirs of heat during the day, and of cold during the night.’

‘...The height which it is deemed best to fix upon is that of four feet from the ground to the thermometer bulb, and the surface under the thermometer should be of short grass, sufficiently exposed to the sun and wind to keep it from habitual dampness.’

‘A thermometer box, in which most of the thermometers observed and recorded at the station are suspended, is generally used for the best conducted meteorological observations, and one should be made and set up at every post where there are means of constructing it. This box, which should be at least two feet square, is preferably made of louver-boards or overlapping slates, but ordinary boards pierced with numerous half-inch holes may be used instead. It should be open at the bottom, and have a roof, which will shed rain. One of the sides should be hinged for convenience of access to the interior, or the box may be left permanently open toward the North, a piece of board or of canvas being used to

protect it against driving winds from that quarter. This box is to be well secured on posts, at the proper height from the ground. It should be sheltered from the sun between sunrise and 7 AM, and between 11 AM and 3 PM, special screens being erected for the purpose if necessary. These screens, as well as the box itself, should be whitewashed or painted white.”

Beginning with July 3, 1853 four time daily temperature readings were made at Sunrise, 9am, 3pm and 9pm.

No sketch or a photograph of a temperature shelter has been found at Fort Ridgely.

Rain Gauge

A rain gage was installed at Fort Ridgely on July 3, 1853. No description exists about the type of gauge. It was probably a De Witt type of gauge that is mentioned in a book published in 1851 titled: **Meteorological Register: Observations Made by the Officers of the Medical Department of the Army at the Military Posts of the United States.** See Figure 7.

“In 1836, rain gauges were furnished to many of the posts, by which the daily falls of rain and snow could be measured and entered upon the tables in inches and the fractions of an inch. The instrument employed is the conical rain gauge of De Witt; and observations are ordered to be made immediately after every shower or fall of rain or snow. The following are the instructions issued by the Department for its observers:’

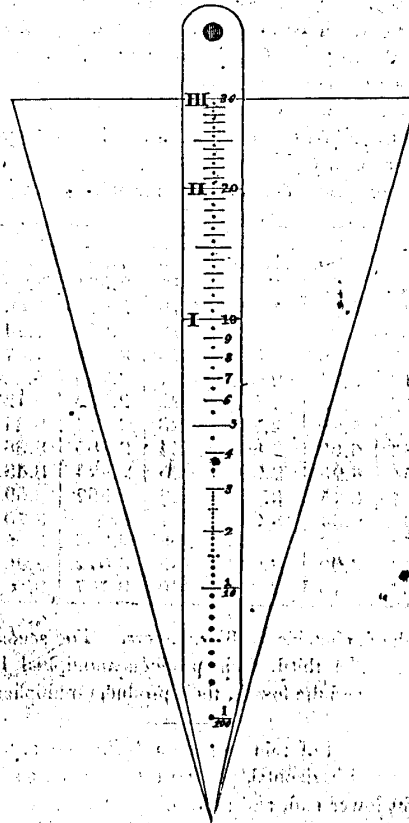
‘The instrument used to measure the quantity of rain which falls, is the conical rain gauge. It will be kept remote from all elevated structures at a distance at least equal to their height, and still further off, where it can be conveniently done. It is to be suspended in a circular opening, made in a board, which is to be fixed to a post, eight feet from the ground; the opening to be five inches in diameter, and beveled, so as to fit the side of the gauge, into which the cap is to be fixed, base downwards, to prevent evaporation.’

‘In freezing weather, when the rain gauge cannot be used out of doors, it will be taken into the room, and a tin vessel will be substituted for receiving the snow, rain, or sleet that may then fall. This vessel must have its opening exactly equal to that of the rain gauge, and widen downwards to a sufficient depth, with a considerable slope. It should be placed where nothing can obstruct the descending snow from entering, and where no drift snow can be blown into it. During a continued snowstorm, the snow may be occasionally pressed down. The contents of the vessel must be melted by placing it near the fire, with a cover to prevent evaporation, and the water produced poured into the gauge to ascertain its quantity, which must then be entered into the Register.”

ART. X.—Description of the Nine Inch Conical Rain Gauge; by
S. DEWITT.

Read before the Albany Institute, May 3, 1832.

DeWitt's Nine Inch Conical Rain Gauge, with the Scale represented in it.



Above 3 tenths of an inch, the scale is graduated to half tenths. The intermediate fractions may be measured with sufficient accuracy by the eye.

Figure 7. Sketch of the DeWitt Nine Inch Conical Rain Gauge from: “Stillman’s Journal of the Arts and Sciences”

The old rain gauge instructions were replaced on 10 August 1868, when the Army Surgeon General’s Office advised the following gauge to use:

“The rain gauge now issued by the Department is a brass cylinder seven and a half inches high, and with a diameter at its mouth of one and ninety-seven hundredths (1.97) of an inch; this diameter being fixed upon for the reason that one inch of rain falling through such an aperture will measure exactly fifty cubic centimeters (50 cc), and centimeter graduates are furnished with each gauge for the purpose of making such measurement.”

“The most desirable place for a rain gauge, other things being equal, is at the surface of the ground, but since it is not easy to protect an instrument in that situation, the gauge will be placed on the top of a post eight feet high,…”

‘For measuring very heavy snow falls, a snow gauge must be used having a mouth of the same size with that of the rain-gauge, but wider at the bottom, so as not to be easily overfilled. The snow which falls in it is to be melted and measured in the centimeter graduate.’

Hygrometer

The first measurement of atmospheric moisture at Fort Ridgely was on November 1, 1855. Below are instructions in 1844 with regard to wet-bulb observations:

“The most easy method of finding this (wet bulb temperature) is to wet the bulb of a Thermometer covered round with fine gauze, and swing the instrument in the open air, in the shade, until the mercury sinks as low as it will.”

“The current of air upon the wet-bulb should be kept up (by swinging) as long as the mercury continues to descend in the tube of the instrument, and for a few minutes after it becomes stationary, in order to ensure the full effect of the evaporation and the lowest degree to which the mercury can be forced to descend by this process, will constitute the observation required...”

When wet-bulb temperatures were again measured in the Army Medical Department the Surgeon General instructions for 1856 contained the following:

“The hygrometer adopted by this Department consists essentially of a thermometer, the bulb of which is covered with floss silk enclosed in a piece of thin muslin, the ends of the silk sufficiently long to dip into water contained in a brass reservoir secured immediately below the bulb. In the top of this reservoir is a small opening to admit the silk, and to the front is attached a cylinder communicating with the interior by a small hole. The reservoir is to be kept always supplied with water poured into it through the cylinder, and the bulb will be constantly moistened by capillary absorption.”

On the December, 1859 form this was written on the margin: “Hygrometer broken in an attempt at repair and render its indications reliable & consequently no observations taken.”

Barometer

Like other military posts of its time, Fort Ridgely had a mercury thermometer. The attached thermometer to the barometer can offer clues to its location. Measurements began on October 3, 1859. There were some remarks about the barometer on the October, 1859 form. “Barometer not having been in the fort for a long period was out of order. Having succeeded in adjusting it, observations commenced on the 3rd of October.

Another mention of the barometer is with the December 1859 form. “Observations began on December 13, 1859. Under the remarks was as follows: “Having found it necessary to give the Hospital Steward some special instructions with regard to the management of the barometer, I was misunderstood and consequently no observations were taken for the first twelve days of the month. Robert Bartholow Asst. Surgeon.” This serves as further evidence that the mundane task of taking observations was delegated to other staff.

Interestingly, the barometer with attached thermometer appears to originally have been on the outside of the building and was moved indoors on June 1, 1860. The following was noted under the remarks section of the June 1860 form. Barometer and Thermometer on the first of June were removed from the outside of the building to the inside.

There was a remark on November 13, 1865 form that stated: “Barometer removed from southeast corner of room to NW corner of _____?”

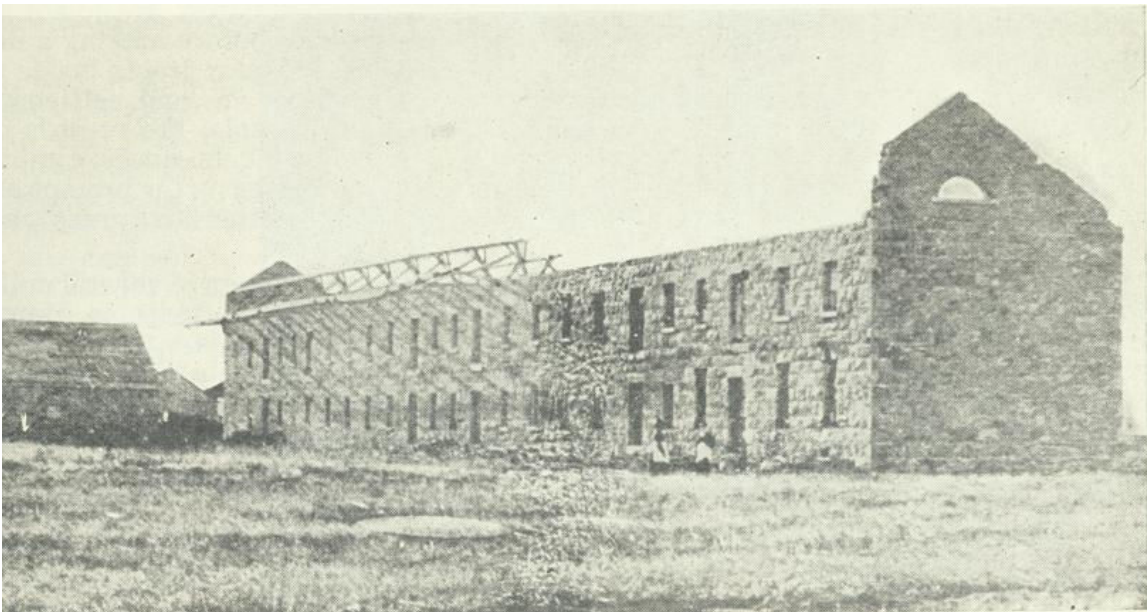


Figure 8. Ruins of Barracks at Fort Ridgely. Date of photograph unknown but likely soon after fort was abandoned. From March 1938 issue of *Minnesota Conservationist*.

Modern site visit to Fort Ridgely



Figure 9. Minnesota Historical Society Sign for Fort Ridgely.

After the closing of Fort Ridgely in 1867 Ordnance Sergeant William Howard was left in charge of the buildings. When he left in 1871, people in the area began to scavenge the granite blocks and other building materials. In 1880 Congress opens the Fort Ridgely Military Reservation for settlement. In 1896, the state of Minnesota purchased five acres that included the site of the fort. In 1911, the Minnesota legislature established Fort Ridgely as Minnesota's fourth state park. In 1936 an archeological excavation identified the foundations of eight buildings. The commissary was rebuilt and enlarged back to its original size. The log powder magazine is the only other building that remains from the fort era.

To visit the site, a daily permit to Fort Ridgely State Park is required. The foundations of the old buildings are plainly visible. The author visited the site on June 18, 2008. The look of the site matches the descriptions of historical topography and trees in the gullies have been allowed to grow. It is easy to see how the Dakota could approach the fort quite easily from the north without being detected. The commissary is open on weekends in the summer. All site visit photos are from the author.



Figure 10. Overall view of the parade grounds. View is to the west. The magazine ruins are on the far right. A modern flagpole marks the site of the original one on the parade grounds. The hospital was located far left center by the lone trees.



Figure 11. This is the site of the hospital and chapel. View is to the south. These trees are growing in the depression left by the cellar.



Figure 12. View to the east of the hospital site.



Figure 13. View to the south of the hospital site, showing the 1896 monument in the background.

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APPENDICES

Appendix 1

One cannot help in looking through the recorded observations the remarks of unusual weather the hapless medical staff found themselves in when transferred to an outpost such as Fort Ridgely. Listed are some of the more interesting remarks found in the Meteorological Register.

Note on the July, 1853 form: Arrived at the post on the second of the month?

Prairie fires to the west and north were common occurrences during the life of the fort. One comment summed them up on the November 1, 1854 comment section. "Prarie fires as usual.

August 1, 1855. Violent thunder storm with hail as large as pigeon's eggs. (1.70 inches of rain)

August 2, 1855. ___ thunderstorm from N.E. with hail-large as if of a hen's egg which broke a great deal of exposed window-glass- ended in night. (1.48 inches of precipitation)

June 13, 1857. Rainstorm, hail 4 inches in circumference.

September 27, 1858. Comet very brilliant until 9:30pm. (Most likely was Donati's Comet http://www.daviddarling.info/encyclopedia/D/Donatis_Comet.html

January 21 or 22), 1859. Very strong wind last night and early in the morning. Light fall of snow at 7am. At 11pm two brilliant _____? resembling perihelia to the right and left of the moon, connecting and forming a lunar circle (very distinct) of about 30 (degree) radius. Very strong NW wind at the time. Atmosphere filled with fine particles of snow, giving a foggy appearance and visible for about an hour.

October 29, 1861. This was one of the wordiest descriptions of a storm found in the Fort Ridgely record. "During the night of the 28th, the Barometer indicated a depression of 22 (or .22?) and a great storm of wind & rain began about midnight raging with great fury from the N.W. through the whole day of the 29th mixed with snow from 9am until 1pm, melting as it fell- when it also ceased raining, but the wind continued unabated till late in the night when it ceased altogether." The pressure was noted to be 28.28 at 7am on the 29th. The highest for the month was 29.37.

There was a reason for lightning rods on some of the buildings at Fort Ridgely as noted by this comment on August 4, 1863. "Two persons struck by lightning, inside the garrison, at 10am."

Interesting non-weather feature was noted on March 16, 1864. "Large shooting star at 11pm illuminating the whole Fort, could not observe the direction.

July 28, 1864. Smoky atmosphere during the day. Grasshoppers innumerable. Welding much damage to green plants. Hottest day of the season. (2pm temperature was 101)

June 1, 1865. Grasshoppers in large numbers destroying crops and vegetation.
June 10, 1865 Grasshoppers apparently leaving after destroying most all the crops in this vicinity.
June 20, 1865 Very cool morning. White Frost & traces of ice on stagnant water 4am.
June 21, 1865 White Frost in the am. Supposed to be the last killing frost of the season. Fine crystals of ice in stagnant water 4am.
September 13, 1865. 3.60 inches of rain was recorded from 7:20pm to 10:10pm.
November 16, 1865. Large and brilliant prairie fire the whole horizon NE & NW
February 14, 1866. A terrific snowstorm during the previous night and to-day.
April 30, 1867 last observation taken at the fort (at least what has been recorded.)

Appendix 2

Methodology

The Meteorological register was the primary source for information regarding instrumentation changes at Fort Ridgely. These were provided on CD's titled: **Climate Database Modernization Program: Forts Database from Midwestern Regional Climate Center and the National Climatic Data Center**. These files are also available on WSSRD (Web Search Store Retrieve and Display) <http://noaa.imcwv.com/> The Meteorological Register had observation sheets from 1853 to 1867.

A visit to Fort Ridgely State Park and looking through photographs in the park office was very helpful. There is one book devoted entirely to Fort Ridgely. It is by Paul N. Beck called **Soldier, Settler, and Sioux Fort Ridgely and the Minnesota River Valley 1853 to 1867**. The photograph on the front of the book is actually Fort Ridgely.