Big Blue River at Beatrice, Nebraska
06881500

LOCATION

Latitude and Longitude

40.25676, -96.74681

Road Log

At left upstream corner of 6th Street bridge in Beatrice which carries U.S. Highway 77 over the Big Blue River about 0.7 miles south of the intersection of U.S. Highway 136 with U.S. Highway 77.

Nearby Features

The Burlington Northern Railroad crosses the Big Blue River about 800 feet upstream from the gage. The Chicago Rock Island and Pacific Railroad cross the river about 2,000 feet upstream from the gage. Court Street Bridge carries U.S. Highway 136 across Big Blue River 1.1 miles upstream from the gage. Indian Creek enters on the left riverbank 1.2 miles upstream from the gage and Bear Creek enters on the left riverbank 3.1 miles downstream from the gage.

Equipment Details

Recording Gage

A Sutron SatLink3 data logger/transmitter is housed in a 2'x 2.5'x 6' stainless steel gage house. The SL3 is connected to an OTT RLS radar which is mounted to the upstream side of Hwy 77 bridge railing near the wire weight. The SL3 collects data every 15 minutes and is transmitted once an hour.

External Gage

"Type A" wire-weight gage mounted on upstream handrail of 6th Street Bridge. Check bar reading is 38.24 feet 11/02/2022 Levels. (New Wire Weight mounted on 03/20/2019)

Bench Mark and Reference Marks

BM#1 is a state bench mark and is a brass disk set in the northwest or left upstream wing wall of the 6th Street Bridge. It is located 15 inches south of the north end of the wing wall and is 8 inches from the west edge. Elevation 34.02 feet gage datum. 05/10/2022 Levels.

BM#2 Found destroyed Levels September 15, 2011.

RM#1 is a brass tablet set in northeast corner of gage house slab. Elevation 31.44 feet gage datum. Levels 05/10/2022.

RM#2 Destroyed

RM#3 A chiseled X on east iron rim of a man hole on the southeast quadrant of HWY 77 and Caldwell St. PID#LG0010. Elevation 30.61 feet gage datum by Levels 05/10/2022.

RM#4 Aluminum cap located 48 feet south from the northeast fence corner of power substation. PID#LG0009 Elevation 26.75 feet gage datum by Levels 03/20/2019.

RP#1 is the base plate of the handrail on bridge deck at station 95 the North West corner of the plate. Elevation 36.09 feet gage datum. Levels 05/10/2022.

Levels 03/26/2014 established NAVD88 of the gage datum as 1,220.279 feet.

Hydrology

Drainage Area

The streamgage has a drainage area of 3,901 square miles as determined by the Corps of Engineers in 1965.

Channel and Control

The channel is at a slight skew with the bridge but is fairly straight for about 900 feet downstream from the gage and then bends slightly to the right. A rock riffle at bridge acts as the control for extremely low stages.

Discharge Measurements

Six current-meter measurements were made for the Department of Health during 1948 and two medium high-flow measurements were made in 1954 to give some definition for a flood and bridge report. These are the only known measurements made between 1915 and 1960. Starting with the 1960 year, the Corps of Engineers, Kansas City District, has requested that a stage-discharge relation be developed for the 6th Street gage on Big Blue River at Beatrice. At least one measurement annually after stage-discharge relation is defined, preferably on the annual peak, but at least on a major rise. Discharge measurements obtained on a regular basis at present for the continuous record.

Floods

The maximum flood for the period of record 1902 to present occurred on October 12, 1973, when a stage of 33.02 feet was obtained from HWM at the gage and the peak discharge is considered as about 49,100 cfs.

ACTION STAGE: 16.0 FT

FLOOD STAGE: 18.0 FT

MODERATE STAGE: 26.0 FT

MAJOR STAGE: 32.0 FT

Values provided by NWS as of December 29, 2014.

Chautauqua Park begins to flood at 20.0 feet. Flooding begins to affect businesses and residences at 23.0 feet. Highway 77 overflows at 26.0 feet and railroad and highway traffic is affected.

Extremes for Period of Record

Peak discharge 55,100 cubic feet per second June 14, 1984, gage height 31.27 feet; minimum daily discharge 20 cubic feet per second August 15, 1976.

Point of Zero Flow

Variable. Changes with conditions of scour and fill.

Winter Flow

Flow may be affected by ice November through March.

Regulation and Diversions

Natural flow of stream may be affected at times by ground water withdrawals and direct pump irrigation from stream.

Accuracy

Open-water records should be fair to good with sufficient measurements to define shifts. Records for winter period would be poor.

Establishment and History

A chain and weight gage was established on the upstream side of the 6th Street truss bridge by the U.S. Weather Bureau on June 2, 1905. This gage was read once daily by the U.S. Weather Bureau from January 1 to July 31 of each year for the period June 2, 1905 to 1910. Gage heights only are available for this period.

The U.S. Geological Survey took over the operation of the chain gage on October 15, 1910, and operated this gage until September 30, 1915. Records of stage and discharge were obtained. The gage was read once daily except during 1915 when twice-daily readings were obtained.

The U.S. Weather Bureau took over the operation of the chain gage in 1916 and has continued operation of manual gage at this site with once daily readings March through September of each year. More frequent readings are made during flood

periods or if floods occur during October through February. Readings are published in Weather Bureau publications "Daily River Stages."

On September 27, 1934, a standard Weather Bureau Type A wire-weight gage was installed to replace the chain gage used previously. The elevation of the check bar was set at 30.03-foot gage datum and the former gage datum was maintained. A dam and small, automatic, self-operating power plant was located about 1.7 miles downstream from the wire-weight gage. It was located in the SW¼ SE¼, S2, T3N, R6E, and carried a water right dated October 7, 1922. Presumably this plant went into operation on June 4, 1924 and was operated by Black Brothers of Beatrice and later sold to Consumers Public Power District of Columbus, NE. The dam produced backwater at the 6th Street gage so that a low-water stage discharge relation is unstable. Based on low-water readings from the U.S. Weather Bureau gage, the dam has probably not been used for power production since 1956. The dam was removed on March 1, 1960, according to a local resident. After that, the channel degraded through the reach which had been in the backwater of the dam.

A power dam was located about 1.1 miles upstream from the gage and just downstream from the Court Street Bridge. This dam also belonged to Black Brothers of Beatrice. It carried a water right dated January 11, 1860, and was still in operation on August 9, 1954. This dam was also removed in March of 1960 to bring some relief to the flood problem in Beatrice.

A new bridge was built over the Big Blue River at 6th Street during 1951 and 1952. The new bridge consists of five spans and is a total of 435 feet in length and was built just downstream from the former bridge. The wire-weight gage was removed from the old bridge which was being demolished on February 19, 1952. The old bridge consisted of one 18-foot length and two 40.5-foot length truss spans. The gage was installed on April 18, 1952 on the upstream side of the new bridge at the center of the span. The gage location on the new bridge is approximately 39 feet downstream from the former gage position. The new gage is set to the same datum as the previous gage. The gage check bar was set at 38.71 feet gage datum.

Wire-weight gage was moved over the main flow on September 30, 1974. Check bar set to 37.69 feet gage datum. A continuous recording gage was installed November 29, 1974. The mean sea level of the gage zero was published as 1,219.88 feet in 1939 to 1941, but was published as 1,219.63 feet from 1948 to 1954. The gage was not changed; this discrepancy was introduced by running levels to a damaged bench mark. On August 23, 1955, BM#2, a USGS brass disk was assigned a new mean sea level value and was changed from 1,245.634 to 1,245.900 feet. This changed the zero of the gage from 1,219.63 to 1,219.896, however, no physical change in gage or gage site was involved. This BM was destroyed and a new BM USGS reset 1951 as described under bench marks paragraph.

This station was dropped from the CO-OP agreement at the end of Water Year 1994. The Department of Natural Resources (DNR) assumed operation of the gage from October 1, 1994 on. All USGS equipment was removed on April 18, 1995. After that date, the DNR installed new equipment and restarted the station on a calendar year publication. After 1998 the station was converted back to Water Year publication.

The National Weather Service installed a telemetry device (Handar Lark) in the station about water year 1991. This unit is called by the National Weather Service, city of Beatrice, and Department of Natural Resources for stage until its removal May 25, 2005.

A WaterLog Data Collection Platform was installed to provide 1 hour satellite readings.

A tipping rain bucket gage was connected to the WaterLog Data Collection Platform to report precipitation on April 13, 2006.

On July 15, 2009 the Stevens A-71 strip chart recorder (Scale 1:6), Fluid Data G-2 manometer, and the Fluid Data safe-purge gas system was removed and new equipment was installed.

On March 20, 2019 the Wire Weight was replaced with a new one. Check bar set to 37.68 feet gage datum.

On September 28, 2021 the Waterlog and bubbler were disconnected, and on September 30, 2021 a Sutron Satlink 3 and an OTT radar were installed at this site.

In October 2022, the bridge rail at the site was removed and replaced with a new one. On September 29th, 2022, the wire weight and OTT radar was removed from the old bridge rail and an OTT bubbler was installed. On November 2nd, 2022, the wire weight and OTT radar was replaced on the new rail. Levels were ran right after the installation of the wire weight on November 2nd, 2022 and established an elevation of 38.24 feet gage datum on the check bar. The wire weight was set accordingly.

Revision History

Revised by J. A. Marburger, 06-14-1996

Revised by J. A. Marburger, 07-21-1998

Revised by J. A. Marburger, 08-08-2001

Revised by J. A. Marburger, 06-29-2004

Revised by J. A. Marburger, 06-17-2005

Revised by J. A. Marburger, 12-28-2006

Revised by J. A. Marburger, 08-21-2007

Revised by J. A. Marburger, 12-28-2009

Revised by J.A. Marburger, 09-29-2011

Revised by J.A.Marburger, 09-02-2015

Revised by J. J. Vifquain, 11-21-2017

Revised by J.D. Hladik, 10-11-2019

Revised by J.D. Hladik, 10-01-2021

Revised by L.L. Geyer, 05-13-2022

Revised by L.L. Geyer, 09-30-2022

Revised by L.L. Geyer, 11-04-2022