ALLEGHENY COLLEGE, NEWTON MEMORIAL OBSERVATORY
North Main Street, South of Ruter Hall
Meadville
Crawford County
Pennsylvania

HABS PA-6785
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WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

FIELD RECORDS

HISTORIC AMERICAN BUILDINGS SURVEY
National Park Service
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ALLEGHENY COLLEGE, NEWTON MEMORIAL OBSERVATORY

HABS No. PA-6785

Location: 556 North Main Street, Meadville, Crawford County, PA 16335

The Newton Memorial Observatory is located on the west side of North Main Street between Sherman and East College Streets. It is 1/20 mile south of Ruter Hall, also on the west side of North Main Street, and 1/10 mile southeast of Bentley Hall (HABS No. PA-5955) via pedestrian walks on campus.

The observatory is situated at 41.64748, -80.14688 WGS 84, as measured at the front door at the eastern entrance. The Federal Register (1995) indicates that NAD 83 and WGS84 can be considered identical for all mapping and charting applications at scales of 1:5,000 or smaller. Accuracy is estimated at approximately 10m. There is no restriction on the release of the locational data to the public.

Significance: At the dedication of the Newton Memorial Observatory on June 19, 1901, Dr. FM Bristol, a medical practitioner and pastor of the Metropolitan Church of Washington DC, spoke on the relationship of science to the humanities and religion, a connection which is highlighted in the physical structure of the building and also the workings of the instrumentation held within. The building follows a cruciform design laid out on the cardinal directions, a style typical of a church, and the building's rough-hewn Cleveland sandstone presents a façade reminiscent of a mausoleum. The building was in fact built as a memorial, but it also was designed to house advanced astrophysical instrumentation. It was designed to house both a finely crafted transit telescope and a refractory telescope, each made by expert optical craftsmen and the refractory telescope was fitted with lenses made by internationally renowned craftsmen. While the study of the heavens inspired reflection on the human condition and the position of the world within the universe amongst the general citizenry, the observatory itself was at the forefront of astronomical research. The paired transit and refractory telescopes and other technical equipment installed in the building, including a sidereal clock, chronometer, and sextant, permitted scientists to conduct pioneering research using binary star systems to determine the distance, spectra, and especially the mass of distant stars, previously impossible to calculate.

Newton Observatory was designed by the architect MH Church of Chicago. Church was a nationally known architect with interest in a wide

variety of building types. He was most well known for the design of Chicago's Garfield Boulevard Elevated "L" Station and Overpass in 1892 to provide public access to the World's Columbian Exposition in 1893 commemorating 400 years since Columbus arrived in the New World. Locally, Church also designed Allegheny College's Montgomery Gymnasium on the eastern side of North Main Street using similar material resources.

The Observatory wall composition is brick with plaster interior and a 6" Cleveland Sandstone exterior. The dome of the observatory is fitted with a copper roof, and three of the rooms were finished with maple wood floors.

Mrs. Mary M. Prindle Newton donated the observatory and an endowed professorship in astronomy in memory of her late husband, Captain Don Carlos Newton, who was a student at Allegheny College from 1848-49. Captain Newton left to assist in a family wagon-making business in upstate New York (located first in Attica and later in Batavia). He served in the Union Army during the Civil War, then returned to the increasingly successful family business which he took over in 1879 until his death in 1893. While Captain Newton left Allegheny College after only one year, Mrs. Newton had additional family connections to the College that led to this most generous gift. The Newtons had a nephew, James Prindle, who graduated from the college in 1898, and a favored niece from Chicago, Jennie Foote, who married the Rev. Mr. William Henry Crawford, who became Allegheny College's 10th president, serving from 1893-1920. The observatory was built during a period of significant growth in the physical buildings on campus, highlighted by a focus on research and scientific structures. In addition to the observatory, the Crawford presidency added Reis library, Alden Hall, Cochran Hall, Carnegie Hall, Ford Chapel, and Montgomery Gymnasium. The undergraduate enrollment quadrupled during this time. A research telescope and observatory of this caliber at a small rural school places this in an unusual category, bringing it to national recognition with astrophysics research facilities much larger and more well-endowed than Allegheny College.

Description: The Newton Observatory was built during the overlapping period between Victorian and Late Neoclassical. The building itself has a cruciform design laid out on the cardinal directions, and is symmetrical on the east-west access. The central cross houses a circular memorial room on the first floor and the refractory telescope and dome on the second floor. The western side housed the transit room on the first floor, which housed the transit telescope, and an observation deck on the roof. The north-south transept housed the reception room (main office for the astronomers and scientists) on the north side and a computing room on the southern side.

The exterior of the building was constructed of 6" Cleveland Sandstone, quarried from Berea Sandstone in northern Ohio, over brick. Notably, articulated stone of the exterior sandstone is rough hewn on the transept of the building, with variations in depth of up to 1", providing a distinctive character to the building, while the sandstone around the front portico is smooth, with variation typically less than ¼". The Portico utilizes the Italian Renaissance composition of two different style columns paired carrying entablature. The Dome is made of copper. A 4:1 gear ratio pulley system assists the astronomer to manually operate the dome rotating mechanism. The Dome rotates on a set of eight casters set on rounded steel railroad rails. The rails are stamped with the word Cleveland and a set of Roman numerals MCMI (1901), presumably indicating the year in which they were cast.

The original structure was not built with electricity, so the computing room was designed for hand-calculations of astronomical measurements. In addition, the observatory had to be completely dark during measurements, so scientists in the observatory would use a bell system (similar to those used by servants in larger homes) to let the scientists in the calculations room know when to record exact sidereal time of an astronomical measurement. Part of the bell mechanism is still present in the observatory, in the dome on the floor opposite the stairwell.

The building interior was finished with plaster throughout the building, with maple hardwood flooring in all rooms excepting the memorial room, which had a Victorian tile floor in a simple pattern. While the original blueprints called for paneling and additional cabinetry in the observatory, these additional features were not built.

The reception Room holds a stair case with large, Victorian detailed newel post, 18 risers ascend to a landing taking one to the observation room or to the exterior observation deck

History: The Newton Memorial Observatory, was commissioned in 1899 and built over two years. Architect MH Church of Chicago designed the observatory and one other building on campus, a gymnasium located northeast across the North Main Street.

The observatory was designed to house a refractory telescope, one that views light directly (as opposed to reflective). The refractory lens required two massive pieces, one to measure a star's spectra, and another to correct for the chromatic aberration typical in space observations as light passes from far distances across the galaxy and refracts as it passes through the

thick lens into its constituent wavelengths (blue, green, red, infrared…). To correct for these distortions, a tremendous second lens was crafted and placed over the first, separated by the tiniest fraction of a dimension, such as a piece of paper. A refractory telescope can get to about 40" in dimension, but because of its weight, cannot get much wider without direct support, which obscures the area of view, making mirrors essential at larger lens diameters.

While awaiting the commissioned telescope, the observatory housed a 7" Alvan Clark & Sons refractory scope, made with a mahogany tube, circa 1865. Alvan Clark & Sons were internationally recognized telescope and optics makers, most well known for the lens of the 36" diameter refractory telescope at Lick Observatory, University of California at Mount Hamilton in San José, CA, and for the world's largest refractory lens at 40" diameter at Yerkes Observatory, University of Chicago, in Williams Bay, WI.

The observatory was designed for a slightly larger and more advanced telescope, a 9.5" refractory scope, designed by Warner & Swasey, of Cleveland. The Clark was made during a brief era in the firm's history when they did not include the date on the inscription. The company was most well known for its primary products, lathes and military instruments, but their skills in precision military optics allowed them to maintain a less profitable arm of products in high-end refractory telescopes. The Lick Observatory and Yerkes Observatory refractory telescopes were both built by Warner & Swasey to accommodate the Alvan Clark lenses.

The 9.5" lens on the Warner & Swasey refractory telescope was made by nationally recognized self-taught lens maker from Pittsburgh, John A. Brashears. Brashears is known for his exceptional quality lens, in particular the 30" diameter lens for the Thaw Memorial refractor telescope and the 30" diameter Keeler Memorial lens, both at the University of Pittsburgh. John A Brashear is most well-known for his exceptional optics, but perhaps his most notable, but little known scientific contribution is that he made the instrumentation that helped to establish Einstein's theory of relativity.

The transit telescope is one that is fixed along a meridian. By the 1800s, sufficient number of stars had been documented and mapped within the sky, creating a "sky map." When a known star passed by the meridian, the distance can be calculated and used to calibrate the entire map, which can then be used to identify the distance and location of previously unknown stars. The brass transit telescope is less than four inches in clear aperture and the ~4.5' in length. The transit is relatively simple construction and is probably contemporary with the Alvan Clark telescope, i.e., ca. 1865, and

is engraved with the makers names, Stackpole & Brothers, New York. Excellent examples of transit telescopes from Stackpole & Brothers are currently housed in the Smithsonian's National Museum of American History in Kenneth E Behring Center. The transit telescope is currently in storage, and planned to be on permanent loan to HUT Observatory in Eagle, CO.

For nearly twenty years, Allegheny College was a premiere institution for research using the refracting telescope. However, with a small faculty, expertise in high end astrophysics was not maintained. An astronomer was hired again in 1947, bringing back some of the early attention from the exceptional instruments at the turn of the century. The College's first IBM computer, a behemoth that took up nearly a full room, was housed in one of the first floor rooms of the observatory. It became quickly outdated, but the space taken up decreased space for high-end research. The telescopes became more teaching than research, and in the mid-1960s, a short-lived student-run café was allowed in one room of the observatory, and in 1969, the newly created security force was moved into the building. Subsequent renovations converted the transit room and memorial room into offices, and the observation deck had material renovations to support teaching viewings.

The College now houses a computer interfaced 10" Meade LX2000 telescope with CCD camera, and the Wible planetarium, located Carr Hall, which are used for teaching as well.

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