Spring 2013. Volume 2, Issue 1
South Jersey Culture & History Center

On New Jersey Maps

by James Pomar

The Beaver Dam Map

Stockton College has recently received a rather interesting document, which some have hastily christened "The Beaver Dam Map." Encased in glass surrounded by a sturdy, wooden frame, The Beaver Dam Map looks as old as it is (1774). The large, scrolling text is written by a hand certainly more refined than one used to typing on a computer. Each letter is perfectly formed, but, to the modern eye at least, difficult to make out. Careful study of the text shows that the map is an accompaniment to some sort of land agreement. The map is labeled with precise measurements of a ten-acre rectangle of land (or as precise as possible). The land is on or near what is denominated the Isaac and Joseph Sharp Cedar Swamp. At each corner of the rectangle is drawn what appears to be a tree (cedars, most likely) that serve as landmarks for the measured ten acres. Such a map certainly serves no purpose to persons living today, but the interest of the thing is not practical. It is a snapshot (however small and obscure) of a time centuries before the one in which we live, and that is where the value of an item such as this lies.

Below is the text of The Beaver Dam Map, transcribed as accurately as possible. Because of wear at the map's creases, some words are illegible and are displayed thus: "_____."

Above the map, this text appears:

> N.B. These Lines are Protracted on a Scale of 10 Chains to an inch and laid down on the same degree as is Recorded in the Surveyor Gen. Office at Burlington, the true Course now varying one degree therefrom ~

Below the map, this much longer text appears:

> 1774 5 mo:
>
> Survey'd the above Lot of Cedar Swamp ____ within the black lines from the Cedar Swamp of Isaac and Joseph Sharp for William Zane which he purchased of said Joseph Sharp, situate in the Township of Woolwich and County of Gloucester containing ten acres agreeable to the above Plan. The dotted lines are part of the Bounds of said Isaac and Joseph Sharps Survey and the said ten acres convey'd to said William Zane is half the Breadth of the Swamp being part of said Survey, lying Distant from the end Line & Beaver Dam six chains and fifty… *The text is cut off here.*

Contents

Early New Jersey Maps

The earliest European settlers in New Jersey were Dutch. The province of New Netherland, encompassing the lands of New Jersey and the Hudson River Valley, was established in 1623, and it is for this reason that the first maps of the area are Dutch made. The first of these, Johannes de Laert's *Nova Anglia, Novum Belgium et Virginia* (1630) shows the Atlantic coast from New England to Virginia. New Jersey can be made out by recognizable formations such as Sandy Hook and the small notation at the southernmost tip: "C. May." Five years later, Willem Janszoon Blaeu's map *Nova Belgica et Anglia Nova* (1635) was the first to clearly show what are likely Long Beach Island and Island Beach. While successive maps are more detailed, and the picture of New Jersey transforms into a more recognizable shape, they are still highly inaccurate. It is not until 1639, when Johannes Vingboons draws his map *Manatus Gelegen op de Noot Rivier*, that more modern techniques would be used. Vingboons' is the first map on the area based on extensive coastal surveys, showing the land around New Jersey, Manhattan, and the Hudson Bay.

Nicolas Joan Visscher's 1656 map, *Novi Belgii Novaeque Angliae nec non partis Virginia tabula* is distinct for a number of reasons. The most distinctive feature is the orientation of the map. Previous Dutch maps faced west, whereas Visscher's map more recognizably faces north. But perhaps the most important aspect of the map is Visscher's error in drawing the Musconetcong River, which is shown connecting the Delaware and Hudson Rivers, making New Jersey an island. This error led to over a century of boundary disputes between New York and New Jersey until it was finally resolved in 1769. In 1690, Visscher's grandson updated the map, adding the names of Pennsylvania and "Nieu Iarsey" to the map. A map likely based on Visscher's map, *A Mapp of New Jarsey* (1675) by Englishman John Seller, is the first to show New Jersey on its own.

In 1674, under English rule, New Jersey was divided into East and West New Jersey. The division line moved from Little Egg Harbor north to a line on the Delaware River. Thus maps of New Jersey began to appear as maps of East and West New Jersey. One such map is John Thornton's *A New Mapp of East and West New Jarsey*, dated ca. 1700 and based on surveys by John Worlidge. The map shows West Jersey in great detail but pays little attention to the northeast. Luckily, around this same time John Reid was working on a map of the area mostly ignored by Thornton and Worlidge. *East Jarsey in America* (1690) is a much more accurate rendering of East New Jersey that shows many of the towns in the area Newark and "Berghen."

The eighteenth century saw the production of three more important pre-Revolution maps of the area surrounding New Jersey. The first, in 1749, was *A Map of Pennsylvania, New-Jersey, New-York, And the Three Delaware Counties* by Lewis Evans. The outline of New Jersey that Evans drew is by far the most accurate yet and would remain so for several years. New Jersey is still divided into two sections, but for the first time the county lines are drawn and several roads are visible. John Mitchell's *A Map of the British and French Dominions of North America* (1755), produced in England would become the standard for several years. The map is highly detailed, showing the boundary lines to the north claimed by both New York and New Jersey, county names for most of the state, and the road from Trenton to Amboy. This map surpassed that of Evans in terms of accuracy, and was used by newly independent United States to set state boundaries in 1783.

The final important map of this period, and one of the most popular, was William Faden's *The Province of New Jersey, Divided into East and West*, commonly called *The Jerseys* (1777). This was the largest map of the state yet produced, measuring 32 by 23 inches. Faden produced this map in consultation with surveys conducted in 1769 by Bernard Latzer, then a Lieutenant in the Royal Artillery. Faden's map shows county boundaries and some of the roads between towns, although these were drawn without the help of surveys. The map is inaccurate, with some of these errors nearly twelve miles off. Both the Faden and Mitchell maps demonstrate how far the mapmaking trade had progressed in little over a century, presenting a much more recognizable New Jersey than the earliest Dutch settlers ever produced.

Revolutionary War Maps

Maps of the 17th and 18th centuries served several purposes. These maps were works of art: often embellished with features of the land – wildlife, Native American settlements, forests – these maps would also make use of artfully designed fonts, scales and compasses. This does not mean that the early Dutch and English maps of North America had no practical use: towns, rivers and lakes were marked, and maps of smaller areas would often list landowners as well. The problem, however, is that these maps were highly inaccurate. Many of these maps were produced in Europe, often repeating the inaccuracies of other European-produced maps.

The Revolutionary War called for maps with more precision. Military maps are highly specialized, depicting only a few miles of land. Both the British and Continental armies required maps that showed as much detail as possible. The precise distance of roads, the plant life, the buildings and their inhabitants, rivers and streams, all of this had to feature on the map. Drawings of wildlife and other embellishments prominent on earlier maps have no purpose here. Robert Erskine, surveyor general to the Continental army, explained the requirements of producing a map in a letter to George Washington:

> A Surveyor might go to work with two Chain-bearers and himself; but in this case he must carry his own instruments, and some of them must frequently traverse the ground three times over at least…A great deal however may be done towards the formation of an useful Map, by having some general outlines justly laid down; and the situation of some remarkable places accurately ascertained; from such data, other places may be pointed out, by information and computed distances…Navigable Rivers, and those which cannot be easily forded, and likewise the capital roads, should be laid down with all the accuracy possible. (67-8)

Robert Erskine was born in Scotland in 1735. He sailed to New York in 1771 in order to help manage a mining business on the verge of bankruptcy in New Jersey. In 1775, Erskine helped form one of New Jersey's first militias. He first met George Washington in July 1777 and was asked to serve as geographer and surveyor general to the Continental Army. Over the course of his career Erskine helped prepare hundreds of maps, one-third of which involved New Jersey. Most of these maps showed the area surrounded by Ringwood, Phillipsburg, Trenton and Amboy, later Perth Amboy. Erskine's assistant, Simon DeWitt, helped to prepare more than a dozen road surveys and would eventually succeed Erskine as surveyor general after his death in 1780. Because Erskine and DeWitt performed meticulous surveys, as outlined in Erskine's letter to Washington, their maps are highly accurate with only minor errors.

Other surveyors were not as meticulous as Erskine and DeWitt. One such man was John Hills of the British army. Hills produced a series of maps, commonly referred to as the Clinton Maps after General Henry Clinton, that were copied from surveys conducted in 1766, and because of this the accuracy suffers. Another set of maps was produced by Louis-Alexandre Berthier of the French army. The six Berthier maps show the road from Suffern, NY to Trenton. Berthier's maps run from left-to-right and depict the road as essentially straight. Adding to this confusion is the lack of any north-pointing arrow. Thus it is evident that Berthier did not use instruments to survey the land, but simply drew what he saw.

These three sets of military maps illustrate the need for more accurate surveying techniques. Erskine and DeWitt, who made use of both equipment and assistants, produced the most accurate maps of this period while Hills and Berthier – using the dubious technique of copying existing surveys or not surveying at all – produced maps of markedly inferior quality. After the war, cartographers began to use the techniques of Erskine and DeWitt to map the state of New Jersey with more accuracy than existing maps ever had before.

The Nineteenth Century

At the turn of the century the state of New Jersey saw the need for highly accurate, detailed maps of the state. In 1799, the state legislature passed an act that was supposed to support production of such a map. This led to nothing, prompting the legislature to once again pass an act, this time in 1822, for the loan of $1000 to Thomas Gordon to prepare a map of the state. He did this mostly with the aid of existing surveys, though some additional surveying was required. In 1828, Gordon's *A Map of the State of New Jersey* appeared, engraved by Henry S. Tanner of Philadelphia. Not only does this map show every township of the state and more roads than any other previous map, it is one of the most accurate, with errors ranging only from five-eighths to three-fourths of a mile. Gordon's map was revised three times, in 1833, 1850, and 1854.

Gordon's map would be the standard New Jersey for nearly thirty years, until 1860 when William Kitchell published his map from new topographic and geodetic surveys. The first state geologist of New Jersey was Henry D. Rogers, who worked on a geologic survey of the state from 1836 to 1840, when the legislature withdrew funding. He was succeeded as state geologist by William Kitchell in 1854. Using a method known as triangulation, Kitchell and his assistants were able to survey three counties – Sussex, Cape May, and Monmouth – before funding was once again withheld in 1856. The state resumed funding in 1860 and demanded that a map of the state be drawn. The resulting map was prepared by Kitchell and Griffith Morgan Hopkins using the previously completed surveys and information provided by the U.S. Coast and Geodetic Survey. A unique feature of the Kitchell maps are seventeen vignette maps around the border, showing street plans of seventeen towns.

Kitchell resumed work on the survey for only one more year until his sudden death in 1861. This prompted the legislature, in 1864, to appoint George Hammell Cook as state geologist to complete the survey. Cook was granted $20,000 and four years to complete the survey. In 1868, with the help of G. M. Hopkins, Cook published a 900-page report with a four-section geological map of the state, which was lightly shaded to indicate the rock formations of the state. This map included all counties, towns, and municipalities and every road, although not all were labeled. Cook's report indicated the need for additional surveys, stating that existing maps were not accurate or detailed enough to create a useful geologic map of the state. The legislature appeared to agree and continued funding the New Jersey Geological Survey. In 1888, Cook issued his final report before his death stating that a topographic survey of the state was complete. In 1889, this work was published by the Geological Survey in the *Atlas of New Jersey*, a copy of which can be found in the Special Collections of The Richard Stockton College of New Jersey.

Further Reading

Snyder, John. *The Mapping of New Jersey*. New Brunswick: Rutgers UP, 1973.

New Jersey Road Maps of the 18th Century. Princeton: Princeton UP, 1964.

Ristow, Walter W. *American Maps and Mapmakers: Commercial Cartography in the Nineteenth Century*. Detroit: Wayne State UP, 1985.

Heusser, Albert A. *George Washington's Map Maker: a Biography of Robert Erskine*. New Brunswick: Rutgers UP, 1966.

Maps in Stockton's Special Collections

In 2007 Bill Leap donated to Stockton his considerable collection of materials preserving the history and culture of South Jersey, approximately 1,265 titles in a variety of formats: monographs, annuals, maps, atlases, newspaper and magazine articles. Within this collection was an 1849 map titled *Map of the Counties of Salem and Gloucester, New Jersey* by Robert Pearsall Smith. The map, now restored, hangs in the Richard E. Bjork Library.

While impressive, this map is not the sole item of interest donated by Mr. Leap, nor the only item pertaining to maps. Some of the more interesting – and varied – works of Special Collections are those pertaining to maps. Perhaps the most exhaustive account of mapmaking in New Jersey is John P. Snyder's *The Mapping of New Jersey*, a cartographic history of the state. Snyder examines the art of map making and its evolution from the earliest Swedish and Dutch settlers until the present day. For anyone interested in the topic, Snyder's book is the place to start.

Other history texts available in Special Collections include Samuel Steele Smith's works *The Battle of Trenton*, *The Battle of Monmouth* and *Fight for the Delaware, 1777*. These texts provide accounts of New Jersey's Revolutionary War history and include maps of the areas where the battles were fought. Another John Snyder text, *The Story of New Jersey's Civil Boundaries 1606-1968*, is a history of New Jersey's changing shape as township, county, and state boundaries developed. Another volume in the collection is *New Jersey Road Maps of the 18th Century* from the Princeton University Press. This slender text includes facsimiles of four sets of road maps drawn in the 18th century, one of which is the Berthier's *Map of the Road from Trenton to Amboy*. H. Jerome Cranmer's *New Jersey in the Automobile Age: A History of Transportation* chronicles the history of transportation in the state, along with several road and rail road maps.

But the collection is not only for the scholars;

there are a number of fun – and admittedly whimsical – books in the collection as well. There are several guidebooks of the state, *Away We Go! A Guidebook* and *Scenic and Historic Tours of New Jersey*, which provide interesting facts and locations to visit throughout the state. The latter provides a series of pre-planned day-trips for visitors to take. *Trails of the Jersey Shore* by canoe-enthusiast couple Joan and Bill Meyer is devoted to descriptions of various rivers and streams throughout the state, but the Meyers also provide hand-drawn maps of the trails which they describe. *New Jersey Birding & Wildlife Trails* is a similar text, but it is in the form of a gas-station, foldable road map. While there is some text, which describes the various wildlife that inhabits Atlantic County, the primary function of this item is to serve as a map. It shows Atlantic County, and highlighted in color are various trails that one can hike.

Stockton's Special Collections holds numerous atlases. While atlases take the form of a book, they are certainly not something you would take with you on a bus or train ride, or read at your leisure in a café. Atlases are large books, and this is because their purpose is not to tell a story – though some try. Rather, an atlas is a collection of maps capable of showing greater detail than any single map. This is because a single page can focus on a much smaller area, rather than have the need to show an entire continent, country, or state on a single sheet.

More than half of the atlases are county atlases, *Combination Atlas Map of Burlington County, NJ*, *Atlas of Monmouth County, NJ* and *Combination Atlas Map of Salem and Gloucester Counties, NJ* among them. These each feature a large map of the United States, and of New Jersey, accompanied by several smaller maps of each township and the more populous towns. These are interspersed with lithograph images of municipal buildings and industrial sites, such as a courthouse or farm. Biographical essays of the counties are a common feature of these atlases, describing the history of their founding and statistical data about their industries and populations. These atlases are more than mere maps, as they opt to convey the significance of the areas they survey.

Atlases in Stockton's Special Collections are all from the 19th century with one exception: *Auto Trails Atlas 1929*. This is a precursor of the more portable, functional road atlases we use today. It is a paperback road map of the northeastern United States, as capable a navigational device as Google Maps, though the advent of satellite mapping has surely rendered it slightly less accurate.

Bill Leap also donated a wealth of more traditional maps to Stockton. A highlight is a 1970 reprint of William Faden's famous *The Province of New Jersey, Divided into East and West, commonly called The Jerseys* of 1777. Also present is a reproduction of John Hills' 1809-1810 maps *A Plan of the City of Philadelphia and Environs*, which shows the towns of Newton, Gloucester, Deptford and Waterford. Reproductions of *A New and Accurate Map of New Jersey from the Best Authorities* (1780) and *A Map of Philadelphia and Parts Adjacent* (1752) by Nicholas Scull and George Heap are also present.

But the Leap maps are not all highly popular and influential maps such as the Faden. The bulk of the collection is given over to oddities and curios, such as Harry Marvin's *Some Old Highways of South Jersey* which shows the southern half of the state. Major towns are labeled and show the titular "old roads" that connect them. There are several old gas station-type road maps from the twentieth century, depicting everything from the American northeast and New Jersey State to historic sites in Camden and Atlantic counties. The collection bequeathed by William Leap to Stockton gives as much import to these relics of Americana as it does to classic maps of the state. While not as impressive as something like William Faden's *Plan of the Operations of General Washington against The Kings Troops in New Jersey* of 1777, the vast number of old road maps suggests the importance of travel and sightseeing to American culture. The Leap collection seems to argue that these seemingly trivial road maps and commemorative booklets have as much cultural importance as a map from the 18th century. And looking at them, it's hard to disagree.

F. W. Beers Atlantic County Map

Another recent donation to Stockton is a copy of F. W. Beers' *Topographical Map of Atlantic Co. New Jersey from Recent and Actual Surveys* (1872). Beers worked out of New York City and published extensively in the late nineteenth century. In addition to Beers' *Topographical Map of Atlantic Co.*, Stockton owns his 1873 publication *Atlas of Monmouth County*. This work closely follows the format of other atlases of the time, featuring a large map of the county along with maps of townships and lithographic images of Monmouth County. The map of Atlantic County, however, is quite different from this other work.

While called a "topographical map" there is very little topographical detail to be found. Contour lines are completely absent and there are no marked elevations. What the map most closely resembles is a property map. Businesses and properties are marked on the map and, where space is available, the business or property owner is named. If there is no space, as is the case for Atlantic City and several other towns, there are smaller vignette maps on which properties and businesses are labeled. Beers does this by numbering each property on the smaller maps and accompanying them with a list of each business or property owner. The vignette maps are, moving clockwise from the top left, Elwood, Mays Landing, Atsion, Egg Harbor City, Conoverville, Port Republic, Smithville, Absecon, Leedsville, Bargaintown, Mount Pleasant, Pleasantville, Risleyville, Leeds Point, Bakersville, Atlantic City, Hammonton and Weymouth. This is a large map, measuring 171 by 161 centimeters (67 x 63 inches).

The Geodetic Survey of New Jersey

In 1864, the New Jersey legislature approved an act that would fund the geodetic survey of New Jersey under the direction of George Hammel Cook. This act also required that Cook issue annual reports on the progress of the survey. The following was written by Professor Edward A. Bowser, who, in the service of the United States Coast and Geodetic Survey, was occupied between 1874 and 1888 in fixing "with care and accuracy the geographic points which form the basis of all our maps." It appears on pages 10 to 13 of George Cook's report to the state, published in 1888, the year in which the Geodetic Survey of the state was completed. This volume is held in Special Collections at Stockton College.

The Geodetic Survey of New Jersey

The Geodetic Survey of the State was made in order to fix accurately the latitudes and longitudes of points in the various parts of the State. They were necessary for furnishing correctly-located points about which the Topographical Surveys could be arranged and located. This work was done under the direction of the United States Coast and Geodetic Survey, and by its officers, and at its expense. Being for the special use of New Jersey, it was, however, always directed so as to meet the needs of its Topographical Survey.

Reconnoissance

This Survey was begun in June, 1875. The primary stations, Mount Rose, in New Jersey, and Newtown, in Pennsylvania, accurately-known stations of the United States Coast and Geodetic Survey, were chosen for the starting points. Several months were passed in making a reconnoissance for stations suitable for this Survey. In the following summer this reconnoissance was improved by slightly altering the position of some of the stations and selecting new ones. By continuing the reconnoissance from season to season, it was made, finally, to include the northern part of New Jersey, from the Coast Survey primary triangulation, at Mount Rose and Newtown, northward to the northern boundary of the State, the stations being from 10 to 30 miles apart.

In the latter part of 1875, I obtained the services of Mr. A. A. Titsworth, a graduate of Rutgers Scientific School, of the Class of 1877, and now Professor of Graphics and Mathematics in Rutgers College. Prof. Titsworth has been with me from that date to the present, excepting the two years, 1885 and 1886, when I was assisted by Mr. John E. Hill, a graduate of the same institution, of the Class of 1884.

The labor involved in making a reconnoissance over a thickly-wooded country, containing no prominent elevations, is very considerable. The uniformity in height of the hills and ridges, their sameness in contour, and the consequent difficulty of identification, added to the dense undergrowth through which lines of sight must be cut, greatly increase the hardships of the work. An essential point in reconnoissance is to determine, beyond the possibility or doubt, the intervisibility of every primary line essential to the scheme. In the case of lines 20 or 30 miles long, and in hazy weather, this is often very difficult. The greatest care has to be taken to obtain only "well-conditioned" triangles. In the older works on Geodesy, 30° is prescribed as the smallest admissible angle in a primary chain of triangles, but in the case of triangles forming parts of quadrilaterals, the above rule need not be rigidly adhered to.

Triangulation

Early in August, 1876, scaffolds and tripods were erected at Mount Rose and Goat Hill, each 40 feet high, to support the theodolite[1] and observer, and in order to see over the intervening ridges without laborious and expensive cutting through the timber. The signals observed on were poles, either black or white, or with alternate bands of each, depending upon the background, or upon the atmospheric difficulties. In the case of long lines, or those rendered difficult by haze or smoke, the heliotrope[2] was used. When the scaffolds and signals were built, Goat Hill and Newtown were occupied, and all the angles at these stations were measured in the course of the season. The instrument used was a 14-inch repeating theodolite with a large telescope. In measuring the primary angles, each one was determined by not less than 6 sets of measurements, each set consisting of 6 repetitions in the direct and 6 in the reversed position of the telescope, thus making 72 measurements in all. In the triangles belonging to the tertiary series, such as those for determining the position of church-steeples, chimneys and other auxiliary points, to facilitate the topographical work, 2 sets of measurements were taken, each of 3 repetitions in the direct and 3 in the reversed position, making 12 measurements. All these observations had to be taken only under the most favorable conditions, when the air was clear and steady. The probable error of an angle in the primary triangulation was in no case allowed to exceed 0".3. To attain this degree of accuracy, days were frequently spent without a single satisfactory observation, and sometimes whole weeks. Patient waiting, so as to observe under no doubtful conditions of the atmosphere, however annoying, or whatever hardship it may entail, is better than to allow any doubt to cloud the results.

In the following seasons of 1877, 1878, 1879, 1880, 1881, 1882 and 1883, the stations Mount Rose, Pickles, Mount Horeb, Mount Olive, Haycock, Montana, Culver's Gap, High Point, Hamburgh, Bear-Fort, Bald Hill, High Mount and High Torne, were occupied, and all the angles measured, primary and tertiary.

In the season of 1883 the Survey was begun in the southern part of the State. Nine stations were selected, starting with the line Mount Holly, Apple-pie Hill, and extending southward. As the country is flat and thickly covered with tall timber, high scaffolds had to be built at nearly all the stations, from which to observe. In the seasons of 1884, 1885, 1886 and 1887, the stations Mount Holly, Apple-pie Hill, Berlin, Martha, Blangie, Hammonton, Richland and Newfield, were occupied, and all the angles measured, besides a great many observations for determining the positions of tertiary points.

Office Work

At the close of each summer, the computations were made of the field-work of that season. These computations were carried on with all the refinement that the present condition of the science of Geodesy will permit. The observed angles were adjusted by the "Method of Least Squares;" the spherical excess was computed, and the difference between this and the observed excess was divided among the angles proportionally; then the triangle sides, and the geodetic latitudes, longitudes and azimuths, were computed of all the lines and stations in the chain of triangles. These computations, with a sketch showing the progress of the Survey, and a report of the season's work, and the records, were sent to the Superintendent of the United States Coast Survey, at Washington.

Primary geodetic work is executed with the greatest possible accuracy. Primary triangulation over any extended area must be so laid out and conducted that its results shall approach as near to absolute precision as the present condition of scientific research, theoretical, instrumental and practical, will permit. No refinement in observation or reduction must be omitted which it is possible to supply. The uncertainty in the resulting linear measures of primary geodetic work "may be less than about 1/100000 of the length, and is rarely as great as 1/60000 (which represents an error of about one inch to the mile). To reach a higher standard of excellence, as, for instance, 1/200000, or even a smaller fraction, requires the application of the most refined means at our disposal." In the Survey of Northern New Jersey, in closing the hexagon at Montana, with Pickles for center, the following four equations had to be satisfied: First, the *length* of the connecting side, Pickles-Montana, must come out the same, when arrived at by computation in either of the triangles, Pickles, Montana, Mount Olive, or Pickles, Montana, Haycock. Second, the resulting *azimuths* of this line must be the same. Third and fourth, the *latitude* and *longitude*, respectively, of Montana, must show no discrepancy. As the computation of these two triangles was nearing completion, considerable anxiety was felt as to how the work was coming out. The hexagon closed as follows: The azimuths of the connecting side, Pickles-Montana, as arrived at from opposite directions, agreed within 1". The lengths of this line agreed within 1/10 of a metre (or about 1/4 of an inch to the mile). The latitude of Montana agreed within 0".006. The longitude agreed within 0".001.

Monuments

With a few exceptions, each primary station is marked with a granite post, 4 feet long, dressed 6 inches square at one end, and for a length of 6 inches, with the letters "U. S." cut in each of the four faces, and a triangle on the top. This post is set in hydraulic cement, to within 6 inches of the top. In the case of a few stations selected on the solid rock, the mark is a copper bolt, driven into a hole which is drilled into the rock.

The tertiary points are not generally well marked. Each of them should have a durable stone post for the security and identification of the station. I have several times suggested that an appropriation be made for marking them, but no provision has yet been made for this purpose. It is of the highest importance that each triangulation point, whether primary or tertiary, shall be so marked, and the record of the marking made so clear and definite that the exact position can be found at any future time.

E. A. Bowser

[1] A theodolite is an instrument used to measure the angles in the horizontal and vertical planes.

[2] A heliotrope is an instrument that reflects sunlight over long distances to mark participants in a land survey.

New Netherland and New England, W. J. Blaeu, 1635. » points to Cape May.

Sandy Shorts is the occasional newsletter of the South Jersey Culture & History Center, based at Stockton College.
For more information about the Center, see blogs.stockton.edu/sjchc/ or contact the director, Thomas.Kinsella@stockton.edu.