Beyond the Classroom: Finding the First Cornerstone

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WHAT COULD TWO DOZEN MIDDLE SCHOOL STUDENTS, two teachers, land surveyors, journalists, divers, college professors, lawyers, archaeologists, an author, and an 85-year old retiree possibly have in common? The answer is their insatiable quest to redefine colonial American history. From geodesy to glaciology, from geology to hydrology, from navigation and cartography to oceanography, and from archaeology to pedagogy, the search for the first cornerstone has taken on a life of its own.

The Cornerstone Project is an open-source history project on Cape Cod. This inquiry-based undertaking is a community partnership involving teachers, surveyors, lawyers, archaeologists, astronomers, and a host of others. For the past two years, the group has been searching for artifacts and primary documents related to the first land survey of Plymouth Colony and possibly of the New World.

Cape Cod is the idyllic island off of Massachusetts known for its miles of unspoiled beaches, its cranberry bogs, and its history. In recent years, the Cape has become a summer destination for travelers from near and far. More concerned with finding a restaurant that has no wait for a lobster roll or a place to park at the beach, tourists (and even the locals) are not likely to notice the shape of Cape Cod or the fact that it forms a natural compass rose. Few travelers arrive by boat like the Pilgrims did; most sit in traffic waiting to cross either the Sagamore or Bourne bridges or they choose to fly into the Barnstable Municipal Airport. Such modern

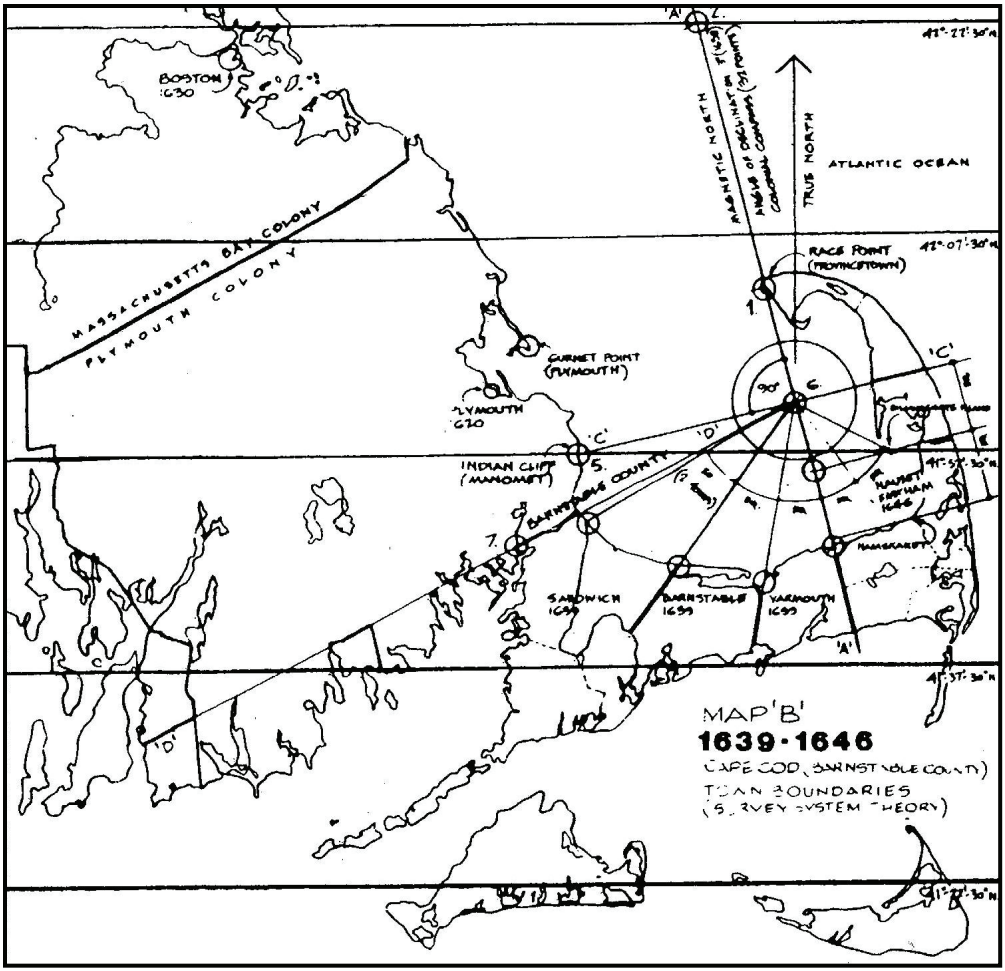

Figure 1: *Cape Cod Survey Boundaries I. From Morse Payne, "The Survey System of the Old Colony," in* Three Centuries of the Cape Cod County, Barnstable, Massachusetts, 1685-1985 *(West Yarmouth, MA: Barnstable County, 1985), <http://www.ccas.ws/surveysystem.html>.*

conveniences have eliminated the need for a ship, a sextant, and a skipper. Unless you view the Cape on Google Earth, you are unlikely to notice the simple navigational beauty of Cape Cod, which likely led to our Pilgrim ancestors' choices when it came time to distribute the land.

Is it merely a coincidence that Cape Cod's town bound lines radiate at 22.5 degrees from one another? A group of my students at the Cape Cod Lighthouse Charter School (CCLCS) and I think not. These lines are

incontrovertible proof that the Pilgrim elders used a center point off the coast of Truro in Cape Cod Bay to survey and set the ancient town bound lines. How we came to corroborate this theory is a tangled tale of geodesy and glaciology, geology and hydrology, navigation and cartography, and most importantly, archaeology and pedagogy known as The Cornerstone Project.

In the 1622 text *Mourt's Relation*, Edward Winslow observed, "the bay is so round and circling, that before we could come to anchor we went round all the points of the compass."[1] Coincidentally, the most reliable device onboard with the Pilgrims was their navigational compass. In 1985, architect H. Morse Payne was inspecting old charts and maps of Cape Cod when he recognized that the ancient bound lines of Cape towns all projected to a single junction point located in Cape Cod Bay. There are a number of theories about how this was accomplished. One idea is that the Pilgrims might have anchored a ship and some Pilgrims with a compass off the coast of Truro who would communicate with flashes of light to people on horseback riding along the shore. This would allow something akin to a "bird's eye view" and facilitate setting boundaries. Payne deduced that the Pilgrim Elders who subsequently settled on Cape Cod (the first crew to arrive aboard the *Mayflower*, including William Bradford, Myles Standish, and John Howland among others) used this central axis point which was positioned along the magnetic north line to conduct the first land survey in the New World; aligning the central axis with magnetic north would be indisputable since it was a fixed point. In the resulting boundaries, a vertical line drawn along magnetic north on Cape Cod would run from Race Point in Provincetown through a central point in Cape Cod Bay to the southern shore of the Cape between the towns of Dennis and Harwich. A horizontal line would run from Indian Cliff, just south of Plymouth, through the central point to the eastern shore of the Cape in Truro, hence forming a right angle (see Figures 1 and 2).

Payne asserted the notion that the Cape's "ordering of towns" was based on a series of "radiating lines" and that the original town bound lines were indicated by the careful and deliberate placement of large rocks. Using natural geographic features to set boundaries was a commonly used system throughout Europe at the time; this system is called metes and bounds. Lastly, Payne noted that this central axis, positioned precisely on the magnetic north line, was drawn between two of the Cape's prominent land features—Race Point at Provincetown and old Bound Brook at Quivett Creek. Provincetown is at the very tip of Cape Cod, is visible at a great distance, and is a point along magnetic north. Provincetown is visible on a clear day from Quivett Creek. It is also important to remember that there was much higher visibility along the Cape 400 years ago. After years of

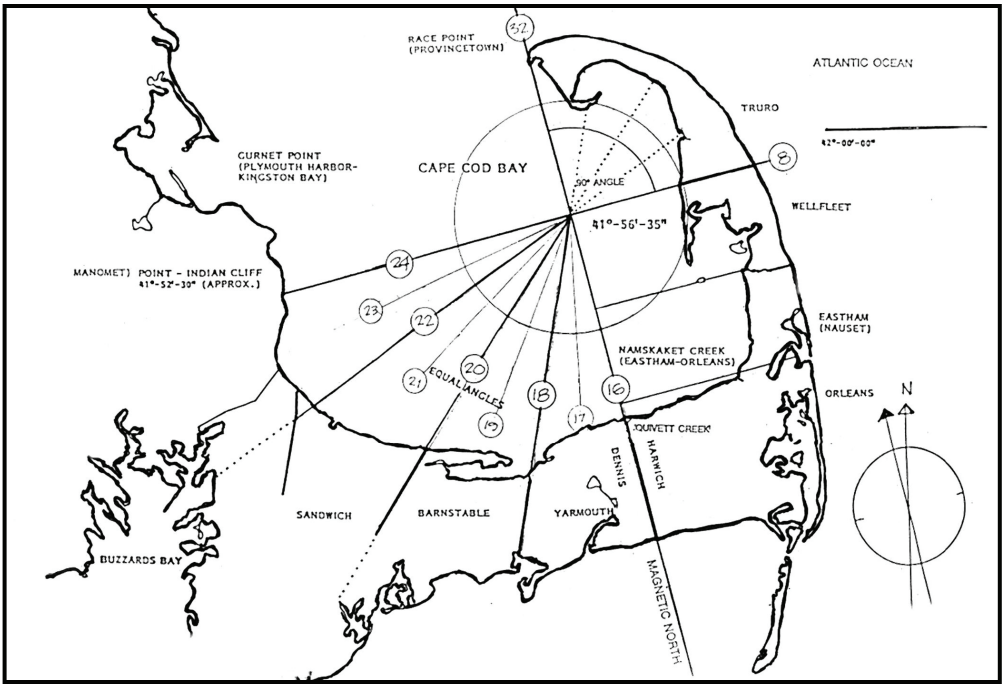

Figure 2: *Cape Cod Survey Boundaries II. From H. Morse Payne, "'The Ordering of Towns': Massachusetts Bay Colony 17th Century Land Strategy,"* New England Antiquities Research Association Journal *36, no. 1 (2002): 16, <http://www.neara.org/payne/orderingtowns.pdf>.*

historical research, Payne published these findings in professional journals. Though thought-provoking, Payne's theory neglected to turn any heads for twenty years.

In 2007, Michael Farber, a retired lawyer and surveyor from West Virginia, happened upon Payne's theory while perusing a commemorative book on the History of Barnstable County in a Cape Cod library. Farber tracked down Payne in a retirement community in Bedford, Massachusetts and, after speaking with him, decided to put Payne's theory to the test. After agreeing to take the lead in conducting the field work necessary to prove Payne's theory, Farber quickly realized that he would not be able to go it alone. Acquaintances suggested that he contact CCLCS which is known for its collaborative work with community partners like the Cape Cod Museum of Natural History, Friends of Pleasant Bay, and the Massachusetts Audobon Society's Wellfleet Bay Wildlife Sanctuary and its progressive approach to education through project-based learning and the integration of multiple intelligence theory. My colleague, science teacher

Paul Niles, and I jumped at the opportunity to get involved in such an exciting interdisciplinary endeavor. We were thrilled at the prospect of partnering with scientists from Woods Hole Oceanographic Institute (WHOI) and conferring with professors from MIT and Clark as well as furthering our partnerships with the Orleans Historical Society and the Cape Cod Museum of Natural History. We felt that it was important to collaborate with a number of experts in a variety of fields since the project spanned so many disciplines. Support and guidance from the Massachusetts Board of Underwater Archaeological Research (BUAR) was critical since some of the rocks we were interested in fell below the high tide line and therefore into the jurisdiction of BUAR. Our work with WHOI stemmed from the idea that there may have been some artifacts or sites of interest located underwater. We looked to their researchers for information concerning anomalies in the depth of Cape Cod Bay and for guidelines around the use of a sub-bottom profiler which we contemplated using in Orleans Town Cove, for example. These collaborations were the result of our open-source investigation, research which utilizes partnerships in an effort to generate a final product or reach a conclusion. Many of our partners stemmed from pre-existing professional relationships among group members. That spring, we team-taught a seminar based on Payne's theory.

The students spent their spring term reading and interpreting primary documents such as *Mourt's Relation* and *The Winthrop Papers*, meeting with community members, keeping a blog, speaking with reporters, and searching for clues out in the field. Arguably the most exciting moment came when our group ventured to Town Cove in Orleans in search of an "X Rock" that the students first saw in a circa-1900 source in the library's H. K. Cummings collection. The group split in half for their investigation. After nearly an hour, one of the students came running down the beach towards the other half of the group. Out of breath, he gasped, "We found it! We found the X Rock!" The discovery of this rock was significant because it marked the mid-point of the southernmost line parallel to the line intersecting with the magnetic north line. The group of students, teachers, and parents crowded around the rock amidst the rising tide. One face of the rock featured an X that appeared to be artificial, and there were traces of corrosion throughout the incision which could have indicated use of a metal tool to incise the rock.

It became clear that our group would need special permission to proceed with our work. It was also evident that the rock would need the same protection afforded other archaeological sites. We took the next logical step by contacting the Board of Underwater Archaeological Resources in Boston, Massachusetts to protect the rock so that it could not be moved and so that samples could not be taken without the knowledge of BUAR.

This was a necessary and significant step because the rock fell under the jurisdiction of BUAR at high tide. We were visited by Victor Mastone, director of BUAR. After an informative presentation on the process of underwater archaeology from Mastone, students presented him with an application for a Special Use and Reconnaissance Permit which would allow "for the non-destructive inspection and identification of underwater archaeological resources ... characterized by minimum site disturbance." The permit was ultimately granted on July 23, 2008 once a local archaeologist signed onto the project. It also became evident that we would need to substantiate our claims by finding evidence in primary sources. Students made their way through sections of *Mourt's Relation*, *The Winthrop Papers*, and the earliest records for the town of Eastham. *Mourt's Relation* provided an excellent foundation for understanding the Pilgrims' navigation of Cape Cod Bay, while *The Winthrop Papers* chronicled the Pilgrims' settlement of Cape Cod and provided insight into their relations with the Native Americans and how they ultimately distributed land among the settling families. Some of the supporting evidence included a reference in a 1654 court order describing the bound line between Yarmouth and Eastham which correlates to Payne's rendering of the original Eastham line. The court order was the first written reference to the bound lines established by the Pilgrim Elders. At this point, the rocks and the documents literally lined up.

On a humid summer night in July 2008, Farber hosted a community forum on the Cornerstone Project. Moderated by a local reporter and attended by author William Martin (*Cape Cod* and *Back Bay)*, several Cape Cod surveyors, local teachers, Cape Cod Museum of Natural History officials, a host of interested community members, and Morse Payne himself, the group engineered the first public presentation of the information uncovered by the project to date.

With yet another school year underway in September 2008, twelve more CCLCS students dedicated themselves to furthering the work of the Cornerstone Project. Our tasks were daunting; among them, beginning collaboration with the Cape Cod Museum of Natural History on a permanent exhibition and continuing the research and field work necessary to advance the project.

That fall, the Cornerstone Project made swift progress. Farber came across a pivotal piece of evidence in the search for the Cornerstone. He discovered the 1797 bound line marker delineating Orleans from Eastham. This stone, inscribed with an "O" and an "E", represents the "only existing true town line 'corner' along the entire length of the Eastham-Orleans Town Line." (In 1976, Schofield Brothers made a Perambulation Report to the Town of Eastham.) The boundary was described in 1797:

> Beginning at the mouth of Rock-harbor river ... thence a due east course into the middle of Boat-meadow river; thence up the middle of said river to its head; thence running southerly through the center of the meadow and swamp, along Jerimiah's Gutter (so called) into the middle of Town cove; thence down the center of said cove to Stone island; thence an east southeast course into the Atlantic[2]

Several weeks later, we inspected an inscribed rock which was believed to delineate the bounds between the towns of Yarmouth and Barnstable. The bound line was referenced in a 1641 Plymouth Court record that had been agreed upon by two prominent Pilgrim Elders, Myles Standish and Edward Winslow, and the settlers of Yarmouth and Barnstable. A week later, a small group blazed a trail through the woods behind a local restaurant with a rock carver, reporter, and video crew in tow. The rock carver brought along samples of Colonial-era letters for comparison. He deduced that the rock had been carved by a skilled craftsman and that the letters were in keeping with the style of the era. The group unearthed a remarkable rock flush with the ground that appeared to be a glacial erratic which had been carved with "Y x B". Such glacial erratics are significant because they are so large and because they are not indigenous to the area; the only means of transport was by a glacier. Hence, the engraved rocks were likely in the area when the Pilgrims set the bound lines and because of their size, they made excellent and obvious markers. Even more amazing was that the "x" at the center of the carving aligned with magnetic north (or what had been magnetic north at the time of the Pilgrims). We believe that this rock reflects the bound lines determined by the June 17, 1641 general court order. Both the "Y x B Rock" and the "O E Rock" lay at the exact coordinates proposed by Morse Payne's theory.

In December of that year, a crowd of nearly 100 attended the Cornerstone Forum at the Cape Cod Museum of Natural History to hear group members weigh in on our findings and continued work. By the time the various speakers finished outlining their research, there was little doubt among audience members that the Cornerstone Project had amassed some truly convincing evidence. Word of this group continued to make its way around Cape Cod, and in early 2009, several of us appeared on Spectrum, a local radio show promoting the open-source nature of the project. Because this project has been open to virtually anyone who is interested and willing to collaborate, we were delighted to attract even more local interest. This broadcast garnered a tremendous amount of public attention, which resulted in several new leads, and soon we had e-mails and phone calls from local residents who had inscribed rocks on their property, caches of old family documents, or old family anecdotes which they wanted us to examine.

The most significant information came when we began pursuing a lead about the location of the first windmill on Cape Cod which came from a local resident who had heard us on the radio. Its original location in Orleans, if pinpointed, would verify the southwest corner of the ancient Orleans bound line. Following a host of clues and documents such as deeds to land tracts, court records, and local family legends, a group of twenty-five local residents and reporters joined Farber, some of my students, and me as we unearthed incontrovertible proof of Pilgrim use of this site as evidenced in the artifacts we discovered—including Pilgrim-era stakes, hinges, and metal fittings. We had discovered yet another piece of proof to substantiate Payne's theory.

The Cornerstone Project continues to seek artifacts and primary sources related to the first land survey of Plymouth Colony and possibly of the New World. Whether or not the speculation about the Pilgrims' surveying methods turns out to be valid, investigating the logic behind the conjecture, learning about the technology necessary to conduct a search, and reviving the seventeenth-century mapping and surveying techniques the Pilgrim elders may have used have proven to be a treasure trove of exciting curricular opportunities for students at the Cape Cod Lighthouse Charter School. This project also clearly demonstrates the potential for middle school students to excel when given even the most complex inquiry-based curriculum; given the necessary tools, resources, and guidance, they have the ability to make significant contributions to their chosen fields of interest.

Notes

1. Edward Winslow and William Bradford, *Mourt's Relation: A Journal of the Pilgrims at Plymouth* (London, U.K.: 1622).
2. Simeon L. Deyo, ed., *History of Barnstable County, Massachusetts* (New York: H. W. Blake & Co., 1890), 747-786.

Appendix I: Lesson Plan

LESSON TITLE	Finding the First Cornerstone
FOCUS QUESTION	How did the Pilgrims first divide and distribute the land on Cape Cod?
TEACHING METHODS	Brainstorming, Direct Instruction, Cooperative Learning, Independent Research
LEARNING OBJECTIVES	Students will: • Conduct research using primary sources • Understand why the Pilgrims divided up the land on Cape Cod as they did
MATERIALS	• Map of Cape Cod • Compass • Pencils • *Mourt's Relation: A Journal of the Pilgrims at Plymouth* • Payne, H. Morse. "The Ordering of Towns: Massachusetts Bay Colony 17th Century Land Strategy." *New England Antiquities Research Association Journal* 36. no. 1 (2002), <http://www.neara.org/payne/orderingtowns.pdf>.
ENGAGE	Ask students to brainstorm a list of what they think a society needs in order to survive. Once students are done, ask them to share their ideas. Record their ideas on the board or on chart paper so that you can refer back to this list later. (*The list should include access to water, fertile soil, natural defenses, natural resources, etc.)* Give students a blank map of Cape Cod with no boundary delineations. Show them where the magnetic north line is. Ask them to think about how they would divide up the land fairly into eight sections so that everyone would have what they needed. Have students mark up their maps to show how they would distribute the land. When students have completed this task, ask them to share their ideas and explain why they chose to divide up the land as they did. Have the class offer constructive criticism about everyone's ideas. After the discussion, distribute "Map B" to students. Show the class these additional historic maps: <http://www.slade-associates.com/historical.htm>. Discuss the placement of the boundaries and why the Pilgrims would have chosen to divide the land this way.

BUILD KNOWLEDGE	Have students read an excerpt from *Mourt's Relation* (pp. 16-17) which can be found online at: <http://books.google.com/books?id=OEzGCrVmUssC&printsec=frontcover&dq=mourt%27s+relation&source=bl&ots=2lfotUjhY1&sig=thnwfIT8EaX6kUIsd5oenZqya8&hl=en&ei=HGCvS87oJMOqlAfhu-SFDg&sa=X&oi=book_result&ct=result&resnum=7&ved=0CCkQ6AEwBg#v=onepage&q=&f=false>. Then have students read H. Morse Payne's article, "The Ordering of Towns: Massachusetts Bay Colony 17th Century Land Strategy," <http://www.neara.org/payne/orderingtowns.pdf>. Discuss the following questions: 1. Why would the Pilgrims have used the Roman surveying system to the east of the magnetic north line and the so-called "pie-shaped" system to the west of the line? 2. How would the Pilgrims have delineated the boundaries between towns? 3. How would the Native Americans have reacted to the Pilgrims' organizing of the land that they had once inhabited?
APPLY KNOWLEDGE & REFLECT	Ask students to write a brief essay in response to the following prompt: *When the Pilgrims arrived on Cape Cod, what were some of the challenges that they faced? How did they choose to resolve these issues? What evidence is there for researchers to prove that the Pilgrims ordered the towns in a particular way?*
RECOMMENDED RESOURCES	See Appendix II

Appendix II: Resources

Cape Cod and Massachusetts

- Cape Cod Genealogcial Society. December 1994 Bulletin. Vol. XX, No. 4, Issue 72.
- Heath, Dwight, ed. *Mourt's Relation: A Journey of the Pilgrims at*

Plymouth. Bedford, MA: Applewood Books, 1986.

- Morse Payne Cornerstone Project. Via Cape Cod Astronomical Society, <http://www.ccas.ws/morsepayneproject.html>.
- Payne, H. Morse. "The Ordering of Towns: Massachusetts Bay Colony 17th Century Land Strategy." *New England Antiquities Research Association Journal* 36, no. 1 (2002), <http://www.neara.org/payne/orderingtowns.pdf>.
- Philbrick, Nathaniel. *Mayflower: A Story of Courage, Community and War*. New York: Penguin, 2007.
- *Winthrop Papers*. Volume III, 1631-1637. Massachusetts Historical Society. 1943.

Land Allotments and Land Distribution

- Allan, David Grayson. "Lesson 2: Vacuum Domicilium: The Social and Cultural Landscape of Seventeenth Century New England." Via Memorial Hall Museum Online, <http://memorialhall.mass.edu/classroom/curriculum_12th/unit1/lesson2/allen.html>.
- Bangs, Jeremy Dupertuis. "A Level Look at Land Allotments, 1623." Via Society of Mayflower Descendants in the Commonwealth of Pennsylvania, <http://www.sail1620.org/history/articles/123-land-allotments.html>.
- Egelston, Melville. *The Land System of the New England Colonies*. Baltimore, MD: Johns Hopkins University, 1886. Via Google Books, <http://books.google.com/books?id=vQMEAAAAMAAJ&dq=land+system+melville+egleston&printsec=frontcover&source=bl&ots=eF119bA8HE&sig=aqh03vb04PIBL7vKVzoSi_ck-bk&hl=en&ei=SDKnSdbSB9W5twfmwZ3wDw&sa=X&oi=book_result&resnum=1&ct=result#PPA1,M1>.
- Price, Edward T. *Dividing the Land: Early American Beginnings of Our Private Property Mosaic*. Chicago, IL: University of Chicago Press, 1995. Via Google Books, <http://books.google.com/books?id=8Vc76gmpzMgC&pg=RA1-PA7&lpg=RA1-PA7&dq=first+land+survey+plymouth+colony&source=bl&ots=B6JO3K5TP7&sig=XHyBFQFewK9brSk40JrDToN6rhM&hl=en&ei=2O-lSeufC5aitgfmn9HOBA&sa=X&oi=book_result&resnum=9&ct=result#PRA1-PA29,M1>.
- Sears, Ray. "History of Barnstable County, Massachusetts: Chapter IV, 1890." Via USGenWeb Archives, <http://files.usgwarchives.org/ma/barnstable/hbch04.txt>.

Colonial Surveying Instruments

- Boston Rare Maps. "Mapping Massachusetts, 1600-1750." BRM

Newsletter No. 3, <http://www.bostonraremaps.com/pdf/BRM%20newsletter%20no.%203.pdf>.

- Lock, Jeffrey. "The Art of Colonial Surveying Instruments." *The American Surveyor*. December 2006, <http://www.amerisurv.com/PDF/TheAmericanSurveyor_Lock-ArtOfColonialSurveyingInstruments_December2006.pdf>.
- PrimaryResource.org. "Stone Walls of New England: Gunther's Chain Conversion Chart," <http://www.primaryresearch.org/stonewalls/gunther.php>.

Yarmouth and Barnstable Bounds

- Swift, Charles F. *Historty of Old Yarmouth: Comprising the Present Towns of Yarmouth and Dennis*. Yarmouth Port, MA: published by the author, 1884. Via Google Books, <http://books.google.com/books?id=eq1qzgjQqqkC&pg=PA28&lpg=PA28&dq=june+17+1641+yarmouth+barnstable&source=web&ots=342BaFP8wd&sig=0P-RIx6gsfoe1ToriKidklgD_tQ&hl=en&sa=X&oi=book_result&resnum=1&ct=result#PPA31,M1> (see p. 31 in particular).

Media Coverage of the Cornerstone Project

- Cape Cod Lighthouse Charter School. "The Cornerstone Project," <http://cclighthouseschool.org/act/cornerstone.php>.