The PORTOLAN

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2007 Ristow Prize for Academic Achievement in the History of Cartography

Mapping for Peace: The American Inquiry and the Paris Peace Conference, 1918–1919

By Wesley J. Reisser

Border Proposals for Istria & Northern Dalmatia (Border proposals compiled from the "Black Book" Map # 15 and linguistic data from Dominian, 1917 pg. 82).). © Wesley J. Reisser.

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Reprint of "Henry F. Walling and the Mapping of New England's Towns, 1849–1857"

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Thomas F. Sander
Editor, *The Portolan*
Post Office Box 10793
Burke VA 22009-0793
E-mail: Sanderva@erols.com

SEND ALL NON-PORTOLAN CORRESPONDENCE TO:

John W. Docktor
3100 N. Highway A1A, PH A1
Ft. Pierce FL 34949-8831 USA
E-mail: washmap@earthlink.net

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FROM THE EDITOR

The winner of the 2007 Ristow Prize took a fresh look at the post World War I boundary changes in Europe in light of new GIS technologies; his winning paper is in this issue of your journal. One hears much about the 'great' cartographers of the golden age in Europe, but there is less heard about American cartographers who did some very interesting work in the 19th century. In this issue WMS members have contributed articles to enhance our knowledge of Amos Lay and Henry Walling. What map collector does not own a map necktie or map scarf? Len Rothman tells us about his large collection. Baltimore's Festival of Maps is in progress NOW. A WMS Field Trip is planned for May 3 and the nearness of Charm City will permit visits at other times too. While not as large as Chicago's, Baltimore's Festival still presents many opportunities to enjoy mapping of all types—see article inside. For more on these items, book reviews, news of past and future Society events, and much more, look inside this issue.

Tom

Henry F. Walling and the Mapping of New England's Towns, 1849–1857

By Michael Buehler

Henry Walling (1825–1888) was arguably the most accomplished and interesting American mapmaker of the mid-late 19th century. His output was astonishing for its scope and quality, setting new and higher standards for others to emulate. Equally striking was the sheer volume of his output: During a 40-year career he was responsible for at least 117 large-scale maps of American towns and counties, nearly 20 state maps and atlases, substantial contributions to the work of the U.S. Coast and Geodetic Survey and the U.S. Geological Survey, and important academic publications.

This article will address the 60 large-scale, separately-issued maps of New England towns produced by Walling between 1849 and 1857. These merit attention on account of their distinct subject matter, the methods employed in their production, and their role in laying the groundwork for Walling's later accomplishments.[1] Following a brief description of the maps, I will attempt to reconstruct the sources he drew on, then offer an interpretation that treats his map-making practices as a rational strategic response to his competitive environment.

Undated photograph of Henry F. Walling (courtesy, David Bishop Skillman Library, Lafayette College)

WALLING'S TOWN MAPS

The 1850s saw a surge in the publication of large-scale, separately-issued maps depicting New England towns. The numbers were dramatic: Setting aside the rich cartographic record of Boston, prior to 1850 perhaps 200 such maps had been published, while a similar number were issued in the 1850s alone. This phenomenon was driven by social and economic factors that increased demand for such maps, which fortuitously coincided with technological developments that enabled mapmakers profitably to meet this demand. These factors have been ably discussed elsewhere.[2]

Walling was by far the most prolific contributor to this expansion. His earliest published works were maps of Providence, Rhode Island and Northbridge, Massachusetts, both published in Providence in 1849 with Samuel Barrett Cushing, a civil engineer and Walling's early employer. In or around 1850 he established himself on his own and moved to Boston, relocating in 1856 to New York City as his business expanded. Between 1849 and 1857 he produced at least 48 maps of towns in eastern and central Massachusetts, as well as 12 of towns in Maine, New Hampshire and Rhode Island. Interestingly none were published by Walling himself: those issued prior to 1852 bear the imprints of private publishers, usually local

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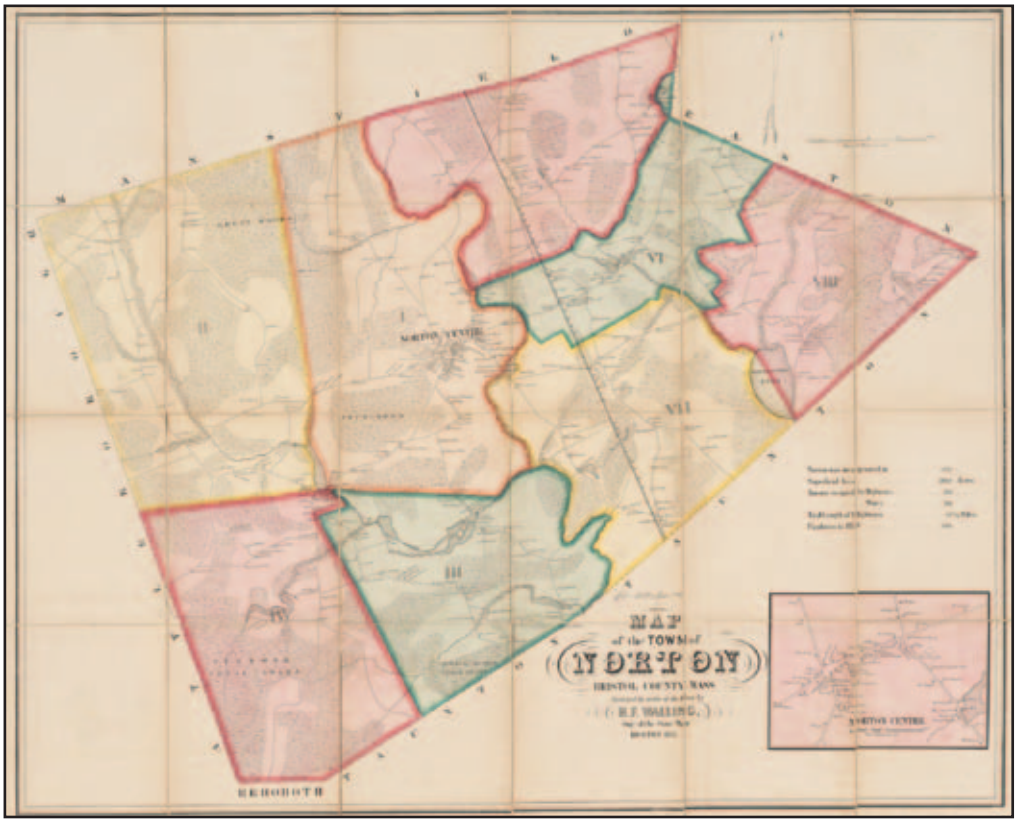

Figure 1: *Map of the Town of Norton*, 1855 (A typical Walling town map)

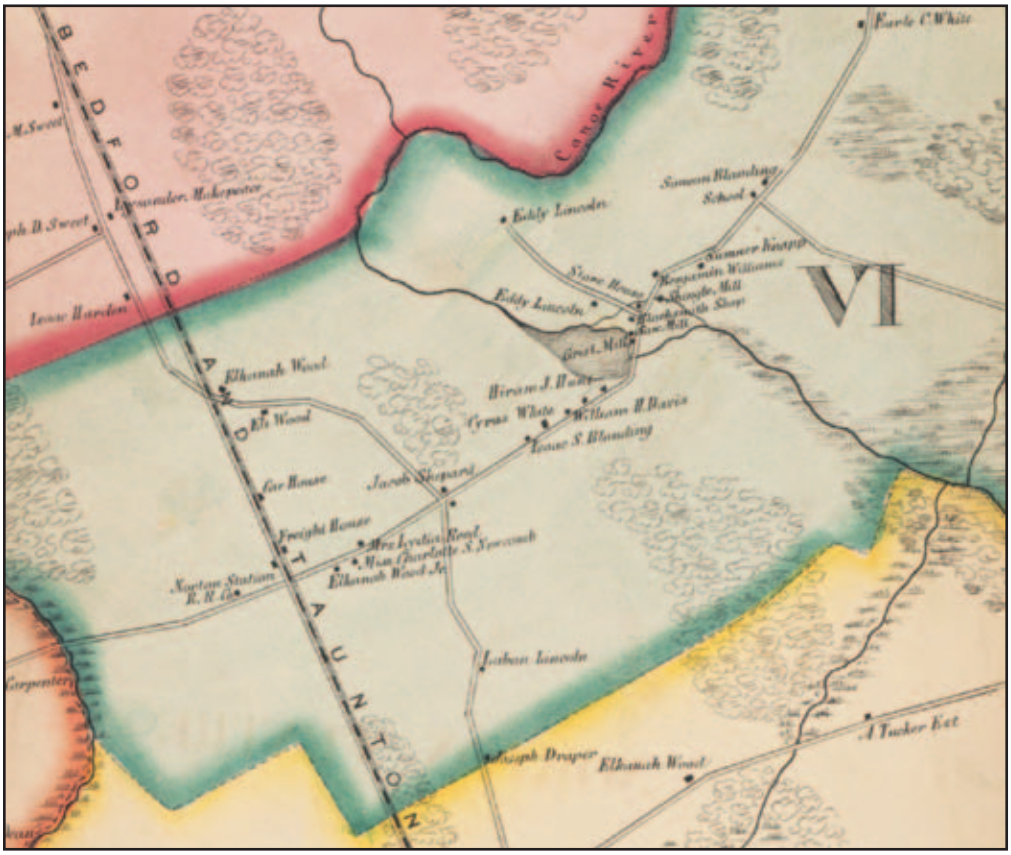

Figure 1a: *Map of the Town of Norton*, 1855 (detail)

Figure 2: *Map of the City of Cambridge*, 1854

Figure 2a: *Map of the City of Cambridge*, 1854 (detail showing lot lines and building footprints)

businessmen, while thereafter almost all were published "by authority of the town."

Walling's town maps are at a large scale hitherto seen only on maps of the most important American cities—generally somewhere between 1:12,000 and 1:15,000. This enables them to delineate ward or school district boundaries; topographical features such as meadows, wetlands, woodlands and elevations; the routes of roads and railroads; the locations of government buildings, schools and businesses; and the names of land owners. The Massachusetts maps typically note the town's incorporation date, population, and total acreage as well as a breakdown of the area occupied by land, roads, and water. The acreage data is an important clue to the origin of these maps: Massachusetts assessed taxes to its towns based on land valuations, so many of the maps were commissioned for administrative purposes by local governments.

Several of the maps are executed at an exceptionally large scale: those of Bath, Maine (1850), Worcester, Mass. (1851) and Portsmouth, New Hampshire (1850) are at no less than 1:3960, while those of Cambridge, Mass. (1854) and Medford, Mass. (1855) are at scales of 1:6000 and 1:8000 respectively. All are at a scale sufficient to depict building footprints, while some also delineate property boundaries. (See figures 2 and 2a.) Such information would have been invaluable for assessing property taxes, but the necessary surveys must have been costly and the large maps expensive to manufacture. This perhaps explains why these large-scale maps are generally confined to larger municipalities, which would have been better able to bear the costs and/or supply a large pool of potential purchasers.

The maps make use of four forms of embellishment—inset plans of densely-populated areas at a scale sufficient to show building footprints and landowners; pictorial vignettes of residences, businesses, churches and other edifices; decorative borders based on geometric or floral designs; and bright pastel wash color. The inset plans and pictorial vignettes convey an enormous amount of architectural, cultural and economic information and are among the most valuable features of the maps. However, Walling made inconsistent use of these design features: of the 54 maps inspected by this writer, only six show inset plans, vignettes and decorative borders (see for example figure 4); 23 have two of these elements, 21 only one, and four none at all. The most commonly seen is the inset plan, one or more of which appears on 32 of the maps.

There is alas no evident pattern to account for the presence or absence of these features—for example, stylistic evolution over time, or a preponderance of decorative elements in maps of wealthier or more populous towns. The explanation presumably lies with the budgets, market analysis and personal preferences of the individual publishers.

Competitors' maps

Walling's town maps were stylistically distinct from earlier maps of localities, quite appealing, and successful enough to attract other mapmakers into the market. By 1851 E.M. Woodford of Philadelphia was making maps of Connecticut towns, by 1852 New York-based Presdee & Edwards were issuing maps of Vermont and New Hampshire towns, and by 1854–55 Woodford and fellow Philadelphian G.M. Hopkins were competing with Walling in Massachusetts. While maps by these other makers are clearly of the same genre as Walling's work, there are important differences of style and content. First, the maps of Walling provide a great deal of information about the natural landscape, making considerable effort to differentiate woodlands, wetlands &c. while providing at least some outline of areas of elevation. His competitors, by contrast, generally delineate only roads and watercourses. They also make far more liberal use of embellishments, often to the extent that they distract the viewer from the cartographic information. Consider the example shown in figure 3, E.M. Woodford's 1854 map of Waltham, Mass. With the occasional exception such as the map of Weymouth (figure 4) Walling's map designs are by comparison generally quite streamlined, focusing on the communication of geographic information rather than on decorative impact.

CONSTRUCTING THE TOWN MAPS

Walling left no writings about how he made his town maps, so his methods must be reconstructed from several pieces of indirect evidence as well as examination of the maps themselves. Rather misleading in this regard are the subtitles found on the Massachusetts maps. Prior to 1852 one finds the phrase "From original surveys by Henry F. Walling, Civil Engineer" and in that year the wording shifts to: "Surveyed by authority [or 'by order'] of the Town by [or 'under the direction of'] Henry F. Walling, Civil Engineer."[3] These formulae imply a product that is based on Walling's own fieldwork and is therefore

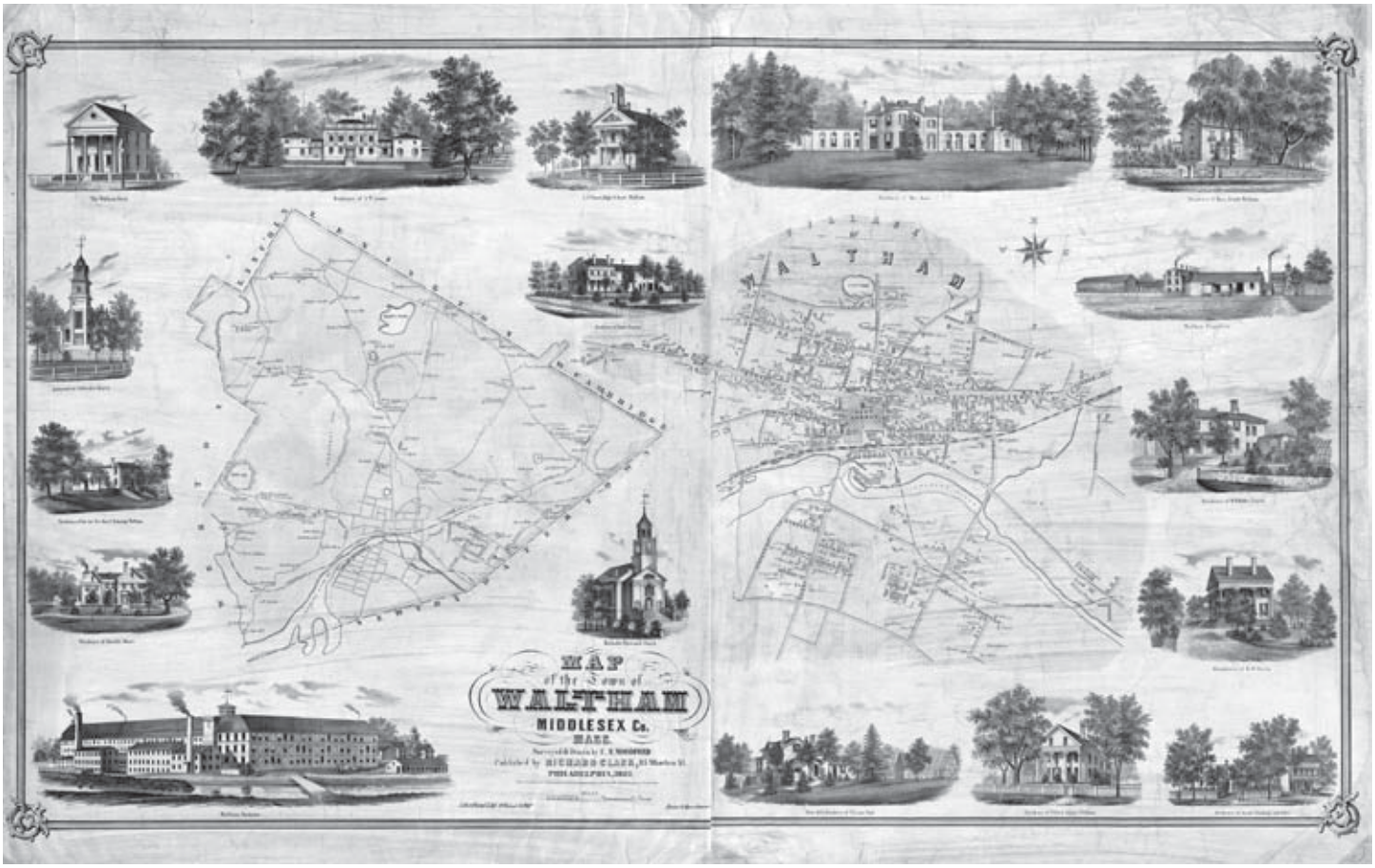

Figure 3: E.M. Woodford, *Map of the Town of Waltham*, 1854

accurate, current and—in the latter case—even has the blessing of the town government.

A closer examination, however, reveals that many of the maps credit other sources, albeit in small print. In fact, the evidence indicates that Walling *systematically* compiled his maps from at least four sources, of which his own "original surveys" constituted but one. These included town surveys available in public archives; odometer surveys of local roads conducted by Walling, his employees or subcontractors; coastal and hydrographic data from the U.S. Coast Survey; and *ad hoc* surveys such as subdivision plans.

Town surveys in public archives

At least 11 of Walling's maps of Massachusetts towns include a note to the effect that "The town line boundaries are principally taken from old surveys."[4] These almost certainly date from the early 1830s, for in 1830 the legislature mandated that every town conduct a survey and submit a map to the Secretary of State. These were to be quite large scale (1 inch to 100 rods, or 1:19,800); indicate the length and bearing of town boundaries; delineate roads and waterways; and show the locations of meeting houses, schools, mills, mines &c. Hundreds of maps were duly produced and submitted, and some years later they were compiled by Simeon Borden into the *Topographical Map of Massachusetts* (1844).[5] [6]

These surveys were conducted by the centuries-old *metes-and-bounds* method. Using a compass for taking bearings and a rod (16.5 feet) or chain (66 feet) for measuring distances, a surveying team would work its way in a continuous path along the boundary to be

Figure 4: *Map of the Town of Weymouth*, 1853 (one of Walling's most decorative town maps)

measured, recording bearings and distances between objects designated as boundary markers. This arrangement required a minimum of three men, one to handle the compass and two to manage the distance measurements.

So long as no one moved the markers, metes-and-bounds surveys worked well enough for surveying the bounds of small properties. Over larger distances such as the territory of a New England town, however, they tended to produce flawed results, due to the limitations of the instruments, the methods, and the surveyors themselves.[7] So inaccurate were some of the Massachusetts town surveys of the 1830s that in 1844 Borden wrote to Walling "in one instance I placed the maps of two towns upon the space required to be filled by them, and found room enough left to place the map of Boston between them."[8]

For all their flaws it appears that Walling used the boundaries delineated on the 1830s surveys as a framework over which other data could be superimposed. This view is supported by a comparison of several Walling maps with their 1830s counterparts, which reveals great similarities in their depictions of boundaries.[9] Particularly useful in this regard is his map of Lexington, Massachusetts (1853), which—unusually for a Walling map—gives the bearings and lengths of the town's boundaries. These are quite similar and in some areas identical to those given on John Hales's 1830 map of the town: clearly Walling used Hales' data, updating it in places based on other sources or conceivably his own surveys. By contrast the interior details on the Hales and Walling maps vary substantially, indicating Walling must have obtained that data by other means. (See figures 5 and 6.) This pattern is repeated in other comparisons of Walling's maps to their 1830s predecessors.

Given the cost of paying two chainmen and a surveyor, Walling would likely have repeated the boundary surveys only when the earlier work was hopelessly muddled or incomplete. Hence perhaps the qualifier on some of that maps that boundaries were derived "principally" or merely "in part" from existing surveys.

Odometer surveys

Walling took great care in depicting local roads on his town maps, and in this regard they generally appear far more exact than on the 1830s prototypes. In some cases, such as his maps of Andover and Concord (both 1852), he goes so far as to label each road in ½-mile or 1-mile intervals, indicating distances from the town center.

"Topographic Surveys of States," an article published by Walling toward the end of his life, provides strong albeit indirect evidence that Walling eschewed the traditional compass-and-chain method of road surveying. In a section discussing the production of his many large-scale *county* maps, he recalls that "the plan was adopted of traversing all the public highways by course and distance, using the ordinary surveyor's compass for directions, and the revolutions of a wheel for distances."[10] The "wheel" was an odometer, described by Ristow as "a small brass circular box that housed a series of cogwheels which regulated the motion of an index on a dial plate fixed to its exterior. The dial recorded the number of revolutions of a wheel attached to the box."[11] A surveyor would roll the wheel along the path to be surveyed, then multiply the number of revolutions by the circumference of the wheel to determine the distance traveled. This data was complemented by compass readings to determine the bearing of each stretch of road.

Given that the coverage of Walling's town maps overlaps that of his county maps, and that their periods of production overlapped, it seems reasonable that the former also drew heavily on odometer surveys. This method had two advantages: First, it was inexpensive, requiring but one man, whereas traditional compass-and-chain surveys required a minimum of three. Its second advantage, Walling argued, was a surprising level of accuracy: "By the system of traverses adopted, all the highways were surveyed and platted continuously in a network. Each closed circuit of this network not only checked itself, but served to check adjacent circuits. Usually the errors of closure did not exceed one or two per cent. of the distance traversed."[12] This accuracy also made these odometer surveys a valuable means for checking existing boundary surveys, at least at points where roads crossed town lines.

When preparing his county maps—and presumably the town maps as well—Walling supplemented the quantitative data obtained by odometer surveys with qualitative data from simple observation: As he or his assistants traversed local roads, they made notes about the locations of dwellings and other structures, the points where waterways crossed, and the nature of the terrain. They then superimposed this information on the depiction of the road network: "Upon the final adjustment of the network of roads, the other details of topography, namely, the dwellings, streams, etc., were supplemented."[13]

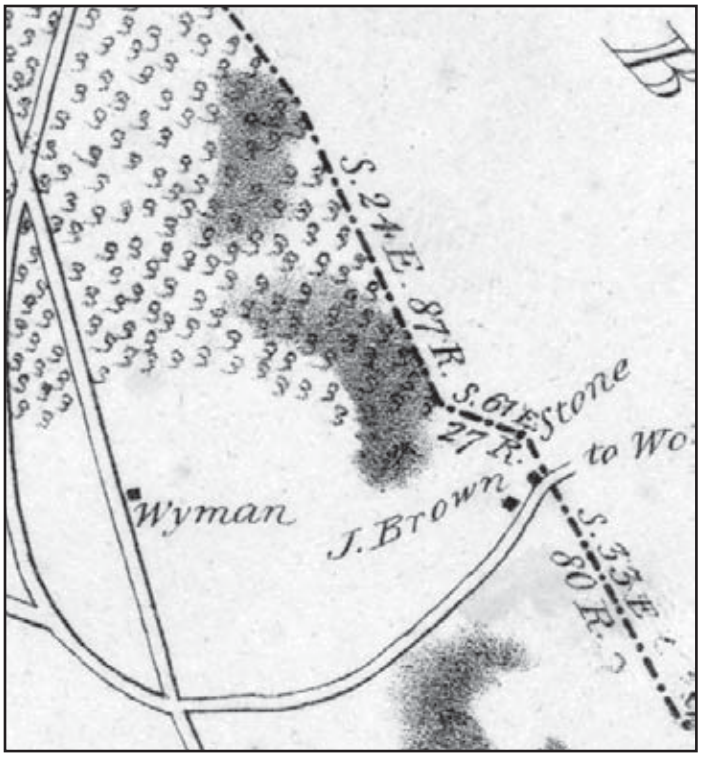

Figure 5: John G. Hales, *Plan of the Town of Lexington*, 1830 (detail)

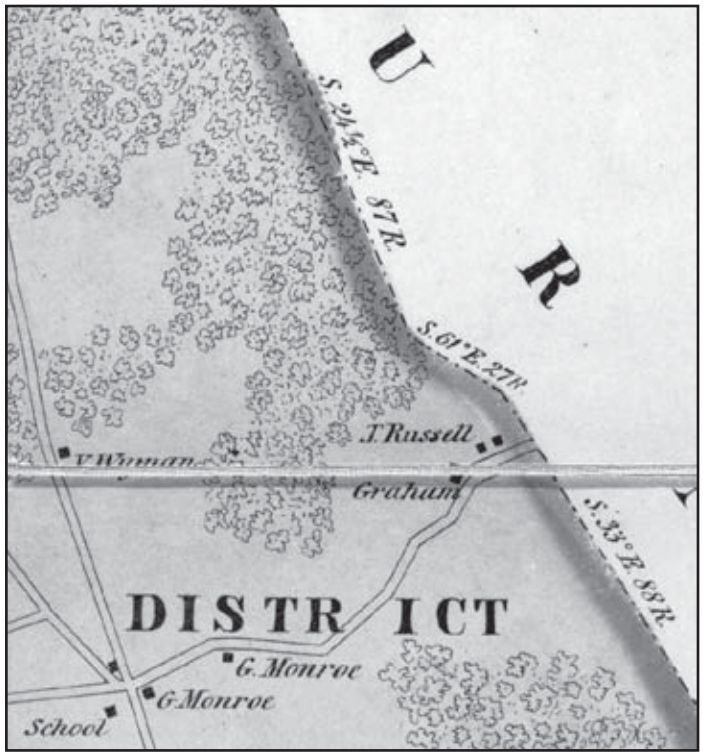

Figure 6: Henry Walling, *Map of the Town of Lexington*, 1853 (detail)

Data from the U.S. Coast Survey

Walling wrote of making extensive use of U.S. Coast Survey (USCS) sources when constructing his Massachusetts county maps[14], and he likely would have used them for his many maps of coastal towns. In fact at least three of these—Cambridge (1854), Marion (1855) and Rochester, Mass. (1856)—explicitly credit data provided by the USCS. These include "Latitude and Longitude, with a portion of the shore of the Charles River" (Cambridge) and "the Line of Coast and the Soundings" (Marion, shown in figure 7), while the data used on the Rochester map is unclear but was most likely used for the coastal outline.

This data was extremely useful, because the USCS was the most sophisticated mapping organization in the country, and its work was very accurate—often to within inches over a survey of many square miles. Further, its surveys typically covered not only coastlines but extended some miles inland and included much detail of the natural and human geography. Much data covering the New England coast would have been available at little or no cost, and Walling was certainly aware of the value of this information at an early date: USCS records note a request by him for data on the Rhode Island coast made as early as 1853.[15]

Ad hoc surveys

Several of Walling's town maps acknowledge the use of large-scale surveys of relatively small areas, typically produced for real estate development, the routing of roads or railroads, or other projects. There would have been many such surveys available in most towns, and through professional courtesy or lax controls on intellectual property Walling would likely have been able to employ them free of charge. For example, his map of Concord (1852) notes "White Pond & Walden Pond from surveys by H.D. Thoreau Civ. Engr.," on the map of Natick (1853) "Long Pond is laid down from the Plan made for the City of Boston," and the map of Rochester (1856) rather mys-

Figure 7: *Map of the Town of Marion*, 1855 (hydrographic data visible at lower right)

teriously cites "surveys and plans made by Ansel." Though not acknowledged on the map itself, his map of Cambridge (1854) makes use of subdivision plans that would have been available at the city's Registry of Deeds, as well as an 1831 plan of Mt. Auburn Cemetery by Alexander Wadsworth.[16]

A puzzle

As discussed earlier, several of the town maps are executed at an unusually large scale, sufficient to depict building footprints and in some cases property lines. Further, more than half of the smaller-scale maps include inset plans of population centers executed at a similarly large scale. These present something of a puzzle: it is difficult to see how, without access to municipal "master maps" documenting lot lines and building footprints, Walling could have gathered the necessary data in a timely and cost-effective manner. Yet such master maps did not become systematically available until the "fire insurance" atlases of urban areas proliferated in the last quarter of the 19th century.

COMPETITION, COMPILATION AND BUSINESS STRATEGY

Walling's apparent failure to comment in print on business matters during this period limits us to informed speculation about his business strategy. With that *caveat* in mind, it does appear that his "synthetic" approach to map making—compiling his own "original surveys" with the best available data from government and other sources—would have been a sensible response to a difficult competitive environment.

The finances of producing a town map were unpromising. To begin with, the pool of potential customers was usually small, restricted to local land- and business owners. Yet it was not realistic to compensate for low sales volumes by setting prices high, as most prospective purchasers would have considered a town map a luxury rather than a necessity. Given the substantial fixed costs of producing a map—whether 1 or 1000 copies were sold—the prospect must have been daunting. This may explain why Walling never published his own town maps, preferring instead to shift the financial risk to others. It may also explain why from 1852 on almost all his town maps were published by the towns themselves, which felt the profit motive less keenly and at any rate needed the maps for administrative purposes.

Walling also faced a "time-to-market" challenge, for in the early 1850s several of his competitors were rushing to issue their own maps of New England towns. With most consumers likely to buy at most one map of a given locality, whoever was first to bring a map to market had a powerful advantage. The greatest threat in this regard was Philadelphia-based Richard Clark, who between 1851 and 1855 published at least 33 maps of New England towns, including no fewer than 18 in Massachusetts. In at least one case Walling missed his chance: his 1851 map of New Bedford, Mass. lagged one issued by J.C. Sidney in 1850. In a likely indicator of their relative success, numerous examples of the Sidney are known to survive, while the Walling map is now almost vanishingly rare.[17]

Perhaps Walling could have brought maps to market quickly and inexpensively by producing derivative work, a strategy long in vogue among American and European map makers. The simplest approach would have been to copy the best existing town maps—in particular, those filed with the Massachusetts Secretary of State in the early 1830s—and "dress them up" with land owners' names, decorative vignettes, &c. Even if he had been comfortable doing so, however, blocking such a plan were the 90 or so maps of the most populous Massachusetts towns already published in the 1830s. To compete with these, new maps would have to be interestingly different—more current, more accurate, more complete, and preferably more decorative.

In fact his career trajectory indicates that he would *not* have felt comfortable producing "hack" work. Even in 1854, when Walling was just 29, Simeon Borden and other leading civil engineers felt confident enough in his skills and integrity to recommend him for the position of Superintendent of the Massachusetts State Map.[18] Later his work brought him into the embrace of the scientific community, and he became an acknowledged leader in applying advanced methods and tools to the mapping of the United States.

Whether Walling realized it or not, his synthetic approach to mapmaking was an elegant resolution of these competing considerations. Use of the best existing material would have reduced time in the field and kept costs down, while the cost-effective odometer road surveys provided an important corrective for earlier inaccuracies and ensured that the maps were current and comprehensive. Finally, the addition of decorative elements would have

rendered the maps more attractive, and the inclusion of land owners would have appealed to the vanity of prospective buyers.

THE SIGNIFICANCE OF WALLING'S TOWN MAPS

Near the end of his life Walling wrote to defend the work of "commercial" mapmakers:

> "The wholesale condemnation which certain scientific critics have from time to time bestowed upon commercial maps, as such, not discriminating between those which have been carefully made from original work and other mere compilations… which perpetuate from year to year the original errors of their sources of information, indicates an unjustifiable lack of knowledge on the part of the critic, of the amount of original and really valuable information which some of these commercial maps embody."[19]

This claim is undeniably correct, at least with regard to Walling's early town maps. These set a new cartographic standard for the depiction of New England towns, and they pointed the way for a generation of maps by competitors such as Richard Clark, G.M. Hopkins, Presdee & Edwards, E.M. Woodford and others.

For Walling himself, this early body of work was a catalyst for a lifetime of achivement and innovation. His synthetic approach served him well in the next phase of his career, during which he produced the dozens of large-scale "land-ownership" maps of counties in New England and elsewhere. It also earned him the commission to revise Simeon Borden's groundbreaking map of Massachusetts, which in turn lead to work on several other major state maps in the late 1850s and early 1860s.

These experiences helped him develop a powerful understanding of both the science of mapmaking and its financial and organizational aspects, and they brought him into contact with leaders of America's scientific mapmaking community. From there he went on to play a key role in important transitions in American mapmaking: the rise to market dominance of large-scale "land-ownership" maps and atlases; the application of the methods and tools of "geodetic" and "trigonometric" surveying to the mapping of states, counties and even towns; the emergence of topographical mapping; and the growing importance of collaboration between the private sector and federal and state agencies in the mapping of the United States.

ACKNOWLEDGEMENTS

This article would not have been possible without the opportunity to examine the Walling maps held in several major collections. In this regard the author greatly appreciates the assistance of Georgia Barnhill of the American Antiquarian Society, David Cobb and Joseph Garver of the Harvard Map Collection, Ronald Grim of the Leventhal Map Center, Tom Hall of the Barry MacLean Collection, Ed Redmond of the Library of Congress Geography and Map Division, and Fred Musto, formerly of the Yale Map Collection.

The photograph of Walling is used courtesy of Lafayette College. All other images are provided courtesy of the Harvard Map Collection. Larry Caldwell, David Cobb, Ronald Grim and Henry Taliaferro were kind enough to review a draft of this article. Any errors remain the author's alone.

THE AUTHOR

Washington Map Society member Michael Buehler is the principal of Boston Rare Maps, a firm specializing in important, interesting and rare maps of New England and the Northeast.

ENDNOTES

1 A valuable chapter-length survey of Walling's career is found in Walter Ristow, *American Maps and Mapmakers.* Detroit: Wayne State University Press, 1986, pp. 327–338.

2 Ristow (1886) is very helpful in this regard, as is his essay "Lithography and Maps, 1796–1850," in David Woodward, ed., *Five centuries of map printing.* Chicago: University of Chicago Press, 1975, pp. 77–112. One other valuable discussion is found in Michael Conzen, "The County Landownership Map in America Its Commercial Development and Social Transformation 1814–1939." *Imago Mundi*, vol. 36 (1984), pp. 9–31.

3 For reasons unclear, only one of his maps of towns in other states has this feature: *Map of the Villages of Saco and Biddeford York County, Maine from Original Surveys* (1851).

4 Oddly only the map of Attleborough (1850) gives explicit credit: "The Courses & distances of the Town Lines are taken from the Survey in 1832 by Joseph W. Caproni Civ. Eng."

5 *Resolves of the General Court of the Commonwealth of Massachusetts…* Boston: Dutton and Wentworth, 1831, pp. 270–272. These original manuscript surveys submitted by the towns may be examined by the public at the Massachusetts State Archives on Columbia Point in Boston.

6 This was in fact the second such effort in Massachusetts: in the 1790s towns had been similarly required to submit plans, which were then compiled by Osgood Carleton to yield the first official state map: *A Map of Massachusetts Proper Compiled from Actual Surveys made by Order of the General Court* (1801). The story of Carleton's map is ably told in Susan Danforth, "The First Official Maps of Maine and Massachusetts" in *Imago Mundi* vol. 35 (1983), pp. 37–57.

7 Walling discusses the limitations of traditional cadastral surveying tools and methods in "Co-ordinate Surveying," *Van Nostrand's Eclectic Engineering Magazine* (1877), pp. 62–64.

8 Committee on County Estimates, "House….No. 170," in Massachusetts House of Representatives, *Documents*, 1854, p.5.

9 The author also compared Walling's maps of Rockport and Gloucester (1851), Andover (1852) and Concord (1852) to maps by John Mason (1831), Moses Dorman (1830), and John Hales (1830), respectively.

10 Henry F. Walling, "Topographic Surveys of States," *Journal of the Association of American Engineering Societies*, vol. 5 (1886), p. 167.

11 Ristow (1986), p. 331.

12 Walling (1886), p. 167.

13 Walling (1886), p. 167. This observational method is also described (albeit in a much less favorable light) in Bates Harrington, *How 'Tis Done. A Thorough Ventilation of the Numerous Schemes Conducted by Wandering Canvassers.* Chicago: Fidelity Publishing Co., 1879.

14 Walling (1886), p. 66.

15 A.D. Bache, Superintendent of the U.S. Coast Survey, *Report of the Superintendent of the Coast Survey, showing the progress of the Survey during the year 1853.* 33rd Congress, 1st Session, Senate Exec.Doc. 14, Dec. 30, 1853, Appendix, p. 13. The requests were for charts of Narragansett Bay and the Rhode Island coast, as well as for data on the locations of the Massachusetts State House, New York City Hall, and Greenwich, Connecticut.

Walling's relationship with the Coast Survey was lifelong. For example, Ristow records an 1875 communication from Walling requesting permission to use Coast Survey data in his mapping of Pawtucket, RI and another later in the year requesting the loan of a plane table. (Ristow, 1886, p. 336) After Walling's private mapmaking business faltered in the 1870s, in 1880 he accepted a position with the Coast Survey as a map compiler. He held this position through 1883, when he transferred to the U.S. Geological Survey.

16 Charles Sullivan, Executive Director, Cambridge Massachusetts Historical Commission, unpublished email, November 2007.

17 The Sidney map resides at the Boston Public Library and Harvard Map Collection and has appeared on the antiquarian market at least thrice in the past 10 years. By contrast, this writer knows of examples of the Walling only at The New Bedford Whaling Museum and the Yale Map Collection.

18 Committee on County Estimates (1854), p. 4.

19 Walling (1886), pp. 163–4.

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