Geo-Temporal Interpretation of Archival Collections with Neatline

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At Digital Humanities 2013 in Hamburg, Germany, the University of Virginia Library Scholars' Lab released Neatline, a Web-based tool with which students, scholars, and curators can express the geo-temporal dimensions of literary, historical, or other digital collections.[1] These customized interfaces take the form of highly interpretive exhibits that link together interactive maps, timelines, texts, images, sound and video files, and archival objects. Neatline's geo-temporal visualizations are built using open-source software and standards-based approaches to geospatial data, and they allow scholars to illustrate collections they have independently digitized or to draw on open access archival content and standardized metadata created by cultural heritage institutions. That said, each use of Neatline is imagined as a carefully-designed narrative or exhibit—a subjective story told through small-scale interpretive decision-making, rather than (as is commonly pursued in our era of "big data" visualization) a more passively-derived algorithmic output. In the broadest terms, Neatline is conceived as a contribution—in the visual vernacular—to multidisciplinary, place-based interpretive scholarship using primary humanities sources.

This short paper describes: 1) the theoretical goals of Neatline, including our assertion of the place of hand-craftedness and iterative sketching in humanities interpretation using digital tools; 2) the decision-making process which led us to build Neatline not as a stand-alone application, but as a set of mix-and-match plugins for Omeka, a popular, open-source platform for online collections and exhibits; and 3) the results of work in two project phases, undertaken in 2010 with Digital Humanities Start-Up Grant funding from the National Endowment for the Humanities (NEH), and in 2011 and 2012 with support from the United States

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Library of Congress, in collaboration with the Roy Rosenzweig Center for History and New Media (RRCHNM) at George Mason University.[2]

Neatline makes three claims to innovation in the sphere of geo-temporal humanities visualization. These align roughly with notions of content, audience, and method. First, by building on primary resources expressed in portable metadata standards like Dublin Core (DC), Encoded Archival Description (EAD), and VRA Core, Neatline creates a pragmatic path for collaboration among metadata providers and humanities scholars. Although these formats have long been employed by academics working in concert with archivists (as in the Walt Whitman Archive), they have typically been used as straightforwardly bibliographical tools – as finding aids for archival collections, or for the production of new catalogs of manuscripts and letters. They have rarely been used as a stepping-stone to rich, interpretive or theory-based expression (much less visualization) of the *content* of those primary resources. Neatline aims to demonstrate the value of archival metadata to interpretive scholarship, and thereby to strengthen connections among scholars and the stewards of humanities collections.

Next, Neatline aims for ease of use by scholars new to the digital humanities. This was a major argument in our bid for NEH funding, and our rationale for shifting from development of a stand-alone, downloadable tool (installable as a single, server-side application), to a modular collection of interchangeable plugins for the open-source Omeka platform is arguably the most important contribution of the project to the current scene of humanities computing software development. Neatline was first imagined as a self-contained, single-function application that nonetheless allowed easy access "under the hood" for expert users to customize and contribute to its open source code. For a stand-alone tool, this would have been the right approach; but we quickly realized that we had the opportunity to model a more productive and collaborative set of open source software practices. The Scholars' Lab has now shared source code for ten completed, Neatline-related plugins with the Omeka developers' community, and Omeka forms the backbone for basic content management functionality in our project (Fig. 1). We feel strongly that our shift to Omeka plugin production retains or enhances all of the desired qualities

of our originally-proposed system, while adding two great benefits. First, Neatline has become mix-and match. In other words, users no longer have to participate in an entire, integrated, ideal Neatline workflow in order to use parts of our work—and in fact we are seeing great interest in and use of individual Scholars' Lab plugins in Omeka user communities and scholarly and archival contexts far removed from those focused on geo-temporal interpretation. Secondly, our close collaboration with the Omeka team at George Mason University and with the tool's open source developers' community is leading to advancements in the core code of Omeka itself, again benefiting a far wider audience than anticipated. Not only were we able to leverage Omeka as a technical and social framework for Neatline, but our work (stemming from the curatorial perspective of a digital humanities lab embedded in a university library) has made its underlying system a more attractive option for research and special collections libraries—even those who possess a sophisticated technical and repository infrastructure of their own.

Finally, Neatline makes a theoretical contribution to digital humanities methodology by asserting the value of hand-crafted visualization as a mode of praxis and scholarly inquiry. Analog sketching and graphical storyboarding is regularly taught as part of the earliest design processes for digital projects in the Scholars' Lab. These activities demonstrate the value of iterative interpretation and knowledge-production manifested in visual form—particularly in fields like history and literary studies, in which the interpretation of visual artifacts is rarely taught[3] and physical drawing is infrequently modeled as (in William J. Turkel's formulation) "a way of knowing.[4]" Neatline seeks to re-insert visual, incremental knowledge-production, or *graphesis*, into the digital design process for humanities interpretation, by producing drawing and editing interfaces that are painterly: highly aesthetic and tangible, relatively simple to use, and nearly identical to a finished, end-user's view.[5] Neatline encourages experimentation and gradual refinement; instead of providing only a medium for finalized interpretations, the software is designed as a scratch pad on which users can formulate, refine, or discard ideas about time and space. Neatline users are always sketching, erasing, and drawing again their arguments on the screen.

Interpretive subjectivity was a matter of great interest to the creators of Neatline. Our map and timeline-related plugins offer users the ability to model multiple backgrounds (including historical spaces or alternative readings) independently from the foreground of their critical attention, and to express all of these fields and their interrelations visually. The spatial and temporal foreground of a Neatline exhibit provides a space for scholarly commentary and intervention in the visual field, by way of textual annotation, freeform vector illustration on the map, and temporal visualization on the timeline (Fig. 2). Conflicting or congruent interpretations can be created, using a single, shared dataset. Meanwhile, user-specified backgrounds may be empirical or unabashedly subjective—precisely geo-referenced or wholly speculative.

For example, one set of demonstration exhibits made available on our Neatline website employs maps and letters created by U.S. Civil War cartographer Jedediah Hotchkiss. GIS (Geographic Information Systems) layers are brought into Neatline from modern satellite imagery and stylized vector maps, from scans of Hotchkiss's own surveyed-and-drawn battlefield maps, and from the historical atlases that served—to use GIS terminology—as the surveyor's mental "base layer." Against these, we have geo-referenced (or morphed and rubber-sheeted for matching display) an informal, child's-eye map of the Chancellorsville battlefield that Hotchkiss sketched in the margins of a letter to his young daughter, Nellie (Fig. 3). Neatline allows all of these documents, designed for different audiences and purposes, to be plotted and annotated in space and time (Fig. 4).

Concrete products of the Neatline project undertaken between 2010 and 2012 include improvements to the codebase of Omeka (in collaboration with RRCHNM) and a new suite of open-source plugins by the Scholars' Lab. Each plugin can be used independently but they have been designed to gain value in combination, comprising the entire Neatline system:

1. *EAD Importer*: Allows for the easy and easily-adjusted import of Encoded Archival Description metadata into an Omeka exhibit.

2. *Neatline Maps*: Provides map display through one or more GeoServer instances or through any specification-compliant WMS service.
3. *Neatline Features*: Allows users to draw points, lines, and polygons on map layers, encoding and editing formal geospatial shape information.
4. *Neatline Time*: Incorporates an updated and aesthetically-improved version of the well-known Simile Timeline Javascript framework into Omeka, to provide chronological visualization of Omeka items. When used as part of the core Neatline installation, this tool also includes the ability to express temporal ambiguity, uncertainty, and nuance.
5. *Neatline*: Serves as a single, easily-installed version of the full suite of Neatline functionality, allowing users to combine illustrative, annotative, or aesthetic information specific to their Neatline installation with underlying Omeka collections, in order to build unified, interactive, and highly interpretive presentations.

In addition, our work on Neatline led us to develop five other plugins which users can employ in the creation and display of their Omeka exhibits. These plugins greatly extend the basic capacity of Omeka and make it a more attractive option for individual scholars and collections stewards. They also increase the likelihood of engagement by better-resourced libraries, digital humanities centers, and cultural heritage institutions—a constituency well-positioned to contribute further software development time to the open source code of Neatline and Omeka alike.

1. *FedoraConnector*: Makes it possible to display, comment on, annotate, and otherwise employ digital objects inheriting behaviors from a Fedora Commons repository.
2. *GenericXmlImporter*: Permits users to import any arbitrary, flat XML data into Omeka.
3. *SolrSearch*: Allows use of the powerful Solr search engine with Omeka collections, which greatly improves the quality of search results and makes it possible to create faceted browsing interfaces.

4. *TeiDisplay*: Allows users to render and style TEI files in HTML format and to attach them to Omeka items—facilitating the first formal connection between Omeka and the TEI.
5. *VRACoreElementSet*: Allows users to bring the VRA Core Element Set (designed as standard descriptive metadata for artistic and other visual resources) into Omeka.

The Neatline project concluded its round of funding from the Library of Congress with a major launch of the finished product and its source code in July of 2012. This launch coincided with the release of a number of Neatline demonstration projects, a sandbox environment for evaluation, and end-user documentation at http://neatline.org/, http://omeka.org/, and http://github.com/scholarslab/.

During the second half of 2012, Neatline saw widespread uptake among scholars and students, with an equal level of interest in short-term classroom and long-term research project use. Building on user feedback from the first release, the development team spent the following academic year building towards a second major release of the core Neatline plugin, incorporating a number of additions and improvements designed to make the software more scalable, expressive, and flexible. These include:

- Improved vector-drawing tools, including the ability to import high-fidelity SVG illustrations from specialized vector-editing tools like Adobe Illustrator and Inkscape;
- New features that allow users to build exhibits using annotated base layers that are not explicitly geospatial in nature, such as manuscripts, printed pages, scanned artworks, and other images;
- Improved performance and scaling characteristics enabling users to build extremely large interactive exhibits that incorporate hundreds of thousands of entities, which makes Neatline a viable platform for research collaborations that need room for long-term growth;
- An expanded programming API that makes it easy for developers to extend the core Neatline feature set with custom functionality for specific projects—

everything from custom user-interface elements to deep modifications that expand the core data model or add completely new interactions.

From early prototypes to its recent 2.0 release, Neatline has focused on archival and cultural heritage metadata—itself already an interpretation of a given literary or historical collection—to allow scholars to illustrate connections among documents or objects and the spatial and temporal dimensions that arise through their reading. In this, it embodies a theme of much work in the UVa Library Scholars' Lab: that method is a path to argument, and that interpretive digital humanities scholarship may be best enacted in iterative, visual modes.

Notes

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[1] Freely available at http://neatline.org/. Further information about Neatline development is available at http://scholarslab.org/, with source code under the Apache 2.0 license at http://github.org/scholarslab/.

[2] Omeka is an open source product of RRCHNM, freely available at http://omeka.org/.

[3] On the neglect of visual training in humanities education, see Jessop (2008a). Jessop's follow-up article in *LLC* (2008b) treats the implications of this neglect for geospatial scholarship in the digital humanities, and was a major inspiration to the Scholars' Lab's training programs (including a two-year NEH-funded institute on Spatial Humanities: http://spatial.scholarslab.org/), which deeply informed the Neatline project.

[4] See Turkel's description of a 2009 NiCHE (Network in Canadian History and Environment) workshop on *Hacking as a Way of Knowing*: "Practically every kindergarten in the country is better equipped for hands-on exploration than the kinds of spaces that we teach our graduate students in. And that's a shame, because physical objects and artifacts constitute a vast part of our knowledge of the world. Manipulating is a way of knowing, making is a way of knowing, hacking is a way of knowing." http://niche-canada.org/hackknow

[5] On graphesis, see Drucker and Nowviskie (2004), Nowviskie (2010), and British artist Bridget Reilly (2009): "You cannot deal with thought directly outside practice as a painter: 'doing' is essential in order to find out what form your thought takes... It is only through the experience of working that answers may be discovered within the inner logic of an invented reality."

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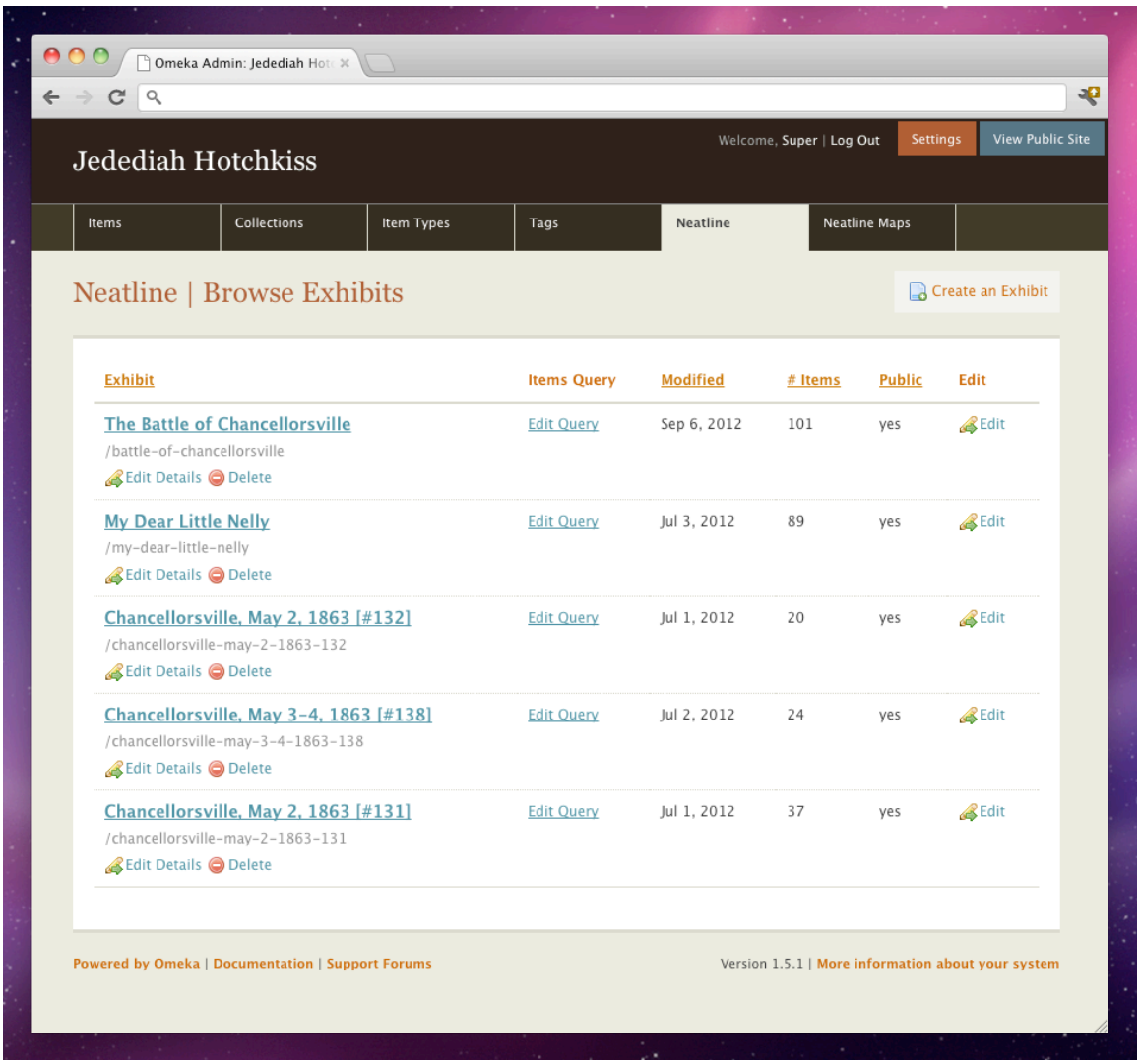
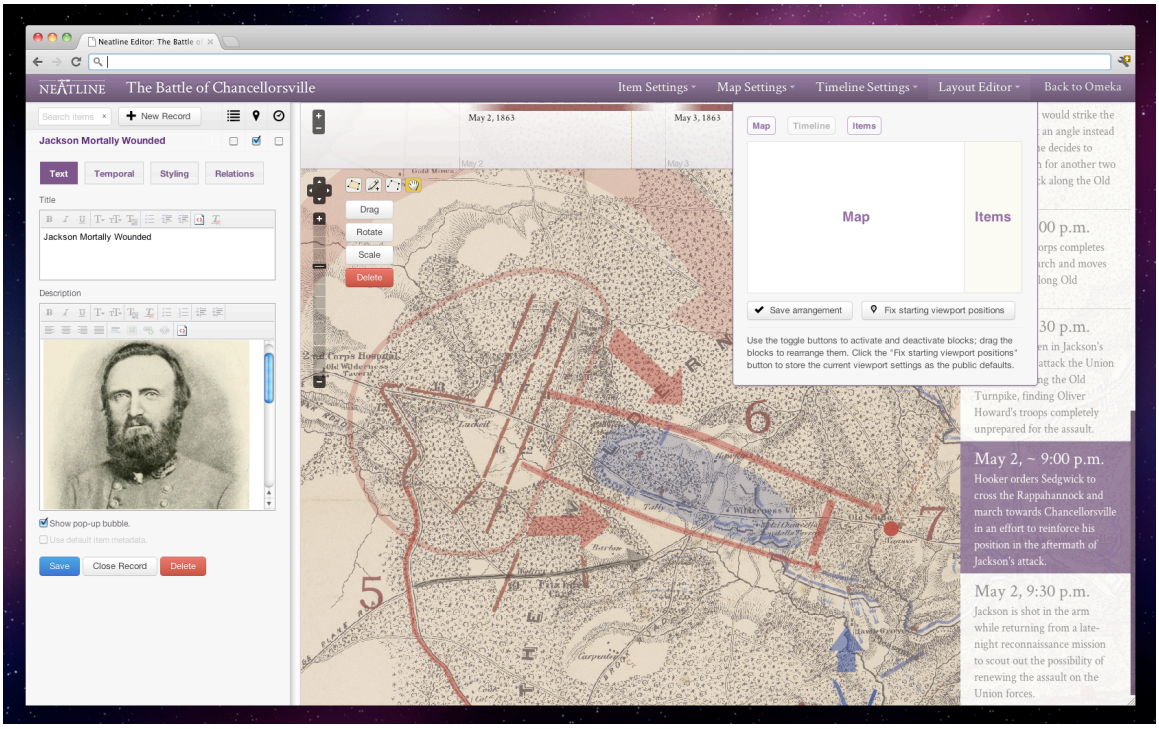
Appendices

Figure 1



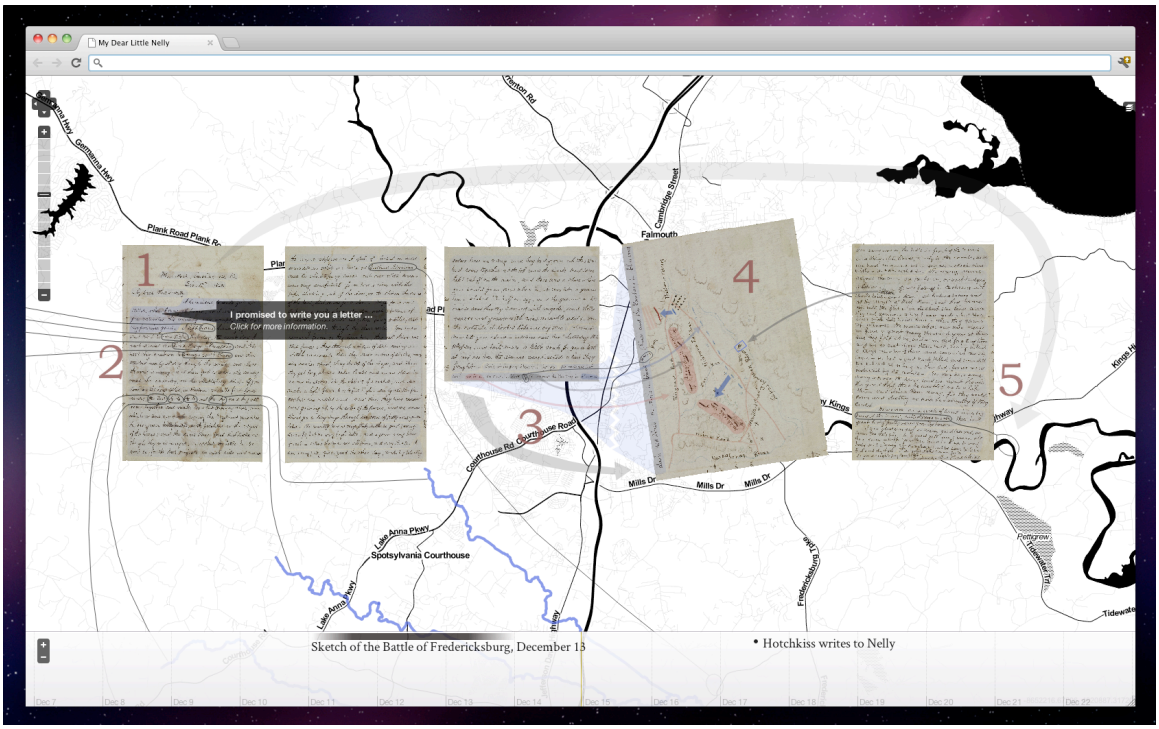
Neatline is built as a collection of modular plugins for Omeka, an open-source publishing platform for digital collections and exhibits, which provides a flexible, extensible foundation for content management. Shown here, basic administrative functionality for our Neatline plugins is added to the default Omeka interface.

Figure 2



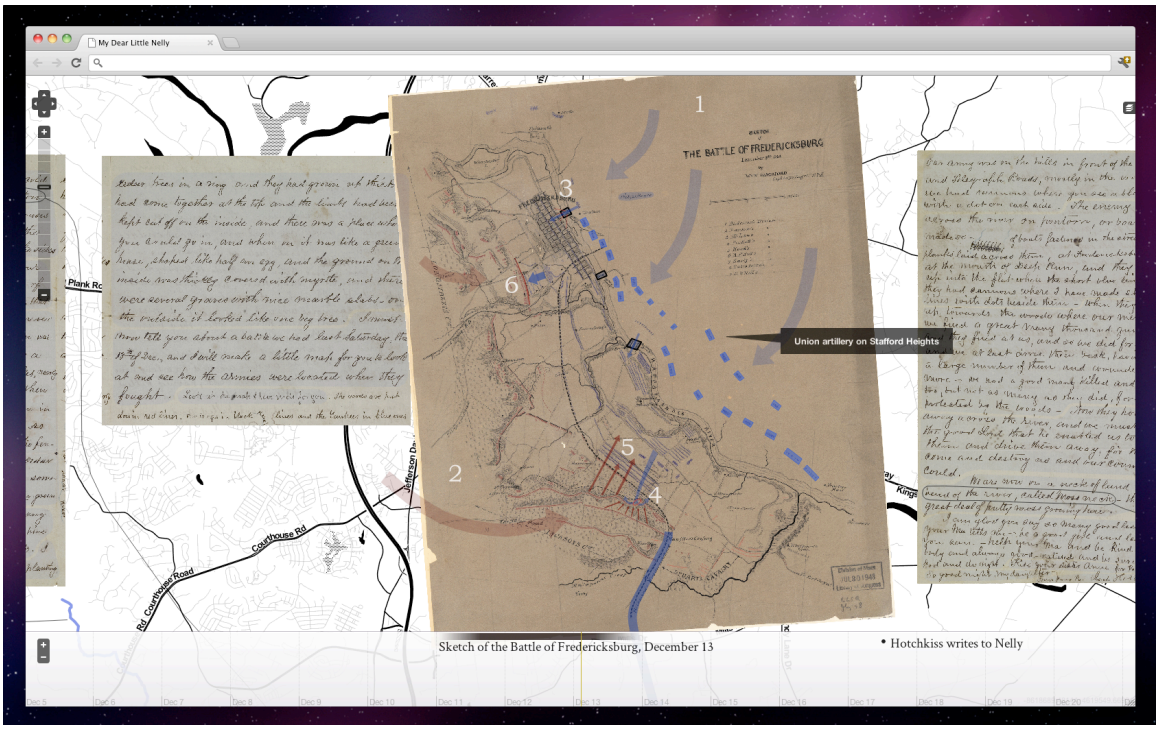
The core Neatline plugin creates an integrated, interactive exhibit-building environment in Omeka, allowing the user to sketch out ideas on a canvas that looks almost identical to the final, public-facing instantiation of the project.

Figure 3



Neatline can accommodate a wide variety of textual and geospatial "backgrounds." Here, a contemporary letter containing a small sketch of troop movements at the Battle of Fredericksburg has been cut into pieces and georeferenced. The battle map has been layered over its corresponding location on the modern terrain, with pages of the letter spread out around it and annotated with reference to physical landmarks.

Figure 4



When the user drags this Neatline timeline backwards, from the writing of the letter in Fig. 3 to the moment of the battle, a different map is layered over the sketch, making it possible to toggle back and forth to compare documents positioned in time as well as space.