Digital Deep Maps for Integrating Archaeological and Historical Knowledge:  
The Hamtramck Historic Spatial Archaeology Project 

WHITE PAPER 

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Project Summary  

The free, open-access Hamtramck Historic Spatial Archaeology Project prioritizes the documentation and visualization of fragmentary or lost historical landscapes and stories in Hamtramck, an ethnically diverse, postindustrial urban community with a history that reflects widespread processes of industrialization, urbanization, immigration and migration experienced by many American cities in the 20th century (Figure 1). This 18-month project supported by a Tier I Research and Development grant was aimed at better integrating the archaeological and historical records; these two key sources of information about the past are often segregated due to challenges inherent in working with diverse types of fragmentary evidence within the same context. The project also supports an increased public awareness of the significance and value of archaeology and history to the community. It attracts new audiences to the Hamtramck Historical Museum (a key project collaborator), engages them in conversations about Hamtramck’s immigrant and working-class heritage, and promotes the complementary roles of historical and archaeological data in contributing to its preservation. The project is a collaboration between an interdisciplinary team of researchers based at Wayne State University (WSU) and Michigan Technological University (MTU), and a diverse group of Hamtramck community members based out of the Hamtramck Historical Museum (HHM) with expertise in heritage and museum management, journalism, education, historical and archaeological research, and public outreach.
We accomplished our project goals through three primary project activities:

**Activity 1**: To collect and prepare the data and create a historical spatial data infrastructure needed to support the Deep Map.

**Activity 2**: Build a Prototype, free, web-accessible Deep Map for Hamtramck.

**Activity 3**: Maintain collaboration with Hamtramck community members during all phases of the design, building, and evaluation of the prototype Deep Map.

The live prototype Deep Map resulting from this grant-funded project may be accessed at [www.mappinghamtramck.com](http://www.mappinghamtramck.com)

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**Project origin and Goals**

**Project Origins**

The Hamtramck Historic Spatial Archaeology project evolved from a previous public archaeology collaboration between the Hamtramck Historical Museum (HHM) and the WSU Anthropology department focused on showcasing Hamtramck’s heritage, with researchers from Michigan Technological University joining the collaboration to help demonstrate how digital
geospatial approaches could enhance urban archaeology research and community heritage-making. After two seasons of fieldwork in Hamtramck in 2018 and 2020, the WSU archaeology team had documented numerous historical features and recovered over 10,000 artifacts from a property, referred to as the Old Hamtramck Center, featuring archaeology that spans the period between roughly 1880 and 1980, covering the emergence of Hamtramck, its rapid growth into an industrial urban center, and its subsequent deindustrialization (Ryzewski 2023). The property included a former city hall that also hosted a police headquarters and fire station, residences, and commercial structures including a saloon, grocery, tin shop, and a short-lived school. This public archaeology project subsequently shifted focus to a second site, located over the Gass Saloon, a pre-prohibition drinking establishment that yielded over 8,000 artifacts (Figure 2).

As with all urban historical archaeology projects, researchers drew on evidence from the historical record at all phases of the project, from the initial research design through the fieldwork, data analysis, and dissemination stages. This historical evidence was drawn from several repositories, including the Library of Congress and University of Michigan’s Bentley Historical Library, but the Hamtramck Historical Museum, in addition to being an active collaborator in publicizing the fieldwork, provided the bulk of the key historical documents and photographs from its own collections. Property records and fire insurance plans were, as always, extremely valuable sources to aid in targeting specific structures or parts of structures for excavation, and subsequently linking recovered features and artifacts to historically recorded activities and occupancies.

The archaeological and historical records are, by their nature, fragmentary, and exist in disparate forms. Archaeologists working with historical data are often compelled by time and
resource limitations to gather a very select and targeted body of historical evidence to accompany their archaeological data - whether it be used as a tool of prospection to locate sites and features, a contextual body of evidence for the finds, the basis for an archaeological narrative or counter-narrative, or all of these. But the compact, dense nature of Hamtramck’s built and social environments, and its relatively recent emergence as an industrial city, suggested the possibility of the development of a more comprehensive historical context; bringing together a large number of historical record sets such as fire insurance plans, historical photographs, and property records could provide a much richer body of historical information that could link archaeological discoveries to the physical and social landscape of Hamtramck at multiple scales and across time.

Project Goals

To address these challenges, and to merge the complementary efforts of the HHM’s heritage activities and WSU’s public archaeology project, researchers from Michigan Technological University joined the collaboration and, supported by funding from the NEH Tier I Research and Development grant, launched the Hamtramck Historic Spatial Archaeology Project in Spring 2022. The goal of the project was to develop and demonstrate digital, spatial approaches to better integration of the archaeological and historical records in Hamtramck; and also, to demonstrate that integration by creating and publicly releasing a prototype ‘deep map’ for Hamtramck in the form of a publicly web-accessible, digital map-driven heritage tool for the discovery, visualization, exploration of spatio-temporally linked archaeological data, archival data, and museum objects.

Researchers at Michigan Technological University have been developing the concept of building deep maps with historical big datasets using spatial data infrastructures, resulting in the Keweenaw Time Traveler project, a publicly web-accessible deep map available at www.keweenawhistory.com (Lafreniere et al. 2019; Trepal et al. 2020). They have also argued for the potential for this approach to advance the capabilities of historical, urban and industrial archaeologists who may benefit from linking archaeological data with the richer context provided by these infrastructures (Trepal et al. 2020; Trepal et al. 2021). Joining the existing collaboration between Wayne State and the Hamtramck Historical Museum offered the Michigan Tech team members an opportunity to put these latter arguments into practice. The MTU Geospatial Research Facility (GRF) hosted the bulk of digital and geospatial project development activities. The Hamtramck Historic Spatial Archaeology Project met its goal through three primary project activities:

Activity 1: To collect and prepare the data and create a historical spatial data infrastructure needed to support the Deep Map.

Activity 2: Build a Prototype, free, web-accessible Deep Map for Hamtramck

Activity 3: Maintain collaboration with Hamtramck community members during all phases of the design, building, and evaluation of the prototype Deep Map.
These three activities took place concurrently, with our community collaborators participating in the scoping, design, construction, and evaluation of the deep map.

**Project Activities**

**Activity 1: Creating a Historical Spatial Data Infrastructure for Hamtramck**

Digital deep maps require the creation, storage, and handling of large quantities of digitized historical and archaeological data. We have elsewhere conceptualized the solution for this challenge in the form of a **Historical Spatial Data Infrastructure, or HSDI** (Trepal, Lafreneire, and Gilliand 2021), and an early implementation of this concept underpins the Keweenaw Time Traveler Project ([www.keweenawhistory.com](http://www.keweenawhistory.com)), which produced one of the first deep maps to be built and released to the public. The Hamtramck Historic Spatial Archaeology Project represented an opportunity to more fully demonstrate the potential of the HSDI concept using both archaeological and historical data, and to build an HSDI in support of a next-generation deep map prototype that both builds on the lessons learned from the Keweenaw Time Traveler Project and integrates material culture from archaeological investigations.

Linking the archaeological data recovered by the Wayne State field archaeology crew with historical records and museum objects held at the Hamtramck Historical Museum was a demanding phase of the project and required a multi-stage process of data collection, cataloging, digitization, spatializing data, and setting up the HSDI to serve as its ‘container.’ When work on this phase began the HHM was coincidentally in the early stages of developing its own digital catalog. This presented an additional challenge to the project, as much of the collections are (and remain) in need of formal cataloging, but also an opportunity to coordinate our own data management efforts with theirs.

**Creating a collaborative digital research space and digitizing historical and archaeological data**

The first step in the development of the HSDI was the creation of a digital environment for collecting historical and archaeological data to be used in the project, as well as for collaborative work in scoping the project, critiquing initial results, and generating written products. We used a dedicated Google Workspace and the MTU GRF’s ArcGIS Enterprise Portal to support these needs. The use of a Google Workspace as our initial collaborative environment made it easy for researchers at each of the three partner institutions (WSU, MTU, HHM) to share data as well as criticism and feedback on initial versions of the prototype. The Google Workspace was used as the initial storage location for digitized historical and archaeological data that was subsequently formatted for inclusion in our HSDI, described in further detail in the following section. The choice of a Google Workspace over more specialized archival software (for example, PastPerfect) for this stage of the project was based on three factors. First, the HHM had recently begun the early stages of planning to develop a digital catalog of the museum’s archives and objects and we wished to avoid choosing proprietary software that might not be compatible with their ultimate choice of software and workflow. Second, as the ultimate
destination for our data was to be the Esri Enterprise Portal geodatabases maintained by the MTU GRF, the introduction of an intermediate archiving stage with proprietary software would complicate the project workflow and slow our progress. Finally, the Google Workspace used for the project is freely accessible to MTU researchers, making it a zero-cost option for gathering, storing, and performing basic formatting and cataloging work with our data.

Much of the data needed for the deep map exist in physical or non-spatial digital formats, including over 100 historical map sheets, dozens of historical photographs, museum objects, several thousand artifacts from the archaeological assemblage, and other archaeological data in the form of field notes, drawings, photos, and excavation reports. The Google Workspace served as the initial assembly point for data that was either acquired in digital form or digitized for the project. The team digitized documents and objects at the HHM using either the MTU GRF large-format flatbed scanner, or, in the case of museum objects, using a high-resolution Canon EOS RF digital camera. Artifacts recovered during archaeological excavations were photographed. The team also generated 3D models of several artifacts and excavation units using Metashape structure-from-motion photogrammetry software (Figure 3).

![Figure 3. Selected artifacts and excavation units were digitized in 3D model form for inclusion in the deep map interface.](image)

The team generated separate catalogs in CSV table format for maps and documents, museum objects, and archaeological artifacts stored in the workspace. These catalogs contained metadata for each historical or archaeological document or object, were assigned a unique ID number, and also stored the digital paths within the Google Workspace to the locations where digital versions of each item were stored.

**Constructing the Hamtramck Historic Spatial Data Infrastructure : Spatializing and Linking Data**

Any digital data supporting a deep map needs to be configured in a way that permits the mutual juxtaposition of multiple different forms of evidence, in different formats, at different scales, and across time. We have previously developed the HSDI as a digital infrastructure that supports sufficient flexibility in the storage, visualization, analysis and data sharing and dissemination of historical data, and proposed its expansion to cover archaeological datasets (Trepal, Lafreniere, and Gilliland 2019). For the Hamtramck Historic Spatial Archaeology Project, we proved this concept with an HSDI built using the historical and archaeological data gathered initially in our Google Workspace.
Within the HSDI we maintain both digitized and born-digital archaeological records alongside digitized historical archival documents, cartography, and photographs. Importantly, all items within this infrastructure are geospatial data; they are mapped to a point or building within Hamtramck. All data is also assigned a date, with a result that all data with the infrastructure is defined in four dimensions, permitting mutual contextualization of all the data in space and time. The basic space-time organizational scheme of the HSDI is the division of the project period of study (c. 1880-1950) into decadal ‘time bins’ and the assignment of real-world spatial coordinates to every piece of data within the infrastructure.

Historical Cartography and Aerial Images

Building the HSDI and populating it with our project data took place in several stages. The first stage involved the georectification of historical cartography and aerial imagery for the City of Hamtramck. Rectified historical maps and aerial images serve as a digital visual proxy for the Hamtramck landscape as it existed at previous moments in the past, and, crucially, as spatial reference for the geolocation for archaeological and historical datasets used in the project. Using the most detailed maps available, we achieved total coverage for the city of Hamtramck with Maps dating to the 1880s, 1890s, and 1940s, and partial coverage for the 1900s and 1910s, 1920s, and 1930s. For the 1890s, 1900s, 1910s, and 1950s, we rectified Sanborn Fire Insurance map sheets and stitched them into a continuous mosaic, providing a highly detailed cartographic representation of Hamtramck’s built environment within those decades. We also acquired and rectified 1950 aerial imagery of Hamtramck from the USGS EROS as an alternative to the cartographic representations for that decade (Figure 4).

![Figure 4. Rectified historical cartography (in this case a mosaic of 1949/1951 Sanborn Fire Insurance Plan maps) served as the visual representation of the historical landscape within each decadal 'time bins,' and also as spatial reference for the geolocation of the project's data.](image-url)
Spatializing Archival Records, Documents, and Museum Objects

The rectified historical cartography and aerial imagery permitted the geolocation of all other datasets added to the HSDI. This spatialization of the archival data and museum objects formed the second stage of the HSDI building process. We assigned a decadal time bin and spatial location to each object in our catalog of HHM archival data and museum objects previously scanned and photographed by the team. This process involved a combination of examining the scans and originals, consulting HHM volunteers familiar with the materials, and examining the objects themselves for clues as to where they should be located within space and time in our HSDI. For photographs, we sought to identify the location of the subject of the photo. Documents and objects were associated with the address or place most closely associated with their creation or use. We used desktop GIS software (ArcGISPro 3.x) to create a location for each item in the form of a building footprint corresponding to the structure associated with the item. We assigned a unique ID number to each structure footprint. Since each structure is associated with a map that falls within one of our decadal time bins, each unique structure ID serves as unique space-time coordinates. When more than one record or object was associated with the same structure, they were all assigned that structure’s unique ID, so that any given location within the HSDI can be associated with an unlimited number of records or objects.

Integrating Archaeological Data

The incorporation and integration of archaeological data into the project was crucial to the success of this project and represents an important advance over previous HSDIs. We incorporated archaeological data in the form of digitized versions of artifacts, field notes, drawings, photos, and excavation reports into the HSDI. Each record is accompanied by a full set of metadata that includes the archaeological provenience, description/interpretation, and at least one photograph or representation of the artifact (or, in the case of reports and drawings, digital copies of the item). The process of digitizing and spatializing archaeological data is handled in a generally similar way to the historical records and museum objects, in that the entry in our archaeological data catalog for each artifact or item of archaeological data was assigned a unique ID corresponding with real-world space-time coordinates in our HSDI. However, the method for geolocating the archaeological data required a different approach compared to that adopted for the historical records and museum objects.

To begin with, we considered archaeological remains to be spatially associated with excavation units. Thus, while the artifacts themselves date to historical time periods, the spatial reference we assigned to each relates to the act of archaeological recovery, which took place in the present. They could also be associated with historical structures present on one or more of our historical landscapes (as represented by our rectified cartography) if their associated excavation unit fell within a historical structure footprint. As a result, the spatial reference for each artifact or other archaeological record is represented by the digitized excavation unit it is associated with.
As with the building footprints, a unique ID was assigned to each digitized excavation unit and each record in our archaeological data catalog references its associated excavation unit unique ID.

A number of excavation units were also located within a historical structure. In such cases we used the overlapping geometries of the excavation unit and the building footprint to associate archaeological remains with both the excavation unit it was recovered from and also the historical structure associated with that excavation (see the Activity 2 Bootstrap subsection for further discussion). This use of interacting / overlapping geometries allows us to situate an archaeological object within a landscape that is dynamically evolving over time, a critical advantage when attempting to create an interactive representation of a city such as Hamtramck as it rapidly industrialized during the first half of the 20th century.

Finalizing Data within the HSDI

The final step in building the HSDI involved converting all of the aforementioned data into formats suitable for storing within an Esri ArcGIS Enterprise Portal, from which they could be accessed by our end product deep mapping software. The rectified cartography and aerial images for the city were converted into cached tiled image services suitable for sharing with end users via the web. Digitized building and excavation unit footprints for all of the archaeological and historical data gathered for the project were published to the Portal as hosted feature services, and the catalogs for the historical records, museum objects, and archaeological data were imported into the portal geodatabases as tables. At this point, the HSDI contains all of the historical and archaeological data gathered for the project in digital, spatialized formats that can be interacted with (and interact with one another) using both spatial and tabular linkages built into the data that situate all of our gathered information about Hamtramck’s past in space and time.

While this HSDI is a purpose-built infrastructure serving a specific project, the use of the Enterprise Portal itself is a commonly implemented form of spatial data infrastructure, and the datasets themselves exist in standard geospatial and enterprise database data formats. As such it is ultimately also designed to serve as a model for replication in future projects. To this end, we have been careful to ensure that the contents of the HSDI are stored in formats compatible with existing archaeology database infrastructures (tDAR, ARIADNE+, and state archaeology and historic preservation databases, for example) and popular collections management software (such as the popular PastPerfect).

Activity 2: Build a Prototype, free, web-accessible Deep Map for Hamtramck.

The HSDI discussed in the previous section represents our process for converting the traditional components of the historical and archaeological records into digital datasets that are mutually linked through space and time in order to support a deep-mapping user interface. This was an experimental process requiring a large investment and a great deal of manual work formatting and organizing the data. Since our deep map is intended for use by the general public and free
access via the web, our project also demanded the development of a web-based application that could effectively support interacting with the data in sophisticated ways, while also featuring adequate performance (e.g. brief loading times, responsive controls) and a simple, user-friendly interface. The following section briefly outlines the technical development of the web-based deep-mapping interface, which we call the Hamtramck Explorer (Figure 5). This phase of the project underlines the importance of assembling an interdisciplinary team of PIs, collaborators and project technicians for deep mapping work, as the specific skills needed for this phase of the project fall outside the expertise of many humanities practitioners, even those with long experience in working with geospatial data and deep mapping.

There is a growing array of off-the-shelf, no-coding tools available for the development of web-based software, and many of these also incorporate tools for handling spatial data. We initially faced the choice of whether to use off-the-shelf software, such as Esri’s ArcGIS WebAppBuilder or Experience Builder, or to develop the deep mapping application from scratch using web programming languages. Due to our need for the app to be able to query and manipulate large amounts of tabular data from specific user-based actions, we decided to use programming with Esri’s ArcGIS JavaScript SDK. While the Esri builder apps are intuitive and require no programming knowledge they generally lack the ability to query and display data on the fly.

The Hamtramck Explorer deep mapping application was ultimately built using HTML, CSS, and JavaScript. On the frontend we used Bootstrap framework for application’s main user interface including the navbar, search bar and modals. The ArcGIS JavaScript SDK was used to display layers (such as rectified historic cartography and aerial imagery) and manipulate and control the map. We used the Tabulator JS library to display our tabular data (historical and archaeological data catalog records and metadata) within an interactive table. Additionally, JQuery was used for attaching DOM event listeners. On the backend we used ArcGIS Server to host our FeatureLayers for the building footprints and excavation sites and TileLayers for the georeferenced historical maps. We also hosted the historical and archaeological data tables on ArcGIS Server. The ArcGIS REST API was used to query and return data from the FeatureLayers and Hosted Tables and return the data back to the application for display. The following section will provide a brief overview of each of the main technologies used to build the application and how they were used in the development process.
Client-side Technologies overview

ArcGIS JavaScript SDK

The ArcGIS JavaScript SDK 4.24 is used to display and control the application’s main web mapping interface. The SDK is responsible for the display and style of the vector archaeological excavation unit and building footprint layers (Feature Layers), as well as the display of rectified historical map overlay raster layers (Tile Layers). Additionally, the JS SDK retrieves attribute information from each object when the user clicks on a building footprint or excavation unit. This attribute information is then used for display on the web app interface in a Bootstrap modal popup.

To allow the user to adjust the opacity of a historic overlay map, we used the ArcGIS JavaScript SDK OpacitySlider widget. The widget allows for dynamically adjusting the opacity of any layer on the map. When the user selects a new historic map from the map picker dropdown menu, the widget allows for the opacity to be changed by dragging the handle of a range slider up or down allowing the user to make comparisons in what the landscape looked like in the past compared to present day. The ArcGIS Online Javascript API is also used to change the display of a historic overlay map. When the user selects a map from the map picker dropdown menu, the JS API changes the visibility of the Tile Layers to show only the one the user has selected from the list (Figure 6).
Figure 6. Screenshot of the Hamtramck deep map interface, showing the Gass Saloon site. Excavation units are visible in red; the interactive building footprint outline for the Gass Saloon is visible in purple.

Bootstrap

Bootstrap is a powerful and extensible frontend development toolkit that utilizes a grid system for responsive design and prebuilt components for user-interface design. We used Bootstrap 4.5.2 for designing the main user interface components: The Navigation bar, the search bar, the historic overlay map picker dropdown menu, and the pop-up modal windows. The modal windows are used for displaying attribute information in pop-up windows when the user clicks on an excavation site or building footprint. The pop-up window consists of basic information about the excavation site, building, artifact, or object and includes a series of tabs containing items such as documents, photos, and 3D models for each. The search bar is used for capturing text from a user input for querying the data tables on ArcGIS Server. For example, excavation unit 2 at the Gass Saloon Site was sited within the building footprint of the (since demolished) saloon structure. Selecting the saloon building footprint within the deep map interface opens the building information popup (to the right of the screen in the figure above). It also opens the artifact calc catalog (to the left of the screen in the figure above) for any excavation units located inside the selected building.

Tabulator

Due to the large volume of artifact and object data in this application, we needed a flexible platform that would allow the display of thousands of records in the same table within a web browser. We chose Tabulator (version 4.9.3) because of its ability to handle many data records, its design customization, and its ability to call functions on a table record click. Tabulator is responsible for displaying a table of artifacts or objects that are linked to specific excavation units or building footprints. Tabular allows for the grouping of items by excavation or footprint ID number. When the user clicks on any artifact or object in the table, the map zooms to the corresponding polygon highlights it, and a Bootstrap modal popup appears displaying any items we have linked to that site such as excavation site reports and pictures.

Server Side Technologies Overview
ArcGIS Server

We used ArcGIS Server 10.9.1 for hosting and creating GIS services for our Feature Layers (digitized building footprints and excavation sites), Map Services (rectified historical cartography and aerial images), and Hosted Tables (historical and archaeological data catalog records and metadata). Once the services are live on ArcGIS Server they can be accessed, displayed, and queried through our deep mapping web application.

ArcGIS REST API

The ArcGIS REST API is used in the application for querying data from Hosted Tables and Feature Layers and returning it to the browser for use in the application. When a user clicks on an excavation unit footprint, building footprints, or executes a search using the search bar the application uses the ArcGIS REST API to query all features from a Feature Layer or Hosted Table matching either the excavation site or building footprint’s id number or for a matching search term. Once a footprint has been clicked or a search has been executed, the application uses the ArcGIS REST API to call to the Feature Layers or Hosted Tables on ArcGIS Server and query all matching features and then return them to the application in JSON or GeoJSON format. The JSON data is then used in modal popups or in the table of artifacts or objects displayed in the sidebar.

Activity 3: Collaborative Project Work

Establishing a Collaborators Group and Initial Data Sharing

As a fundamentally publicly oriented project fusing archaeology, history, community heritage, and deep mapping, the Hamtramck Historic Spatial Archaeology project was planned from its inception as a public collaboration between the community and an interdisciplinary group of researchers. A key component of the project was the assembly of two groups - and advisory board and local collaborators group - to evaluate and provide feedback on project activities and products. The advisory board was intended to consist of scholars with relevant expertise to the project activities, and the local collaborators group were to be drawn from the Hamtramck community.

At the start of the project we assembled a local collaborators group that included ten heritage practitioners based in Hamtramck: Greg Kowalski, Director of the Hamtramck Historical Museum and Chair of the Hamtramck Historical Commission, and the nine-member Board of Directors for the Hamtramck Historical Museum. Among the Board members there are individuals who work as an elementary school teacher, a historian/author, a journalist, a public relations executive, non-profit coordinator, small business owner, and a tradesman. This group also brought in additional community members on a meeting-by-meeting basis to join them in reviewing our progress and participating in meetings.
At an early stage of the project, we realized that the individuals planned to compose our scholarly advisory board could just as efficiently support the project on an *ad hoc* basis without spending time and resources in assembling them as a group. We consequently devoted all of our project meeting time to working with our local collaborators group. This shift in focus towards the local collaborators group led us to increase the total number of planned meetings with collaborators to four, coinciding in three cases with complimentary public events showcasing project progress.

One of our first activities upon project launch was facilitating the sharing and organizing project data among the project team and collaborators group. We set up a dedicated collaborative Google Workspace immediately upon project launch and began gathering and digitizing key datasets such as historical cartography and museum documents (Figure 7). The HHM curates a large archive but through lack of resources, much of it remains uncatalogued. It was therefore essential to work with HHM volunteers to identify and digitize the most useful historical cartography and develop a list of the most significant people, places, and events in Hamtramck’s history, after which we could focus our efforts on collecting relevant archival materials for ultimate inclusion in our HSDI. With project team members and local collaborators working in three separate locations and institutions, Google Workspace allowed any contributor access to ongoing project data and documents between in-person meetings and events.

![Image of project data](image_url)

Figure 7. Project team members and members of the collaborators group began assembling project data from the uncatalogued collections of the HHM in spring 2022.
April 2022 Meetings / Events

The project team and collaborators first gathered as a group in Hamtramck at the HHM in April 2022, at the beginning of the project, to collectively wireframe the planned deep mapping app. We discussed the desired content, format, features, and user experience. The MTU GRF prepared a basic web-based spatial data viewer with a few of the earliest prepared datasets to demonstrate how data could be visualized and interacted with and also demonstrated similar features using the more mature Keweenaw Time Traveler web interface. The project team and collaborators then met in the HHM archives as a group identifying materials for scanning and rectifying. Recognizing that the project resources were not sufficient for comprehensive coverage of the city, the project team asked the collaborators group to assemble a ‘Top Ten List’ of historical places in Hamtramck that occupied prominent roles in community heritage narratives. This could then serve as focal points for data-gathering efforts, providing appropriate content for the prototype within the time and resource constraints of the overall project.

Additional meetings of the project team at the Wayne State Anthropology Department’s archaeology lab established protocols for formatting the archaeology data catalog and organizing artifact cataloging, scanning, and photographing activities (Figure 8). During this visit, the HHM also hosted a public event at the museum that gave the project team the opportunity to introduce the project to the public, answer questions, and gather initial feedback on the deep map wireframe design. This visit concluded with plans for the project team to focus on building out the Hamtramck HSDI with the highest priority datasets and begin work on an alpha prototype of the deep mapping software for review and critique at a future series of meetings in the fall of 2022.

Figure 8. Wayne State University students wash artifacts recovered from the Old Hamtramck Center during the November 2022 Archaeology Day event. Attendees also had the opportunity to trial the alpha prototype of the Hamtramck deep mapping interface at this event.
**November 2022 Meetings / Events**

During the fall of 2022, the WSU Anthropology Department’s archaeology field team had planned to conduct additional excavation work at the Old Hamtramck Center site, with the new data being included in the ongoing efforts at building the project HSDI. However, shortly before the scheduled start date, the Old Hamtramck Center property was sold and the new owners refused further access to the WSU archaeology team. The team were able to secure access to an alternate site, a property previously occupied by the Gass Saloon, a late 19th-early 20th century saloon run by a German Immigrant family. Excavations at this site, especially at a historic trash puit located on the property, yielded a large volume of artifacts, including many diagnostic artifacts clearly associated with the saloon period of occupation. The project team had previously scheduled their second project meeting to coincide with the last week of excavation work allowing team members to conduct additional digital documentation work, photographing the open excavation units to be used in creating 3D models of the excavations using structure-from-motion-photogrammetry software. The WSU archaeology team also surveyed their excavations using GPS and captured aerial drone footage of the site to support and augment the digitization of the excavation data.

This field activity coincided with the second planned series of meetings between the project team members and the local collaborators group in November 2022. After several months of focusing on building the digital, spatial datasets, assembling them within the HSDI, and developing an alpha prototype of the deep mapping web app, the project team presented a live functioning alpha prototype to the collaborators group and reviewed the previously developed wireframe design. The alpha prototype was originally planned for presentation to the collaborators group in Spring 2023, but initial development moved more quickly than anticipated. By this point, the previously developed ‘Top Ten List’ of focus sites had expanded into more than 20, and so team members spent a substantial amount of time during this visit working with the project student assistants to scan and photograph additional museum materials and objects for inclusion in the project HSDI and in the final prototype deep map.

This group of meetings took place in conjunction with an Archaeology Day event hosted by the HHM on November 12, 2022, that showcased the recent archaeological excavation work conducted in Fall 2022 by the Wayne State University Anthropology Department’s field team. During the latter part of this event the project team provided a public update on the Hamtramck Historical Spatial Archaeology Project and described how the archaeological data from the opening excavation work was being integrated into the prototype deep map planned for launch in Fall 2023. The public were then invited to explore the alpha prototype Hamtramck Explorer on several computer kiosks set up for the event, with project staff in attendance to answer questions and record feedback.


June 2023 Meetings

A third round of meetings with the local collaborators and team members took place during June 2023. Since the group had developed the alpha prototype deep map ahead of schedule, this meeting was used both as an extra opportunity to evaluate the current state of the prototype development, with the project team sharing a new version of the deep map alpha prototype, and also an opportunity to begin discussing longer-term project goals and follow-on work. The June meetings also provided an opportunity for the MTU team members to work directly with the student assistants on further archaeology data cataloging and digitizing activities.

![Figure 9. Project PIs Krysta Ryzewski (left) and Dan Trepal (right) demonstrate the Hamtramck deep map interface to Hamtramck Historical Museum visitors during the project deep map launch event.](image)

October 2023 Deep Map Launch Event and Wrap-Up Meetings

The Hamtramck Historic Spatial Archaeology collaborative activities culminated in the public launch of the completed Hamtramck Explorer prototype deep map interface on October 8, 2023, at a public event held at the HHM. Team members gave an overview of the project goals and achievements, and then devoted the bulk of the public event to allowing attendees to explore the deep map on kiosks set up and accessing the software. The Hamtramck Explorer went live (and is now permanently located) at www.mappinghamtramck.com. The final deep map prototype as launched includes over 130 historical maps and aerials, over 1,300 digitized archaeological records, and more 300 digitized historical records and objects.
Project team members and the local collaborators group held a final round of meetings to discuss and evaluate the project outcomes. While evaluative critique was the primary planned activity, the local collaborators group were primarily interested in planning follow on work, to maintain momentum to the project.

**Project Outcomes and Impact**

Response from the Community and Project Continuation

The most significant outcome for the project has been the overwhelmingly positive public response to the project’s successful launch of our free, web-accessible prototype deep map. This deep map represents a successful fusion of the historical record of Hamtramck, the Hamtramck Historical Museum’s local heritage programming and collections more specifically, and WSU’s multiyear program of archaeological investigations in Hamtramck. Community response to the Hamtramck Explorer has greatly exceeded our expectations, to the point that HHM Director Greg Kowalski has made expansion and improvements in the app and related activities “a top program priority for the foreseeable future” at the museum. The HHM have already begun coordinating a volunteer effort solely dedicated to generating improvements and additions to the Hamtramck Explorer. He also plans to host public programs over the next year at Macomb College and Schoolcraft College aimed at drawing in members of the public to use and contribute to the prototype deep map.

While the HHM has been an enthusiastic collaborator in the project from the beginning, this pivot towards a major investment of museum staff attention in the Hamtramck Explorer app comes as a direct and immediate response to growing community interest in the app in the wake of its public release. The museum continues to receive a steady stream of inquiries and interest from members of the public who are interested in sharing stories, photos and artifacts for use in the Hamtramck Explorer. This has already brought to light new, previously unknown historical materials such as photos and private correspondence. Thus, while our deep map was intended as a prototype, it has already been adopted by the local heritage museum and a growing number of community members as an important tool for exploring local heritage, and an asset that needs to be expanded and enhanced going forward.

We have also received interest from other local heritage organizations, such as the Ukrainian American Archives & Museum in Hamtramck, the Detroit Historical Society, and the Reuther Library and Archives at Wayne State, who are interested in exploring avenues for potential future collaboration with the project team.

Our experience during our public events also highlighted the extent to which the app raised awareness of Hamtramck as a rich archaeological landscape, and the extent to which that landscape can help tell stories about the foundation, growth, and continued evolution of Hamtramck. While the Wayne State Anthropology program’s multiyear program of excavation work in Hamtramck functions as an important public archaeology project in its own right, the number of HHM visitors and event attendees who discovered the excavations through the
Hamtramck Explorer’s deep map demonstrated that our approach allowed new segments of the community to discover the archaeology. This reinforces an important assumption we began the project with; namely that archaeology stands to benefit greatly from the integration of archaeological data into deep maps that help tell stories about a place using multiple bodies of evidence that are often brought to the public separately.

We have already begun planning follow-on work and seeking funding to support further development of the project, with the enthusiastic support and encouragement of our local collaborators group. This includes a proposal submitted to the Michigan Humanities Council to fund the development of a mobile-friendly version of our deep map interface that will permit the use of the HSDI layers to support movement through the present-day city of Hamtramck with the user’s current location projected onto our historic maps. We are also scoping the development of a story submission feature that allows Hamtramck residents to directly engage in expanding the deep map through the sharing of memory with accompanying media (photos or scans, videos, and audio recordings). In the meantime, our prototype deep map remains live and accessible to the public and will be maintained indefinitely (see the following section for further details).

Technical Products and Sustainability

The primary tangible project outcomes are the establishment of a collaborative digital space developed between the project partners, the Hamtramck HSDI, the various datasets it contains and workflows followed to produce them, and the prototype deep map itself, along with the free, web-accessible Hamtramck Explorer, which serves as the public interactive interface for the deep map.

The digital collaborative space set up during the project includes the project Google Drive for initial data sharing and collaborative writing. The workflows we established for bringing both historical and archaeological data into our prototype deep map will continue to function going forward as the HHM staff devote more volunteer time to adding stories, photos, and other data to the deep map for sharing in the Hamtramck Explorer App.

As initially set forth within the project Data Management Plan, the digital data and infrastructures developed during the project will be housed within the Geospatial Research Facility (GRF) at Michigan Tech using a combination of industry standard ESRI geospatial Portal and ArcGIS Server products and open-source PostGreSQL Server. While ESRI is proprietary, the datasets and web-components will be stored and delivered in widely compatible open-source formats. The data, portal, and web interface will be hosted indefinitely in anticipation of ongoing use by the community and further development in future follow-on projects; a contingency plan for archiving all digital products is also in place. Project activities, projects, and outcomes are documented within this white paper and within a forthcoming peer-reviewed scholarly publication. These will also be stored within the same project data portal used to house our Hamtramck HSDI and deep map. Team members have already presented preliminary results of the project at the Society for Historical Archaeology annual conference in Lisbon Portugal, in
January 2023. The Hamtramck Historic Spatial Archaeology Project and its output, the Hamtramck HSDI, will expand the boundaries of deep mapping and digital archaeology, integrate deep mapping with collaborative and community-involved heritage initiatives, and will further establish HSDI as a method of integrative data access and analysis across multiple disciplines.

References


