

**NSDI 2010 CAP GRANTS  
CATEGORY 7  
REPORT FROM MASSGIS**

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**Agreement Number:** G10AC00206

**Project Title:** Building and Maintaining a Map of Locations for Structures with Addresses

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**Project Narrative**

Summary of project activities

This project involved the creation and validation of an address point database for a number of communities in Massachusetts with some additional investigation of how structure data could be coded consistent with the National Structures Dataset. The initial creation of draft address point databases for each community was done by MassGIS, which is part of the information technology office in Massachusetts state government. This initial work relied on both existing and newly developed spatial data infrastructure (SDI) layers, specifically orthophoto, LiDAR, roads, tax parcels and roof outlines.

Orthophoto was current four-band imagery at 30cm resolution obtained by MassGIS and shared with regional and local partners. LiDAR was a compilation for Eastern Mass. of projects since 2003 including notably a large area acquired in partnership with USGS, FEMA and other Federal and state agencies as part of the ARRA-funded New England LiDAR project. Roads are being maintained by MassGIS and the DOT using data and services from NAVTEQ (commercial data provider.) Tax parcels were compiled from local municipal data to a statewide standard by a variety of contractors, funded by various state agencies including the information technology office (IT bond) and the public safety office (funding for staff.) Building outlines were developed by a contractor working for MassGIS and also funded by an IT bond.

The CAP grant supported the participation of regional planning agencies who worked with local officials to review and correct the draft address data. It also paid for the development of a mobile tablet- and phone-based application designed for this project.

The address point database consists of the point locations themselves, which in general lie within structure outlines, and the address records from various sources which were parsed and standardized and loaded into a master address lookup table. Once the geography (the points) and the tabular data (the addresses) were in place, building the initial version of a point address database involved linking the points and the address records so that every address had a geographic location. Investigation of how this work might feed into a national structures layer primarily involved matching local use codes for parcel data and geocoding other sources for sector-specific domains for FCodes at the national level to the point address data set.

#### What practices or activities led to success?

The technical approach included several key elements that represent best practices to be incorporated into a statewide project. The attached project report is intended to cover these key technical elements in enough detail so that others can evaluate and possibly adopt the approach we took.

1. The project used a layout for numbered address data based on the recently issued Federal Geographic Data Committee (FGDC) standard and for sub-address data based on a profile of the FGDC standard as implemented in the draft Civic Data Location Exchange Format (CLDXF) by the National Emergency Numbering Association (NENA).
2. At MassGIS, we used a flexible and powerful parsing engine in the Python programming language to standardize street names to the FGDC standard and extensive coding in Python to standardize other components of thoroughfare addresses as found in local datasets.
3. Through discussions with municipalities and iterative trials, we developed a relational data model for address points and tabular listings which builds on the available SDI data for the state. This data model replaces the flat-file model currently in use by many municipalities in Massachusetts.
4. An important component was the deployment of a browser-based mobile GIS data capture application built on new capabilities in HTML5. This

enabled local updates to a centralized database. Since forthcoming phone and tablet hardware and operating systems are expected to continually improve support for HTML5 geolocation, map display and data management capabilities, it is our belief that a browser-based solution represents the most viable and portable approach for mobile GIS.

5. The project benefitted greatly from the use of LiDAR data by the vendor interpreting building outlines and by our program in performing QA of those outlines. We were not able to reliably derive structure points from the LiDAR directly, so we elected to go ahead and interpret structure outlines manually from orthophoto, but the LiDAR played a very important role in the quality assurance of the building outlines, which we estimate improved the accuracy from 99.5% to 99.8%. For a dataset that included over 2 million structure outlines, this was a significant benefit.

The overall address data compilation for which this project served as a pilot was initiated at the state level primarily to meet public safety needs, but as is often the case with GIS projects, there are many ancillary benefits accruing to project partners and participants. Regional agencies were enthusiastic about the opportunity to engage in a long-term partnership on this activity. Other state agencies and local officials participated in the project on a volunteer basis because of their interest in the project outcome which will be extremely useful in local government operations like emergency response, permitting and inter-departmental coordination. Since address data are so widely used it is not surprising that this kind of project would motivate the participation of regional and local partners.

#### What practices or activities were not successful?

A key lesson learned is that future organizational and institutional challenges will be at least as great as the technical ones. Relying on volunteer energy may not be the best approach, since in Massachusetts at least, the issue of “unfunded mandates” is a very sensitive one. Making the case that geographic data collection of addresses should be added to all the other responsibilities of local officials requires substantial persuasion, and one lesson learned is that we will have to allocate more staffing and resources to that effort and possibly seek a political solution. Issues include the lack of an overall mandate for integrating local and state data, lack of understanding and support for project goals, and very uneven technical capacity among project participants at the local level. Massachusetts has no counties, and so the responsibility for data collection and maintenance falls to the 351 cities and towns, which often lack any technical infrastructure.

### How inclusive is your effort?

As described above, the project relied on data that were developed through cooperative funding arrangements between state level agencies and on an initial compilation of addresses from local government, transportation and public safety sources. The address data review and the evaluation of the field data collection were done by regional agencies working with local officials. This is a good model for Massachusetts, which has no county level government, because regional agencies have GIS staff who provide technical services to municipalities and thus have existing relationships they can build on for this kind of work. Of course it is also helpful that they are distributed geographically across the state.

We have presented the work supported by this grant in three venues:

1. MARGIS workshop (regional planning agency staff)  
Worcester, MA, Oct. 2012
2. National Emergency Numbering Association National Conference  
Anaheim, CA, June 2012
3. Northeast Arc Users Group meeting  
Rockland, ME, November 2012

### **Next Steps**

We are continuing to develop draft address datasets for every municipality in Mass. and intend to complete the first round by July 2013.

### **Attachments**

**The complete report, which details each of the key technical elements of the project, is attached to this summary.**

### **Feedback on Cooperative Agreements Program**

This planning grant was very useful in helping to develop a prototype for an ambitious statewide process. The templates for the CAP program planning documents are easy to use. We found the FGDC and USGS support staffs a pleasure to work with. The CAP program's biggest weakness is the complexity of the process for handling financial transactions between the state and the federal funding agency.