

**Business Plan for
Statewide Parcel Data
Development & Maintenance
For the
Commonwealth of Massachusetts**

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For



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1 EXECUTIVE SUMMARY

1.1 BACKGROUND

Over the past two decades, Massachusetts has made enormous strides towards creating a statewide GIS data layer from local assessors' maps. Key accomplishments include:

- Digital parcel data available for approximately 92% of the state
- A strong data standard that covers minimal requirements for both digital parcel content and accuracy
- An ongoing \$2 million program, funded by the Executive Office of Public Safety and Security and the Information Technology Division that will result in approximately 1.7 million of the state's 2.3 million parcels (i.e., 73%) being brought into compliance with the statewide standard by the end of FY2012.

This plan is focused on documenting the progress that has been made, summarizing the business case for completing parcels on a statewide basis and identifying the funding and implementation path necessary to complete the job.

1.2 THE BUSINESS CASE FOR STATEWIDE PARCELS

Parcels are a critical and versatile data set that is used by the vast majority of state, local, and private sector GIS practitioners in the Commonwealth. This study documents the positive experiences of other states that have pursued similar efforts and while an exhaustive cost-benefit analysis was out of scope, the plan documents the wide benefits of statewide parcel data as well as several specific examples of cost savings and cost avoidance that would accrue if statewide parcels were developed. The following highlights the expected benefits and savings:

General Benefits

- Creation of statewide addresses and improvements in geocoding
- Improved accuracy and efficiency in property tax assessment
- Improved E911 dispatching and emergency response

Cost Savings

- State owned property boundary verification is streamlined
- On-line data leads to improved public data access with less staff time
- Decreased GIS application development time

- Support for statewide economic development
 - Support for natural resource protection
 - Improved management of state owned property
- Cost Avoidance**
- Commercial data licensing fees are eliminated
 - Redundant state agency parcel data collection efforts are removed

1.3 THE COST AND IMPLEMENTATION PLAN

1.3.1 Finishing the State

Based on the cost of current parcel automation and standardization efforts, the plan documents that the expected cost to finish the statewide parcel data layer beyond state fiscal year 2012 will be approximately **\$601,000**. To complete parcels, the Commonwealth would contract for and conduct a third phase of the parcel automation and standardization work to take place in FY2013.

1.4 KEEPING THE DATA CURRENT

Earlier MassGIS grant programs have shown that converting parcels into digital format is not enough. Parcel data that is converted into electronic format with statewide funding does not get readily updated on a voluntary basis. To protect the Commonwealth’s investment in statewide parcels, this plan recommends that MassGIS partner with the Department of Revenue (DOR) to phase in a requirement that a community submit standards compliant, digital parcel data as part of the three-year revaluation and certification cycle. The current DOR revaluation and certification process includes a hard copy parcel mapping requirement and making this a digital requirement is a logical and timely evolution for the 21st century. Such a requirement leverages a technology that is already employed by the vast majority of communities and would serve to protect the investment the Commonwealth has made in electronic parcels by helping to maintain this extremely valuable data asset.

2 PROGRAM GOAL

This Business Plan provides details for the implementation of complete and accurate mapping of **statewide parcels that are regularly and systematically updated**. The 2007 Strategic Plan for Massachusetts' Spatial Data Infrastructure (hereafter "the Strategic Plan" see <http://www.mass.gov/mgis/stratplan.html>) identified parcel data as a key data set to support government operations and economic development in the Commonwealth. Amongst other observations, the "Vision for a Massachusetts Spatial Data Infrastructure (MSDI)" in the Strategic Plan, identified requirements for:

- Rich and accurate spatial databases including new capital initiatives to develop *standardized mapping of statewide parcels and addresses*
- Sustainable *funding to support data maintenance*, including regular updating of core, base datasets such as parcels

This plan includes the identification of funding to complete development of standardized statewide digital parcel data and a plan for maintenance and standards compliance to protect the value of the investment in statewide parcel data.

2.1 BACKGROUND

Digital parcels are important for a broad range of government activities at state, regional and local levels of government for property assessment, planning, environmental, transportation, public health and public safety programs. **In particular, parcel data can support the development of high quality address point data for emergency response** and other field operations.

Currently, each community in Massachusetts is required by the Department of Revenue to maintain a complete map of property parcels as part of the property tax assessment process. Historically, these hard-copy maps have been maintained on Mylar or linen at varying scales. These maps show the approximate boundaries of each property parcel along with related information - such as parcel identification numbers, street names, dimension text, acreage, easements, building footprints, and natural features - to assist with property valuation. Over the past 15 years there has been an increasing trend for communities to manage their property parcel maps using geospatial technology and the resultant digital parcel data are among the most important and versatile of any GIS data set. Some

communities, however, **have not had the resources to create a digital assessor map** or have an inferior electronic dataset that is poorly done or out-of-date.

To encourage the creation of digital parcel maps, MassGIS funded grant programs in 2002 (\$434,000) and 2006 (\$198,000). Under these programs MassGIS provided communities cash grants to support new parcel data development and to bring existing digital parcel data into compliance with the data standard. In 2002, 117 communities applied for a grant and there was funding for 34 awards. In 2006, when grants were targeted to Bristol and Plymouth counties, 43 of a possible 47 communities applied for grants. The funding supported 15 awards which were scaled to the number of parcels and ranged from \$2,000 to \$30,000.

While these programs were successful in incentivizing a substantial number of communities to meet the digital parcel standard, **there remained a large gap in the Commonwealth's digital parcel database.** MassGIS estimated that only 43% of the Commonwealth's 2 million parcels were considered "good quality" as of December 2010. Furthermore, the communities who did upgrade their parcel data in 2002 and 2006 have had little incentive to maintain the data in compliance with the standard and return copies to the Commonwealth in the subsequent years. Nevertheless, the vast majority of these communities have received significant value as they continue to use the data for a wide variety of other internal purposes.

To further the goal of statewide, standardized parcels, the State Executive Office of Public Safety and Security has committed funding to cover some portion of the cost as part of building a statewide point address dataset. As an example of public safety's need for more precise mapping, **the new, next generation 911 systems (NG911) being installed over the next 3-5 years will require an exact geographic location, down to the level of a parcel of land or even a specific building** in order to correctly route calls to the call centers and to assign responding services. More accurate mapping will also enable emergency personnel to respond more quickly and accurately to calls, as the display of parcel polygons and the availability of more detailed address information will allow dispatchers to help responders find locations. Ultimately, more accurate mapping, including parcels, may be deployed in the field using mobile technology. Additional funding is coming from bond funds through the Executive Office of Administration and Finance (ANF), the agency that houses the Information Technology Division of which MassGIS is a part.

3 BENEFITS & JUSTIFICATION

3.1 OVERVIEW & BENEFITS

Parcel data are essential to state, local, and private sector GIS practitioners in the Commonwealth. Parcel data are extremely useful in municipal operations, whether in planning and zoning, public health, building inspections, assessing, education, conservation, public safety or other departments. Parcel data are also used by state programs with regional goals or with involvement in specific sites, such as economic development, transportation infrastructure, broadband infrastructure planning, natural resource protection, land use and environmental permitting, large-scale emergency response and disaster recovery, energy facility siting, property management and other state agency missions. The private sector depends on parcel data to comply with permitting processes and identify optimal sites for new businesses. **In short, investments in parcels will benefit a very broad cross section of government and private sector stakeholders.**

3.2 RETURN ON INVESTMENT

Studies completed in several other states, as well as the “National Land Parcel Data: A Vision for the Future” (2007), and the Commonwealth’s 2007 strategic plan all indicate that **statewide parcels have and will generate a substantial return on investment in terms of benefits and cost savings.** As presented by the National Research Council, “It can be argued that in addition to the efficiencies that digital parcel data brings to the assessment community, the parcel layer used as a base map is the most information rich database with the broadest utility to local, state and federal agencies.”¹

3.2.1 Strategic Plan for Spatial Data Infrastructure (2007)

The 2007 Strategic Plan for Spatial Data Infrastructure focused on identifying key data sets that serve as core resources for government operations and economic development in the Commonwealth. **Parcel data was deemed “critical” for a variety of state and local activities and was identified as the largest existing data gap in the Commonwealth.** At the time the report was published, it was estimated that \$20 million had been spent on GIS data development over the preceding seven years. This investment as well as the demands on the state’s spatial data infrastructure, have continued to grow rapidly. With this growth comes the needs for improved coordination and effective resource allocation to develop

¹ National Research Council, “National Land Parcel Data: A Vision for the Future” (Washington D.C.: The National Academies Press, 2007), 53.

and maintain critical data sets such as parcels. The report recommends that the Commonwealth protect these investments in data assets by upgrading accuracy and currency and filling in the identified data gaps, such as statewide parcel data.

3.2.2 Evidence from Other States

NORTH CAROLINA EMERGENCY RESPONSE TO FLOODING. The State of North Carolina is prone to flooding because of frequent hurricane activity, with average annual flood damages of \$56 million². On September 18, 2003, Hurricane Isabel arrived on the outer banks of North Carolina leaving devastation in its path. While the hardest hit communities were identified and evacuated in plenty of time, the lack of digital parcel data inhibited damage assessment and distribution of emergency relief funds. Many of the more rural communities were unable to provide responders with digital data. In response, a Federal Geographic Data Committee (FGDC) workgroup was created to evaluate the importance of parcel data in emergency response situations and to identify issues that limited access to these data. The workgroup efforts revealed that in many cases, local governments had digital parcel data, but had problems getting it to emergency response crews in an efficient and standardized manner. Parcels are essential for formulating disaster management plans and for helping to preserve the assets of the state and its citizens. “Knowledge about who owns a given piece of land, the value of improvements made to the land, and current use of the land can be crucial in formulating disaster management plans.”³ In North Carolina, where available, digital parcel data helped expedite insurance claims and federal emergency loans thus greatly reducing the processing time and labor required for the recovery effort.

MONTANA CADASTRAL DATABASE. The Montana Cadastral Database was completed in 2002 and is publicly available for all counties in the state. The Montana Department of Revenue maintains the parcel maps for forty-nine of fifty-six counties with the remaining seven being maintained by county GIS staff. Montana works closely with the Bureau of Land Management to improve the accuracy of the parcel data through its Montana Cadastral Framework Program. The public as well as local governments and state agencies benefit from the parcel database through its use in countless applications ranging from agricultural appraisal to determination of surface ownership for lease agreements by private oil and gas firms. The parcel data is made accessible for query and download via the states Cadastral Website and a 2002 cost/benefit analysis estimated that the website alone was providing an annual

² Smith, Brandon R. “Floodplain Fliers: North Carolina’s Massive LiDAR Project”, *GeoSpatial Solutions*, February 2002.

³ David Stage & Nancy von Meyer, “Parcel Data for Emergency Response”, *GeoIntelligence Magazine*, September, 2004.

benefit of approximately five million dollars as thousands of individuals, from realtors to state employees, use the parcel data accessible on the website on a daily basis.

ARKANSAS GEOSPATIAL STRATEGIC BUSINESS PLAN: STATEWIDE PARCELS. Parcels are a critical data set to the State of Arkansas as evidenced by the disproportionate demand for parcel data from the state's geospatial web services. Parcels alone count for 13% of data requests despite the fact that less than 50% of the state's parcels are digitally available, and an even smaller percent are available via the web service. The state's 2010 Strategic Business Plan revealed a long list of the expected benefits and returns that investment in statewide parcels would bring. These include:

- Improved efficiency and equity in property tax assessment, revaluation and revenue collection including:
 - Finding new, untaxed development on existing parcels.
 - Performing automated agricultural land assessment based on soils.
 - Increased ability to perform analysis such as viewing assessment sales ratios (ASRs) across an entire county to look for clusters of high or low values.
- Increased revenue collection from property taxes that will lead to increased school funding.
- Routine state government planning and decision making.
- Providing a key tool for economic development and meeting site selection consultant requirements.
- Resolving jurisdictional boundary questions.
- Providing an invaluable tool in assembling the statewide address databases.

3.3 ANTICIPATED BENEFITS

3.3.1 Benefits

Benefits to local and state agencies as well as citizens and the private sector will be broad and varied. Property ownership, location and feature proximity impacts short and long-term planning from the rapid decisions of the emergency responder to the long term protection of environmental resources. Statewide parcels are an essential component to each of the following important activities.

- BASIS FOR CREATION OF STATEWIDE ADDRESSES.** The Commonwealth has a vital interest in maintaining a comprehensive, statewide address database for a variety of reasons, particularly in the public safety and emergency response arenas. Indeed, a working and effective E911 system requires current and accurate addressing – in the existing system, a dataset called the Emergency Service List (ESL) is used for this purpose. However, the ESL does not have a geographic component, nor does it include addresses where there is no land-line, which is a significant and increasing percentage of all addresses. Statewide parcels would provide an invaluable resource for standardizing and enhancing the statewide address database. While a single parcel can have multiple addresses (e.g. for apartments or various commercial properties), the statewide parcel data would provide an accurate inventory of all places that *should be* addressed and in combination with assessor’s data from their computer assisted mass appraisal (CAMA) systems, parcels provide an important cross check for address list accuracy and completeness.
- IMPROVED GEOCODING.** Almost every piece of information that state agencies collect and manage about businesses and citizens is attached to an address. This project will allow state agencies to derive the benefit of having a geographic location associated with each address (this is called “geocoding”) without having to resort to commercial geocoding services which provide much less accurate information. Parcel data can mitigate linear geocoding inaccuracies by making possible geocoding to specific address locations represented by parcel polygons.

FIGURE 1: COHASSET GEOCODING. GEOCODING USING COMMERCIAL STREET DATA CAN RESULT IN SIGNIFICANT MISPLACEMENT OF ADDRESS POINTS. IN THE EXAMPLE BELOW FROM COHASSET IN 2007, THE GEOCODED POINT FOR 39 ATLANTIC AVENUE IS APPROXIMATELY 600 METERS NORTH OF THE ACTUAL LOCATION.



- **MORE ACCURATE AND EFFICIENT TAX ASSESSMENT.** Completion of parcels will lead to improved efficiency and equity in property tax assessment, revaluation and revenue collection. Specific examples include, but are not limited to:
 - **Support for in-office revaluation certification by DOR staff.** Field certification currently requires 10 full-time DOR staff who must visit Town offices throughout the state and review maps in person. Digital submission of parcels would allow DOR staff to complete the map review portion of their certification process in office. Statewide standardized parcels would alleviate the need for some, and perhaps a lot, of the field work, thus offsetting budget cuts for traveling.
 - **Finding new, untaxed development on existing parcels.** Once parcels are automated, then Tax Assessors can compare those properties to orthophotography and the existing CAMA database. From those comparisons, Tax Assessors can see whether the CAMA record properly accounts for all the real property (e.g. structures, mobile homes, etc.) that are visible in the imagery. The City of Newton’s aerial-photo GIS base map (“orthophotos”) provided conclusive evidence in city's favor for a personal property assessment dispute. **This resulted in a one-time additional \$61,800 in tax revenue.** Many such examples can be found in communities across the Commonwealth.

FIGURE 2: UNTAXED DEVELOPMENT DETECTABLE. AN EXAMPLE OF THE QUALITY OF DATA USED IN NEWTON TO IDENTIFY UNTAXED PROPERTY FEATURES, SUCH AS POOLS, DECKS, OR OUTBUILDINGS.



- **Improved revenue collection.** As CAMA systems are reconciled with mapped parcels and gaps indicating untaxed or improperly assessed parcels are identified, revenue collection tools will be refined. By comparing the area of a parcel calculated by the GIS with the area listed in the Assessors database, finding errors and making the necessary corrections in lot area, **the City of Fitchburg gained \$225,000 in assessed value for the first ten properties corrected.**
- **Improved neighborhood classification methods.** The neighborhood classification is a key element in establishing assessed value. The classification process, however, has traditionally required extensive field work to identify homogenous areas based on factors such as proximity to water. **The assessor in the Town of Marshfield had estimated that it would have required one person full-time for a year to drive around and classify approximately 12,000 parcels.** Using parcel data, orthophotography, contours, surface waters, and wetlands however, the Assessor was instead able to complete this task by devoting approximately 75% of her time over 45 days. The parcel data saved the Town money and provided further refinement of the assessment neighborhoods, thus improving the quality of the evaluation used in determining assessed values.

FIGURE 3: NEIGHBORHOOD MAPPING IN MARSHFIELD. DIGITAL PARCEL DATA CAN SAVE TOWNS HUNDREDS OF HOURS OF FIELD LABOR TRADITIONALLY REQUIRED FOR NEIGHBORHOOD CLASSIFICATION. THE MAP BELOW SHOWS PARCELS COLOR CODED ACCORDING TO NEIGHBORHOOD CLASSIFICATION.



- **Support for fair and accurate tax assessment.** Accurate and up to date parcel data are required for fair and accurate real property tax assessment *across the state*. MassGIS has collaborated with the DOR to produce an on-line mapping tool for researching statewide comparable sales. Having parcel data on-line will further enhance this capability by enabling assessors to view potential comparable sales and other map information on a regional basis.

- **SUPPORT FOR ECONOMIC DEVELOPMENT.**

Statewide parcels will provide a key tool for economic development and business site selection consultants. When businesses or their site selection consultants are looking for properties, it is critical that they be easily able to view property boundaries and key characteristics of the parcels such as the current assessed value or current land uses. Of equal importance can be information on abutting properties such as the number of neighbors a given parcel may have. Cities and states that have their parcels completed and on-line are at a distinct advantage in this arena.

“In our attempts to collect data from municipal offices, we found that many communities had no established process for delivering parcel geography data to the public. Most municipal officials had little or no knowledge of the data at all. Even its existence was unknown to many municipal officials in assessing and engineering offices.

...we strongly support the intention and goal, of MassGIS and others, to create a statewide data repository for parcel level geography. Ultimately we believe this outcome will prove itself the best practice for public access to this valuable data. Also a consolidated and consistent statewide data set allows for the use of parcel geography in regional and statewide GIS applications.”

Mark Fahey, President, Real Estate Mapping Inc.

Commenting on his company’s experience providing site-finding services in the Metro Boston area for a commercial client.

- **CADASTRAL BASE MAP.** In addition to the data content benefits described above, parcels – like orthophotography – fulfill an important base map function. Specifically, a variety of political and administrative boundaries such as school districts or zoning are coincident with property boundaries. For example, a given parcel should not be split by a school district boundary. Accurate parcel data will help ensure that there is no ambiguity about the taxation and services provided to that parcel. Without statewide parcels, it will be impossible to properly map such

boundaries across the Commonwealth and there will continue to be inequities and time spent resolving jurisdictional boundary questions.

FIGURE 4: PARCELS SERVE AS THE BASEMAP FOR OTHER THEMATIC MAPS. A VARIETY OF POLITICAL BOUNDARIES, DISTRICTS, AND ZONES ARE DERIVED FROM PARCEL DATA, SUCH AS IN THE ZONING MAP EXAMPLE BELOW FROM NEWTON.



- **SIMPLIFIED DATA MANAGEMENT.** Standardizing and aggregating parcels statewide provides many benefits to the managers and users of parcel data, including:
 - Eliminating the workload associated with redundant requests from multiple state agencies and the private sector by enabling parcel data distribution from a single state-level source. Currently, a single municipality may be asked to provide parcel data to many separate state agencies via separate data requests. Similarly, a state agency would need to make 351 separate requests for parcels to achieve statewide coverage (even if all towns had parcels). **With a statewide approach, a city/town would only need to provide the data to the state once, and the state could be responsible for sharing it amongst its own agencies.**
 - Independent state-level data quality checks for municipal data. Compliance with the parcel standard and submission to MassGIS will provide Towns with outside feedback on the quality of their parcels highlighting issues that may be interfering with proper assessment, such as mismatched parcels or unidentified property owners.

investigation or enforcement actions. For instance, owners of properties subject to Chapter 91⁴ might need to be contacted regarding construction activities not shown as permitted. In other cases, notification would be a matter of public safety and welfare such as owners of land abutting a parcel where a spill was reported might need to be informed about a threat to their water supplies. The parcel mapping, which eliminates the interpolation error of commercial geocoding, would directly support such requirements and allow DEP staff to implement operational and regulatory mandates more efficiently and effectively.

- **SUPPORT FOR MORTGAGE CRISIS “DISTRESS” INDICATORS.** Standardized, statewide parcels would provide a common, statewide platform for integrating, comparing, and analyzing key factors such as utility shut-offs, mortgage payment status, foreclosures, unemployment, crime statistics, undelivered mail, etc. Parcel data makes it possible to correlate these disparate factors and observe patterns before the situation reaches a critical point.
- **SUPPORT DCAM IN MANAGING STATE PROPERTIES AND WITH SURPLUS PROPERTY SALES.** At present, there is no comprehensive GIS dataset representing boundaries of any state agency lands outside of EOEA. This makes it difficult for DCAM’s planners and site programmers to take advantage of the wealth of GIS data on physical conditions, such as soils and slopes, and resources, such as water supplies. In many cases, outside consultants are hired to provide the GIS expertise and parcel map data conversion services at significant expense to DCAM.
- **MORE EFFICIENT PERMITTING PROCESSES.** Parcel data are essential to the permitting process for identifying proximity to protected areas, relevant

“In our water and wastewater projects where a state permit is required, we need assessor parcel boundaries for the permitted sites and the abutting properties. In creating project maps, it is a great deal more efficient if we can obtain digital parcel data from municipalities. Often they don't have it or they contract the work to a consultant that we then have to negotiate with. Sometimes towns refuse to provide the data and creating the paper trail for a public records request is very time consuming. Standardized centrally available parcel data would be extremely helpful; it would substantially streamline preparing the information required for these permits and also make it easier to anticipate and resolve issues earlier in the permit approval process.”

*Jay Billings, President
Northeast Geosciences Inc.*

⁴ Massachusetts General Law Chapter 91 protects the public's interest in waterways of the Commonwealth. It ensures that public rights to fish, fowl and navigate are not unreasonably restricted and that unsafe or hazardous structures are repaired or removed. Chapter 91 also protects the waterfront property owner's ability to approach his land from the water.

features or buffer zones as well as notifying abutters to the project. Contractors spend time and budget hunting down parcel data from various sources, converting data to a usable format, or even digitizing parcel data on a case by case basis. These activities and costs would be significantly reduced with statewide standardized parcels.

3.4 COST SAVINGS

Many burdens on local and state agency staff can be reduced through access to reliable statewide, standardized parcel data.

- **IMPROVED PUBLIC DATA ACCESS.** Public access to parcel data viewer online parcel viewers would free up, on average, the equivalent of one-half to one assessing staff per Town currently devoted to answering questions and providing parcel information. Communities that do not have digital parcels must manually identify parcels on paper tax maps and look up associated property information such as owner, acreage, zoning, and purchase or permit history. When abutters lists are requested by the public, assessing staff have reported spending 4-6 hours manually measuring distances and retrieving owner and address information for abutters. With digital parcel data, property information can be made public 24 hours/day via web access.
- **REDUCED COST FOR GIS APPLICATION DEVELOPMENT.** Historically, local and state agencies have contracted with GIS vendors to develop custom GIS viewer applications that provide simplified queries and spatial analysis for their particular data sets. Communities often require similar functionality, but non-standardized parcel and CAMA data has typically driven costs up. Development costs can be reduced significantly with the use of standardized data as the same code base can be delivered to multiple, even hundreds, of communities providing easy access to property information and spatial overlay tools.

3.5 COST AVOIDANCE

Statewide parcel data will allow agencies to use internal resources rather than purchasing commercial data or outsourcing data maintenance.

- **FINISHING PARCELS AND ADDRESSES OBVIATES THE NEED FOR AGENCIES TO PURCHASE COMMERCIAL DATA FOR GEOCODING PURPOSES.** Ownership of an accurate and up to date parcel data set would provide a robust reference layer for geocoding purposes. **Currently, a**

number of Commonwealth agencies license costly commercial street centerline data for geocoding purposes at a cost ranging from \$15,000 to \$80,000 per year.

- **COMPLETE PARCELS WOULD REMOVE THE FINANCIAL BURDEN ON STATE AGENCIES FOR OUTSOURCING ANNUAL MAINTENANCE OF AGENCY PARCEL DATA.** Data changes made at the local level would be reliably carried through to the statewide database and made available to all agencies. The current duplication of this effort would be unnecessary.

4 REQUIREMENTS & COSTS

4.1 STRATEGIC & ORGANIZATIONAL APPROACH

The Strategic Plan from 2007 identified the development of statewide parcels as a major goal for MassGIS. As described earlier in this document, MassGIS has had a long-term interest in and engagement with parcel data and has put in place many of the precursors necessary for an efficient statewide parcel effort. In building this foundation, MassGIS has also learned important lessons that will help smooth the construction of statewide parcels. Foundational elements that are currently in place include:

- Publication of a mature **data standard** for parcels, currently in its second edition
- Development of a GIS data layer containing the **legislatively approved mapping of municipal boundaries** (see <http://www.mass.gov/mgis/townssurvey.htm>). Without this data layer, it would not be possible to quilt together a seamless statewide parcel map from mapping maintained by the Commonwealth's 351 cities and towns
- Construction of critical **working relationships and collaborations with other Commonwealth agencies** that require parcel data, including the State 911 Department and the Massachusetts Department of Revenue (DOR)
- Completion of two rounds of **parcel grant programs** that have catalyzed new parcel data development across the Commonwealth
- Initiation of a third, **larger scale round of parcel automation and standardization** that will greatly increase the volume of standards compliant parcel data within the Commonwealth

In short, through a combination of persistence and opportunism over an eight year period, MassGIS has substantively *begun the development* of a statewide parcel data set. Critically, this work has not been done in isolation and all MassGIS program efforts – from standards development to grant making – have been done in consultation with other state agency stakeholders and with the strong recognition that *parcel mapping* originates through the efforts of **local government assessors**. Indeed, both intra-governmental and inter-governmental collaboration and coordination are integral to the overall strategic approach of building statewide parcels.

Right now, the key strategic challenge is transitioning current statewide parcel development efforts from opportunistic projects into a cohesive **ongoing program that will not only complete the state but also will build in both incentives and business processes for the ongoing maintenance of the parcel data**. One of the core challenges of parcel data is that parcel data changes regularly and on a transactional basis with every sub-division and every home sale. It is critical that parcel data development not be viewed as a one-time exercise but rather as an ongoing, multi-participant program.

The following provides an overview of how such an ongoing, multi-participant program might be organized for the long-term.

4.1.1 Program Management

MassGIS would maintain **technical leadership** and serve as the **overall coordinator** of the program.

Activities in this area include:

- Standards setting and revision
- Coordination amongst state agencies that are involved in funding or incentivizing the program
- Provision of education and technical support to local governments
- Coordinating with private mapping companies to promote the benefits of the state parcel standard
- Coordinating with the vendors of computer assisted mass appraisal (CAMA) software used by assessors to include a standard report in their software that produces the extract needed for the state standard and to incorporate a standard map identifier from parcel maps into each property listing in each municipal CAMA database

4.1.2 Program Funding

The Executive Office of Public Safety and Security would continue to support this initiative with the operational requirement of “next generation” E911 systems (NG911) as a key driver. Parcels provide a direct linkage to the high quality addressing required by NG911 and parcel depictions provide critical context to first responders working in the field, particularly in rural places.

Once developed, MassGIS staff, through its parent agency, the Executive Office of Administration and Finance, Information Technology Department, would support the ongoing update and distribution of parcel data on behalf of the Commonwealth. Various agencies that are significant users of parcel

information, such as State 911, may be tapped to provide a cost share for the staff and technical resources necessary to keep the statewide parcel data current on an ongoing basis.

4.1.3 Engaging the Municipalities And Ongoing Maintenance

The DOR Division of Local Services currently requires that all communities maintain complete and current tax parcel maps. Such maps are critical for helping to ensure a fair and equitable assessment by ensuring that Assessors have a complete view of all property within their jurisdiction. While rarely used, DOR has the ability to withhold certification of the local tax rates due to inadequate mapping. Instead, DOR prefers to proactively work with communities to encourage good mapping practices. Nevertheless, the “certification transaction” provides an opportunity for DOR to support the statewide parcel program by inspecting the condition of parcel mapping during the tri-annual revaluation process. Ultimately, such a *business transaction* is essential for ensuring 100% participation by municipalities so that a true *statewide* resource is created.

Currently, DOR does **not** have a requirement that parcel mapping be conducted in electronic, GIS format nor does it have detailed technical standards for how communities should perform their parcel mapping. **There is a significant opportunity to combine DOR’s oversight of local parcel mapping with MassGIS’s strong technical standards setting work to help provide an ongoing parcel data maintenance process.** Under this scenario, the following could happen:

- MassGIS would work to provide **state funding support** to automate any parcels that were not yet in electronic form and to bring up to standard quality and format already automated parcels across the Commonwealth.
- With the completion of this work, which is already underway, **all parcels in the Commonwealth will be automated in a standard form.** Thus, there would be no “unfunded mandate” to automate the parcels.
- Once this was done, DOR would work to **alter parcel mapping requirements so that it is clear that parcel mapping should be done in an electronic format** and parcels should be submitted in compliance with the MassGIS standard (for both quality and format) as part of the tri-annual revaluation process. This should not impose a burden on municipalities since parcel maintenance is no harder/more expensive than manual drafting and is likely easier/less expensive when done utilizing electronic technologies. Equally, providing the mapping in

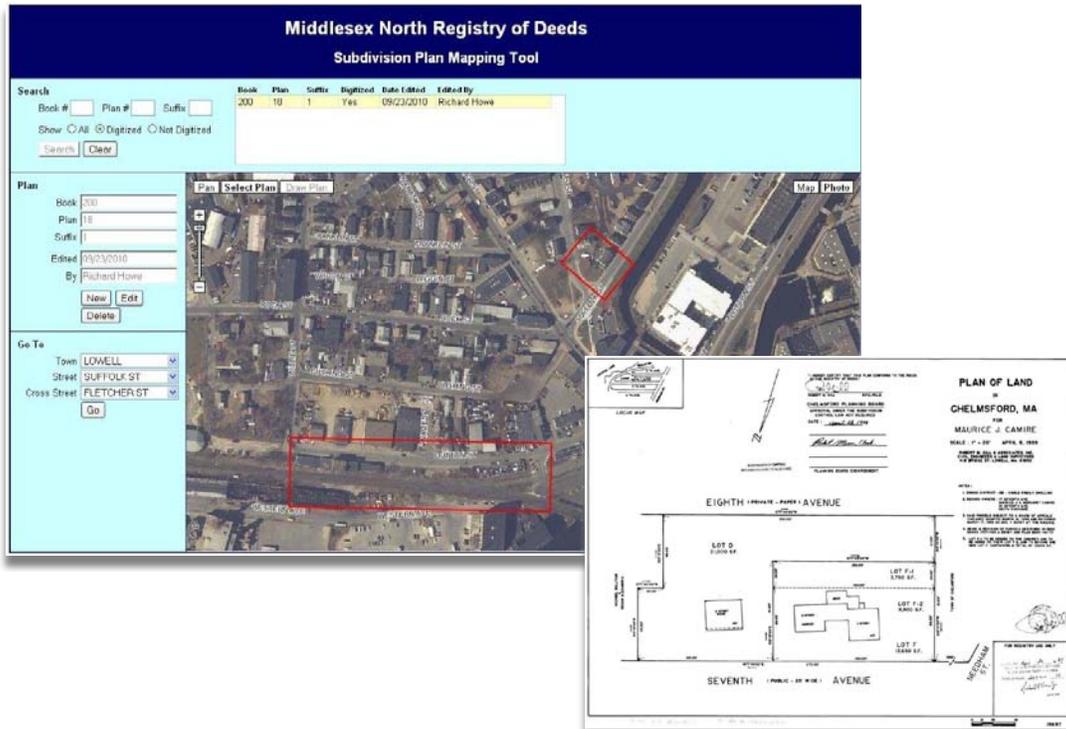
electronic format reduces the physical size of the submission which can be hundreds of pages of maps thereby saving resources such as paper. Electronic maps may be submitted via email or by on-line file transfer (“FTP”).

- Just as they always have, **municipalities would continue to perform ongoing work to keep their parcel data current** by updating them for new sub-divisions and other lot changes and also for changes in ownership and valuation. As with hard copy mapping, municipalities could perform the updates in the manner that best meets their needs. Currently, common practices include: performing the work in-house with their own GIS staff, sub-contracting to the private sector, or partnering with organizations such as Regional Planning Agencies.
- MassGIS would assist DOR by **performing quality control and would validate that submitted parcels have maintained their standards compliance**. Ideally, parcels would be submitted annually, but at worst they would be submitted once every three years through the DOR revaluation process.
- MassGIS would **warehouse all submitted parcels** on behalf of the Commonwealth and would **serve the parcel data back** to both municipalities and all state agencies that would benefit from access to parcel data, including State 911 and DOR.

4.1.4 Related Activities & Opportunities

Once automated, there are many further opportunities to integrate parcel data with other data sets and applications. For example, municipalities and regional Registries of Deeds could align their records so that scanned images of deeds can be related to municipal parcel mapping. Many Registries are in the process or have completed scanning their documents. The parcel standard would enable this link as it includes last sale date, book, and page from the local assessor’s database. In this manner, the Commonwealth can build a complete, integrated land records management system. This system could be employed directly by the Commonwealth as the largest land owner in the state, but it would also be available to municipalities, the real estate industry and citizens. Integrating registry records with assessor parcel mapping will remove some economic inefficiencies that currently burden the Massachusetts economy.

FIGURE 6: MIDDLESEX NORTH REGISTRY OF DEEDS LINKING TO PARCEL DATA. IN NORTH MIDDLESEX, THE REGISTRY OF DEEDS USES PARCEL DATA TO LINK SCANNED IMAGES OF DEEDS TO PROPERTY MAPS.



4.2 SUITABILITY ASSESSMENT OF EXISTING INFRASTRUCTURE

MassGIS is well suited to provide the technical infrastructure necessary to aggregate and host statewide parcel data. MassGIS:

- Has a long history of coordination and GIS support for Massachusetts cities and towns as well as active relationships with both the private sector GIS suppliers and regional planning agencies (RPAs)
- Has long established data and web serving capabilities and capacity
- Move of MassGIS infrastructure to the Massachusetts Information Technology Center (MITC) in Chelsea in 2011 will increase server capacity, providing the robust infrastructure needed for supporting the state’s web mapping services

4.3 DATA COMPONENTS

Statewide digital parcels involves several, interrelated data components required to compile the data, assess spatial accuracy, retrieve descriptive information about the land, identify the locations of structures and associated addresses, and understand the data limitations and compilation methods.

- **BASEMAP** (Aerial Imagery): Orthophotography serves as the spatial anchor for digital parcel boundaries and is required for accurate compilation of parcel data.
- **DIGITAL PARCEL POLYGONS**: The vector representation of property boundaries compiled as polygons with a unique identification number that can be linked to owner and address information from the assessor's CAMA database.
- **CAMA ATTRIBUTES**: Are non-graphic information stored in the assessor's Computer Aided Mass Appraisal database (e.g., name of owner, property address, property area, property value, etc.) and associated with a unique parcel identification number. CAMA attributes are necessary to retrieve descriptive information about the parcel including a property address that can be spatially associated with an address point within the property boundary.
- **BUILDING ROOF PRINTS**: Vector representation of structures as visible in an orthophoto basemap or as detected in elevation data. Structure locations are necessary for proper placement of the address points that inform emergency response efforts.
- **ADDRESS POINTS**: Point locations coded with property address and indicating the location and/or entrance to structures on a given property.
- **METADATA**: Description of the compilation methods, level of completeness, spatial accuracy, and limitations of any particular data component. With parcel compilation, MassGIS requests that communities provide ample description of the source materials, the data development methodology, data development dates, and contact information.

4.4 TECHNOLOGY REQUIREMENTS

Key technology components for the success of this program include:

- Automated reminders to communities to provide data, at least annually and a system for logging contributed data
- Automated standards compliance checking
- Data aggregation methods for piecing individual town data into a statewide data set
- Address extraction from polygons and conversion to point data as a key component to statewide standardization and validation of addresses from multiple address sources
- Data updating capabilities that may include, but are not limited to:
 - Wholesale replacement of community data on a regular basis
 - Pilot projects for parcel database replication approaches for communities that are interested, willing and maintain the appropriate technology
- Web map and feature services for data publication
- Data extraction/download for public data distribution

4.5 STANDARDS

The implementation of a robust standard is a vital prerequisite to the creation of a statewide digital parcel layer. The MassGIS digital parcel data standard, initially released in 2001, is widely viewed as a substantial improvement over having a wide variety of data management schemes in use. The essential elements of the original standard have remained throughout the revisions that have taken place over the past 10 years. These standard elements aim to:

- Provide communities a **flexible specification** for developing a high quality digital parcel file for use with their local GIS
- Make it possible to **merge parcel data from multiple communities** for multi-town mapping and analysis
- Establish a **parcel identification that uniquely identifies each parcel statewide**
- Assure a minimum level of **spatial accuracy**
- Assure a minimum and **consistent set of descriptive attributes** from the assessor's database are associated with each parcel on the map

- Assure that all entries in the assessor database, including **condominiums and combined lots**, are associated with a parcel on the map

The standard is strong and mature after a decade of minor revisions and clarifications. MassGIS has engaged stakeholders throughout the Commonwealth's GIS community including local communities, regional planning agencies, state agencies, and private contractors to gather input and suggestions for improvements to the standard since its inception. Recent changes have included a new approach to boundaries of other legal interests in land (such as easements and other features), revised guidance on boundary compilation, and a restructuring of the data model for the highest level of compliance (Level III). The success of the Massachusetts standard and an indicator of its usefulness can also be measured by the fact that other New England states, such as Rhode Island have borrowed heavily from its content and used it to inform their own standard development process⁵.

As described in the most recent version of the Parcel Standard (v2.0, October 2010), the standard aims to provide the following benefit to stakeholders using and/or maintaining the community's parcel data:

- A **consistent framework** for the management of parcel data in GIS which should satisfy the needs of assessors to view and query mapping linked to their tax list and to produce hard-copy map products
- **Guidance for** municipal staff and their contractors on **compilation of parcel boundaries** where the existing mapping is of poor quality and/or not in digital form
- A **format for the exchange and aggregation** of assessors' tax parcel mapping and associated attributes
- Minimum specifications for **mapping accuracy** and for consistent and **complete attribution**

While most of the **requirements described in the standard are quite feasible to achieve**, the requirement for spatial accuracy goes beyond the minimal requirements for parcel mapping currently issued by the Department of Revenue. However, this level of accuracy is required to compare parcels to orthoimagery without introducing inconsistencies. Once the parcels meet the spatial accuracy requirements, maintenance at this level is no more burdensome than maintenance at a level of poor spatial accuracy. Furthermore, cities and towns generally find the usefulness of parcel data increases with enhanced spatial accuracy and want to protect the quality of their investment. In addition,

⁵ RIGIS Standards for Digital Parcel Data Sets for Use in a Geographic Information System, Dec. 2003

implementing the standard often reveals errors in assessing databases, leading to data quality improvements.

As described earlier in the document, MassGIS funded grant programs in both 2002 and 2006 to encourage the creation of new digital parcel maps and upgrade of existing digital parcel data to meet the parcel standard. Nearly 50 communities participated in the program and successfully submitted standardized, digital parcels to MassGIS. Clearly, with a suitable incentive, **communities are willing to standardize their digital data**. However, while these programs were successful in incentivizing communities to meet the digital parcel standard, many have failed to maintain their parcel data at the same level in the subsequent years due to **lack of enforcement**. If, as described in more detail in the Strategic Approach section, the Department of Revenue were to require electronic mapping according to the MassGIS digital parcel standard, this would provide suitable incentive for communities to maintain their parcel data in a standard format to the benefit of the Commonwealth.

4.6 COSTS & RESOURCE REQUIREMENTS

Substantial funding will be required to meet the goal of statewide, standardized parcels. As described in the Implementation Details (see section 5.1), MassGIS has already contracted \$880,000 for FY2011 to bring over 700,000 parcels in compliance with the standard. These tasks include:

- Digitizing parcels from various non-GIS sources
- Standardizing **good** quality parcels (e.g., move into MassGIS standard format)
- Standardizing **poor** quality parcels (e.g., move into MassGIS standard format and remedy quality and accuracy deficiencies)

An additional \$1.53 million has been requested for FY2012 to bring an additional 1 million parcels in compliance with the standard.

MassGIS staff time will be required to:

- Assemble, review, and manage data automation and improvement projects
- Act as liaison to local governments and municipal data providers
- Technology management (data hosting and web services)

4.7 RISKS

Implementing this project is not easy nor without risk. Currently, only a small minority of states – notably Montana, Tennessee and Delaware - have completed statewide parcel automation. The following provides an overview of the major risks that need to be avoided:

1. **LACK OF FULL PARTICIPATION ACROSS 351 CITIES AND TOWNS:** Given that parcel data is maintained locally, absent full participation from all communities there is a significant risk that the Commonwealth will not be able to construct a statewide resource. While the suggested implementation path aims to avoid known obstacles, there remain several reasons why full participation may prove elusive:
 - **There is no motivation to participate.** While many communities have voluntarily automated their parcels with their own resources and for their own needs and willingly share their parcel data with the Commonwealth, many other communities have not been able to fund automation. Without a compelling reason and with local government facing budget challenges new data automation is not likely to take place. Thus, it is critically important that DOR parcel mapping requirements be updated to acknowledge the 21st century reality that most parcel mapping is taking place electronically. Updating the parcel mapping requirement provides a reason for participation.
 - **There is no money to participate.** Parcel mapping and map updating responsibility is properly at the municipal level and some communities face real technological and staffing constraints. The program presented above provides a funding stream to provide original automation and standards compliance and backs this recommendation with ongoing education and technical support to communities through MassGIS.
 - **There is a reluctance to share digital parcel data with the state.** Even communities that have successfully created and maintain parcel data may not be willing to share these data with the Commonwealth. This reluctance can emanate from several sources and will require active effort to overcome. Reasons for a reluctance to share include:
 - Misunderstanding of the Massachusetts **Freedom of Information (FOI) law** which requires that public documents, including electronic records such as GIS data, be provided to any entity that asks for them for the cost of duplication.

- Some communities “sell” their data and generate modest revenues that exceed the cost of duplication called for under by FOI. These communities may fear that freely sharing data will lead to **lost revenues** and understand that it is up to data requesters to initiate FOI challenges.
- Misconceptions and concerns about the **spatial accuracy of parcel boundaries and associated liability**. In other words, some parcel data maintainers understand that their data are imperfect and are concerned about exposing information that is known to have problems. Experiences elsewhere have shown that proper disclaimers can alert users to the limitations of data, and more importantly that active use of data by others helps expose errors so that they can be corrected.
- There can be legitimate **concerns over privacy issues** related to property ownership information and related data in municipal tax parcel data. While these concerns may be made in good faith, it is established that the parcel and registry data are public records, including owner names (except in a few cases specified by legislation)⁶. Ultimately, property ownership involves asserting rights to property and the public is entitled to validate ownership claims via public access to the records. The technology to preserve privacy for the small number of legislated exceptions to this open data norm (in the case of names of judges and other public safety officials) already exists and should be employed.

2. **STATEWIDE PARCELS WILL BE CONSTRUCTED, BUT THEY WILL NOT BE MAINTAINED.** One of the biggest challenges with GIS data in general is performing ongoing work to keep the data current in light of constant administrative and environmental changes. Water courses such as streams change over time. Land use changes with new development. New zoning districts are legislated. And, parcel ownership changes and parcels get subdivided – *all the time*. The proposed implementation path involves spending a good deal of Commonwealth resources to automate and standardize parcels on a statewide basis. The fullest return on investment will not be realized unless the funding and processes are in place to help ensure that the parcels are kept current. Hence, it is critical that some kind of “business transaction” with the Commonwealth be employed that creates a reason for parcel data to be exchanged and an opportunity for those data to be inspected to ensure that

⁶ The Secretary of the Commonwealth’s Guide to Public Records (available on the Secretary’s public records web page) specifically notes that GIS and other computer records are public records.

changes are recorded. The existing oversight of parcel mapping by the DOR provides the perfect opportunity to *modernize* an existing transaction as opposed to installing a new one.

3. **PUBLIC SAFETY RISKS FROM INACTION.** One of the key opportunities that has allowed progress is the availability of public safety funding to support parcel and address data development. These funds have become available due to an understanding within the public safety community that high quality parcel and addressing data leads to improved emergency response. Better mapping and more accurate addresses can cut response times and eliminate response errors in an environment where minutes and seconds matter. Inaction or an inability to execute can lead to extended response times and an overall decrease in public safety.

5 IMPLEMENTATION PLAN

As described above, MassGIS has been engaged in parcel data development through standards setting and grant programs for the past 10 years. During that time some important lessons have been learned which have informed the overall strategy and the specific implementation path that it outlined below:

- Key lessons learned from the 2002 and 2006 parcel grant programs:
 - Municipalities will support data development, standardization and data sharing when they have financial incentives
 - It has been a recurring challenge to get municipalities to *voluntarily* maintain parcels in standardized format and regularly re-submit updated parcels to MassGIS *following* the grant program

Another factor that has influenced the proposed implementation path is the recognition that New England poses unique challenges with parcel data management since this function occurs exclusively at the city/town level of government. In most other parts of the country, parcel data management largely occurs at the county level which has a built-in aggregation of city/town information. For example, in spite of the fact that Utah is almost 10 times the size of Massachusetts, it may be easier to create a statewide parcel layer there due to the fact that state needs to coordinate with, and collect data from only 29 counties. In Massachusetts, this coordination and collection needs to take place with 351 independent municipalities. As such, the process for receiving data submission and tracking data status across communities must be automated and watched closely.

The last factor that has strongly influenced this implementation plan is an explicit recognition of the *versatility of parcel data*. Parcel work should not be viewed only through the lens of “assessing” but also through critical and fundamental linkages to public safety and other environmental and economic development programs. Indeed, this versatility is what drives a larger return on investments in this important data set.

5.1 IMPLEMENTATION DETAILS

Implementation of statewide parcels can be covered in three steps:

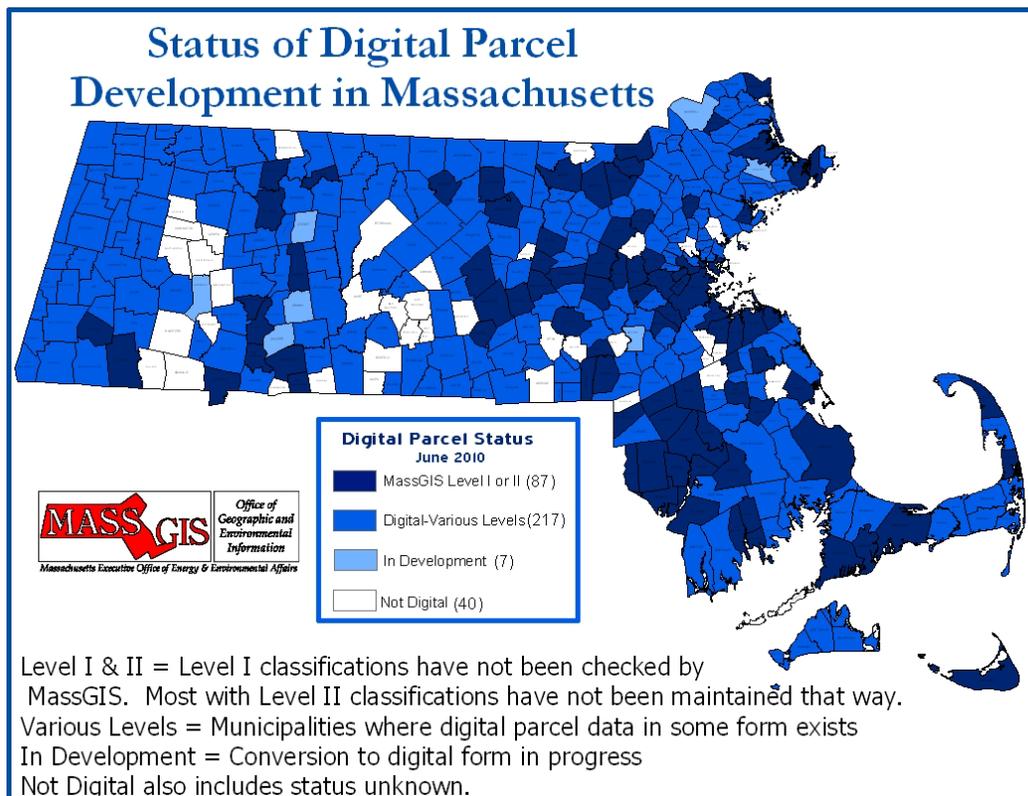
1. Completion of development
2. Transition to maintenance
3. Enforcement of currency

The following sections provide further details for these three steps.

5.1.1 Completion of Development

As of December 2010, 92% of the 2 million parcels in the Commonwealth had been automated and exist in electronic form (MassGIS, FY10). The quality of these parcels varies greatly, however. MassGIS records indicate that 45% are “good quality” and 48% are non-standard and sometimes very poor quality. The image below shows the best reckoning of parcel development status across the state:

FIGURE 7: STATUS OF DIGITAL PARCEL MAPPING DEVELOPMENT IN MASSACHUSETTS



Thus, the completion of development can be reduced to two elements:

1. The remaining 8% of parcels needs to be automated into electronic format
2. Existing parcel data needs to be updated and upgraded to comply with the MassGIS parcel standard

During the last quarter of 2010, with funding support from the Executive Office of Public Safety and Security (EOPSS), MassGIS initiated a project targeting these two elements. In January of 2011, MassGIS issued \$880,000 of contracts to multiple vendors⁷ to both automate new parcels and to retrofit existing parcels to match the standard. MassGIS has requested funding to continue the program in FY2012 with another \$1.53M.

These projects will enable MassGIS to not only create substantial volumes of standards-compliant parcel data, but also they will help to perfect the approach for completing the state. This work should also enable a firmer cost estimation for the additional funding necessary to finish the state. The table on the following page provides a summary of the total volume of parcel work necessary, the current status of planned and active automation work in FY2011 and FY2012, and the remaining work that will be necessary after FY2012.

⁷ Full disclosure: Applied Geographics received one of those contracts.

ITEM	NUMBER OF PARCEL RECORDS	NUMBER OF TOWNS*	% OF PARCELS
Total parcels (including condo records)*	2,091,175	348	100%
Total parcels in electronic format (estimated)	1,923,881	317	92%
FY2011 New parcels digitized	82,495	19	4%
FY2011 Existing digital parcels made standards compliant	630,461	102	30%
FY2011 Subtotal	712,956	121	34%
FY2012 New parcels digitized	43,016	11	2%
FY2012 Existing digital parcels made standards compliant	956,456	139	46%
FY2012 Subtotal	999,472	150	48%
FY2013 New parcels digitized	1,219	1	0%
FY2013 Existing digital parcels made standards compliant	377,528	76	18%
FY2013 Subtotal	378,747	77	18%

*Figures for "Total Parcels" and "Number of Towns" do not include Boston, Worcester or Springfield because current plans and funding requests do not include contracting for standardization in these communities. "Total Parcels" *does* include condominium records.

As the finished product of the FY2011 projects should demonstrate and the table illustrates, the path forward is well understood. Thus, the remaining element is **securing funding** that will finish the state according to the methods established with the FY2011 and FY2012 work. Options for obtaining this funding include continued funding from EOPSS and continuing capital funding through MassGIS's parent agency, the Information Technology Department within the Executive Office of Administration and Finance.

5.1.2 Transition to Maintenance

As indicated above, if the Commonwealth can fund the completion of standardized, statewide parcels, an extensive investment will have been made. It should be noted that this investment goes far beyond the current direct expenditure by the Commonwealth and includes significant funding from local governments over the past 20 years that has resulted in the approximately 92% electronic parcel coverage across the state. Given that parcel data changes regularly, and in light of the lessons learned

from the 2002 and 2006 parcel grant programs, it will be essential that MassGIS and its partners formulate a strategy for protecting that investment and ensuring regular update and re-submittal of parcel data so that the *statewide resource* is kept current.

As described above in the Strategic and Organizational Approach (see Section 4.1) it is recommended that the existing Department of Revenue parcel mapping requirement be modernized to include the submission of electronic parcel data that complies with the MassGIS standard. Given DOR's regular, tri-annual revaluation approval cycle this should result in regular updates and re-submittals of parcel data to the Commonwealth. Since the Commonwealth is providing funding support to bring parcels into standards compliance this modernization of DOR's requirements should *not* require any new investments by local governments.

This is a significant change and the process would need to be carefully planned and closely managed by DOR. As described above, completion of parcel automation will take at least three additional years and this provides time for DOR and MassGIS to plan the details of this change and to communicate with the assessing community. Any types of new requirements or changes of practice need to be handled carefully and sensitively. At the same time, given the improvements in mapping technologies over the past 20 years it is entirely appropriate that the Commonwealth evaluate existing programs to see whether there are opportunities to capitalize on these technologies. Does it make sense to have a hard copy standard when most people are using electronic technologies to fulfill this function, including the Commonwealth itself and most of the companies that produce subdivision plans and provide map maintenance services? Indeed, receipt of up-to-date digital parcels from communities will open new possibilities for spatial analysis at DOR that can help improve the equity and efficiency of the statewide revaluation process.

If desired, MassGIS could substantively support DOR in three separate ways:

1. Providing technical assistance in developing a plan for issuing the new requirements and in communicating to the assessing community
2. Performing "standards compliance" testing on parcel data submittals received from communities
3. Aggregating and assembling submitted data into a statewide data set and efficiently serving those data for DOR's internal uses

While the parcel revaluation certification process happens once every three years, there may be opportunities to encourage and incentivize communities to contribute their parcel maps more frequently and on an ongoing basis. Indeed, most communities update their GIS data and parcel maps annually. Beyond a DOR requirement, MassGIS could explore other outreach activity and incentives to generate annual submissions of updated parcel data.

Regardless of the update cycle, new tools will be necessary for streamlining the process of tracking submittal of parcels from municipalities to the state. At its simplest, these tools might involve a database that lists contact information and the date of the last, accepted submittal. Using this database, MassGIS could proactively generate requests/reminders to re-submit on an annual basis. Private sector companies such as the Warren Group have been successful in obtaining updated CAMA data from assessors by being diligent in their communications and requests to communities.

Developing tools for assessors that facilitate their maintenance of standards compliant digital parcels would potentially incentivize more frequent submittals. The easier it is to update standardized parcels the more likely it is that communities will update and resubmit their data. By working with communities to provide technical guidance and productivity tools, MassGIS may be able to encourage both parcel updating and a willingness to share with the Commonwealth.

Finally, state government outreach to the private sector geospatial services and CAMA software vendor communities can be an important element in fostering regular updating and sharing with the Commonwealth. Many geospatial companies perform parcel map updating on behalf of communities and these companies can help explain the benefits of the MassGIS standard and perform their work so as to maintain parcel compliance. Indeed, most of the leading geospatial service providers in the Commonwealth are working, under contract to MassGIS, to perform parcel automation and standards compliance work as part of the State 911 funded initiative of FY2011. MassGIS has also already contacted the major CAMA vendors concerning the parcel standard and the need for those vendors to add a standard report (data extract) to their software that supports the state standard; these companies have willingly created this new report. Such reporting tools should simplify the process of producing standards compliant parcel attributes directly from CAMA databases. The companies can help to further carry this work forward through their collective parcel updating contracts with municipalities. Again, by providing and/or encouraging the development of tools that make it easier for municipalities to comply with the standard, the more likely it is that the cities and towns will regularly provide updated data to DOR.

5.1.3 Enforcement Of Currency

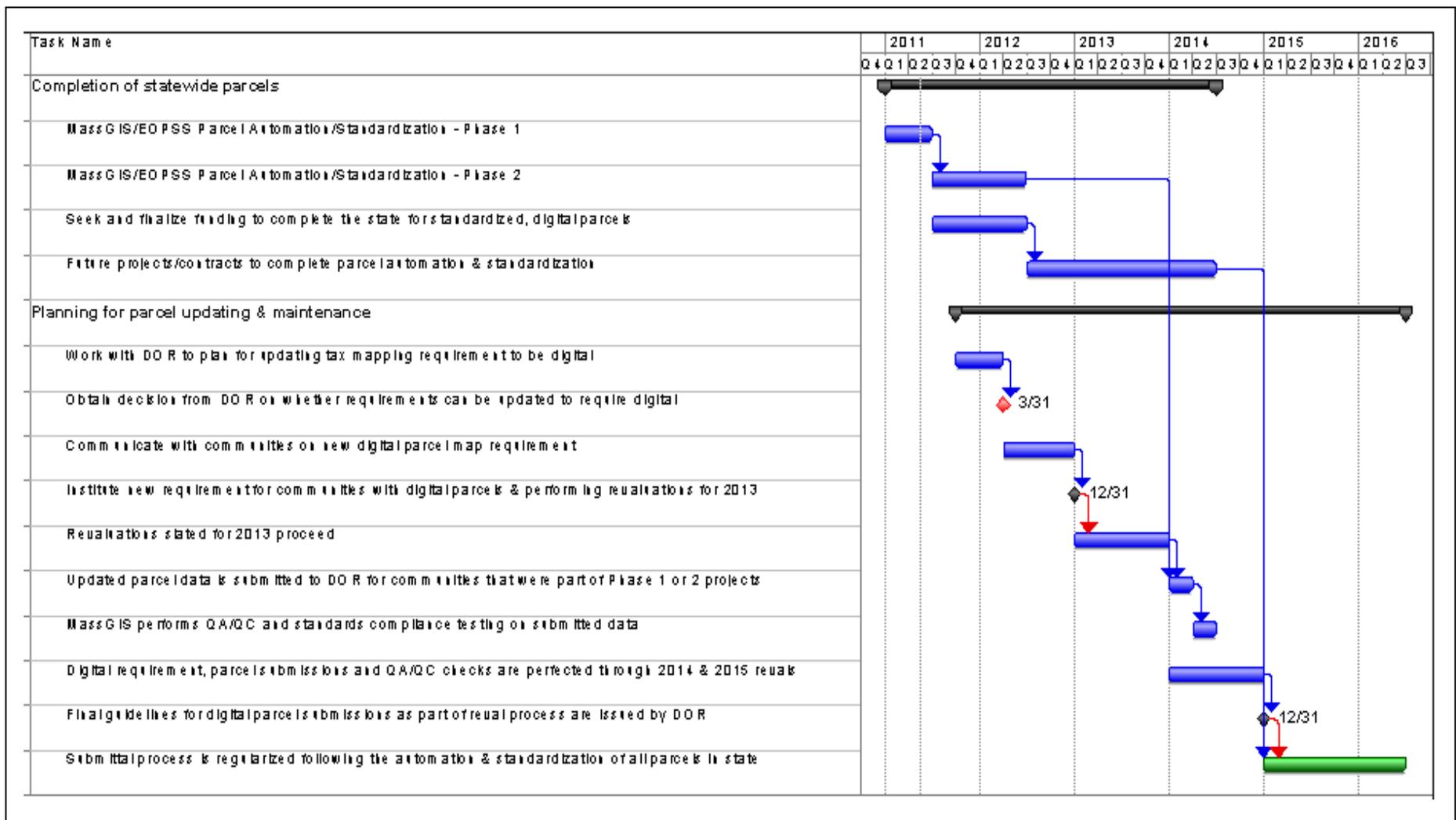
While it is far more desirable to encourage compliance with the parcel standards and regular submittals to MassGIS, it is likely that some form of “enforcement” will also, in rare cases, be necessary to ensure that the statewide parcels are kept current. As described earlier, the DOR “certification” of local revaluations has the potential to provide this kind of enforcement mechanism. Local communities cannot levy the property tax without having a certified revaluation and tax rate and thus they are highly incentivized to meet DOR requirements. If providing parcels in a standards compliant format was a requirement for certification, then communities would have a very strong motivation for updating parcels.

Indeed, DOR has this capability with their current hard copy mapping requirement. While used very infrequently, there have been several cases where a community’s maps were so bad that DOR communicated that improvements would be necessary in order to receive their *next* certification. In these cases, such a warning was enough to compel the community to improve its parcel maps. The City of Revere provides an example of this as following a DOR “warning” they made significant investments in both automating their hard copy maps and updating them. Again, the three-year revaluation cycle provides a good amount of time for DOR to communicate concerns and for a community to react on a voluntary basis to avoid a future certification complication.

Absent DOR involvement, there wouldn’t be opportunities for a regular business transaction between the Commonwealth and assessors that has a direct nexus to parcel data. Other opportunities would be more limited, but could be experimented with. For example, other grant or funding opportunities between EOAF-ITD and communities could be made contingent on the community having parcel data submitted to MassGIS. While less expansive than a DOR requirement, this approach has the ability to make access to funding an incentive for regular, standards compliant parcel submittals.

5.2 PHASING & MILESTONES

The **phased, timeline** on the following page shows the general sequence of activities for executing the program over the next 5 years. As per the implementation path presented above, the timeline reflects two major sets of activities pertaining to 1) completion of standardized, digital parcels on a statewide basis, and 2) working with DOR to formulate and implement a strategy for making digital parcel submissions a component of the revaluation process.



5.3 BUDGET PLAN

The following provides a summary of the expenditures that are committed for FY2011 (Phase 1) and anticipated for FY2012 (Phase 2) and FY2013 (Phase 3) to implement the goal of statewide, standardized parcels.

5.3.1 Assumptions

The following assumptions should be kept in mind when considering the budget requirements described below:

- As described in the table in Completion of Development (see section 5.1.1), the statewide parcel total refers to total number of project parcels which does not include parcels in the three largest communities in the Commonwealth: Boston, Springfield and Worcester. Because of their size and the quality of their existing parcel mapping, which complies with important elements of the MassGIS standard, current plans do not include funding requests for standardization of parcels in these communities.
- The numbers in the budget table below include condominium records. It is estimated that there are 300,000 condominium records in the Commonwealth. While condominiums are not represented as polygons in the parcel standard, it does require significant effort to properly associate condominium records with the appropriate parcel polygon and should be budgeted for accordingly.

5.3.2 Budget Requirements

As the table below documents, following the full execution of the FY2011 and FY2012 projects, approximately **\$601K** of additional funding is required to complete statewide parcel automation and standard compliance work (i.e. see the Phase 3 columns below).

Statewide		Phase 1 (FY2011)				Phase 2 (FY2012)				Phase 3 (FY2013)			
Parcels	As %	Parcels	As %	\$ per parcel	Cost	Parcels	As %	\$ per parcel	Cost	Parcels	As %	\$ per parcel	Cost
2.1M	100%	712K	34%	\$ 1.24	\$883K	1M	48%	\$ 1.53	\$1.53M	378K	18%	\$ 1.59	\$601K

5.3.3 Maintenance Costs

Maintenance of standardized digital parcels is no more costly than maintenance of non-standardized digital parcels. Communities who are currently maintaining parcel maps digitally, and who typically outsource these activities to consultants, are typically paying in the range of \$1,500 - \$3,500 per year for parcel maintenance depending on the number of updates and number of maps. Approximately 20% of a community's annual maintenance fees go toward printing hard-copy maps for display at the Assessor's public counter and distribution to municipal departments. **If the perceived need to view and distribute parcel maps on paper went away, average costs for digital parcel maintenance would be significantly reduced** and fall in range of \$1,200 to \$2,800 annually. The reliance on paper maps has already begun to decline as digital maps are often made available to municipal staff and the public in widely accessible formats such as Adobe PDF.

5.4 OUTREACH & EDUCATION

The program presented above institutes some significant changes. While these changes are consistent with existing trends and the vast majority of parcels are already managed in an electronic format, requiring these changes, including a submittal of digital parcel data to the Commonwealth, will be very new. Thus, if and when it is determined that new revaluation requirements will be pursued, this concept will need to be communicated proactively and sensitively and with input from impacted stakeholders, i.e., the assessing community.

MassGIS has already begun to pursue this path. During 2010, MassGIS conducted 7 regional stakeholder workshops that introduced MassGIS's strong interest in obtaining statewide parcels and the nexus between parcels, addressing data and public safety. As summarized below, these stakeholder sessions were very well attended:

LOCATION	DATE	PARTICIPANTS
Pittsfield	May 4, 2010	16
Springfield	May 20, 2010	31
Auburn	May 24, 2010	42
Boston	June 3, 2010	22
Lawrence	June 7, 2010	17
Greenfield	June 10, 2010	27
Wareham	June 15, 2010	56

If this program moves forward, these initial workshops should be repeated to demonstrate the progress that has been made. Such workshops might be planned and conducted in collaboration with the Massachusetts Association of Assessing Officer's (MAAO) and the county assessing associations.

Examples of general progress that might be highlighted include:

- MassGIS parcel automation and standardization projects
- Introducing the concept of a DOR parcel data submittal requirement in the context of keeping the statewide parcel data current.

Other key messages to convey during a second round of workshops might include:

- Encouraging broad, ongoing participation to help shape the parcel submittal requirement
- Describing how Commonwealth funding for initial automation and standardization in combination with existing requirements for parcel *map* maintenance means that this is not an unfunded mandate
- Introducing a multi-year implementation schedule that will allow all parties to participate in program planning, and for communities to make appropriate preparations
- Explaining the linkage of parcel data submittal requirements to existing revaluation cycles

In addition to outreach to the GIS community, there should also be energetic outreach to the GIS and public safety communities. These communities understand the importance of standardized statewide parcel data and will be eager consumers of this resource. These communities need to know the shape and status of these initiatives so that they can continue to help advocate for it. While there may be understandable concerns from some communities, it is important to also show that there is deep and broad based support as well.

6 MEASURING SUCCESS & FEEDBACK FOR RECALIBRATION

The timeline presented in Section 5.2 identifies several key milestones. The most obvious measure of success is to see whether those milestones have been met and whether the initiative is unfolding “on time.” The following provides a summary of key implementation milestones that will help to measure the success of this effort:

1. The **funding necessary to complete the next round of statewide parcel** standardization and automation is obtained by **August or September 2012** when capital funding requests are reviewed
2. The DOR determines that there will be **parcel data submittal requirement** as part of the revaluation process by **March 31, 2012**.
3. **100% of the Commonwealth’s parcels are automated** and standardized⁸ by **June 30, 2014**.
4. The first **digital parcel submittals** from communities are **received by DOR as part of the 2013 revaluation process**.
5. By the **2016 revaluation cycle, the submittal of digital parcels is fully implemented** and 100% of communities have *re-submitted* updated parcel data at least once.

While the DOR revaluation cycle is currently 3 years, most communities update their parcel data annually and for this initiative to be most effective, most communities will submit their parcel data to the statewide collection annually. An alternative approach might be to separate communities into three groups with the one group for communities where the target would be annual updates, one for bi-annual updates, and the third for tri-annual updates. These groups could reflect the level of development activity and property sales. The following targets aim to track the progress of obtaining annual updates from communities:

- By 2013, **33%** of municipalities have parcels no more than 1 year old
- By 2014, **67%** of municipalities have parcels no more than 1 year old

⁸ Except, as noted earlier, for Boston, Springfield, and Worcester.

- By 2015, **90%** of municipalities have parcels no more than 1 year old

APPENDICES

6.1 INTERVIEW WITH THE MASSACHUSETTS BOARD OF REAL ESTATE APPRAISERS (MBREA)

Date: November 16, 2010

Attendees:

- Neil MacGaffey, MassGIS
- Shaun Fitzgerald, Past President of the Board of Massachusetts Real Estate Appraisers
- Michael Turner, Applied Geographics, Inc. (AppGeo)
- Kate Hickey, Applied Geographics, Inc. (AppGeo)

Discussion:

- Neil introduced project as a 3-4 year timeline
 - a. Conversations need to happen with described the major stakeholders: DOR, MAAO, State 911, Board of Real Estate Appraisers
- Big question: How does MassGIS hold onto funding?
 - Shaun described appraisers as falling in to 2 groups:
 - Group 1: Residential
 - Using lots of scrubbed, easy-access online data
 - Focused on questions on the standard appraisal form
 - Need to see utilities, flood, endangered species, zoning, orthos, hazardous waste, underground storage tanks
 - Group 2: Non-Residential
 - Focused on eminent domain, divorce proceedings, etc.
- Appraisal Software Vendors
 - Help fill in forms
 - Package the “free” data
 - Examples include ACI, Appraisers Choice, AppraiseIT
 - These are the vendors buying data and standardizing it
 - Creating software design to fill in the forms

- Errors occur: Paper data is more accurate but often out of date. Digital data can reveal spatial inaccuracies.

KEY POINT: There are multiple agencies collecting parcels perpetuating an inefficient process.

- Desired Functionality
 - a. Wants to be able to map any property list using standardized parcel data for geocoding to generate thematic maps (e.g. foreclosures, comparable properties).
 - b. Wishes there was a “Map from List” web service that would do this for him
 - c. Thematic Map Checklist: Flood, Storage Tanks, Zoning, Flood
 - d. Direct links to Property Record Cards, Deeds, Plans
 - Some registries charge to print these documents (e.g. Plymouth, Barnstable, Norfolk, Bristol) as these are still independent registries
 - e. Support for identifying developable land (Owner, street address, lat/long, parcel identification number)
- The Privacy Issue
 - a. Some communities don’t want to give CAMA data and get their legal departments involved
 - b. Property records are public and transparency is critical
 - c. Data already available from Banker & Tradesman
 - Everything in same format because of B&T (he designed this database as a consultant)
 - d. The Towns **know** they have to give it to you but the Open Records Law is contentious and litigious
 - e. The Warren Group
 - Data Supplier of Statewide Data
 - Scrub and merge with registry information (weekly) via electronic feed
 - Are they a monopoly? They have competition, but it’s weak
 - The coup that Warren Group has achieved is collaboration with CAMA vendors
 - Soon Patriot and Vision will implement a MassGIS standard extract

KEY POINT: Good lessons to be learned from the private sector about data collection and standardization

6.2 INTERVIEW WITH THE MASSACHUSETTS ASSOCIATION OF ASSESSING OFFICERS (MAAO)

Date: December 15, 2010

Attendees:

- Neil MacGaffey, MassGIS
- Kate Hickey, Applied Geographics, Inc. (AppGeo)

Discussion:

- Neil introduced the project and the business plan
 - a. Parcel status in Massachusetts
 - b. Recap of prior grants
 - c. The “maintenance issue”
 - d. Described the role of Assessors in supporting the statewide parcel initiative
 - e. Said we are here for their suggestions
- MAAO Suggestions:
 - a. Take the 911 funding and distribute to every city and town promising that funding would continue as long as they keep submitting standardized parcel data. They would lose money if they didn’t comply with submission request. (This suggestion did not take into account that the state does not have long-term funding for parcel maintenance).
 - b. Need DOR requirement for standard digital data in order to get Town funding and support. Otherwise, this gets “hacked” from the Town budget. They ALL want it done, but they need a “club” to force the Town to support standardization and maintenance. They were all in agreement that they didn’t think the DOR would change their requirement because this would be viewed as an “unfunded mandate”.
 - c. Educate decision makers that Parcel data is the basis for the entire Town’s GIS capabilities and these will be lost without good parcels.

- d. The state should pay for maintenance. (This recommendation had no suggestion for where the long-term funding would come from.)
- e. Public Safety departments should budget for parcel maintenance as it serves local emergency response.

6.3 INTERVIEW WITH THE MASSACHUSETTS DEPARTMENT OF REVENUE

Date: March 14, 2011

Attendees:

- Marilyn Browne, DOR
- Dave Davies, DOR
- Brenda Cameron, DOR
- Christian Jacqz, MassGIS
- Michael Turner, Applied Geographics, Inc. (AppGeo)
- Kate Hickey, Applied Geographics, Inc. (AppGeo)

Discussion:

- **MassGIS Summary of Current Parcel Project**
 - a. \$800K this year with additional \$1.18M next year requested
 - b. Vendors currently working with 120 Towns to produce standardized, digital mapping
 - c. Funding sources
 - d. Brief history of the standard - a lot of input from Assessors, Consultants and is generally well-received
 - e. Clarification made that MassGIS is working with all major GIS vendors on current effort; AppGeo is a parcel vendor and also happens to be working on the Business Plan simultaneously
- **So, what's the role for DOR in sustaining this investment?**
 - a. MassGIS is convinced that digital mapping is important to local assessing and a major benefit to DOR because it makes standard, high-quality information easily available

- b. With the right PR and support, people will see the benefit
 - c. Owner information easily accessible because of required link to CAMA
 - d. Benefit to DOR includes ability to perform multi-county comp analysis
 - e. The Assessors in Arkansas are supportive of statewide parcel standardization and are discovering new land and increasing assessments
- **Since DOR has business transactions with communities already, could there be a “strong encouragement” and even potentially a requirement for digital standard parcels?**
 - a. DOR has occasionally recommended digital parcels “as funding permits”
 - b. There have been issues with a map-centric revaluation in an unidentified Mass Town
 - c. DOR acknowledges that GIS is a great tool, but maintenance is a big problem
 - d. DOR concerned about the small communities – would they need to pay for an annual contract with vendors? How would they view parcels?
 - MassGIS will provide online viewer to towns and soon, Broadband will be available to all western Massachusetts. This will provide public service and help small towns that are only open for limited hours each week.
- **What’s the current procedure for checking maps and certification?**
 - a. Currently DOR checks paper maps – only the changed map sheets.
 - b. Mapping is really a minor component for certification
 - c. DOR acknowledged that mapping would help alleviate field work and help get around travel restrictions (currently 10 people in the field)
- **DOR: What do we need to do?**
 - a. DOR to endorse the MassGIS Parcel Standard
 - Encourage communities to use it and endorse it as “best practice”
 - b. Potentially change procedures so that DOR validates map updating practice through digital submission (regular but not necessarily annually)
 - MassGIS does not see that as an “unfunded mandate” because Towns are already required to maintain maps

- **DOR: What are the Town’s hesitations to comply with program once you’ve “sold” them on benefits to assessors, public safety, schools, etc?**
 - a. Everyone is interested in a “free” parcel product; the RISK we are trying to address is long term maintenance
- **DOR: Could MassGIS tell DOR who is not in compliance? Would they accept this QA role?**
 - a. Yes, MassGIS has highly automated QA process

NEXT STEPS

- a. DOR will consider endorsing the standard after review
- b. The Business Plan will identify DOR as potentially part of the long term maintenance plan
 - DOR would like to see draft of plan when complete
- DOR will consider the requirement of digital submission
 - a. IF they did proceed they would issue a “Guideline” to be included in certification materials.
If Towns don’t comply, then no certification and no tax rates.