MassGIS Standard
for
Digital Assessor Parcel Files

Version 3.0
(Replaces version 2.1)
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This standard for spatial accuracy and detail of assessor parcel mapping and related attribute information is for developing digital versions of assessor's property maps for use in planning, property assessment, and map display. There is no intent to provide a standard for developing a legally authoritative definition of property boundaries. Matters related to those more definitive interests remain the purview of the professional title attorney and/or professional land surveyor.

PREFACE

This Version 3 of the standard supersedes previous versions. However, it does not implement any new requirements. Nor does this version make changes that require modifying existing work processes or related software tools that automated compliance with Version 2.1 of this standard. The primary change in this version of the standard is that is easier to use and read.

Previous versions of the standard had different levels: one, two, and three. All cities and towns now comply with "Level 3" of version 2.1 of the standard. Therefore, this version eliminates references to "levels" and is simply the Commonwealth's standard for digital assessor parcel files. As defined in this standard, those files include both map and database files in an ESRI file geodatabase.

A useful companion document to this standard is the Guide to Maintaining Standardized Parcel Mapping. The Guide can be found here: https://www.mass.gov/service-details/maintaining-standardized-assessor-parcel-mapping. Besides the Guide, MassGIS also provides a stand-alone software tool (the AssessPrep tool) that makes it much easier to include the assessing data required in complying with this standard. Additionally, MassGIS provides a quality assurance (QA) software tool that checks compliance with this standard. That tool runs in ArcMap (a version for ArcGIS Pro is being developed) and is the same tool used by MassGIS' staff. We strongly recommend using both these tools. Taking the time to install and use these tools, will make it much easier to prepare parcel mapping that complies with this standard. You can request these tools by sending email to massgismail@mass.gov.

MassGIS' success in implementing this standard has only been possible because many people and organizations that provide parcel map maintenance services have spent time explaining the standard and its requirements to their customers. Thank you. Together we created a result that is the envy of many other states. Standardizing the Commonwealth's assessor parcel mapping has substantially upgraded the statewide quality of assessor parcel mapping and associated assessor records; it has also created a resource relied upon by all levels of government and by thousands of the Commonwealth's residents every year. Municipalities have also saved money with standardization. Companies providing GIS applications and services no longer must customize their work around each municipality's parcel mapping.

At MassGIS, we look forward to continued collaboration with all stakeholders on this important mapping resource. If you have questions about the standard, please send them to massgismail@mass.gov.

Thank you.

Neil MacGaffey, Director
MassGIS
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INTRODUCTION

Public or private planning for economic development, managing growth, protecting environmental resources, delivering local and state government services including public safety and emergency response, managing transportation infrastructure and many other government functions require information about property boundaries. This standard applies to GIS mapping of property boundaries as represented on municipal assessor's maps with the intent of creating a product that is useful for assessors, other town departments, other levels of government, and anyone else interested in assessor parcel mapping. Ultimately, we need to be able to answer the most common, basic questions for anywhere in the state – who owns this parcel of land, how is it being used and what's on it or near it? That parcel data and use of MassGIS' Statewide Parcel Mapping Viewer are the most popular data download and mapping application, respectively, supports the importance of being able to answers these questions.

There are numerous benefits associated with having standards for the format, quality, and documentation of assessor's maps in GIS. Standardization makes it much easier and more efficient to use digital parcel files. Often, the use of digital parcel maps spans entire regions or even the whole state. For digital parcel maps and assessing data from multiple communities to be used together, they must all be developed according to the same specification, and they must have common, well-defined, and compatible data elements. Not only the boundary mapping must be compatible, but attribute names and definitions must also agree. Without a standard, making digital files from multiple communities compatible requires a prohibitive amount of work. Furthermore, developing mapping templates or end-user applications which can be used with data from different communities becomes much more cost-effective when the data are standardized..

Combining data from adjacent communities is relevant not only for regional purposes but also to individual towns. For example, parcel data from adjacent communities is needed to support abutter notification mailings, "comparables" for property assessments, mapping locations of students when schools are regional, reviewing proposed developments that straddle town boundaries, and police/fire tasks such as crime mapping, mutual aid dispatch support, and lost-person searches. Similarly, as regionalized municipal services become more common, the need for standardized digital parcel data will grow.

PURPOSE

The standard has four purposes:

1) It provides a consistent framework for managing parcel data in GIS. This framework should satisfy the needs of assessors and other stakeholders to view and query mapping linked to their tax list and to produce printed maps. Data products which are not useful to local assessors are not likely to be maintained; for that reason, we have included guidance on options to handle dimensioning and annotation which are of particular interest to assessors, and options to support the production of familiar, useful map products. Similarly, the standards relating to compilation accuracy are primarily intended to support the assessing function, with the additional understanding that the mapping and attribution of *all* properties, even non-taxable ones, is a critical requirement. Anyone maintaining assessor parcel mapping should determine if the reconciliation of parcel geometries at a survey level of accuracy is necessary for their day-to-day operations; at a minimum we presume a need for a reasonable depiction of the area, shape, and situation of the property. The capability to view parcel boundaries on top of an orthoimagery base map, combined with the ability to overlay mapping of improvements, wetlands, rights-of-way or other factors that might affect property valuation is highly advantageous to assessors and many other users of assessor parcel mapping.

2) It provides guidance for municipal staff and their contractors on compilation of parcel boundaries where the existing mapping is of poor quality or not in digital form.
3) It provides a format for the exchange and aggregation of assessors' tax parcel mapping and associated attributes. This makes it possible to merge digital property information from more than one community and to identify a single property parcel statewide based on a single unique identifier. The standard also supports the migration to more sophisticated data management techniques using "topological" rules in multi-user geodatabases – without requiring those techniques.
4) It establishes minimum specifications for mapping accuracy and for consistent and complete attribution. As the public expectation of access to data on-line has grown (in 2022, the MassGIS statewide parcel mapping viewer was accessed well over 2,000 times per business day), so does the importance of data availability in a standardized, agreed-upon format. Standardization enables state and local government to avoid customized, one-off solutions and leverage investments in web mapping platforms across different communities and different vendors.

AUTHORITY and PROCESS

As the Commonwealth's Bureau of Geographic Information, MassGIS has, through the Secretary of Technology and Security Services, legislatively assigned authority to "...coordinate all geographic information activities in state and local government…", and at the Secretary's discretion to "...set standards for the acquisition, management, and reporting of geographical information..." (MGL Ch. 7D, Section 5). In developing or maintaining assessor parcel maps, **compliance with this standard is recommended as a best practice by both the Department of Revenue's Bureau of Local Assessment and the Massachusetts Association of Assessing Officers**[1]**.** This requirement is not burdensome for communities, as state funding provided through MassGIS has funded conversion to standardized parcel mapping. Additionally, complying with this standard mapping by those experienced with GIS data development and maintenance will find the requirements of this standard reasonably straightforward. Finally, eligibility for Support and Incentive grant funding (an annual grant program of the State 911 Department) is contingent on providing updated standardized parcel mapping to MassGIS. This eligibility requirement exists because standardized parcel mapping updates are an important source of information for maintaining the addresses, address point locations, and emergency service zones on which routing 9-1-1 calls to the correct dispatch center relies. Guidance concerning how to maintain standardized parcel mapping can be found on the MassGIS web site at https://www.mass.gov/service-details/maintaining-standardized-assessor-parcel-mapping .

The original standard was drafted by MassGIS staff, drawing upon their experience with parcel map conversion and with developing GIS applications in municipal government. The first version of the standard drew on work by other states, notably Vermont and Wisconsin. Both the first and second versions of the standard were reviewed by representatives from various assessor parcel mapping stakeholder groups. Many helpful comments and suggestions were received; many of them resulted in changes to the standard.

OVERVIEW

This standard implements common-sense, reasonable approaches to compiling assessor map property boundaries in a digital format. It also implements a data management scheme that maximizes the value of the mapping both to the municipality and to other organizations by linking a map feature to a standard extract from the assessor's database (the "tax list") and vice versa. A central objective of this standard is

[1] Assessor parcel maps are for tax assessment purposes and, unlike areas outside New England, are not the legal (cadastral) record of property ownership. In Massachusetts, the legal record of property ownership is found at the deed registration offices. While property boundaries on assessor maps often serve as a proxy for ownership, any authoritative representation of property ownership must be based on records from the registry of deeds and/or work by a licensed professional surveyor.

that the parcel mapping and associated assessing records become an inventory of all land in a city or town and not simply an inventory of taxable properties.

Implementing this standard requires creating an Esri file geodatabase with six components: three feature classes and three database tables. **MassGIS provides a template for this file geodatabase**. Those components must adhere to the file naming conventions listed below where "xxx" refers to the TOWN_ID, left padded with zeroes so that it has three characters (e.g., 008, 251, etc) from the town boundaries data layer distributed by MassGIS. The six required elements of the file geodatabase are:

1. Tax Parcels (map) in a GIS file format (file name in form MxxxTaxPar)
2. Other legal interests (map) in GIS file format (file name in form MxxxOthLeg
3. Miscellaneous features (map) in GIS file format (file name in form MxxxMisc)
4. Extract from assessor database (file name in form MxxxAssess)
5. A look-up table for additions to the domain for LEGAL_TYPE in the OthLeg layers and MISC_TYPE in the Misc layer (file name in form Mxxx_LUT)
6. A look-up table for standard and custom assessor use codes (those not in the Bureau of Local Assessments standard for assessing use codes (file name in form MxxxUC_LUT).

MassGIS has developed and makes freely available its "Assess Prep" software tool. This tool ingests the "MassGIS extract" from the four dominant (used by all cities and towns except two) CAMA software vendors. The output from the Assess Prep tool are a text file and a parameter file. These files are used with the ArcCatalog Load>Load Data" tool available through a right mouse-click on a database table. Use "Load Data" to import the assessing extract directly into an empty Assess table template. If you are interested in using this tool, send a request to massgismail@mass.gov.

The remainder of this overview discusses some core concepts associated with the TaxPar and OthLeg feature classes and their relationship to the Assessing data table. Full details on the above six components of the file geodatabase are presented later in this document.

The Three Feature Classes

The standard organizes potential content for the assessor maps into three different map layers. The TaxPar layer stores the boundaries of ordinary parcels of land in fee ownership. Public rights of way are treated differently – since for all practical purposes the abutting fee owner has no use of their property within the public right of way, we retain public rights of way as their own polygon within the tax parcel layer*.

** Some municipalities find that a single large right of way polygon in TaxPar is cumbersome and slows graphic display. Single large right of way polygons can be arbitrarily broken up, perhaps where political ward boundaries cross the rights of way.*

The OthLeg layer stores the boundaries of other legal interests whose areas wholly or partly overlap parcels in TaxPar (e.g., conservation restrictions or easements). Coding the type of legal interest for these other polygons makes it possible to represent them using different outline symbols or area shadings or not to display them at all, so no functionality is lost in this approach.

Finally, the Misc layer contains polygons representing miscellaneous features such as water bodies, traffic islands, and so on that appear on assessor maps but that are not needed for representing ownership boundaries. *While all three feature classes must be present in the file geodatabase, if the assessing maps do not have any content that would go into either the OthLeg or Misc feature classes, they can be left empty.*

The Three Database Tables

The standard also requires three different database tables. One contains assessing data and two are look-up tables.

The Assessing database table - This standard requires that specific items of assessor information for each property parcel, a "standard" extract[2], be associated with the parcel mapping in each municipality. Implementing that association is inherently challenging. Part of that challenge is because the identifiers for a parcel on assessor mapping are not structured the same as the equivalent identifier in the assessor tax listing. This standard resolves that part of the challenge by creating a unique identifier that must be part of both the assessor mapping and the assessing tax list.

Another part of that challenge is that multiple parcel polygons may be linked to a single tax record and, conversely, multiple tax records (for example, condominiums) may be linked to one parcel polygon. This is referred to as a "many-to-many" relationship. This standard's solution for this many-to-many relationship has two parts.

The first part requires that the standard's unique property parcel identifier be stored directly in each municipality's assessing database. This unique identifier is referred to as the "locational identifier" or "LOC_ID" for short; it is a required attribute for each polygon in the TaxPar feature class. The state's Bureau of Local Assessment requires that every city or town in Massachusetts have LOC_IDs added to and kept current in their assessing records. This means that each assessing record is tagged with the LOC_ID for the parcel to which it should link and vice-versa. Thus, when many assessing records (for example, condominiums) are associated with the same parcel, they each have the same LOC_ID.

The solution's second part is for situations where multiple parcel polygons on the map are associated with a single assessing record**. This situation is created when the assessor record for a tax bill covers two or more deeded parcels on the assessor's parcel map. These deeded parcel polygons may be contiguous or non-contiguous and each polygon has a unique parcel identifier on the map. In these cases, the assessor has combined information about these two parcels into a single tax listing in the assessing database. The mapping challenge in these cases is that assessor information will only be available for one of the parcels when, ideally, both deeded parcels would still link to an assessing record. This standard's solution for this issue is fully explained in Section F.

*** Actually, the combined information in the single assessing record may be for a "land parcel" or "condo main" parcel. In that case, assessing records for each of the condominium tax listings are associated with the single "condo main" record. However, both the condo main and all the condo records on that parcel are assigned the LOC_ID of the parcel polygon where the condos are located.*

The Domain Lookup Table – This database table contains additional domain values for the LEGAL_TYPE attribute in the OthLeg feature class and the MISC_TYPE in the Misc feature class. Individual cities and towns may choose to extend the valid set of values (the "domain"); if they do so, those additional values and their description are stored in this table.

The Use Code Lookup Table – This database table contains assessor customizations of their use codes beyond the standard cords in the Department of Revenue standard. The lookup table distributed by MassGIS in the template file geodatabase for standardized parcel mapping includes all the standard use codes and their descriptions. Custom codes created by the assessor in a city or town, and their descriptions, must be added to this table. Because use codes are very valuable beyond their purpose in the assessment function, it is essential that their descriptions be documented.

Completing this overview, this standard further requires:

[2] Each of the four Computer Assisted Mass Appraisal (CAMA) software systems used in Massachusetts (Patriot, PK Systems, Tyler, and Vision) have a standard "MassGIS extract" report or query. Two towns use a CAMA system that does not support this capability; they have both successfully and regularly created the required extract.

1. Using the most recent iteration of the North American Datum of 1983
2. That parcel mapping conforms to the legislatively approved municipal boundary mapping developed by MassGIS (https://www.mass.gov/info-details/massgis-data-municipalities).
3. Developing and maintaining metadata

Implicit in how this standard is written and supported by MassGIS is that it will be implemented by:

1. Professional GIS staff employed by a city or town.
2. Other non-municipal organizations (e.g., regional planning agencies) that employ GIS professionals to provide parcel map maintenance services using GIS software to municipalities in their region.
3. GIS consultants that provide parcel map maintenance services.

All these entities should have the resources, the software, and the skills, to implement this standard.

DEFINITIONS

The following definitions will help in understanding this standard:

Assessor database – This is the database of property assessment information maintained by the assessor; it is also referred to as the tax list, property list, CAMA system, CAMA database, etc.

Attribute – A single element of non-graphic (e.g., name of owner, property area, property value) information stored in a database field and usually, in the context of this standard, associated with a single geographic feature (e.g. a property parcel on a map).

Base Map – This refers to a map portraying basic reference features on the earth's surface (both natural and cultural) onto which other, specialized, features (e.g., property boundaries, water mains) are placed. A commonly used example is the statewide color orthoimage base map available through MassGIS.

CAD – Acronym for Computer Aided Design, software technology which supports the creation and maintenance of engineering and survey documents and many other kinds of drawings. Some CAD packages can support mapping scales and use real-world coordinates as well as storing drawing elements in “paper space”.

CAMA – A computer-assisted mass appraisal (CAMA) system is an automated system for maintaining property data, valuing property, notifying owners, and ensuring tax equity through uniform valuations (source: https://www.mass.gov/doc/guidelines-on-cama-system-acquisitions/download).

CAMA extract – See “MassGIS extract”

CAMA_ID – The field in an assessing database extract containing the identifier from the assessing database that uniquely identifies each property record. This unique identifier is typically an arbitrary sequence-generated number. It appears in commercial CAMA databases developed using relational database management software where the tables can be joined using unique IDs. For example, in a Patriot AssessPro database this unique ID is called the account number; in a Vision database it is the parcel_ID or “PID”; in a PK-Systems database it is the “key”; and in the IAS World database it is the “LOC_ID” field under “Grid Coordinates”.

Deeded Parcel - Individual parcel of land whose specific ownership is recorded on a deed at the Registry of Deeds – but as used in this document, "deeded parcel" is also taken to include parcels whose ownership is recorded in Land Court documents as "registered land" or land which is in probate.

Digital Parcel File – This refers to a computer file or files containing a graphic (vector) representation of the boundary information originally depicted and maintained on a city or town assessor's maps. Besides fee ownership, boundaries that may appear include public and private rights of way and various kinds of easements. These files are typically created in and maintained using GIS or CAD software.

Digitizing – This term refers to tracing the lines on a map to recreate them in electronic (digital) form. This tracing historically was done on a special digitizing table but is more commonly done these days by viewing a scanned version of the map on a computer screen and using the mouse cursor to trace the lines ("heads-up digitizing"). The lines may also be traced by software in a semi-automated fashion.

Disjoint – This term describes two or more polygons which do not share a common linear boundary, although they may touch at one or more points (vertices). An important and relatively common example is a single tax parcel which has been split by a road right-of-way into two distinct polygons.

Fee Simple Ownership– Fee simple (or "fee") ownership means that a property owner has all rights (surface, sub-surface, air, etc) in the land described on a deed.

LEGAL_TYPE – This attribute identifies the type of legal ownership interest for a tax parcel in the "other legal interests" data layer required by this standard. See the discussion of the attributes for the OthLeg feature class later in this document. Note, also, that the non-fee interests may be partial or overlapping with respect to the fee interest in a parcel. For example, a conservation or agricultural restriction will often apply to only part of a property. In developing GIS files to comply with this standard, only the polygons that appear on the assessor's maps need to be captured and coded. So, for example, if there are no conservation restrictions mapped on the assessor's maps, then no LEGAL_TYPE values of "CR" will exist. However, even if no content for the OthLeg feature class exists on the tax maps, an empty version must still be created as part of complying with this standard.

LOC_ID – The "locational identifier" uniquely identifies every polygon on the assessor's parcel map; it is specific to this standard. LOC_IDs are created by whoever maintains the assessor parcel mapping. The LOC_ID appears in two places: as an attribute of the *TaxPar* feature class and in a field in the assessing extract (this extract is usually referred to as the "MassGIS extract"). The LOC_ID will also appear in the TAXPAR_ID attribute of the *OthLeg* feature class when there are parcel polygons copied there from the *TaxPar* feature class (see discussion, above, in the overview, of the assessing database table).

The LOC_ID is based on a coordinate (point) location inside each polygon on assessor maps; it is created by combining a letter specifying the units of the X and Y coordinate location used to create the LOC_ID ("F" for units of US Survey Feet and "M" for meters; Massachusetts State Plane System, NAD83 datum). LOC_IDs can be created using GIS tools. However, care must be taken with U-shaped or L-shaped parcels and with multi-part polygons to ensure that coordinate location used actually falls within the polygon. The letter indicating the units and the X and Y coordinate values of the point are then appended together, each separated by a single underscore character ("_"); coordinate values after the decimal point are truncated. This creates the LOC_ID. Examples of LOC_IDs are "F_552984_2956780" or "M_168529_901230." Mixed entries for the units specifier ("M", "F") within the records for one community are not permitted. This identifier has two useful properties. First, it is unique (it is a database primary key) statewide. Second, because it is derived from coordinates, it can be used by GIS software to locate the parcel in the absence of any other identifier. Furthermore, a LOC_ID for every map parcel can easily be created using standard capabilities in most GIS software. Finally, two annual reports required

from assessors by the state's Bureau of Local Assessment must include LOC_IDs: the annual sales ("LA-3") report and the annual new growth ("LA-13") report.

MAP_PAR_ID – This is a parcel identifier whose purpose is to unambiguously reference one or more polygons on a tax map for a city or town. Although it may be called various names or may even be concatenated ("merged together") from more than one field, some such identifier must exist in any digital parcel file if that file is to be initially linked with information from an assessor's database. In digital parcel attribute files, the content of this field is usually created by concatenating various identifiers, (e.g., map number/map sub-number/parcel number/parcel sub-number, or map/block/lot or section/block/lot) that appear on assessor's maps. When implementing this concatenation, the preferred separator is an underscore ("_"). The various components of this identifier will vary from community to community.

Typically, each parcel polygon on an assessor's map is labeled with the lot number. The map number may only appear once on the map sheet, and, if used, the block numbers may appear as needed to differentiate the different blocks on the map sheet. While this identifier uniquely identifies one ownership interest in a single municipality, it is not unique statewide.

MassGIS Extract – This extract or standard database query is available in all the principal CAMA systems used in Massachusetts. The extract contains the content for the assessing table required by this standard. That content includes current owner, valuations, site and owner address, building, and other information maintained by assessors.

MISC_TYPE – In the "miscellaneous features" layer (MxxxMisc), this attribute identifies and classifies miscellaneous features on an assessor tax map.

Orthoimagery – When a photograph is taken from an airplane, there are distortions in the resulting image due to the motion of the aircraft, the variable distance between the camera lens and the ground in the middle of the photo and at the edge of the photo, and the variable distance from the camera lens to the ground due to elevation changes. An orthophoto is an aerial photograph from which distortions have been removed so that distances and areas can, within the limits of the orthophoto accuracy, be correctly measured.

Planimetric base map - A map that depicts the horizontal positions of natural (e.g., ponds, trees, elevation contours) and cultural features (e.g., paved areas, building footprints, poles).

POLY_TYPE - This attribute indicates whether a tax parcel represents a single parcel in fee ownership or a combined "tax" parcel; is also used to identify rights-of-way and bodies of water, but ONLY where the boundaries of those features contribute to defining a parcel boundary. *In developing GIS files to comply with this standard, only the polygons that appear on the assessor's maps need to be represented in the standardized mapping*. If the Commonwealth has jurisdiction over a body of water (Great Pond), or if the ownership of a body of water is private but ambiguous (e.g. many parcels fronting on a small pond) then the POLY_TYPE for that body of water may be coded "WATER". Bodies of water that are entirely contained within a single parcel of land must not be retained in the tax parcel layer. Instead, they must be included in the Misc feature class.

Property – In this standard, this word refers to a record in an assessor's database.

PROP_ID – This field contains the information needed to unambiguously associate a property (tax record) with a single parcel on the tax map. The PROP_ID field is required in the assessor database extract that is a required part of complying with this standard. The PROP_ID may be constructed in a manner like the MAP_PAR_ID out of component fields like map/block/lot. In some cases, a property ID will extend the map/block/lot identifier to uniquely identify each property record. Condominiums are the

most common example. Each condominium is a record in the assessor's database because each condominium owner needs to receive a property tax bill. However, condominiums cannot be uniquely identified with the same information used to identify other properties (e.g., map/block/lot, etc.) because there will be two or more condominiums on one lot. This situation is commonly resolved by extending the lot number so for example the condominiums on "lot 1" have lot numbers 1A, 1B, 1C, etc.

Registration - In this document, registration refers to the process of finding reference points on a map/image document and assigning them coordinates from their known positions in the real world. Once coordinates are specified for enough points on the map/image document, the entire digital document may be mathematically transformed to real-world coordinates for GIS display and analysis. This is often referred to as "geo-referencing".

Scan - This refers to the process of making a digital image of a document (e.g., a map, text document, or photo). A scanned document can be displayed on a computer screen, but until locations on the document are assigned ("registered") to map coordinates, it cannot be overlaid with map features in a GIS database.

TAX Parcel – This refers to an area of land, comprised of one or more deeded parcels, which is associated with a single tax record in the assessor's property database. As described in this standard, a tax parcel polygon may be created by dissolving two or more deeded parcels to simplify data management. The polygons representing the individual underlying deeded parcels in such cases must be transferred to the Other Legal Interests ("OthLeg") layer.

REQUIRED AND OPTIONAL ELEMENTS

Complying with the required elements of this standard is the minimum acceptable standard for developing a digital parcel file by ANY community in the Commonwealth of Massachusetts. Requirements include that assessor's maps conform to the boundary compilation requirements described below, assigning an identifier (the MAP_PAR_ID) and this standard's unique "location identifier" ("LOC_ID") to each parcel polygon, and using the LOC_ID to join the parcel map polygons to an extract from the assessor's database. Parcel mapping must conform to the municipal boundary derived from survey data distributed by MassGIS, except where the boundary follows:

a) A river or stream channel that closely agrees with the equivalent mapping from the adjacent city or town
b) A coastline
c) A road or rail right-of-way and MassGIS has not already adjusted it's mapping of that boundary based on a survey of that right-of-way.

Here is a summary of the required elements for digital parcel files conforming to this standard:

A. *Parcel Boundary Compilation* – The digital parcel file must conform to minimum compilation standards and horizontal accuracy requirements for property boundary locations. These requirements are as important now with a mapping update from a subdivision or deed as they were for when standardized parcel mapping was first developed.
B. *Tax Parcels, Other Legal Interests and Miscellaneous Features*– These are the three feature classes required by this standard. They are all required elements of the file geodatabase. However, if there is no content on the assessors mapping that would be stored in either the Other Legal interests or the Miscellaneous Features feature classes, they can be empty.
C. *Attributes for Map Layers* – The three map layers required for this standard have required attributes. Additional attributes created by a municipality can also be included on any of these map layers; MassGIS will remove them when mapping updates are delivered to MassGIS.
D. *Assessor's Database Record Table* – This standard extract from municipal CAMA systems is part of standardized parcel mapping and is included as a database table (see Appendix A). A database "relate" or "join" can be used in GIS software to connect this table to the TaxPar feature class.
E. *Creating multi-part polygons where necessary* - This standard requires using multi-part polygons for situations where one assessor's tax bill (one CAMA record) corresponds to two or more polygons on the assessor map (a one-to-many or 1:M situation) AND those polygons do not share a boundary (although they may touch at one or more points).
F. *Dissolving internal polygon boundaries where necessary* – This is the solution for two or more adjacent parcels with the same owner when only one parcel's parcel ID matches to a CAMA record because the records for the other parcels have been combined to one record for tax billing purposes. Because the parcels being combined will each be recorded at the registry of deeds (either with a deed or as part of a subdivision plan), it's important for other municipal purposes that, where possible, the constituent parcels be preserved. In this standard that is accomplished by copying those parcels to the Other Legal (OthLeg) feature class.
G. *Adding the LOC_ID to the tax list extract* – The LOC_ID created by this standard is now recorded and maintained in assessor databases in Massachusetts. LOC_IDs are stored in the same database field in the installation of each of the different types of CAMA systems. Because the LOC_ID appears in the same location in CAMA system installation, the standard "MassGIS extract", as well as the Bureau of Local Assessment's (BLA) required annual LA3 (sales) and LA13 (new growth) reports, all include the LOC_ID. The LOC_ID is required by the BLA to be in these reports.

H. *Required match rates* – This standard establishes required match rates between the parcels and the assessing database extract and vice-versa. This match is made based on the LOC_ID attribute in the TaxPar feature class and the LOC_ID field in the Assess database.
I. *Horizontal Datum* – The digital parcel file must use the North American Datum of 1983 (NAD83) or a successor and the state plane coordinate system, units of meters or feet.
J. *Metadata* – This file provides information needed to better understand the digital parcel file.
K. *Legislatively Approved Municipal Boundary* – The parcel boundaries must be coincident with the official survey boundary for municipalities from DOT Survey Section and MassGIS as distributed by MassGIS.
L. *Data Delivery Format* – The data must be delivered in ESRI file geodatabase format.

Additionally, there is some guidance for the following optional elements:

M. *Text Labels/Annotation* – Assessor maps often include important text-based information as well as mapped features. In keeping with our principal objective of creating a data product that is useful to assessors, the standard is not prescriptive with respect to labeling/annotation and how it is stored and used.
N. *LOC_ID Archive* – Tracking changes in the parcel layer can often help resolve questions about why parcels are represented in a particular way, what the source information may have been, etc.

Each of the above elements is explained in detail below.

A) Parcel Boundary Compilation

Background

Assessor paper maps are converted to a form useable in a GIS using one of two approaches:

1. Individual maps are scanned, registered to a geographic coordinate system using a base map, and then lines from the maps are converted to digital form, usually by "heads up" digitizing on a computer screen. The base map is typically an orthophoto base map such as the one available from MassGIS, although it may also be a detailed planimetric base map.
2. Deeds for each property are examined, and the property boundaries are re-constructed and pieced together along with those of adjacent properties based on the coordinate geometry of the boundary distances and bearings. This too results in a digital file. This method costs the most, but provides the highest accuracy result, although this level of positional accuracy is not required for tax mapping purposes. This approach also requires that an individual with suitable experience and professional qualifications be involved in the mapping process.

Sometimes a combination of the above methods may be required.

Even if a digital file already exists, as it most often does, it still may need correction of geographic and other errors so the file conforms to the standard. Both compilation from paper maps and rectification or reformatting of digital files are covered by this discussion of digital parcel boundary compilation.

Boundary Compilation Standards

Digital parcel boundary compilation MUST result in a GIS data file (the "TaxPar" file) containing polygon features representing tax parcels (see definition) as shown in the assessor's maps or other sources. Compilation MAY also result in content being added to two other files: the first is the "OthLeg" file, containing polygons representing the boundaries of other legal interests such as easements and conservation restrictions, if such are shown on the assessor's maps; the second is the "Misc" file for storing miscellaneous polygons often found on assessor maps (e.g., traffic islands, ponds, portions of

parcels that fall outside of a community but that the assessor wants on their tax maps). Taken together, these files must reflect the best professional judgment of the individual developing the digital assessor map about how to compile existing mapping (and any other source documents or research) such that:

- Boundaries shown on the assessors' parcel map are represented as well as possible;
- Polygons representing other legal interests may overlap ordinary parcels or each other, but if the assessor map or research related to the compilation indicates that their boundaries are coincident with other mapped features then that coincidence must be enforced;
- No "slivers" occur and there are no overlaps between tax parcels;
- Boundaries match without any "jogs" or discontinuities at map sheet edges; and
- All polygons are closed.

Attaining these objectives requires striking a balance between a) being as faithful as possible to the original map sources and any other research that is done, and b) using visible features on the orthoimagery base map to make plausible adjustments to the mapping. In general, compilation should give credence to the configuration and orientation of parcel boundaries on the original assessor map *provided* most boundaries on that map appear to be in the correct location as referenced to the orthoimage base map. However, it may still be necessary to make localized adjustments so that the match between the assessor map and the orthoimage base map improves. In some instances, it may not be possible to resolve geographic discrepancies without deed/plan research, and whether or not such research is part of developing a digital parcel file would be up to the community involved.

The base map on which boundaries are compiled or adjusted must be the most recent publicly available orthoimagery either from MassGIS OR some other source which is at least as current and accurate[3]. Developing the digital assessor map will typically involve digitizing assessors' mapping boundaries after first registering the tax maps to an orthoimage base map. Registration is accomplished by matching visible or implied features on the map to corresponding features on the orthoimage base. Better results may be achieved by georeferencing on a block-by-block basis rather than globally. Applicable criteria for geographic registration of the map and compilation of boundaries shown are:

1) Continuous Lines and Closed Polygons
2) Respect for the accuracy of subdivision plans or other sources
3) Fidelity to original assessor map
4) Coincidence with street rights-of-way
5) Coincidence with other base map features
6) Edge-matching across map sheets

These criteria are listed in order of priority from first to last, meaning that unless specific circumstances warrant different priorities, respect for the accuracy of a surveyed subdivision plan takes precedence over fidelity to the assessor map which takes precedence over coincidence with street rights-of-way, etc. Each of the above criteria is discussed in detail below.

Continuous Lines and Closed Polygons - Lines must be geometrically continuous and all boundaries must be geometrically closed with no "undershoots" or "dangles" where boundaries intersect. The conversion process must not create "sliver polygons" (gaps or overlaps between properties) which are not on the assessor's maps.

[3] If parcels are viewed on top of orthos that are different than the ones on which they were compiled, then some displacement of boundaries relative to the orthos may appear. In dense urban areas with small lots, building lean and the horizontal accuracy of the MassGIS orthophotos are issues in how lot lines appear relative to orthos.

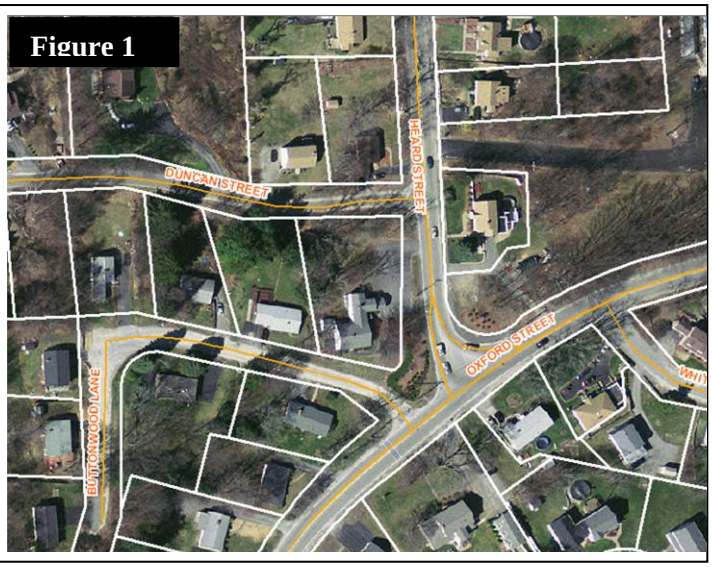
Also, as discussed below in relation to municipal boundaries, all rights-of-way (ROWs) must be closed off at a city or town boundary and at a coastline or shoreline where they terminate in a water feature. In other words, the entire area of the tax parcel layer must be composed of polygons. **Right-of-Way (ROW) polygons may be subdivided to reduce their complexity, thus reducing the time to draw or query, and to delineate the distinction between public and private rights of way if so desired.** A recommended way to divide ROW polygons is where election ward boundaries cross ROWs.

Respect for Subdivision Accuracy - Where subdivision information developed by a surveyor has been submitted to a city/town and is being used to update assessor mapping, the compilation procedure should respect the accuracy of those boundaries relative to the rest of the map. Subdivision boundary arcs should not be adjusted relative to adjacent boundaries unless the adjacent boundaries are known to be of equivalent or better accuracy. When adjacent boundaries presumed to be of equal accuracy do not coincide within the limits of the horizontal accuracy of the map, then further research is needed. When the boundaries of adjacent properties are less accurate than the subdivision, they should be adjusted to fit those from the subdivision. An exception to this requirement should only be made if there is a documented error in the subdivision map.

Sometimes the MassGIS orthoimagery or other base map will not show recent subdivisions. Alternatively, there may not be sufficient information to guide the geo-referencing and boundary compilation, unless the source files already reference a state plane or some other real-world coordinate system or such a system can be introduced. If the update source contains such coordinates, it may need to be projected so that its coordinate system is the same as the parcel data to be updated. Alternatively, existing parcel boundary junctions in common between the existing parcel(s) and the new subdivision may provide sufficient information to geo-reference the subdivision. In the absence of any information, the best possible representation of the boundaries must be made.

Fidelity to Original Assessor Map - Assessor map sheets must be geo-referenced such that a) the amount of total registration error on any one map sheet is minimized, and b) road rights-of-way are correctly aligned to match as closely as possible the equivalent areas on the orthoimage base map (see further discussion below for map sheets with few or no roads). The exception to this guidance is if it is known that the road visible on the orthoimagery was not built in the correct location.

Figure 1



Once the best geo-referencing "fit" is achieved, there may still be substantial discrepancies between the linework of the assessor's map and features visible on the orthoimagery base map. If these discrepancies involve moving internal (not road right-of-way) arcs for an entire parcel so that the parcel's location better matches what is visible on the orthoimagery (e.g., not cutting through single family homes and following hedges, fences, and especially stone walls) then usually those adjustments should be made. Similarly, a discrepancy between the parcels and the orthoimage base map may involve a group of parcels bounded on three or four sides (a "block" of parcels) by paved road rights-of-way. In these situations, if moving the entire block as a single unit yields a better fit relative to the visible features, then it should be moved.

Visible features such as hedges, fences, and stone walls are not authoritative indicators of boundary locations but may be the best available source for compilation purposes. When a series of assessor parcels are offset by a consistent amount from visible features on the orthoimagery, aligning the parcels with the visible features will generally be an acceptable approach to improving the spatial accuracy of the assessor mapping absent other authoritative information.

If it is the best professional judgment of the individual performing the work that the boundaries shown in a specific area on an assessor's map are accurate, and that discrepancies between the polygons digitized from the assessor map and the orthoimagery result from other causes such as differences between as-built features and those shown on a plan, (see example in middle of Figure 1), then the BND_CHECK attribute of the affected parcel polygons must be updated as a way of indicating that this judgment has been made. That attribute is discussed later in this document.

A final important element of fidelity to the original assessor's map concerns the municipal boundary. As described later in this document, the legislatively approved municipal boundaries distributed by MassGIS must be incorporated into the parcel layer in complying with this standard. However, some municipal boundaries are legally defined to follow road or, occasionally, rail rights-of-way; these boundary arcs are identified in the BND_QUAL attribute of the MassGIS TOWNSSURVEY_ARC data layer. In mapping municipal boundaries that followed rights-of-way, MassGIS staff only had visible features on the orthophotos as a guide. Thus, the spatial accuracy of those boundaries is less than that of the boundaries connecting to monumented locations over land. The assessor's map(s) may represent these boundaries following rights-of-way more accurately than the corresponding mapping by MassGIS in the municipal boundary data layer. Therefore, MassGIS will accept tax parcel data layers where the portion of the municipal boundary that follows a road or rail right-of-way is based on the boundary from the assessor's parcel map. The exception to this would be if the person managing development of the tax parcel data layer determines that the quality of the geo-referencing and subsequent digitization of the boundary from the assessor map does not support its use. In these cases, the boundary from the MassGIS data layer would be retained. In situations where there are disputes between communities or uncertainty about the boundary location, the boundary in the MassGIS data layer will be used.

Similarly, when a municipal boundary follows a stream channel, the only guide MassGIS staff had for delineating this boundary was what they could see on the orthoimage base map. That boundary as depicted on the tax map may or may not be based on a more authoritative source. Whatever the situation, boundaries following shorelines and water features will usually be different than what is provided in the MassGIS data. In the interests of seamless data presentation, MassGIS strongly prefers that its mapping of boundaries coincident with water features be used, particularly if the boundaries on the tax map are of uncertain or dubious origin. However, MassGIS *will* accept tax parcel data layers where the portion of the municipal boundary that follows a stream channel is based on the boundary from the assessor's parcel map. Also see the later discussion in this standard of coastal boundary delineation.

Coincidence with Street Rights-of-Way - As a rule, the street rights-of-way depicted on the assessor's maps should be compiled so that, when the street has a sidewalk, they coincide with the apparent "back-of-the-sidewalk" visible on the orthoimage base map. If there is no sidewalk, the centerline of the paved way is centered on the right of way. If in locating the boundaries of the public street right of way there is an inconsistency between following visible "back of sidewalk" features and maintaining a correct and consistent width of the right of way, priority should be given to showing a correct and consistent width, provided that approach is consistent with the assessor's map; the exception to this is highway rights-of-way, which often have irregular widths or substantial distances between the edge of the pavement and the actual edge of the right-of-way. With very few exceptions once geo-referencing has occurred, arcs representing road centerlines from the current state Department of Transportation roads data layer should fall completely within the rights-of-way on the geo-referenced map sheet.[4] This last specification still allows for significant variation in the geographic location of the rights-of-way on the map while still providing a check on the geo-referencing result. The agreement between the street center lines and the geo-referenced rights-of-way does not have to be perfect; it is expected that centerlines may sometimes have brief lateral intersection with a right-of-way boundary due to imperfections in the DOT's road centerline data. The road centerline data may also include arcs for which there is not a right-of-way indicated on the assessor map. In these instances, the road would, of course, cross parcel boundaries. In other situations, e.g. Plum Island, the visible right of way will have no relationship to the right-of-way represented by the assessor map – this would be a situation where the BND_CHK attribute would be used to validate the inconsistency.

Legal parcel boundaries may not always be coincident with visible features. Some features (e.g. edges of fields, pond/lake shorelines) can move over time. Therefore, assumptions about coincidence with visible features must be carefully reviewed, case-by-case.

Coincidence with Other Base Map Features – As discussed earlier, property boundaries are often coincident with clearly defined and visible features on the base map. These include features such as the "back-of-the-sidewalk", stone walls, hedges and tree lines, etc. Therefore, within the limits of the orthoimage base map's absolute accuracy and other constraints (such as what can reasonably be interpreted from the orthoimagery), and when appropriate as determined by the map compiler, parcel boundaries should be registered as accurately as possible to features visible on the base map. When using the MassGIS orthophotos as a compilation base, such features should not be displaced in excess of three (3) meters relative to corresponding features on the base map.

Edge Matching Across Map Sheets - No bends or other deformities in the boundary lines corresponding to seams in the original map sheet layout should be visible.

Additional Guidance: Geo-Referencing Map Sheets with Few or No Roads

Assessor map sheets in rural areas may have few or no roads and geo-referencing these sheets can be problematic. If such sheets include the community boundary, it can be geo-referenced to the MassGIS municipal boundaries data layer (see https://www.mass.gov/info-details/massgis-data-municipalities)

Another possibility is to refer to the MassGIS open space data layer which has both polygon and line features. The accuracy of the line features in this data layer varies, but some of them were developed from sources accurate enough to be valuable in geo-referencing assessor parcel boundaries. The accuracy of these arcs can be determined by reference to the feature attribute SOURCE_TYPE in the OPENSPACE_ARC data layer available from the MassGIS web site. The domain for the SOURCE_TYPE for this attribute includes the following codes:

[4] The DOT roads are usually spatially accurate because they are based on road crown break lines developed as part of the digital elevation model for the state's 1990s black and white orthoimagery.

SV = Geo-referenced Survey; this is the equivalent of a geo-referenced sub-division plan
GSV = Geographic Coordinates from Survey
CS = COGO from Survey
CD = COGO from Deed

Lines in the open space data layer having one of the above values in their SOURCE_TYPE attribute will likely be useful for improving the geo-reference of the corresponding arcs from assessor maps. This will be true because the quality of the source records will be roughly equivalent to or even better than the records used in creating the assessor maps. Arcs in the open space data layer with this level of quality are commonplace, particularly in western and central Massachusetts.

B) Tax Parcels, Other Legal Interests and Miscellaneous Features

This standard requires organizing assessor map information into as many as three separate GIS data layers or feature classes. Each class contains some of the various geographic features commonly found on tax maps. These three feature classes are:

a. Polygons for ordinary tax parcels – These are the mapping representation of the land that is referenced in assessing records. This feature class also includes public rights of way and rail rights of way associated with physical streets and with railroads as shown on the assessor maps as well as water features whose boundaries contribute to defining parcel boundaries. These map features are stored in the TaxPar ("tax parcels) feature class.

b. Polygons representing other "invisible" legal boundaries such as conservation restrictions or easements that overlap tax parcels. Also included in this layer are adjacent parcels with common ownership that are eventually dissolved into single polygons in the ordinary tax parcel layer. Additionally, parcels with different map IDs combined as multi-part polygons in the TaxPar feature class are copied here to preserve the map IDs. These features are stored in the OthLeg ("other legal interests) feature class. There may be few or even no features in this layer; these features are required only if such boundaries are shown on the original map or digital source file. *However, even if there is no content for this layer, it must exist as an empty feature class in any submission to MassGIS.*

c. Polygons representing miscellaneous features such as wetlands, ponds (whose shorelines are not legally or functionally being used as parcel boundaries), traffic islands, buildings from condominium complexes, abutting parcels in adjacent communities, and the like. There is no specific requirement for this layer; it is at the discretion of the community as to whether the mapping of these additional features should be preserved. However, unless otherwise instructed, features that the assessor expects and wants to see on the tax map and that are not available from some other digital source should be included in this layer. These map features are stored in the Misc ("miscellaneous) feature class. *Regardless, even if there is no content for this layer, it must exist as an empty feature class in any submission to MassGIS.*

The distinction between (a), (b) and (c) is that there is no overlap allowed between different tax parcels (and public rights of way and certain water features) whereas other legal interests or miscellaneous features will overlap with parcels and may even overlap with other legal interests.

Creating these separate layers is the first step towards a more "topological" approach such as the ESRI "parcel fabric" without requiring significant additional effort. Where boundaries are actually coincident between these different layers, the standard requires that editing techniques such as "snapping" must be used to enforce that coincidence. ESRI "map topology" can be used to facilitate editing coincident features in different layers.

C) Attributes for Map Layers (3 layers)

Full definitions[5] for all attribute and database table fields are found in Appendix A.

Attributes of Tax Parcel Layer (MxxxTaxPar)

The following attributes must exist (as described below, they may or may not have content) for the tax parcel feature class:

MAP_PAR_ID – This is the parcel ID that appears on the assessor's map. A MAP_PAR_ID value is only required where the POLY_TYPE (see below) entry is "FEE" but may be populated for rights-of-way and water features that have been assigned IDs on the tax maps. (Polygons classified as POLY_TYPE = "TAX" will have their MAP_PAR_ID values retained in the MAP_PAR_ID attribute for their constituent LEGAL_TYPE = "FEE" polygons in the OthLeg feature class).

LOC_ID – This attribute (see full discussion in the definitions portion of this document) uniquely identifies (statewide) a tax parcel polygon.

POLY_TYPE – This attribute identifies the kind of polygon in the tax parcel layer. Valid entries in this attribute are:

FEE - Most polygons will be coded "FEE", including polygons owned by non-profit or state government organizations.
TAX – This is used when the polygon is created by dissolving the constituent deeded parcels because assessor information about these parcels has been combined.
WATER - Polygons may be coded "WATER" when a body of water participates in representing the boundary of one or more parcel polygons.
ROW – this attribute value indicates a public right of way, usually for motorized vehicles.
PRIV_ROW – these are rights of way, usually for motorized vehicles, that are not publicly owned. They may provide access to a public right of way, but even so are still mapped as separate polygons. Polygons classified as PRIV_ROW only occur as discrete polygons that do not overlap with other polygons in TaxPar.
RAIL_ROW – these are railroad rights of way. When a "RAIL_ROW" crosses a "ROW" or PRIV_ROW at a grade crossing, the "RAIL_ROW" "breaks" the "ROW" or "PRIV_ROW".

Rights-of-way that overlap part or all of one or more "TAX" or "FEE" parcel polygons (e.g., access easements) belong in the "other legal interests" data layer.

MAP_NO – Map number of the assessor's map sheet from which the mapping of the parcel in the digital file was created. This attribute only needs to be populated if the information is readily available – creation of standards-compliant parcel files from CAD files or other digital sources may not provide this information.

SOURCE – The most recent boundary feature source (valid values are "ASSESS" (assessor map – this choice includes existing digital files including CAD files and is the default), "SUBDIV" (subdivision plan), "ANR" (subdivision approval not required), "ROAD_LAYOUT", and "OTHER"). While this

[5] Note on field specifications – character fields specify the minimum number of characters, number fields specify the minimum total number of digits and, optionally, the number of digits after the decimal point e.g. (number 4,2) would be 99.99. Dates are given as integers in YYYY or YYYYMMDD format to avoid the occasional difficulties encountered with importing and exporting date formats – dates as integers in this format are platform independent and can be sorted and queried using integer comparison. Field specifications may be translated to various specifications such as Varchar, Short Int, Float, etc according to the database system in use.

attribute and its companion, PLAN_ID, are not typically part of assessor parcel mapping, this is useful information to start tracking.

PLAN_ID – Identifying information for plan (e.g, subdivision or road plan) used to update the digital file.

LAST_EDIT – The date this parcel polygon was last edited, formatted as YYYYMMDD. Initial value will be the date the GIS file was brought to compliance with this standard. This cannot be null or zero. Updating this attribute is essential as it also helps identify locations where there is a high likelihood of new addresses. Also, if carefully maintained over time, this attribute will enable useful visualization of a community's change over time.

BND_CHK – This attribute is used to identify parcels where, although there is a discrepancy between the parcel boundary and features visible on the orthoimage base map, the boundary shown is believed to be correct. In addition, this attribute will enable those conducting QA to identify parcels where the boundary compilation may need editing. The domain of values for the BND_CHECK attribute will be:

Null = indicates that no particular attention has been given to checking the compilation of the given parcel

"CC" = this value indicates the compilation has been checked and is entered by the compiler to indicate an apparent discrepancy between the map data and the orthoimage base map where, in their professional judgment and based on the available evidence, the compilation is correct. This might include such anomalies as a parcel boundary cutting off a corner of a building, or a boundary displaced from a feature such as a stone wall that might often indicate the boundary location.

"NR" = This rarely used value indicates that the boundary needs research from primary sources; use of this value by the data developer MUST be accompanied by a separate communication to MassGIS explaining why the circumstances require its use.

"OK" = this value is entered only by MassGIS staff, and indicates that a discrepancy between the boundary compilation and the orthoimagery previously coded as "CC" by the data developer has been approved as being consistent with known information. If a polygon coded in this way is subsequently edited, this attribute would be changed to null or "CC".

Data developers should expect to code only a small minority of parcel polygons as "CC" – most parcels would simply carry null values in this field.

NO_MATCH – This attribute is for identifying parcel polygons whose exclusion from calculations of match rates between parcel polygons and the assessor's tax list has been approved by MassGIS. The default value is "N". The value for parcels approved for exclusion from the match, is "Y".

Background - Some communities have collections of parcels where ownership is unknown or in dispute. These collections are typically failed subdivisions (e.g. "Sherwood Forest" in Becket, "Edgewood Park" in Holden) or "lottery" parcels given away as prizes at events like county fairs or as part of business promotions in the 19th and 20th century. Lottery parcels were typically very small (usually non-conforming by today's zoning requirements) and were usually clustered together around a pond or on a large wetland (for example, South Meadow Cedar Swamp in Carver). Also, some communities have "odds and ends" or "scraps" of land where ownership is unknown, and the value of the unpaid tax bill does not justify the cost of determining ownership. In circumstances, where it is unduly burdensome to determine the ownership of these properties, they may be excluded from the match rate calculations of the standard.

Process- The request should be made via email and must include a shape file of the parcels at issue and some documentation (e.g., from the assessor) that the ownership is unknown or in dispute. This documentation does not have to be parcel-specific – a general statement relative to the shape file is sufficient. MassGIS will approve the exclusion via email. Once approved, the NO_MATCH attribute of the TaxPar data layer must be set to "Y" for the affected parcels. Note that properties where the orthoimage base map reveals a structure that could carry a site address MUST be the subject of extra effort to link them with a tax record as MassGIS is very unlikely to approve a NO_MATCH request for properties that contain a building.

TOWN_ID - The Department of Revenue "town ID". Valid values are 1 – 351. While as of the data of publication of this version of the standard "Devens" is not a Massachusetts municipality it has been assigned TOWN_ID = 352.

Attributes of Other Legal Interests Layer (MxxxOthLeg)

The following fields must exist (as described below, they may or may not have content) for polygons in the "Other Legal Interests" file:

MAP_PAR_ID – This is the parcel ID that appears on the assessor's map. A MAP_PAR_ID value is only required where the LEGAL_TYPE (see below) entry is "FEE".

TAXPAR_ID – This attribute only needs to be populated for polygons where LEGAL_TYPE = "FEE" and will contain the LOC_ID value for the corresponding polygon (single or multi-part) in the TaxPar feature class having POLY_TYPE ="TAX" that the OthLeg "FEE" parcel contributes to.

LEGAL_TYPE – This identifies the kind of legal interest. The initial domain of values for this attribute include:

FEE = parcel of land copied from the tax parcel layer to preserve boundaries and related map IDS
PRIV_ROW = private right of way
RAIL_OVER = rail right-of-way crosses over another right-of-way; at a grade crossing, the RAIL_ROW polygon breaks a ROW polygon.
ROW_OVER = a road right-of-way crosses over another right-of-way
EASE = easement (e.g., for a driveway or for utilities)
CR = conservation restriction
APR = agricultural preservation restriction
CRX = conservation restriction exclusion
APRX = agricultural preservation restriction exclusion

Private rights-of-way in feature class OthLeg (LEGAL_TYPE = "PRIV_ROW") only occur when they overlap a portion of one or more polygons in feature class TaxPar; they are a form of easement.

This domain can be expanded to include domain values different from those listed above. The standard requires that any new values for this domain be added to lookup table that supports that purpose in this standard. See the lookup table's description at the end of this Section.

LS_BOOK – Registry of Deeds book for last sale. If known, this is useful, and it should be filled in, but there is NO requirement to do legal research to find the book number.

LS_PAGE – Registry of Deeds page for last sale. Again, if known, this is useful, and it should be filled in, but there is NO requirement to do legal research to find the page number.

REG_ID - this is the equivalent to Registry of Deeds book and page information but for registered or probate land; it may also be known as the certification or case number. This is because land in Land Court

or Probate does not have a normal book and page identifier. It should be filled in if known but this standard does NOT require legal research to determine this identifier.

TOWN_ID - The Department of Revenue "town ID". Valid values are 1 – 351. While as of the data of publication of this version of the standard "Devens" is not a Massachusetts municipality it has been assigned TOWN_ID = 352.

Attributes of Miscellaneous Features Layer (MxxxMisc)

The following fields are required for the "Miscellaneous Features" file:

MISC_TYPE – This attribute identifies the kind of miscellaneous feature.

The domain of values for this attribute are:

WETLAND = wetland area (as shown on the assessor map, not as mapped by DEP)
ISLAND = island within a body of water, if not representing a separate parcel
TRAFFIC_ISLAND = a raised area within a right of way, shown for reference
WATER = stream/river represented by a double line, or a lake/pond or reservoir, whose boundary is not co-incident with parcel boundary
OUTSIDE = A portion of a parcel that falls outside the boundary of a community but since part of the parcel is in the community, the assessor wants the mapping to show the entire parcel.
BLDG = the outline of a building, typically containing condominiums, that are retained on the assessors map to better illustrate the circumstances on a specific property parcel.

As with the LEGAL_TYPE attribute of OthLeg feature class, this domain can be expanded at the users' discretion. However, any new codes must be included in the look-up table as specified in the discussion of the LEGAL_TYPE attribute, above.

TOWN_ID - The Department of Revenue "town ID". Valid values are 1 – 351. While as of the data of publication of this version of the standard "Devens" is not a Massachusetts municipality it has been assigned TOWN_ID = 352.

Look Up Table for Domain Values (Mxxx_LUT)

This look-up table describes additional domain values for the OthLeg feature class LEGAL_TYPE and the Misc feature class MISC_TYPE attributes. Entries to this table must adhere to the following specification:

FIELD NAME	DEFINITION	EXPLANATION
TOWN_ID	Number, 3	Town-ID from MassGIS towns data layer
FIELD_NM	Character, 10	Specifies field (LEGAL_TYPE or MISC_TYPE) in which code is used
CODE	Character, 20	Code for LEGAL_TYPE or MISC_TYPE code
CODE_DESC	Character, 80	Definition of the code

By including the FIELD_NM field, this look-up table can be joined to individual attributes (LEGAL_TYPE or MISC_TYPE) by creating a definition query or view based on the FIELD_NM field value.

D) Assessor's Database Record Fields

Accessing attributes from the assessor's database through the parcel file is accomplished by obtaining a copy of the necessary assessor's information (e.g., as a delimited text file or Excel spreadsheet file), importing it into the Assess database table, and establishing a table join or related to the TaxPar feature class based on the LOC_ID.

When municipal tax maps are updated, assessing offices are responsible for updating the effected tax records using the "LOC_ID change list" provided by whoever maintains the tax maps. Part of complying with this standard is ensuring that the parcel map polygons can be joined to CAMA records, either directly to a database view in the assessment database, or to an extract containing the LOC_ID.

As of 2022, LOC_ID has been added to and should be maintained in every municipal assessor database in Massachusetts. This LOC_ID appears in the MassGIS extract available for any community. So, establishing a 1:M relationship between parcel polygons in the MxxxTaxPar feature class and the assessing data extract in the ASSESS table based on LOC_ID is a straightforward process in GIS software.

A list of required data fields from the assessor's database is below; it includes information commonly needed for GIS applications involving parcel data, both at a municipal and a regional level. These required fields are to be held in the ASSESS table, a required element in complying with this standard. All these fields are required to be populated with content from the correct source in the assessor database.

PROP_ID – Assessor records include the identifier used to identify the parcel on the assessor map to which the assessing record applies. The PROP_ID is typically stored as the map number, the block designation, and the lot designation or similar references. When those identifying references are combined, they typically match the parcel ID (See MAP_PAR_ID in this standard) on the mapping. The PROP_ID must be unique within the city or town.

BLDG_VAL – current assessed value for the main building(s) on the property.

LAND_VAL – current assessed value for land.

OTHER_VAL – other structures or physical improvements that are separately valued.

TOTAL_VAL – current total assessed value for land and structures. Because some databases include other categories of valuation not included above, this may not represent the total of the fields above.

FY – Fiscal year of assessed value formatted as YYYY.

LOT_SIZE – deed area in EITHER square feet OR acres, but not both.

LS_DATE – last sale date formatted as YYYYMMDD.

LS_PRICE – last sale price.

USE_CODE – state three-digit use code with optional extension digit to accommodate the four-digit codes commonly used by assessors. If the codes contain a four-digit use code, because the meaning of the fourth digit varies from community-to-community, the standard requires a lookup table. See the end of this Section for more details on this look-up table.

SITE_ADDR– this field will contain the complete original site address as listed in the tax record.

The complete site address may be one of the following:

1. An ordinary numbered address (“10 Main St.”) also known as a thoroughfare address
2. A street name without a number, or with “0” as the number (“0 Marley St”)
3. A landmark address (“Town Hall”)
4. An intersection-style address (“corner Maple and Vine”)
5. Two full numbered addresses (“1 Maple / 14 Vine”)
6. A hybrid form including numbered address and cross street (“10 Main at Vine”)

Additionally, in many input address records, there will be secondary location information to specify the relative or absolute location of the property, the unit number etc. For example, the site address field might contain any of the following: “off Marshall St.”, “North Side Tisbury Lane”, “10 Main St. left side”, “47 Maple St. (Rear)” or “34 Vine St. Unit B.” Many assessors have codes for the relative location (“ES” for “East Side” etc.). All this information should be retained in the SITE_ADDR field.

This parcel standard does not require parsing of address information. However, if the site address is already parsed into several fields in the assessing extract, and those fields can be used to populate the ADDR_NUM, FULL_STR, and LOCATION fields, the standard requires the existing parsed address data to be included.

ADDR_NUM – this field will contain address number information, either a single house number with alpha prefix (this is extremely rare) or fractional or letter suffix (e.g. A14, 25, 103 ½ or 12A) or a range of valid address numbers (e.g., 12-16 or 12A–12B). The only characters permitted are numbers, letters, “/” for fractional addresses and hyphens separating ranges of numbers as well as “&” or ”+” to indicate a collection rather than a range. This specification is intended to provide flexibility while allowing for address numbers to be parsed and geocoded. If address numbers are now stored in several fields, e.g. the number and the number suffix are stored separately, then those fields can readily be concatenated to provide the format required here. Undeveloped properties may not have an assigned address number or may have “0” as an address number. If “0” is entered to signify no address number, it should be translated to null to avoid confusion, since occasionally it will be used as a real “vanity” address.

FULL_STR – this field will contain the full street name, which may be stored in separate fields in the assessor database. Note that additional, secondary location information should not be stored in this field, but this standard[6] does not require parsing and eliminating such content.

In the case (rare) where street name elements are stored in separate fields they should be concatenated. For example, if an assessor’s database has the street name (“North Reading”) in one field and the street post-type (“Road”) in another field, then these two parts of the street name would be combined in the FULL_STR field to read “North Reading Road”.

LOCATION – this is the place to put secondary location information. Frequently, descriptors such as “Side”, “South Side”, “Rear”, “Basement” as well as building and unit descriptors such as “#1” or “Unit A” are found in assessor data. If a field for such secondary information already exists in the original data set, that content should be preserved in this field. The most common such field would be a UNIT field. Again, note that the standard does not require scrubbing address fields – this field layout is provided to facilitate doing so. The key point is not to lose information that is contained in the site address.

CITY – city or town where the property is located.

[6] The recommended standard for address content is the United States Thoroughfare, Landmark, and Postal Address Data Standard which can be found on-line. However, strict adherence to the FGDC standard is not required for this standard.

ZIP – zip code where the property is located, if available.

OWNER1 – Name of first owner of record.

OWN_ADDR – the complete owner mailing address, including the street number, name, etc. This is not the site address, rather it is the address to which the tax bill is sent, thus it may include PO Boxes, out-of-state addresses and other entries which would not be allowed in the site address field. If this field is blank then the site address and the owner's mailing address are presumed to be the same.

OWN_CITY – the city for the property owner's address

OWN_STATE – for US addresses, the state where the property owner lives, using the postal service abbreviations for state.

OWN_ZIP – the zip code of the owner's address.

OWN_CO – the country where the owner lives.

LS_BOOK – Last sale Registry of Deeds book.

LS_PAGE – Last sale Registry of Deeds page.

REG_ID – this is the equivalent to Registry of Deeds book and page information but for registered or probate land.

ZONING – this is the code to indicate the zoning district within which the property lies not including overlay zoning districts.

YEAR_BUILT – format YYYY; this is an extremely important attribute for any kind of planning analysis of growth trends or for change detection.

BLD_AREA – This information applies primarily to apartment buildings and commercial/industrial properties; assessor's data is based on exterior building measurements. Building area may be recorded as gross square-feet, adjusted gross square-feet, or finished area. Basement area may or may not be included in finished area. Partial story-heights and attic areas may be treated differently by different CAMA systems. Gross area may include non-living areas such as porches and decks, or attached garages. Contact the specific community to be sure you correctly understand this information for that community.

UNITS – Number of living/dwelling units and also other units, for example, commercial condos and storage units in a warehouse (this was formerly named "LIV_UNITS" in previous standard version.)

RES_AREA – Total residential living area in square feet (not gross building area) as defined by the assessor (e.g., this may or may not include only heated space). This is a useful attribute when evaluating development proposals relative to surrounding residences, but a difficult one to create because it may require adding areas from multiple fields in the assessor's database. This information applies primarily to 1, 2 & 3 family dwellings based on exterior building measurements or residential condominiums based on deeded unit areas. Building area may be recorded as gross square-feet, adjusted gross square-feet, or finished area. Basement area may or may not be included in finished area. Partial story-heights and attic areas may be treated differently by different CAMA systems. Gross area may include non-living areas such as porches and decks or attached garages.

STYLE – code indicating style of structure ("colonial", "ranch" etc.).

STORIES – the number of stories assigned by the assessor to each structure. Typically recorded as a full story for each floor, except under roof-line floors, which may be adjusted by factors ranging from 10% to 90% of a full story depending on roof slope and wall height; examples include one-half stories and attics. Note that in the Patriot AssessPro database, letters (e.g. A, H) may be assigned to indicate partial story heights.

NUM_ROOMS – the number of rooms identified by the assessor; this information may be primarily recorded for residential records. Contact the specific community to be sure you correctly understand this information for that community.

CAMA_ID – the unique, typically arbitrary sequential number that is the internal record identifier in the assessing database. For example the Patriot "Account #" or the Vision Parcel Id ("PID").

Note that the above fields are required for the standard, but nothing precludes a community from including additional information from the assessor's database as needed for GIS use. These additional items of information would, in effect, be additional "optional" attributes.

LOC_ID – This is the unique parcel ID required for this standard. It is an attribute of each polygon in the TaxPar feature class.

Finally, two fields may or may not be included in the standard "MassGIS extract". If they are not present, they must be added:

LOT_UNITS – This identifies the deed area units in the LOT_SIZE field: "S" for square feet and "A" for acres. This field will typically have to be added to comply with the standard.

TOWN_ID - The Department of Revenue "town ID". Valid values are 1 – 351. While as of the date of publication of this version of the standard "Devens" is not a Massachusetts municipality it has been assigned TOWN_ID = 352.

Look Up Table for Custom Use Codes (MxxxUC_LUT)

This look-up table, called MxxxUC_LUT (where xxx is the TOWN_ID) must adhere to the following specification:

FIELD NAME	DEFINITION	EXPLANATION
TOWN_ID	Number, 3	Town-ID from MassGIS towns data layer
USE_CODE	Character, 4	Code from CAMA database
USE_DESC	Character, 150	Definition of the four character code

Two-digit codes are not allowed –a code which is numerically in the range 0-99 must be left-padded with a zero. For more information about use codes, see "Property Type Classification Codes Non-Arms Length Codes and Sales Report Spreadsheet Specifications," by the Division of Local Services (DLS) at https://www.mass.gov/files/documents/2016/08/wr/classificationcodebook.pdf

E) Creating Multi-part Polygons Where Necessary

A multi-part polygon in the ESRI software is a single polygon feature that contains several non-contiguous polygons but is represented in the attribute table as one record. Municipalities that include islands or land areas separated by water (for example, Gloucester or Bourne) are a common example. On

parcel maps these cases occur where a parcel polygon entirely described on one deed but is mapped as multiple polygons because it is split by a steam mapped as a polygon or by a road right-of-way or some other geographic feature. The polygons do not share a boundary (although they may touch at one a single vertex). All the polygons should be associated with a single assessor record. In these cases, this standard requires creating a multi-part polygon. When creating this multi-part parcel polygon, it is essential that its' LOC_ID be from a location inside the multi-part polygon. Also, there may be an issue with the acreage value in the assessing database being for only one of the polygons covered by the tax record

F) Dissolving Internal Polygon Boundaries to Create "Tax Parcels"

As described in the "overview" section of this document, sometimes the assessor record for a tax bill covers two or more deeded parcels on the assessor's parcel map. This situation occurs when one individual or organization owns two or more parcels that abut or are in proximity. In these cases, assessors sometimes combine the corresponding tax listings into one, producing a single tax bill. This change is usually made because it's more convenient for the assessor, the landowner, or both. However, combining records in this fashion means that one of the parcel polygons on the map no longer matches to an assessing record.

The solution is creating a "tax" parcel. A tax parcel is a parcel polygon created by combining the parcels for which the assessor combined the assessing records. That single parcel polygon links to a single assessing record or, if the parcel houses condominiums, multiple assessing records. However, in solving one problem another is created. The parcel map no longer shows the parcels representing the deeded ownership of the parcels combined into the "tax" parcel. Showing these deeded parcels on the assessor mapping is often useful information for municipal planning boards and conservation commissions.

There are two variations of the situation where multiple parcel polygons are associated with a single assessing record:

1. Multiple parcels, each with its' own deed and owned by the same entity, are not contiguous[7] but are treated as one parcel for tax purposes. This standard requires that these parcel polygons be merged into a single "multi-part" polygon (only currently possible using the ESRI software). That single multi-part polygon has a single attribute record in the feature class. The LOC_ID attribute links the polygon to a single assessing or, if there are condominiums involved, multiple assessing records. The POLY_TYPE attribute value is "TAX".

   If a parcel consists of two or more non-contiguous polygons based on a single deed (the same parcel map ID applies to all polygons), then it is still "fee simple" ownership. Correctly linking these non-contiguous parcels to its CAMA record simply requires creating a multi-part polygon with a LOC_ID that matches a LOC_ID on the appropriate CAMA record.

2. Two or more adjacent parcels of land being treated as one parcel for tax purposes. In this case this standard requires dissolving the adjacent polygons and classifying the resulting polygon a "tax parcel" (POLY_TYPE = "TAX"). This designation of a "TAX" parcel distinguishes this polygon from ordinary "fee simple" ownership parcels (POLY_TYPE = "FEE"). A "TAX" parcel does not correspond to a single deed. A new LOC_ID must be created for the new "TAX" parcel and the assessor must be given the original parcel map IDs and the corresponding LOC_ID. One of the map IDs will be associated with the assessing record or records (condominiums) and that record must be assigned the LOC_ID for that map ID.

   When combining or dissolving parcels in this way, we don't want to eliminate showing all the deeded parcels on the parcel map. So, before dissolving adjacent parcels into one "TAX" polygon, this

[7] These cases are typically due to the parcel being split by an intervening road or stream.

standard requires copying the original (separately deeded) parcel polygons into the *OthLeg* feature class, along with their respective MAP_PAR_IDs; these IDs must be preserved as attributes of the polygon in the OthLeg feature class in case they are needed for labeling parcels. The LOC_ID of the original constituent parcels must also be retained and copied into the TAXPAR_ID attribute.

In either variation, with multi-part polygons or with the dissolved "tax parcels", the LOC_ID from the parcel attribute in the TaxPar feature class links to the correct assessing record(s) and vice-versa.

With this approach, when creating the tax map (either printed or on a computer display), you first draw the feature class (*TaxPar*) showing the parcel polygons that link to an assessing record. Then you draw the polygons for the deeded parcels that you stored in the *OthLeg* feature class. Visually, by including both the "TAX" parcel and its constituent "FEE" parcels from the OthLeg feature class, the original parcel map information is preserved. At the same time, no matter which of the visible parcel polygons inside the "TAX" parcel are selected or queried on an interactive mapping application, the same (and only) assessing record is displayed.

G) Required Match Rates

Within the file geodatabase required by this standard, parcels must link to assessing records and vice-versa. These linkages must meet requirements for percentage matches. There are three match rate percentage calculations required by this standard:

1. A rate for tax records linking to corresponding parcels with a structure (building or other) valued over $1,000
2. A rate for tax records linking to corresponding parcels with a structure (building or other) valued at less than $1,000
3. A rate for parcel polygons linking to the assessing database.

For communities with over 1000 parcel polygons the match rate for tax records with a structure valued at more than $1,000 must be at least 99.8%. For all other tax records, the required match rate is at least 97%. The match rate for communities with 1000 or fewer polygons is at least 99% for tax records with a structure valued over $1,000[8] and at least 95% for all other records.

Since it cannot have different levels based on characteristics of the tax record, the match rate from the mapping to the assessor's database for communities with more than 1000 parcels will be at least 99% and for communities with 1000 or less polygons will be at least 98%. For purposes of determining match rates from map polygons to the assessing database, only polygons classified as POLY_TYPE = "FEE" or "TAX" are considered; any polygons where NO_MATCH = "Y" that have been approved by MassGIS are excluded from the match calculation.

The tables below provides sample calculations of the match rate requirements going from the assessing database extract to the map parcels.

[8] Determining if a property parcel has a structure value above or below $1,000 must be based on information from the municipality's assessment database as included in the BLDG_VAL or OTHER_VAL fields in the assessing extract included with the standardized parcel mapping.

Communities > 1000 parcels

Sample parcel #s	Has Structure	Max non-match Count		No structure	Max non-match Count	
	0.998			**0.97**		
1100	1098	2		1067	33	
5000	4990	10		4850	150	
7500	7485	15		7275	225	
10000	9980	20		9700	300	
15000	14970	30		14550	450	
25000	24950	50		24250	750	
50000	49900	100		48500	1500	
100000	99800	200		97000	3000	
145000	144710	290		140650	4350	= Boston

Average number of parcels in a municipality, excluding Boston, is 6,200

Communities <= 1000 parcels

Sample parcel #s	Has Structure	Max non-match Count		No structure	Max non-match Count	
	0.99			**0.95**		
950	941	10		903	48	
850	842	9		808	43	
600	594	6		570	30	
500	495	5		475	25	
300	297	3		285	15	
165	163	2		157	8	= Monson

H) Horizontal Datum

While some communities have their own horizontal survey datum, or use the North American Datum from 1927, complying with this standard requires using the North American Datum of 1983, or the most recent successor. This will facilitate using digital data from other sources (e.g., MassGIS and the regional planning agencies) and from adjacent communities. Likewise, the community must use the State Plane Coordinate reference grid with units of US Survey feet[9] OR meters. Note that Nantucket, Martha's Vineyard, and the Elizabeth Islands have their own zone in the state plane coordinate system, the Island Zone. However, updates provided to MassGIS must be in Mainland Zone.

I) Metadata

MassGIS requires that metadata complying with the Federal Geographic Data Committee's metadata standard be produced by any organization that delivers or creates digital GIS data (See Appendix C). That is the requirement for this standard, at a minimum for the tax parcel data layer. In developing metadata for

[9] According to a recent notice by the National Geodetic Survey (NGS) the US Survey Foot will be phased out as part of the modernization of the National Spatial Reference System. The schedule for that modernization was for it to originally be completed in 2022. However, it has since been delay to at least 2025. As of June 2022, MassGIS has not addressed the implications of this change for the parcel standard.

the TaxPar data layer, particular attention should be paid to metadata about the source materials, the data development methodology, data development dates, and contact information.

J) Legislatively Approved Municipal Boundary

If the boundary between adjacent cities or towns agrees in the digital parcel file from each community, then it will be much easier to use digital parcel information jointly or in regional GIS applications. Digital parcel files (the tax parcel data layer) complying with this standard must include a town boundary based on the legislated record of each town's boundary[10] as distributed by MassGIS at the time the digital parcel file is completed[11]. The final digital tax parcel data layer must include the new town boundary incorporated directly into the digital parcel file. All property boundaries must be clipped at the town boundary. The municipal boundary must also close off all street rights-of-way at the edge of the community. One effect of this requirement is that the road rights-of-way will become polygons; these must then be classified as "ROW" (or "PRIV_ROW" or "RAIL_ROW" if appropriate) in the POLY_TYPE attribute field of the TaxPar data layer. Property boundaries should also be adjusted to the new 1: 5000 coastline unless an existing digital, larger-scale, coastline is preferred. As noted earlier, right of way polygons may be subdivided to improve drawing and querying performance.

There are three exceptions to the above requirement for using the municipal boundary from MassGIS. First is the coastline. A community's coastline boundary may be retained in place of the one from MassGIS, particularly if on a rocky coast it is clear that the tax map coastline is more detailed. Second, where a community boundary follows a stream or river channel, the version of that boundary depicted on the tax map may be based on sources, particularly survey-derived sources, that are better than the MassGIS equivalent; in these cases, MassGIS will accept the boundary from the municipal tax map provided it substantively agrees with the equivalent boundary from the adjacent community OR is recognized as being a better representation of that boundary. Third, some municipal boundaries follow rights-of-way[12]. Where this is true, the version of this boundary shown on the tax map may be a better representation of this boundary than the equivalent from the MassGIS data layer unless MassGIS has updated its version of the boundary from a surveyor's mapping of that boundary. These updates are tracked in the BND_QUAL of the line feature class in MassGIS municipal boundaries data layer.

K) Parcel Mapping Data Quality Assurance and Delivery Format

MassGIS typically receives about 250 parcel mapping updates annually. To make the intake as efficient as possible, MassGIS has two requirements: using the MassGIS parcel QA Tool before delivery and checking that all QA elements have passed and delivering the update using the correct file format.

1. For years, MassGIS has automated as much as possible of the routine quality assurance (QA) process. This automation is done using a software program developed in Python. The tool can be installed in and run from ArcToolbox. This QA tool checks almost all the standard's requirements. Many of these checks overlap with common sense best practices. MassGIS makes this tool freely available. Anyone completing a parcel mapping update that is intended to comply with this standard is required to run the QA tool, review the output, and fix any errors before delivering a parcel update to MassGIS. This

[10] Because developing a municipal boundary for the digital parcel file based on the statutory boundary may involve resolving significant property boundary discrepancies, use of the statutory city/town boundary requirement is subject to waiver if appealed to MassGIS. A waiver of this requirement may be granted if the statutorily correct boundary causes properties to move from one town to another. A waiver may also be granted if, in the judgement of the Director of MassGIS there are other circumstances that would make this requirement exceptionally burdensome for a community to implement. Waivers are only valid if granted in writing (including email).

[11] Also see the discussion of municipal boundaries in the discussion of "Fidelity to Original Assessor Map".

[12] These arcs are identified in the BND_QUAL attribute of the TOWNSSURVEY_ARC data layer found on the MassGIS web site at https://www.mass.gov/info-details/massgis-data-municipalities.

requirement ultimately saves you and MassGIS staff a lot of time. If you do not have the MassGIS parcel QA tool, please send a request for the tool to massgismail@mass.gov.

2. Parcel mapping updates to MassGIS must be delivered in ESRI file geodatabase format. Shapefiles are NOT accepted. Additionally, updates must be delivered via MassGIS' parcel update portal. The portal requires credentials. If you are not familiar with the portal and need credentials, please send a request for credentials and instructions on using the portal to massgismail@mass.gov. We created the portal so that we could automate the intake and initial processing of parcel map deliveries, including the initial run of our quality assurance Python script.

L) Additional Guidance (Optional) on Text Labels / Annotation

The following guidance is provided to suggest best practices for labeling and annotation data to be stored in the GIS product. There is no requirement for including such information or for how it should be stored if it is included.

Assessor's maps often include important text-based information as well as mapped features. This might include labels and annotation such as lot numbers on parcels, lot area, property boundary dimensions (length), reference to monuments or other survey related data, easement type/purpose (e.g., water/sewer/drain, vehicular access) and so on.

Using GIS software capabilities for labeling property polygons based on links to the assessor database attributes is the recommended approach for labeling properties with lot numbers, deed areas and other polygon attributes. However, in some cases, cartographic considerations may dictate the use of annotation which is offset or otherwise difficult to obtain from labeling. Other text labels that may be desired include parcel boundary dimensions and other linear annotation, These cannot be maintained, obviously, as attributes of polygon features without creating a "shadow" layer of line features based on polygon boundaries.

In keeping with our principal objective of creating a data product that is useful to assessors, the standard is not prescriptive with respect to labeling/annotation and how it is stored and used. Annotation as managed by the ESRI software in a separate "feature class" is a flexible and useful way to store text information and can be exported in a generic form by linking the text with point locations. Of course, line feature layers can be created and given text attributes to store dimensions or other linear kinds of annotation as well. There is no clearly "best" way to do this and the main utility of the labeling is to assessors themselves, who have varying preferences, thus we do not mandate any particular approach.

Several recommendations, however, are made with respect to managing text as annotation or as labels for other types of features:

1. It is often important to distinguish between dimensions or measures whose source is the GIS software itself, those which derive from a deed description or survey plan and those whose provenance in the assessor database or the mapping is simply unknown. The discrepancies, in fact, may lead to significant discoveries regarding the true area of parcels that are being under-valued. To the extent possible, labeling and formatting display conventions and additional explanatory text should be used to clearly identify the source of the text in question. For example, feature specific metadata for dimensions is highly recommended – source, currentness, and so on can be stored as attributes for both annotation and line features and used to control the formatting of the text output. Source values might include "DEED", "SURVEY PLAN", "SCALE" or others.

2. One primary consideration with dimensional values may relate to zoning requirements such as frontage requirements for ANR or subdivision development and special attention should be paid to establishing a legally supported source for such dimensions if their exact magnitude may be in doubt.

3. A full-fledged effort to manage dimensions as geometric line feature attributes would have to include distinguishing the left and right dimensions, along with their respective sources. However, given the "back-lot" problem (dimensions which are divided on one side and not on the other), a more sophisticated environment, such as the "parcel fabric" provided by ESRI in their latest release of the ArcGIS software, is probably required in order to go this route. Note that the full implementation of the "parcel fabric" requires higher levels of the ArcGIS suite.

4. Some communities maintain, either in-house or through a contractor, parcel maps in CAD format. In this case the dimension information is stored in a text layer in the CAD file. It is possible to export this text information to the GIS environment; it appears there as annotation with an anchor point. Some limited testing indicates that it may be possible to automate moving this annotation into a line attribute, with reference to the correct left/right side of the line, although some feature-by-feature checking might still be needed.

M) Additional Guidance (Optional) on Archiving LOC_IDs

The standard creates a unique identifier for parcel map polygons called LOC_ID. As parcel boundaries change because of subdivision or combination, it may be useful to archive LOC_IDs that disappear as a result. So, for example, if a four-acre property is subdivided into four one-acre parcels, its present LOC_ID will disappear, to be replaced by four new LOC_IDs. A much preferable alternative to simply deleting these LOC_IDs is to archive them. This archive table would contain the following fields:

NEW_LOC_ID – the LOC_ID of the property or properties formerly associated with the OLD_LOC_ID
OLD_LOC_ID – the LOC_ID that has been eliminated
DATE – date when the update occurred (Use YYYYMMDD format)

So, in the above example of the four-acre property that was subdivided, the archive table would contain four NEW_LOC_ID entries, one for each of the four new one-acre properties. Each of these would have the same entry in the OLD_LOC_ID and DATE fields.

For the case where two parcels were combined to one, the same NEW_LOC_ID would be entered twice, once each for each of the LOC_IDs that was deleted and entered as the OLD_LOC_ID. This second case presumes that one of the two existing LOC_IDs would be retained for the combined parcel. If both original LOC_IDs were deleted and replaced with a new LOC_ID, then the new LOC_ID would be entered to the NEW_LOC_ID field twice, once for each of the original LOC_IDs entered to the OLD_LOC_ID field.

APPENDIX A: FIELD DEFINITIONS

Field Name	Type	Size	# Dec. Places	Valid Values	Null allowed?
Tax Parcel Attributes					
MAP_PAR_ID	C	26			YES(1)
LOC_ID	C	18		M_<X>_<Y> (for meters) F_<X>_<Y> (for US Survey Feet)	NO
POLY_TYPE	C	15		FEE, TAX, ROW, PRIV_ROW, RAIL_ROW, WATER	NO
MAP_NO	C	4			YES
SOURCE	C	15		ASSESS, SUBDIV, ANR, ROAD_LAYOUT, OTHER	NO
PLAN_ID	C	40			YES
LAST_EDIT	N	8		format YYYYMMDD	NO
BND_CHK	C	2		null value (default), CC, NR, OK	YES
NO_MATCH	C	1		Y, N (default)	NO
TOWN_ID	N	3		The Department of Revenue "town ID". Valid values are 1 – 351. While "Devens" is not a Massachusetts municipality it has been assigned TOWN_ID = 352.	NO
Other Legal Interests Attributes					
MAP_PAR_ID	C	26			YES
LEGAL_TYPE	C	15		FEE, RAIL_OVER, ROW_OVER, EASE, CR, APR, CRX, APRX, (domain is extensible - see text)	NO
TAXPAR_ID	C	18		M_<X>_<Y> (for meters) F_<X>_<Y> (for US Survey Feet)	YES(2)
LS_BOOK	C	16			YES
LS_PAGE	C	14			YES
REG_ID	C	15			YES
TOWN_ID	N	3		The Department of Revenue "town ID". Valid values are 1 – 351. While "Devens" is not a Massachusetts municipality it has been assigned TOWN_ID = 352.	NO
Miscellaneous Features Attributes					
MISC_TYPE	C	15		WETLAND, ISLAND, TRAFFIC_ISLAND, WATER, OUTSIDE, BLDG (domain is extensible - see text)	NO
TOWN_ID	N	3		The Department of Revenue "town ID". Valid values are 1 – 351. While "Devens" is not a Massachusetts municipality it has been assigned TOWN_ID = 352.	NO

Fields from Assessor Database					
Field Name	**Type**	**Size**	**# Dec. Places**	**Valid Values**	**Null allowed?**
PROP_ID	C	30			NO
BLDG_VAL	N	9			NO(7)
LAND_VAL	N	9			NO(7)
OTHER_VAL	N	9			NO(7)
TOTAL_VAL	N	9			NO(7)
FY	N	4			NO(3)
LOT_SIZE	N	11	2		NO(3)
LS_DATE	C	8			NO(3)
LS_PRICE	N	9			NO(3)
USE_CODE	C	4		Set by Dept. of Revenue	NO(3)
SITE_ADDR	C	80			NO(3)
ADDR_NUM	C	12			NO(3)
FULL_STR	C	60			NO(3)
LOCATION	C	60			NO(3)
CITY	C	25			NO
ZIP	C	10			NO(3)
OWNER1	C	80			NO(3)
OWN_ADDR	C	80			NO(3)
OWN_CITY	C	25			NO(3)
OWN_STATE	C	2			NO(4)
OWN_ZIP	C	10			NO(4)(5)
OWN_CO	C	30			NO(3)
LS_BOOK	C	16			NO(3)
LS_PAGE	C	14			NO(3)
REG_ID	C	15			NO(3)
ZONING	C	8			NO(3)
YEAR_BUILT	N	4		format YYYY	NO(3)
BLD_AREA	N	9			NO(3)
UNITS	N	4			NO(3)
RES_AREA	N	7			NO(3)
STYLE	C	20			NO(3)
STORIES	C	6			NO(3)
NUM_ROOMS	N	3			NO(3)
LOT_UNITS	C	1		S (sq. ft.) OR A (acres)	NO (5)
CAMA_ID	N	8			NO
LOC_ID	C	18		M_<X>_<Y> (for meters) F_<X>_<Y> (for US Survey Feet)	YES (6)
TOWN_ID	N	3		The Department of Revenue "town ID". Valid values are 1 – 351. While "Devens" is not a Massachusetts municipality it has been assigned TOWN_ID = 352.	NO

(1) But only if POLY_TYPE is not "FEE"; if POLY_TYPE = "TAX", this must be null
(2) Cannot be null for LEGAL_TYPE = "FEE"
(3) Can be null only if information is not present in the assessing extract
(4) Not required for owners with non-US addresses unless needed

(5) This may be added by the CAMA vendor in their MassGIS extract; if not it must be added
(6) Included in "MassGIS extract" available as a standard report or query from PK Systems, Patriot, Tyler and Vision CAMA systems.
(7) Because this is an assessed value field, we assume that zero occurs rather than null.

APPENDIX B: METADATA REQUIREMENTS

Below are the metadata fields, as located using ArcMap 10's metadata editor (Description tab in ArcCatalog), that should be populated for the TaxPar data layer. The guidance provided represents the **minimum** amount of details necessary to pass MassGIS' QA, but as always, it is recommended to add anything else of value.

As each city and town had metadata already created using the ArcMap 10's FGDC Editor Add-in, we **HIGHLY RECOMMEND** that, rather than manually re-enter the information from the old editor, that you import the information using the proper ArcTool (First, set your editor metadata style to "FGDC CSDGM Metadata," then go to ArcToolbox > Conversion Tools > Metadata > Import Metadata) to import the existing metadata). The procedures are outline in the document, MassGIS_AssessPrepUserGuide_ver1_1_2019Dec.docx or .pdf, which is distributed with the AssessPrep tool (see discussion in the "Overview" section at the beginning of this document).

The following fields, ordered by **section**, then by subsequent *subsections*, while in Edit mode, must be populated with the appropriate information.

Overview → *Item Description* → *Title* – See **Overview → *Resource Citation (Citation)* → *Title.***
Overview → *Item Description* → *Thumbnail* – **Typically** a screenshot of the TaxPar feature class polygons or an image of the town/city seal – optional.
Overview → *Item Description* → *Tags* – See **Overview → *Topics and Keywords* → *Theme Keywords*** and **Overview → *Topics and Keywords* → *Place Keywords.***
Overview → *Item Description* → Summary (Purpose) – Brief description of the TaxPar feature class. ESRI specifies this as required – Optional in MassGIS Standardized parcels.
Overview → *Item Description* Description (Abstract) – Brief description of data set ("Assessor's parcel data for Town/City of <name>. "Developed from existing digital data" OR "Developed from existing mylar maps"). Also, when modified, add a statement describing currentness of the data, such as "Map and CAMA data updated <Month, Year>."
Overview → *Item Description* → *Credits* – At a minimum, should list the vendor. May also include the town and any other entities (i.e. subcontractors) who have contributed to the creation of the level 3 parcel dataset.
Overview → *Item Description* → *Use Limitation* – Brief statement concerning how the data should and should not be used. One statement that can be included: "This dataset should not be used in legal matters, for instance, in determining the exact boundaries of parcels or municipalities. Only a licensed land surveyor can properly weigh the evidence to make a legal determination."
Overview → *Item Description* → *Appropriate Scale Range* – Should be set at the county (1:500,000) or city (1:50,000) level to the Buildings (1:5,000) level.
Overview → *Item Description* → *Bounding Box* – Should be set to the extreme West, East, South, and North coordinate of the extent in decimal degrees (negative longitude in North America, from ISO 19115:2003/Cor. 1:2006).
Overview → *Topics and Keywords* → *Theme Keywords* – The following keywords must be entered, each on its own line: MassGIS, Right Of Way, Property, Water, Level 3, Parcels, Tax, ROW. These will display in the ***Overview → Item Description*** window.
Overview → *Topics and Keywords* → *Place Keywords* – The following keywords must be entered, each on its own line: <Name of Town/City>, Massachusetts.
Overview → *Resource Citation (Citation)* → *Title* – The general description of the feature class, "Tax Parcels")
Overview → *Resource Citation (Citation)* → *Presentation Form* – "Digital Map" should be selected.

Overview → *Resource Citation (Citation) → Dates → Published* – Select the date from the calendar that represents the date of most recent submittal to MassGIS. This should represent the vintage of the delivered parcel dataset. Fields, ***Created*** and ***Revised*** may also be used.
Overview → *Resource Citation Contacts (Citation Contacts) → Contact* – (We'll leave it to you to decide if the best contact is someone at your company or someone in each community.) Multiple contacts can be listed. Also see ***Overview → Contacts Manager*.** The following fields are associated with Contact:

Name - (if you wish to have an office or business entity as the primary contact instead of an individual, you may leave this field blank)

Organization - (if an individual is not listed in 'Person', please make sure the 'Primary Contact' radio button is changed to 'Organization')

Position

Role (At least one must have the Roll, "Originator," selected.).

Contact Information - (if no individual listed, you may leave this field blank)

Either Name or Organization must be filled in. Within ***Contact Information*** (Not all fields are required):

Linkage – Contact information associated with Contact.
Address Type
Address - (must choose correct dropdown)
City
State
Postal Code
Country
Phone
Fax
Instructions
Hours

Overview → *Contacts Manager* – This section allows you to edit the initial three fields of an existing Contacts record initialized ***in Overview → Resource Citation Contacts → Contact.***

Metadata → Metadata Details (Details) → Date Stamp – (date when metadata is completed. If any edits or updates are made to the metadata, this date should be updated to reflect that.)
Metadata → Metadata Details (Details) → Language – Select "English" (Optional)
Metadata → Metadata Details (Details) → Hierarchy Level – Select "Dataset." (Optional)
Metadata → Metadata Contacts (Contacts) – At minimum "Massachusetts Bureau of Geographic Information, Commonwealth of Massachusetts should be loaded, with Roll "Distributer."
Metadata → Metadata Maintenance (Maintenance) → Update Frequency – (only if known, otherwise leave as "unknown." A typical selections is "Annually").

Resource → Resource Details (Details) → Status – State of present dataset (Optional).
Resource → Resource Details (Details) → Processing Environment – Describe the data's processing environment, including the software and operating system used, and the file name and size (From ISO 19115:2003).
Resource → Resource Extents (Extents) → Extent → Description – "Ground Condition" should be entered.
Resource → Resource Extents (Extents) → Extent → Temporal Instant Extent → Instant Date – Date associated with the content source (Optional).
Resource → Resource Extents (Extents) → Extent → Temporal Instant Extent → Bounding Box – The West, East, South and North -most coordinate of the extent, expressed in decimal degrees longitude, where positive values are East. (From ISO 19115: 2003/Cor. 1:2006). Optional.

Resource → *Points of Contact* → *Contact* – (We'll leave it to you to decide if the best contact is someone at your company or someone in each community.) Multiple contacts can be listed. Also see ***Overview → Contacts Manager*.** The following fields are associated with Contact:

Name – (if you wish to have an office or business entity as the primary contact instead of an individual, you may leave this field blank)

Organization – (if an individual is not listed in 'Person', please make sure the 'Primary Contact' radio button is changed to 'Organization'. One entry must be for the Massachusetts Bureau of Geographic Information, Commonwealth of Massachusetts, with Role "Distributor")

Position

Role - (Roles include several kinds, including "Point of Contact" and "Distributor")

Contact Information - (if no individual listed, you may leave this field blank)

Either Name or Organization must be filled in. Within ***Contact Information*** (Not all fields are required):

Linkage – Contact information associated with Contact.
Address Type
Address - (must choose correct dropdown)
City
State
Postal Code
Country
Phone
Fax
Instructions
Hours

Resource → Resource Constraints (Constraints) → legal Constraints → Use Limitation – One Element must have the following in the text field: This parcel data is in the public domain and should not be redistributed for a fee beyond reproduction costs."

Resource → Resource Constraints (Constraints) → legal Constraints → Other Constraints – One element must have the following in the text field: This digital parcel data layer is considered to be in the public domain and will become accessible for download and display from the MassGIS website: http://www.mass.gov/mgis.

Resource → Resource Constraints (Constraints) → legal Constraints → Use Limitation – One element must have the following in the text field: This data may be appropriate for planning purposes. It should not be utilized where legal and surveyed property boundaries are required.

Resource → Spatial Representation Information (Spatial Data Representation) → Vector Representation – One element must have the following selections (automatically generated):

Topology Level – Select "Geometry Only."
Geometric Objects – Number of records in TaxPar Feature Class.
Type of Representation – "Composite."

Resource → Spatial Representation Information → Indirect Spatial Representation – One element must have the following in the text field: "Parcel ID, LOC_ID."

Resource → Data Quality (Quality) → Scope Level – "Dataset" is selected.

Resource → Data Quality (Quality) → Report – One element must have the following selections:

Report Type – "Conceptual Consistency" is selected
Dimension – "Empty" is selected. Within Dimension, the following elements are used:
Measure → Description – The following must be entered into the text field: "This parcel layer contains discrete, non-overlapping polygons for each property. Adjacent polygons with common ownership and a single tax record have been retained in the "OthLeg" layer that accompanies this TaxPar layer, and dissolved into single parcels in this TaxPar layer. Some non-adjacent parcels may be represented by multi-part polygons where they share common ownership and a single tax record. Public

rights-of-way (ROWs) exist as polygons, not null space. Linework associated with private ROWs are retained in the "OthLeg" layer. Water polygons also representing parcel boundaries have been retained in this TaxPar layer. Additional water features that are not considered parcel boundaries may have been placed in the "Misc" layer that accompanies this TaxPar layer. Easements and other similar non-fee 1taxable boundaries exist in the 'OthLeg" layer, not the TaxPar layer."

Evaluation Method→Type – "Empty" is selected.

Resource → Data Quality → Report – One element must have the following selections:

Report Type – "Absolute External Positional Accuracy" is selected

Dimension – "horizontal" is selected. Within Dimension, the following elements are used:

Measure → Description – The following must be entered into the text field: "Original data compiled or reviewed for horizontal accuracy over the MassGIS color orthos from 2008/2009; these orthos are known to be +/- 10' horizontal; however, this data set cannot be used to reach authoritative conclusions about the horizontal accuracy of the boundaries depicted. That work requires a licensed land surveyor. Any updates to this data have been compiled on more recent orthophotography, base maps, or digital plans."

Evaluation Method→Type – "Empty" is selected.

Resource → Lineage → Data Source – The following must be selected or entered:

Source Description: - (REQUIRED) -- Discuss the quality/origins of the source materials and how they contributed to the level 3 parcels. Do not discuss the processing methodologies in this section. That will go in the "Process Step" area of the FGDC metadata.

Source Extent: "ground condition" is entered in the text field.

Resource → Lineage → New Data Source – The following must be entered for this element:

Process Description - (REQUIRED) -- Summarize the processing methodologies used in the conversion/upgrades of the source materials into this digital level 3 parcel dataset, including parameters and tolerances used, if any.

Process Step Date: -

Load a processor: - "Massachusetts Bureau of Geographic Information, Commonwealth of Massachusetts" is selected.

Resource → Lineage → Data Source

Resource → Distribution Information (Distribution) → Distribution Format – The following is entered in this element:

Format Name: File Geodatabase Feature Class.

Resource → Distribution Information (Distribution) → Distributor→ Contact - "Massachusetts Bureau of Geographic Information, Commonwealth of Massachusetts" is selected with role as Distributor.

Resource → Distribution Information (Distribution) → Digital Transfer Options→ Online Resource – The following fields are selected or entered for this element:

Linkage – https://www.mass.gov/info-details/massgis-data-property-tax-parcels is entered.

Description – "Click on the "Download this layer" link to access all digital parcels." Is entered.

Resource → Distribution Information (Distribution) → Digital Transfer Options→ Online Resource – The following fields are selected or entered for this element:

Description – "MXXXTaxPar represents a version of digital municipal parcels for the community of <Town Name> that is considered 'level 3' compliant per the specifications outlined in the MassGIS Standard for Digital Parcel Files. Its features can be linked in a GIS or database environment to a set of standardized assessing attributes in the table MXXXAssess by using the unique identifying values in the LOC_ID field. This data is also intended to be used in conjunction with associated (and optional) features in the ancillary data layers MXXXOthLeg and MXXXMisc. As one of the data sets in the Massachusetts' Spatial Data Infrastructure, this data enters the public domain as a valuable resource for mapping, planning, and analysis at all levels of government as well as the private sector." Is entered.

Resource → Entity and Attribute Information (Fields) → Distribution Information – Attribute information, including field names and domains, are automatically generated.
Resource → Entity and Attribute Information (Fields) → Overview Description → Summary – The following is entered in the text field: "For a full description of the features and attributes contained in this data, please refer to the MassGIS Standard for Digital Parcel Files – v3.0.