

MassGIS Guide to Maintaining Standardized Assessor Parcel Maps in Massachusetts

(Version 2, June 2022)

Introduction

This version of the Guide was released with, and is a companion to, Version 3 of the MassGIS Standard for Digital Assessor Files. Here are the essential concepts to understand before editing standardized parcel data:

1. That there are two primary feature classes, TaxPar and OthLeg, and how they differ;
2. Why some parcel polygons in the TaxPar feature class are classified as “TAX” polygons, why some “TAX” polygons are multi-part polygons, and the relationship between “TAX” polygons in the TaxPar feature class and “FEE” polygons in the OthLeg feature class;
3. The LOC_ID identifier, why it is important, and how to create them.

The standardized data from MassGIS are in a file geodatabase¹. They are organized a little differently from what you may be used to and have some unfamiliar attributes. However, maintaining standardized parcel mapping is not significantly different from maintaining any other version of your community’s parcel data. You still edit:

- Parcel boundaries using information from plans, deeds, and other sources
- Attributes (but you must be familiar with the additional attributes required by the standard – see summary from standard at the end of this document); and
- Annotation or equivalent text features.

Advantages of Maintaining Standardized Parcel Mapping

The advantages of using and maintaining standardized parcel mapping are that:

1. The MassGIS QA process helps ensure consistent data quality
2. It eliminates the many-to-many relationship between assessor data and parcel mapping
3. It ensures a very high match rate between maps and CAMA and vice versa
4. It provides seamless integration with parcel data from adjacent communities, whether for supporting emergency response, complete abutter notifications, planning, or development review
5. It lowers software application and contracted map maintenance and production costs because consultants don’t have to customize applications or their parcel data maintenance process for your parcel data structure
6. It enables tight integration between parcel data and other land records (for example, permit records and registry records)
7. It enables state or regional level on-line viewing of parcel data

¹ A shape file version is also available, although if you use ArcMap or ArcGIS Pro MassGIS strongly recommends using the file GDB version of your data. The fGDB version can also be imported into a personal GDB.

8. It is consistent with the Department of Revenue’s current recertification guidelines for assessors that recommend using the MassGIS standard for tax maps.

Overview

Standardized parcel mapping for each community is available through the MassGIS web site (see <https://www.mass.gov/info-details/massgis-data-property-tax-parcels>) as a file geodatabase (fGDB). This fGDB contains three feature classes and three database tables:

Feature classes

1. *MxxxTaxPar* = The name of this feature class is short for “tax parcels” and it contains almost all the parcel polygons. Different types of polygons (e.g., parcels, water, rights-of-way, etc) are identified in the POLY_TYPE attribute. This feature class is the equivalent to a municipality’s parcel data layer.
2. *MxxxOthLeg* = The name of this feature class is short for “other legal interests” and contains polygons that completely or partly overlap polygons in the TaxPar feature class. This includes easements, which are stored as polygons, not lines. Different types of polygons, each representing specific legal interests, are identified in the LEGAL_TYPE attribute. This approach is consistent with property ownership consisting of a “bundle of rights” that can be sold off individually (e.g., development rights, easements, air rights, etc.). When rights are sold, they may only be sold for part of a property. Therefore, mapping areas where these rights have been sold requires a separate map layer and that is what is occurring in this feature class. This feature class does not have to be retained if you have the equivalent information in some other part of your GIS database or if there is no content that needs this feature class.
3. *MxxxMisc* = This feature class contains any “miscellaneous” features in the source file or maps that do not belong in the other two feature classes. This feature class does not have to be retained if you have the equivalent information in some other part of your GIS database or if there is no content that needs this feature class.

The standard enforces a naming convention for municipal data. In that convention, “Mxxx” appears frequently. The “xxx” refers to a unique three-digit municipal ID (“town ID”) ranging from 001 to 351. This format provides MassGIS with a consistent naming structure for feature classes and data tables. The town ID must be left padded with zeroes as needed. Thus Town_ID #1 would be M001TaxPar and 351 would be M351TaxPar

Some communities are adopting the standardized data but renaming the TaxPar feature class and some attributes to match the equivalent names they have been using; when they provide updates to MassGIS they will change names to match those used in the standard.

Database tables

MxxxAssess = the extract of assessing information; joins or relates to TaxPar feature class using the LOC_ID

MxxxUC_LUT = a look-up table that translates assessor use

codes, both statewide and any custom codes for that community into a description (e.g., 101 = “single

You likely maintain parcel attributes in addition to those required for the standard. It is not a problem for MassGIS if you include attributes in the TaxPar feature class beyond those required for the standard; we will remove them when you submit a parcel mapping update

family residential”). The template version of this table provided by MassGIS includes all the codes in the DOR standard. The only codes that need to be added to this table are custom codes created by your assessor.

MxxxLUT = a look-up table that translates the values in either the LEGAL_TYPE attribute of the OthLeg feature class OR the MISC_TYPE attribute of the Misc feature class. This look-up table is required because the allowed values of LEGAL_TYPE and MISC_TYPE can be expanded by the communities. When you add a value in the LEGAL_TYPE or MISC_TYPE attributes that is not found in the standard, you need to add it to this look-up table along with its description.

The standard also requires use of a standardized parcel identifier, the LOC_ID (“locational ID”). All the above components are described in more detail below, starting with the LOC_ID.

Details

Now we go through the above elements of standardized mapping in more detail.

The LOC_ID Identifier

Standardizing the link between parcel mapping and assessing records is a pre-requisite for statewide standardized assessor mapping. That link is provided by the LOC_ID identifier. The LOC_ID does not have to replace any existing identifiers.

The LOC_ID is derived from an X,Y coordinate pair inside each map polygon (plus a letter, “F” or “M”, indicating whether the source units are feet or meters), is unique statewide, and is the foundation for consistent linking of maps and assessing data across all communities. A LOC_ID with units of meters (the most common) looks like this: M_247721_956656.

Traditional map identifiers based on map, block, lot, or equivalent will not disappear anytime soon. However, an ID for linking maps and assessing data that does not depend on map-derived information is simpler and easier to maintain; for example, it would not be impacted by a decision to change your map grid layout. Developing applications that link assessor maps and data is also easier with a standardized ID. New LOC_IDs can be produced without knowing anything about the underlying mapping such as map, block, or lot numbers. A reliable process for creating new LOC_IDs is detailed below.

The TaxPar Feature Class

This feature class (FC) (MxxxTaxPar) contains polygons or multi-part polygons, each of which links to one or more assessor tax records (unless it is a polygon for which a tax record does not exist, i.e. public right-of-way, most water features, etc.). The POLY_TYPE attribute of this FC identifies each polygon as to what type of parcel it represents. Most polygons will be classified as “FEE” which refers to “fee simple” ownership. Polygons classified as “TAX” are discussed below. Typically, only “FEE” or TAX” polygons link to an assessing record

Valid values (the domain) for POLY_TYPE are FEE, TAX, ROW, PRIV_ROW, RAIL_ROW, and WATER

Polygons classified as “WATER” only appear in this FC if they participate in defining the boundaries of a parcel. Water polygons that are entirely within a parcel polygon are placed in the Misc FC or eliminated altogether in favor of a separate “water features” data layer.

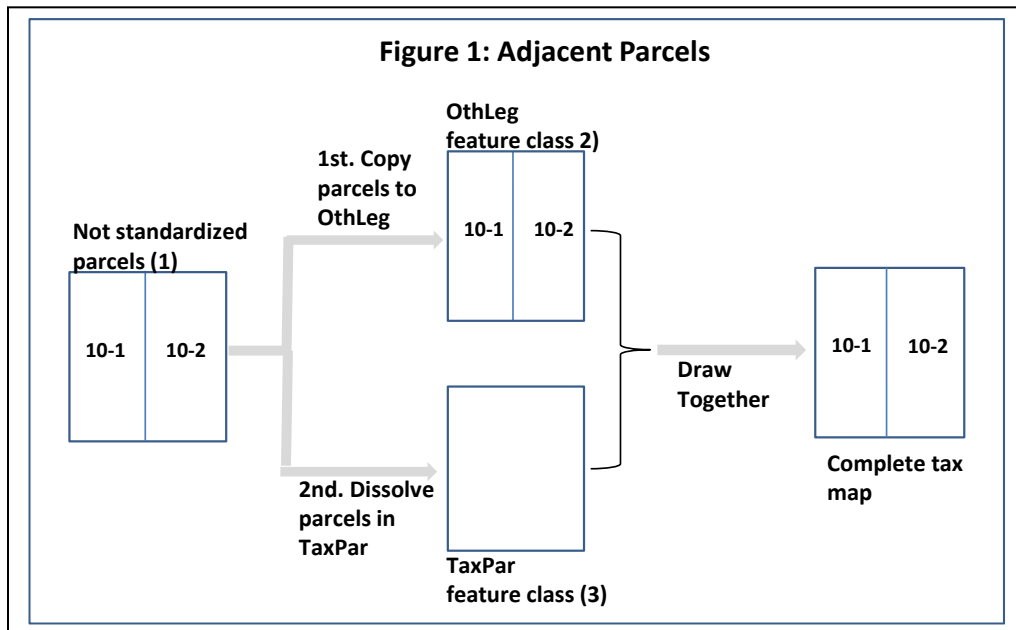
In most communities, polygons in TaxPar classified as POLY_TYPE = "TAX" are a small minority of all parcels, if they exist at all. When they exist, it is because of two situations where more than one polygon on the map is associated with a single assessor record. One goal of the parcel standard was eliminating these situations, because they complicate managing the data in a GIS. Classifying some parcel polygons as "TAX" parcels was part of achieving that goal, as explained below.

In the first situation (see Figure 1, below; the notes are in a text box on the next page) two or more contiguous parcels have common ownership but only one of the parcels will join to an assessor record. ** In these cases, the assessor typically maintains a single tax record (i.e., sending a single tax bill) for all these properties, either as a convenience to the assessor or to the property owner. This standard requires that:

- a) The parcels involved are copied to the OthLeg feature class (along with their map ID which goes into the MAP_PAR_ID attribute).
- b) In OthLeg these polygons are identified in the LEGAL_TYPE attribute as "FEE" polygons and they must also have their attribute TAX_LOC_ID updated to contain the LOC_ID of the corresponding "TAX" parcel in the TaxPar FC.
- c) In TaxPar, the internal boundaries of these parcels are dissolved; this creates a single polygon corresponding to the single assessor tax record. The POLY_TYPE attribute is also set to "TAX" and the MAP_PAR_ID attribute is set to null (because this information is likely different for the constituent parcels and is now carried as an attribute of those parcels in the OthLeg feature class). Other attributes are updated as noted in the standard.

*** Actually, the combined information in the single assessing record may be for a "land parcel" or "condo main" parcel. In that case, in the assessor database, 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 parcels that will be combined to create a "TAX" parcel are copied (along with their map ID) to the OthLeg feature class. This makes it possible to create a tax map showing boundaries for the deeded parcels and so that all parcel identifiers can still appear as labels on the map.



The second situation (see Figure 2, below) is where two or more non-adjacent parcel polygons share common ownership, link to a single tax listing, AND have different map IDs². Common examples are town-owned parcels or parcels split by a road but owned by the same person and described on one deed. The standard requires that:

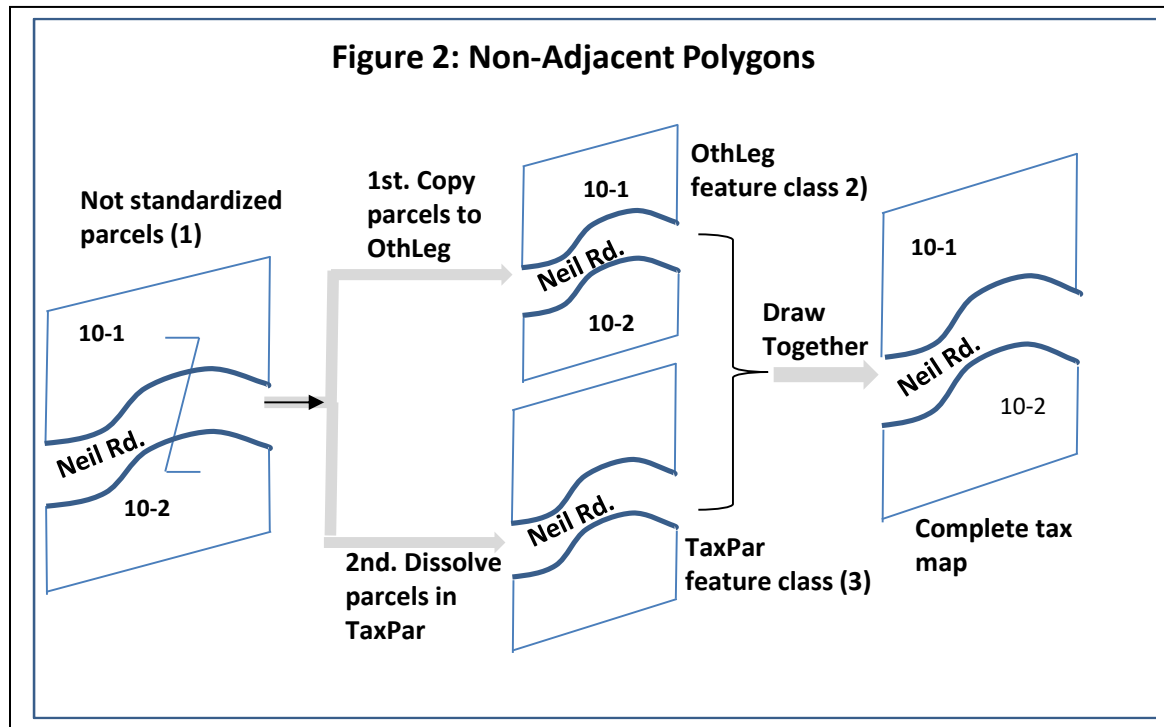
- a) The parcels are copied to the OthLeg feature class (along with their map ID which goes into the MAP_PAR_ID attribute)
- b) Once in OthLeg, the parcels are identified in the LEGAL_TYPE attribute as "FEE" polygons and they must have their attribute TAX_LOC_ID updated to contain the LOC_ID of the corresponding "TAX" parcel in the TaxPar FC
- c) In TaxPar these polygons are then converted to a multi-part polygon. Each multi-part polygon links to one (or multiple if condominiums are involved) assessor tax listings.

Notes for Figures 1 and 2:

1. Two lots, same owner; Only lot 10-1 links to assessing record which has combined information for both lots
2. Two original polygons, LEGAL_TYPE = FEE
3. Single LOC_ID links to one assessing record, POLY_TYPE = TAX

² If two geographically separate polygons have the same map IDs and should be linked to the same tax listing, then a one-to-one relationship with the tax record can be established by converting them to a multi-part polygon.

d) In TaxPar the multi-part polygon is identified in the POLY_TYPE attribute as "TAX".



The multi-part polygons have a single LOC_ID that links them to the corresponding tax listing; no polygons need to be copied to the OthLeg feature class.

Because of these two situations, if you want your assessor map to show all deeded parcels using standardized data you need to draw both TaxPar and OthLeg together. Also, as you probably still want to label all parcels on the map, you will need to do map ID labeling twice, once for TaxPar and once for OthLeg, in both cases based on the MAP_PAR_ID attribute. Note that you will need to draw both feature classes anyway if you want to show easements and other features in the OthLeg feature class.

The OthLeg Feature Class

This feature class (MxxxOthLeg) contains polygons representing other legal interests in land. Polygons in OthLeg overlay all or parts of one or more polygons in TaxPar. As discussed above, these other legal interests (LEGAL_TYPE attribute) include polygons classified as "FEE" ("fee simple") property parcels corresponding to combined parcel polygons ("TAX" parcels) described above in the TaxPar feature class. Other legal interests in this feature class include various types of easements.

Valid values (the domain) for both the LEGAL_TYPE and the MISC_TYPE attributes are extensible, provided the additions are added to the MxxxLUT discussed below.

The Misc Feature Class

This feature class (MxxxMisc) contains map features from the assessor parcel maps not accounted for in the other feature classes. This feature class is where map features the assessor expects to see, such as water, wetlands, traffic islands, etc., can be stored; the polygon classification is recorded in the MISC_TYPE attribute.

The Assess Database Table

This table is a standard extract from the assessor database containing about 25 elements (See Appendix A) including property valuation, site address, state use code, owner, owner address, and a selection of information about the first (usually the primary) structure record linked to each parcel. This table includes the FY (fiscal year) field, which stores the vintage of the assessed value of the parcel. Also included in this extract is the assessing database field containing the LOC_ID. All the major vendors of computer assisted mass appraisal (CAMA) software in Massachusetts (PK Systems, Patriot, Tyler, Vision) provide “MassGIS extract” report; if you or your assessor are unaware of this new report, contact the CAMA software provider’s customer service and request that this extract be added to their standard report choices.

A key benefit of the standardized mapping specification is the very high match rates required between the map and the assessing database extract and vice versa. You can preserve this benefit by making sure to provide your assessor with a LOC_ID “change list” whenever you complete your annual map update. Doing this will help ensure that LOC_IDs remain up to date in the CAMA database.

A “LOC_ID change list” is a two-column table that includes the map or parcel ID for each new or changed parcel and its corresponding LOC_ID.

The MxxxLUT

This is a look-up table for the MISC_TYPE attribute of the Misc feature class and the LEGAL_TYPE attribute of the OthLeg feature class. The domain for these two attributes is extensible provided new domain values are included in this look-up table.

The MxxxUC_LUT

This is a look-up table for the state use codes found in the assessing extract and other custom codes that may be used by the assessing office.

Updating Standardized Parcel Data

Many communities have developed digital parcel files for use in GIS. These files have typically placed all the parcel polygons into a single shape file or ESRI feature class. This is largely true in the MassGIS standard, with almost all parcel polygons being stored in the TaxPar feature class. So, when you have updates to make, you will most likely be editing TaxPar. The standardized parcel data does have topology rules (no gaps, no slivers). Editing while maintaining these topology rules requires either an ArcGIS Standard (formerly ArcEditor) or Advanced (formerly ArcInfo) level of software license. HOWEVER, at the ArcGIS Basic (formerly ArcView) level you can use map topology to make sure you don’t

MassGIS has developed a Python program that checks parcel data for compliance with the standard. Anyone is welcome to request this program which comes with instructions on how to set it up. This program runs using an ArcGIS Basic (ArcView) license, although it will skip some checks if you do not use it with an ArcGIS Standard or Advanced license. Request this QA tool by sending email to massgismail@mass.gov

introduce gaps or slivers. See the ArcGIS help topic “About Creating a Map Topology” for more details³.

Editing Geography

Perform your map edits as you would have before. As noted in the above paragraph, parcel polygons will mostly be in the TaxPar feature class but will occasionally involve parcels in the OthLeg feature class; if easements, private rights-of-way, and conservation restriction polygons (and some other less common features) are elements on your parcel map, they are maintained in the OthLeg feature class.

Editing Attributes

When editing either the TaxPar or OthLeg feature classes, there are attributes that you will need to maintain; some of them you may already maintain except they have different names. Most of the attributes used in the standardized data are easy to understand by looking at the standard; in particular, see Appendix A (included at the end of this document) and explanations in the parcel standard. Reading the definitions for selected items in the standard may also be useful. Note that some attributes have a list of valid values (a domain) that must be used. As noted above, the valid values for both the LEGAL_TYPE attribute in the OthLeg FC and the MISC_TYPE attribute in the Misc FC can be extended.

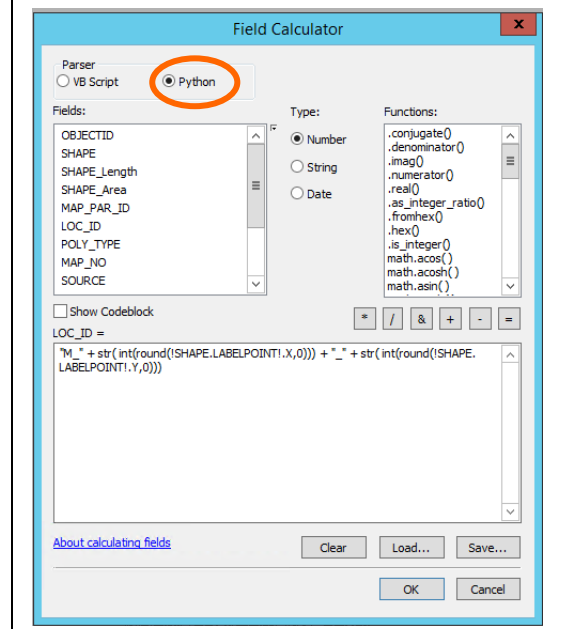
All polygons in the TaxPar feature class must have a LOC_ID, even if they do not link to an assessing record.

Maintaining the LOC_ID Attribute

The LOC_ID has two parts, the letter identifying the units of the coordinate from which the ID is drawn (either “M” or “F”, for meters and feet, respectively) and the unique number developed from an X,Y coordinate pair inside the parcel. For example, M_241942_938482. The numeric portion is developed using the integer portion of the X and Y coordinate values. Here’s how to produce new LOC_IDs (same process works in both ArcMap and AcrGIS Pro):

1. Select all newly created or edited polygons, whether they link to an assessor record or not.
2. Open the attribute table and display only the selected records. **BE SURE YOU ONLY HAVE SELECTED THE POLYGONS IN TAXPAR FOR WHICH YOU NEED A NEW LOC_ID, otherwise you may change existing LOC_IDs, thus breaking the link to the assessing data.**
3. Right mouse-click on the LOC_ID column name and choose Field Calculator.
4. At the top of the interface (See Figure 3), change the parser radio button choice to “Python”.

Figure 3: Field Calculator



³ MassGIS has produced documented use of map topology in parcel mapping in its “GuideToEditingSharedFeatures_Ver3”. Send email to massgismail@mass.gov if you are interested in receiving this document.

5. Copy or type the following string of Python code into the field calculator as-is (be careful not to introduce leading or trailing blanks):

```
"M_" + str( int(round(!SHAPE.LABELPOINT!.X,0))) + "_" + str( int(round(!SHAPE.LABELPOINT!.Y,0)))
```

If your parcel data's coordinates are in state plane feet, then edit the above string, replacing the "M" at the beginning with "F". (You should be able to copy and paste this string).

6. Click on "OK" and the LOC_ID field for the selected parcels will be updated. You MUST then provide the assessor with a "change list" consisting of the MAP_PAR_IDs and their corresponding LOC_IDs for the new or edited parcels. The assessor will use this list to update the corresponding new or altered tax listings. You should provide this information to your assessor as a digital document (spreadsheet, text file, etc.) such that they can copy and paste the new LOC_IDs from that document into their CAMA software interface; this will cut way down on data entry errors.

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 in Assessor Data Table					
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

Fields In Look-Up Table					
FIELD NAME	TYPE	SIZE		EXPLANATION	Null Allowed?
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
FIELD_NM	C	10		Specifies field (LEGAL_TYPE or MISC_TYPE) in which code is used	NO
CODE	C	20		Code for LEGAL_TYPE or MISC_TYPE code	NO
CODE_DESC	C	80		Definition of the code	NO
Fields In Use Code Look-Up Table					
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
USE_CODE	C	4		Code from CAMA database	NO
USE_DESC	C	150		Definition of the four character code	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.