Mapping and Analysis of Privately-Owned Structures along the Massachusetts Shoreline

Appendix B – Structure ID Generation

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1 Introduction

A unique identifier, known as the structure ID, was required for each coastal structure. To maintain consistency with the format of previous phases of the Massachusetts Coastal Infrastructure Inventory and Assessment Project, the structure ID was based on the nearest tax parcel. The first 12 digits of the ID string correspond to a combination of the town, map, block, and lot number for the nearest parcel. An incrementing number was appended to the end of this string to ensure the ID was unique for cases where multiple structures occur on the same tax parcel.

2 Methodology

A significant amount of data preparation was required in order to create the structure ID. The complete process is described below:

1. Tax parcel GIS data for all municipalities in the project area (Table 1) were downloaded from the Massachusetts Office of Geographic Information (MassGIS) website (http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/). Although each town is responsible for creating and maintaining their own parcel data, MassGIS has established standards for parcel data with which towns are encouraged to comply. There are now 3 levels of parcel standards, the most stringent being Level 3. The format of the parcel data is different for each standard level, and needs to be processed differently in order to generate structure IDs. Table 1 also lists the standard level of parcel data for the towns included in this project. Tax parcel GIS data were downloaded for each town as a shapefile. Level 3 datasets also included an assessors table containing information about the address and parcel owners.

   Although parcel data for the town of Newbury was not available through MassGIS, tax maps were located on the town's website. Given the relatively few structures located in Newbury, the parcels were examined manually.

Table 1. List of towns within the project area, along with the town ID and current parcel standard level.

ID	Town	Level
20	BARNSTABLE	3
30	BEVERLY	0
35	BOSTON	0
36	BOURNE	3
41	BREWSTER	3
55	CHATHAM	3
62	CHILMARK	3
65	COHASSET	3
72	DARTMOUTH	0
75	DENNIS	3
82	DUXBURY	3
86	EASTHAM	3
89	EDGARTOWN	3
94	FAIRHAVEN	2
96	FALMOUTH	3
104	AQUINNAH	3
107	GLOUCESTER	0
109	GOSNOLD	3
126	HARWICH	3
131	HINGHAM	3
142	HULL	3
144	IPSWICH	3
145	KINGSTON	3
163	LYNN	0
166	MANCHESTER	0
168	MARBLEHEAD	0
169	MARION	3
171	MARSHFIELD	0
172	MASHPEE	3
173	MATTAPOISETT	0
196	NAHANT	0
197	NANTUCKET	0
201	NEW BEDFORD	3
206	NEWBURYPORT	3
206	NEWBURY	n/a
221	OAK BLUFFS	3
224	ORLEANS	3
239	PLYMOUTH	3
242	PROVINCETOWN	3
243	QUINCY	3
248	REVERE	3
252	ROCKPORT	0
254	ROWLEY	0
258	SALEM	3
259	SALISBURY	0
261	SANDWICH	3
264	SCITUATE	3
291	SWAMPSCOTT	3
296	TISBURY	3
300	TRURO	3
310	WAREHAM	3
318	WELLFLEET	0
327	WEST TISBURY	3
334	WESTPORT	3
336	WEYMOUTH	3
346	WINTHROP	3
351	YARMOUTH	3

2. While all tax parcel data include some form of parcel ID (typically consisting of a map, block, and lot/parcel number), each town has their own system and format. For example:
    - Several towns do not use a block number.
    - A variety of delimiters are used for separating the parcel ID (hyphen, forward slash, period, spaces, no spaces).
    - Some parcel ID formats included extra characters that are not a map, block, or lot number.

    In order to create structure IDs using this information, each town's parcel ID format was examined. The portions of the parcel ID that corresponded to the map, block, and lot number were then extracted. Table 2 presents examples of different parcel ID formats and their segmenting for the required structure ID information.

Table 2. Examples of how Parcel IDs were separated to map, block, and lot numbers.

Parcel ID	Map #	Block #	Lot #
064-043-017	064	043	017
26-114	026	000	114
013.0.002	013	000	002
10/ 1/ 143/ /	010	001	143
1310110000000120	011	000	012
53_9A_0	053	000	09A

3. Records for non-parcel data such as roads, water bodies, and right-of-ways were removed from each town's parcel layer prior to analysis. This was done on a town by town basis since the criteria for removing these parcels was different for each town. Any parcel records that did not contain a parcel ID were also removed.

4. The parcel datasets for each town were merged together. Because of differences in formatting between the different standard level datasets, only the following attributes were maintained in the final parcel dataset:
    - CommunitNo – town number (as listed in Table 1)
    - MapNo – map number
    - BlockNo – block number
    - ParcelNo – parcel/lot number
    - Town – town name
    - SiteAddress – address for parcel.

    For Level 3 parcel data, the address was taken from the Assessors table included with the parcel shapefile. The parcel layers for the other levels included this field although not all parcels were attributed with an address (for example, none of the parcels in the town of Fairhaven included an address).

5. To associate structures with parcels, the mid-point of each linear structure was determined and saved as a point layer.

6. About 30% of the structure mid-points do not fall on a parcel. This is primarily occurs because many coastal structures extend seaward of the shoreline, while parcel boundaries commonly end at the shoreline (see Figure 1).

Figure 1. Example of structure mid-points that do not fall within a parcel.

For this reason, structure mid-points were associated with the nearest parcel. A 50 meter threshold was used to prevent assigning structures to distant (potentially invalid) parcels. Of the approximately 230 structures outside of the 50 meter threshold, most were located in areas that did not have any useful parcels (no parcel ID). The largest portion of these occurred in the town of Gosnold (no parcels with IDs) and some of the smaller Boston Harbor islands.

7. Because a structure ID was still required for structures with no nearby parcel data, the parcel ID segments were set as follows:
    - CommunitNo – town number where structure is located
    - MapNo – “000”
    - BlockNo – “000”
    - ParcelNo – “000”

8. With the community number, map number, block number, and parcel number assigned to each structure, the structure number was determined in order to finalize the structure ID. For structures that have the same community number, map number, block number, and parcel number (same nearest parcel), the structure number was set using an incrementing number (i.e. 001, 002, 003…). For all other structures, the structure number was set to "001".

9. The final structure ID was set by concatenating all parts (community, map, block, parcel, and structure number). Each section was separated with a hyphen, as shown in Table 3.

Table 3. Example of concatenated structure IDs.

Community #	Map #	Block #	Parcel #	Structure #	Structure ID
096	064	043	017	001	096-064-043-017-001
096	064	043	017	002	096-064-043-017-002
109	000	000	000	001	109-000-000-000-001
252	010	001	143	001	252-010-001-143-001