

CENSUS ADDRESS ONTOLOGY

What is an Ontology?

An ontology defines a common vocabulary for users who share information. This logic-based organizational structure for knowledge includes definitions and relations among categories of information.

What is the benefit of establishing an ontology for address data?

- To encourage effective communication and ease the burden of data sharing by establishing a standard language for the common understanding of address information and its structure.
- To make terminology, concepts, and relationships explicit.
- To allow for the discovery and comparison of relevant partner address information

Background

As part of the Geographic Support System Initiative (GSS I), the Geography Division has committed to maintaining an up-to-date address list to support current censuses and surveys throughout the decade. In the past, the Master Address File (MAF) was updated primarily through biannual Delivery Sequence File (DSF) updates from the USPS and field work. Moving forward, the emphasis for updates is placed on developing partnerships with local, state, and tribal governments. This ontology will provide a shared language to help ease the burden of data sharing between disparate databases.

According to the FGDC Address Standard, “an address specifies a location by reference to a thoroughfare or a landmark; or it specifies a point of postal delivery.” The U.S. Census Bureau conforms to these two separate but related views of an address. An address may be used as a location address and/or a mailing address. A location address is used to physically locate the structure on the ground. A mailing address is what the USPS uses to distribute mail to the occupants of the structure.

Addresses vs MAF units vs. MAF Structure Points (MSPs)¹

Within the MAF, three different categories of information, addresses, MAF units, and MSPs, are linked together. The address category includes data about the actual address such as house number, street name, and zip code. The address guidelines for these data elements has been outlined by the Address Coverage and Sources working group as part of the GSS I. These guidelines specify the minimum address data needed to support receipt of data from partners,

¹ This document outlines the “ideal” data collected and maintained in the MAF. It should be noted, this is not the current situation. While the general statements hold true, there may be many unique circumstances and exceptions in the MAF.

locating an address on the ground, and mailing to an address. (See REC-2011-016 for stateside addresses and REC-2011-18 for Puerto Rico addresses attached).

The MAF unit category contains data about each individual unit. These data elements include unit class and unit type. These are observable data elements and there may be multiple units within a structure (i.e. in an apartment building). This ontology defines each of the data types possible for the MAF unit class.

The MSP category contains the coordinate data that locates the structure on the ground. Each structure may contain multiple MAF units (i.e. an apartment building). In addition to the coordinates, this category contains structure type and structure use data elements. There may be multiple versions of the physical location for each MSP record. There may be both a manual and a GPS location but in these cases, one location is designated as the preferred location.

Facilities

A facility is a new level of organization (an “umbrella” record) that is a link between an individual MAF Unit and a place entity. A facility contains one or more MAF Units that share a common named location. The facility can be completely contained within a single structure or cover an area with many structures. The facility can contain residential and non-residential MAF Units, whether the units are GQs or individual units. The facility serves as a link between MAF Units at a named location, where available and/or required. An example of a facility is “University of Maryland”. The MAF Units linked to the facility record would contain dormitories, classroom buildings, campus stores, etc.

Data Relationships

An address is linked to a MAF Unit. This is a N:1 relationship. The address record contains the data about the actual address while the MAF unit contains the data about the unit type. Each MAF Unit is linked to one preferred MAF Structure Point (MSP). This is a 1:1 relationship. However, a MSP can be linked to multiple MAF Units (1:N relationship). This would be the case where there is one MSP for an apartment building. Each unit within that building is linked to the same MSP. It is also important to note that while a single address is linked to a single MAF Unit, there may be multiple versions of the address in the address data record. An example of this would be Route 1, Apt A, 11011 could also be denoted as 101 Main St, Apt A, 11011, both representing the same location on the ground. See Figure 1.

The facility record is linked to one or more MAF Units. This is a 1:N relationship. See Figure 2.

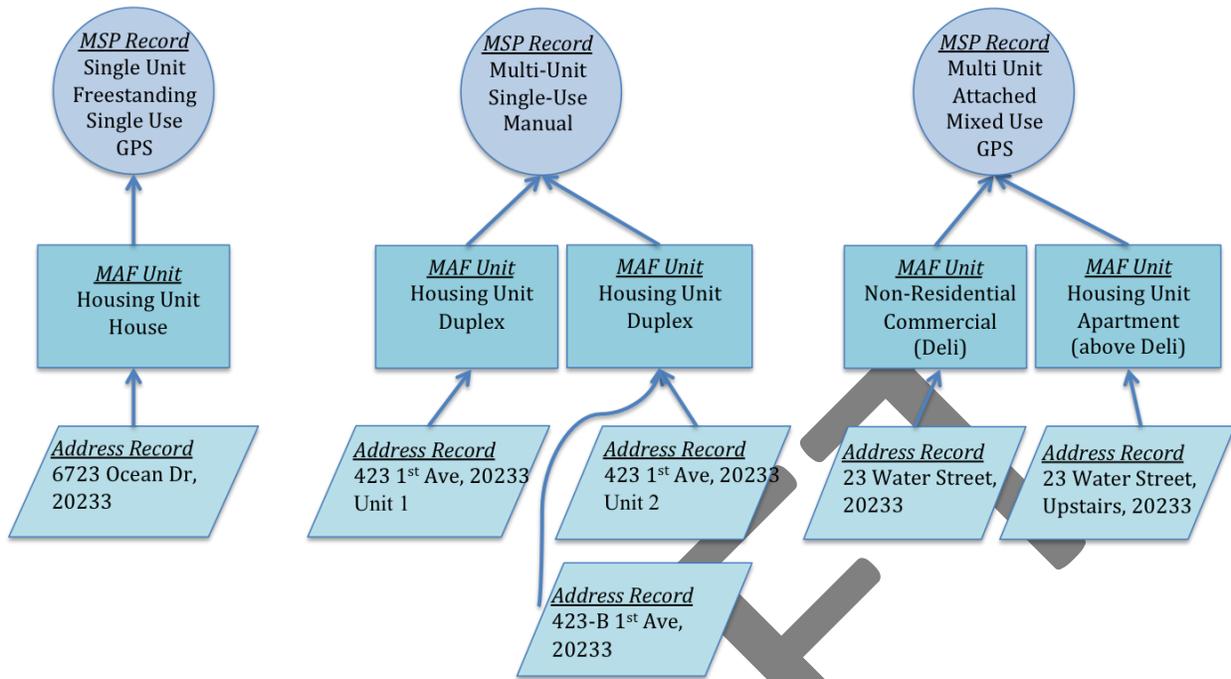


Figure 1. Address data relationships

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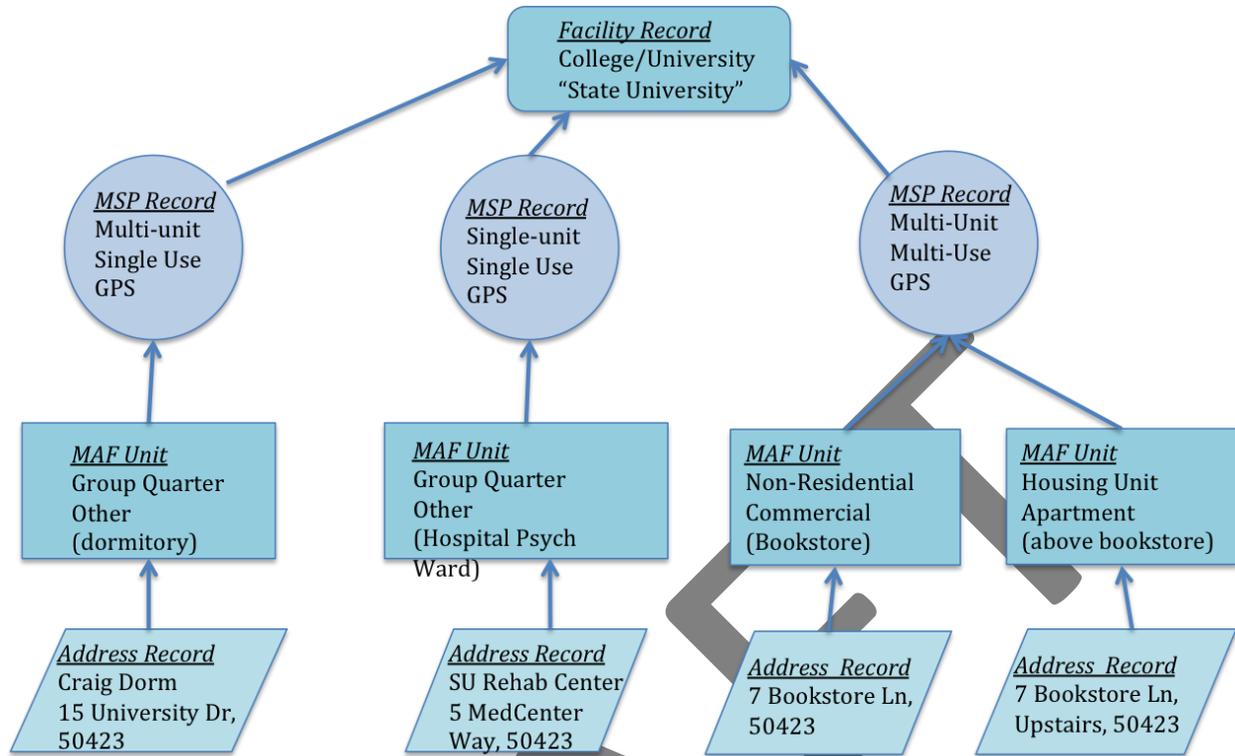


Figure 2. Facility data relationships

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Data Elements

The following sections outline the data elements associated with each category of data covered by the Census Address Ontology: MAF Units, MSPs, and Facilities.

MAF Unit Data Elements

1. Unit Class

- a. Housing unit– a unit where a person lives or is intended to live.
- b. Non-Residential- a unit that can be used for commercial, public, industrial, and/or community activities where users do not live in the unit.
- c. Group Quarter - an institutional or non-institutional place where people live or stay that is normally owned or managed by an entity or organization providing housing and/or services for the residents. These services may include custodial or medical care as well as other types of assistance, and residency is commonly restricted to those receiving these services. People living in group quarters are usually not related to each other. Group quarters include such places as college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, correctional facilities, dormitories, and facilities for people experiencing homelessness. Each GQ would be linked to the appropriate facility record.
- d. Transitory Unit - a living quarter inside a transitory location where occupants live or stay most of the time. Each TU would be linked to the appropriate facility record. Examples of transitory units include, but are not limited to, units within RV parks, marinas, and campgrounds.

2. Unit Type²

- a. House - A free-standing structure containing a unit serving or intended to serve as living quarters
- b. Apartment – a unit within a structure containing multiple such units that share an exterior entrance
- c. Rowhouse/Townhouse -usually a single unit that is connected to a similar unit by a common sidewall or floor/ceiling
- d. Duplex - a 2- unit structure with separate exterior entrances to each unit
- e. Trailer - a dwelling unit built on a steel frame and fitted with wheels that is intended to be hauled to a usually permanent site
- f. Boat/Ship - a vessel for travel on water
- g. Commercial - a place of business, not intended for living quarters
- h. Industrial - a unit that creates products which are not intended for retail sale from the unit

² It is important to note that this includes a to-be-determined codeset. Exclusion or misclassification of these data elements will not negatively impact the core work of the geographic programs. Instead, the inclusion of these elements will allow for more robust analysis of the MAF data and act as improved inputs to future models and analysis.

- i. Governmental - a unit that contains the administrative, support, and/or service facilities owned or managed by a governmental organization.
- j. Unconventional - a unit that is hard to identify or is not obvious as a separate unit
- k. Other

MSP Data Elements³:

- 1. Structure Type²
 - a. Single Unit Freestanding – A stand-alone structure with a dedicated external access point to only one unit.
 - b. Single Unit Attached – A structure that is attached to one or more units with multiple external accesses but each access is to one unit only
 - c. Multi-unit - A structure that has shared external access to multiple residential or non-residential units.
- 2. Structure Use²
 - a. Single Use – An MSP/structure that contains all residential or all non-residential units
 - b. Mixed Use – An MSP/Structure that contains both residential and non-residential units
- 3. Preferred coordinates
 - a. GPS
 - b. Manual

Facility Data Elements:

- 1. Facility Type^{2,4}
 - a. Correctional facility
 - b. Group Home
 - c. Nursing Home
 - d. Assisted living
 - e. Hospital
 - f. College/University
 - g. Military
 - h. Port (Non-Military)/Marina
 - i. Mall
 - j. Retail Center
 - k. Industrial Park
 - l. Apartment Complex
 - m. Sports Complex (Stadiums/Raceways/Arenas/etc.)
 - n. Government Center
 - o. Recreational/seasonal/resort
 - p. Other
- 2. Facility Name

³ To date the GPS collection standards have not been implemented. When implemented, the MSP data category may be affected.

⁴ This is not an inclusive list. More types can/will be added when needed.

Ontology Examples

The following are examples of using the Census Address Ontology data categories and elements to classify data. This is not an exhaustive list, rather a broad overview of possible classifications.

Single family house

Unit class = Housing unit

Unit type = House

Structure type = Single unit freestanding

Structure use = Single use

ABC apartments

Unit class = Housing unit

Unit type = Apartment

Structure type = Multi-unit

Structure use = Mixed use

Facility type = Apartment complex

Facility name = ABC Apartments

ABC Apartments (Coffee shop at the first level)

Unit class = Non-residential

Unit type = Apartment

Structure type = Multi-unit

Structure use = Mixed use

Facility – Apartment complex

Facility name = ABC Apartments

Condominium (within an apartment like structure)

Unit class = Housing unit

Unit type = Condo/Townhouse

Structure type = Multi-unit

Structure use = Single use

A Unit in a Condominium Complex

Unit class = Housing unit

Unit type = Condo/Townhouse

Structure type = Single Unit Attached

Structure use = Single use

Apartment above the pizza place

Unit class = Housing unit

Unit type = Apartment

Structure type = Multi-unit

Structure use = Mixed use

Pizza place

Unit class = Non-residential
Unit type = Commercial
Structure type = Multi-unit
Structure use = Mixed

Marina

Unit class = Transitory Unit
Unit type = Boat
Structure type = Single Unit Free Standing
Structure use = Single use
Facility Type = Port/Marina
Facility Name = Waterview Marina

Store in the Marina

Unit class = Non-residential
Unit type = Commercial
Structure type = Multi-unit
Structure use = Mixed use
Facility Type = Port/Marina
Facility Name = Waterview Marina

Living quarter in the Marina

Unit class = Housing unit
Unit type = Apartment
Structure type = Multi-unit
Structure use = Mixed use
Facility Type = Port/Marina
Facility Name = Waterview Marina

Nursing home (GQ)

Unit class = Group quarters
Unit type = Apartment
Structure type = Multi-unit
Structure use = Mixed use
Facility Type = Nursing home
Facility Name = Heart Homes

Medical equipment store in the (Nursing home)

Unit class = Non-residential
Unit type = Commercial
Structure type = Multi-unit
Structure use = Mixed use
Facility Type = Nursing home
Facility Name = Heart Homes

State Elderly Affairs Office in the Nursing home

Unit class = Non-residential
Unit type = Government
Structure type = Multi-unit
Structure use = Mixed use
Facility Name = Heart Homes

University Residence Hall unit

Unit class = Group Quarter
Unit type = Apartment
Structure type = Multi-Unit
Structure use = Single use
Facility type = University
Facility Name = U of A

Hall Director apartment unit within a University Residence Hall

Unit class = Group Quarters
Unit type = Apartment
Structure type = Multi-Unit
Structure use = Single use
Facility type = University
Facility Name = U of A

Basement apartment

MAF Unit Class - Housing unit
MAF Unit Type - Unconventional
MSP Structure Type - Single Unit Attached
MSP Structure Use - Single use

Disney Dream cruise ship

MAF Unit Class - Group Quarter
MAF Unit Type - Other
MSP Structure Type - Multi-unit
MSP Structure Use - Mixed use
Facility Type - Recreational/seasonal/resort
Facility Name - Disney Dream

Talledega Raceway infield RV pad

MAF Unit Class - Transitory Unit
MAF Unit Type - Other
MSP Structure Type - Multi-unit
MSP Structure Use - Mixed use
Facility Type - Sports Complex
Facility Name - Talledega Raceway

Vista Way (Worker Dorms at Walt Disney World)

MAF Unit Class - Group Quarter
MAF Unit Type - Apartment
MSP Structure Type - Multi-unit
MSP Structure Use - Single Use
Facility Type - Other
Facility Name - Vista Way

Edgar Thomson Plant - U. S. Steel Mill

MAF Unit Class - Non-residential
MAF Unit Type - Industrial
MSP Structure Type - Multi-unit
MSP Structure Use - Single use
Facility Type - Industrial Park
Facility Name - Mon Valley Works

Sears in the mall

MAF Unit Class - Non-residential
MAF Unit Type - Commercial
MSP Structure Type - Multi-unit
MSP Structure Use - Single use
Facility Type - Retail Center
Facility Name - St Charles Towncenter

Military Housing (Officers)

Unit class = Housing unit
Unit type = Governmental
Structure type = Single-unit freestanding
Structure use = Single use
Facility type = Military
Facility = AB Army Base

Military Barracks

Unit class = Group quarters
Unit type = Governmental
Structure type = Multi-unit
Structure use = Single use
Facility type = Military
Facility = AB Army Base

Military Vessel (Ships)

Unit Class - Group quarters
Unit Type - Boat/Ship
Structure Type - Multi-unit
Structure Use - Mixed Use

Facility Type - Military
Facility Name - USS Census

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