INTRODUCTION

Street addresses are the location identifiers most widely used by state and local government and the public. Street addresses are critical information for administrative, emergency response, research, marketing, mapping, GIS, routing and navigation, and many other purposes. Because they have evolved over many decades, under the control of thousands of local jurisdictions, in many different record and database formats, and to serve many purposes, different address formats and types pose a number of complex geoprocessing and modeling issues. As a consequence, government agencies struggle with these issues as they seek to integrate large, mission-critical files into master address repositories.

Objective

The Street Address Data Standard provides, in four separate parts, data content, classification, quality, and exchange standards for street, landmark, and postal addresses:

- **Data Content** specifies and defines the data elements that may appear in or describe street, landmark, and postal addresses. This part also specifies and defines attributes of addresses and their components.
- **Data Classification** defines classes of addresses according to their syntax, that is, their data elements and the order in which the elements are arranged.
- **Data Quality** defines quality tests of address data accuracy, currency, lineage.
- **Data Exchange** describes how to exchange standardized address data between agencies and systems.

The standard has been created to meet the following objectives:

1. Provide a statement of best practices for street address data content and classification.
2. Provide standard terms and definitions of the content and applicability of an address dataset or data element, to reduce inconsistencies in the use and organization of address data elements.
3. Define standard tests and means of describing street address data quality and accuracy.
4. Provide a method for documenting the content of address information to facilitate address data exchange and offer a migration path from legacy formats to standards compliant ones.
5. Recognize, as a practical matter, that different users may require different levels of standardization.

Benefits of an Address Data Standard

The collection, storage, and management of address data are important components of everyday business activities in many organizations. Today, digital address data are a necessity throughout an address data management life-cycle, from system planning through application design, operations, and maintenance. Automating, sharing, and leveraging address data through a widely-accepted standard can provide a variety of benefits:

6. Reduction in time required to collect and manage address data across project phases, applications, and users.

- Exchange of street address data can be simplified through a single and flexible data structure
- Reduction of duplicative efforts creating lower production costs
- Applications can be developed more quickly by using existing standards-compliant data
- Resolution of address data inconsistencies is facilitated if the data are standards-compliant
- Improvement of address data quality through sharing and increasing the number of individuals who find and correct errors

Scope

This standard covers United States addresses that specify a location by reference to a thoroughfare, or a landmark; or that specify a point of postal delivery. There are four broad groups of address classes:

1. Thoroughfare addresses specify a location by reference to a thoroughfare. A thoroughfare in this context is a road or part of a road or other access route (walkway, railroad, or river) by which an address can be reached.
2. Landmark addresses specify a location by reference to a named landmark. A landmark is a relatively permanent feature of the natural or man-made landscape or seascape that has recognizable identity within a particular cultural context.
3. Postal delivery addresses specify points of postal delivery that have no definite relation to the location of the recipient, such as post office boxes, rural route boxes, etc. The USPS specifies each class in detail in USPS Publication 28.
4. General addresses contain all of the above classes, for those files in which the various classes are mixed together or for addresses whose class is unknown.

This definition does not attempt to describe or quantify the relationship between an address and a corresponding occupant. An addressee may have multiple addresses, and an address may have many occupants. For data processing purposes, address and addressee should be treated as separate entities, and defined by separate standards. In addition, the standard excludes electronic addresses, such as e-mail addresses.

The definition also excludes coordinate values. Coordinate values are an alternative way to specify location: coordinates specify locations by reference to a grid, spheroid, or geoid, and a datum. Coordinates require different data items and data processing operations, and therefore different standards. Within the context of this standard, coordinates are treated as attributes of street addresses, and, in the case of certain postal addresses, as inapplicable.

This standard applies to addresses only within the United States (including U.S. territories and outlying possessions.)

This Street Address Data Standard is fundamentally a data processing standard. It is not intended to be an implementation guide for the development of a standards-compliant address database.

Implementation rules can be established and maintained in various ways, and it is beyond the scope of the standard to provide guidance as to which way might be best under given circumstances. Subsequent to the acceptance of this standard, an implementation guide that concentrates on various data models, relationships, best practices, and implementation strategies should be developed as a companion to the standard.

Standards Development Procedure

This standard builds on the United States Postal Service (USPS) Publication 28, and on the Address Data Content Standard previously proposed by the Federal Geographic Data Committee (FGDC) (Public Review Draft, April 17, 2003).

The FGDC effort led the Urban and Regional Information Systems Association (URISA) to propose, with the support of the National Emergency Number Association (NENA) and the U.S. Bureau of the Census, the convening of a Street Address Standards Working Group to include representatives from a range of interested federal, state, regional, and local government agencies, the private sector, and professional associations. The proposal was accepted by the FGDC Standards Working Group on April 13, 2005. The draft standard is a product of the efforts of URISA and supporting organizations and individuals.

Maintenance Authority

The Census Bureau will maintain the standard as part of its duties as theme lead for the FGDC Subcommittee on Cultural and Demographic Data (SCDD), ensuring that the standard is revisited on the 5-year schedule as stipulated, or updating and revising as necessary.

Review and Comment Steps

1. Present first draft at the Street Smart and Address Savvy Conference (Austin, TX). **Complete**.
2. Post to URISA website for review & comment (www.urisa.org). **Complete**.
3. Synthesize comments. **Complete**.
4. Present revised draft at the URISA annual conference (Kansas City, October 2005). **Complete**.
5. Post revised draft to the URISA website for review & comment (www.urisa.org). **Complete.**
6. Second public review period. **Complete**.
7. Synthesize comments. ***Complete.***
8. Submit final draft to FGDC and formal public review. ***November 2006***.

DRAFT ADDRESS STANDARD

Part 1: Address Data Content

The content part of the street address data standard specifies and defines the data elements that may appear in or describe street, landmark, and postal addresses. The content part defines three types of elements: simple address elements, complex address elements, and address attributes.

Simple address elements are address components that are defined independently of all other elements. **Complex address elements** are formed from two or more simple or complex elements:

Element Type	Name	Example
Address Number	Address Number Prefix	**N6W2** 3001 Bluemound Road
	Address Number	**1234** North Main Street
	Address Number Suffix	123 **1/2** Main Street
	Separator Element	Eighth Street **and** Pine Street
	Complex Element: Complete Address Number	**27N4W305-A** County Road 45
	Complex Element: Address Number Range	**405-411** West Green Street
Street Name	Street Name Pre-modifier	123 **Old** North First Street
	Street Name Pre-directional	1234 **North** Main Street
	Street Name Pre-type	1234 **Avenue** A
	Street Name	1234 **Central** Street Southwest
	Street Name Post-type	1234 Central **Street** Southwest
	Street Name Post-directional	1234 Cherry Street **North**
	Street Name Post-modifier	1230 East End Avenue **Extended**
Occupancy	Occupancy Type	**Building** B, **Apartment** 6
	Occupancy Identifier	Building **B,** Apartment **6**
	Occupancy Element	**Building B**
	Private Mail Box	Rural Route 1 Box 12 **PMB 596**
	Complex Element: Complete Occupancy Identifier	450 Green Street, **Building B, Apartment 6**
Landmark Element	Landmark Name	**Statue of Liberty**
	Complex Element: Complete Landmark Name	**Suzallo Library, University of Washington**
Larger-Area Elements	Place Name	**New Hope Community** **Birmingham,** Alabama **Shelby County,** AL
	Complex Element: Complete Place Name	**Ajo**, **Pima County,** AZ 85321
	State Name	St. Louis, **MO**
	ZIP Code	Webster Groves, MO **63119**
	ZIP Plus 4	Webster Groves, MO 63119-**3212**
	Country Name	**United States**
USPS Postal Address Elements	USPS Box Type	**PO Box** 489
	USPS Box ID	PO Box **6943**
	USPS Box Group Type	**RR** 4, Box 10
	USPS Box Group ID	HC **28,** Box 34
	USPS General Delivery Point	**General Delivery,** Tampa, FL 33602
USPS Address Lines	*Complex Element: Complete Feature Address*	**1 Main Street**, Ajo, AZ 85321
	Complex Element: Place State ZIP	**Atlanta, GA 30316**

Address attributes provide descriptive information about an address, including geospatial information:

- Address ID
  - Address ID
  - Address UUID
- Address Coordinates
  - Address X Coordinate
  - Address Y Coordinate
  - Address XY Coordinate Reference System ID
  - Address Longitude
  - Address Latitude
  - Address Lat/Long Coordinate Reference System ID
  - US National Grid Coordinate
  - Address Elevation
  - Address Elevation Coordinate Reference System ID
- Descriptive Attributes
  - Address Classification
  - Feature Type
  - Address Lifecycle Status
  - Address Official Status
  - Address Anomaly Status
  - Address Z Level
  - Location Description
- Attributes Describing Specific Elements
  - Address Number Parity
  - Address Range Parity
  - Address Range Type
  - Element Sequence Number
  - Place Name Type
  - GNIS Feature ID
  - Complete Feature Address Type
- Address Scheme Elements
  - Address Scheme Name
  - Address Scheme Description
  - Address Scheme Origin
  - Address Scheme Axes
  - Address Scheme Extent
  - Complex Element: Address Scheme
- Address Lineage Attributes
  - Address Start Date
  - Address End Date
  - Dataset ID
  - Address Authority

Part 2: Address Data Classification

The standard classifies addresses according to their syntax, that is, their data elements and the order in which the elements are arranged. Syntax determines the record structure needed to hold and exchange the address, and often it is all we know about the addresses in a given file. Classifying addresses by syntax rather than by semantics (i.e. meaning) allows the users of the standard to focus on record structures, and to avoid making assumptions about what the address might reference "on the ground."

THOROUGHFARE ADDRESS CLASSES

A **thoroughfare** address specifies a location by reference to a thoroughfare. A thoroughfare in this context is a road or part of a road or other access route (such as a walkway, railroad, or river) by which an address can be reached.

- **Site:** 1230A North Main Street Extended
- **Landmark-Site:** City Hall, 410 Main Street
- **Intersection:** Seventh Street and D Street
- **Two Number Address Range**: 405-411 West Green Street, Flint MI 48502
- **Four Number Address Range:** TIGER file ranges (left low, left high, right low, right high, street name) are the most widely-used example of block ranges
- **Unnumbered Thoroughfare Address:** Fagaima Road, Nu'uli, AS 96799

LANDMARK ADDRESS CLASSES

Landmark addresses specify a location by reference to a named landmark. A landmark is a relatively permanent feature of the natural or man-made landscape or seascape that has recognizable identity within a particular cultural context.

- **Landmark Address:** Truth Hall, Howard University, Washington, DC 20059
- **Community (Urbanization):** 123 Urbanization Los Olmos, Ponce, PR 00731-1235

POSTAL DELIVERY ADDRESS CLASSES

Postal delivery addresses specify points of postal delivery which have no definite relation to the location of the recipient, such as post office boxes, rural route boxes, etc.

- **USPS Postal Delivery Box:** PO BOX 16943, New Orleans LA 70112
- **USPS Postal Delivery Route:** RR 2 BOX 152, Finleyville, PA 15032
- **USPS General Delivery Address:** General Delivery, Tampa, FL 33602-9999

GENERAL ADDRESS CLASS

The **general address** class handles all of the above classes, for files in which the various classes are mixed together. The feature address may have any syntax, but city, state, and ZIP are separated from the rest of the address.

- Holds addresses of any class:
    - Complete Feature Address
    - Place, State, ZIP, ZIP+4

This class supports general mailing and contact lists and it can provide a starting point for address parsing and classification. It also supports specialized profiles, for example, one based on USPS Publication 28. The general class provides a way to handle addresses that do not conform to any of the thoroughfare, landmark or postal classes, including non-US addresses.

Part 3: Address Data Quality

Data quality standards provide tests of the applicability and fitness of data for a given purpose. Existing standards (FGDC, ISO, SDTS) define seven basic dimensions of spatial data quality: dataset purpose and use, attribute (thematic) accuracy, logical consistency, completeness, positional accuracy, lineage, and temporal accuracy.

The data quality part of this standard provides a set of methods for applying spatial data quality standards to address data. It defines and describes tests for address elements, address attributes, and address classes, and it provides SQL pseudocode for each test. The tests include:

- Tests for Simple Address Elements
  - Does each value have the correct data type?
  - Does each value conform to its domain or range of values?
  - Conformance to spatial domain – does the address fall in the correct municipality, ZIP Code area, etc.?
- Tests for Complex Address Elements
  - Are the component elements assembled in the right order?
  - Does the street name in the address match to an authoritative street name list?
- Tests of Address Coordinates
  - Is each coordinate pair complete?
  - Is the address feature actually at the location indicated by the coordinates?
  - Do the XY, Lat-Long, and USNG coordinates equate to the same location?
- Tests of Other Address Attributes
  - Is every AddressID unique?
  - Is every Address Start Date <= its End Date?
  - Do the Address Start and End Dates conflict with the Address Official Status?
  - If the address status is "official," does the address have an Address Authority?
  - Has every Location Description been field-checked for accuracy?
- General Tests for Address Classes
  - Completeness: Does every addressable feature have an address?
  - In each class, is every address unique?
- Address Range and Situs Address Tests
  - Does every address range have a non-zero low and high value?
  - Is every address range low value <= its high value?
  - Do any ranges with the same complete street name (and parity, when relevant) overlap?
  - Are address ranges in the correct sequence along a thoroughfare?
  - Do address numbers increase with distance from the origin point or axes of the address schema?
  - Do the low and high numbers for each block-face range have the same parity?
  - Are the even and odd numbers in each block-face range on the correct side (right or left) side of the thoroughfare?
  - Does every intersection address name a pair of thoroughfares that actually intersect?
  - Does every situs address align spatially with the range that contains it?

Part 4: Address Data Exchange

OBJECTIVE AND BENEFITS OF THE EXCHANGE STANDARD

This part provides a template for the XML documents and metadata that will move addresses between systems, and it provides information on packaging and unpackaging street address data for exchange.

TYPES OF DATA EXCHANGE

The Address Standard is designed to both basic forms of data exchange:

- Monolithic, in which all records are in the exchange package.
- Transactional, in which the exchange package records include commands to add or remove a record from the local copy of all records.

The Standard supports both of these forms, using a slightly modified structure to enable transactional exchanges.

THE DATA EXCHANGE FORMAT WILL BE IN XML

XML was selected because:

- FGDC standards requires its use
- XML protects content producers and content consumers from changing data
- Field order is unimportant
- Missing fields don't prevent exchanges
- Extra fields don't prevent exchanges
- XML is extensible – users can add other information for specific purposes

DATA EXCHANGE PROCESS AND BENEFITS

Before exchanging address data, each data exchanger must first create export programs that convert its local, non-standardized address data to the standardized exchange format. Data export includes four steps:

- Undo localizations of data (standardize the data)
- Reparse data into one of the address classes
- Express data in the XML format of the Standard
- Prepare metadata describing the data being exchanged
- For data import, the steps are reversed, and the data exchanger must create import programs to convert standardized data to its local format.

Once created, these programs will suffice for all subsequent exchange partners, because all will be converting their data to and from a common standard. Address export/import programs need to change only when the standard or the local data model change - as opposed to the current need to create a separate program for each different exchange partner. By providing a single, flexible data structure for exchanging street address data, the Address Standard will simplify the implementation of data exchanges by making exchange programs more reliable and stable, and by minimizing the need for changes due to system and software upgrades.

EFFECT ON LOCAL ADDRESS DATA FORMATS

The Exchange part is intended to provide a medium for exchange, without requiring the local authority to make any change in its addressing practices or data structures. The Content and Classification parts provide a taxonomy for converting local addresses into standard elements, attributes, and classes. A recipient of data might choose to store the data differently, but it should memorialize the **official** form somewhere within its databases. If a recipient is distributing data from other address authorities, it should maintain and be able to reproduce the original taxonomy or parsing of addresses into elements.

For example, given an address such as:

- **225 North Avenue Northwest Atlanta GA 30318**

the Address Standard will allow the address producer to state that the word **North** is a street name, not a directional prefix. When stated by the addressing authority, the definition should be taken as authoritative and not altered.